
Requirements and challenges to employees and managers in the era of industry 4.0.

Dr.-Ing. **Martin Wolpers**

Fraunhofer Institut für
Angewandete Informationstechnik FIT

Maik Kiesel, Sciforma GmbH



Digitalization → Internet of Things and Services

Hand writing – Books – eReader

Music Instrument – Disk – CD - Streaming

Film – CD – Netflix

Theater – TV – Youtube

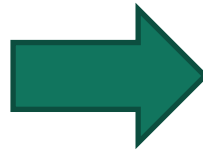
Letter – Email – SMS – Facebook

Object – Identification – Communication – „Intelligence“



Change in Workplace Learning (IoT, IoS, Smart, Big Data)

Learning @ computer



Learning with the computer



- Serious games
- Learning at the workplace
- Learning supported by new sensors
 - AR/VR
 - Wearables
 - Smart clothing

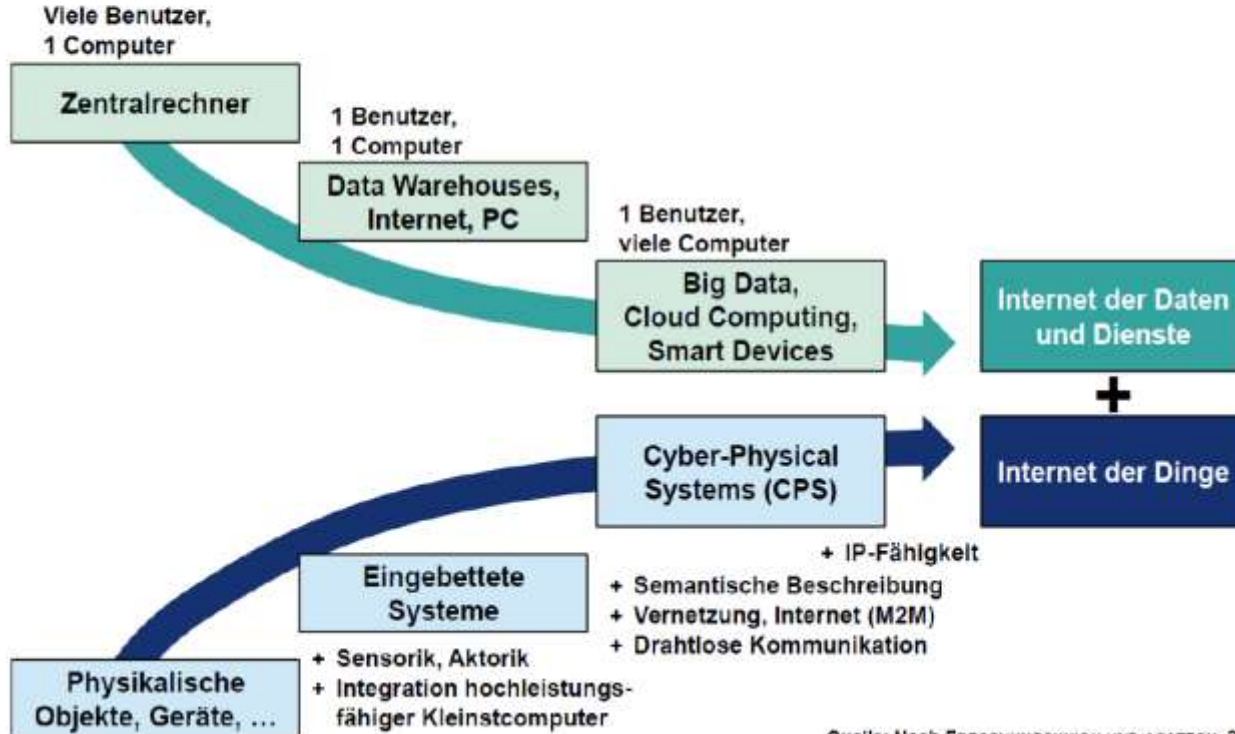


Industrie 4.0 – What?

