

Digitalisation @Festo

- Integrated Strategy
- Business
- Product
- Processes



Which are the goals of Industry 4.0?

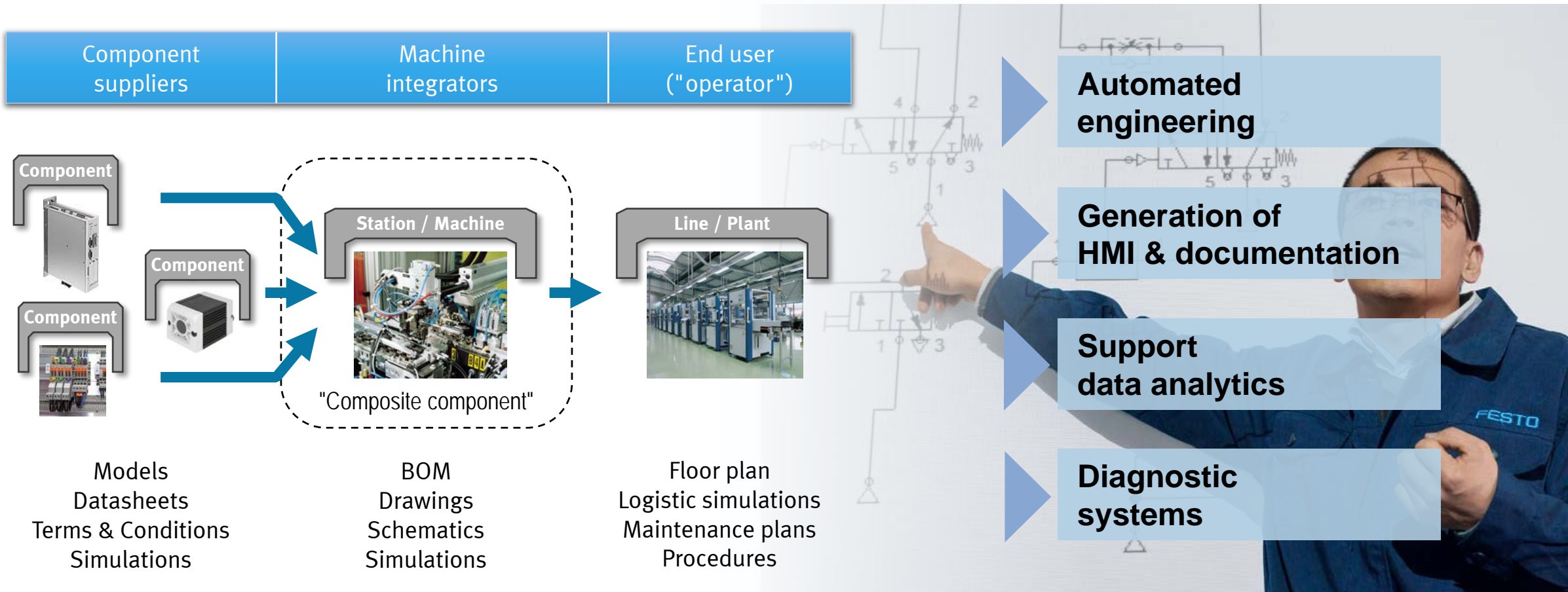
- Basic-Function: No accidents
- No information of and for drivers
- Rigid traffic flows



- + Auto
- + Navigation
- + Net

- Networking: Traffic lights adapt to traffic situation
- Adaption: Your car can choose a different route
- Energy efficiency: Your car brakes optimally
- Business Model: What would you pay for your green wave?

The Administration shell is used for the **entire factory lifecycle** ..
.. and enables benefits for **engineering and operation**



Current status of Platform Industrie 4.0

International specification of the Administration shell



France / Italy / Germany

International reference architecture for Smart Manufacturing

Joint Working Group 21



China, France, Germany, Italy, Japan, Korea, Sweden, USA, ..

