TUM Graduate School 2.0: Introducing Automatism

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University-wide graduate schools as the general organizational framework for doctoral education have been basically absent in the German academic landscape for a long time. As one of the first German universities, Technische Universität München (TUM) established its TUM Graduate School (TUM-GS) in the framework of the German Excellence Initiative a few years ago. In a first step, our doctoral candidates (I avoid the term "students" here, since, even in the case of a structured program during doctoral education, the understanding of doctoral candidates is the one of employees or freelancers, but definitely not that of students) could choose: either becoming a member of one of the 24 different graduate centers and, thus, also a member of the umbrella organization TUM-GS, or doing an individual doctoral project outside any school organization scheme – the latter option representing the traditional German way. By spring 2013, TUM-GS had roughly 2,200 doctoral candidates from all departments as members, together representing roughly one-third of all those striving for a doctoral degree from TUM.

From the very beginning, the major concern of quality management and of tracking the candidates' progress was the role of the so-called "external" candidates – i.e., doctoral candidates without a formal TUM affiliation. While such a lack of affiliation might sound strange in an academic system with established graduate schools, it is quite widespread in Germany, for various reasons. In the engineering sciences, for example, it is a well-established (and fruitful for all) practice that master's-level graduates join an R&D department of a (typically larger) company after their master's degree to pursue a doctoral degree there. They work in the company, are paid by the company, get some free time for their research from the company, and are (sometimes in a very collaborative way, sometimes more or less formally only) supervised by a professor at the university. Other external candidates join a non-university research institution after their master's degree, such as a Helmholtz, Leibniz, Max Planck, or Fraunhofer institute (the first being roughly comparable to the national labs in the US), with a contract and presence there, but again with the doctoral degree coming from the university. A third, but no less important, group of externals are candidates in fields such as architecture, who frequently have to organize their own non-university money (via a scholarship, or by working elsewhere) while doing their doctoral research.

Although such an external model has some advantages (close links to other institutions, especially industry, or a maybe stronger practice orientation), there are also obvious drawbacks: a missing emotional affiliation with the academic institution issuing the doctoral certificate, a missing integration into the university's research environment (which also frequently means missed opportunities), and the basic impossibility of tracking student progress in many of those cases. Actually, just trying to get a precise answer to the question "Who is and how many are working for a doctoral degree with us?" was hardly possible at TUM. A personal case: one of my former master's students joined Daimler research after graduation – a really excellent researcher, whose qualities were also detected by his new industry environment, of course – and used for other purposes. As a result, we have been in contact just once a year so far, with discussions on

what to do next – but neither myself nor he would likely be able to declare whether, after six years, this is still an active endeavor.

Hence, we intended to introduce a mandatory TUM-GS membership for at least all our external doctoral candidates, i.e., all those without a direct TUM affiliation. However, this did not work for legal reasons – our legal department clearly said "if mandatory then for all." This was the birth of an obligatory, or maybe less frightening, automatic membership of all doctoral candidates at TUM in TUM-GS. As of January 1, 2014, all doctoral candidates (across all the different titles such as those from science (Dr.rer.nat.), engineering (Dr.-Ing.), or even medicine (Dr.med.)) will become a member of TUM-GS as soon as their applications have been formally approved. A couple of rules will hold for all of them (participation in a kick-off seminar; a minimum membership of two years; an active integration into TUM's academic life; a discourse with the scientific community, typically via talks, conferences, or publications; and a small amount of coursework, which can also be seminars, etc.). Following a clear subsidiary strategy, the concrete implementation of the above as well as any additional regulations are to be fixed by each of the 24 so-called graduate centers individually (one for each department plus a couple of cross-departmental ones).

Concerning the tracking of candidate progress by TUM-GS, the following instruments have been established:

- a mentoring agreement to be signed at the beginning by the candidate, the advisor, and the respective graduate center's representative, with a research plan;
- an annual re-registration by the candidate, to be confirmed by the advisor, with an update of the research plan;
- the tracking of the records by TUM-GS office.

The latter will be done via an IT solution currently derived from our student life-cycle management tool, which is a must due to the expected increase of TUM-GS members by a factor of two to three.

Hence, there will be use of technology for tracking the progress of our doctoral candidates. However, the current emphasis is also on getting a smooth transition to and a high level of acceptance of the new and mandatory TUM-GS.