Smart Factory
Digital Integrated Processes

SCENARIO

1- Why Digitalization

2- Advantage of Process Digitalization

3- Data Driven Approach

4- Systems Integration

5- Digital Manufacturing 4.0

6- Smart Factory Monitoring

7- Factory of the Future in Industry 5.0

8- Cybersecurity & Data Security

9- Results & Continuous Improvement

DIGITALIZATION
WHY DIGITALIZATION?

Information collected on **paper or Excel sheets**

Failure to **identify root causes**

Long downtime due to unexpected failures

Fragmented and uncontextualized **data**

No communication between departments

Events **not recorded** and historicized

Decisions **not based on data analytics**

High cycle time due to unexpected downtime

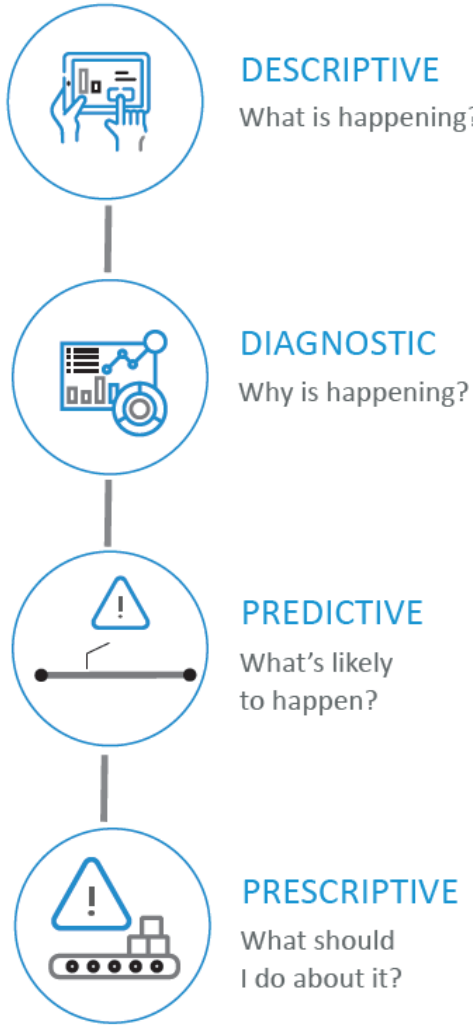
Delivery dates **missed**

Low OEE: **<20%**

DIGITALIZATION
ADVANTAGES OF PROCESS DIGITALIZATION

1. –> Lower manual operations
   –> Lower errors
   –> More time available for other activities
2. Paperless and cost reduction (environmental awareness)
3. Compliance with regulations on document management
4. Greater data security and traceability
5. Fluidity and sharing of information thanks to integration with ERP, MES and other web based software
6. A digital approach that allows you to manage large volumes of operations
7. Better customer service, with benefits for brand reputation
8. Integrated digital system that guides the employee in carrying out activities
9. Traceability of operations and guarantee of correct management of activities, as desired by management

DIGITALIZATION
DATA DRIVEN APPROACH



Data driven approach is related to the analytics models used to be improved in all company integrates processes: Descriptive, Diagnostic, Predictive and Prescriptive.

A 'data driven' approach brings with it the advantage of better visibility of operations, thanks to the use of reference metrics called KPIs, Key Performance Indicators, which allow you to focus your attention on areas for potential improvement.

Accurate data in real time allows you to optimize all business processes, reduce waste and rework, improve the use of energy resources.

Through automation technologies and Industrial Internet of Things (IIoT) platforms, the collection, processing and analysis of data and their monitoring are enabled in all internal and external business processes: focus on production, maintenance and quality control.

DIGITALIZATION
SYSTEMS INTEGRATION

Control of entire production areas

Smart Factory : Digital Production Systems

The "Smart Factory" concept that PM created was made possible through the software is used on different systems from well-known machine and automation manufacturers.

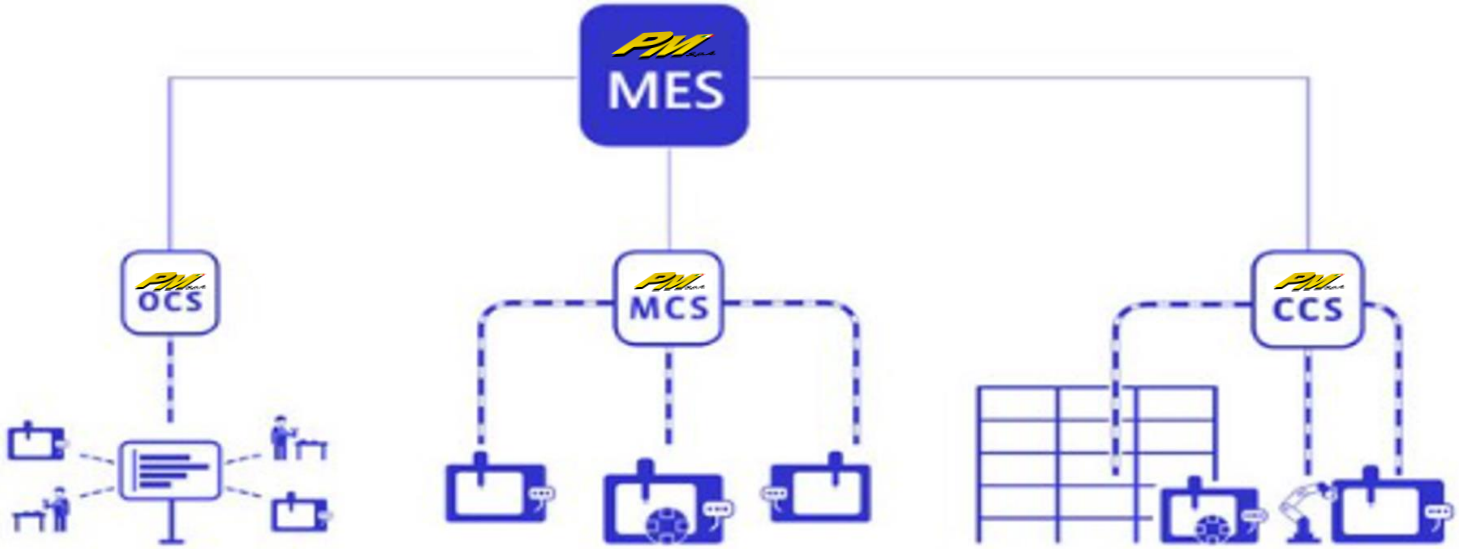
This has provided the user with a standardized solutions for production.

