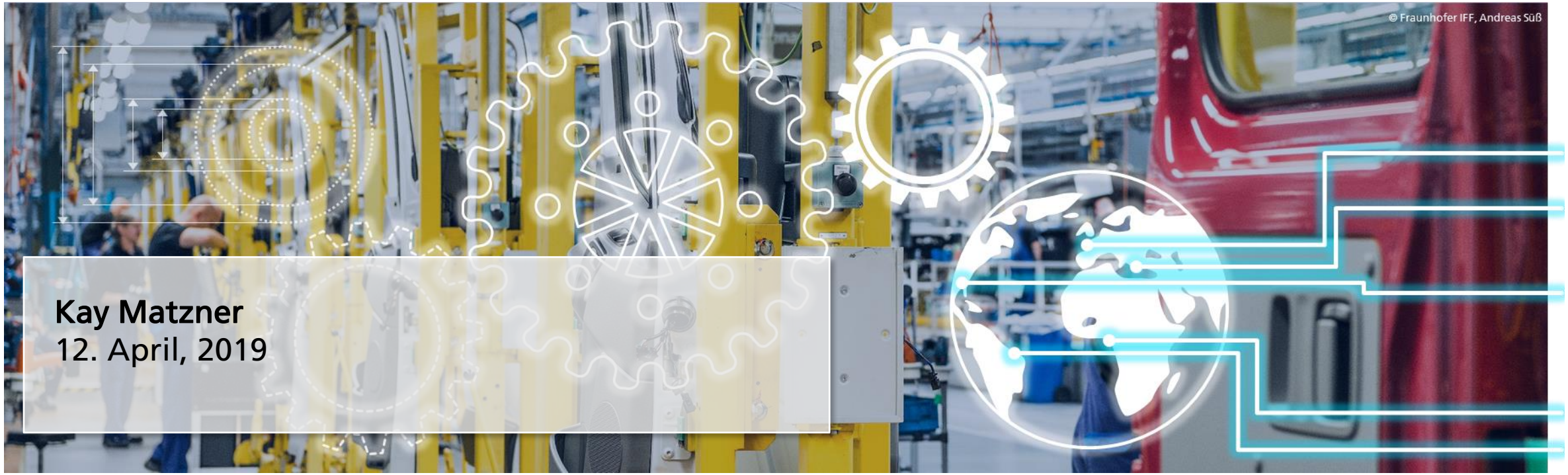
FRAUNHOFER PRODUCTION ORIENTED RESEARCH AND POTENTIALS IN CHINA

GLOBAL INDUSTRIAL INTERNET CONFERENCE 2019 in TONGXIANG



Kay Matzner
12. April, 2019

Fraunhofer IFF

Fraunhofer-Gesellschaft

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- Fraunhofer is Europe's largest application-oriented research organization
- Research efforts are geared to people's need: health, security, manufacturing, communication, energy and the environment

1949
Established

72
Institutes and Research Facilities

25,530
Employees

2.3 billion Euro
annual research volume

thereof
2.0 billion Euro
from contract research

thereof
over 70%
from industrial contracts and publicly funded research

Fraunhofer IFF

Fraunhofer Group for Production

Leading Network of Centers of Applied Manufacturing Research

- 11 member institutes and units
- 2,369 research scientists
- 288.7 million Euro annual research volume (2017), thereof 38 % business revenue (2018)
- Chairman: Prof. Michael Schenk, business office: Prof. Fabian Behrendt
- Locally based research institutes with significant national and international research
- Excellent connection outside the Fraunhofer-Gesellschaft to fully meet the needs of the industry

intern

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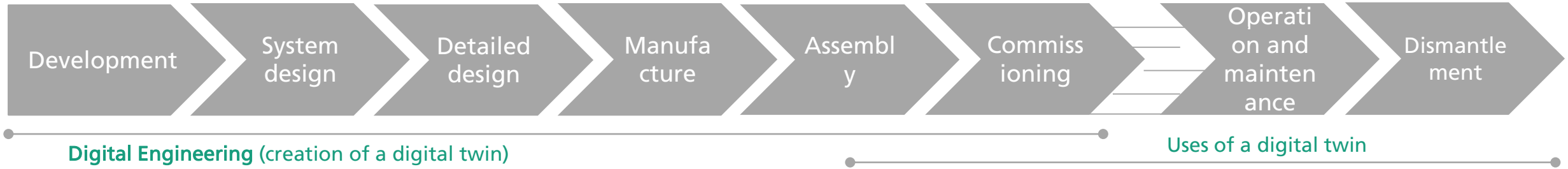
Digital Engineering

