

Digitalization and TVET:

Changes in industrial sectors due to digitalization and the disruption of traditional vertical organizations – consequences for white- and blue-collar workers – a Siemens example

GIZ online conference, September 8, 2021

Leading Questions

1 How is the industry developing in selected sectors due to the implementation of digitalization?

2 Is a massive change of traditional shaping of work organization taking place?

3 What are the consequences for occupational profiles and competencies of shop-floor workers and administrative staff?



Digital transformation is imperative for every industry

1

Industry



60%

of manufacturing tasks

can be automated, improving productivity, quality and safety.

Infrastructure



80%

of lifecycle costs

arise from operations. Digital technologies can unlock savings potential of up to 20%.

Mobility



20%

potential increase

in transport capacity through digital signaling technology without building additional infrastructure.

Healthcare



50%

of stroke-related defects

could be reduced by AI and digital twin technologies.

Source: McKinsey, BCG, Siemens Healthineers

Digitalization is changing our world quickly and dramatically

Digitalization



Involves a huge number of new possibilities/challenges

Enables industrial mass production for personalized products

Requires new skills from employees

Challenges for education and teaching



Keep pace with innovation
e.g. Convey Industrie 4.0
knowledge and additional skills

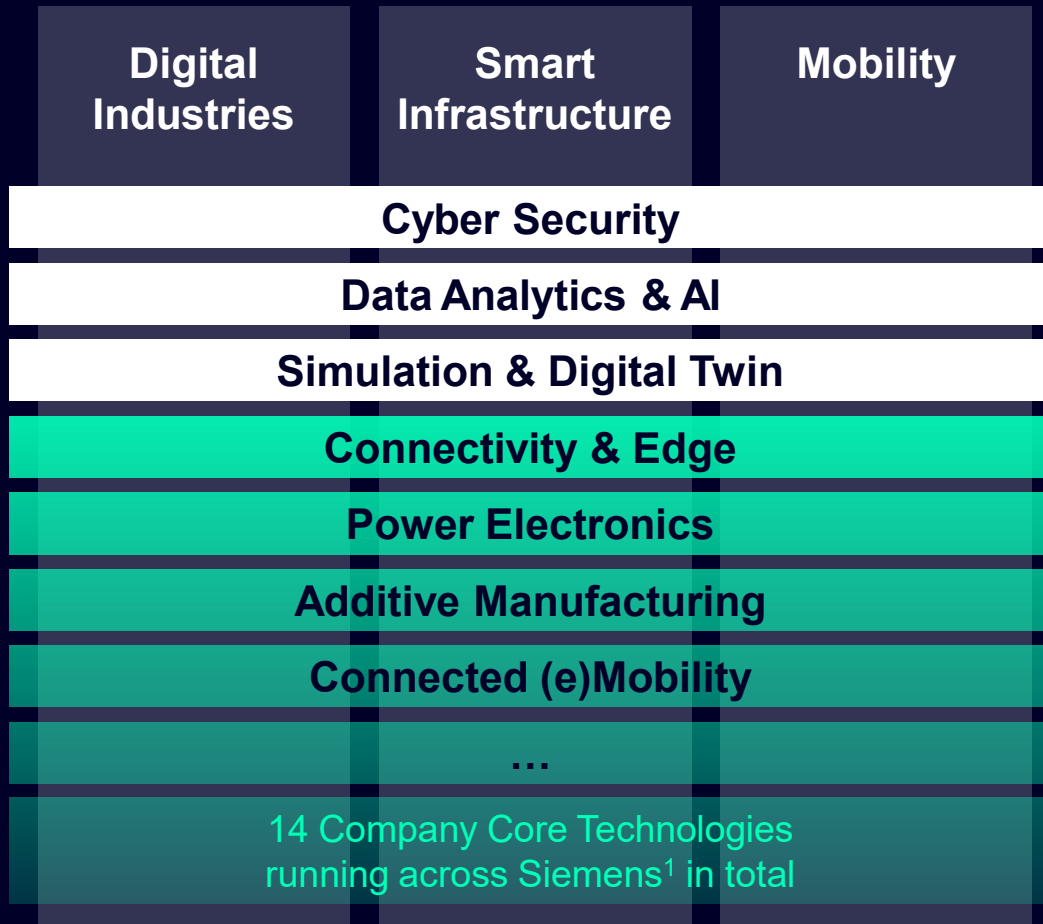
Video

Siemens – as the technology leader in automation engineering – supports educators on the way to Industrie 4.0



