Changing technologies – persistent inequalities?
Exemplifying anticipation of skill demand in Germany

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Outline

• Background
• Past trends
• Future projections
• Technology and inequality
Processes of change: How are new requirements incorporated into VET?
Note: There are differences in academic training – but also strong leanings towards the mediating aspects of this dual system („dual studies“).

In Germany, institutionalised mediation of occupational contents for curricula ... ... leads to a specific understanding of the concept of occupation:
Corresponding factors: Megatrends and their influences

Education System
- general education
- vocational education
- tertiary education

Supply of employees and skilled workers

Trained occupation

Adjustment
- Imbalances
- Matching

Labour Market
- Economic developments, firm requirements

Demand for employees and skilled workers

Qualification demands

Megatrends:
Changed requirements due to

- Demography
- Health and healthcare supply
- Urbanisation
- Mobility
- Work-life-balance
- Globalisation
- Smart economy
- Climate change
- Ressource efficiency
- Social equality and participation
- Knowledge intensification
- New types of employment

Occupational requirements at work
Transforming labour markets and occupations

Access opportunities for skilled workers, career success
BIBB/IAB-QuBe-Projections - structure

Labour Supply
- Education System
- Choice of occupation
- Labor force participation
- Occupation trained for

Demography

Occupational Flexibility
- Current occupation economically active persons

Matching

Labor Demand
- Wages & Prices
- Wage in occupational field
- Matching by occupational field

Economy
- Current occupation in sector 1
- Current occupation in sector 63
- Current occupation gainfully employed persons

Quelle: Maier, Zika u.a. 2014: Löhne und berufliche Flexibilitäten als Determinanten des interaktiven QuBe-Arbeitsmarktmodells. Wissenschaftliche Diskussionspapiere, Heft 148, Bonn
Aim and Ideas

• Understand the impacts of technological change on the labour market (structurally) and on the work place level

• Starting point: Can polarisation (as in task-approach and Frey/Osborne) be found / expected in Germany?
  • TASK-approach
    • medium qualified workers’ tasks are being substituted
    • technological developments being the reason
  • Polarisation
    • substitution of tasks leads to
    • increase in shares of employment and increase in wages for low and high qualified
    • decrease in shares of employment and decrease in wages for medium qualified
**Structure and Data**

- **employees’ perspective (ETB)**
- **branches, occupations, qualifications, worktools**
- **requirements (SteAn)**
- **projections (QuBe)**
- **employers’ perspective (Qualipanel)**
Past trends

N.B.:
Prices for robots dropped significantly after 1991. (Michaels, Guy; Graetz, Georg: Robots at Work. CEP discussion paper 1335. 2015, revised 2017)

In the U.S., prices for microprocessors dropped by 35.3% each year on average between 1985 and 1996. (Grimm, Bruce T.: Price Indexes for Selected Semiconductors, 1974-96. Survey of Current Business 1998)
Polarisation in Germany?

Past trends

Source: Qualification and Career / Employment Surveys 1979-2012, weighted, own calculation
What will the future bring?

<table>
<thead>
<tr>
<th>Assumptions</th>
<th>Partial scenarios</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment investments</td>
<td></td>
</tr>
<tr>
<td>1. Additional investments</td>
<td>PSC 1</td>
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<tr>
<td>2. Conversion of capital stock sensor technology</td>
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<td>3. Conversion of capital stock IT services</td>
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<td>Building investments</td>
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<td>4. Capital expenditure “high-speed Internet”</td>
<td>PSC2</td>
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<tr>
<td>5. Distribution on industries</td>
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<td>6. Balanced Government budget</td>
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<td>Cost and profit structures</td>
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<td>7. Continuing education</td>
<td>PSC3</td>
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<td>8. Consulting services</td>
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<td>9. Digitisation</td>
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<td>10. Decrease in raw materials, consumables and</td>
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<td>supplies as well as purchased services</td>
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<td>11. Decrease in the cost of logistics</td>
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<td>12. Increasing labour productivity</td>
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<td>Change in the structures of occupational fields</td>
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<td>and requirements</td>
<td>PSC4</td>
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<td>13. Adjustment in occupational structure with</td>
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<td>industrial sectors considering routine</td>
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<td>14. Adjustment in labour productivity</td>
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<tr>
<td>Increases in demand</td>
<td>PSC5</td>
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<td>15. Higher government spending on security</td>
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<td>16. Additional demand from private households</td>
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<td>17. Higher willingness to pay</td>
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<tr>
<td>18. Increases in export</td>
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</table>

Comparison with the baseline scenario (baseline projection) QuBe project
What will the future bring?

Effect on job requirements by shifting index

Percentage difference

Helper | Trained | Specialist | Expert

What will the future bring?
Technology and inequality

• We see a general upgrading and a shift towards higher complexity

• Different potentials for substitution for different workers, it rises with age, being female, working in logistic, security or office occupations, when no new technologies have been implemented in the last two years, the lower your job’s required qualification

• Segmentation and segregation on the labour market could be balanced by technology, but instead substitution penalises the same individuals as these structures

• We do not (especially in international comparison) have equal access to, understanding and usage of technology

➢ Technologies are not neutral to inequalities, it seems they preserve and promote them
Thank you!

Dr. Michael Tiemann

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Initiative „Berufsbildung 4.0“

„Berufsbildung 4.0“ at BIBB

With: ministries, social partners, other federal ressorts

- Screening of occupations and branches
- Media competence
- Demand for skilled labour

Further 4.0 initiatives at BIBB

- Digitalisation of work in the automobile industry
- Analyses of IT requirements „IT-Voruntersuchung“
- Digital media in VET training
- Special program digitalisation (inter-company vocational training centres and centres of excellence)
- Polarisation thesis revisited