Research Collaboration Between Academia and Industry

A Report from Germany

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General Situation (1)

Comparatively good public funding of research in Germany

• University funding
  • Positions for PhD candidates, typically 3-4 for a full professor in engineering
  • Start-up funds for newly appointed professors (investments)
• Basic research funding by DFG (German research council) on a competitive basis
  • 30 - 50% success rate
  • Individual projects, focused research programs and research centres
• Funding from inside the university and from the DFG is insufficient for maintenance and upgrade of equipment, running cost of experimental work, and travel.
General Situation (2)

Industry’s view

- Taxes are too high
- No need to fund basic research, consortia are not common
- Universities have to test ideas and to deliver useful results
- Short-term pressure has increased considerably in recent years
  - Engineering R&D was cut down or outsourced in many companies

Public support of academia/industry collaborations

- Federal government (BMBF)
  - 50% industrial contribution requested, typically 3 years projects
- European Commission
  - only transnational projects (3 countries minimum)
  - 50% funding for industry, up to 100% for universities, including overheads and travel
Forms of industry/academia cooperation

- **Informal, no funding**
  - Small workshops organized by professional organizations
  - Meetings, discussions

- **Small projects**
  - Typically some person-months, fully funded
  - Implementation/application of results of previous research

- **Funding of PhD-projects**

- **Cooperative projects with public funding (National/European)**
  - Public funding ensures medium-term cooperation
  - Broad range from industry-driven to research-driven
Examples

- **Small projects**
  - FASTER - MATLAB-based software for controller design
  - Study on control structures for middle vessel columns (Bayer)

- **Cooperative projects with public funding (national)**
  - Joint project U of Dortmund - Merck on optimization and control of chromatographic separations
    - 3.5 years funding, work mostly done at the university, 9 py
    - successful research, stimulating co-operation, but not carried through to real implementation in daily operations

- **Cooperative projects with public funding (European)**
  - VHS, AMETIST (Hybrid / Timed Systems)
    - mainly scientific projects, industry acts as advisors
    - small industrial case studies
    - tool development (UPPAAL)
Commercial transfer activities

➢ The Fraunhofer Institutes
   • Large institutes of “Applied Research”
   • 1/3 institutional public funding, 1/3 competitive public, 1/3 industry
   • Transfer of technology to industry is the main task
   • Close links to universities (Head usually is a full professor)
   • Should be more innovative than engineering firms

➢ Spin-offs
   • Typically in IT-intense areas
   • Production management (ORSoft, Advaris, ..)
   • Supply chain management (AXXOM AG, result of an EU-funded project)
Graduates - the most important means of transfer from academia to industry (and back)

- A large fraction of the ChemE graduates assumes positions in the chemical industry
  - Usually they start in R&D departments or groups
  - Very competitive salaries offered
  - Graduates often catalyse cooperations in small projects
  - Know both cultures sufficiently well

- Graduates with industrial experience are in many cases preferred as university professors
  - Sometimes more pragmatic view on research than “pure” academics
Challenges - Industrial

➢ Fundamental change in Germany
  • Past: several large companies with strong R&D departments
    • Much development work and some research done inhouse
    • Protection of knowledge rated very high
    • Knowledge transfer by graduates, small projects, discussions
    • People usually transferred to operations after < 5 years
  • Today: only BASF still operates according to this pattern
  • Outsourcing or profit centers
    • Economic pressure favors low-risk development projects
    • More stable staff necessary
    • Industry tries to attract public funding
    • Chances for software vendors / consultants
    • Cooperations with universities with public support will increase
    • Transition period of general uncertainty
Challenges - Academic

➤ **Co-operation with SME’s**
  • Goals and needs are often too volatile
  • Lack of infrastructure in the companies

➤ **New rules on the European level**
  • EU wants large, industry-led, self-regulating consortia
    • Companies usually not willing to take the lead
    • Universities not prepared for project management
    • Academia must learn to shape an area together

➤ **Long-term maintenance and support of software**
  • Academic developments not professional and fault-tolerant
  • Implementation and support are not academic tasks
  • Can only be done by vendors or spin-offs
  • Much effort in programming is wasted