



*Mehr Ideen - mehr Erfolge: Wie verbessern wir das
Deutsche Innovationsökosystem?*

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

Dr. Ludger Schuknecht, stellv. Generalsekretär der OECD
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Outline

- 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

Direct channels of interaction

- Flow of graduates to industry
- Academic consultancy,
- Contract research
- Collaborative research/public-private partnerships
- Intellectual property (IP) (patents, licenses, databases)
- Academic start-ups

Indirect channels of interaction

- Publication of research results in scientific journals
- Presentations in conferences, expositions, specialised media
- Courses & continuing education provided to industry
- Idea and business exchanges around innovation clusters
- Domestic and international mobility of high skilled people

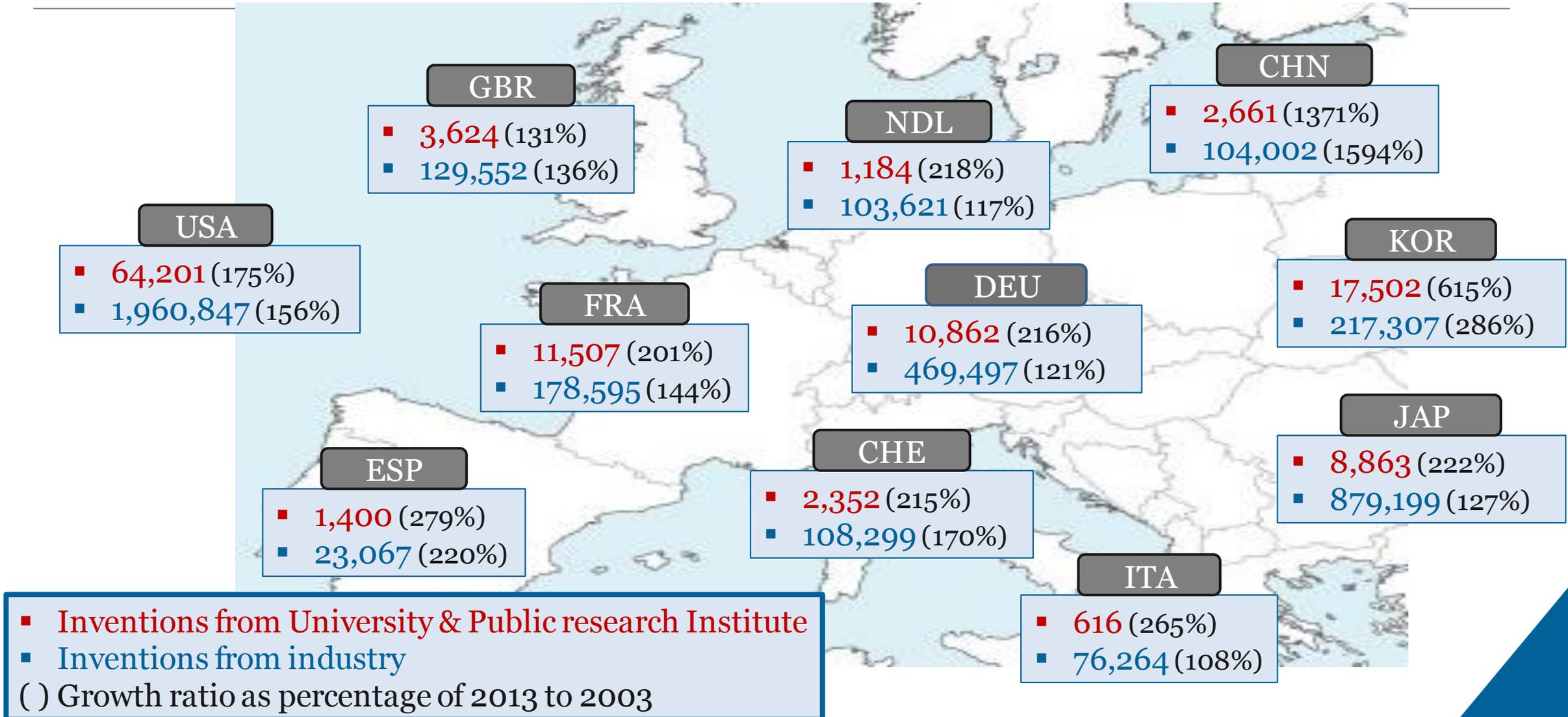


6 key policy domains to support knowledge transfer

- 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.