Operation is identical across all integrated systems used into the Company, allowing operators to have a user friendly approach with the PM IT Infrastructure and the all devices that they use everyday in their activities.

DIGITALIZATION
SYSTEMS INTEGRATION

MES - MANUFACTURING EXECUTION SYSTEM

Start of digital production



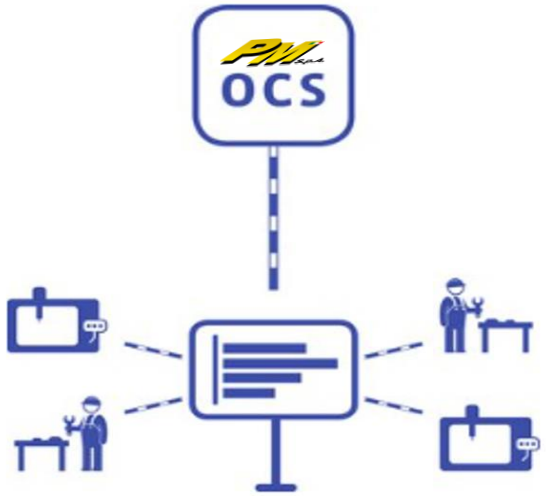
MES integrates machines and manufacturing cells and thus enables a full organization and control of all manufacturing area departments.

An automated data exchange provides all necessary order information for the connected stand-alone machines and production cells.

MES is been integrated into the wall IT environment and serves as a link between the organization systems (ERP, PDM, CAD/CAM, etc.) and the machine / cell controls.

DIGITALIZATION
SYSTEMS INTEGRATION

OCS - ORDER CONTROL SYSTEM



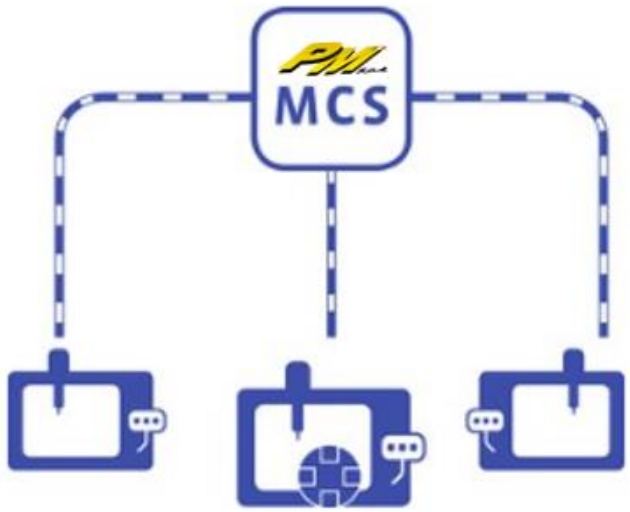
The integration between OCS (Order Control System) and ERP is the ideal entry point for detailed planning and control of order productivity on the shop floor.

OCS with AI implementation schedules production activities and organizes complex production processes easily:

- → **Eliminates unproductive downtime**
- → **Reduces product transformation lead time**

DIGITALIZATION
SYSTEMS INTEGRATION

MCS - MACHINE CONTROL SYSTEM



MCS (Machine Control System) links processing machines with the company's administrative and technical systems like ERP, PDM, CAD / CAM, Tools Management, etc., plans and controls the machining process on an NC machine or PLC's, using the standard protocols like:
MODBUS TCP, OPC UA/DA, MTCONNECT, PROFINET, EUROMAP, FANUC FOCAS, SIEMENS S7, etc.

Integration of the processing machines into the internal information flow is achieved by an automated data exchange between the higher-level organizational systems.

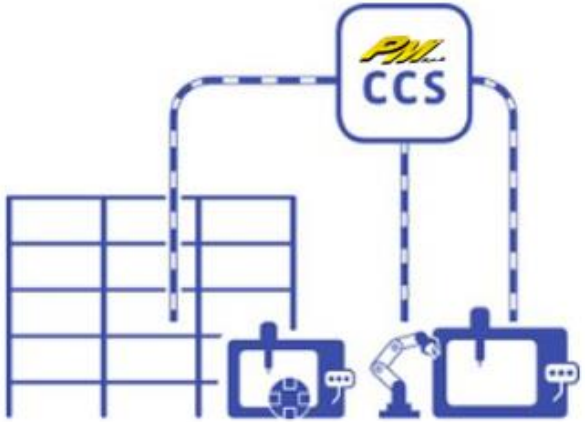
The process control in MCS provides all this information dynamically on demand and controls the production process at each individual machine.

The integrated digital system become the central point of information that manages the machine operations and the digital control plan also.

The operator can concentrate on his main tasks.