Information exchange by Administration shell

Many different initiatives committed to one unifying information exchange format

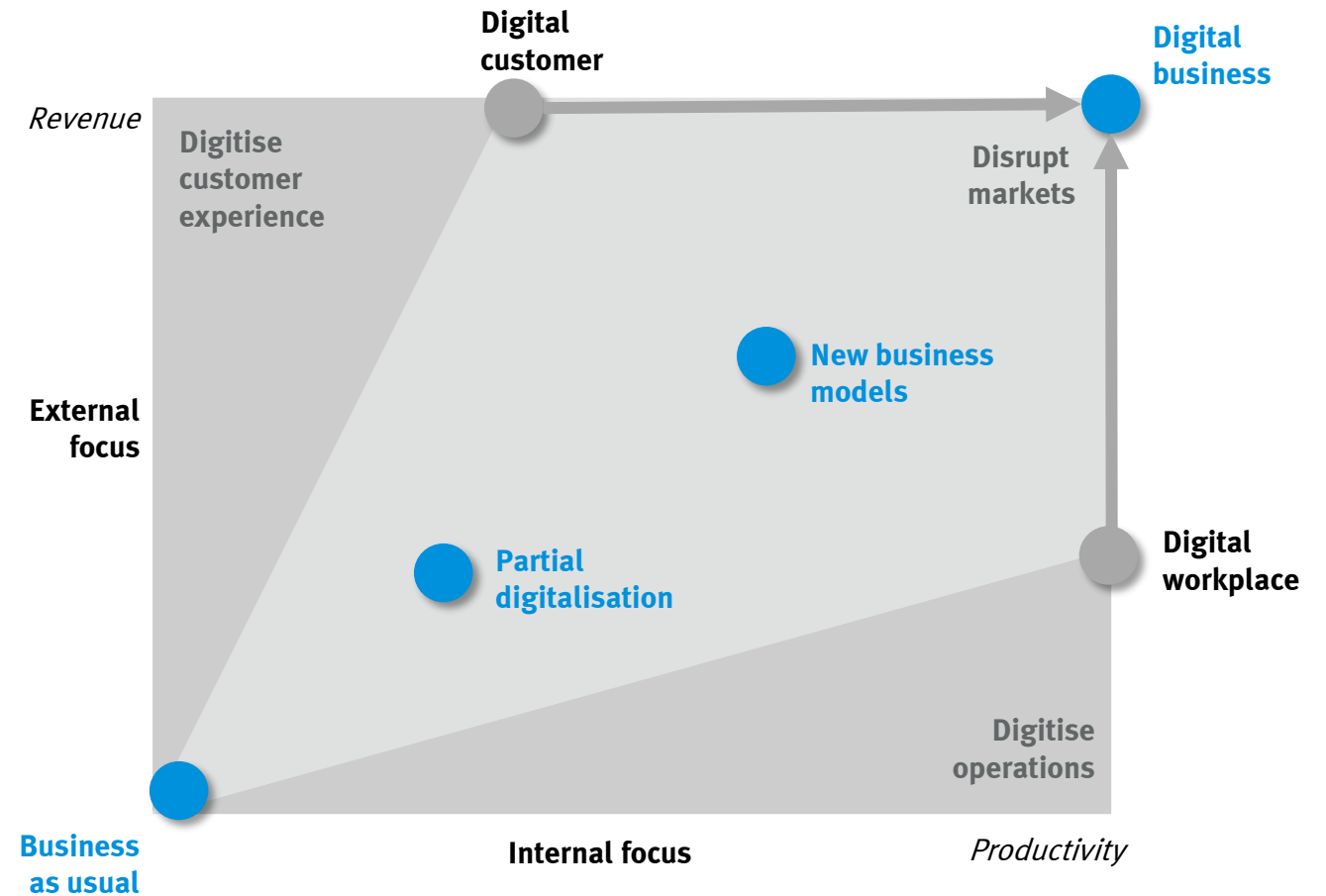


Currently under development

Strategic dimensions and objectives of digitalisation at Festo

Objectives for digitalisation at Festo

- ❖ Increase productivity
- ❖ Sell added value
- ❖ Secure growth
- ❖ Expand innovation leadership



Digitization Program - Overview



DIGITAL OFFERING

CREATE ADDED
VALUES FOR OUR
CUSTOMERS

SELL DIGITIZATION

DIGITAL TRANSFORMATION

UTILIZING AND
LIVING DIGITIZATION
WITHIN THE COMPANY

Definition of Digital Products

Business Model¹

Channels/Collaboration (e.g. E-Business, App World, Digital Support, Platforms & Marketplaces), Income Model (e.g. Licensing) ...

Combined Offers

Condition Monitoring, Predictive Maintenance, Energy Efficiency, Process Optimization ...

