INDUSTRIE 4.0 INITIATIVES IN GERMANY AND SELECTED POLICY INITIATIVES

Christian Blobner, Seoul, November 7, 2018

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TAKE AWAY MESSAGE

- The discussion on Industrie 4.0 was initiated by industry in Germany with a technology focus

- Objective was to ensure the international competitiveness of German Mittelstand (SME) companies, especially machine manufacturers

- Due to the lack of adoption of Industrie 4.0 technology, the German government as well as regional governments started supporting policy initiatives with a special focus on SME

- Initiatives focus on issues such as providing best-practice application examples and standardization

- The SME 4.0 Competence Centers provide regional one-stop shops for SME seeking help in their digitalization efforts

Industrie 4.0 and digitalization is more than just a technology question. It questions the fundamental ways companies conduct their business and needs to be tackled holistically.

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Industrie 4.0
Automation is so 3.0
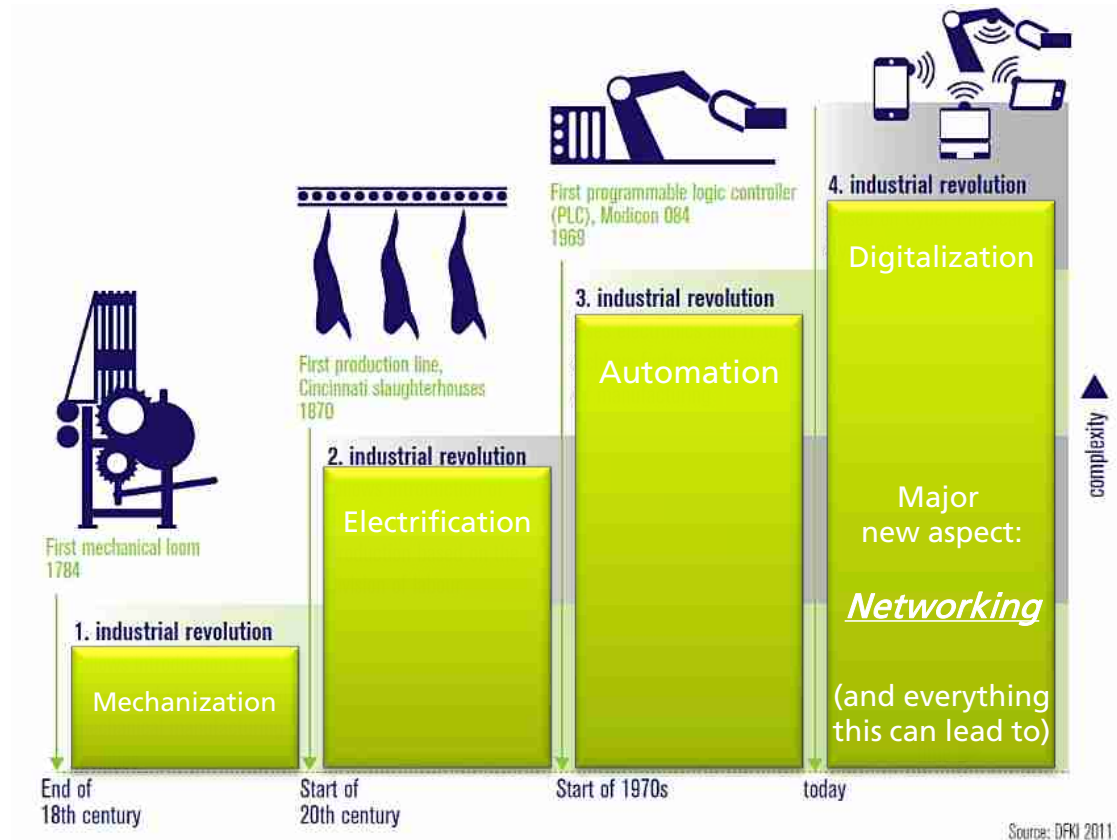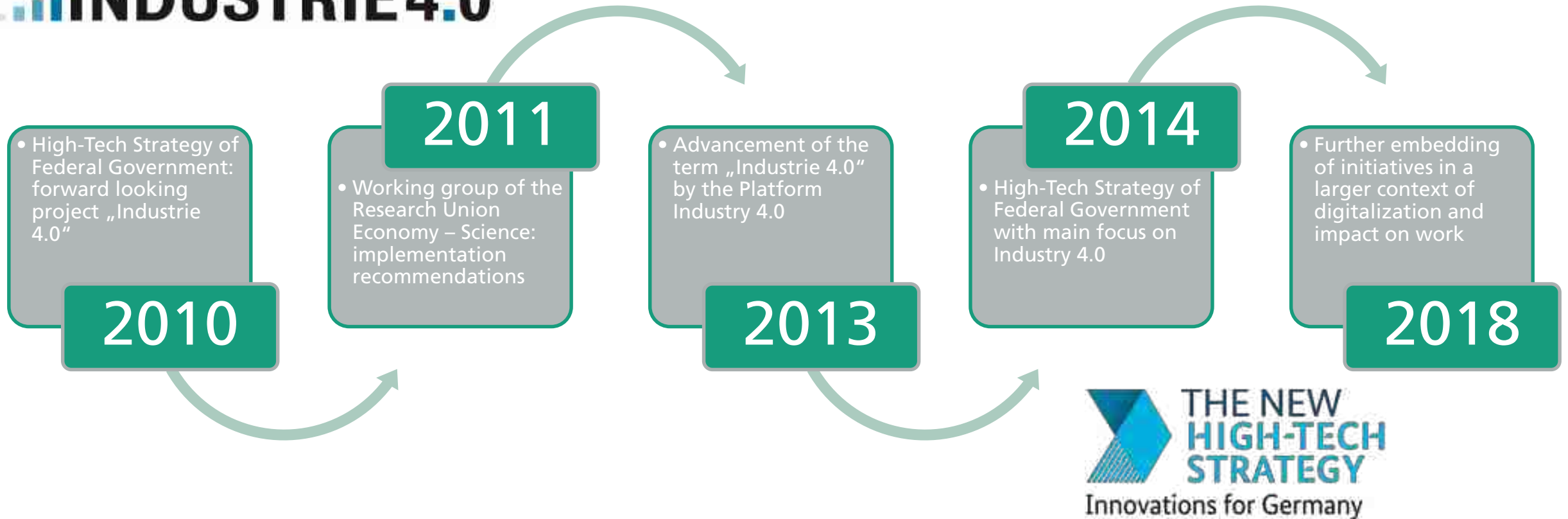