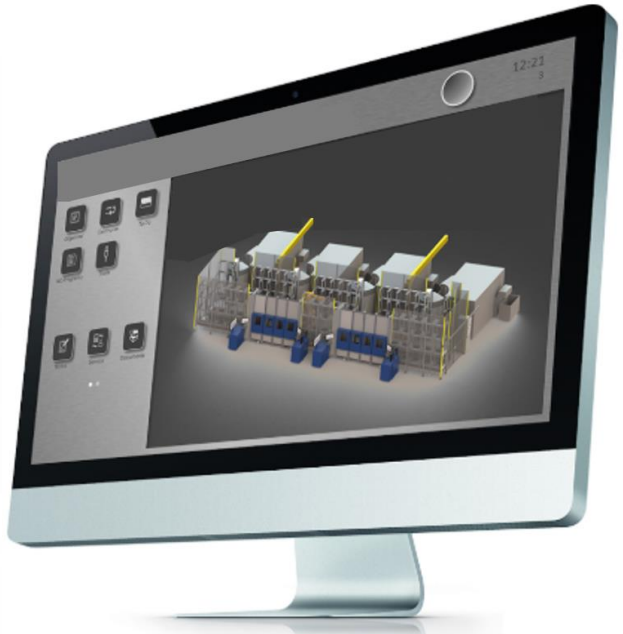
DIGITALIZATION
SYSTEMS INTEGRATION

CCS - CELL CONTROL SYSTEM
Automated Production Cells/Lines



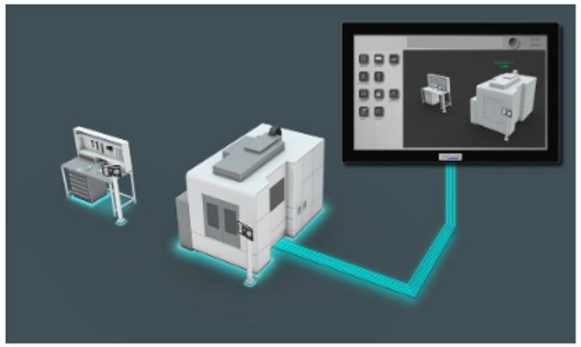
As a compact system/cell controller, CCS is used on machining centers with pallet/workpiece handling through to complex manufacturing systems with different machines and handling systems, using a specific protocols.

CCS controls the production process by triggering workpiece, pallet, tool and fixture transports, transferring production data to the machine and starting automatic workpiece processing.

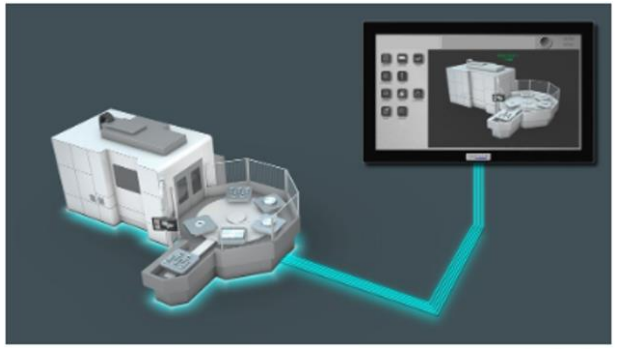


DIGITALIZATION
DIGITAL MANUFACTURING 4.0: AREA OF APPLICATION

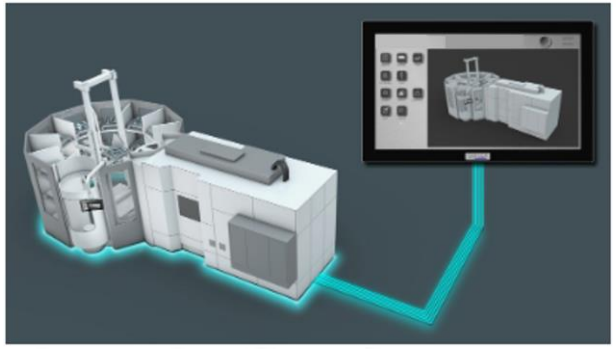
STAND-ALONE MACHINE
MANUAL WORKSTATION



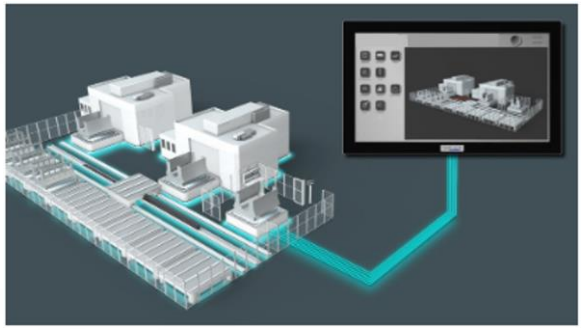
MACHINE WITH PALLET STORAGE



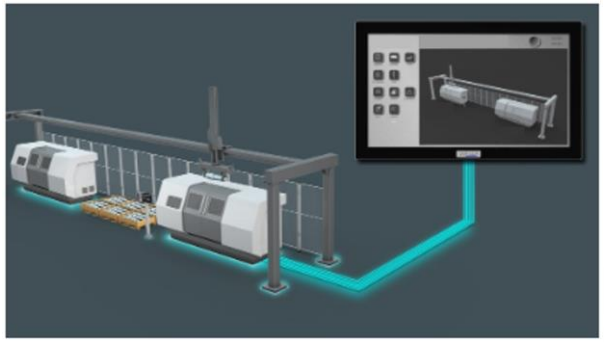
ROTARY LOADING SYSTEM



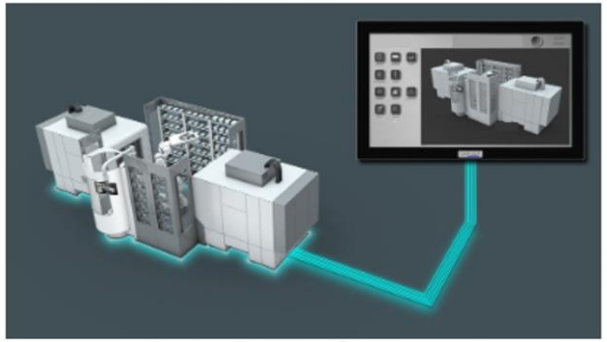
MACHINING CENTER WITH PALLET
TRANSPORTER



