

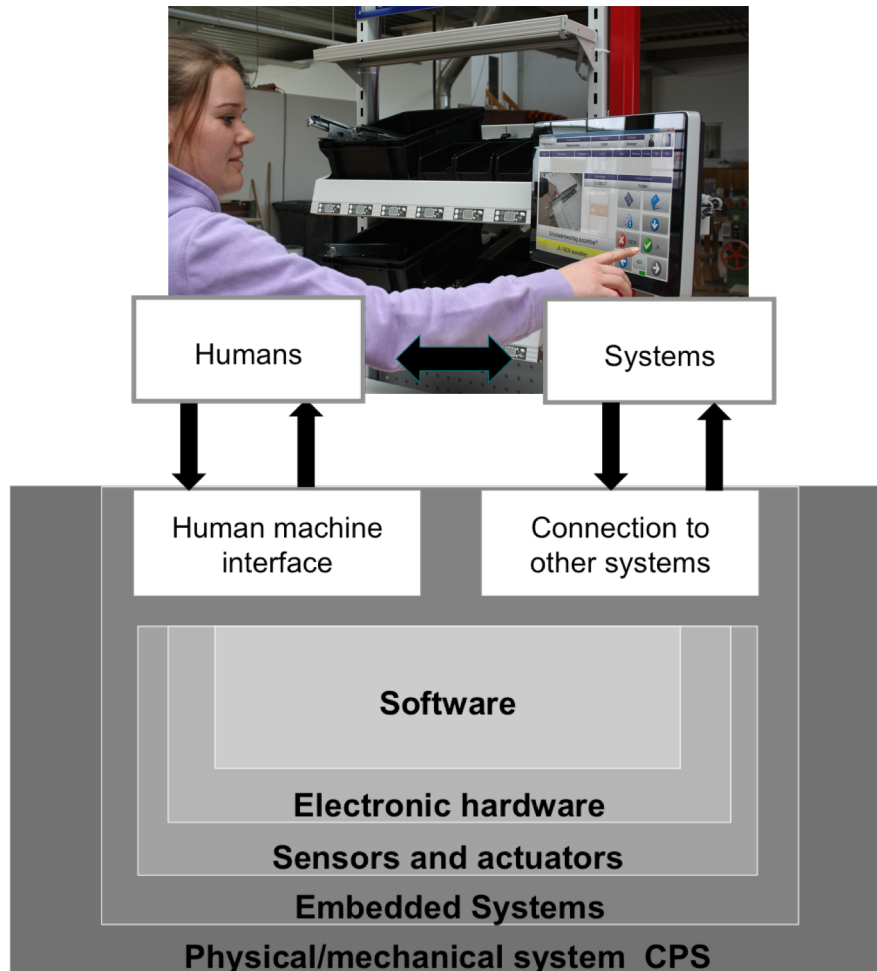


‘Industrie 4.0’ and an Aging Workforce – A Discussion from a Psychological and a Managerial Perspective

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The Internet of Things and Production



Pervasive digitalization

Integrated cyber-physical systems

- Computer-Integrated networking production systems

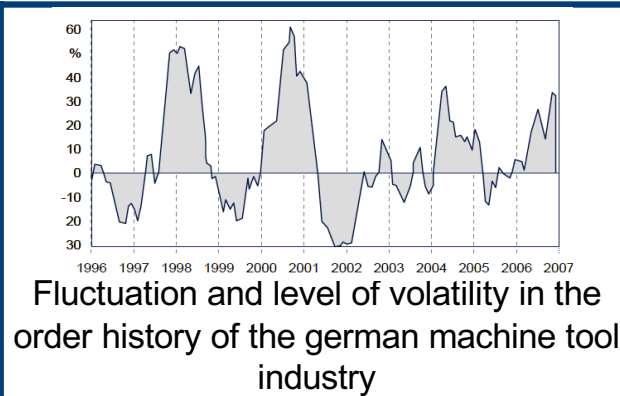
Leads to:

- Improved capacity utilization
- Improved cost-effectiveness

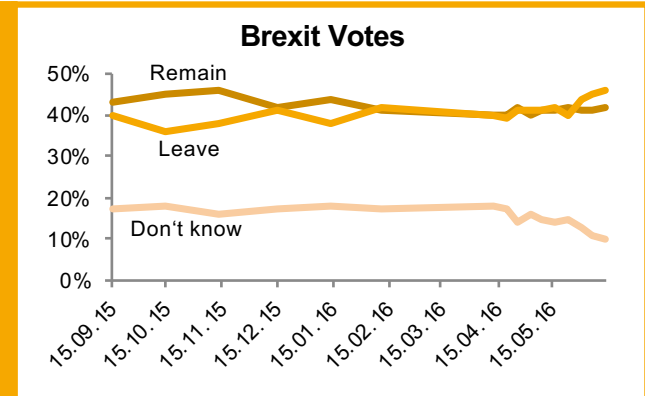
We live in a VUCA world

The components of VUCA describe an environment that confronts companies with huge challenges of digitization.

