



# **ISMTEC 2016 Thailand**

## **STEM Education: Preparing workforce for the future**

**Bangkok, 21 October, 2016**

### **Promise, Promotion, Prospect – STEM in Vocational Education and Training in Germany**

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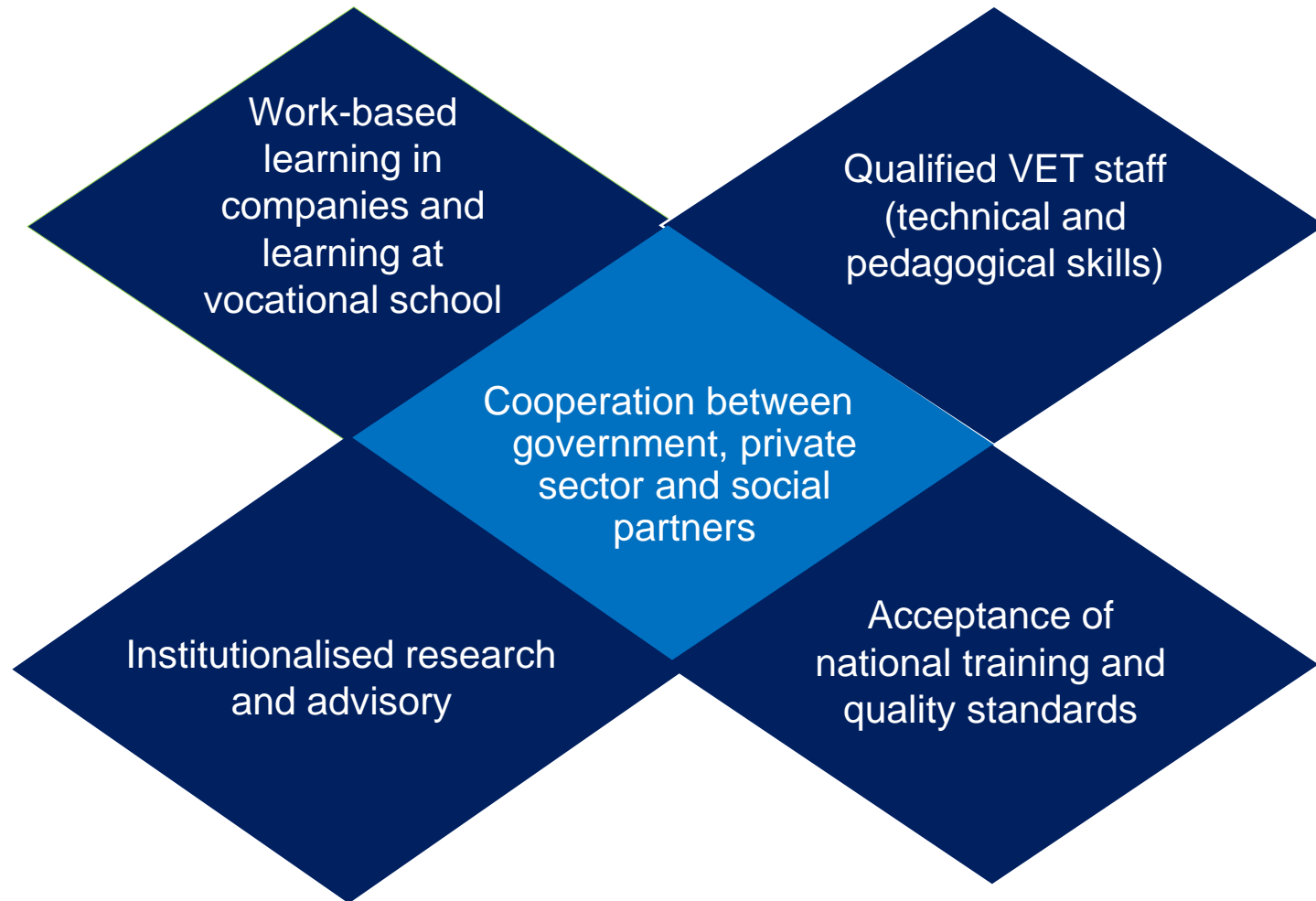
# The Federal Institute for Vocational Education and Training (BIBB)

- National centre of competence for the research and development of vocational education and training (VET) in Germany
- regulated by the Vocational Training Act (1969/2005 amended)
- Tasks: research and development, modernisation of in-company training standards, support to inter-company training centers, internationalisation