Combining Factory, Manufacturing and Product Design Processes



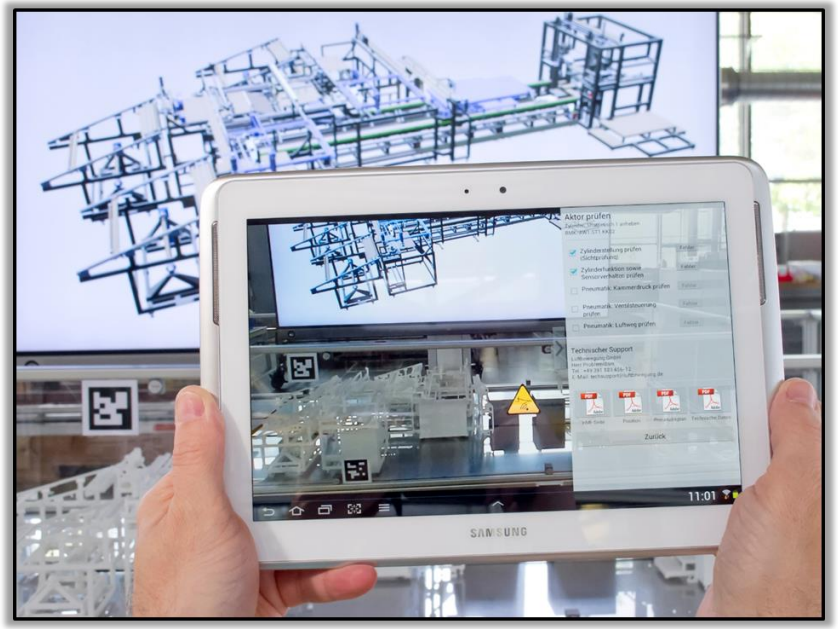
A digital twin creates tremendous capabilities in plant operation and maintenance.

- Control system development on the model
- Integrated functional testing during engineering
- Assistance with troubleshooting and data acquisition
- Reduction of development times and costs
- “Real-time capable” manufacturing system

∅ Annual maintenance costs of 9 % of manufacturing costs

Annual maintenance expenditures of ≈ € 23.6 for machines and plants

[Pawellek 2016]



