An OECD Perspective on Industry-Science Relations in the Digital Age

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Channels and policies for knowledge transfer and exchange

Where does Germany stand among OECD countries?

Recent policy trends in knowledge transfer and co-creation

Some ideas and suggestions for the future
### Main channels of knowledge transfer between public research and the private sector

<table>
<thead>
<tr>
<th>Direct channels of interaction</th>
<th>Indirect channels of interaction</th>
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<tr>
<td>▪ Flow of graduates to industry</td>
<td>▪ Publication of research results in scientific journals</td>
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<td>▪ Academic consultancy,</td>
<td>▪ Presentations in conferences, expositions, specialised media</td>
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<td>▪ Contract research</td>
<td>▪ Courses &amp; continuing education provided to industry</td>
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<td>▪ Collaborative research/public-private partnerships</td>
<td>▪ Idea and business exchanges around innovation clusters</td>
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<td>▪ Intellectual property (IP) (patents, licenses, databases)</td>
<td>▪ Domestic and international mobility of high skilled people</td>
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<td>▪ Academic start-ups</td>
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6 key policy domains to support knowledge transfer

1. **Rules**: Legal frameworks for intellectual property in both private and public sectors, employment rules that encourage university staff to work with industry.

2. **Private Money**: Bank finance, crowdfunding, equity finance, venture capital funds, corporate funds, corporate venture funds,

3. **Public Money**: Direct and indirect funding to encourage SMEs to collaborate with universities/public research.

4. **People**: Incentives for researcher mobility, academic entrepreneurship, industrial PhD-programs, etc.

5. **Hard and soft infrastructure**: Technology transfer offices, intermediaries, platforms, networks and clusters.

6. **Digital capacity**: Research data management, skills and computing power.
German strengths: leading in industrial patents, 2003-2013

- Inventions from University & Public research Institute
- Inventions from industry

() Growth ratio as percentage of 2013 to 2003

Source: OECD Patent Database, 21 February 2019
Germany ranks high in terms of the share of business R&D spending that goes to higher education.

Source: OECD Main Science and Technology Indicators, 2018
Higher education facilitates innovation through student start-ups

18% of German start-ups are by students
Founders of academic start-ups are less often researchers.

Source: OECD based on Breschi et al. (forthcoming); www.crunchbase.com
Germany strong in product innovation. But room for improvement as regards new-to-the market innovations

Most German innovations are mostly new “to the firm”, less “to the market” (Fig. A)
Share of German product innovation fell somewhat between 2010-2014 (Fig. B)

Sales of product innovations as a percentage of total sales

Figure A.

Figure B.

Source: Eurostat, CIS 2014
German firms, and particularly SMEs, tend to use ICT innovations such as digital cloud services less often.

 Enterprises using cloud computing services, by size, 2016 and as a percentage of enterprises in each employment size class

Entrepreneurial education in schools Germany lags behind

Average expert scores, [1 = highly insufficient; 9 = highly sufficient], 2017

Source: Global Entrepreneurship Monitor (2018), ENTREPRENEURIAL BEHAVIOUR AND ATTITUDES
https://www.gemconsortium.org/report
Germany strong on STEM skills... but Asia ahead and decline in share of top scores

Proficiency levels in PISA 2015 in basic maths was above average but proficiency at higher levels has declined by 5 percentage points between 2009-2015

Source: PISA 2015 Results (OECD)
Some recent international trends

1. Greater emphasis on **knowledge co-creation rather than one-way transfer**
   a) Public-private partnership, e.g. Catapult centres in the UK
   b) Joint research laboratories, e.g. Portugal’s CoLABs, France’s LabCom programme support’s the establishment of joint labs between universities/PRIs and SMEs

2. Looking beyond university patents and start-ups: **promoting domestic and international mobility of the highly skilled.**
3. **Adapting knowledge transfer policies to national (+ regional) strengths:**
   - The Netherlands takes a place-based approach
   - France focuses on networks of technology transfer offices
   - Canada’s Technology Access Centers focus on transferring talent, expertise and technology from technical universities or colleges to SMEs

4. **Adapting knowledge transfer policies to the digital age**
   - Research Funders promote open access and open data (e.g. NIH in the USA, Horizon 2020)
   - Guidelines on research data management and creating research data centres at universities and public labs
How can Germany leverage its already strong position in knowledge transfer?

- Take advantage of the Digital transformation to improve the quality and speed of knowledge transfer activities
- Promote open research data as source of innovation for SMEs!
- Improve evaluation of policy initiatives
- Keep a focus on STEM skills in primary school education
- Improve youth awareness and interest in innovation and entrepreneurship
- Improve researcher involvement in start-ups
- Promote international partnering for knowledge diffusion
Thank you!
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- For further information on STI policies and knowledge transfer activities:
  - http://www.oecd.org/sti/inno/
  - oe.cd/tip