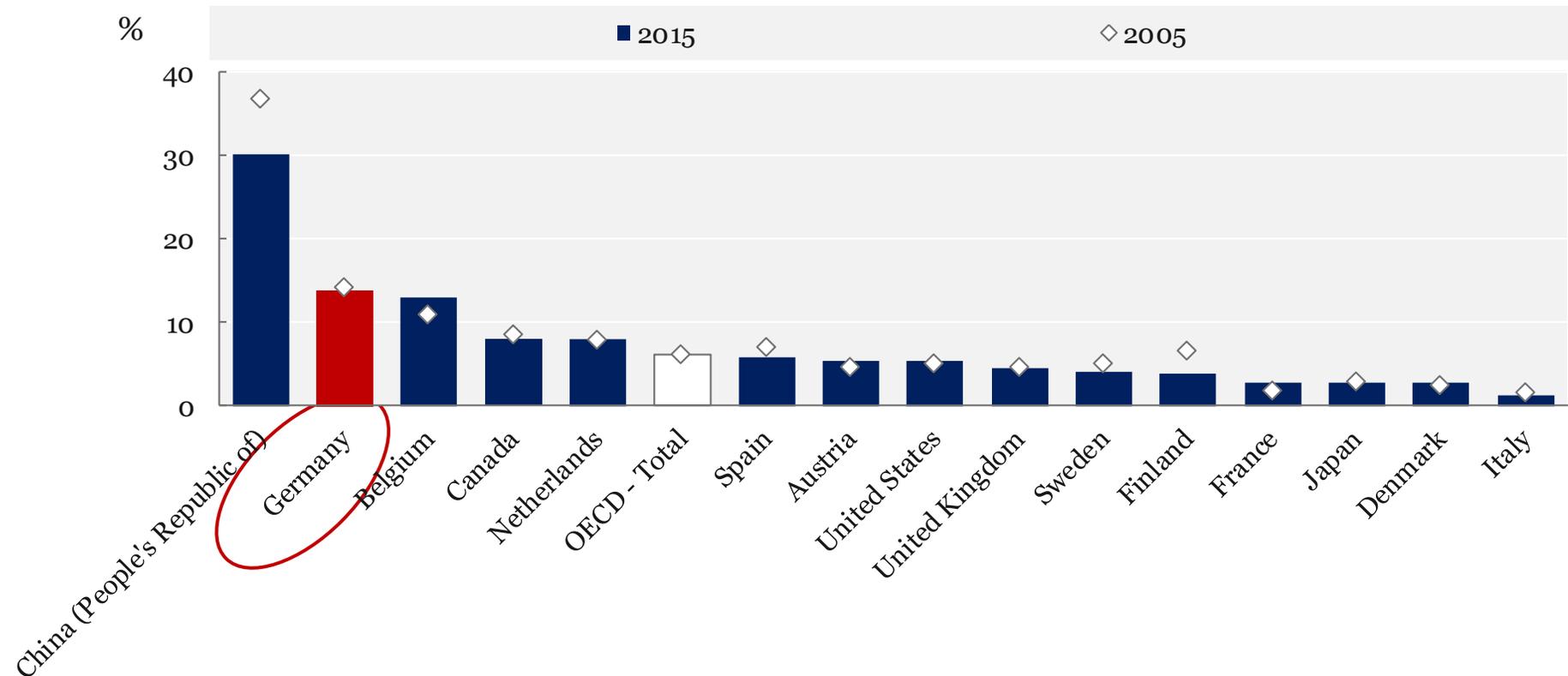
German strengths: leading in industrial patents, 2003-2013





Business financing of R&D in higher education, 2015

Germany ranks high in terms of the share of business R&D spending that goes to higher education





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 .