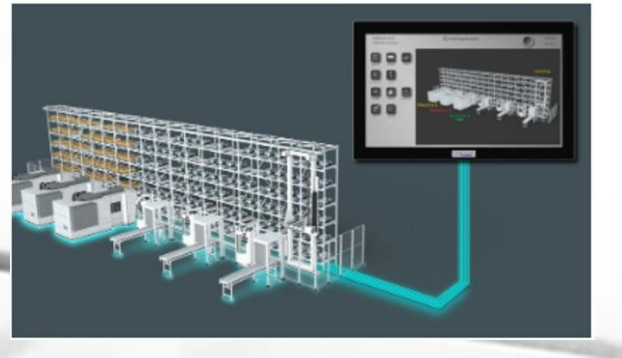
MACHINE WITH PORTAL



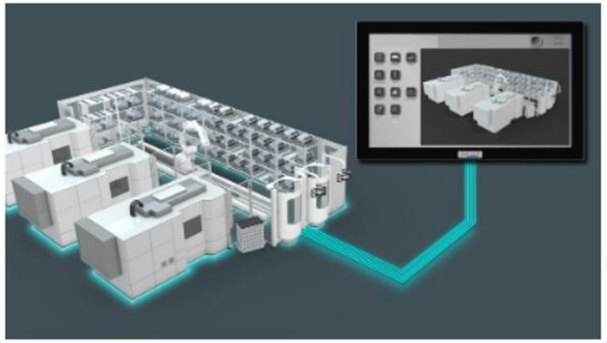
ROBOT CELL



HIGH RACK SYSTEM

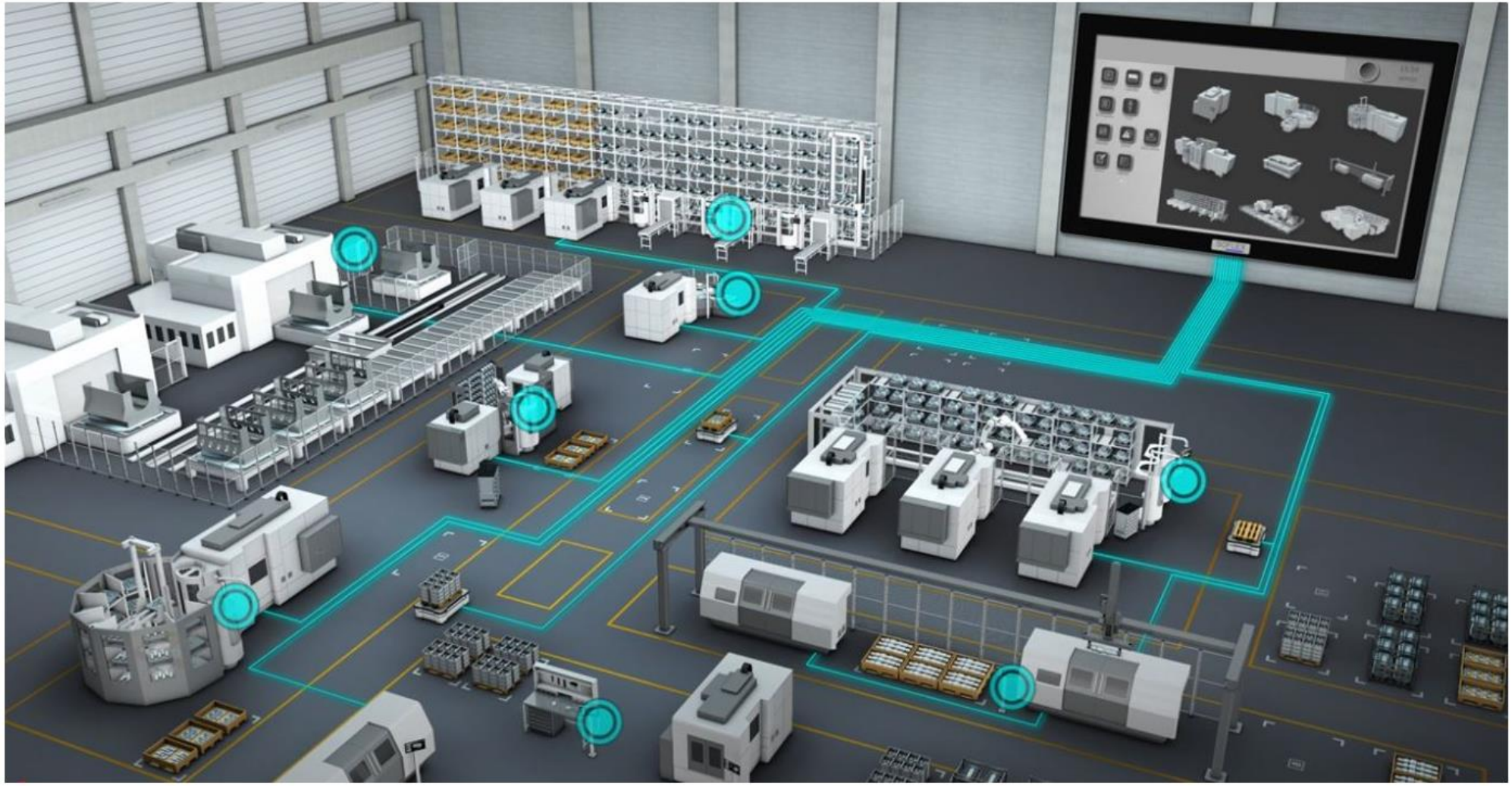


LINEAR SYSTEM WITH ROBOT



DIGITALIZATION
SMART FACTORY MONITORING: DIGITAL LEAN MANUFACTURING CONTROL TOWER

SHOPFLOOR PERFORMANCE MANAGEMENT



DIGITALIZATION
SMART FACTORY MONITORING: SMART FACTORY CONTROL TOWER

SHOPFLOOR PERFORMANCE MANAGEMENT: **KEY BENEFITS**

REAL-TIME INTEGRATE DATA SOURCES
- Integrates all manufacturing data sources in near real-time