Smart Services



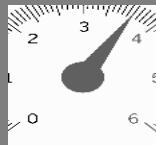
Process
Enforcement
and Execution



Overall
Equipment
Effectiveness



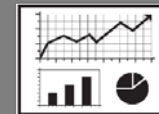
Production
Traceability



Manufacturing
Performance



Product Quality



Process
Optimization



Asset
Information
Network



Energy
Monitoring

Smart Products



Product

+



Intelligence

+



Networking

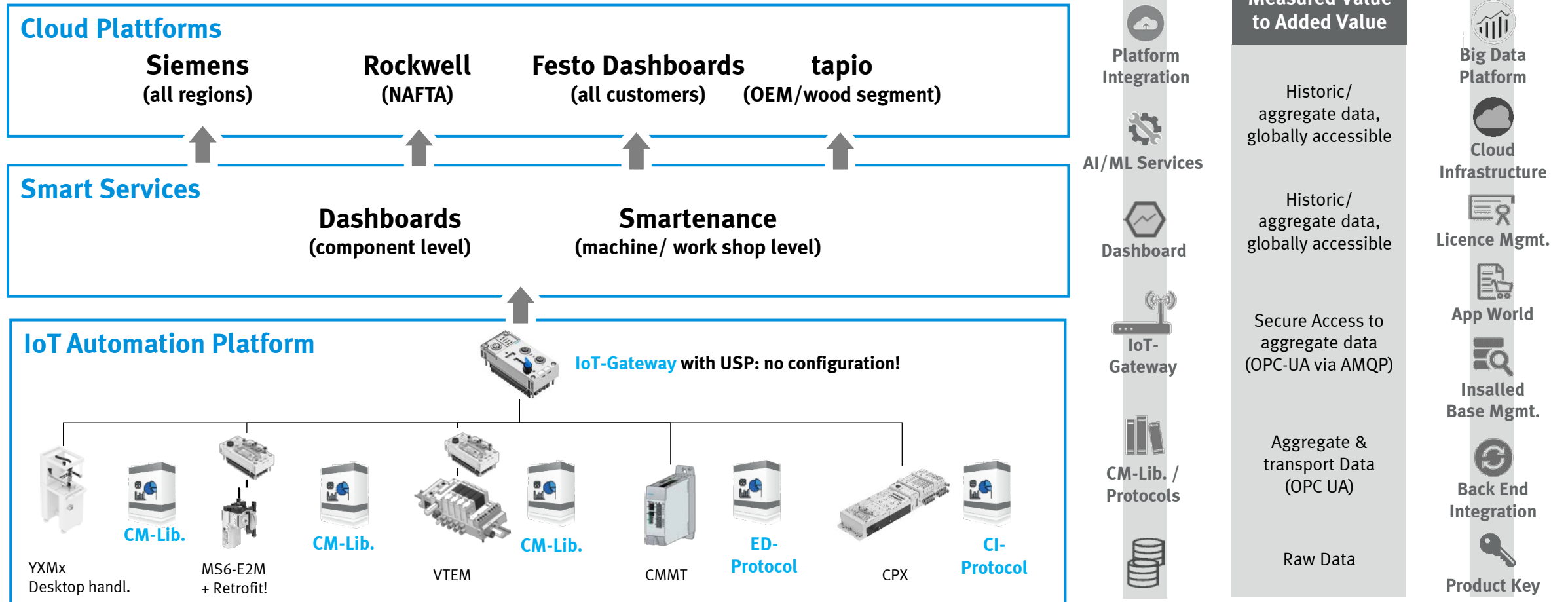
+



Communication

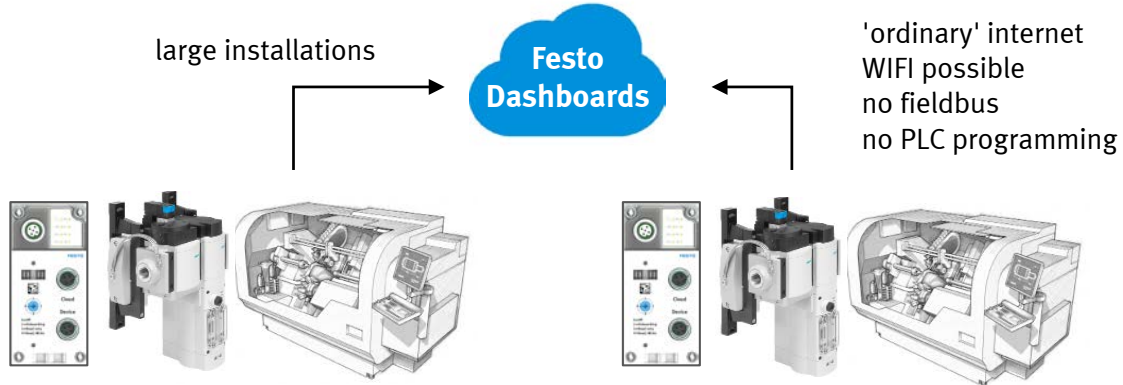
¹ changes to existing business model might apply

