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The role of universities in innovation systems and regional economies

Expert meeting on
The future of academic research
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Changing role of universities

• The traditional role of universities were education, basic research and –science

• In the past 2-3 decades new functions were taken over: knowledge and technology transfer to industry, commercialisation of knowledge, more active role in national and regional innovation systems (NIS and RIS)

• → In most developed countries, a growing attention is paid to the economic utilisation of publicly funded research

• This holds particularly true for high-technology and knowledge based sectors where scientific inputs are of key importance in the innovation process
Related concepts and literature

• Move from “Mode 1” towards “Mode 2” of science system (Gibbons et al. 1996)

• “Triple helix” and “entrepreneurial university” (Etzkowitz et al. 2000)

• Innovation systems
  sectoral (Breschi/Malerba 1997, Edquist 2005)
  regional (Cooke et al. 2000, Asheim/Gertler 2005)

• Clusters of knowledge based industries (Keeble et al. 2000, OECD 2001)
Innovation systems

• Building on the evolutionary and interactive innovation model: Innovation occurs in a division of labour, many private and public actors involved

• Innovation systems are networks of firms and organisations influencing the innovation process in a particular area through their interaction (Lundvall 1992, Edquist 2005)

• Universities are key elements in the subsystem of knowledge generation and -diffusion
Regional dimension of innovation

• Regions differ with respect to their R&D- and innovation capabilities as well as innovation performance

• R&D organisations and universities are at specific locations → Also knowledge spillovers are spatially bounded

• Importance of tacit knowledge: its exchange often requires personal contacts and trust which are facilitated by geographical proximity

• Policy competencies and support organisations are partly bound to subnational territories
Regional Innovation System

Knowledge exploitation

Customers -> Suppliers

Vert.Netw.

Suppliers -> Competitors

Hor.Netw.

Firms

Coop. partners

Human capital

Knowledge, Resources

TTF organis.

Interest org.

Research org.

Educat. inst.

Knowledge generation, -diffusion

Regional socio-economic conditions

National Organisations

National Policy instruments

Other regional Innov.sys.

International Organisations

Policy instrument of EU
Role of universities in innovation systems and clusters of knowledge-based industries

- 1) “Antenna” for adopting external knowledge and mediator for local knowledge circulation
- 2) Source of highly qualified labour
- 3) Knowledge provider in university-industry linkages, and
- 4) Incubator for academic spin-off companies
1) Universities as „antennas“ for adopting external knowledge

- Innovation is taking place increasingly in a division of labour of many actors; → knowledge base becomes more „distributed“ (Smith 2002)

- → External knowledge becomes more important for generating new knowledge and innovations

- Universities hold a key function in this respect being inserted in global knowledge communities and networks → conferences, workshops, research collaborations, co-publication, co-patenting etc.

- Well functioning of innovation system requires also local circulation of absorbed knowledge through various mechanisms
2) Universities as source of highly skilled labour

- A „traditional“ role of universities becoming more important for NIS and RIS in the emerging knowledge economy

- Graduates and highly skilled labour are one of the most powerful mechanisms for knowledge transfer to industry

- One of the key factors for the development of high technology clusters (Keeble et al. 2000, Saxenian 2005)
3) University – industry linkages

- Have clearly become more frequent in past years → Universities have become important knowledge sources and innovation partners for industry

- Increasing variety of relationships: R&D contracts, R&D collaborations, innovation partnerships, joint use of facilities, informal knowledge exchange

- From simple knowledge „transfer“ towards knowledge sharing and interaction

- U-I links are clearly more important in knowledge based industries and clusters
## Innovation partners of firms in regions of Europe

(\% of firms having partners, n = 652)

<table>
<thead>
<tr>
<th>Partners</th>
<th>Regional</th>
<th>National</th>
<th>European</th>
<th>Global</th>
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<tr>
<td>Customers</td>
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<tr>
<td>Suppliers</td>
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<td>Research organisations</td>
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<td><strong>Universities</strong></td>
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<td><strong>22</strong></td>
<td><strong>8</strong></td>
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<tr>
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<td>Venture Capital</td>
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<td>Trade associations</td>
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<td>Training institutions</td>
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<td>14</td>
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</tr>
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Source: Cooke et al. (2000, p. 76)
Knowledge sources of innovative firms in Austria

n = 190; % of firms indicating the following knowledge sources as important:

Source: Tödtling et al. 2006
4) Universities as incubators for spin-offs

• A relatively new route for commercialisation of academic inventions

• Europe is clearly behind the US due to many barriers (venture capital, incentives, organisational rules, attitudes, ..)

• More frequent in high tech industries and clusters such as ICT or biotech

• Examples: Silicon Valley, Route 128, Cambridge/UK, Medicon Valley, Munich
Conclusions

• Universities have become important actors in NIS and RIS

• New roles and forms of interactions with industry (U-I links, R&D collaborations, spin-offs)

• However, the key importance of universities for NIS and RIS has still to be seen in the traditional roles of providing highly qualified graduates, doing excellent scientific work, providing basic science and R&D

• Key challenge: Interact with industry but keep freedom and diversity of academic research

• The role of universities in innovation systems and clusters is to bring in critical views, new ideas / complementary knowledge; not only just carrying out R&D for industry