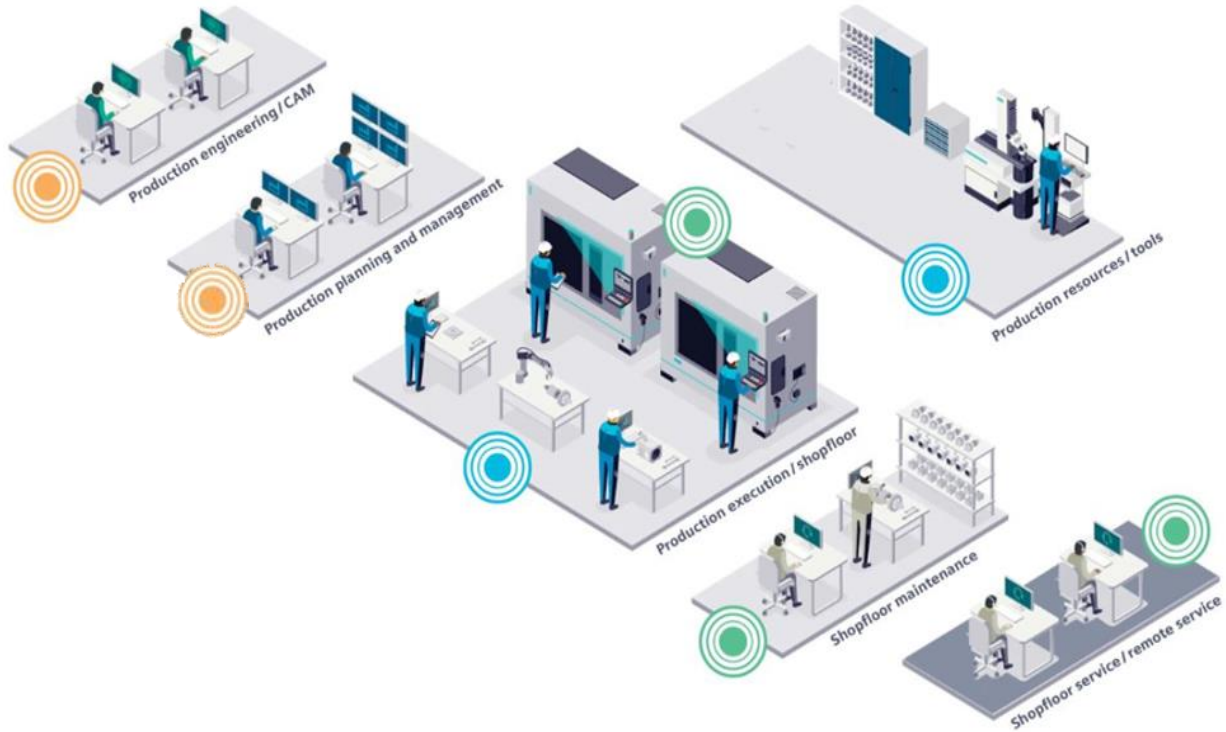
CENTRAL OVERVIEW
- Gives a central overview of everithing that happens in manufacturing and operations in a 3D virtual twin

END-TO-END VISIBILITY
- Anticipate distruptions with end-to-end visibility
- Resolve issues quicky by triggering workflow activities

DRIVE COLLABORATION
- Drive collaboration and well-informed decisions

GAIN CAPABILITIES
- More effective scheduling & planning
- Unparalleled optimization
- Improved reactivity

SUSTAINABLE PRODUCTION
- Improved cost-saving solutions
- Real-Time enenrgy savings optimizations and strategies



Smart Virtual Machine
- Monitoring by visual kpi on Andon systems
- Lower programming cost
- Reduce excess work in progress (WIP) and inventory
- Higher utilization
- Increased efficiency in rework if needed
- Increased manufacturing capacity and revenue

Smart Shopfloor
- Lower material cost
- Higher utilization
- Lower operational cost
- Increased efficiency in rework if needed
- Increased manufacturing capacity and revenue
- Monitoring by visual kpi on Andon systems

Smart Machine
- Faster machining
- Higher machine uptime
- Improved efficiency of manufacturing equipment
- Improve overall quality level
- Lower overall manufacturing costs
- Increased manufacturing capacity and revenue
- Monitoring by visual kpi on Andon systems
- Increased Energy Cost-Saving (Industry 5.0)

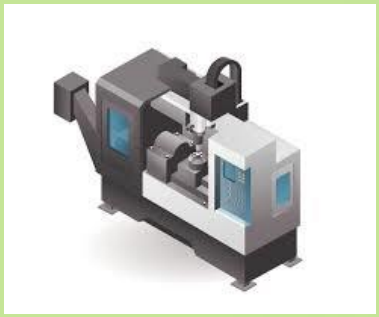
DIGITALIZATION
FACTORY OF THE FUTURE IN INDUSTRY 5.0

GREEN MANUFACTURING WITH A DIGITAL TRANSFORMATION: **A SUSTAINABLE APPROACH**

Resource Optimization

We are adapt of monitoring and optimizing resource usage. Sensors can detect variations in energy and material consumption, leading to more efficient processes.

Waste Reduction



We are able significantly reduce waste by enabling precise control over manufacturing processes.

Energy Efficiency

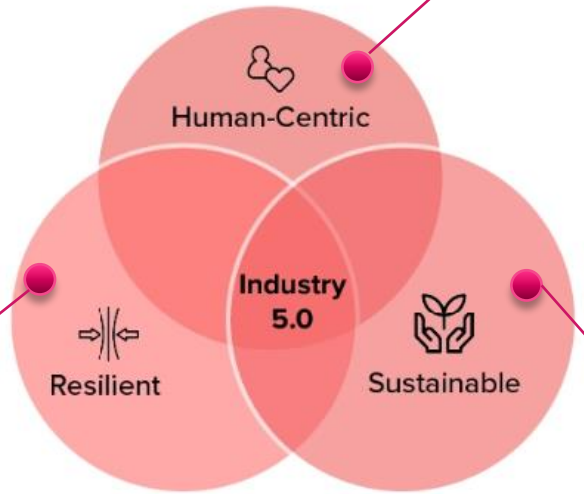
We adopt IoT and data analytics to optimize machines and adjust climate control systems in our facilities to the aim of improving energy efficiency and cost savings too.

Sustainable Materials

Our ESG roadmap: we always aim to explore and incorporate sustainable materials into our processes. By using recycled or bio-based materials, we do our best to minimize our carbon footprint.

DIGITALIZATION
FACTORY OF THE FUTURE IN INDUSTRY 5.0

THE THREE PRINCIPLES OF INDUSTRY 5.0



People are at the center of the process and decision-making.

