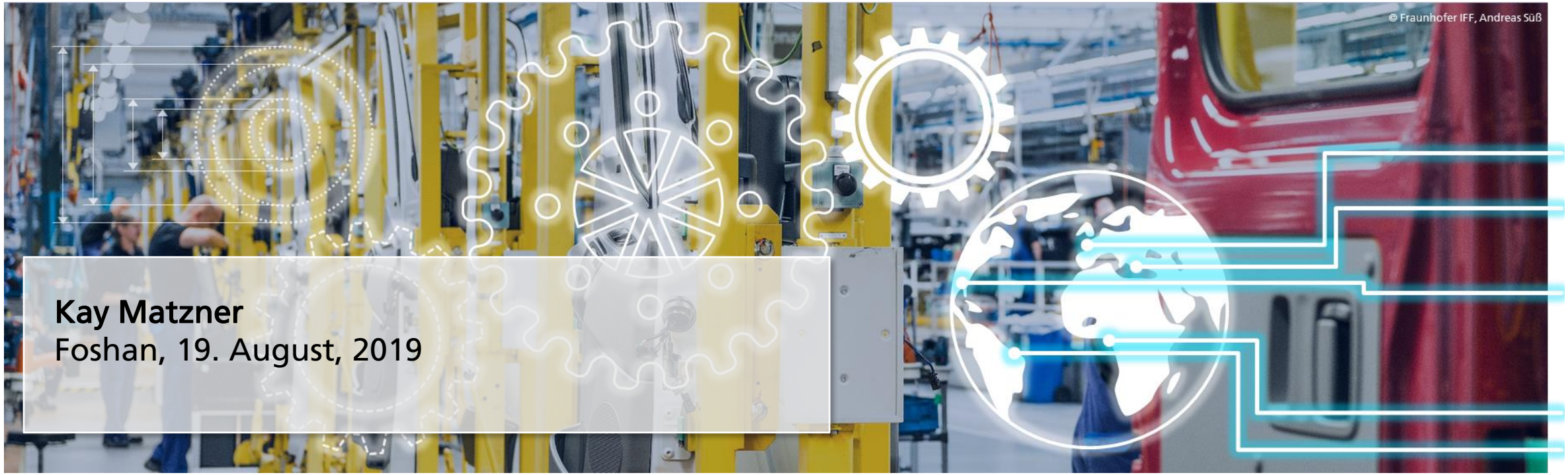
VOCATIONAL TRAINING AND INDUSTRIE 4.0
DATAS AND EXPERIENCES FROM GERMANY

Kay Matzner, Magdalena Albers



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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

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Changes in work processes and tasks by Industrie 4.0 technologies