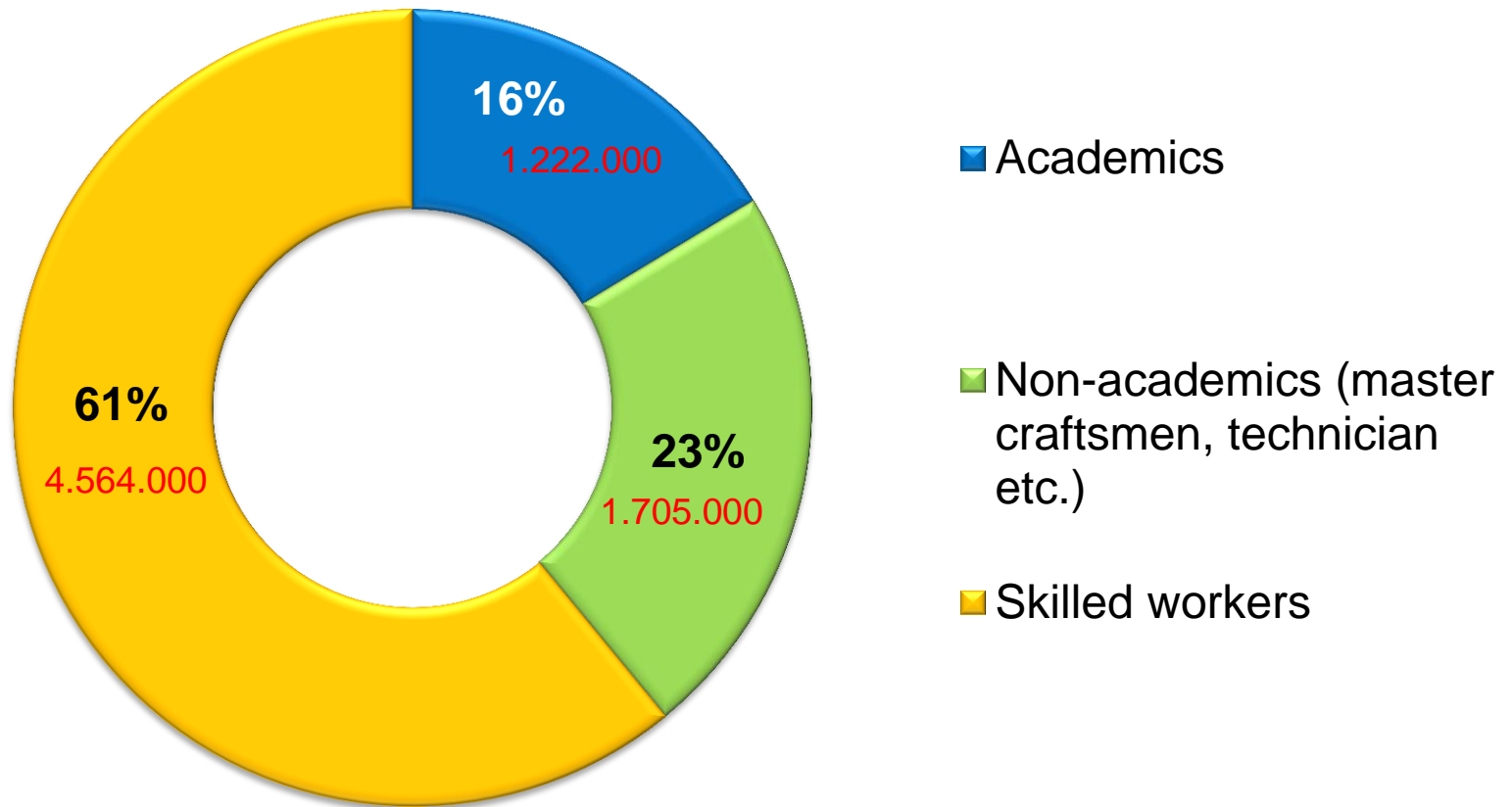


- 1) Introduction
- 2) The German VET System
- 3) **Promise** - Role and relevance of STEM in German VET
- 4) **Promotion** - The young generation
- 5) **Prospect** - Skill shortage and dynamics by Industry 4.0?
- 6) Conclusion

# Key characteristics of the German Dual System of VET



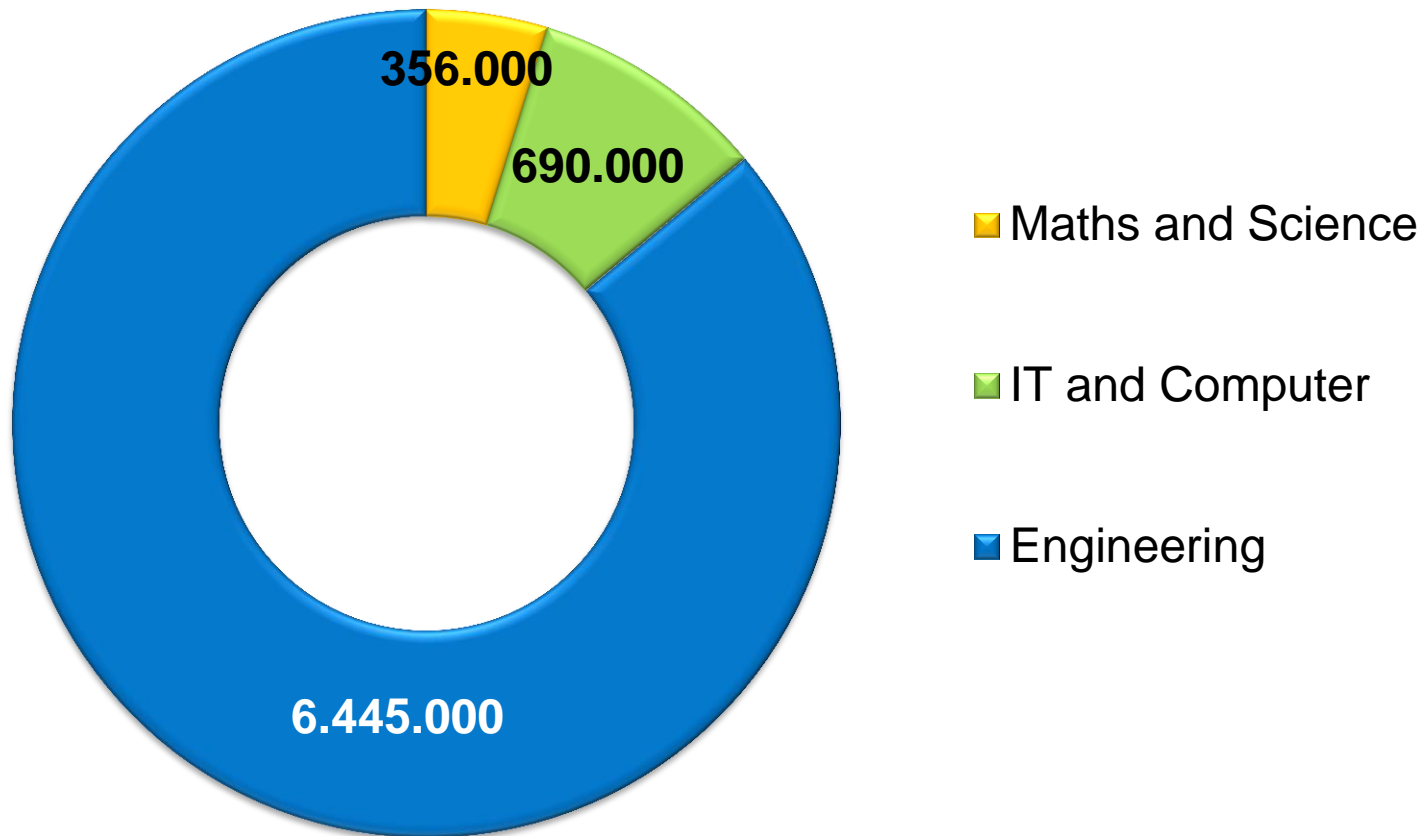
# Profile of qualifications in STEM occupations



Source:

Bundesagentur für Arbeit: Der Arbeitsmarkt in Deutschland – MINT-Berufe. Nürnberg 2016, p. 6.