Fig. A Start-ups founded by students and Phds

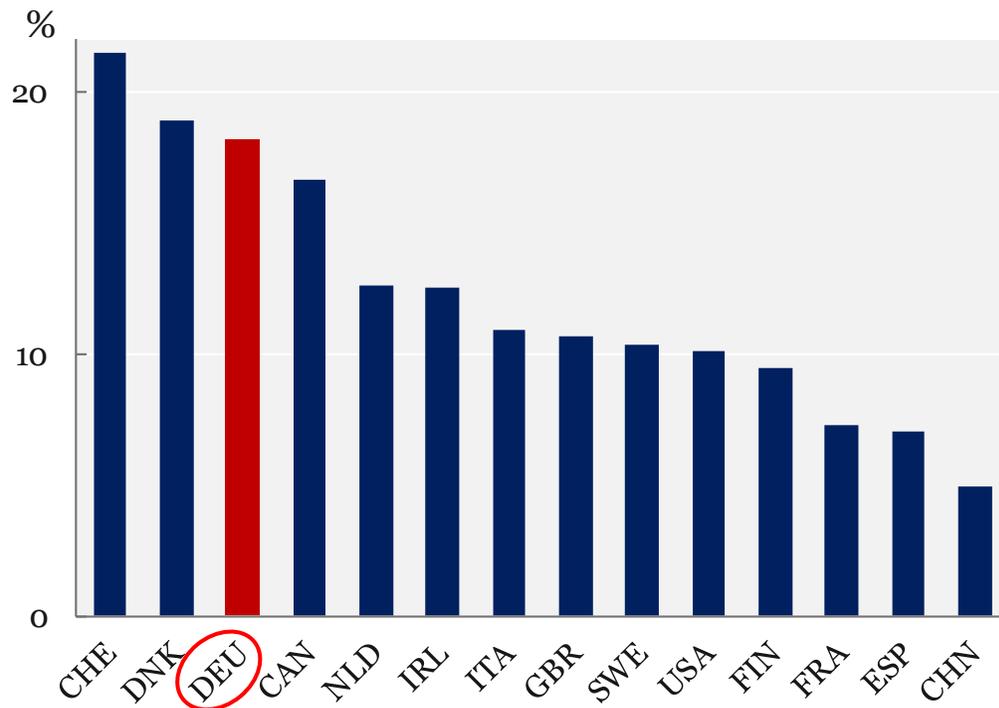
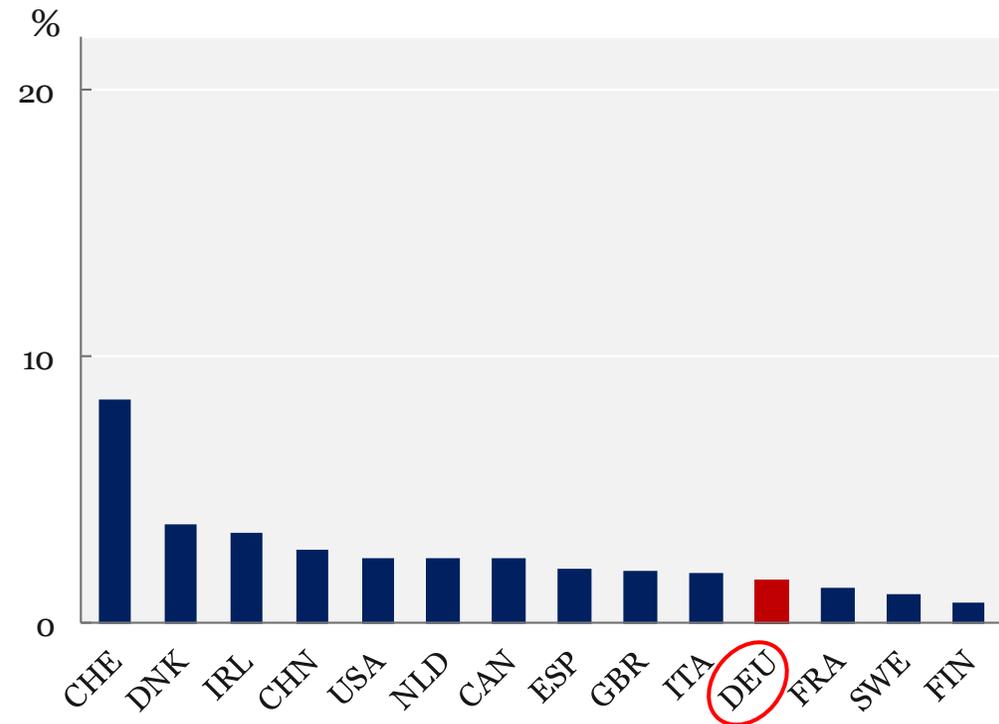


Fig. B Start-ups founded by researchers





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.