Siemens Core Technologies leveraged across all businesses

1



Product Public Key Infrastructure

Centrally hosted industrial PKI services to ease imprinting of manufacturer certificates during production and management of operational certificates (250,000 devices)

Machine Intelligence Core (MI Core)

MI Core engine provides generic code (e.g. industrial AI algorithms, pre-trained models, knowledge graphs) with use case specific extensions (60 use cases)

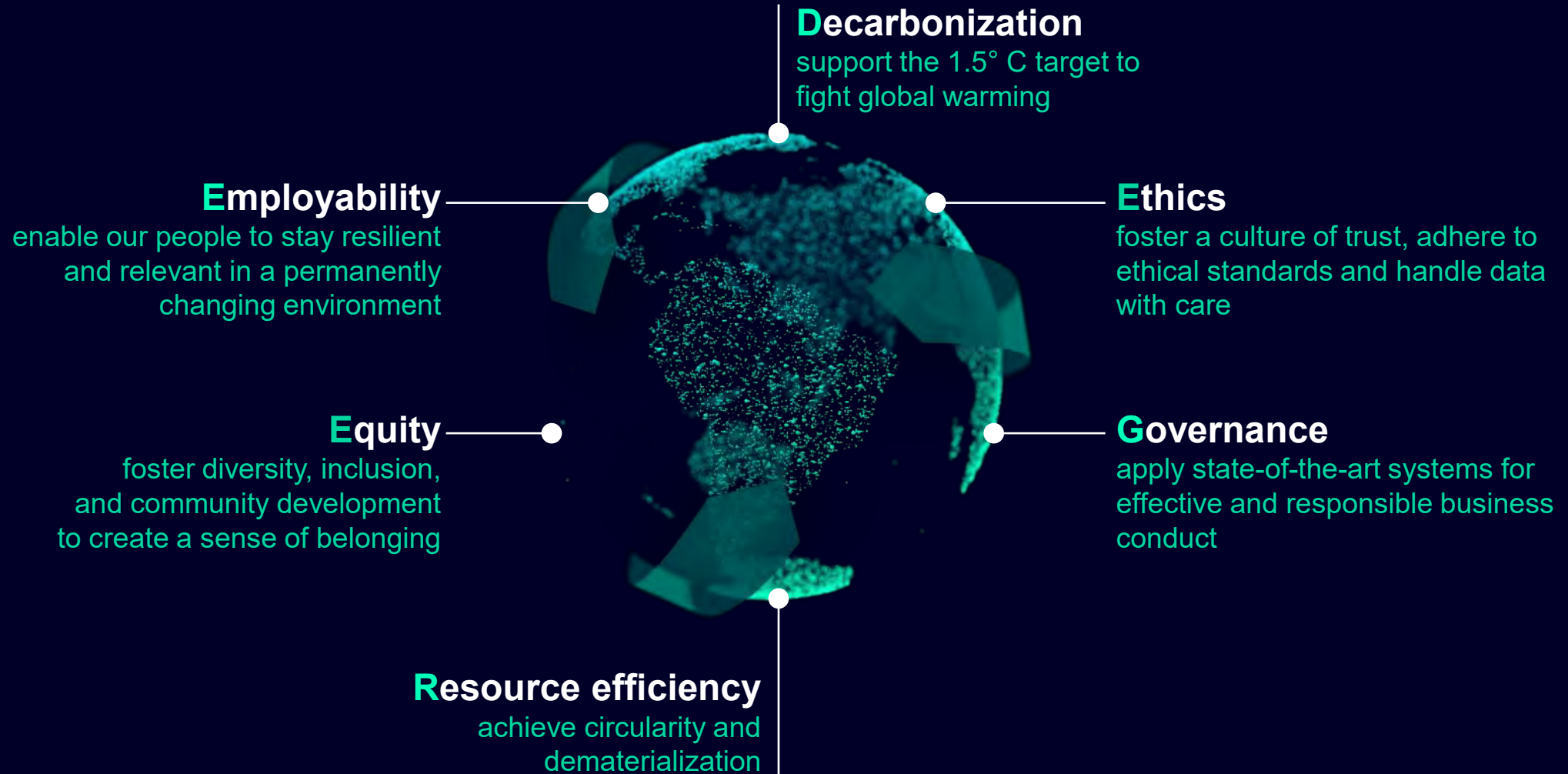
Executable Digital Twin