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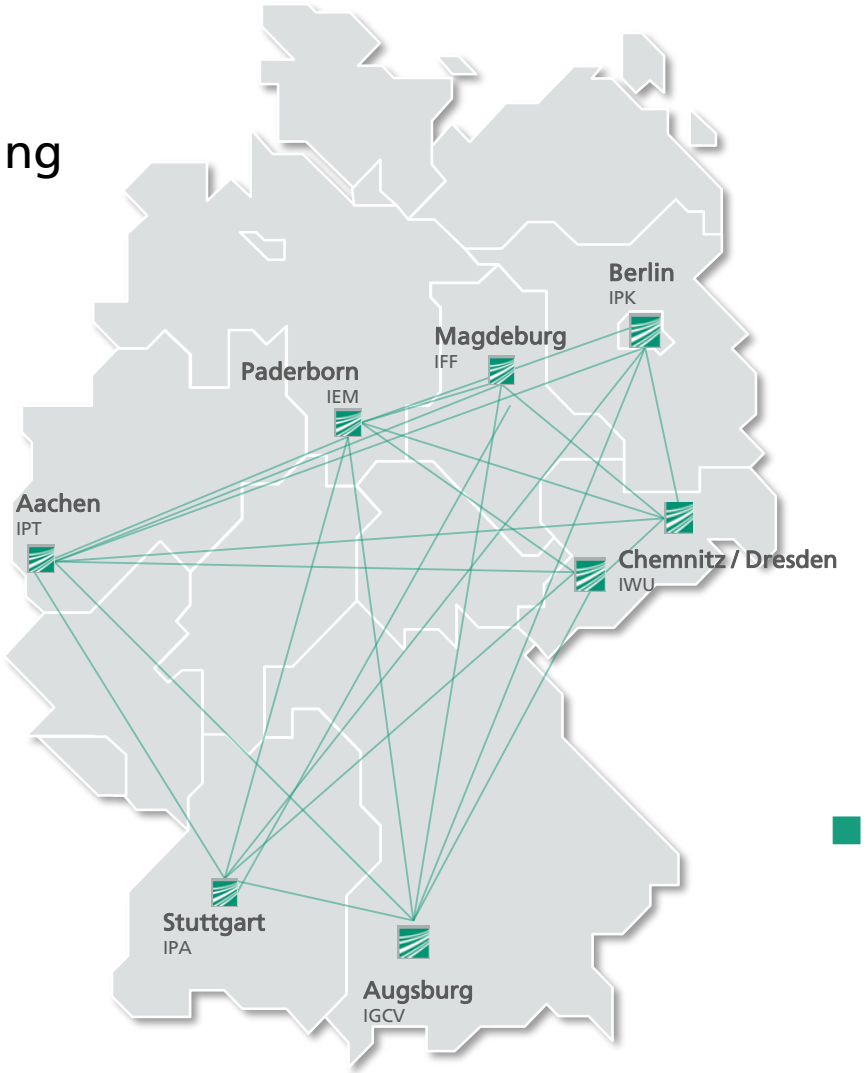
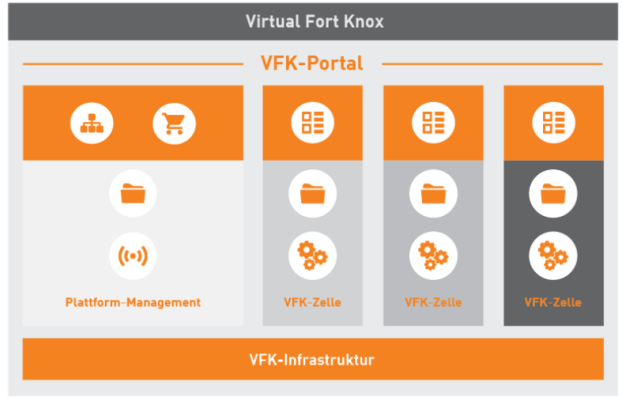
Joint Platform: Virtual Fort Knox

- Establishment of a distributed cloud platform for manufacturing applications
- App center for appropriate on-demand services
- Provision of services and solutions for manufacturing, supply chains and automation

Positioning the Fraunhofer-Gesellschaft and its Group for Production as the leading partner for I4.0 cloud solutions in manufacturing

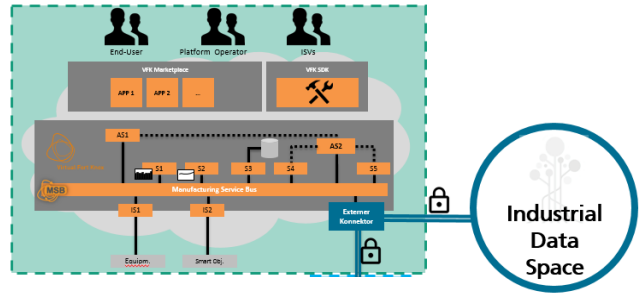
Research Virtual Fort Knox





Industrial Data Space

Manufacturing use case



- Data interface by connectors enhances security and control over data

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Artificial Intelligence

Machines, Robots and Software Systems Perform More and More Complex Jobs

New data-driven business models are generating a multitude of uses for AI systems.

