



Dieter Scholz

# The Cooperative Doctorate at a University of Applied Sciences in Germany

## Defense of a Dissertation on the Arctic Circle

**Mike Gerdes did it. After more than three years as a research assistant at HAW Hamburg and subsequent further support from the university, he was recently able to successfully defend his doctorate at Luleå University of Technology in Sweden. Such a doctorate in cooperation between a University of Applied Sciences (UAS) and a classical University is called "cooperative doctorate" and is necessary because the UAS do not have their own right to award doctorates. Why the doctoral right for the UAS is a prerequisite in a fair competition between the two types of universities in Germany is explained here.**

The **university system in Germany** is diverse. There are Universities, University of Applied Sciences (UAS), vocational academies and various other types of universities. The umbrella term for all these educational institutions is "university" (characterized in this text with a small letter "u"). Classical Universities (characterized in this text with a capital "U") tend to concentrate on theoretical training and have the right to award doctorates. Universities of Applied Sciences are more practice-oriented than Universities. Laboratories are planned for many subjects. There are small seminars rather than large lectures. For historical reasons, the UAS have no right to award doctorates (apart from the first individual cases with a model character). In the European Union, the higher education system has been largely standardized ("Bologna process"). The old degrees (like the diploma) have been replaced by the new Bachelor and Master degrees. This applies equally to Universities and UAS. The differences between the two types of university therefore became smaller.

The **doctorate** is the awarding of the academic degree Doctor (Dr. / PhD) in the form of a doctoral certificate. The doctor is the highest academic degree. The doctorate is proof of the ability to work independently. The doctorate requires the independent creation of a scientific work (dissertation) as well as an oral examination. The candidates are called doctoral students.



At least four **relationship levels of a doctorate** can be distinguished: These include: a) enrollment b) supervision, c) employment, d) doctoral degree regulations. [1]

- a) **Enrollment:** During the doctorate there is always the possibility to enroll at a UAS. For them, such enrollment offers a formal opportunity to build a bond with the doctoral candidate.
- b) **Supervision:** A written supervision agreement should help to make the cooperation between the supervisor and the doctoral candidate transparent and efficient. The supervisory relationship is to be assigned to public law; however, in Germany, it does not establish a contractual relationship between the supervisor and the doctoral student. The UAS often operate a doctoral center that maintains contacts with partner universities, arranges doctoral students at partner universities, accompanies cooperative doctoral projects and provides the doctoral students with general knowledge of scientific work with a free educational program.
- c) **Employment:** Sometimes doctoral students are employed as academic staff at a university, whereby doctoral positions are mainly financed by third-party funds (of the research projects). The duration of the employment is limited in Germany in accordance with the Science Contract Act (Wissenschaftszeitvertragsgesetz). Doctoral students are then in the role of the employee. The doctoral supervisor then takes on the role of the disciplinary supervisor.
- d) The **doctoral degree regulations** of the university establish the frame in which the doctoral student works towards the PhD. The doctoral degree regulations are in Germany public regulations of an administrative act.

There is no uniform definition for a **cooperative doctorate** across Germany. As a cooperative doctorate, two variants are distinguished at UAS Hamburg [2]:

- 1.) A person is enrolled at the HAW Hamburg as a doctoral candidate (a) and is supervised by a professor at the HAW Hamburg with respect to the scientific topic during the doctorate (b). The doctorate is formally processed at the partner University (d). UAS professors may be assigned as examiner at the partner University. The doctoral student may work at UAS Hamburg as a research assistant on a temporary position. Neither of these two expanded options are a requirement for a cooperative doctorate.
- 2.) A permanent employee at UAS Hamburg is doing a doctorate during the time of his/her employment at UAS Hamburg (c) at a partner University where he/she is under the regulations for the doctoral degree (d). A UAS professor does not have to be involved.

**Strong and weak ties:** The enrollment (a) and the supervision at the UAS (b) are weak ties. In contrast, the doctoral candidate's employment (c) at the UAS (if it exists) and the doctoral degree regulations (d) with the University are strong ties. In a cooperative doctorate, the doctoral candidate may be in a conflict because two "masters" have to be served simultaneously. Naturally, at the beginning of the doctorate period, the employment (c) and the supervision at the UAS (b) are more important for doctoral students. At the end of the doctorate period, the University (d) becomes more important. This also means that guidance from professor at the University can have a strong influence on final writing of the dissertation – even though the results have been achieved over several years at the UAS.

**In practice,** doctorates can often only be carried out efficiently if the doctoral students can be offered a position as a research assistant (c). In order to finance such a position, third-party funds have to be raised for a research project. This is usually organized as a joint project with various industrial partners. If the UAS has to take care of a University partner in the context of the cooperative doctorate, the organization of the joint project can become difficult or even impossible because a win-win situation must be created for all partners (including the doctoral student).