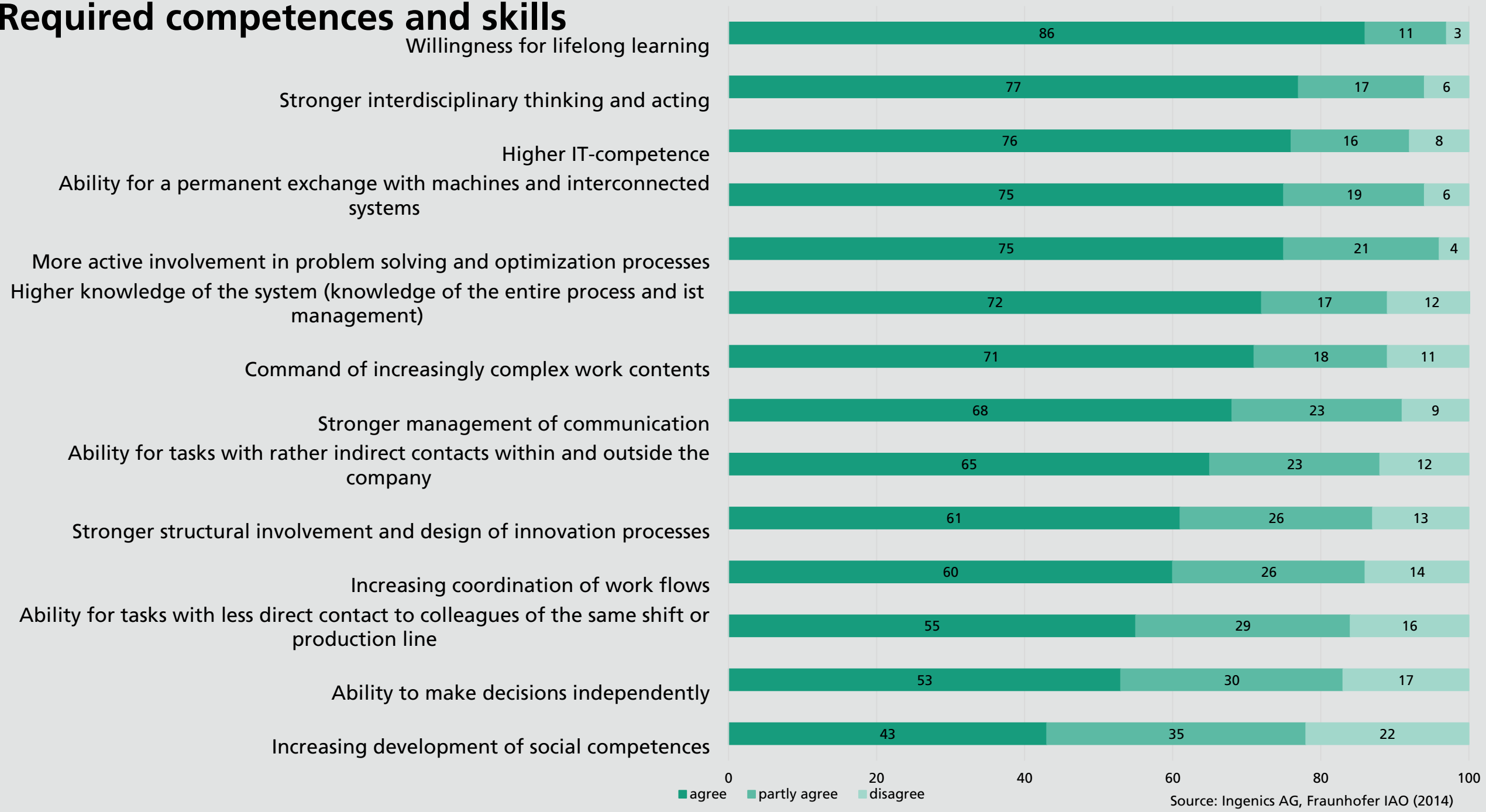
Changes in work processes and tasks

	Current Changes	Future Changes
Complexity	Integration of fields, diversity of data, comprehensive requirements on production	Integration of all value-adding partners, increasing complexity
Variety	Bigger range of monitoring and control functions	Different tasks, more responsibility
Flexibility	Faster reactions to changing requirements	Short-term adaptions of processes due to customer requirements and new technologies
Technological Support	Physical (e.g. robots) and digital (e.g. tablets)	Physical (human-robot cooperation) and digital (intelligent management)
Communication	Networks across corporate boundaries, human-machine-interfaces	Internal and external, human-machine-interfaces

Source: Rost/Stölzel/Kozica (2016)

