



Industry 4.0 – Perspectives for the Working of the Future

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The context of Industry 4.0

Challenges of Digital Change

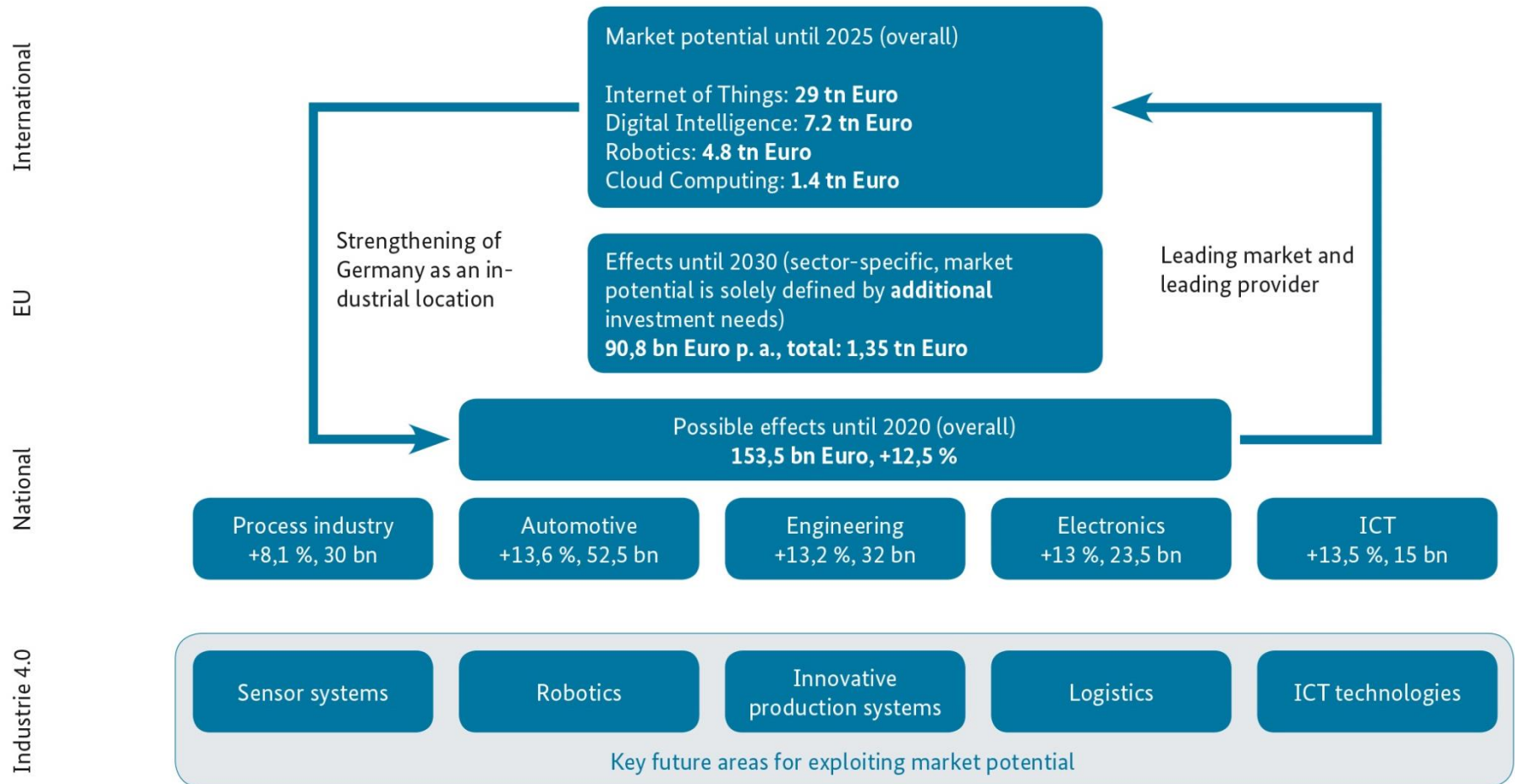
- Strong international competition (USA, Asia)
- Value chain networks, that cross borders between countries and companies
- New disruptive technologies mark a turning point
- Reclaiming and extending the controllability and strength of digital technology