A self-contained, application specific executable model to enhance value of an asset during its life-time by using “virtual sensors”

¹ Siemens Healthineers: R&D Framework Agreement in place plus option to license; Siemens Energy: R&D Framework Agreement plus Cost Pool Agreement in place

Siemens DEGREE framework

Sets clear priorities for Sustainability at Siemens



Leading Questions

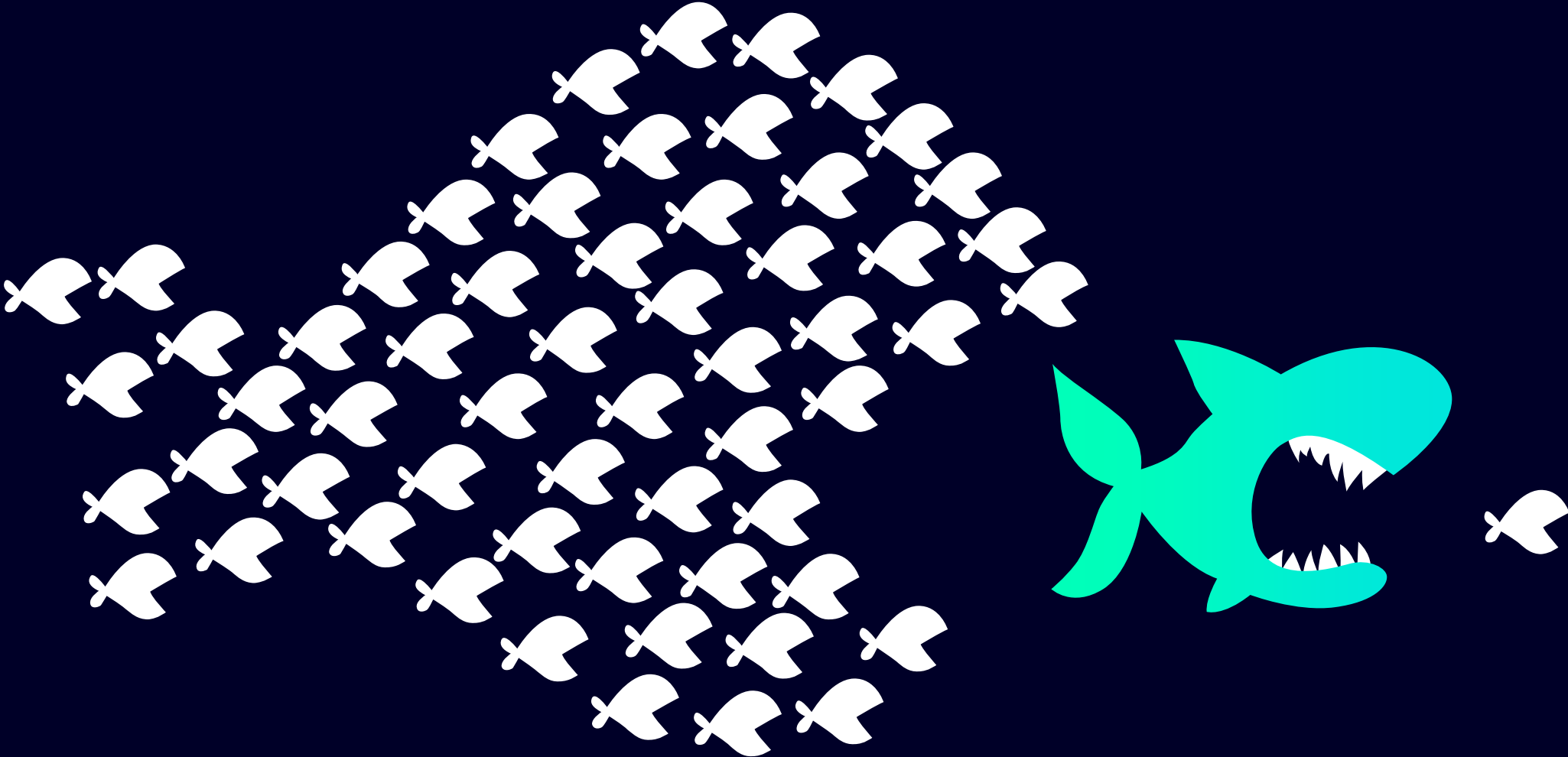
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**It's not the size of the fish, it's the power of the ecosystem:
platforms and ecosystems will be leading paradigms to do future business**