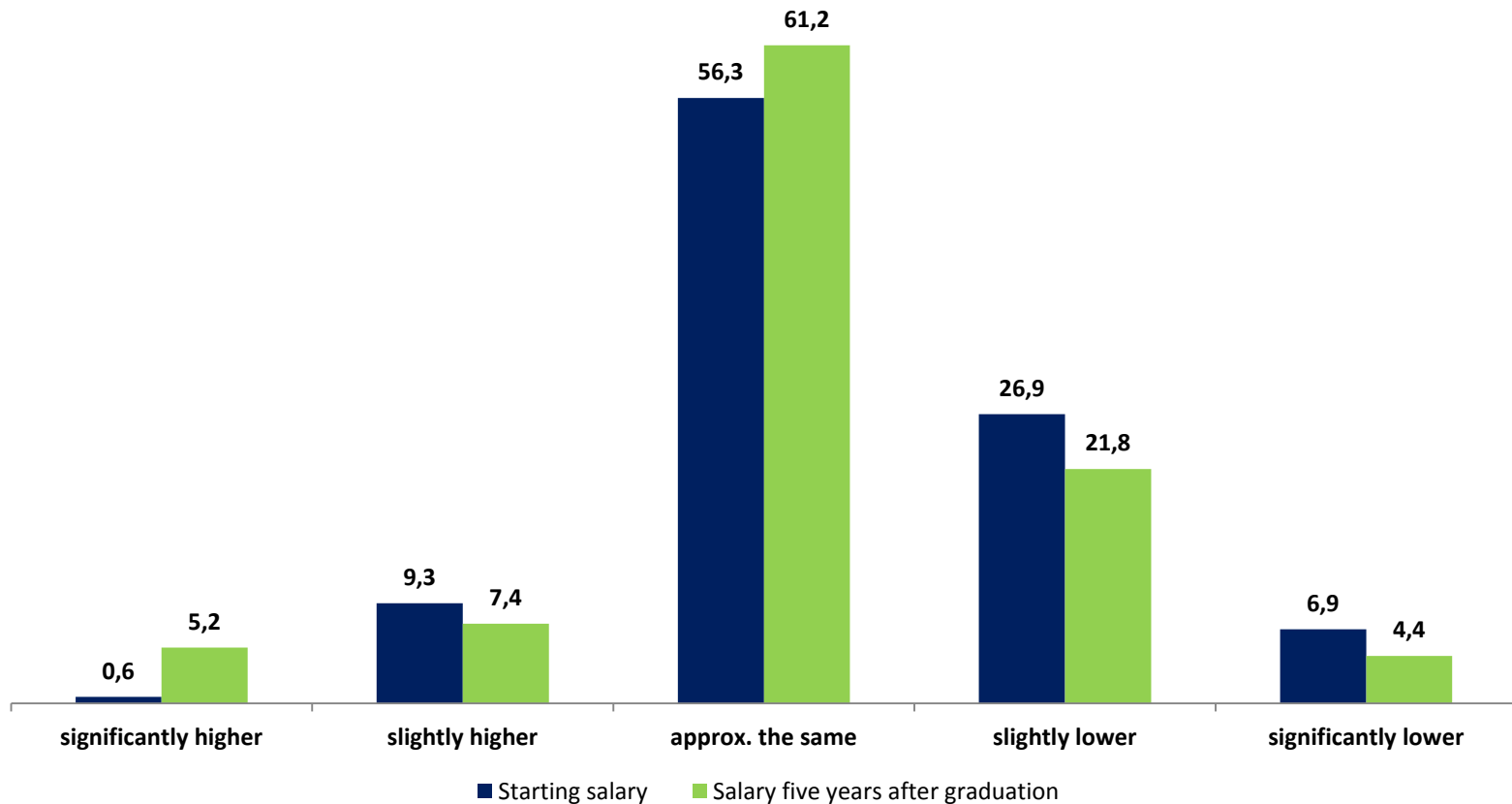
# Employees in STEM occupations in Germany



Source:  
Bundesagentur für Arbeit: Der Arbeitsmarkt in Deutschland – MINT-Berufe. Nürnberg 2016, p. 6.

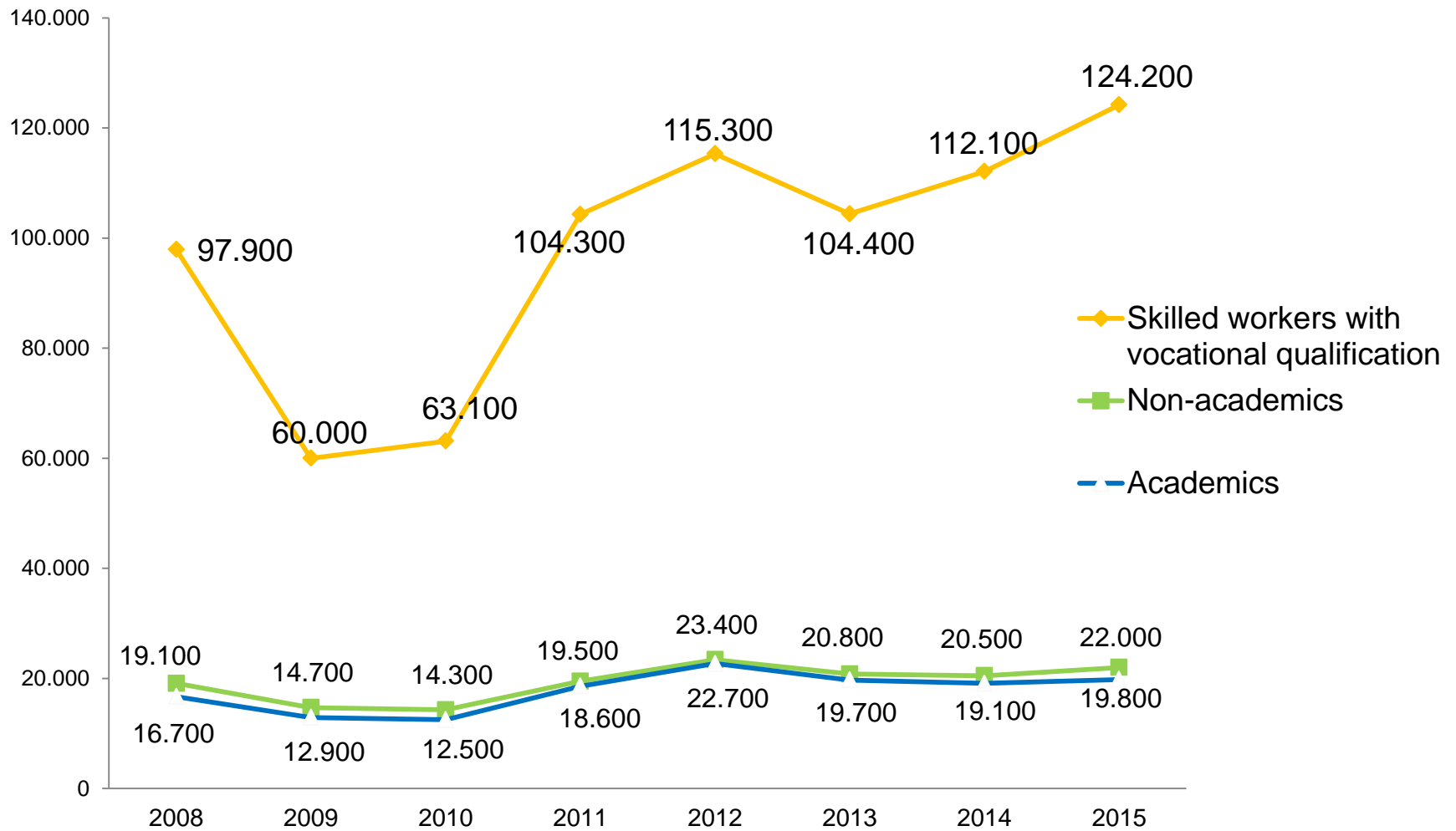
## Salary of vocational further training graduates in comparison to bachelor graduates (techn./sci.)