Festo provides pre-configured solutions for Internet of Things



Applications | 2 of many

Retrofit existing shopfloors



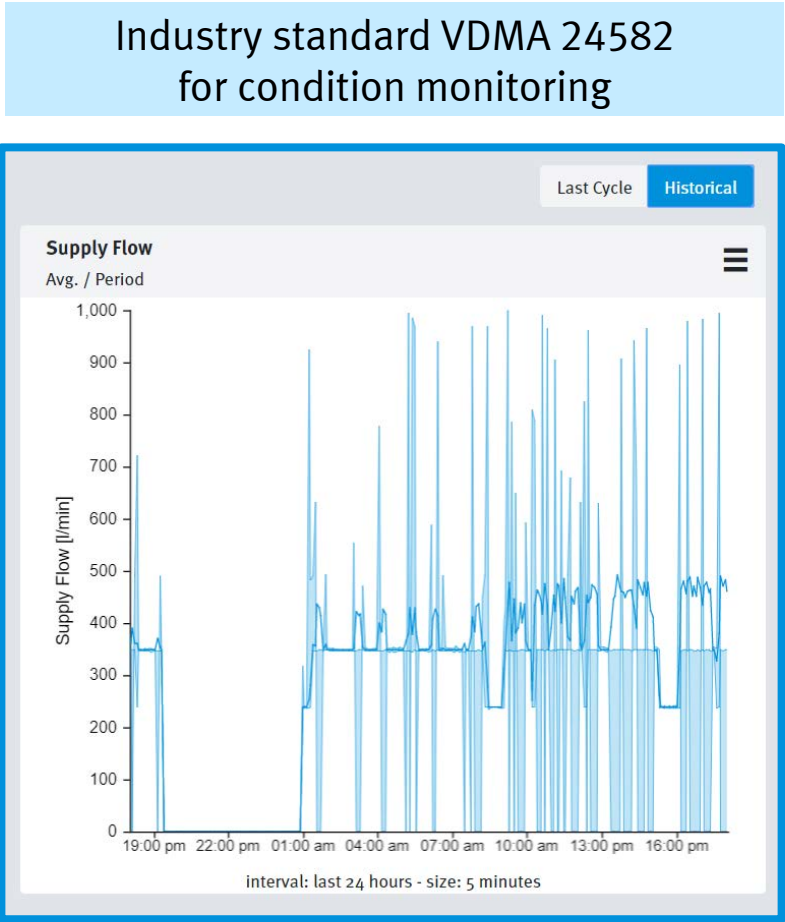
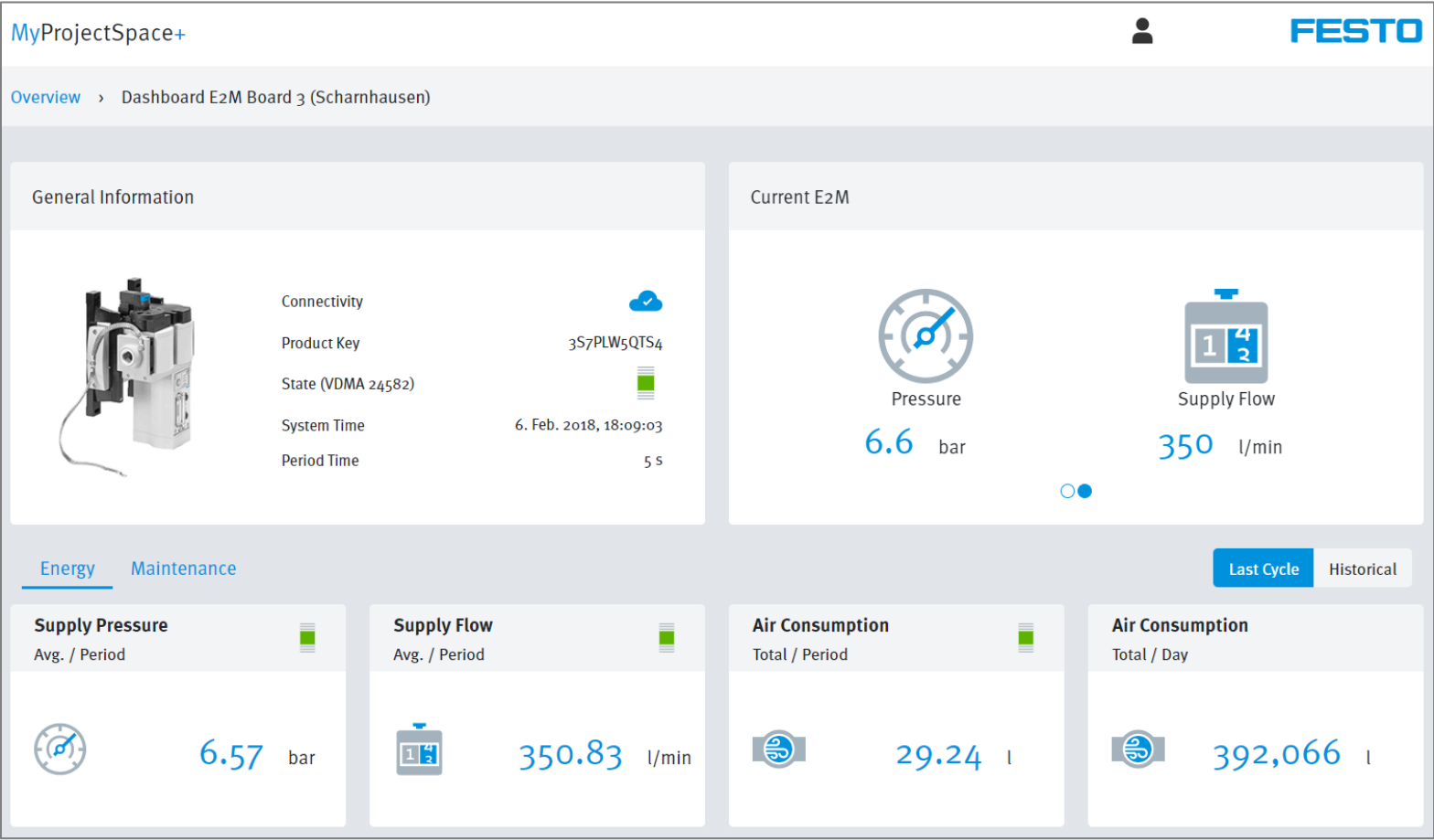
- Retrofit existing shop floor, e.g. machine tools
- 10, 20, 30, .. machines
- multiple halls, different sites, ..
- monitor energy consumption, check for leakage trends
- collect data for certificates (CO2) and reports
- analyse unusual events, usage, occupation
- 99 users, 1 year of data retention