What are the fundamental changes that come with the shift to platform-based ecosystems?

Core principles of leadership in platform-based ecosystems

SHIFT

FOCUS TO THE OUT-SIDE OF YOUR FIRM

Key source of value of ecosystems are network effects. Scale network effects outside of your firm.

CREATE

MORE VALUE THAN YOU TAKE

Ecosystems are all about interactions and the value creation of your ecosystem. Ensure your ecosystem partners benefit from it.

DESIGN

FOR NETWORK EFFECTS

Interactions yield network effects and build communities. Attract complementary sources of value to your ecosystem.

RETHINK

CONTROL

Successful ecosystems balance openness and control. Establish the right governance and technology architecture for it.

INSPIRE

YOUR ECOSYSTEM

Orchestrate and inspire your ecosystem towards a clear mission. Market your ecosystem and not your product.

Source: Platform Revolution; G. Parker, Marshall van Alstyne, Sangeet Choudary; Siemens

Network effects and inverting the firm lead to fundamental changes

2

Finance

- Records outside firm
- From shareholder value to stakeholder value, incorporate network effects



Human Resources

From internal employees to external communities



R&D

From experts and specialized departments to crowdsourcing and open innovation



Strategy

From entry barriers and inimitable resources to ecosystem husbandry and long tail



Marketing

- From push to pull
- From outbound to inbound



IT

From back office (ERP) to front office (CRM) to out-of-office (Social & Big Data).
Communication among users



Operation & Logistic

Shed marginal costs

- Uber: No taxis
- Airbnb: No real estate
- Facebook: Creates no content
- Alibaba: No inventory



Source: Platform Revolution; G. Parker, Marshall van Alstyne, Sangeet Choudary; Siemens

Leading Questions

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#NextWork is our methodology to determine the future skills and competencies

Demographic change and a lack of digital competencies in the existing workforce require a better understanding of the competencies of the future

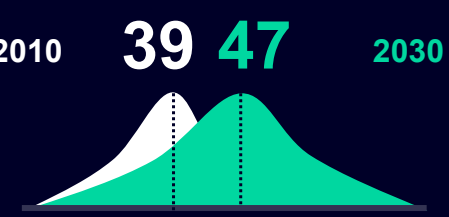
Requirements for digital skills are rising across all job profiles, but



6/10

Employees lack of digital basic skills

An ageing population ...