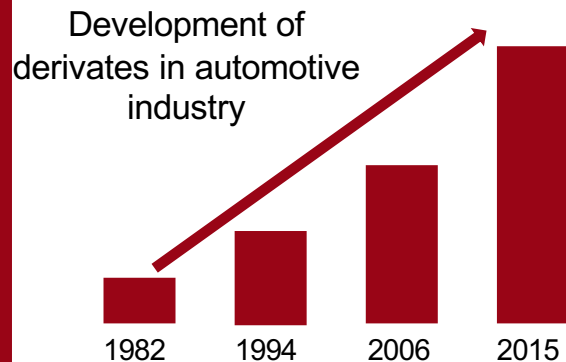
V
Volatility



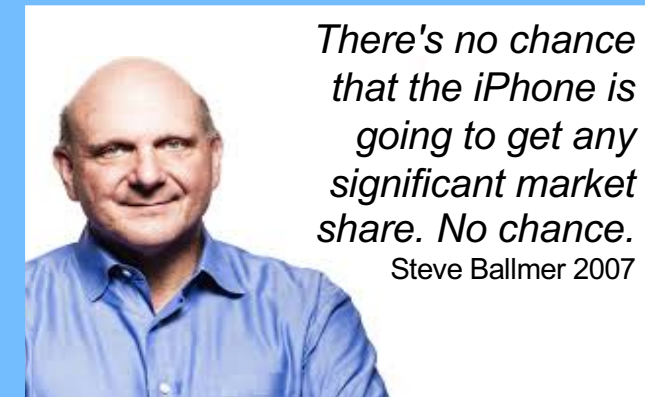
U
Uncertainty



C
Complexity



A
Ambiguity



Bennet/Lemoine, 2014a; Bennet/Lemoine, 2014b.

What will we have to adapt to?

Transition in engineering work

- Self-optimizing, individualized, integrated processes
- Regulatory and monitoring tasks

Challenges in

- Managing knowledge
- Sharing responsibility
- Dealing with **complexity**

What are required skill-sets?

- **Cognitively, socially, technical?**

Challenges in the digital workplace

Automation Scenario	Tool Scenario
<ul style="list-style-type: none"> ▪ CPS guides skilled workers ▪ Work is determined by technology ▪ Autonomy of skilled workers is limited ▪ Emergence of a skill gap: Skilled workers cannot develop/build up the know-how for dealing with problems anymore ▪ High-skilled employees are responsible for installation, modification and maintenance of CPS. 	<ul style="list-style-type: none"> ▪ Skilled workers guide CPS ▪ CPS is the central domain of skilled workers. ▪ CPS supports the decision-making of skilled workers. ▪ A successful performance requires the provision of crucial information and suitable approaches of vocational education and training due to an increasing demand for IT, electronic and mechanical knowledge.