- Human-Machine Collaboration
- Integration of emerging Technologies

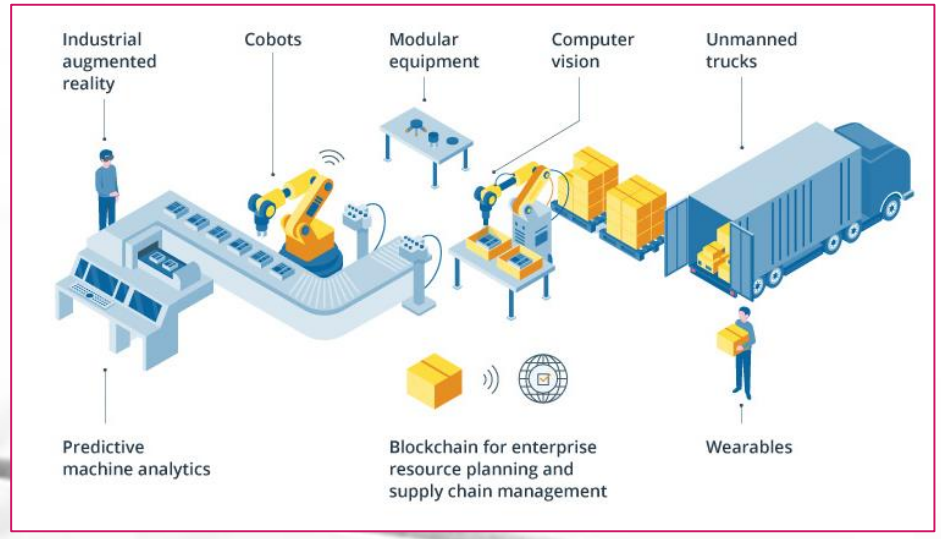
- Adaptability
- Fault Tolerance
- Redundancy

Being able to change quickly to stay ahead of the curve and adapt to changing market dynamics.

New skills for workers and circular processes to leave a better world for future generations.

- Green Manufacturing
- Social Responsibility
- Circular Economy

A tight collaboration between workers and machines, applying Industry 5.0 technologies and artificial intelligence development.



Such business operations automation strives not to substitute humans but to accelerate their performance.

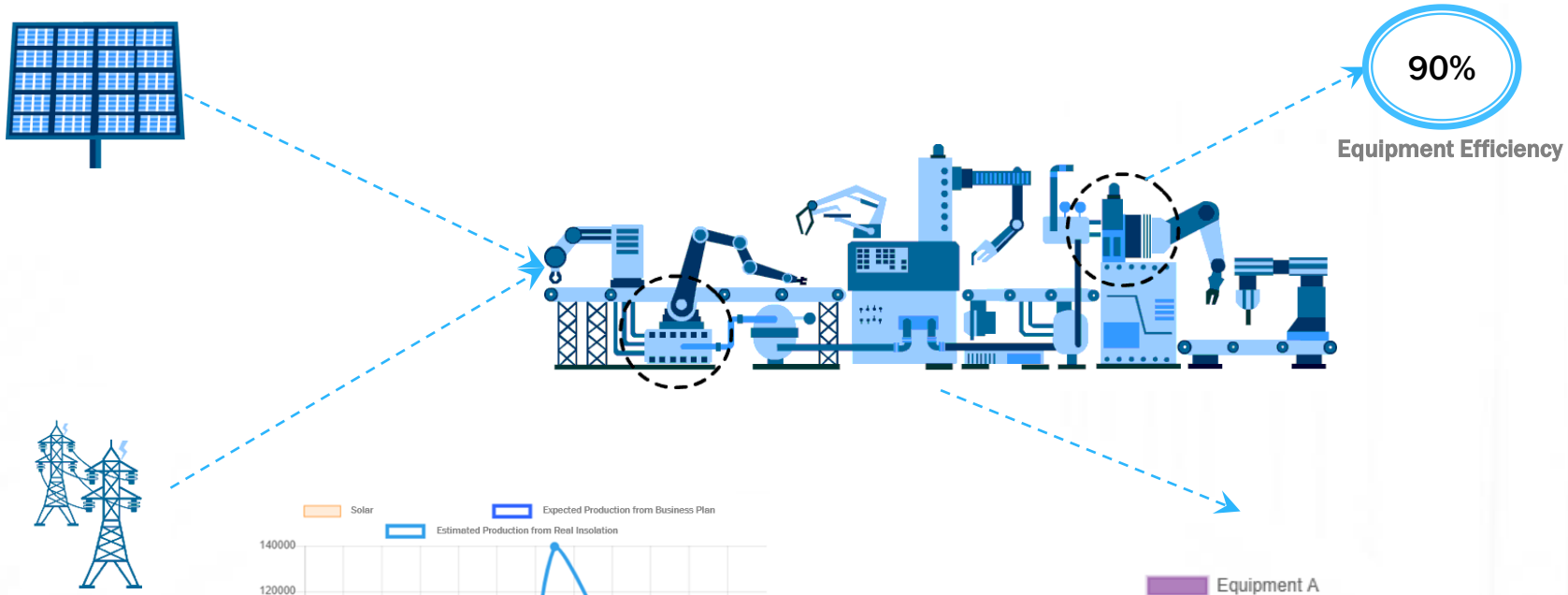
In this way, humans will be able to spend more time on strategizing and planning as well as on other high-value tasks.

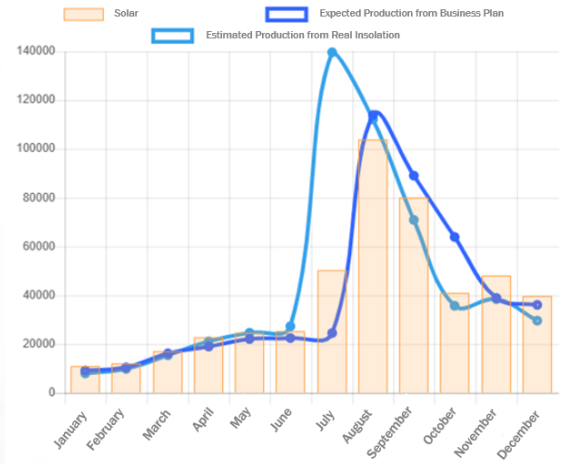
To achieve this collaboration in the workspace, Industry 5.0 is using cobots, or collaborative robots. Cobots are applied to optimize the production process and ensure work safety.