Percentage of companies (in per cent) (only companies with 50 or more employees)



Source: IW: Karrierefaktor berufliche Fortbildung; 2016: 109; <http://www.dihk.de/ressourcen/downloads/iw-studie-karrierefaktor-fortbildung.pdf>

# Vacancies in STEM professions



Source: Bundesagentur für Arbeit: Der Arbeitsmarkt in Deutschland – MINT-Berufe. Nürnberg 2016, p. 13



# Image and Reality of STEM occupations

## Students' perceptions

little contact with people

**61 %**

dangerous

**50 %**

cold  
**32 %**



## Apprentices' experiences

Little contact with people

17 %

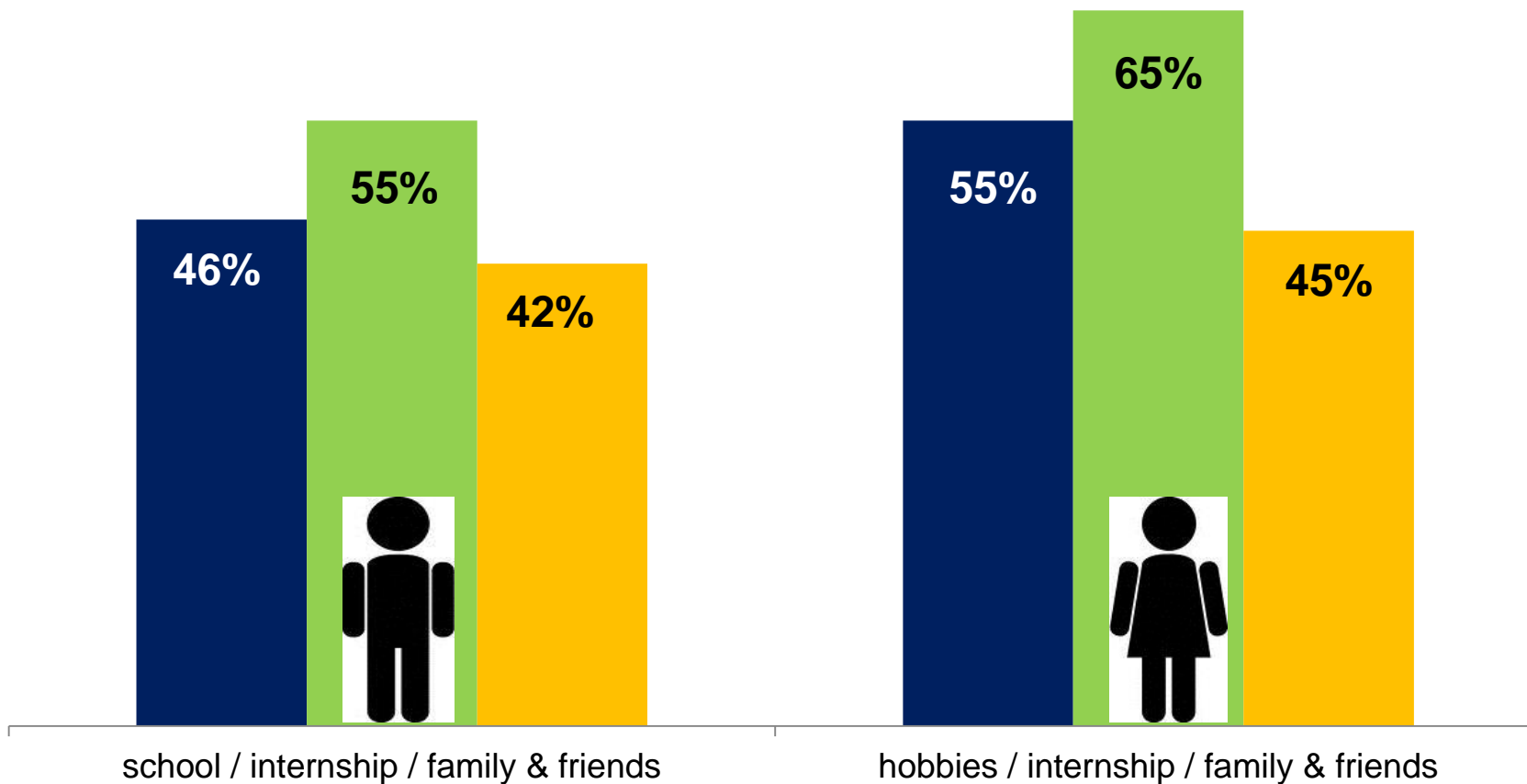
dangerous

21 %

cold  
8 %

Source: Acatech / Körber-Stiftung: MINT-Nachwuchsbarometer 2015 . Fokusthema: Berufliche Ausbildung. Kurzfassung. Hamburg 2015, p. 7.

# Internships: crucial for taking up a STEM career



Source: Acatech / Körber-Stiftung: MINT-Nachwuchsbarometer 2015 . Fokusthema: Berufliche Ausbildung. Kurzfassung. Hamburg 2015, p. 9.