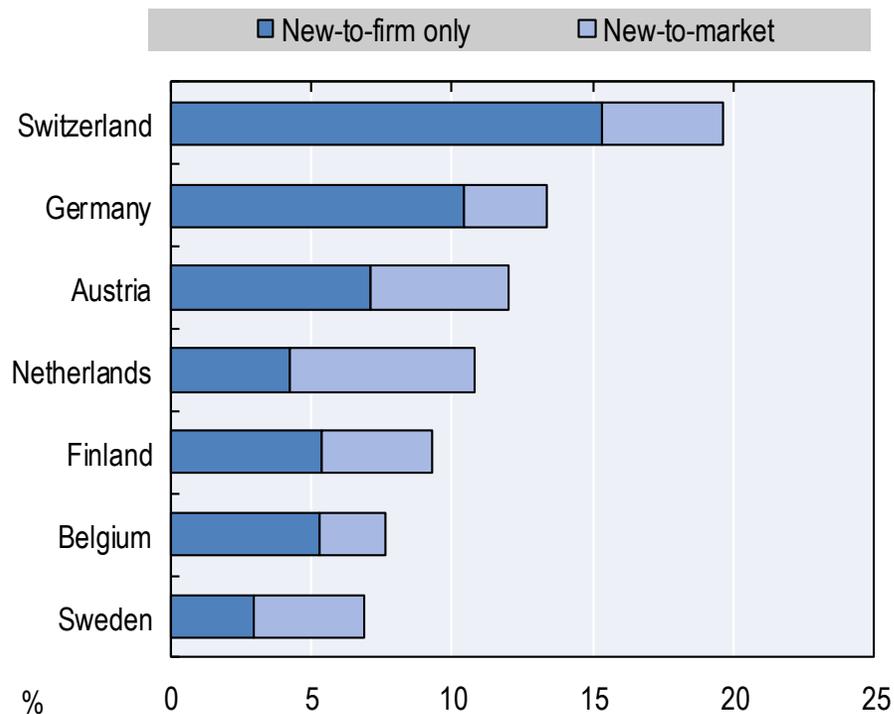
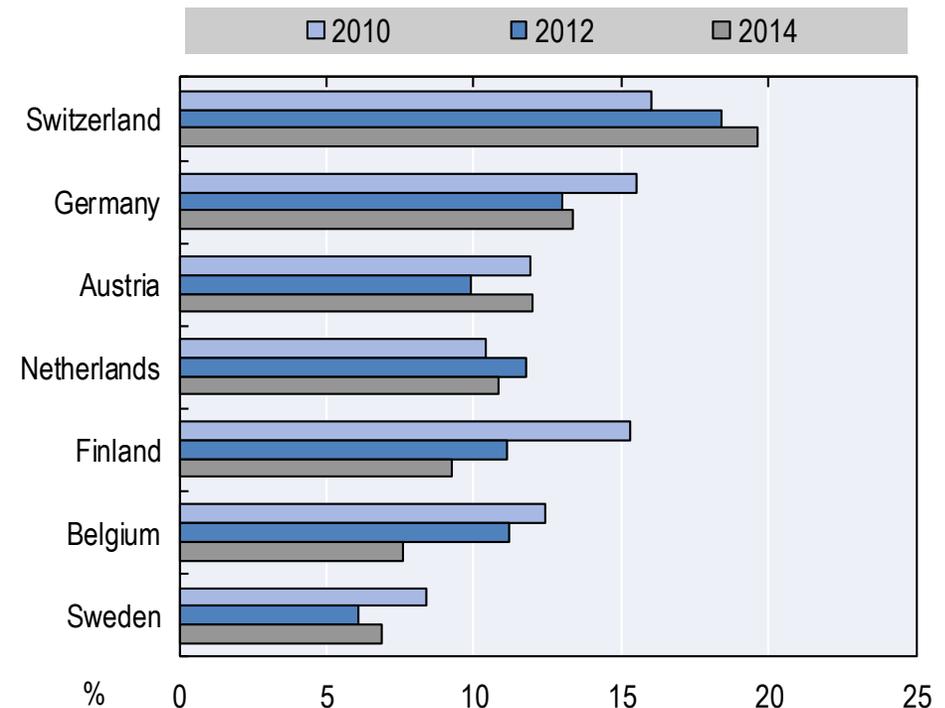