	Physical	Digital
Autonomous	Robots and Transportation • Smart robots • Autonomous vehicles	Autonomous agents • Algorithmic action • Bots
Collaborative	Cobots • Gesture-controlled devices • Driver assistance systems	Cognitive assistants • Affective computing • Dialogue interfaces
Learning	Smart Equipment and Systems • Smart workstations • Smart control systems	Intelligent Services • Smart data discovery • Image and video interpretation

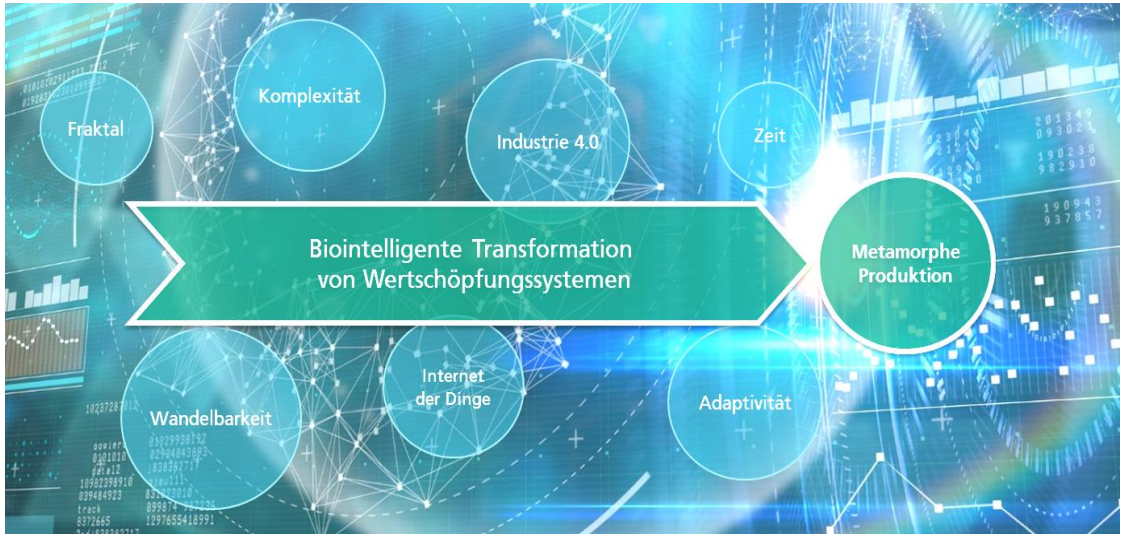
[Fh-Big Data 2017] [IAIS]

[Stock Image]

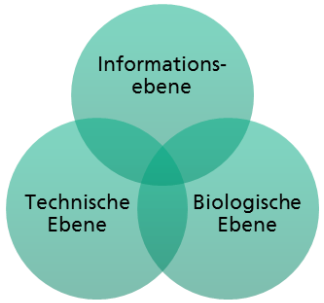
- Machine vision
- Tactile sensor systems
- Speech recognition and dialogue
- Emotion recognition
- Personalized, adaptive assistance
- Educationally preprocessed base of data

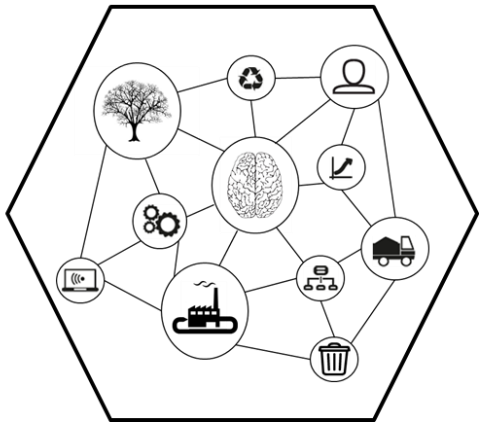
Biological Transformation

Initiative for the Digital and Biointelligent Transformation of Industry



- Access to systems, materials and technologies that are identical or analogous to nature for improved manufacturing or more efficient value added
- Design of sustainable products and services that do not harm the ecosystem
- The use of digital transformation technologies in combination with bioinspired materials, methods and systems results in metamorphic manufacturing.