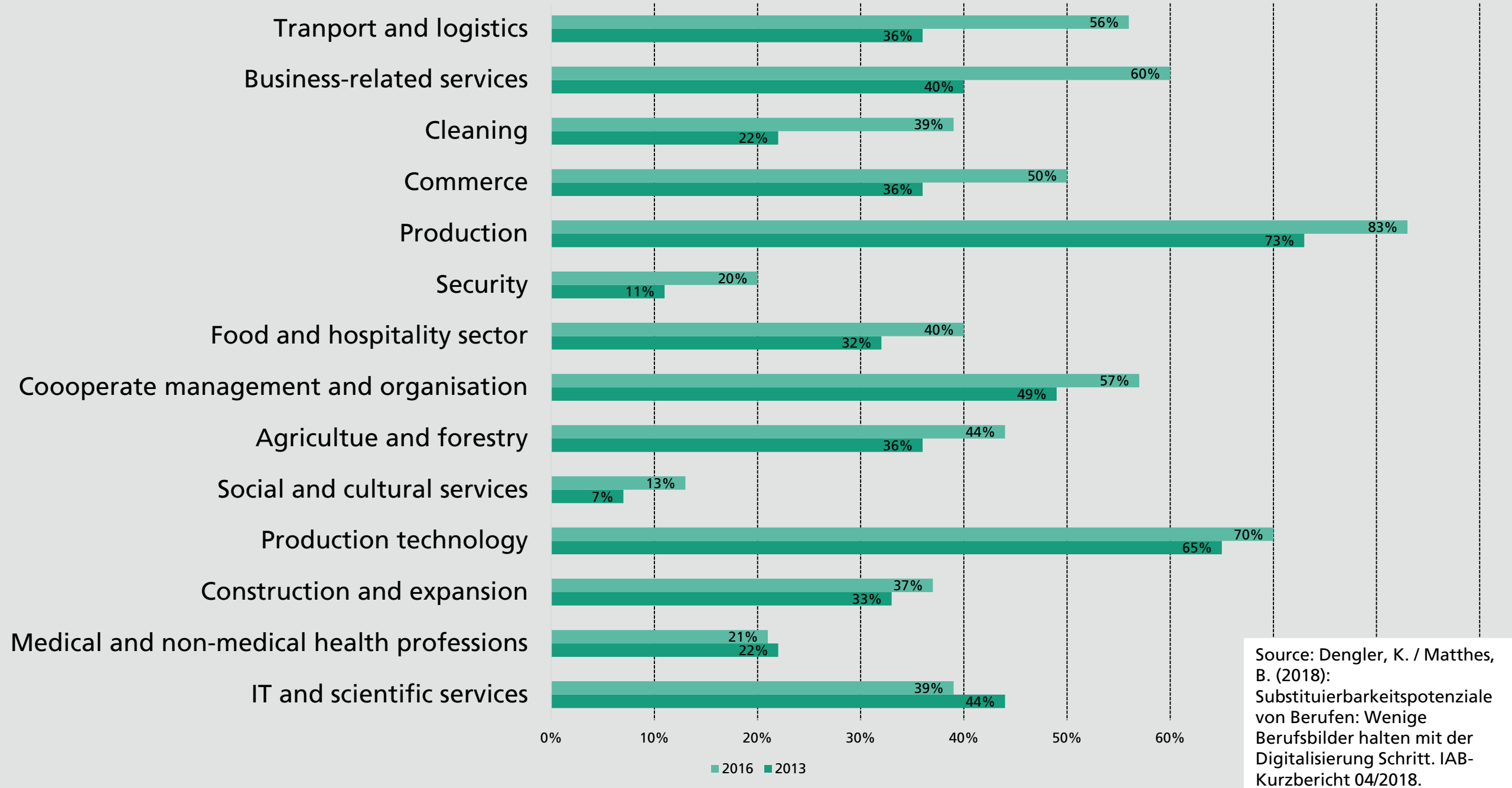

WORLD
ECONOMIC
FORUM

Required competences and skills



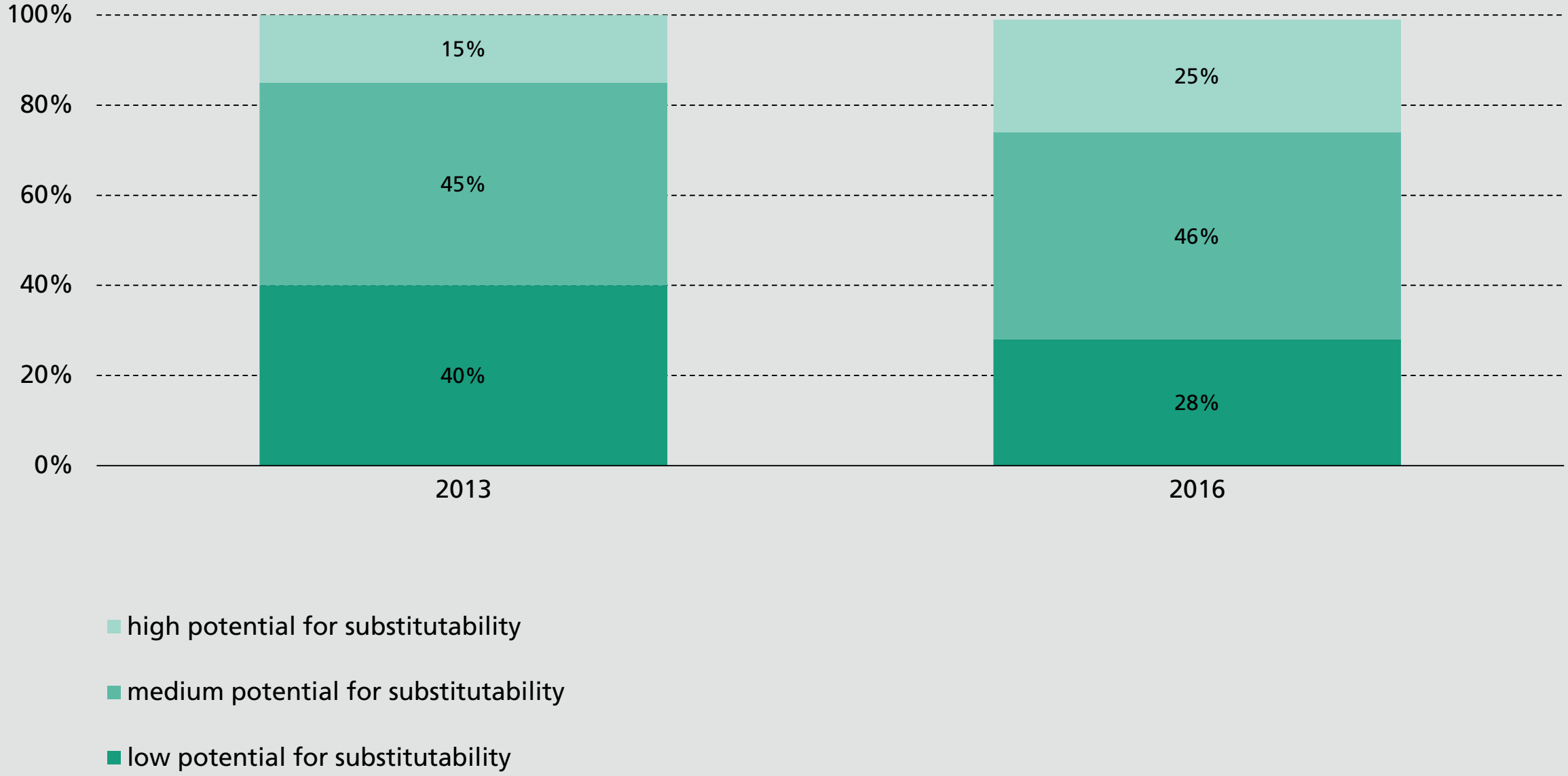
Source: Ingenics AG, Fraunhofer IAO (2014)

Percentage of activities that can be done by computers



Source: Dengler, K. / Matthes, B. (2018): Substituierbarkeitspotenziale von Berufen: Wenige Berufsbilder halten mit der Digitalisierung Schritt. IAB-Kurzbericht 04/2018.

Employees subject to mandatory social insurance contributions that might be affected by the substitutability potential of jobs in Germany



Source: Dengler, K. / Matthes, B. (2018): Substituierbarkeitspotenziale von Berufen: Wenige Berufsbilder halten mit der Digitalisierung Schritt. IAB-Kurzbericht 04/2018.

Changes in employment shares by occupation 2005 - 2025

Source: Cedefop skills forecast (2016), in: Nedelkoska, L. / Quintini, G. (2018): Automation, skills use and training. OECD Social, Employment and Migration Working Papers No. 202.