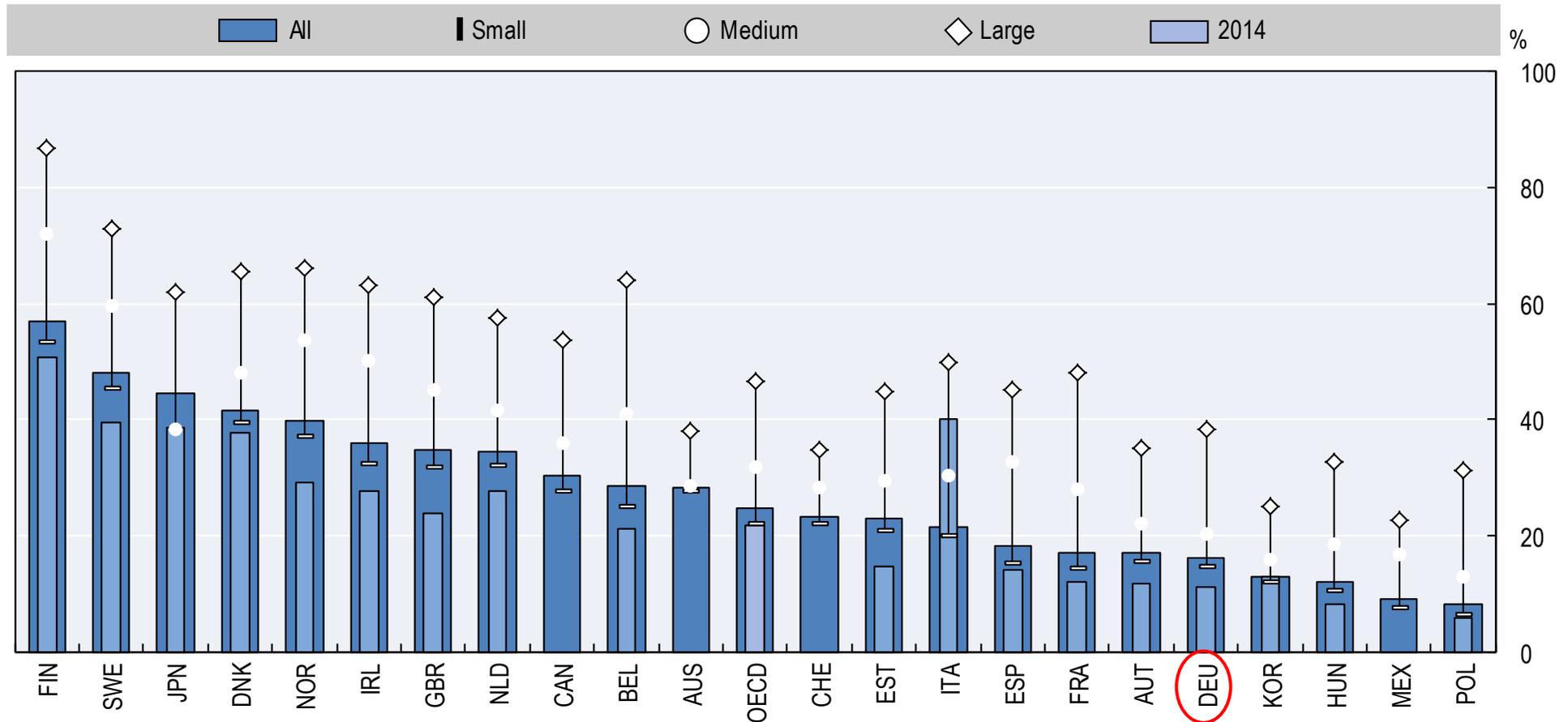
Figure B.





German firms, and particularly SMEs, tend to use ICT innovations such as digital cloud services less often