Source: acatech 2013,
http://www.acatech.de/fileadmin/user_upload/Baumstruktur_nach_Website/Acatech/root/de/Material_fuer_Sonderseiten/Industrie_4.0/Final_report__Industrie_4.0_accessible.pdf

- Industrie 4.0 promises a new production paradigm

- Automation technology plays a role but not in the usual sense, i.e. not simply more robots but networking robots with additional production assets to decentralize and automate decision-making

- Core aspect of Industrie 4.0 therefore is networking and smart data use, which enables smarter automation

- Companies can gain competitive advantage by better exploiting data in their production process, by making their products smarter and by providing data-based value adding services

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Germany's Industrie 4.0 Strategy
Strategic Timeline

2010
- High-Tech Strategy of Federal Government: forward looking project „Industrie 4.0"

2011
- Working group of the Research Union Economy – Science: implementation recommendations

2013
- Advancement of the term „Industrie 4.0" by the Platform Industry 4.0

2014
- High-Tech Strategy of Federal Government with main focus on Industry 4.0

2018
- Further embedding of initiatives in a larger context of digitalization and impact on work

THE NEW HIGH-TECH STRATEGY
Innovations for Germany

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Actors in the German Industrie 4.0 activities
Subdivision of Functions on Federal Level

- Federal Level:

  - **(Fundamental) Research:** Federal Ministry of Education and Research (BMBF, Bundesministerium für Bildung und Forschung)

  - **Knowledge Transfer:** Federal Ministry for Economic Affairs and Energy (BMWi, Bundesministerium für Wirtschaft und Energie)

- Regional supporting Federal States, e.g. Saxony-Anhalt:

  - Digital Strategy of the Ministry for Economic Affairs, Science and Digitalization

  - Supporting regional funding programs

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Actors in the German Industrie 4.0 activities
Plattform Industrie 4.0 and the Fraunhofer-Gesellschaft

- Plattform Industrie 4.0:

    - Industry initiated platform, founding members BITKOM (German Association for Information Technology, Telecommunications and New Media), VDMA (German Engineering Association) and ZVEI (German Electrical and Electronic Manufacturers' Association)