IoTize conventional assembly machine



- compatible with existing ethernet fieldbuses (PN, EIP, ..)
- compatible with existing controls, no programming!
- monitor condition counters -> maintain w/o production break
- error diagnosis of CPX with clear-text messages
- error-log possible
- monitor field bus status, shifts per day, ..
- OEE, productivity up to 1 year

Festo Dashboards - Pre-configured turn key solutions for our customers' Top 3 daily use cases



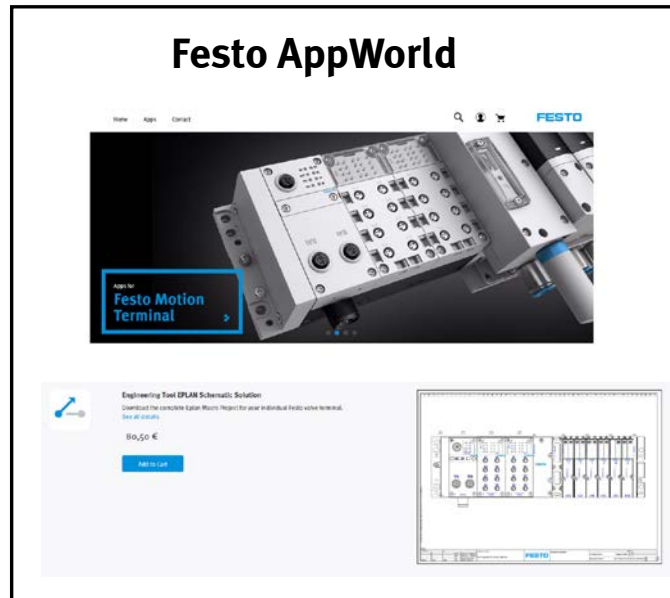
Digital Customer Journey - Intuitive digital support of customers for all customer touchpoints



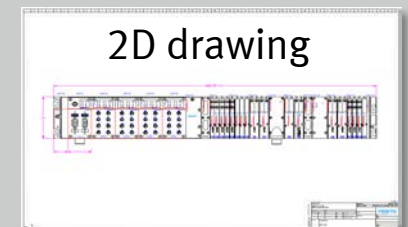
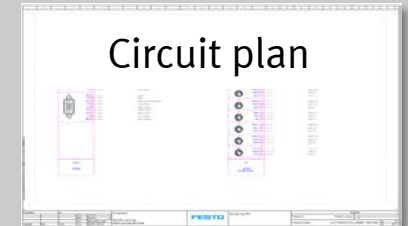
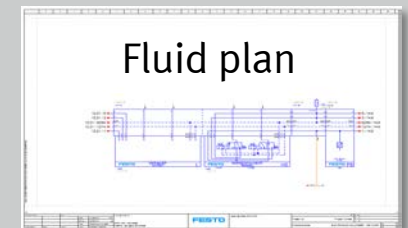
Automatic generation of electric and fluidic schematics via Festo App World