Best Practice Festo AG

A Learning Factory integrated into the Scharnhausen Technology Plant

Festo's Challenges

- Need to quickly and sustainably qualify employees
  - Demographic changes
  - Short product-life-cycles
  - New production processes
  - Interconnectedness of machines and facilities in the frame of Industrie 4.0
- BUT: to integrate learning into the work process entails disruptions

Vision

- A room for training and learning close to the work place, but protected from other influences of daily uncertainties

Festo's Approach

- A Learning Factory integrated into the Scharnhausen Technology Plant
- Including the entire value chain for the valve and valve terminal production in a didactically simplified manner
- Allowing practical learning

Regber, Holger (2019): 6 B/13 Praxisbeispiel 13: Eine Lerninsel in der Lernfabrik. In: Dietl / Schmidt / Wittwer (Ed.): PersonalAusbilden. Wolters Kluwer.

Best Practice Festo AG

A Learning Factory integrated into the Scharnhausen Technology Plant

Advantages of the Learning Factory

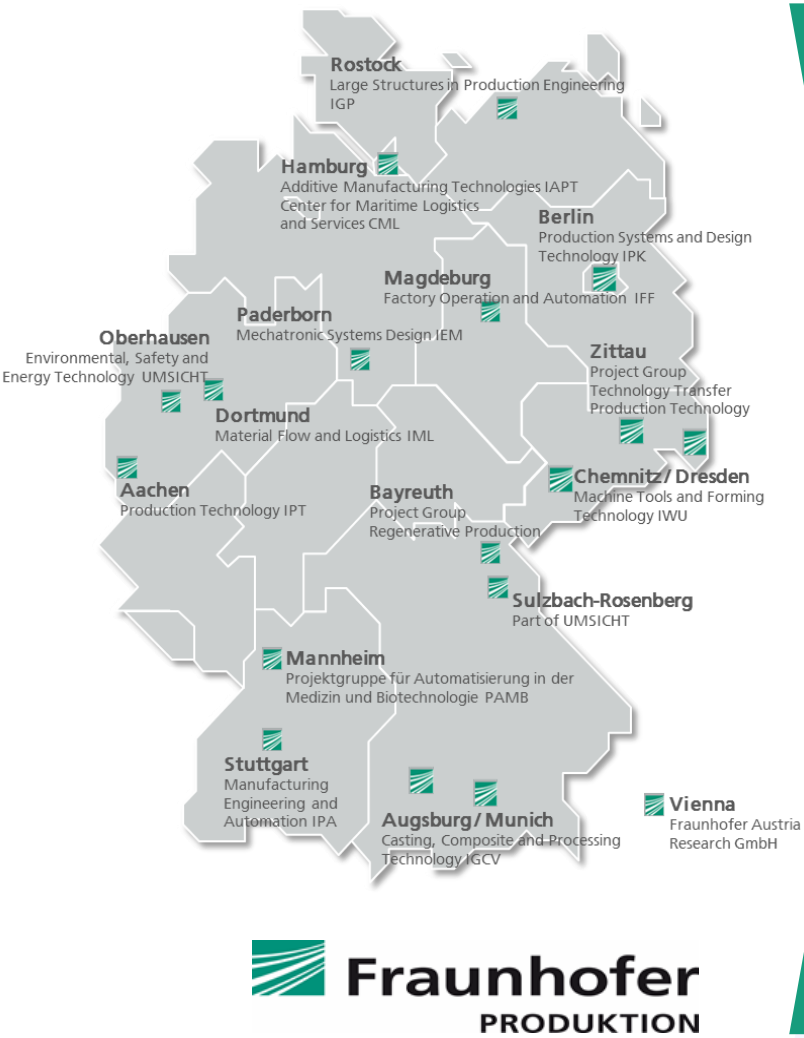
- More training opportunities for employees
- Shorter training time
- Higher flexibility
- Better qualification → less rejected goods → reduced costs
- Cross-cutting issues as energy efficiency and lean manufacturing processes are taken into consideration

Experiences with the Learning Island

- Trainees are able to manage all operative tasks
- Good learning effects
- Interdisciplinary cooperation allows a holistic picture for all employees
- Trainees need to be independent and willing to learn
- Effective way to prepare trainees for future tasks

Regber, Holger (2019): 6 B/13 Praxisbeispiel 13: Eine Lerninsel in der Lernfabrik. In: Dietl / Schmidt / Wittwer (Ed.): PersonalAusbilden. Wolters Kluwer. / Festo (2016): Die Festo Lernfabrik Scharnhausen. Lernen für die Wertschöpfung in einer anderen Dimension. https://www.festo-didactic.com/ov3/media/customers/1100/2019_flyer_expert_lernfabrik_1.pdf.