    - Expanded in 2015 to include further stakeholder from Academia, Research, trade unions and standardization bodies
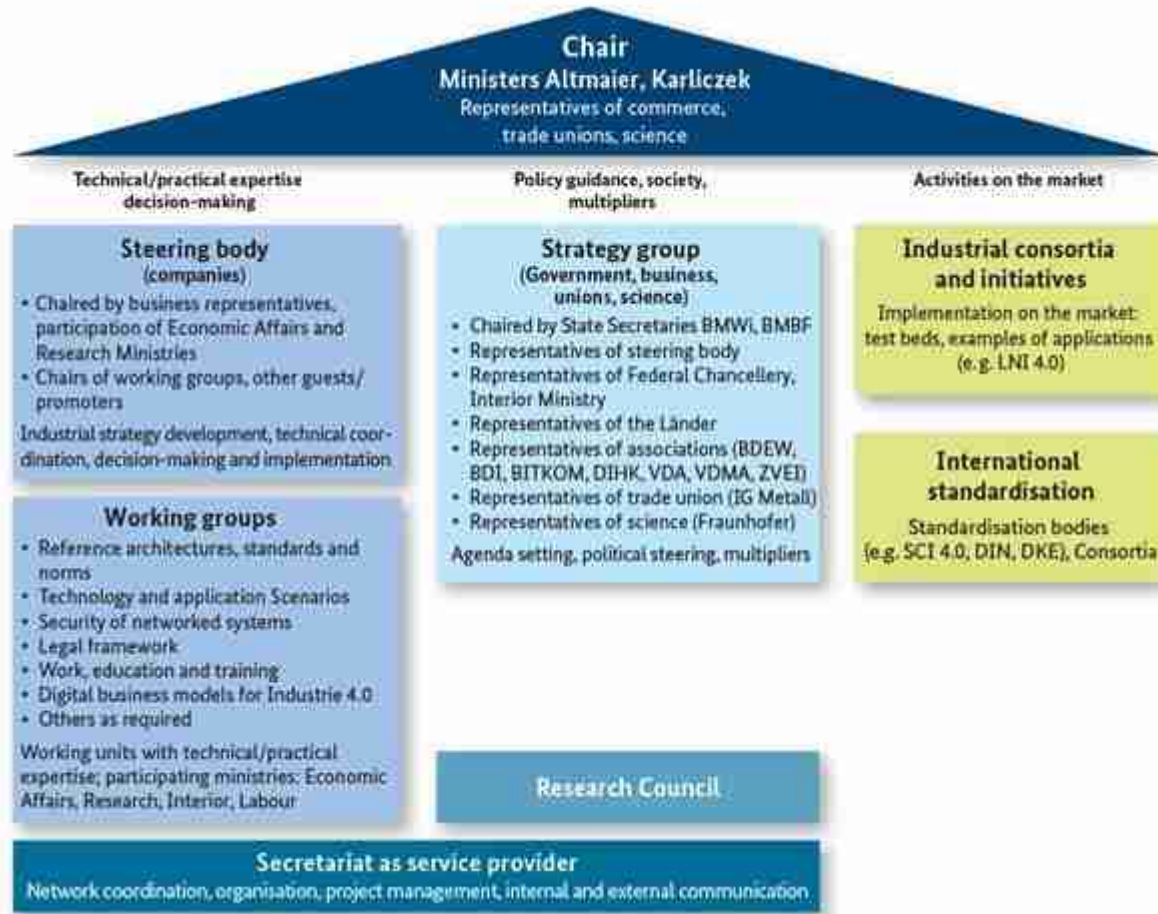
- Fraunhofer-Gesellschaft:

    - Europe's biggest organization for applied research

    - More than 70 institutes all over Germany with more than 25.000 staff and a research budget of over €2bn

Actors in the German Industrie 4.0 activities
Plattform Industrie 4.0

- Working groups:
  - Reference Architectures, standards and norms
  - Technology and application scenarios
  - Security of networked systems
  - Legal framework
  - Work, education and training
  - Digital business models for Industrie 4.0

  - Will be adapted as necessary and according to emerging challenges

Actors in the German Industrie 4.0 activities
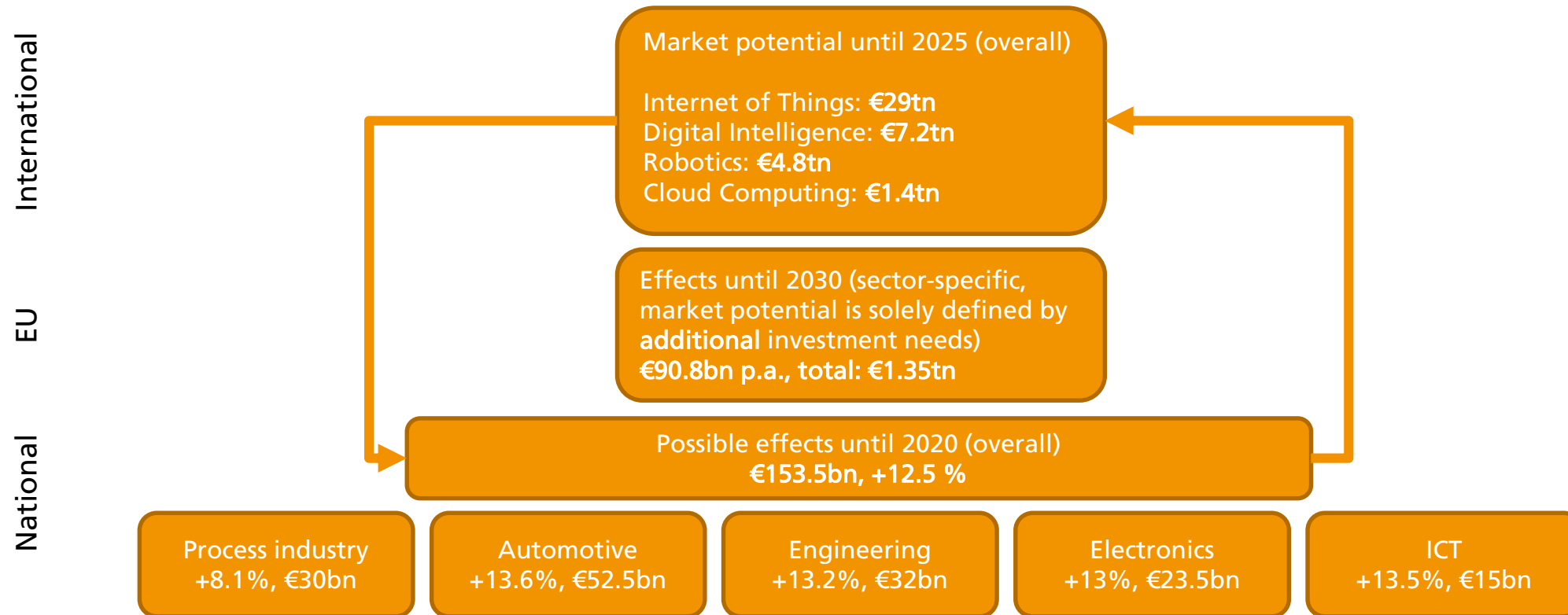## Digital Transformation Triangle for Industry 4.0 in Germany