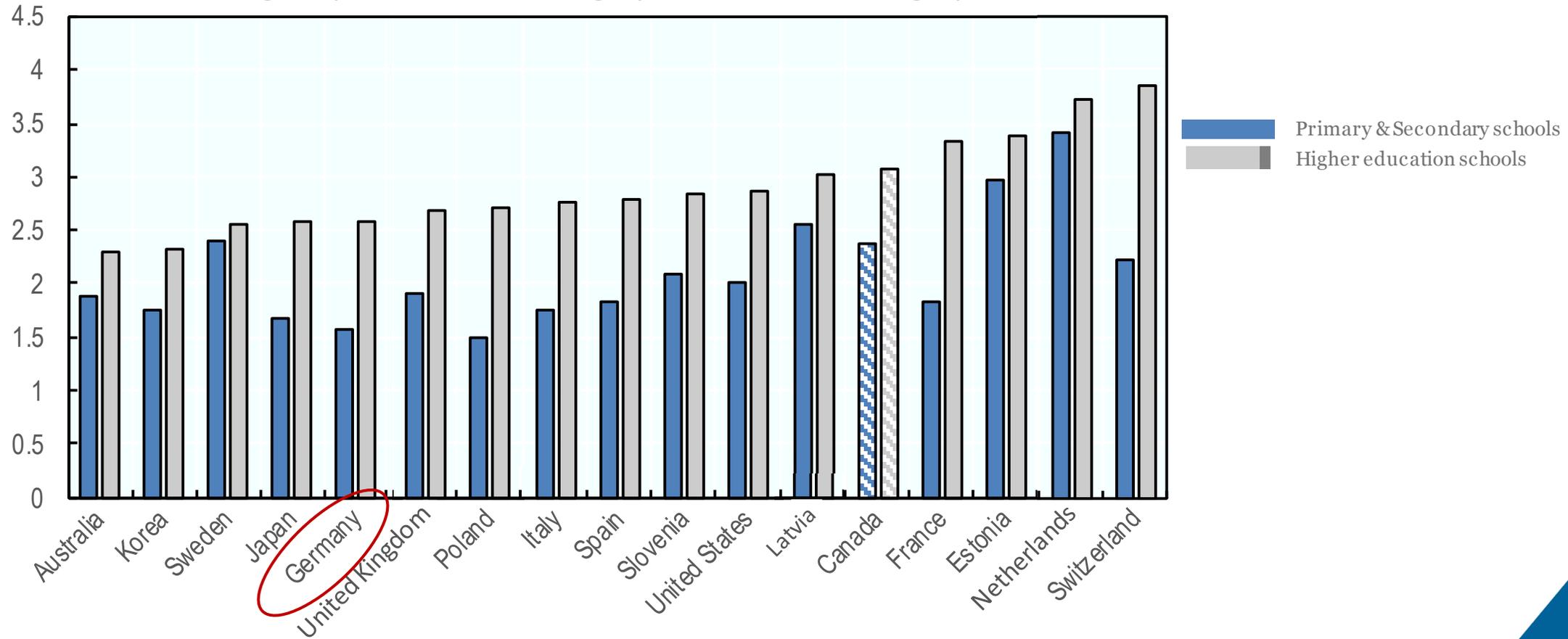
Enterprises using cloud computing services, by size, 2016 and as a percentage of enterprises in each employment size class