The **UAS strive for the right to award doctorates independently** because only then they

- 1.) can network research cooperations freely,
- 2.) can lead the research up to final results including the independent scientific writing of the dissertation,
- 3.) have the possibility of establishing a strong bond with the doctoral candidate based solely on a supervisory relationship without employment at the UAS.

In a situation without the right to award doctorates for UAS, the UAS have a disadvantage in the competition for research funding and for the best minds.

Together with the question about the right to award doctorates for HAWs, **two other topics** are discussed and incorrectly mixed with it:

- A) The **admission of UAS graduates** to a doctorate at the university.
- B) The **participation of professors from the UAS** as examiners in the doctoral procedures for cooperative doctorates.

Regarding A) In accordance with the decision of the German Cultural Minister's Conference of April 14, 2000 [3], master's degrees at Universities and Universities of Applied Sciences generally entitle to doctoral studies. In detail, however, it may be that additional requirements are imposed on UAS graduates [4]. It is very important to the UAS to promote their own young

people - even up to their doctorate. Nevertheless, a position for a research assistant (m / f) is advertised publicly. If a university graduate is hired for the position, then there is no need to meet the time-consuming admission requirements for a doctorate compared to UAS graduates and the new employee from the University has more time for the research project and the doctorate. As a result, UAS graduates can be discriminated against when they are hired.

Regarding B) The German University Rectors' Conference gives only an indefinite, soft recommendation on the handling of cooperative doctorates, e.g. B. on the design of a doctoral committee, which should also include representatives from Universities of Applied Sciences. It is pointed out that the universities are resisting "the independent exercise of the right to award doctorates at Universities of Applied Sciences" [5]. It is a fact that UAS professors in Germany and abroad have been and will be appointed as doctoral examiners or opponents. If the UAS professors are included as examiners for cooperative doctorates in Germany [6], this is positive, but ultimately the lesser evil for the Universities, because they keep control in their doctoral procedure anyhow and prevent by a small concession the independent right to award doctorates at Universities of Applied Sciences. It is interesting that in Sweden the supervisor is never called as an examiner in doctoral procedures, because the proximity to the doctoral student denies the neutrality of the assessment. Ultimately, it is not critical whether a UAS professor acts as an examiner. The decisive factor is the sovereignty over the doctoral procedures and thus also the right to select and appoint professors as examiners.

**At the end of the 19th century, the then Institutes of Technology (Technische Hochschulen, TH) demanded the right to award doctorates.** The Universities bitterly resisted this [7]. In the end however, the THs were given the right to award doctorates. Despite all the warnings from the Universities, the science system has not perished because of the THs granting doctorates. On the contrary. Today we experience a repetition of history and learn from it: The right to award doctorates for UAS will come across the board. It's only a matter of time.



In 1899, Kaiser Wilhelm II granted the Prussian Institutes of Technology (TH) the right to confer the academic degrees of Doktor-Ingenieur and Diplom-Ingenieur. This was the final step towards acquiring equal status with the Universities. This also applied to Hannover Institute of Technology, which is now called Leibniz University Hannover. The picture (by Andree Stephan, CC BY) shows the idyllic Welfenschloss, the Guelph Palace, main building of the university since 1879. The university started in 1831 as The Higher Vocational School, which became later the Royal College of Technology. It took the university 68 years to be granted the right to confer PhDs. The UAS Hamburg is celebrating in 2020 its 50th birthday (but looks back in part at a history of over 120 years).

Against the general background, the question still arises: **How did Mike Gerdes' cooperative doctorate go?**

Dipl.-Ing. Mike Gerdes acquired his diploma at the Technical University Hamburg-Harburg (TUHH) and had first experiences from industry. He started in January 2008 as a **research assistant at UAS Hamburg** in the Aircraft Design and Systems Group (AERO) in the Department of Automotive and Aeronautical Engineering. The cooperative doctorate



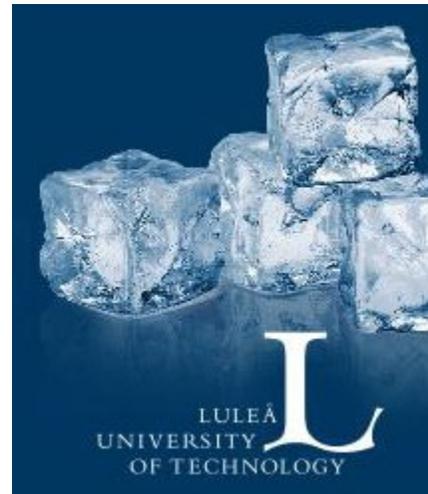
was supervised by Prof. Dr.-Ing. Dieter Scholz, MSME. Mr. Gerdes worked in the research project "Preventive Aircraft Health Monitoring for Integrated Reconfiguration (PAHMIR)". The project was primarily concerned with fault and diagnostic systems for the aircraft cabin and for aircraft cabin systems. In addition to UAS Hamburg, partners in the project were Airbus Operations GmbH and Philotech GmbH. The UAS share in PAHMIR was financed by the Hamburg Aviation Research Program (LuFo HH) of the Hamburg Authority for Economy and Labor (BWA), today: Authority for Economy, Transport and Innovation (BWVI). The funding ended after 3.5 years in June 2011. UAS Hamburg continued to finance Mr. Gerdes for a certain period of time with a one-off contract. [8]