PLATTFORM INDUSTRIE 4.0
- Recommendations for action/strategic approach
- SME
- International co-operations

Digital transformation

STANDARDIZATION COUNCIL INDUSTRIE 4.0
- Initiation of cross-sectoral standards
- Coordination of national and international standards
- Strengthening of German International co-operations

LNI4.0 LABS NETWORK INDUSTRIE 4.0
- Network of test labs
- Field testing
- Validated feedback of results for standardization

Source: https://lni40.de/lni40-content/uploads/2017/04/ueberuns_kooperation_dreieck_eng.png

Industrie 4.0 in Germany
Expected impacts on Germany through Industrie 4.0

International

EU

National

Market potential until 2025 (overall)

Internet of Things: **€29tn**
Digital Intelligence: **€7.2tn**
Robotics: **€4.8tn**
Cloud Computing: **€1.4tn**

Effects until 2030 (sector-specific, market potential is solely defined by **additional** investment needs)
€90.8bn p.a., total: €1.35tn

Possible effects until 2020 (overall)
€153.5bn, +12.5 %

| Process industry +8.1%, €30bn | Automotive +13.6%, €52.5bn | Engineering +13.2%, €32bn | Electronics +13%, €23.5bn | ICT +13.5%, €15bn |

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Industrie 4.0 in Germany
SWOT analysis for German companies and Industrie 4.0

S
- leadership in Europe for industrial production systems
- front runners in I4.0 implementation
- Serve 30 % of sensor world market
- Leaders applying for ind. Robots
- Covering major parts of the value chain of the national innovation system

W
- Lack of AM technology providers
- Lack of industrial (production near) data and information platforms
- Low international market share for in IT-security and mobile internet

O
- IoT as disruptive technology with high economic potential
- Increasing demand and special industrial sensors
- New value added in ind. countries
- Germany's location factors as basis to be leading suppliers of Industry 4.0 solutions

T
- Competitiveness dependent on investments
- Implementation of I4.0 in SME lacking
- Standards might be defined outside of Germany
- Europe as a whole lost shares of global industrial value added.

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Industrie4.0 in Germany
Initiative for regional SME 4.0 Competence Centers
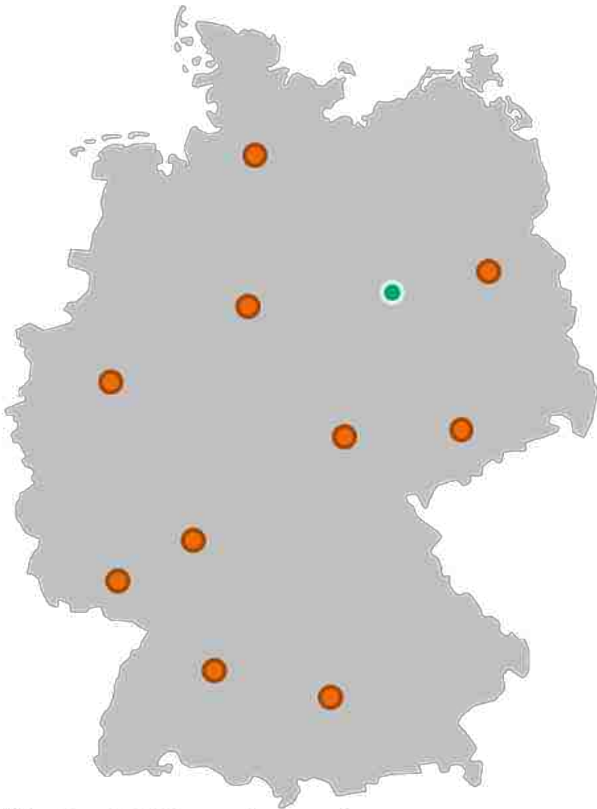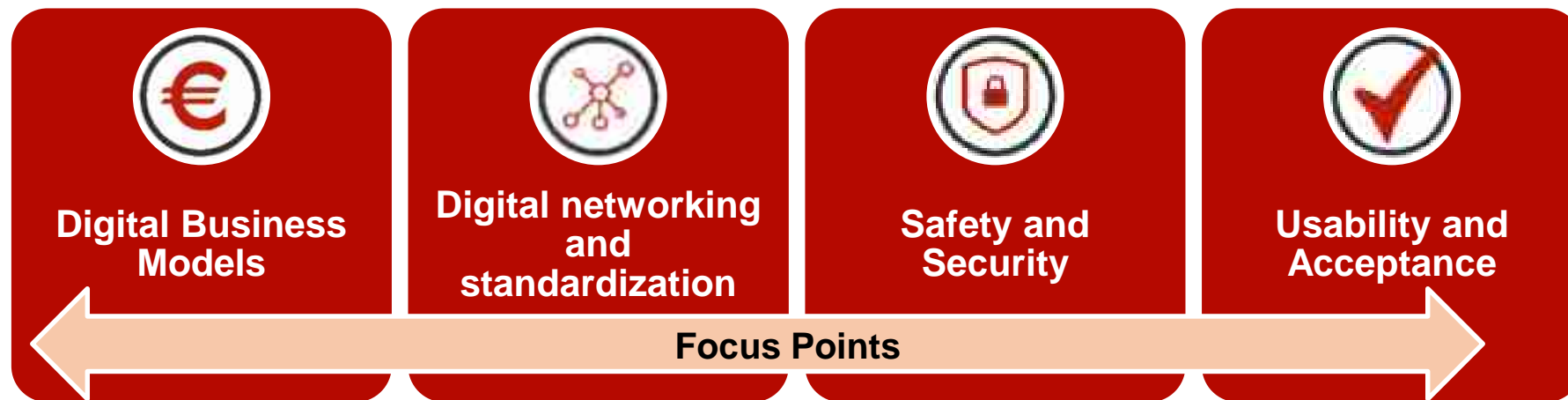