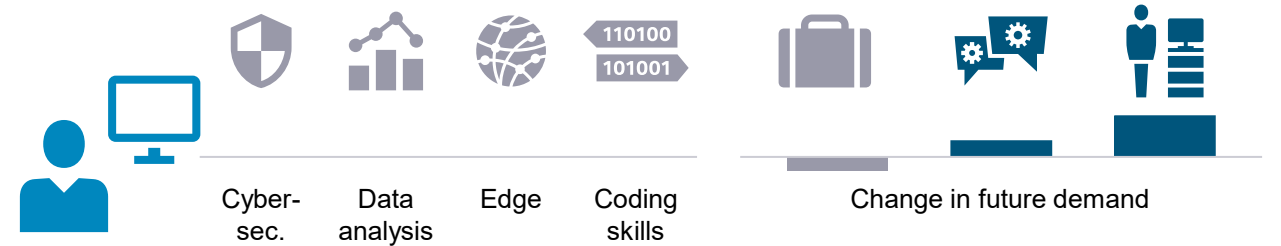


2010 **39** **47** 2030

... reduces the supply in the labour market in countries

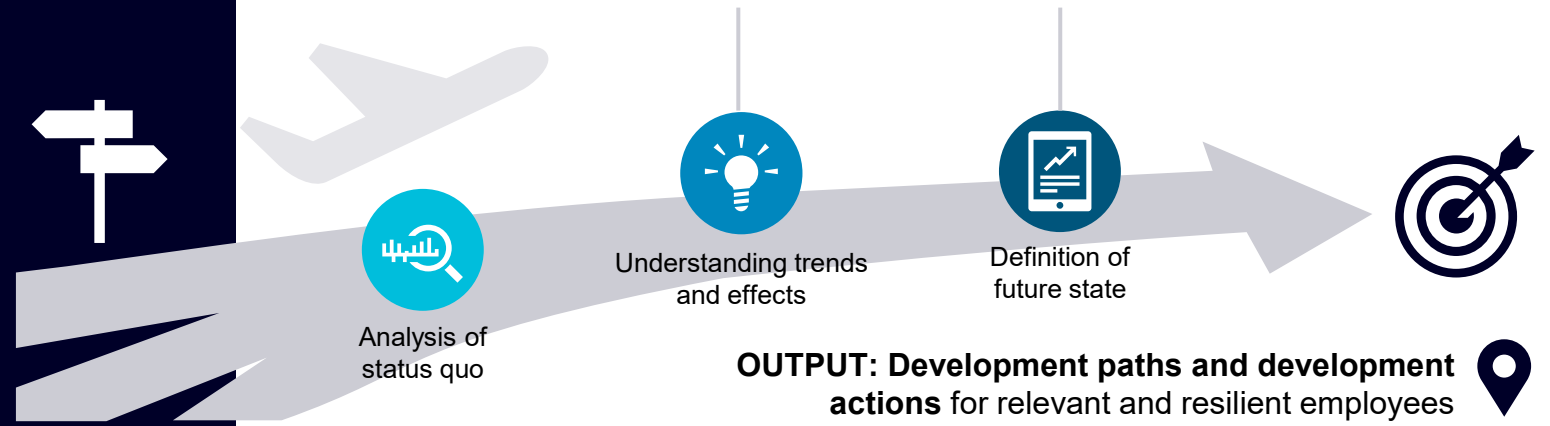
Source: OECD-Daten

With #NextWork we analyze the skills requirements in for future job profiles

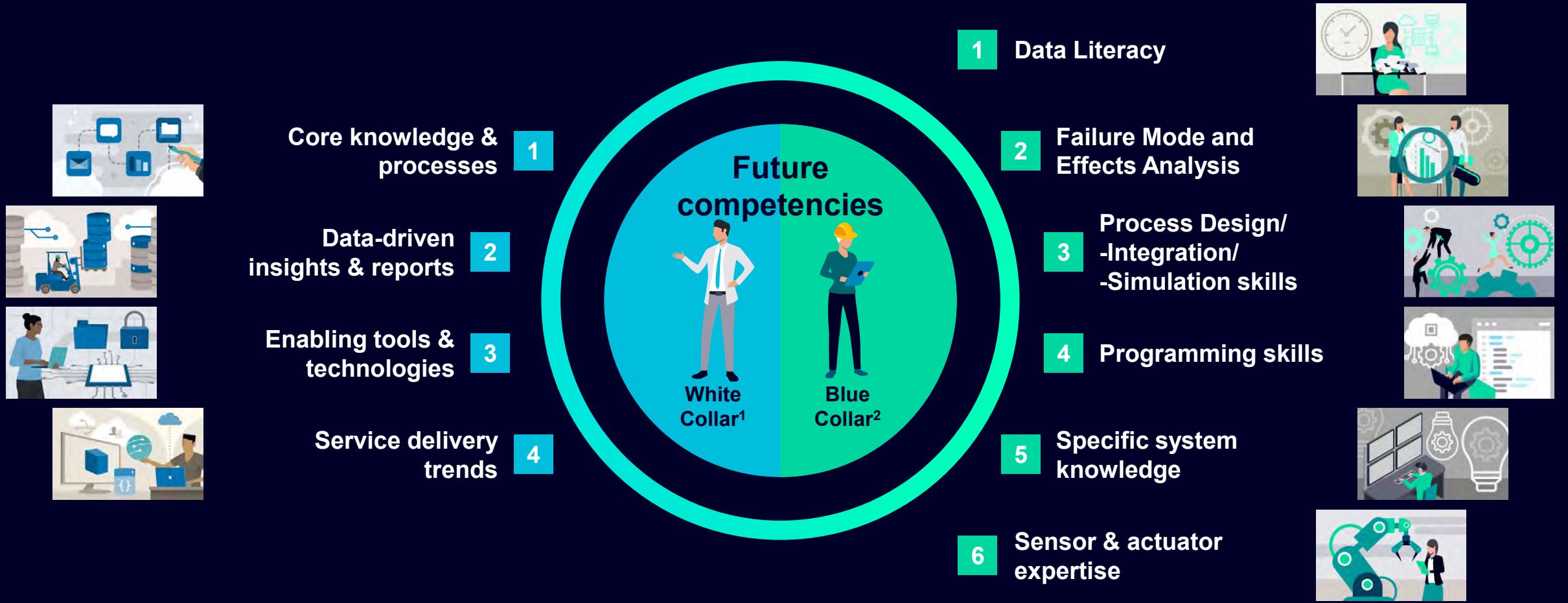


Which competences do my employees need in the future?

Which job profiles will be needed and what are the consequences?



During the #NextWork pilots several future competencies for white and blue-collar were identified – Competencies can be clustered into different capability areas



¹ White-collar competencies derived from GBS pilot & “Master Data Service” role | ² Blue-collar competencies derived from SI-DS & DI-MC pilots

The Siemens Professional Education curriculum is being continuously updated – For education, re- and upskilling

FY21

New topics in curriculum

- Sustainability and Dematerialization
- Cyber Security
- Internet of Things, Edge Computing
- Simulation and Digital Twin
- Low-Coding

FY22

New topics in curriculum

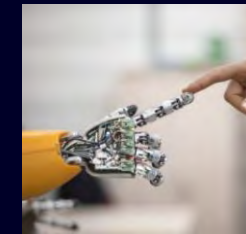
- Mobile Robotics
- Driver-less Transport Systems
- Software defined Power Electronics
- User Experience and Customer Experience Design
- Data Sovereignty
- New Materials and Additive Technologies

FY23

New topics in curriculum

- Blockchain
- Smart Services, Predictive Maintenance
- Zero Coding
- Autonomous Robotics
- Distributed Systems, “Grids”