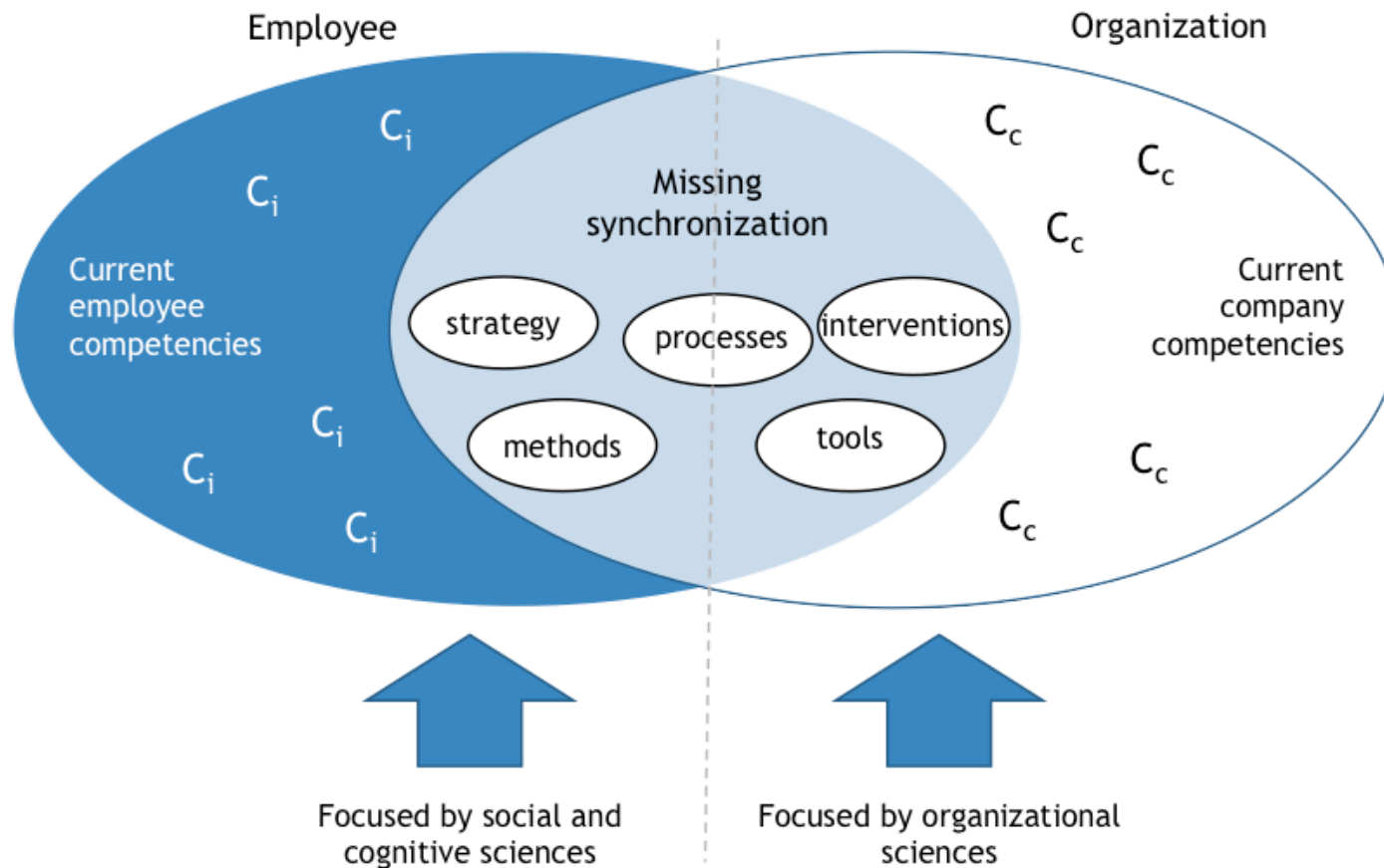
	Technological Complexity	Contextual Complexity
Increasing challenges of CPS for the workforce	<ul style="list-style-type: none"> ▪ Interaction characteristics of technology (interfaces, coordination, information exchange, systems stability) • System architecture and variety of different systems, agents, architectures, devices, or databases 	<ul style="list-style-type: none"> ▪ Broader tasks, roles, or jobs ▪ Open-ended and unstructured tasks (problems) ▪ Less structure ▪ Abstractness ▪ Interpretation and use of information ▪ Collaboration ▪ Information overload

How to find and develop employees?

- 1) Identify critical competences for organizations
- 2) Identify competences of employees