Mittelstand 4.0 Kompetenzzentren

- Objective
  - Raising awareness for opportunities of digitalization among SME

- Approx. 20 regional competence centers all over Germany
  - One-stop-shop for SME seeking support in all matters of digitalization and Industrie 4.0
  - Providing on-site support for SME
  - Demonstration site for new technology
  - Supporting implementation projects
  - Fostering knowledge- and best-practices exchange between regional SME
  - Network of competence centers share knowledge

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Examples of SME4.0 Competence Center
Regional Magdeburg SME4.0 Competence Center

- Facilitating Digitalization – in Saxony-Anhalt and beyond
  - Create trust in Digitalization for SME
  - Embolden and empower SME to take up Digitalization solutions
  - Make it possible to actively experience Digitalization potentials

Digital Business Models	Digital networking and standardization	Safety and Security	Usability and Acceptance

Focus Points

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Examples of SME4.0 Competence Center
Thematic SME4.0 Competence Center Planning and Construction

- Thematic Competence Center focusing on topics in the construction industry with a specific focus on Building Information Modelling (BIM)

- Project partners distributed throughout Germany, establishing regional centers with thematic foci

- Regional centers focus on different aspects of digitalization in the life-cycle-phases of construction projects (design, planning, construction, crafts and trades, operation)

European level coordination of SME support
Digital Innovation Hubs and Competence Center for SME

- VDTC officially recognized as a European Digital Innovation Hub providing companies with cutting edge support towards Industrie 4.0

- Supporting international networks to increase access to knowledge

- DIH as one-stop-shops for companies, especially SME, to improve their competitiveness through digitalization

- VDTC as a central actor in a network of regional stakeholders to promote and support digitalization in Saxony-Anhalt and beyond

Digital Innovation Hubs

Mittelstand 4.0 Kompetenzzentrum Magdeburg

Mittelstand 4.0 Kompetenzzentrum Planen und Bauen

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Industrie 4.0 initiatives in Germany
Bringing together different levels of support for SME

Awareness Raising, Networking & Training

Pre-competitive technology solutions

Industrial Research

or other
research / implementation
actors

directly contracted
by industry

Industrie 4.0 initiatives in Germany
Bringing together different levels of support for SME

Awareness Raising,

Networking & Training

Free of charge offering to companies

- Networking of companies, research providers, universities, stakeholders

- Organization of regional thematic events, conferences and workshops

- Company visits, individual and convoy consulting

- Digitalization Check-Ups

- Trainings on digitizing business processes, digital business models, agile project management, standardization, sensors and automation, communication networks, employer attractiveness, inter-generational learning, corporate culture and motivation – *and more*

- Funded through regional government and federal government (BMWi)

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Industrie 4.0 initiatives in Germany
Bringing together different levels of support for SME

Pre-competitive technology solutions

Limited own-contributions by companies

- Cooperation between regional research actors and universities

- Companies involved as implementation partners / use case providers

- Working on relevant company challenges

- Potential for companies to work in national and international project consortia, supporting international knowledge exchange and transfer and internationalization

- Own contribution and focus depending on funding source and rules

- Fraunhofer IFF currently involved in more than 20 ERDF funded projects with regional companies plus nationally- and EU-funded projects

- Research partners often support companies administratively

Industrie 4.0 initiatives in Germany
Bringing together different levels of support for SME

Industrial Research

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Full costs to be covered by companies

- Companies directly contract research actors for industrial research projects

- One-to-One relationship or consortium approach, depending on theme

- Projects can range from "simple" process analysis and reorganization to technical prototypes to development of full manufacturing systems, i.e. *from a couple of thousand Euro to a couple of million Euro*

- Specific introductory cooperation concepts available, e.g. *Fraunhofer IFF Industrie 4.0 Check-Up* starting at about €30k, to develop a medium-term oriented digitalization strategy (not just technology oriented)
  - Good format to establish trust and understanding between parties
  - Good basis for going into further technology-oriented projects
  - Internationally well received format

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Support example "Digital Business Models"
Everybody needs to be disruptive – right?!?

