

Some remarks on the necessary symbiosis of quality, quantity, and variety

Hans-Joachim Bungartz

Graduate Dean, Dean of Informatics

Technical University of Munich (TUM)

Tarragona, June 17, 2016



Mission

TUM Graduate School ...

- ensures high **quality** of doctoral education at TUM for all doctoral candidates
- gives an **international** perspective – various exchange formats & funding initiatives
- fosters **interdisciplinary** collaboration – across disciplines, institutions, sectors
- strengthens scientific and transferable **skills** – 300+ courses per semester
- increases visibility and **networking** of doctoral candidates
 - to give them an identity and to involve them
- provides **career** orientation and promotes social responsibility – prepares graduates for international careers inside and outside academia
- **Individual doctoral thesis remains in the center of doctoral education**
- **Key responsibility stays with doctoral candidate, advisor, and department**
- **TUM Graduate School creates a corporate environment with optimum conditions for outstanding research**

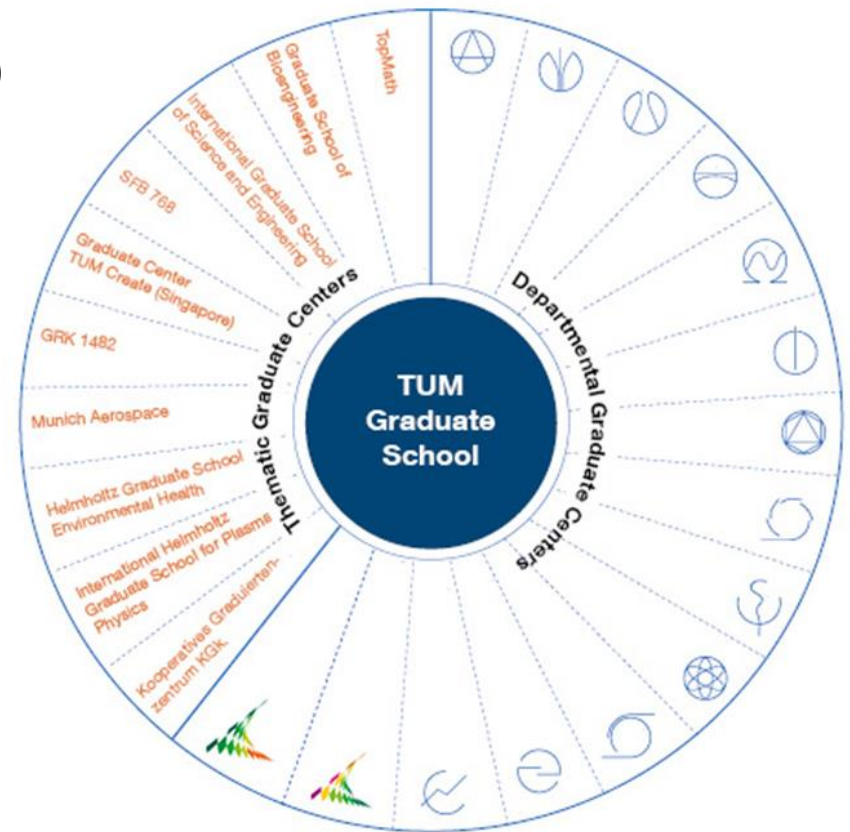
TUM Graduate School

Facts & Figures

- overall number of doctoral candidates: ~5,000
- TUM-GS members: ~4,220
- female doctoral candidates: 34%
- international doctoral candidates: 27%
- Top 5 foreign countries of origin:
China, Italy, Iran, India, Austria

Structure

- 15 Departmental Graduate Centers
- 10 Thematic Graduate Centers,
incl. 5 with external partners
- Managing Office
- Doctoral Council
- Graduate Dean as a member of the TUM
Extended Board of Management



Quality – Quantity – Variety: prejudices

Often heard ...

“high-quality training does not scale”

“a professor / supervisor with more than k candidates can no longer ...”

“different incoming standards deteriorate quality”

“external PhD projects (industry, non-university research) reduce quality”

“collaboration with universities of applied science (UAS) may introduce quality problems”

“anyway, the world doesn’t need so many pieces of esoteric research”

Quality – Quantity – Variety: no dilemma, please!

we need quality

- crucial, of course
- 1:1 mentoring, high-level qualification program, individual components, supervisor training
- QM, surveys, evaluation (evaluation of “TUM model” and TUM GS currently prepared)

we need quantity

- education as societal mandate, huge demand for MINT/STEM education at all levels
- still greedy job market – both academic and non-academic
- requests from partners without right to award doctorates
- some endeavors need larger teams (scientific software development, e.g.)
- 3rd party funds → 2-4 ys positions → qualification (legally) mandatory → doctoral candidates are the engine of research

we need variety

- there isn't the “one and only” path towards a doctorate

Variety – and why we need it

- ... variety **across disciplines and doctoral degrees** (Dr.rer.nat., Dr.-Ing., Dr.rer.oec., Dr.med., ...)
- ... variety in terms of **entrance qualification / educational pathways *before***
- ... variety in terms of **different career paths *afterwards*** (academia, other research institutions, industry, entrepreneurship)
- ... variety in terms of **diversity** (gender, nationality, ...)
- ... variety in terms of **collaboration patterns** (national/UAS, international/joint,double, ...)
- ... variety concerning **funding schemes** (stipend, 50% – 100% contract, “external” with UAS or research institutions (MPG, HGF, WGL, ...), “external” with company, ...)
- ➔ increases *both* our human capital / horizon *and* quantity challenges & quality risks