Sociotechnical value added networks

Preliminary study of **bio**logical **tra**nsformation of **in**dustrial value creation (BIOTRAIN)*

*Participating institutes: **IPA**, IGB, **IML**, IWM, **IPT**, **IWU**

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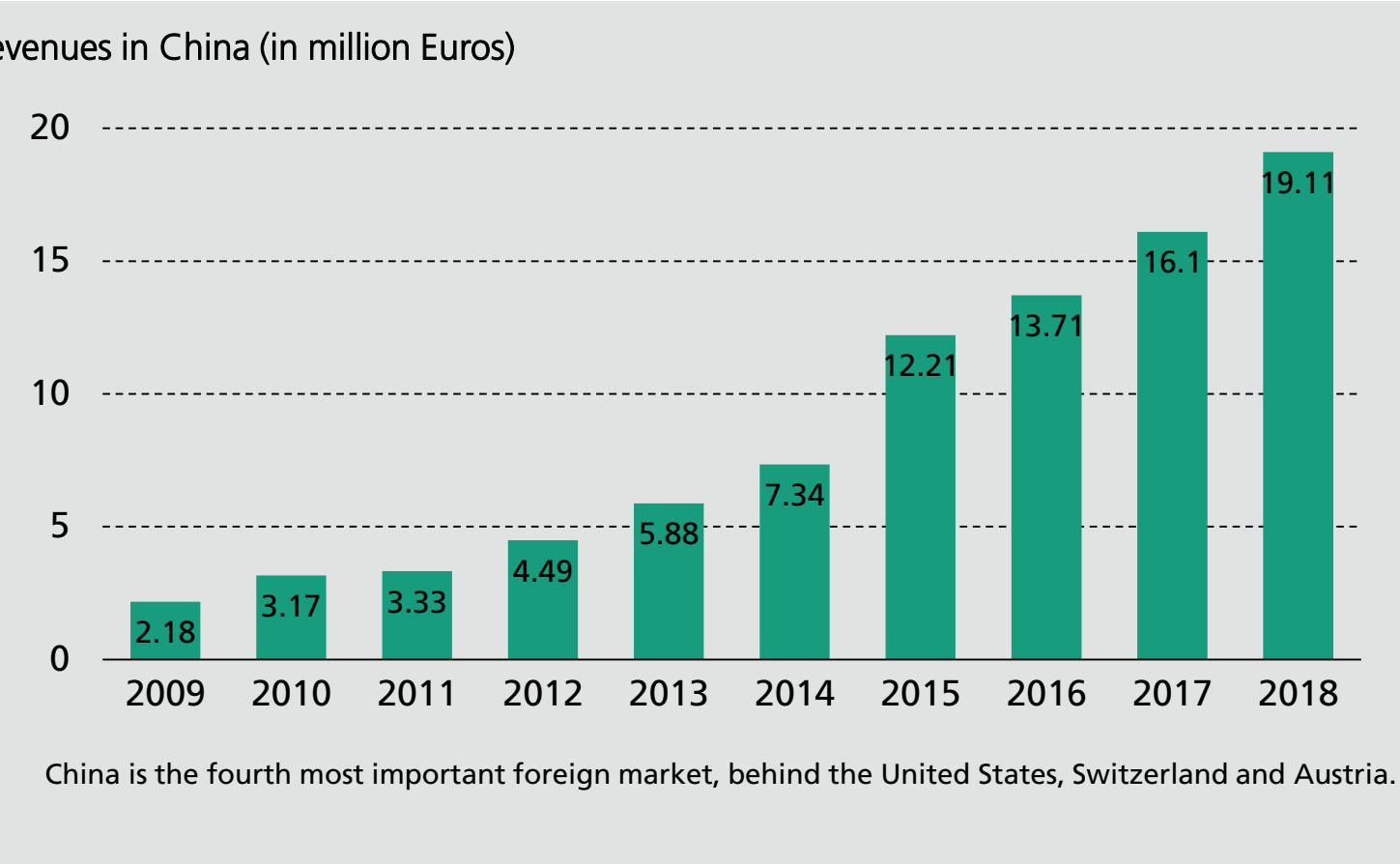
Fraunhofer-Gesellschaft in China



China is the fourth most important foreign market, behind the United States, Switzerland and Austria.