DIGITALIZATION
FACTORY OF THE FUTURE IN INDUSTRY 5.0

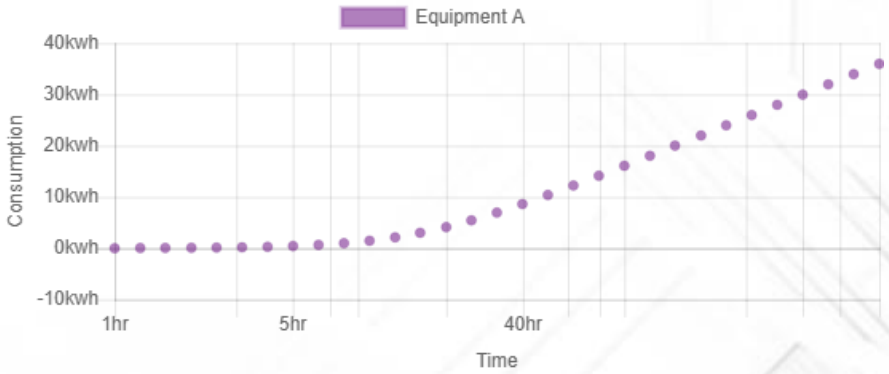
REAL-TIME ENERGY GENERATION AND CONSUMPTION MONITORING

We have the complete visibility of energy consumption/generation into ours manufacturing plants.
Monitoring allow us get detailed insights into our energy consumption not only at the manufacturing unit or building level but also at the level of line, machine and even individual product.





Energy Source



Energy Consumption per Equipment

DIGITALIZATION
CYBERSECURITY & DATA SECURITY

DATA SECURITY INTEGRATED SYSTEM: PREVENTION & DETECTION

The Company ensures the privacy and security of sensitive data through robust encryption and secure access protocols; maintains compliance with data protection regulations and standards

The Data security integrated system is focused on:

- ❑ Defence of the IIoT control devices
- ❑ Secure Remote Access
- ❑ Prevention of the spread of infection by network segmentation
- ❑ Protection of the critical equipment at the network level
- ❑ Prevention of the execution of malware and unauthorized programs
- ❑ Visualization of the asset information of production devices and security events

DIGITALIZATION
RESULTS & CONTINUOUS IMPROVEMENT
DIGITAL CULTURE OPTIMIZATION IN ALL COMPANY PROCESSES

Optimisation

Working in the system

- Organisation
- Structures
- Processes
- Methods

Culture

Working on the system

- Values
- Setting
- Cooperation
- Principles / Guidelines

LEADERSHIP

Instrument

- Visual Management
- Rule communication
- T-cards for process confirmation
- Prioritisation of problems
- Problem solving (PDCA)
- Continuous improvement process

Behaviour

- Go-to-Gemba
- Leading through questions
- Active listening
- Learn & Improve
- Role model function

Continuous Improvement Process

- Digital control and tracking of continuous improvement processes and associated task tickets in the work system.

Support of the behavior to create commitment in management

- Support the planning to enable learning situations between employees and managers.

DIGITALIZATION RESULTS & CONTINUOUS IMPROVEMENT

2025 DIGITAL MATURITY ASSESSMENT BY BUSINESS UNIT

95% PRODUCT & SERVICE

- Process Management ★★★★
- Total Quality Management ★★★★
- Production & Maintenance ★★★★

90% LOGISTICS

- Internal Logistics Management ★★★★
- External Logistics Management ★★★★
- Materials, Semi-Finished Product & Services ★★★★

90% PURCHASING

- Supplier Management ★★★★
- Purchase Materials, Goods & Services ★★★★

85% TEAMWORK / HR

- HR Management ★★★★

80% ACCOUNTING, FINANCE & DECISION MAKING

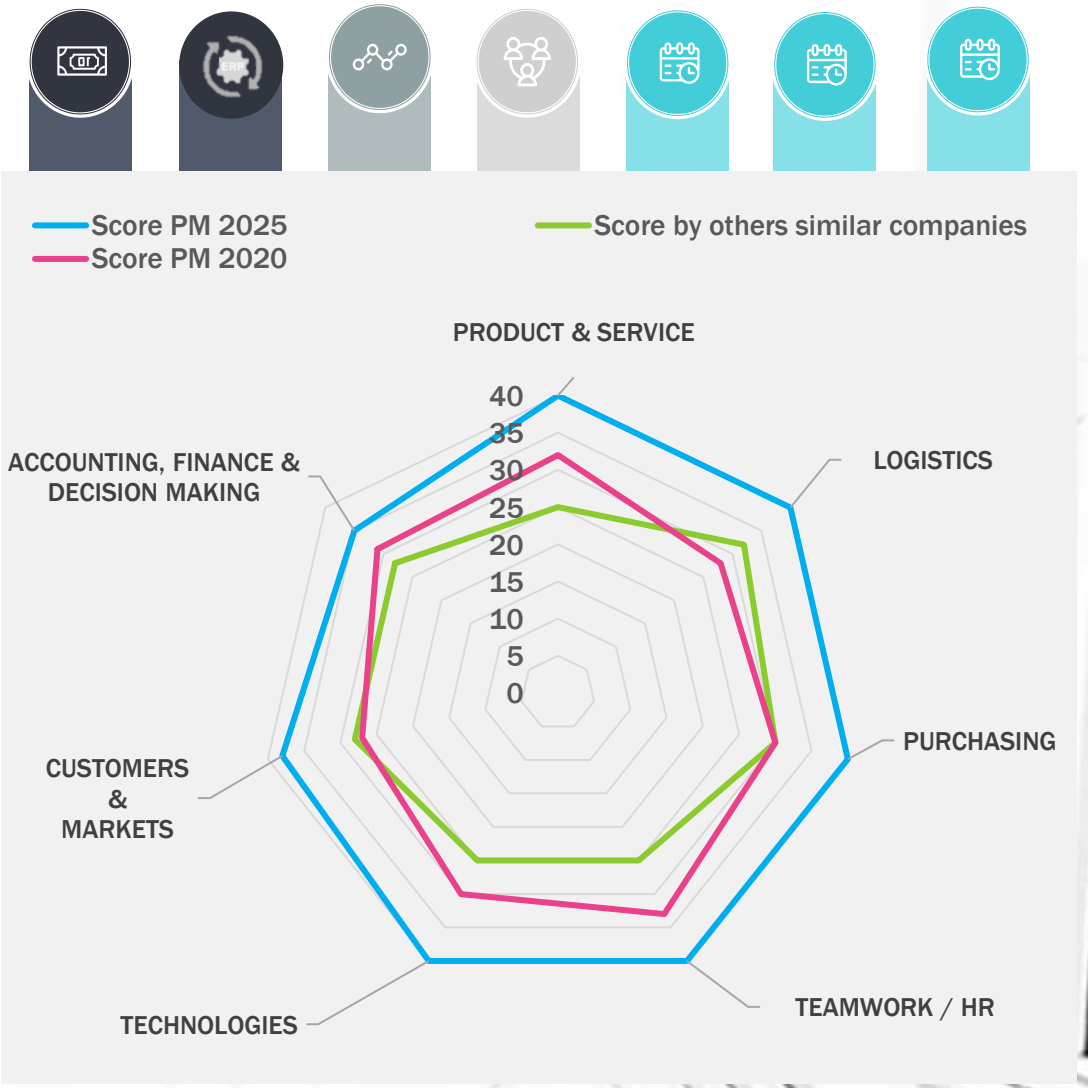
- Accounting & Finance ★★★☆
- Decision Making (BI) ★★★★