# Expectations of STEM apprentices

## MINT career aspiration

Income opportunities

**85 %**



Practical work

**70 %**



Social contacts

**33 %**



## other career aspiration

Income opportunities

**73 %**

Practical work

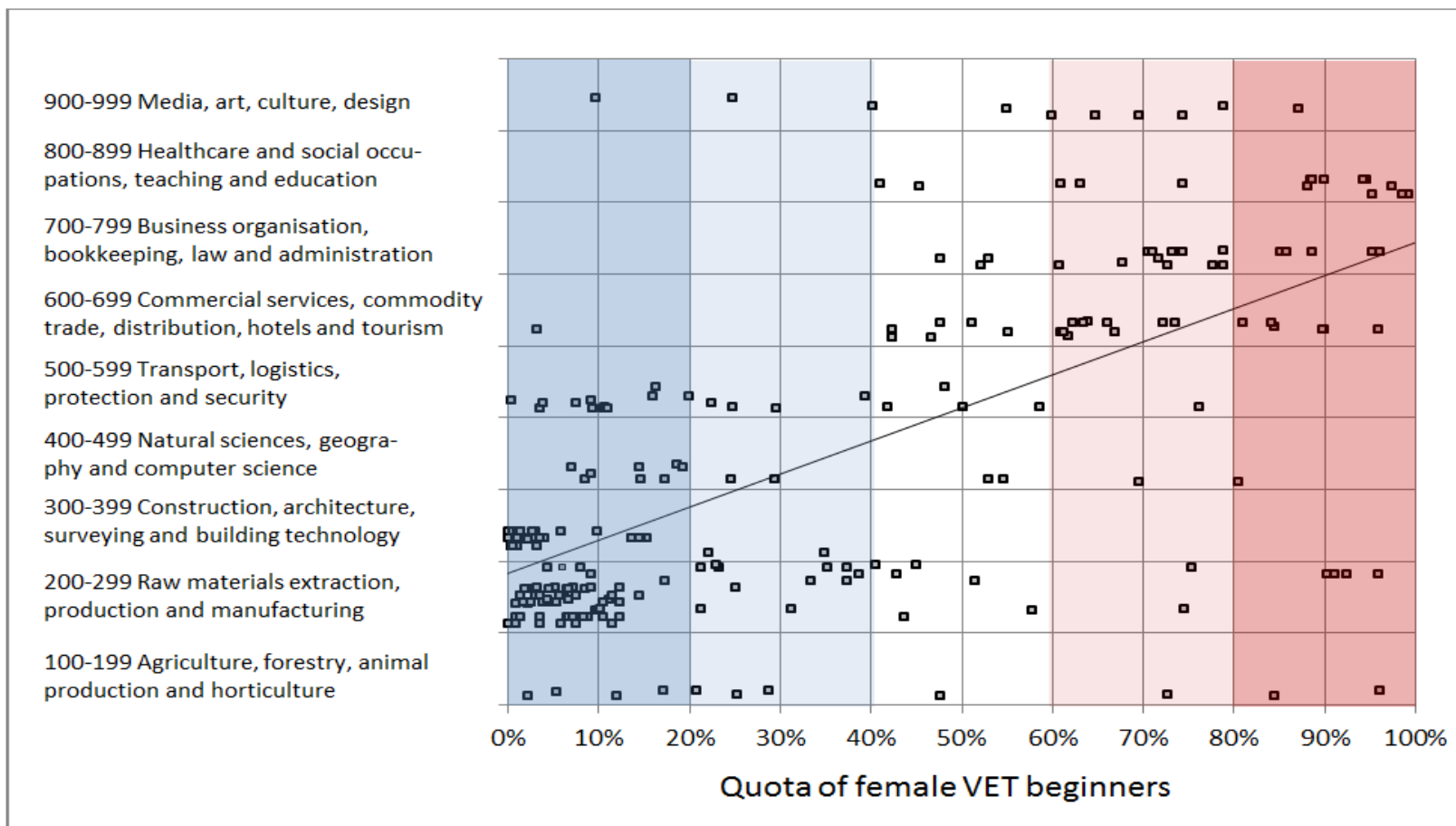
**51 %**

Social contacts

**73 %**

Source: Acatech / Körber-Stiftung: MINT-Nachwuchsbarometer 2015 . Fokusthema: Berufliche Ausbildung. Kurzfassung. Hamburg 2015, p. 11.

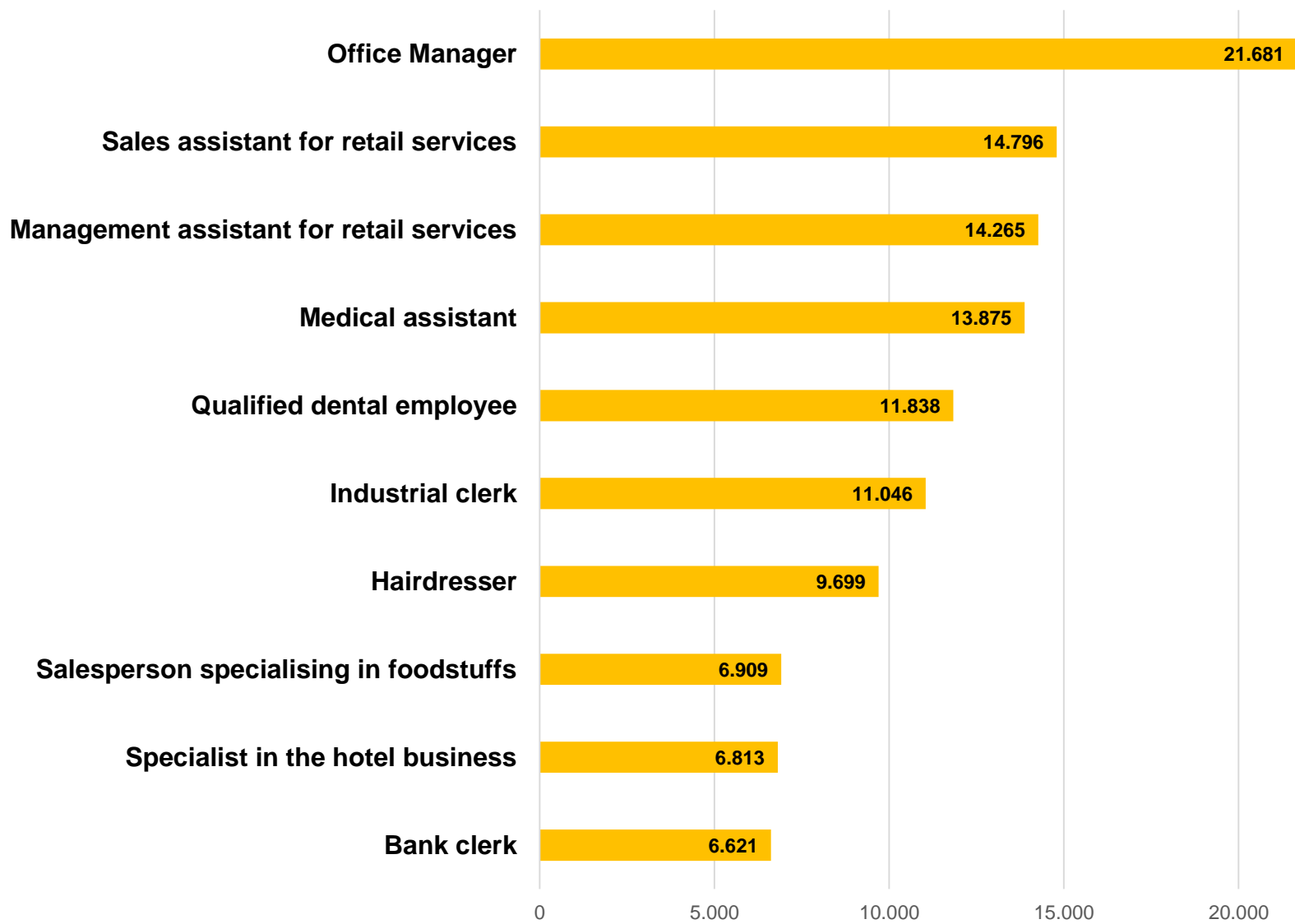
# Gender segregation in VET in Germany



Note: The 238 points mark the position of the different VET occupations. Occupations with the code numbers 100-499 belong to the commercial-technical sector; those with the code numbers 500-999 are service sector occupations.  
 Female occupations = occupations with 80% or more female trainees; Male occupations = occupations with 20% or less female trainees