- High saving potential by automated plan generation

IC1: 50E-F06GCQPERERERER-D+HBABE
IC2: 32P-SGL-R-MAHAHBHLBHIIIUPEBHAH
-5J3LJLHS5JL+6TJ



ZW1 & PDF File

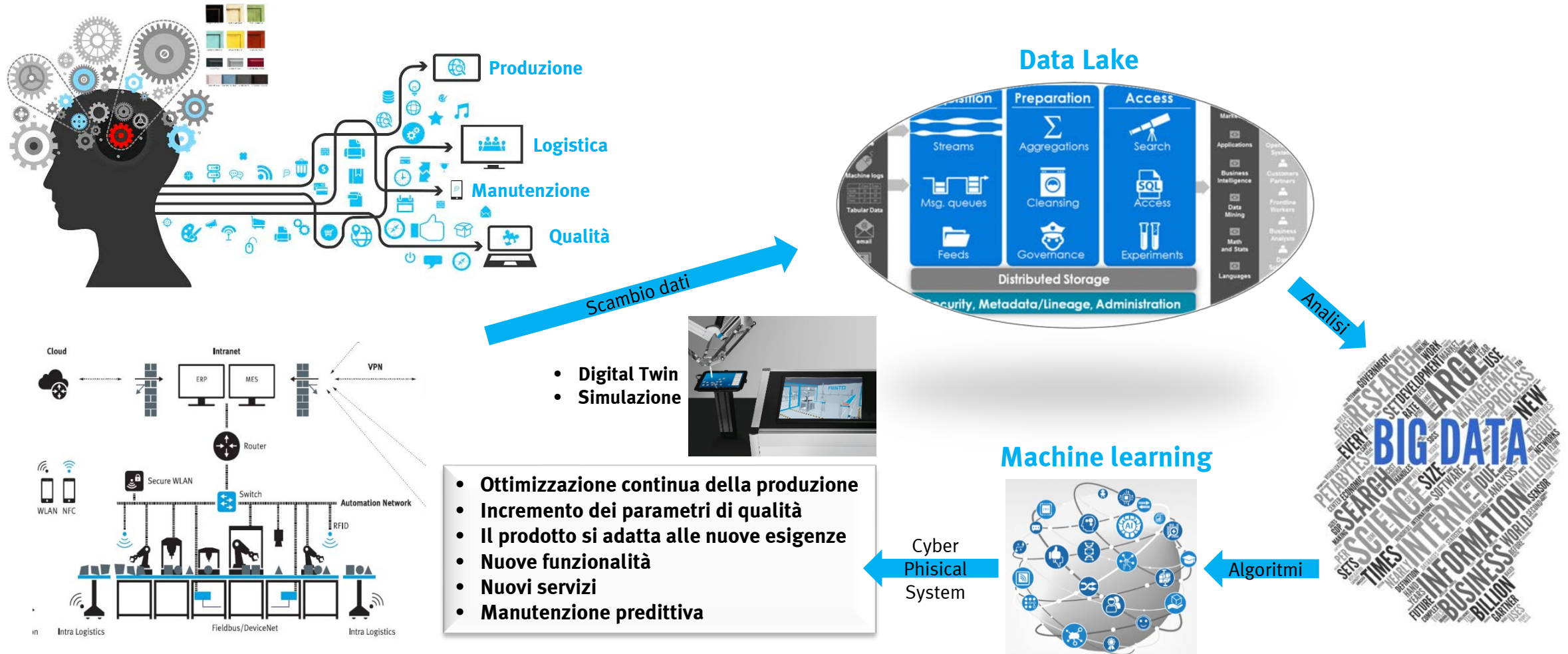


No manual steps for Festo components

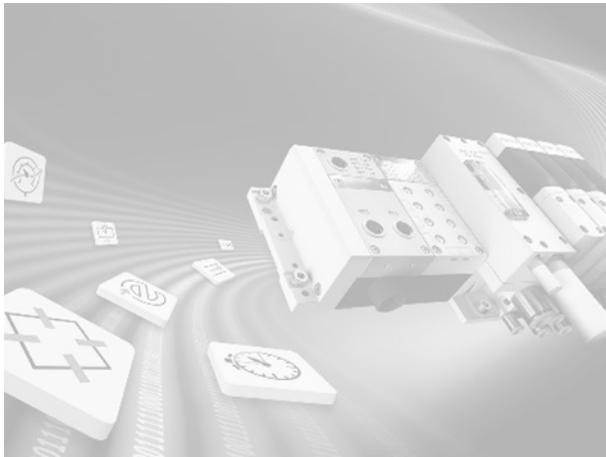
- Just a few **minutes** runtime
- Improved fail safety



Design process and organization - 3.0 Vs. 4.0



Digitization Program - Internal



Digitalisation needs new **skills, competences and culture** within the organisation

Cooperation and alignment are essential to interlink „Digitization“ within the company

Operations

Digitization and Industry 4.0
in the value chain



Human Resources

New working areas,
methods and environment



IT department



Cloud Readiness– hybrid & scalable

- Build up suitable infrastructure and processes
- IT Security
- Big Data & Analytics platform
- Installed Base Management
- License management
- Backend Service Integration

