

Knowledge and Technology Transfer: A German Scheme for Bridging the Worlds of Academia and Business

Thomas Carolus, Konrad Bamberger

Position of authors and affiliation:

Dr.-Ing. Thomas Carolus is professor at the University of Siegen, Germany. He holds the chair of Applied Fluid Mechanics and Fluid Flow Machinery in the Department of Mechanical Engineering (<http://www.uni-siegen.de/fb11/iftsm/>).

He also heads the private STEINBEIS transfer center "Applied Fluid Mechanics and Fluid Flow Machinery". (https://www.steinbeis.de/de/verbund/suche-im-steinbeis-verbund/detail.html?tx_z7suprofiles_detail%5Bprofile%5D=195&cHash=532e2021540ed9dfb92bacb206f26e5a)

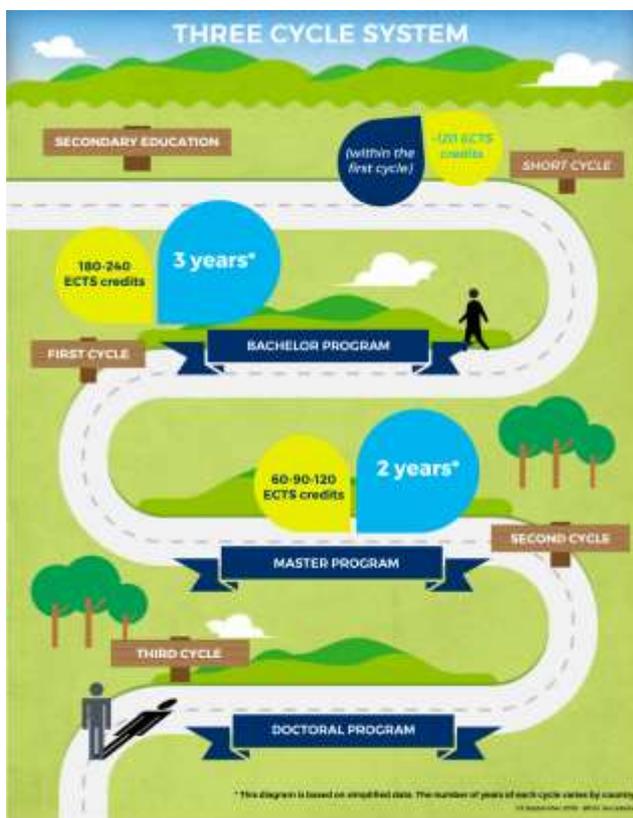
Dr.-Ing. Konrad Bamberger is currently holding a post-doc position in the group of Prof. Carolus. He also is a project leader in the STEINBEIS transfer center "Applied Fluid Mechanics and Fluid Flow Machinery"

Corresponding author: thomas.carolus@uni-siegen.de or SU1797@stw.de

Key words: Technology transfer, academic research, third cycle education

Extended Summary

Countries with existing or emerging industries and a three-cycle system of higher education are faced with the problem to organize the transfer of knowledge from academia to industry.



The European Three-cycle-system of higher education.
(<http://www.ehea.info/pid34438/three-cycle-system.html>)

In the field of science and technology the third cycle is of special interest. Worldwide, the third cycle includes a broad variety of doctoral phases from pure (doctoral) study programmes to fully independent research. These models have various implications for

- the structure of doctoral studies (free, partially or fully structured)

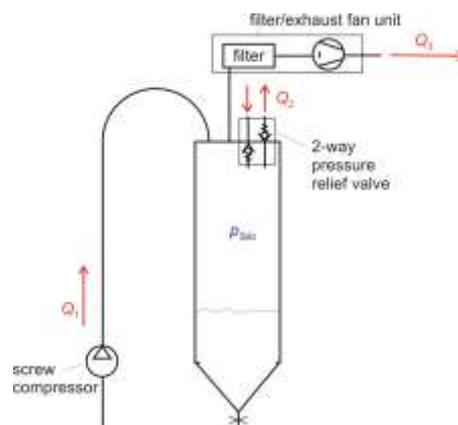
- the responsibility taken and the resources invested (e.g. staff and facilities for taught parts of the programme) by the home institution
- possible links with enterprises and/or professional bodies
- the relation of mandatory and optional elements for the doctoral student
- the status of the doctoral candidate (student, employee, researcher).

Especially in countries and/or disciplines where traditionally free individual research dominates the doctoral phase, the individuals carrying out these projects are not regarded as students but as early stage researchers/young professionals [1]¹. Together with their academic advisors, i.e. professors at various levels and universities and research establishments, they are extremely valuable knowledge sources. This contribution deals with a German scheme for organizing the transfer of knowledge from academic knowledge sources to businesses, the STEINBEIS foundation.

The Steinbeis foundation is named after the technical advisor, director, and chairman of the Chamber of Trade and Commerce (1848-1880) in the Kingdom of Württemberg (Stuttgart) FERDINAND von STEINBEIS (1807-1893). At his time he was an early promoter of technology transfer, founder of vocational schools and initiator of the dual education model. Transfer Centers are the original model for modern Steinbeis Enterprises. Since its beginnings in 1983, Steinbeis Transfer Centers are located primarily at universities, universities of applied science, and research institutes, often managed part-time by university officials. Several types of Steinbeis Enterprises have been developed based on transfer centers: consulting centers, research and innovation centers and transfer institutes. As of 2017 the Steinbeis foundation acts as the umbrella for 1,072 enterprises and Steinbeis partners form the Steinbeis network worldwide, the total revenue is 162 million euros, and 704 professors, 1,899 employees and 3,606 freelancers are involved.

The overwhelming number of German universities, universities of applied sciences and research institutions are state institutions. Frequently, professors have the status of civil servants with remuneration according to government regulations. The potential conflict between official duties and private transfer activities is solved by official regulations that eventually lead to a contract between the university and "transferring" professors. The mutual benefit of transfer efforts is manifold: The persons involved are highly motivated since they see their research applied and they can earn some extra money; the university generates income by providing facilities; academic teaching and research is stimulated by "real world problems and needs".

The scheme is illustrated by a few examples of our own engineering transfer projects such as the aerodynamic optimization of industrial fans, dimensioning of the air supply for powdered or granular goods in the food industry and designing turbines for harvesting ocean wave energy. These projects would have been impossible without the previous basic research conducted by PH.D. students in the group of the authors. It has to be pointed out that during the doctoral phase the individual research absolutely dominated, as in most German universities.



Three examples of STEINBEIS transfer projects: left: optimized axial fan, middle: food processing industry, right: ocean wave energy turbine

¹ At the same time, occasionally it is doubted that in fully taught doctoral programmes original research remains the essence of the doctorate.