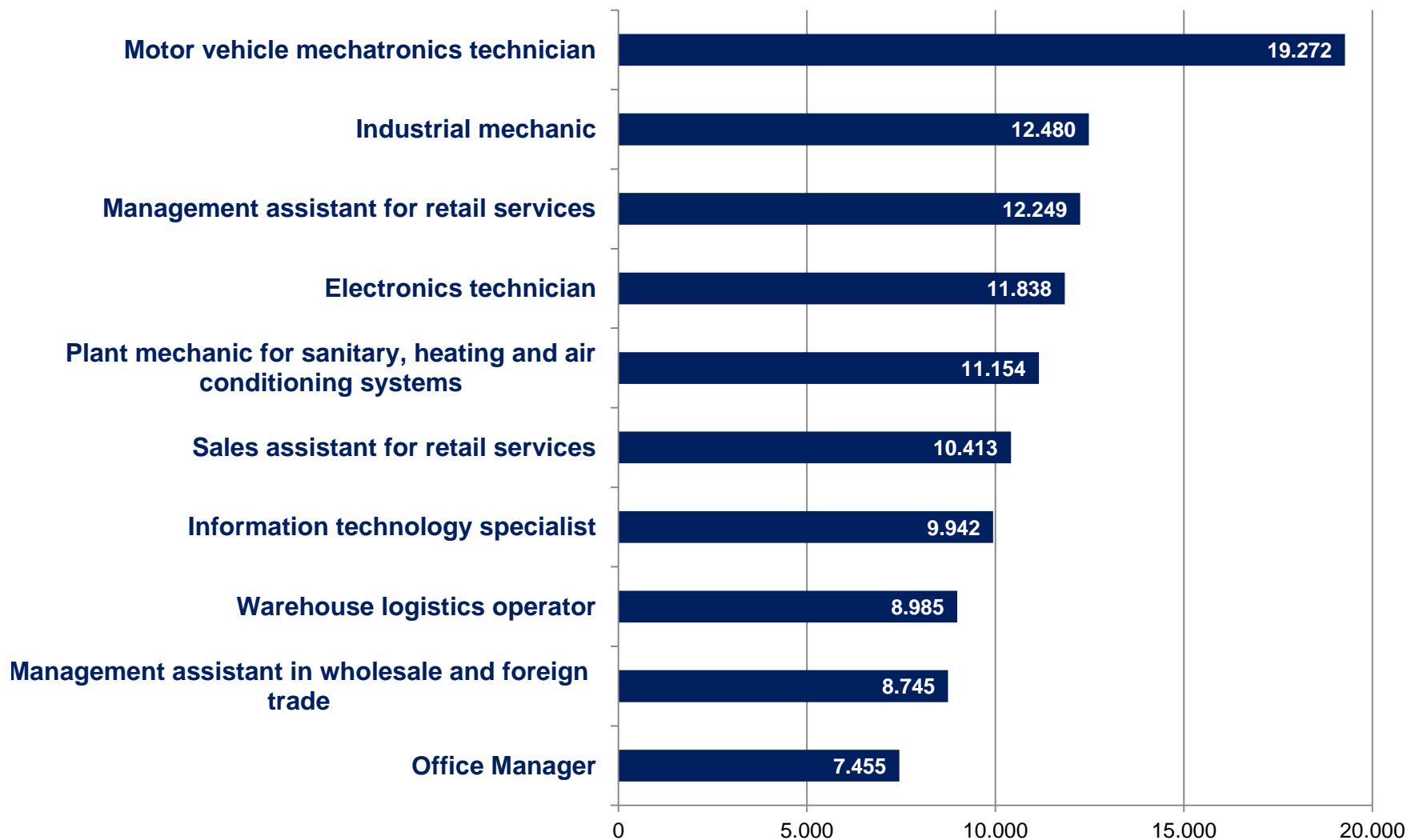
Source: German Federal Statistical Office (2013), BIBB calculations

# TOP 10 popular training occupations - female



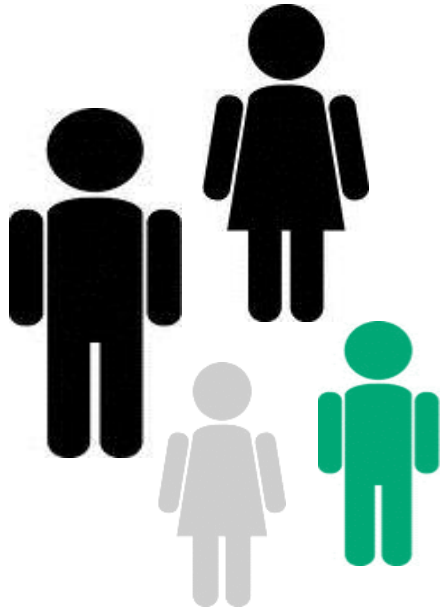
Source: Federal Statistical Office

# TOP 10 popular training occupations - male



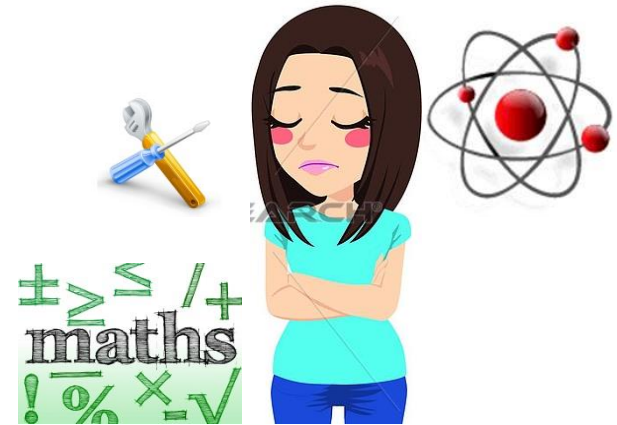
Source: Federal Employment Agency

# Influence of family and friends on career choice in STEM



prejudices  
and  
stereotypes

Family and friends **advise**  
women five times as much  
**against STEM occupations**



Source: Acatech / Körber-Stiftung: MINT-Nachwuchsbarometer 2015, Fokusthema: Berufliche Ausbildung. Kurzfassung. Hamburg 2015, p. 13.