85% CUSTOMERS & MARKETS

- Marketing ★★★★
- Sales ★★★★
- After-Sales Assistance & Services ★★★☆

95% TECHNOLOGIES

- IT Systems ★★★★
- Design, R&D ★★★★



DIGITALIZATION RESULTS: COST SAVINGS

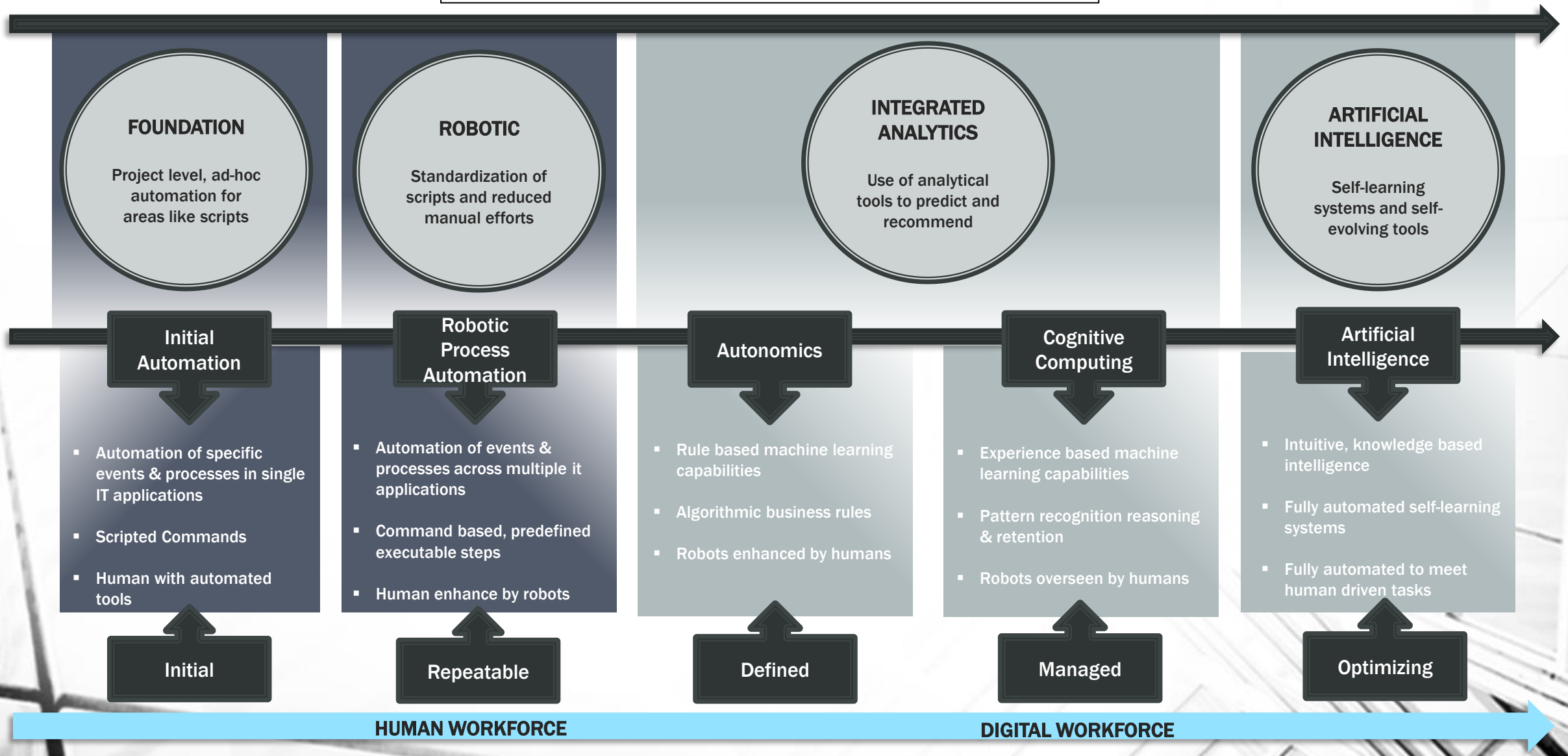
- Classic operation capabilities
- Digital Internet of Things capacities

R&D/Design	Manufacturing	SupplyChain/Logistics	Process Automation
▪ Design to cost ▪ Design to value ▪ Lean R&D ▪ Modularity	▪ Manufacturing productivity and capacity debottlenecking	▪ Lean warehouse management ▪ Inventory modeling ▪ Sales and operations planning	▪ Lean process improvement ▪ Reorganization for synergies
▪ Efficiency analytics ▪ Simulation-based design ▪ Project-portfolio-prioritization analytics	▪ Digital performance management ▪ Advanced Big Data Analytics (e.g. predictive maintenance, quality improvement,...) ▪ Purposeful automation	▪ Footprint optimization and dynamic routing ▪ Demand-sensing and predictive analytics ▪ Digital twin	▪ Zero-based process redesign ▪ Automation of back-office processes ▪ Robotic process automation
~20-30% R&D Efficiency	**~7-15%** Manufacturing-cost reduction	**~20-30%** «On time, in full» improvement	**~55-65%** R&D Efficiency

DIGITALIZATION
CONTINUOUS IMPROVEMENT

SCENARIO 2025--2030: A VALUE AI DRIVEN APPROACH TO ENSURE THE ROI

BUILDING BLOCKS FOR INTELLIGENT PROCESS AUTOMATION



Our Claim

see. think. connect. take action.