PLM: DATA ANALYTICS & AI



New way of teaching in dual VET

Competence and Project Oriented Education COPED Success Formula

COPED =



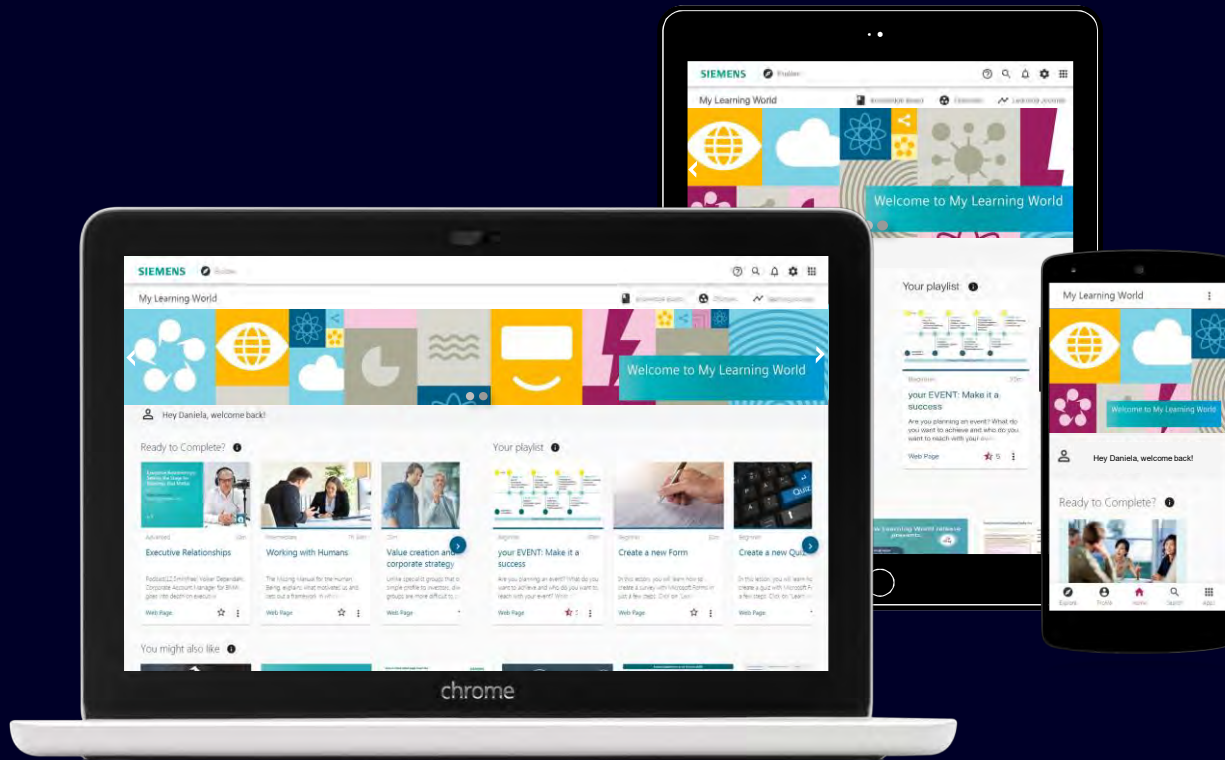
- VET philosophy
- Holistic responsibility of VET trainer
- Individual competency enhancement of learners
- Customer orientation

- Closer to the apprentice
- Learner on center stage
- Flexibility
- Responsibility
- Room for creativity
- Job enrichment ...

- Fostering learners' **individual** competencies
- Trainers are continuously available as **coaches / development partners** throughout the learning programs / apprenticeships.
- Trainers are **empowered to chose the adequate teaching method.**
- **High quality and identical standards** for all trade specific competencies
- **Customer and business specific competencies** as add on
- Integration of **latest didactic/ methodological requirements**

Creating an inspiring new world of learning for Siemens

3



- **My Learning World** connects a global community of learners to inspiring, relevant, and tailored content
- It provides a **personalized learning experience**, matched to role, interests, and goals
- **Flexible** and accessible anytime, anywhere

- My Learning World is your gateway to a **global network** of colleagues, experts, and partners: A worldwide “Siemens memory” of knowledge
- It makes growth more social, more connected, more rewarding
- Learn from and with others & share your insights

Requirements and Approaches for Competence Development of TVET Personnel: Example Siemens Information Portal – Intuitive and Up2date

Comprehensive offer for downloads

The screenshot displays the Siemens SCE Information Portal with a breadcrumb trail: Home > Company > Sustainability > Education > SCE. The main content area is organized into several sections:

- SCE Portfolio** (Offers):
 - Learning & Training Documents**: Downloads, Courses
 - Trainer Packages & Products**: Trainer Packages, SIMATIC IOT2000
 - Contact Partners**: Overview
- WorldSkills**: Cooperation, Competitions, Press
- Technical Support**: Industry Online Support, Trial Software/Firmware, Getting Started, Products & Systems
- Textbooks**: Downloads
- Learning Systems**: Didactic Partners
- Jobs & Career**: Overview
- Media Support**: Apps - Videos - Slides - Images, Information Material, Newsletter

On the right side, there is a **Regional SCE Websites** section with links to:

- Austria
- Belgium
- Brazil
- China / 西门子中国
- France
- Germany
- Italy
- Japan
- Netherlands
- Spain
- Switzerland
- USA

Closely co-operate with the local business to understand the requirements and invest in the skills and competences of TVET personnel to stay relevant for the businesses
All offers for you on the SCE Internet page: [siemens.com/sce](https://www.siemens.com/sce)



Thank you.

| Contact

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Deep dive white-collar – The usage of digital tools and future technologies will be key competencies for future white-collar roles



1

Core knowledge & processes

Strengthening of end-to-end process know-how

Skills

- Contracting and negotiation
- Supplier management
- E2E process awareness
- Customer lifecycle analytics
- Offer/proposal process
- Innovative thinking



2

Data-driven insights & reports

Development of analytical and reporting skills

Skills

- Data visualization e.g., Tableau, PowerBI, Qlik
- Business intelligence & AI
- Predictive analysis and modelling
- Big data/data science
- Data architecture design
- Analytical thinking



3

Enabling tools & technologies

Increasing affinity to key technology & tools

Skills

- Robotic process automation
- Integration & E2E testing
- Cloud services & technologies
- Interactive applications
- Platforms and technologies
- Cyber security
- IT systems affinity



4

Service delivery trends

Focusing on service delivery & process improvement

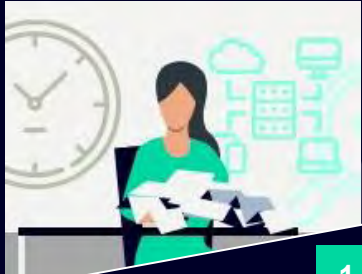
Skills

- Service delivery strategy
- Process improvement
- Transformation management
- Process and governance
- Quality management
- Relationship management
- Creative thinking

Remark: Competencies derived from GBS pilot & "Master Data Service" role



Deep dive blue-collar – Future blue-collar competencies are increasingly related to data-driven use cases and processes



1

Data Literacy

Ability to analyze data & processes

Skills

- Visualization of Data
- BDE & MDE know-how
- Interpretation of data & derivation of implications or action fields
- Ability to analyze processes
- Understanding data structures
- Track & trace data
- Ensure cyber security



2

Failure Mode and Effects Analysis

Identify failures and effects

Skills

- Definition of possible failures
- Identification of influence factors for failures
- Analysis of impacts of failures
- Definition of test scenarios & implementation



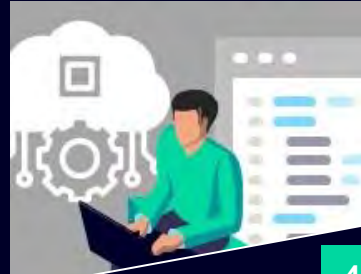
3

Process Design/ -Integration/ -Simulation skills

End-to-End process understanding

Skills

- Understand E2E process and interfaces
- Simulation of processes
- Create digital working instructions
- Competency for manufacturing planning tool
- Presentation of manufacturing progress
- Ensure transparency & digital consistency



4

Programming skills

Ability to program low code systems

Skills

- Master low-coding
- Connection of machines to different SAP systems
- Build up user interface
- Control of digital measure machines, incl. interpretation of results
- Knowledge in Cloud & Edge computing
- Implement autonomous planning & scheduling
- Merging of reality & Virtuality



5

Specific system knowledge

Competencies for different systems

Skills

- MES (Manufacturing Execution System) Poweruser
- ERP-Systems
- MRP (Material Requirement Planning)
- Connection & interfaces of different systems
- Deal with Advanced Manufacturing, Digital Twin & Robotics



6

Sensor & actuator expertise

Service delivery & process improvement

Skills

- Definition & implementation of sensors
- Connection of sensors to systems
- Evaluation of techn. characteristics (e.g., welding robot)
- Interpretat. of 3D data
- Develop KI welding technic
- Consideration of FTS

Remark: Competencies derived from SI-DS & DI-MC pilots

Key Skills 4 Growth give orientation of where to focus on Siemens level and contribute to our Company Priorities