Fraunhofer IFF Industrial Cooperation Project in Foshan



Creation of awareness of Industrie 4.0 among companies in Foshan

Robotation Academy 佛山机器人学院 Robotation Academy Foshan

1. Providing consulting services for the establishment of an Industrie 4.0 project center of the Robotation Academy in Foshan
2. Performing Industrie 4.0 readiness checkups in industry in Foshan
3. Assisting the Robotation Academy with the creation of awareness of Industrie 4.0 in Foshan

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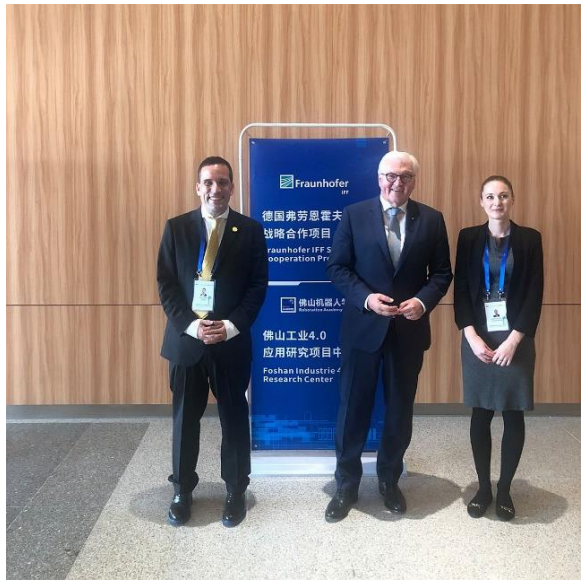
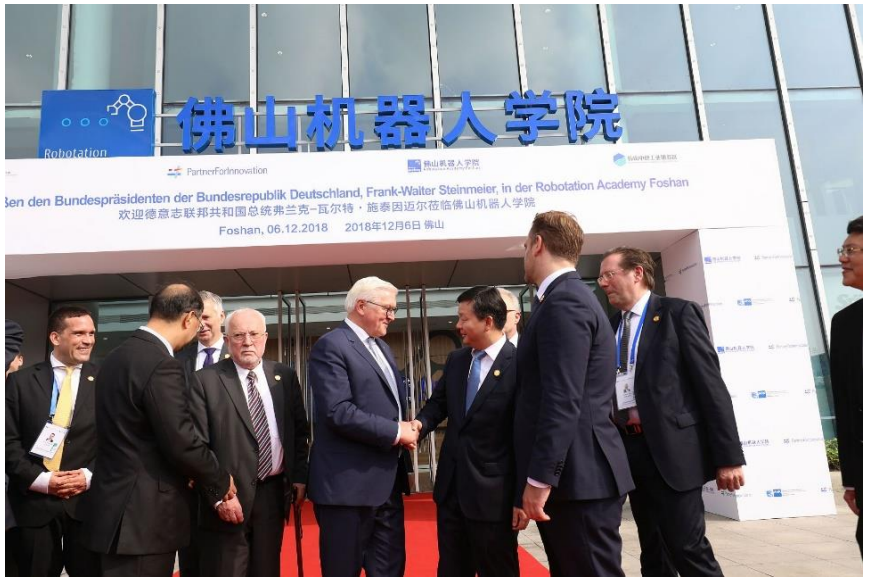
Fraunhofer IFF Industrial Cooperation Project in Foshan and Robotation Academy Foshan

Widely recognized by German Politics





Fraunhofer IFF Industrial Cooperation Project in Foshan

Let‘s pursue applied research together

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