March 27, 2017 Baden-Württemberg – Driving Force for the Fourth Industrial Revolution in Germany

Mike Nager, Solution Center
Festo Didactic Inc.
Festo Group – Industrial Automation and Education
An independent family-owned company

Turnover: 2.5 billion EUR / 19,000 employees worldwide / 61 subsidiaries
Active in 176 countries for 300,000 clients

Innovative and self-learning: 3,000 patents, more than 100 innovations/year
Education investments: 1.5% of sales
Festo Didactic – Symbiosis of Industry and Education

Increasing the productivity of over 300,000 clients worldwide
# Festo Didactic – Technical Education Solutions

<table>
<thead>
<tr>
<th>Training and Consulting Services</th>
<th>Classroom Equipment</th>
<th>Curricula, Programs und Certification</th>
<th>Learning Centers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seminars, Training Programs, Courses, ...</td>
<td>Design and Installation of Learning Labs / Classrooms</td>
<td>Development of customer specific curricula, education programs and certifications</td>
<td>Managed Services: Operation of Learning Centers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Manufacturing Industry</th>
<th>Educational Institutions (Universities, Colleges, Voc. Training Centers, ...)</th>
<th>Industry / Government</th>
</tr>
</thead>
</table>

**We are maximizing learning success, employability and proactivity**

- 950 employees
- In more than 60 countries
- 42,000 Seminar participants annually
- Festo Labs in 36,000 Technical Educational Institutions
- 360 Festo apprentices (DE, US and CN)
Deploying disruptive technologies will change the way we produce tomorrow

Monitoring trends in industry and education

New technologies in industry

- Industry 4.0
- Mechatronics
- Dig. Factory
- Factory Communication
- Rapid Prototyping
- RFID
- Energy Productivity

New and changing job roles and requirements

New and increasing challenges regarding the qualification of technicians and engineers

source: McKinsey Global Institute 2014
“Adapt or Die!”

Karl-Heinz Land
Digital Darwinist

“Uber yourself before you get Kodaked”

Valter Adao, Deloitte Digital
The biggest challenges on the way to Industry 4.0 ......

<table>
<thead>
<tr>
<th>Issue</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Security Concerns</td>
<td>7%</td>
</tr>
<tr>
<td>Lack of Budget</td>
<td>4%</td>
</tr>
<tr>
<td>Lack of Management Buy-In</td>
<td>4%</td>
</tr>
<tr>
<td>Lack of Compatibility of systems</td>
<td>14%</td>
</tr>
<tr>
<td>Lack of expertise and know-how</td>
<td>29%</td>
</tr>
<tr>
<td>Manpower shortage for implementation</td>
<td>18%</td>
</tr>
<tr>
<td>Poor Cost/ benefit ratio</td>
<td>14%</td>
</tr>
<tr>
<td>Unclear Standards</td>
<td>11%</td>
</tr>
</tbody>
</table>

Smarter Products: Value-added services and new business models

- Product
- Communication
- Networking
- Intelligence

Value-added:
- Process Enforcement and Execution
- Overall Equipment Effectiveness
- Production Traceability
- Manufacturing Performance
- Product Quality
- Process Optimization
- Asset Information Network
- Energy Monitoring

Business Model:
- Predictive Maintenance
- Customer Support Portal
- Pay per use...
How can we make Industry 4.0 more tangible?
Industry 4.0 – Key Questions

1. What new opportunities are offered by using Industry 4.0 methods, processes and tools?

2. What impact do smart factories have on job roles, workforce and factory management?

3. How can we quality staff to make it happen?

→ Smart people for smart factories
Control of production is becoming more intelligent and adaptable

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

“I continue on to station 2.”

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

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

“I am finished.”
Currently 5 innovative IT projects at Festo Technology Plant, Scharnhausen

- SAP ME / MII Integration
- Energy Data Management
- Traceability
- Mobile Maintenance
- Overall Equipment Effectiveness
# Competency-based training using the example of a machine operator

## 1. What are the company's objectives

- Flexible production
- Customer focus
- Top quality
- High machine and plant efficiency

## 2. Which tools from the I 4.0 toolbox help achieve these objectives?

- Data processing: Analysis for process monitoring and control
- Man-machine interface Decentralised /mobile process monitoring
- Monitoring: record operating status and functionality for diagnostics

## 3. Which skills does an operator need to master the relevant I 4.0 tools?

- Can interpret and explain performance indicators
- Recognize, analyze and interpret deviations
- Identify cause, initiate measures
- Understands the technical networking of man and machine

## 4. Which competencies must be developed?

<table>
<thead>
<tr>
<th>Competence</th>
<th>Mastered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance indicator orientation</td>
<td>✔️</td>
</tr>
<tr>
<td>Analytical skills</td>
<td>✔️</td>
</tr>
<tr>
<td>Problem-solving skills</td>
<td>✔️</td>
</tr>
<tr>
<td>Ability to learn</td>
<td>✔️</td>
</tr>
<tr>
<td>Social competence</td>
<td>✔️</td>
</tr>
</tbody>
</table>

## 5. Place of Learning: Learning Factory

- Flexible production
- Customer focus
- Top quality
- High machine and plant efficiency

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*Slides courtesy of Dr. Theodor Niehaus, Festo Didactic SE © Festo Didactic SE 2016*
CP Factory – cyber - physical Learning, Teaching and Research Platform
Vocational training profiles and job profiles in the context of I4.0

- Industrial mechanic
- Plant mechanic
- **Mechatronics technician**
  - (Information)
- Electronics technician
- Production technologist
- Warehouse logistics specialist

- Maintenance crew
- Machine operator
- Process optimizer
### Industry 4.0 Application scenarios require new competencies

- Ability to learn
- Abstractive ability
- Systemic thinking
- Problem-solving skills
- Working and learning in inter-disciplinary teams
- Context relevant Industry 4.0 expertise e.g.
- Network technology
- Sensorics, Robotics
- RFID technology...

#### Key Competencies:

- **Real-time data analysis**
- **Maintenance crew**
- **Help design energy transparency concept**
- **Use 450 IP addresses**
- **Use Virtual reality**
- **Understand autonomously regulated capacity utilization with bottleneck-oriented production control**
- **Control, monitor and improve human-robot collaboration**
For Brochure Download: http://bit.ly/2okk7JF