Socio-organizational competence management

Competence Management



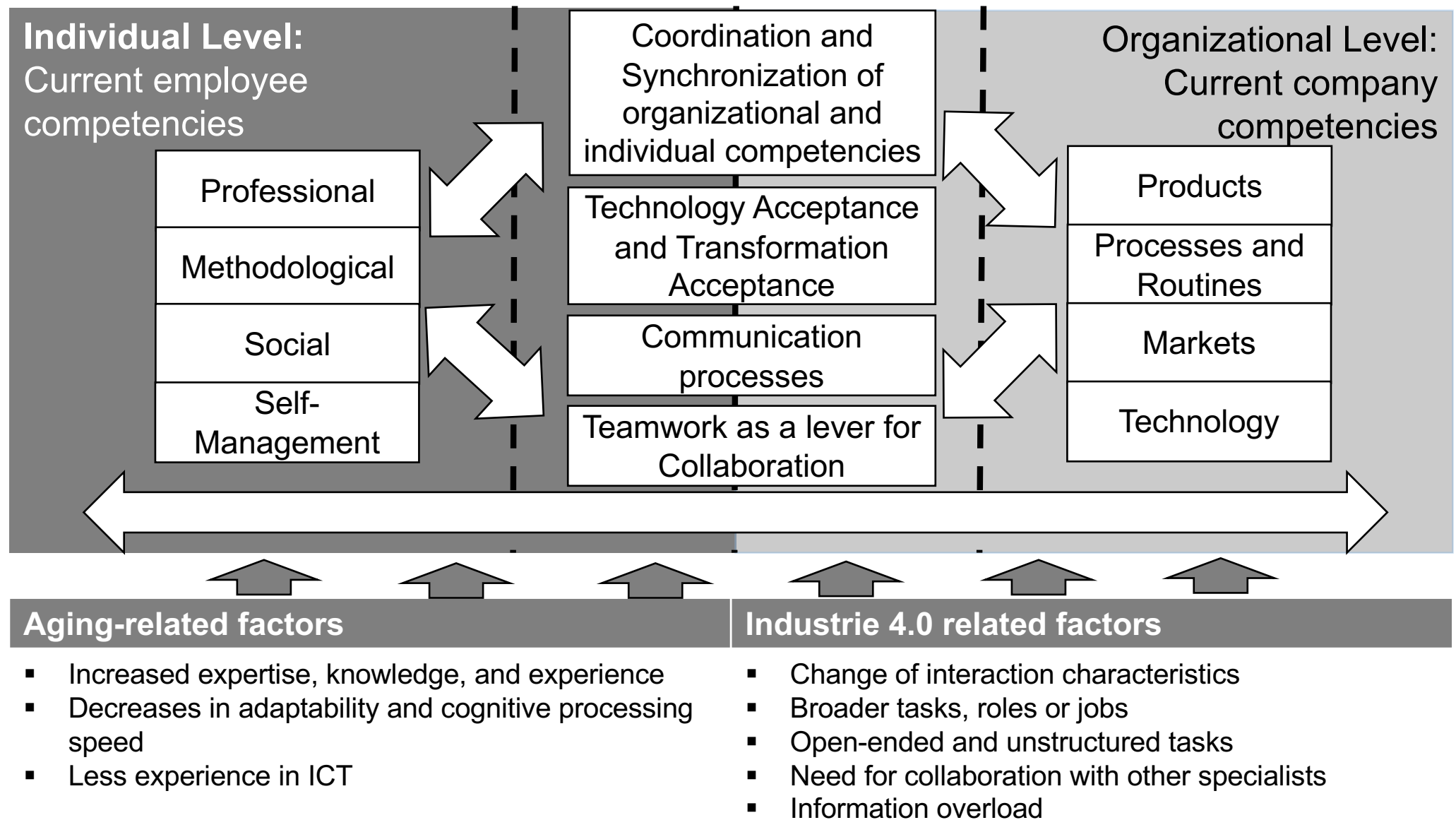
Missing synchronization between individual and organizational competence (Reinhardt and North 2003)

Competence classification

Technical competencies <ul style="list-style-type: none"> • Specialized competencies applicable in specific areas • Professional competencies such as welding, operation of a machine, bookkeeping, designing legal contracts, flawless execution, expertise 	Professional competencies
Methodological competencies <ul style="list-style-type: none"> • Methods with a clear functional focus such as financial mathematics • Methods with broader application areas such as operations research / statistical methods, decision-making abilities, analytical abilities 	
Social competencies <ul style="list-style-type: none"> • Interactional competencies such as managing teams, conflict solving abilities, teamwork, communication skills 	Cross-sectoral competencies
Self-management competencies <ul style="list-style-type: none"> • Competencies relevant to self-organization such as willingness to learn, creativity, efficient organization of individual work processes, quality awareness, reliability, willingness to work, openness to change 	

Letmathe/Schinner, 2017; North et al. 2012; Grote et al. 2006;

Ensuring employability of the aging workforce



Thank you for your attention!

Summary

- Coordination and Synchronization of **organizational** and **individual** competencies
- Technology Acceptance and **Transformation** Acceptance
- **Communication** processes
- **Teamwork** as a lever for Collaboration