- Fraunhofer Representative Office in Beijing since 1999
- 2/3 of all Fraunhofer Institutes are active in China
- PhD-program in cooperation with the Chinese Academy of Sciences (CAS) since 2008
  - Over 100 research visits of PhD-candidates at Fraunhofer Institutes
- Topics: technology consulting, joint innovation research, production technologies, food safety, medical technology et al

Chinese Challenges in Manufacturing

Challenges

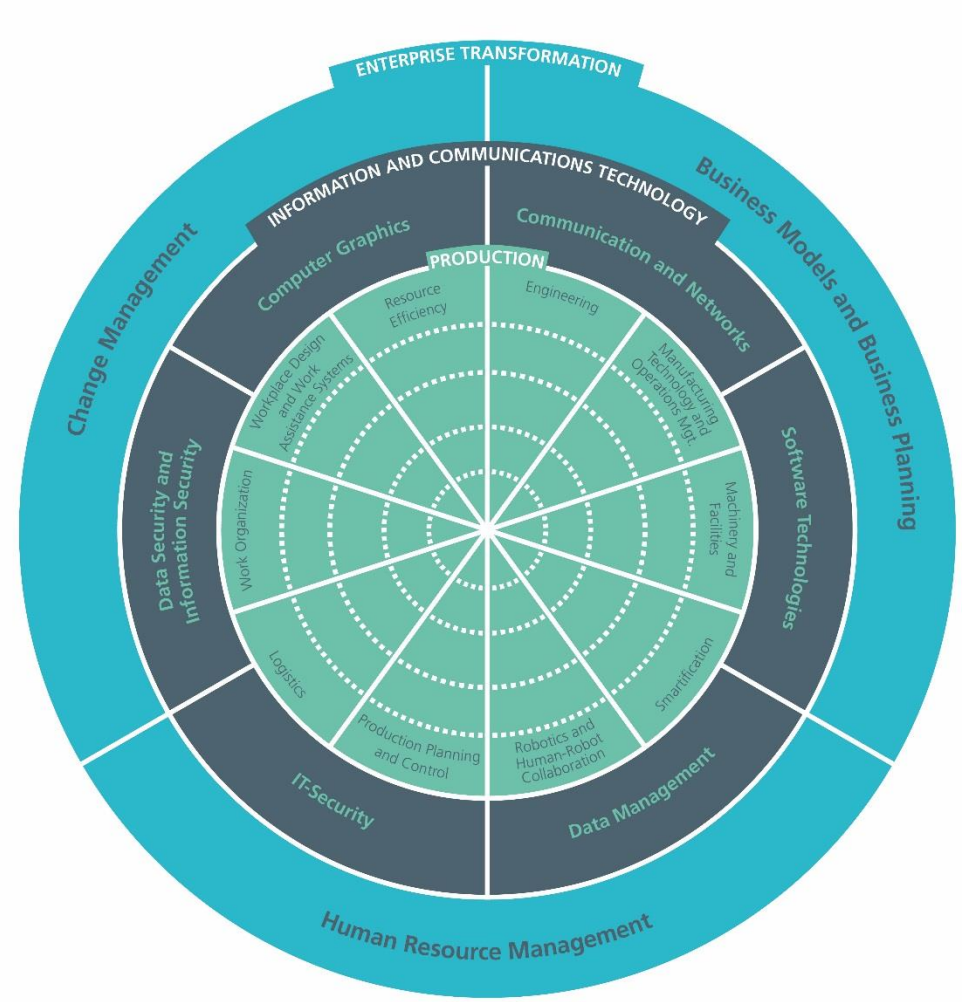
- Shift from mass production to individual products (lot-size one)
- Low labor productivity
- Demographic change in Chinese society
- Increasing labor costs
- Localization of production closer to the markets
- Backshoring of production
- New competencies & qualifications for manufacturing professionals