Entrepreneurial education in schools Germany lags behind

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





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

Fig. A Percentage of proficiency levels in PISA 2015

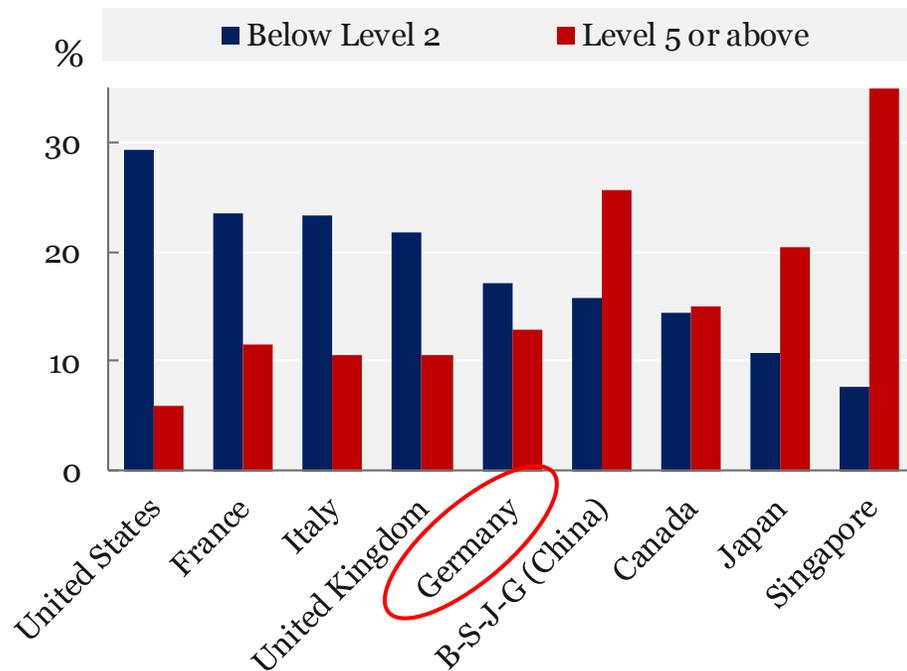
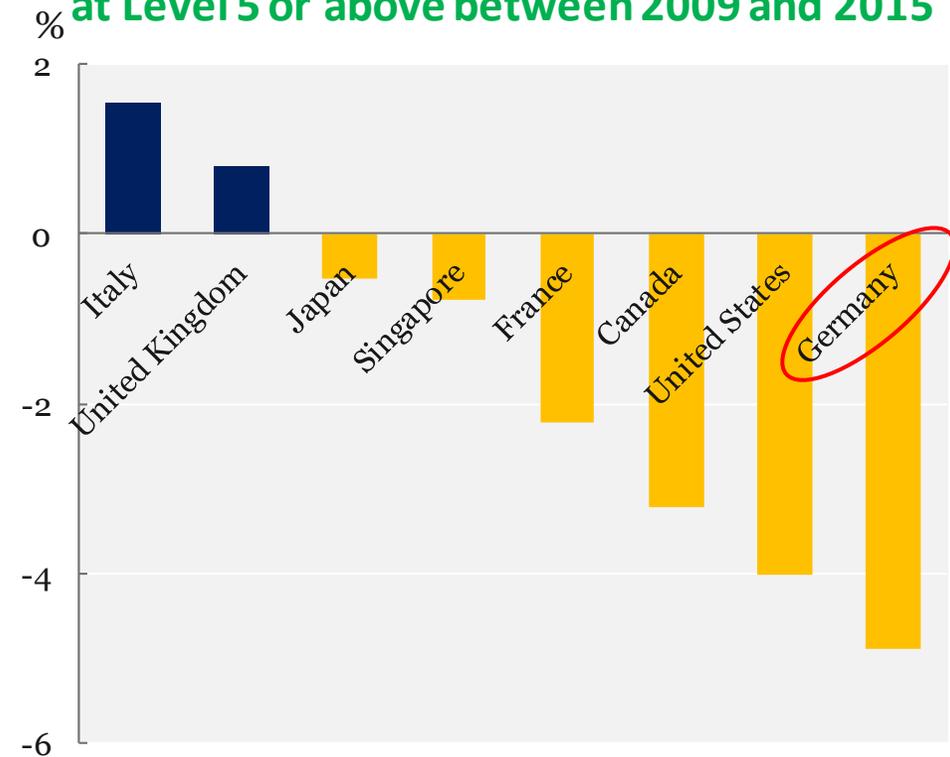


Fig. B Change in percentage points at Level 5 or above between 2009 and 2015





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/PRI and SMEs
2. Looking beyond university patents and start-ups: **promoting domestic and international mobility of the highly skilled.**



More recent policy trends

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



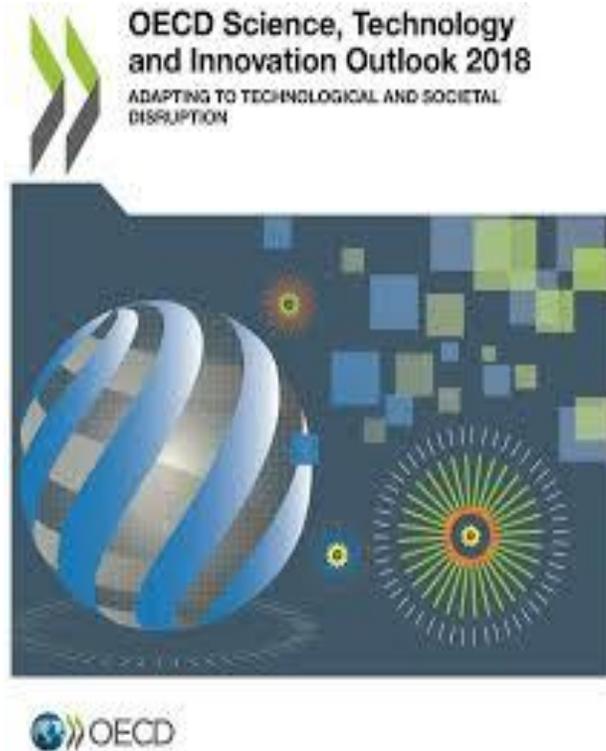
How can Germany leverage its already strong position in knowledge transfer?



- 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!
Ludger.Schuknecht@oecd.org



- For further information on STI policies and knowledge transfer activities:
- <http://www.oecd.org/sti/inno/>
- oe.cd/tip