Disruption is easy!

- If you start from scratch and/or do not have any physical assets.

Disruption is hard!

- If you have physical and financial assets, investment cycles, customers, supply chains, employees, relevant IP, distribution networks.


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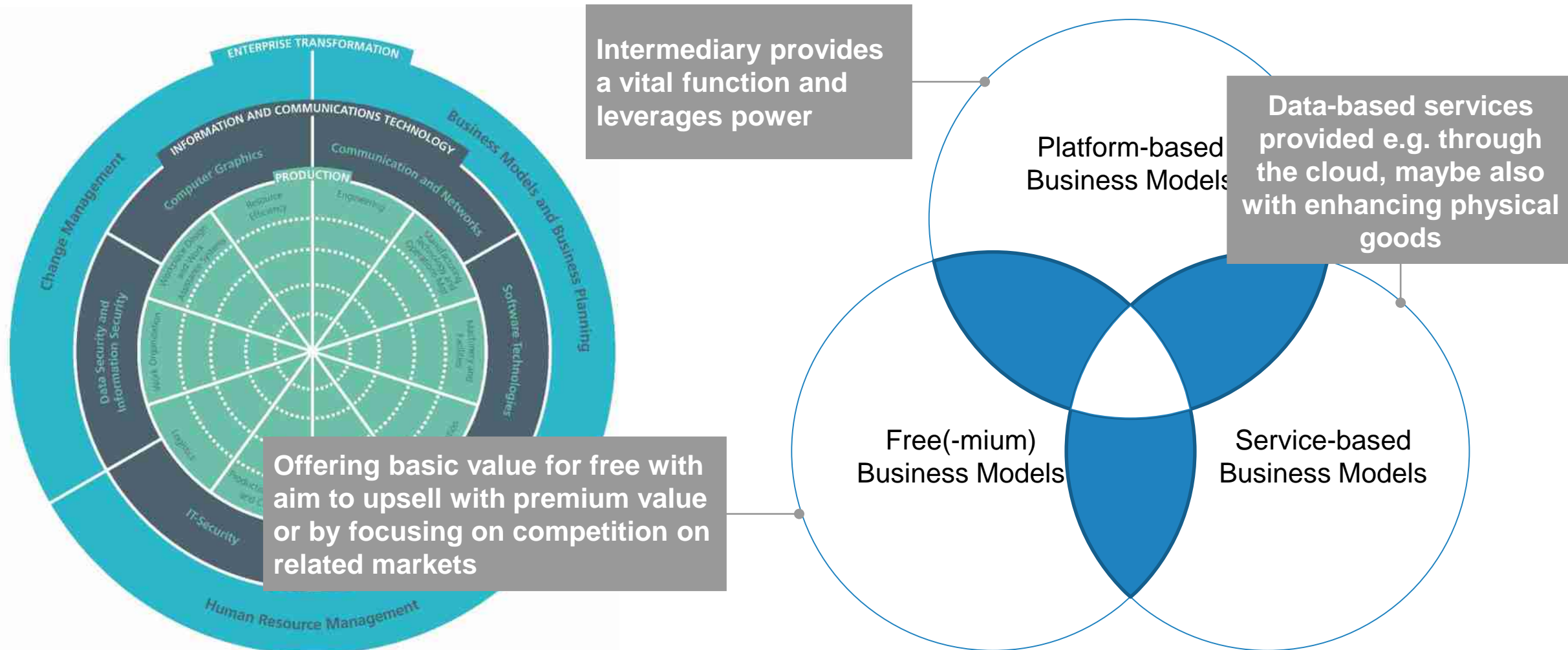
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Support example "Digital Business Models"
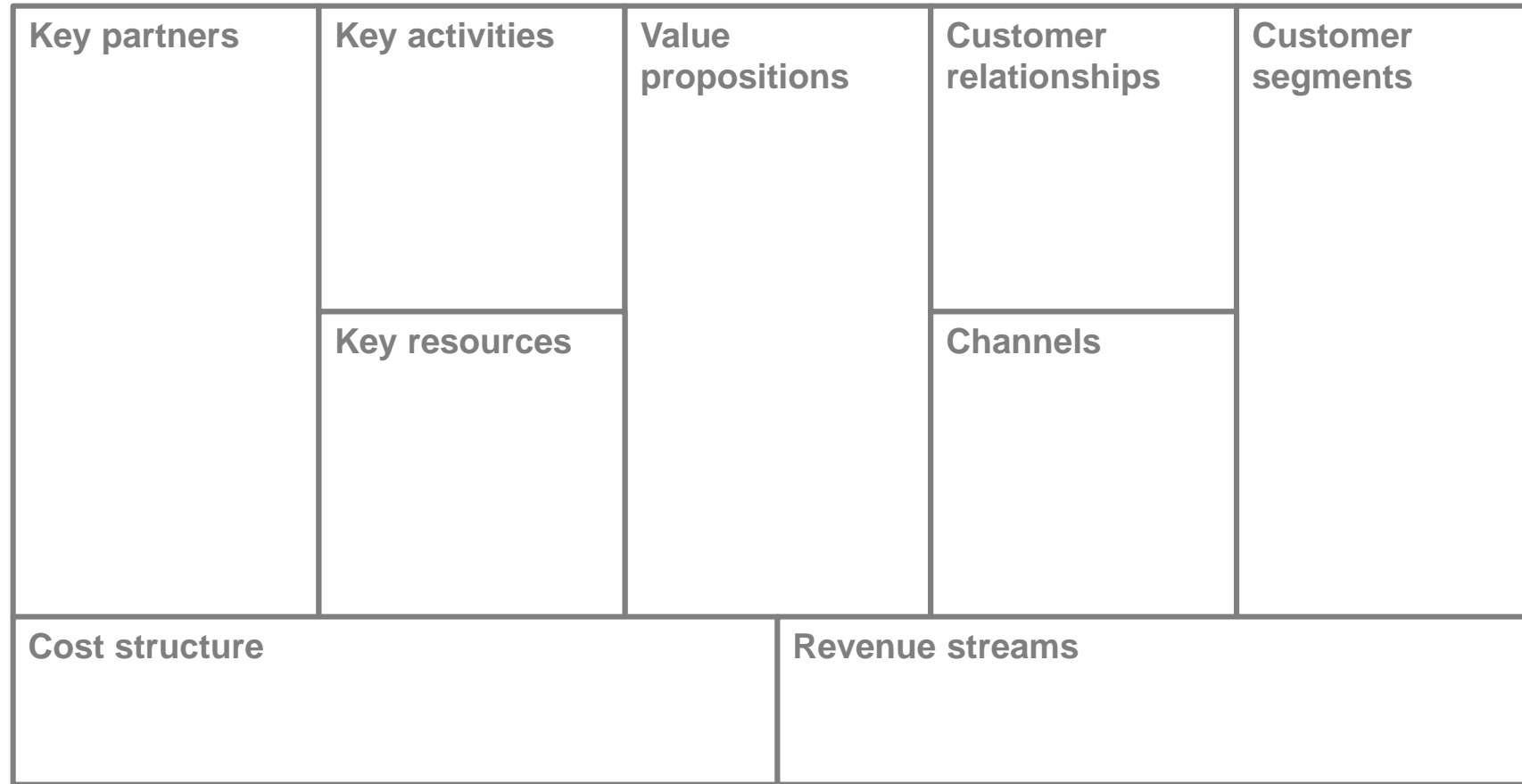## What do we mean by business model transformation?
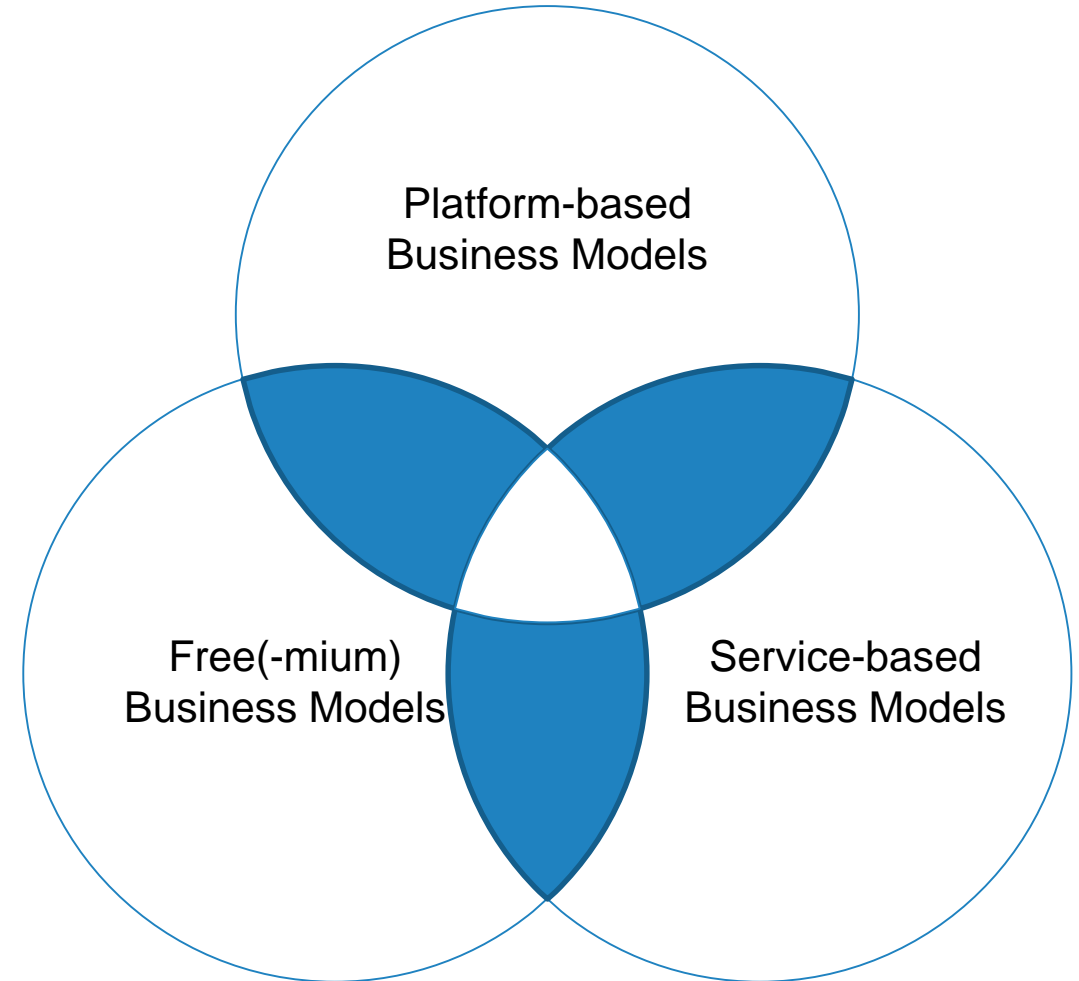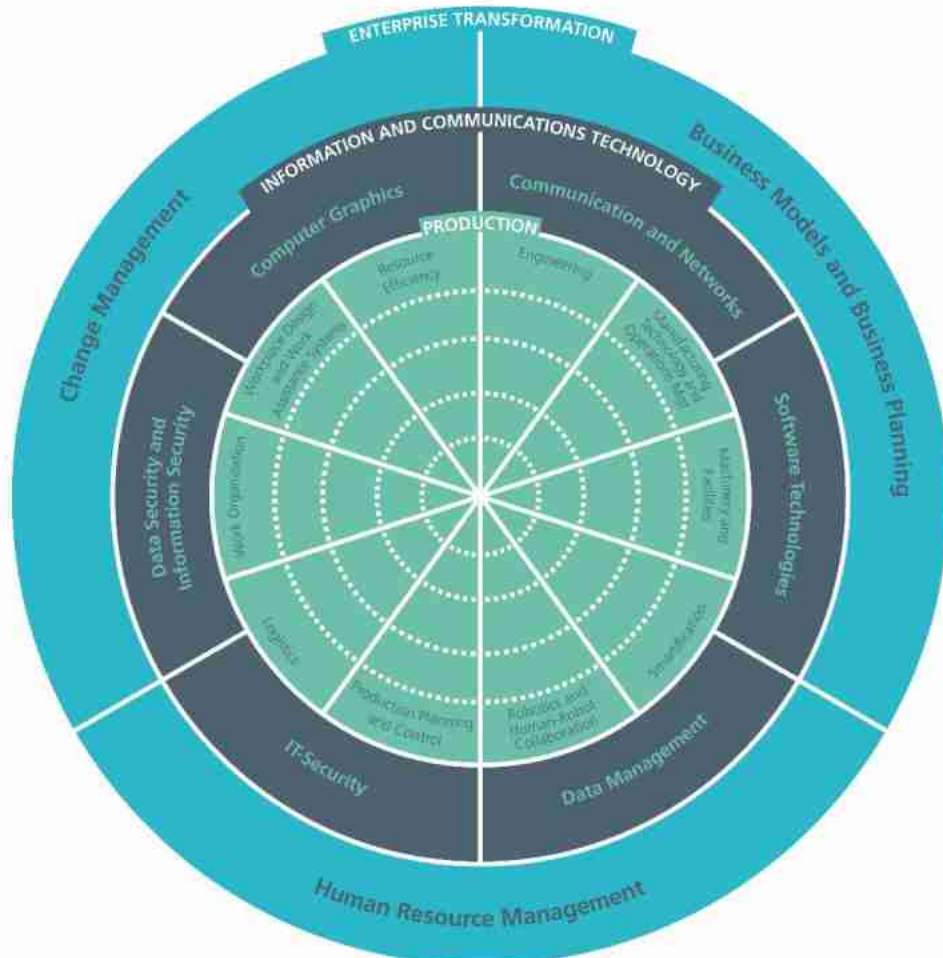
© Neugebauer, Reimund; Hippmann, Sophie; Leis, Miriam; Landherr, Martin (2016): Industrie 4.0 - From the perspective of applied research. 49th CIRP Conference on Manufacturing Systems (CIRP-CMS 2016). Available online at www.sciencedirect.com

Platform-based Business Models

Free(-mium) Business Models

Service-based Business Models

Support example "Digital Business Models"
What do we mean by business model transformation?

Intermediary provides a vital function and leverages power

Data-based services provided e.g. through the cloud, maybe also with enhancing physical goods

Offering basic value for free with aim to upsell with premium value or by focusing on competition on related markets

Platform-based Business Models

Free(-mium) Business Models

Service-based Business Models

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Support example "Digital Business Models"
Business Model Canvas

Key partners	Key activities	Value propositions	Customer relationships	Customer segments
	Key resources		**Channels**	

Cost structure	Revenue streams

Constantly question the form you compete on the market

- Customer-oriented perspective
- Resources-oriented perspective
- Value-oriented perspective

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Support example "Digital Business Models"
You need to know how to do it – ramifications can be complex

Online-Platform
- Automated sale through large online platform or market pull (e.g. Dash-Button)

Washing machine manufacturer
- Sale of washing machine with option to buy detergent through App

Detergent manufacturer
- Sale/free washing machine with subscription of detergent

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