Aim

- Improving manufacturing innovation
- Integrating IT and industry
- Strengthening the industrial base
- Fostering Chinese brands
- Enforcing green manufacturing

Good-practice for Industrie 4.0

Promoting a holistic perspective on Industrie 4.0



© 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

Industrie 4.0 is not only about modernizing production equipment

- Improved digital data collection
- Better exploitation of data
- Fusing different data sources
- Modern equipment produces data and needs data

Companies need to take account of this new paradigm

- Process ownership
- Employee competences
- Vocational training
- Business model

Implementation of Industrie 4.0 in China

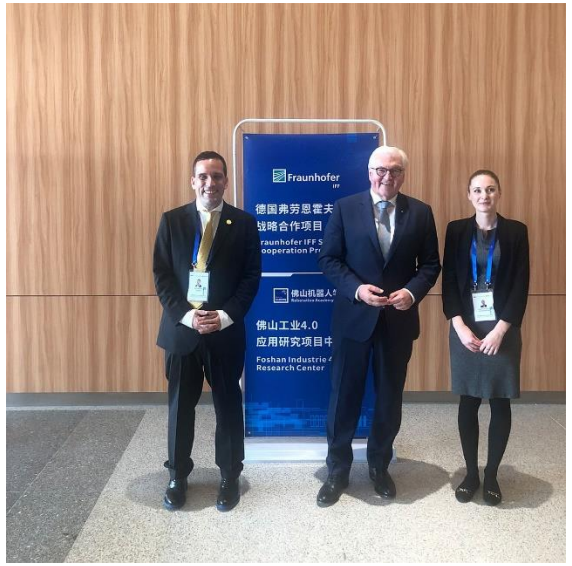
Industrie 4.0 Readiness Checkups

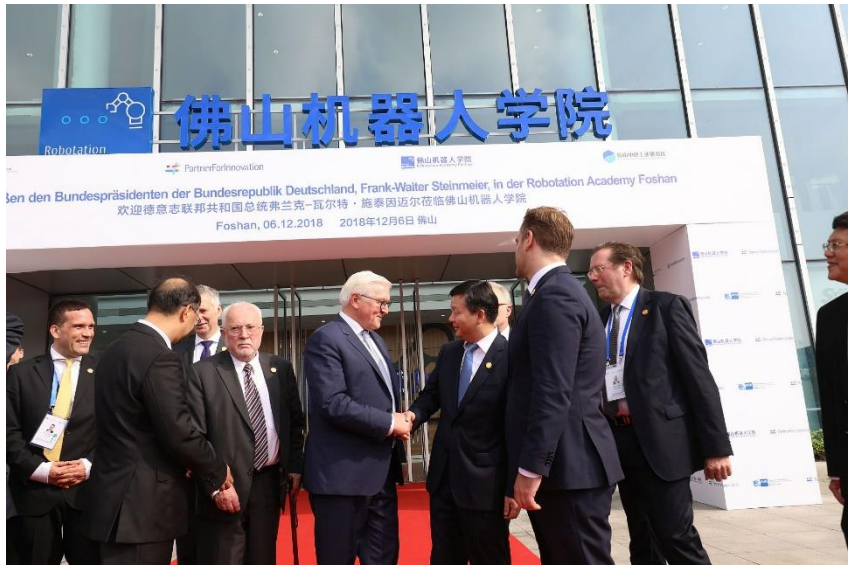
1	Determine the current status in the company
2	Evaluate the status regarding the Capability Maturity Model
3	Assessment of feasible medium-term and long-term goals
4	Development of improvement approaches
5	Determine an implementation strategy
6	Detail specific project ideas for implementation


2025
MADE IN CHINA
中国制造
弗劳恩霍夫工业自动化研究所
Fraunhofer IFF
Robotation Academy
宜奥集团

Fraunhofer IFF Industrial Cooperation Project in Foshan

Reception of the German President Frank-Walter Steinmeier in December 2018





Fraunhofer IFF Cooperation Project in Foshan

Let’s pursue applied research together!

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