LINEAS - Industrie 4.0 & IT



Zwei konvergierende Technologieentwicklungen als Innovationstreiber



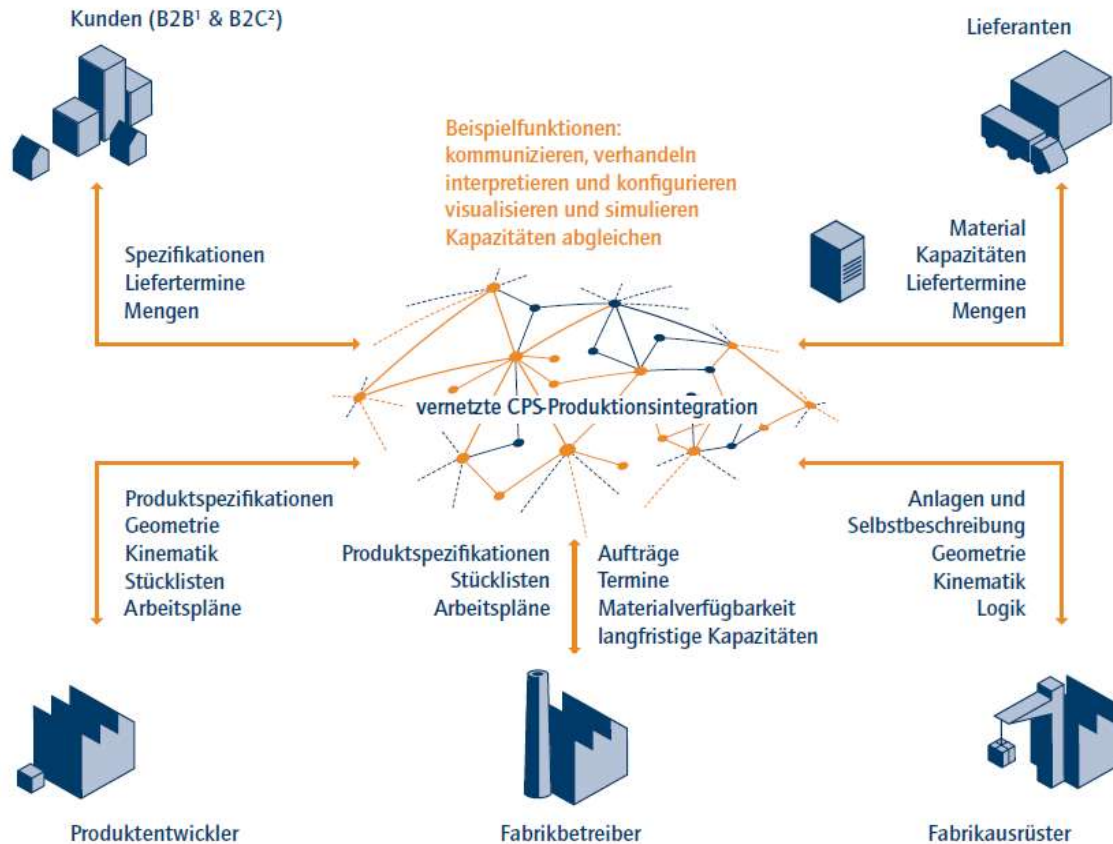
Quelle: Nach FORSCHUNGSUNION UND ACATECH, 2013

http://de.slideshare.net/PeterSchorn/20140128-prsentation-industrie-club-bs-industrie-40?qid=1839b79f-ac92-4fda-a377-52e4e7562d1e&v=default&b=&from_search=4



