Research Collaboration Between Academia and Industry

A Report from Germany

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process control laboratory

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.

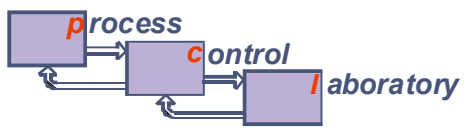
General Situation (2)

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

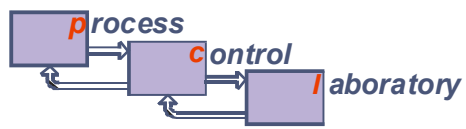
Public support of academia/industry collaborations

- 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

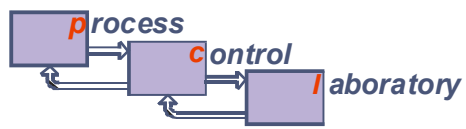
- **Small projects**
  - FASTER - MATLAB-based software for controller design
  - Study on control structures for middle vessel columns (Bayer)
- **Cooperative projects with public funding (national)**
  - Joint project U of Dortmund - Merck on optimization and control of chromatographic separations
    - 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)

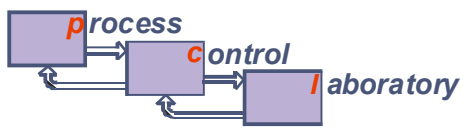
Graduates - the most important means of transfer from academia to industry (and back)

- **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