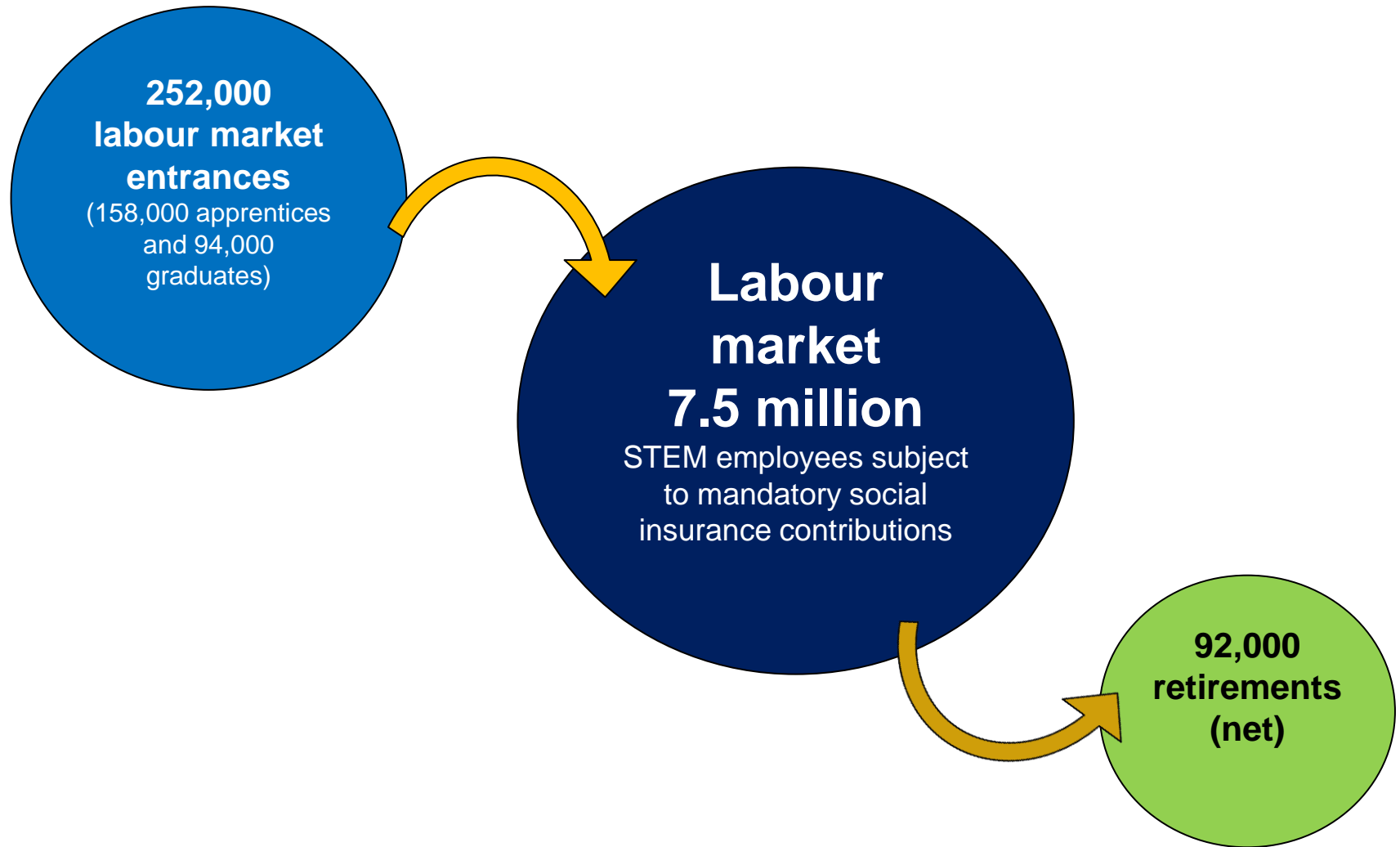
Franziska, 17 years old: Apprenticeship as a lumberjack



[http://www.girls-day.de/Maedchen/Videos/Traumberufe/Franziska\\_und\\_Silke\\_Arbeiten\\_in\\_der\\_Natur2](http://www.girls-day.de/Maedchen/Videos/Traumberufe/Franziska_und_Silke_Arbeiten_in_der_Natur2)