Objective: Strengthening German and European companies to develop innovative solutions

National Key Project: Industry 4.0

- The **mega trend CPS** is of vital importance to answer the question how we are going to produce tomorrow:
 - Acceleration of production cycles
 - Increasing demand for individualized products
 - Penetration of new technologies (innovation at all interfaces)
 - Production that considers the shortage of resources (recycling, substitutional materials)
 - Production in a global world (control of global production networks with ICT)
- We need **adaptive, self-configuring** and **self-organizing** production systems

Expected economic effects through Industry 4.0



Source: iit 2015; the data is aggregated from BITKOM (2014), PwC (2014), Roland Berger (2014), McKinsey (2013)

Digitalization and Labor Market

Results of studies that deal with the influence of digitalization

- BOSTON CONSULTING (2015):
 - Prognosis: 390.000 new jobs will be created during the next 10 years

 - Institut zur Zukunft der Arbeit (2015):
 - Increasing gap between well paid jobs and worse paid jobs
 - BUT: No big changes in the total amount of employed people

 - GRAETZ / MICHAELS (2015):
 - Monitoring the distribution of robots in 17 countries between 1993-2007
 - Use of robots has increased in average about 150%
 - Total amount of employment (amount of working hours) has not changed
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Digitalization and Labor Market

Conclusion with respect to existing studies and literature

- The changes and the impact by the Digitalization are hard to predict for the future
 - Size and employment in the new markets or in niche markets are more or less unpredictable
 - There are no data or experience from the past that allow to predict the development on the labor market by the digitalization
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Qualification needs in Future

- Future requirements for professionals are hard to predict
 - These are depending on company development paths

- In general stronger expected skills:
Team player, reliability, mobility, ability to be precise, negotiation skills, willingness to learn, willingness to cooperate (these requirements are already requirements within job profiles for Mechanical and Electrical Engineering)

- New:
 - **General understanding of machine interactions**
 - **Knowledge about general interdisciplinary methods**
 - **Basic knowledge in statistic (Data Analysis and Data Interpretation)**

Qualification needs in Future

- There is no way to determine the new qualification needs at the moment
 - Especially in a broad field like Industry 4.0

 - There is a need for new methods to determine and predict specific requirements according to:
 - Sectors
 - Type of company
 - Scenarios of work organization
 - Used and applied technologies
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Autonomics for Industry 4.0 Technology programme by the BMWi

- **Measures:** 19 projects, 110 m€ costs, 55 m€ funding, 2014-2017; conferences, workshops, accompanying research on cross sectoral issues, trade fair appearances
- **Additionally:** Identifying new business models
- **Main Objective:** Foster highly flexible production infrastructures that enable disruptive products
- **Central points:** working conditions (human-machine-interaction, safety & security), engineering models (i.e. decision making support schemes), logistics, robotics