Consequence

We need solutions that allow for a combination of quality, quantity, & variety

Therefore:

Design the doctoral system in a way that

- supports top-quality research
- provides a large variety of qualification elements
- offers different collaboration patterns
- prepares for a large variety of career paths

But, nevertheless, keep the system

- scalable
- open and flexible for changes, new developments, new opportunities

The TUM doctoral model



- ✓ Independent research as well as integration into the TUM research environment and interdisciplinary networks
- ✓ Subsidiary principle: the frame top-down, the content bottom-up
- ✓ Combination of mandatory and optional curriculum components based on the individual needs of the candidate
- ✓ Mentor besides doctoral supervisor
- ✓ Supervision agreement and mid-term feedback talk

The TUM doctoral model

Basic/mandatory program elements

- Registration and 2-year membership
- Supervision agreement + exposé
- Double mentoring
- Kick-off seminar
- Scientific training (6 SWS)
- Publications: book/journal/conference article, peer-reviewed
- Integration into academic environment
- Feedback talk

+ requirements of the individual Graduate Center

Optional program elements

- Transferable skills training
- Coaching and career services
- International research phase
- Graduate council
- Social and networking activities



Subject-related training

Available at the chairs & departments

Possibility to take courses at international partner institutions

Selection of top courses:

- Interdisciplinary training
- Quantitative and qualitative research methods and instruments
- Regular doctoral colloquia
- Journal clubs and research retreats
- Symposia and conferences
- Summer and winter schools
- Speakers series



Transferable skills training

50+ courses per semester

Approx. 45% in English

Selection of top courses:

- Project management
- Leadership & responsibility
- Presentation skills
- Scientific paper writing
- Successful cooperation in internat'l teams
- Surviving complex projects
- Business creation and patent law
- Career paths in and outside academia
- Strength-based leadership and collaboration

PhD-oriented program

Career-oriented program



International research phase

Financial support for

- Research stays at foreign universities, research institutions and R&D departments of companies
- International conferences/workshops/symposia
- International scientific summer/winter schools
- Invitation of international researchers to TUM

EuroTech Universities Alliance exchange program

- Staff exchange, lab visits
- Joint PhD summer/winter schools
- Joint PhD course database



UAS & doctorates

Issue #1

The rights of their graduates – solved by law (UAS master allows for PhD entrance)

Issue #2

The rights of their professors

Issue #3

The institutional rights of the UAS

Issue #4

Pragmatic & reasonable solutions that allows for Q & Q & V

Issue #5

Strongly political debate, a lot of nonsense from both sides → keep control

Collaboration with UAS: ensuring Q &Q &V (1)



Collaboration of U & UAS – the Bavarian way ...

(the Hessian is presented in a parallel session)

- **BayWiss** – a joint platform of all U and UAS in Bavaria plus state government
- one field of activities, among others: “collaborative doctorates”, organized in cross-institutional thematic graduate school consortia, e.g. “Mobility & Traffic”
- Guiding principles:
 - right of awarding doctorates stays with universities
 - universities provide apparatus (graduate schools, QM), UAS provide application-/industry-orientation
 - full rights of UAS professors to act as supervisors in a collaborative doctorate
 - full rights of UAS graduates to go for a doctorate
 - Idea of establishing a culture of research collaboration between U professors and the research-oriented UAS professors

Collaboration with UAS: ensuring Q &Q &V (2)

Collaboration of TUM & HSM – the TUM way ...

- **new agreement** signed in June 2016
- fills BayWiss framework with life & provides a roof for all collaborative doctoral projects of the two signing partners
- Important issues:
 - TUM's doctoral regulations & TUM GS govern the processes
 - formal doctorate by TUM, joint supervision by both partners
 - qualification modules can be offered by HSM, too
 - doctoral certificate issued by TUM, but explicitly mentions
 - ... the collaborative character of the project
 - ... the UAS partner HSM
 - ... the HSM supervisor
- first defense under this scheme on June 23 – probably “summa cum laude”



Support and career system for junior scientists



Doctoral Candidates

TUM Graduate School

Postdocs

TUM Talent Factory
TUM Research Opportunities Week
TUM University Foundation Fellowship
TUM Junior Fellow (Fund)

Early Career Scientists

TUM Faculty Tenure Track
System and Academy