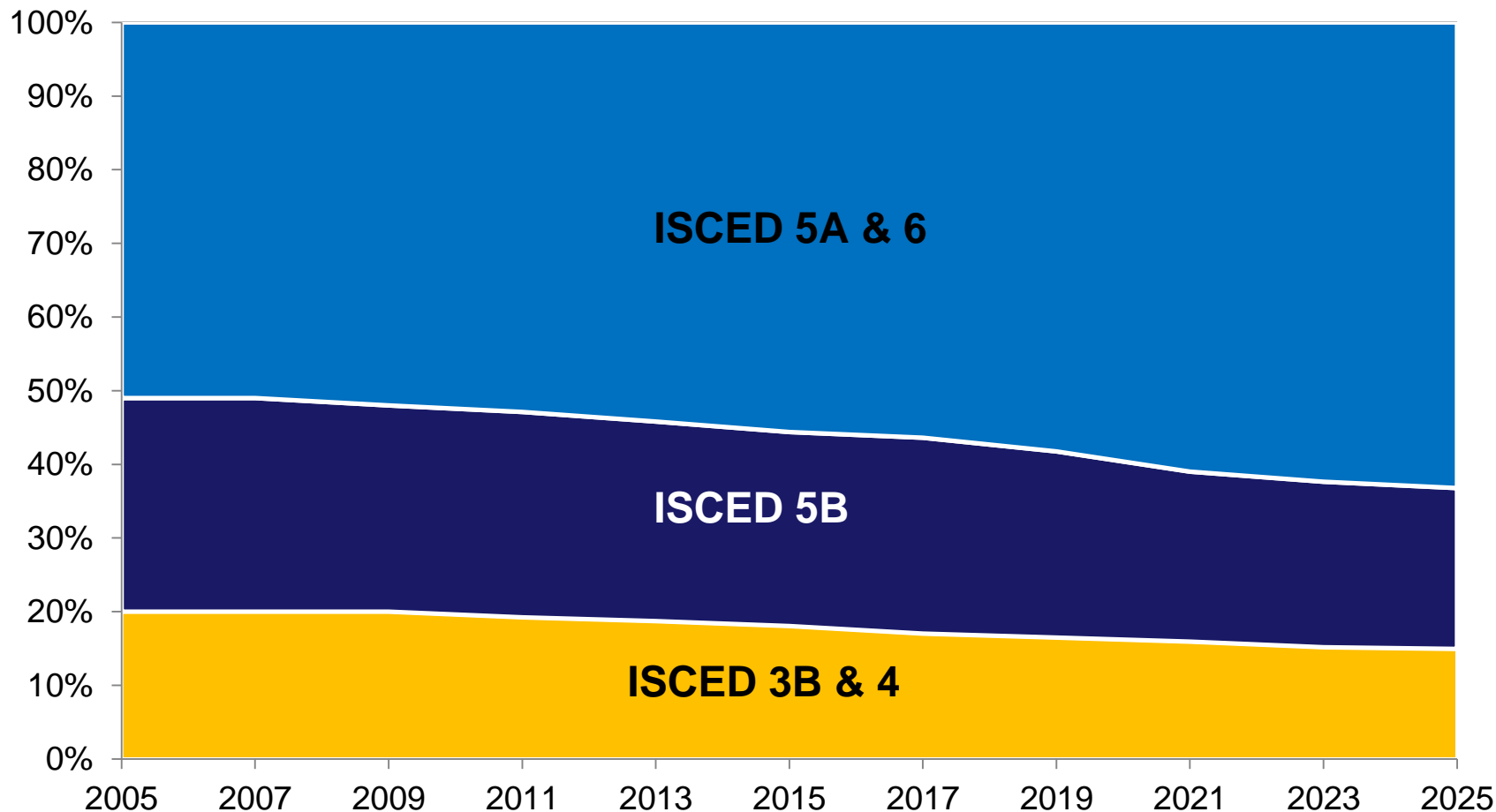


# No general STEM skills shortage



Source: Bundesagentur für Arbeit: Der Arbeitsmarkt in Deutschland – MINT-Berufe. Nürnberg 2016, p. 16

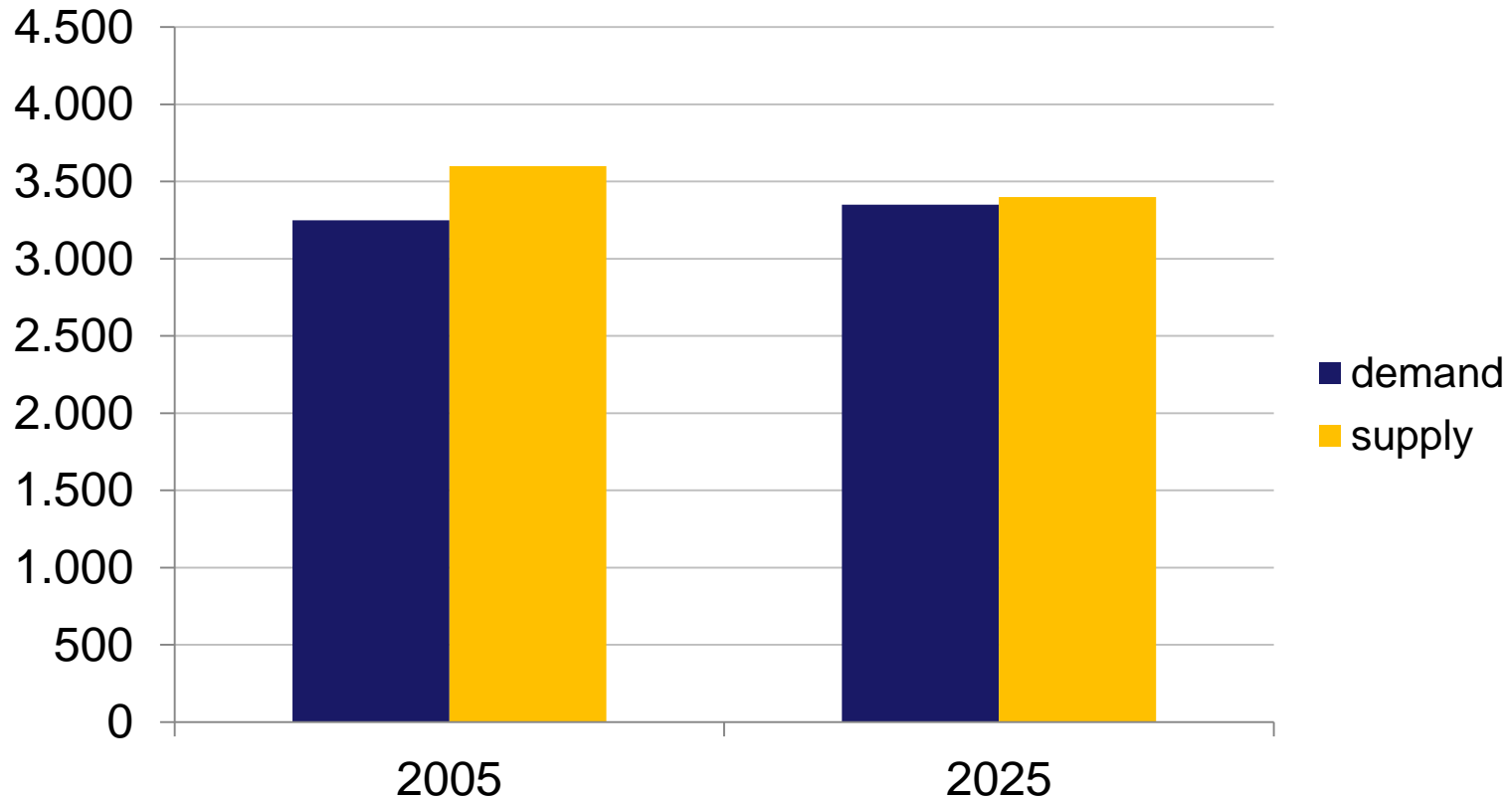
# Development of qualifications in MINT-professions



Source: BWP 03/2010, p. 42.

# Projection of supply and demand in STEM professions

Gainfully employed people and employees in occupational field 8:  
“Technical and scientific occupations” – including flexibility – in thousands



Source: BWP 03/2010: p. 42.

# Examples: Hightech in the world of work

- Diagnostic programs in garages / car repairing
- Roof inspection with drones
- Dental laboratory technology with 3D scanning and printing
- Precision farming with telematics and GPS



# Use of digital devices in training companies

	Training companies in %		
	use	no use	N/A
Desktop-PC with internet access	77	23	0
Scanner	52	47	1
Laptop with internet access	48	51	1
Smartphone	45	54	1
Tablet	28	71	1
Devices for mobile data capturing (MDE)	13	85	3
3D-printer	8	90	3

Source: Gensicke, Miriam e.a.: Digitale Medien in Betrieben - heute und morgen. Eine repräsentative Bestandsanalyse. Bonn 2016, p. 44.



# Many thanks for your attention!

Get more information: [www.bibb.de/en](http://www.bibb.de/en)

Further information on VET 4.0:

<https://www.bibb.de/en/49603.php>

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