more information: <http://autonomik40.de/en>

Foresight Study „Digitale Arbeitswelt“

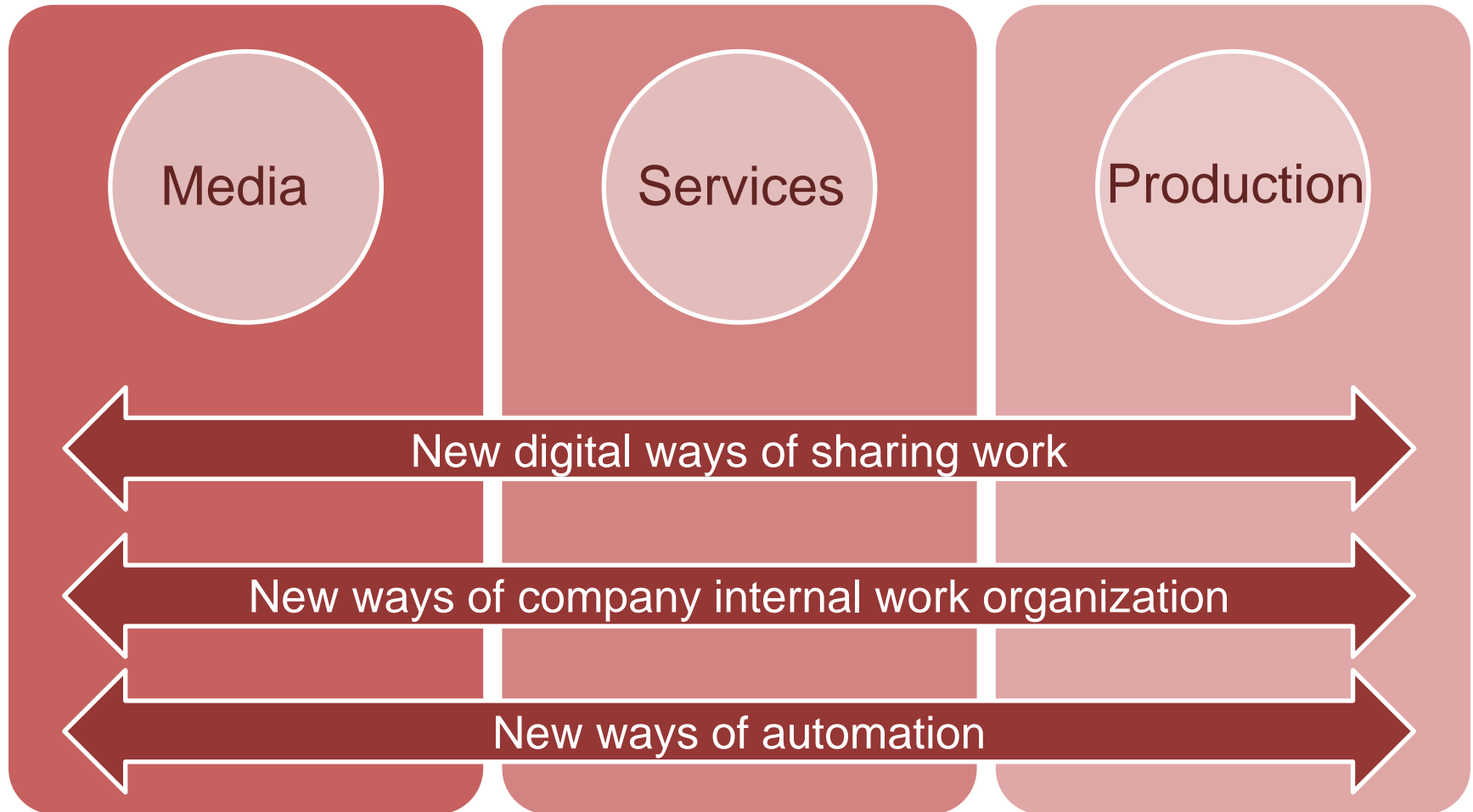
Aim

- Structured Analysis of existing Empery and expert opinions regarding „Digitale Arbeitswelt“
- Outlining potential **future developments** and design options
- Bridging between „**good work**“ and **innovation capabilities**



Digitale Arbeitswelt

Sectors and Phenomena



Task forces on cross sectoral issues

Legal Challenges

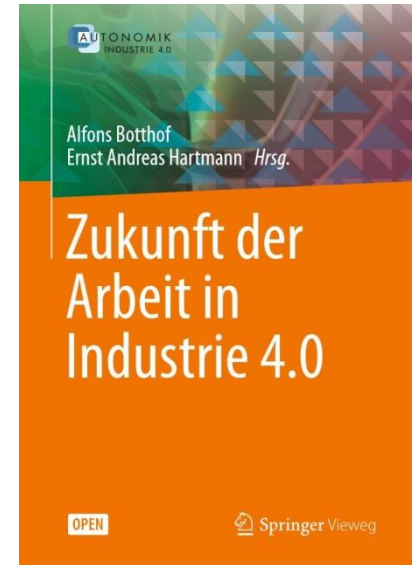
Standardization

IT security

The future of employment

Future of employment

- Smart machinery will work hand in hand with humans
- Resistance is not an option!
- Automation doesn't cause unemployment!
- Through digital technologies companies can, now more than ever before, organize working conditions to simultaneously foster economic growth and employee qualification and well-being



~~Will technology destroy our jobs?~~

How can technology change the way we work?



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