Skills Development Qualification 4.0



Festo Technology Plant: **Smart Factory 4.0**



Riduzione costi, lotto adeguato alla domanda



Flusso di info e materiali continuamente ottimizzato

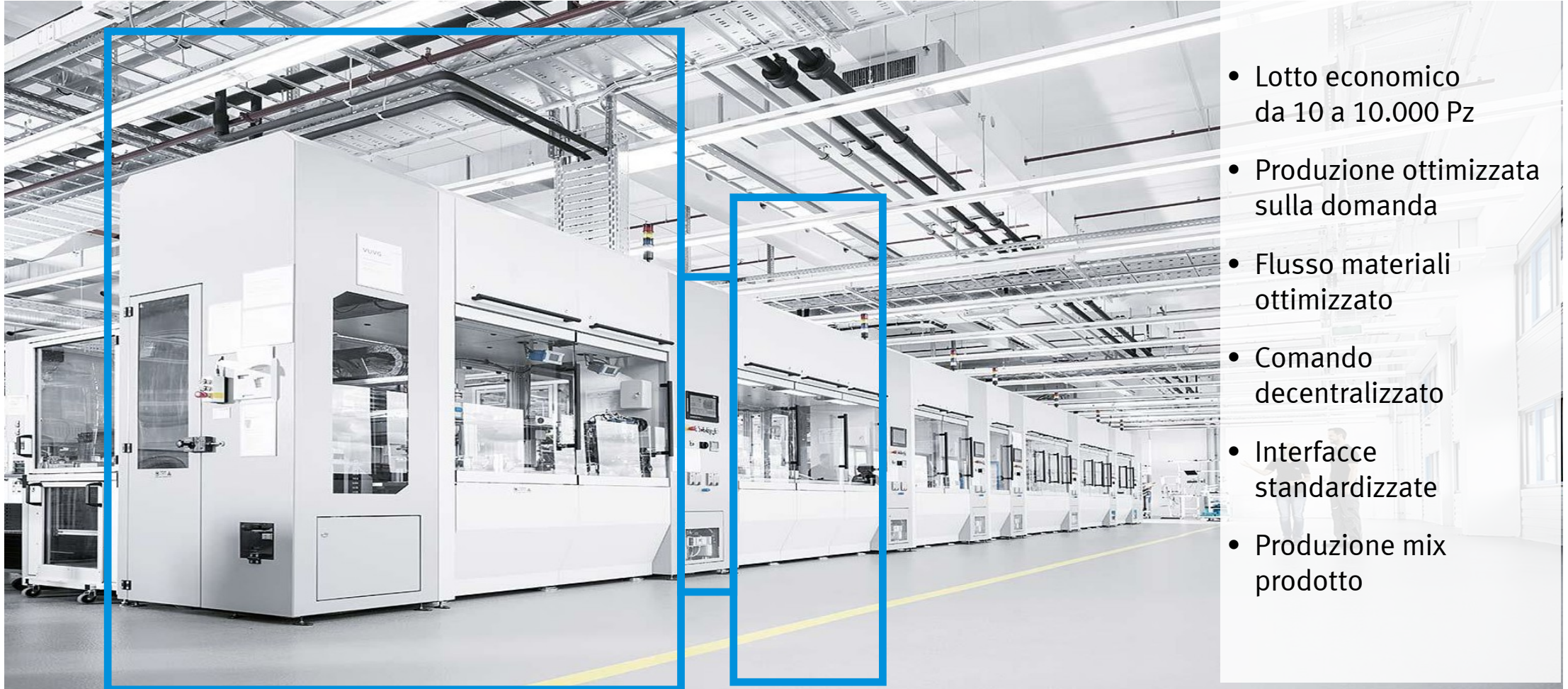


Edifici in Energy Network e efficienza in produzione



Continuo training on the job e Learning centre in loco

Modular Assembly Line: Decentralized intelligence



- Lotto economico da 10 a 10.000 Pz
- Produzione ottimizzata sulla domanda
- Flusso materiali ottimizzato
- Comando decentralizzato
- Interfacce standardizzate
- Produzione mix prodotto

Modular Assembly Line: Decentralized intelligence

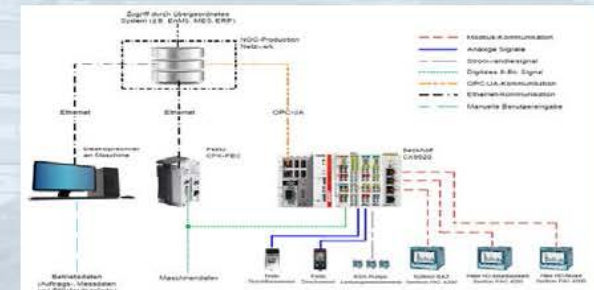
- Lotsizes 200-2000, Lotsize 1 possible, 1.2 million products /a
- SAP/ RFID controlled recipe management
- 400 IP addresses in machine network
- Data science and analytics:
cycle time **13** ➡ **11 sec**,
+15% productivity



CHARACTERIZATION

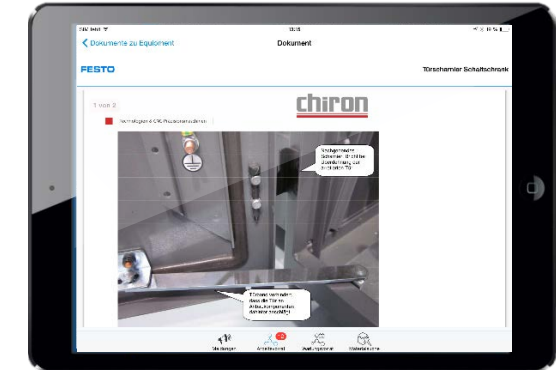
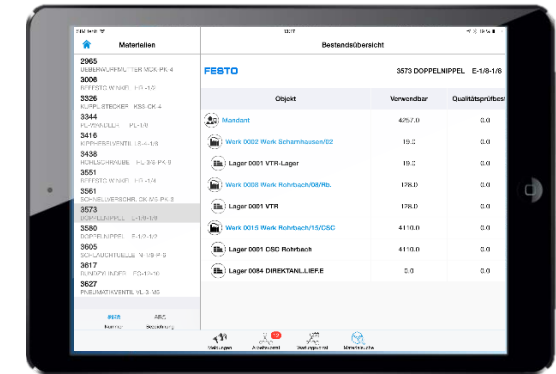
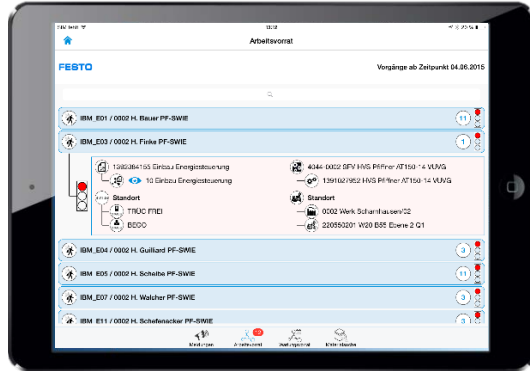
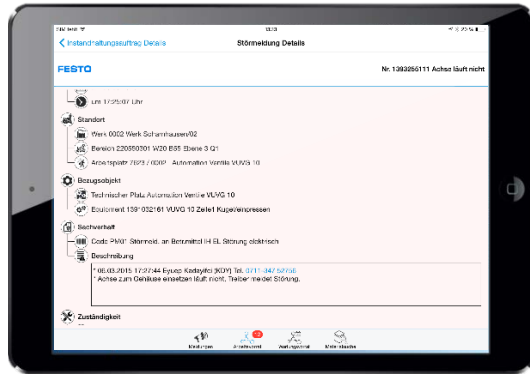
- ## ADVANTAGES