Linköping University, Sweden was selected as **the first partner university for the cooperative doctorate**. The choice fell on this university because of long-standing good contacts with Prof. Dr. Petter Krus and his research



group Fluid and Mechatronic Systems (FLUMES) in the Department of Management and Engineering (IEI). Mike Gerdes wrote his **Licentiate** Thesis [9], which he defended in Linköping on April 11th, 2014. The external opponent was Prof. Dr. Diego Galar, Luleå University of Technology, Sweden. Mr. Gerdes was now allowed to use the designation **Tekn. Lic.** The licentiate is established in countries such as Sweden and Finland. It marks about half the way to a doctorate.

It was agreed that Prof. Dr. Galar and as such Luleå University of Technology with the Division of Operation and Maintenance Engineering should taken over the role as the **second partner university for the cooperative doctorate**. A cumulative dissertation is common in Sweden. It is based on a number of related publications in scientific journals. Through the peer review process of the recognized journals, the work towards the dissertation receives a preliminary check. Furthermore, the new ideas receive an early and increased dissemination. This is in contrast to a dissertation that is written as a monograph. After starting the cooperation with Luleå University of Technology, Mr. Gerdes published four articles in scientific journals and one at a conference. These five articles were based in part on two papers in scientific journals and five conference publications that had been written prior to the contact with Luleå University of Technology. Mr. Gerdes defended his **dissertation** on December 20, 2019 in Luleå. Three external examiners were appointed and one external opponent. With this Mr. Gerdes got the doctoral degree (**Dr.**).



Mike Gerdes' **dissertation** was made available after the defense on various platforms on the Internet without restrictions [10]. The thesis is entitled "Health Monitoring for Aircraft Systems using Decision Trees and Genetic Evolution". What is behind it is called "eMaintenance" in Luleå. The dissertation deals with what is now called "MRO 4.0", "digitization in aircraft maintenance" or "digital twin". Where other organizations in Germany are just starting out, the UAS Hamburg has already a dissertation online.

**Luleå** is located at the northern end of the Baltic Sea, about 110 km south of the Arctic Circle. Global warming is also noticeable in Luleå. For Hamburg standards, there are still "real" winters in Luleå. A tour around the city center in winter is best done on the frozen Baltic Sea during the few hours of light.



Participants at the public defense of the dissertation by Mike Gerdes, Luleå University of Technology, Sweden, 20.12.2019. Sitting from left: Prof. Kumar (Head of Division, LTU), Prof. Baglee (Examiner), Prof. Bilski (Opponent), Mike Gerdes, Prof. Scholz (Supervisor, HAW Hamburg), Prof. Valero Ferrando (Examiner), Prof. D'Emilia (Examiner). (Image: Per Pettersson)

**12 years to graduate** is a long time. Dr. Gerdes has held out where many others have given up in a similar situation. The Swedish university system is excellent and the support is first class. English is a matter of course. A cooperative doctorate abroad is honest cooperation without the political maneuvers that are often common in Germany and to which UAS are potentially exposed. Nevertheless, the basic problem of the cooperative doctorate also became clear in the cooperative doctorate with Luleå University of Technology: a service must be rendered in return. UAS often enter into contractual institutional cooperations with foreign partner Universities for the cooperative doctorates. In these cases, the service of the foreign University partner is usually paid in the form of tuition fees. If it is not money (as it was the case here with Luleå University of Technology), then the win-win situation must be presented differently. This was achieved here in the form of additional scientific papers with joint authorship that went beyond the requirements of a dissertation. This caused the doctoral student to spend much additional time.

If the UAS want to get the right to award doctorates, they must first show their capability to guide doctorates. The cooperative doctorate - preferably abroad - is an opportunity to show this, what is otherwise not possible. It becomes clear; **the cooperative doctorate is no more than a temporary opportunity to overcome a contradiction.** The UAS have taken up this

possibility and have already provided the proof with many doctorates. Dr. Gerdes is just one example. The time is right: **The cooperative doctorate should now be replaced by the right of UAS to award doctorates!**

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**Aircraft Design and Systems Group (AERO)** is the research group for aircraft design and aircraft systems in the Department of automotive and Aeronautical Engineering at Hamburg University of Applied Sciences (UAS Hamburg). AERO leads research assistants to cooperative doctorates and works on projects in research, development and teaching.

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### Infolinks

Research Project: <http://PAHMIR.ProfScholz.de>  
Dissertation: <https://nbn-resolving.org/urn:nbn:de:gbv:18302-aero2019-12-20.012>  
Licentiate Thesis: <https://nbn-resolving.org/urn:nbn:se:liu:diva-105843>

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