Networking systems and data

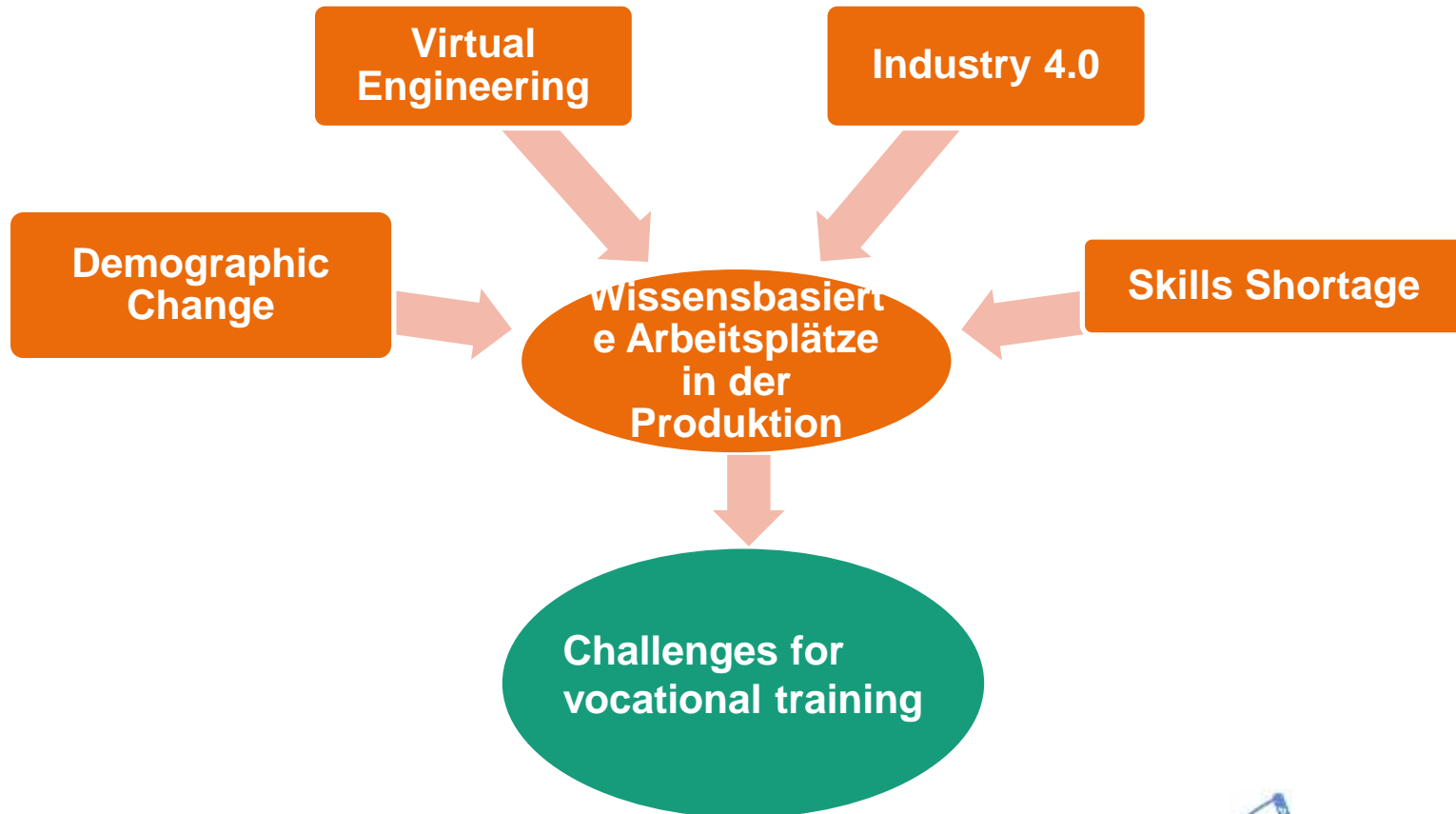
Abbildung 2.9: Beispiele für ausgetauschte Informationen der Beteiligten in der Produktion



¹ Business to Business
² Business to Consumer

Digitalization and Industry

Changed manufacturing environments influence development of workforce



Examples for new approaches to vocational training

Time reduction for introducing new technologies and processes

Change of work from production to control, maintenance, etc.

Change of production line organisation (projects for higher flexibility)

Cost reduction for introducing new technologies and processes

→ **Cost Reduction**



Project-based industrial production



Implemented through project management

Stakeholders industrial production

Production line

management, project manager, sales department, department manager, project collaborators, resource managers, controlling and the purchase department,

! external project collaborators !

! suppliers and the customer !

(Resulting) activities

Extending above with project collaborators (illustrator, constructor, developer, hardware developer, software developer, process developer, technician, etc.)

➔ Very well developed communication skills required



Communication in project-based industrial production

All stakeholders have direct access to information channels via devices and software tightly integrated into the workplace and –process.

Example

A production line worker comments on the production process directly and immediately.

➔ Detailed overview provided and direct control enabled



Missing skills and competences



Recognize and improve once own skills and deficits



Creativity



Problem solving



Cooperation / Collaboration



Communication / knowledge Exchange

These competences are recognized as most important (next to 21st century skills) by Industry 4.0 companies.

Vocational training in companies often does not address them.



Lot's unclear...

Vocational training in the Industry 4.0 context

- Collaborative Learning
- Self-reflective Learning
- Informal Learning
- On-the-fly
- On-the-workplace
- Serious gaming
- Mentoring Concepts
- Adaptive and personalized learning assist systems

Theories long known.

Currently unknown are the **most suitable combinations** of them.

Few experiences with Industry 4.0 related vocational training scenarios.



Education – A „possible“ Future

- New ways for collaboration – *Collaborative Learning*
- (Big) Data Analysis enables better personalization – *Individual Adaptation of learning material, -presentations and pedagogy*
- Better realization for „new“ pedagogical concept – *more efficient and effective Learning*
- Increase in Motivation – Teaching and Learning makes *Fun*
- Power of endurance – complete learning endeavors



Thanks for your attention!

Questions?

Dr.-Ing. Martin Wolpers
martin.wolpers@fit.fraunhofer.de
+49 2241 14 21 28

<http://www.fit.fraunhofer.de/de/fb/cscw/caple.html>