-



Status: Pilot

Industry 4.0 share



0 %

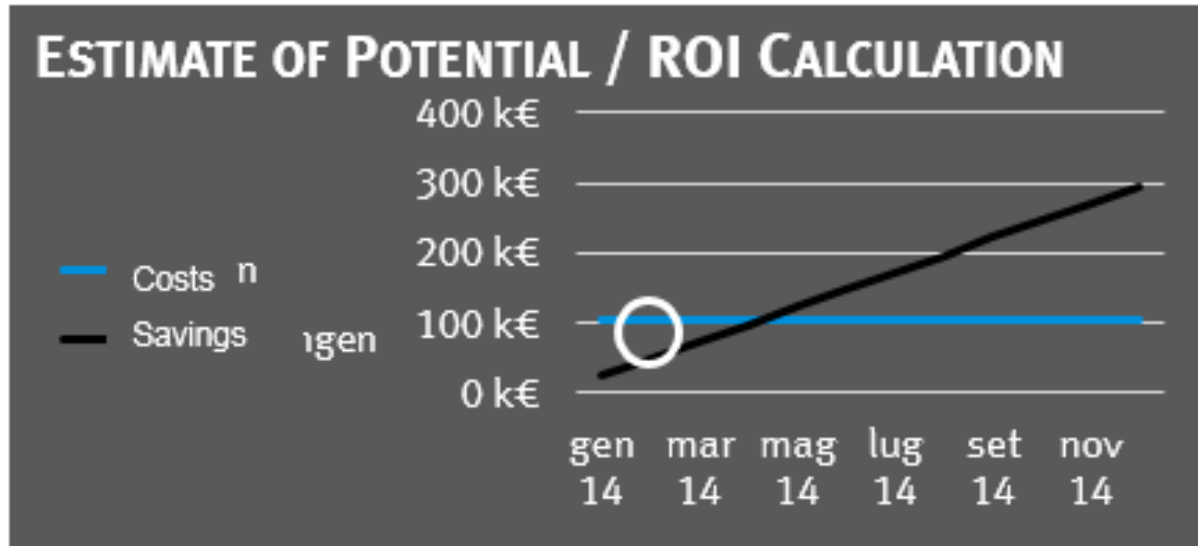
25 %

50 %

75 %

Industrie 4.0

Mobile Maintenance



SUMMARY



- ROI of 4,3 months
- about 190.000 € saving in Scharnhausen and Rohrbach in the first year
- High worker's acceptance of the solution
- Further positive effect: Machine linkage leads to higher availability of production

BUSINESS CASE

- 10 Mins Time saving per notification resp. maintenance
- Year 2014: about 19.000 incidents, 2.000 maintenances
- Leads to time saving of about 3.500 hours for person (two man years) & machine
- According to labor costs & machine hour rates this results in a saving of
- iPads: 46 devices, total 23.400 €
- Cases: 3.500 €
- Licenses: 79.000 €
- Total Invest:

+ 295.000 € *

**+ ca. 190.000 €
p. a.**

- 105.900 €

* Without positive effects of machine linkage

Benefits of comparing machine KPIs and Energy KPIs



1. Bottle-neck optimized work flow

(a chain is only as strong as its weakest part)

- reduce machine performance according to bottle neck situation (1st step: SAP)
- Avoid buffer stocks, one-piece-flow
- Reduce waste of energy

2. Energy Peak management

- Transparency or real (basic) load
- Team targets e.g. -2% p.a. or per part
- Avoid peaks, start the machines different
- reduces energy bill (2-3 GWh, ROI <3 years)

3. Utilise available energy sources better

- pre-heat galvanic baths are by “waste” energy of other machines and compressors

Learning Factory



220 m²

Attività
operative
selezionate



Training
Package
dedicati

Room 1
Chip removal

CNC-programming

Deburring

SPC-measuring

Seminar area

Room 2
Assembly

Valve assembly

Testing

FVP

Quality

Room 3
Technology,
Processes, Products

Automation

Energy efficiency

Elektronics

Product training

Room 4
Media-Center
PC-Station

Office

Trainings-
equipment

PC-Stations

Cyber Physical Factory for training and Education

Virtual emulation:
this will enable automatic
start-up and reconfiguration.

Plug and produce components:
facilitate the exchange of defective
production units and the reuse of
individual units for new products.

“I am finished.”

Condition Monitoring:
the filter reports a
contamination level of 95%.

“I continue on to station 2.”

