

Internationalization and TUM's strategy in the German 'Excellence Initiative'

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ABSTRACT

On 23 June 2005 the German federal and state governments agreed on an initiative to promote top-level research in Germany. The so-called *Excellence Initiative* aims to strengthen science and research in Germany in the long term, improve its international competitiveness and raise the profile of the top performers in academia and research.

The total budget of the initiative will be €1.9 billion for the period 2006 through 2011, which is split between three lines of funding:

- Graduate Schools to promote young researchers
- Clusters of Excellence to promote world-class research
- Institutional strategies to promote top-level university research.

This Excellence Initiative launched an unprecedented atmosphere of departure at German universities resulting in a total of nearly 500 proposals for the three lines of funding. On 13 October 2006 after a highly competitive international review process the results of the first round of the initiative were announced. Only three universities, the Karlsruhe University of Technology, the Ludwig-Maximilians-Universität München (LMU) and the Technische Universität München (TUM) were successful in all three lines, giving them the unofficial title of an 'Elite University' and the expectation of about 150 Mio € additional funding for the next five years.

In the proposal of Technische Universität München *internationalization* plays a very prominent role. The promotion of high-level international research cooperation is central in the 'TUM Institute for Advanced Study', which has been founded as a cornerstone of the institutional strategy. And the 'International Graduate School of Science and Engineering' has as one major goal to stimulate international research groups of students during their Master's and PhD studies, being supported by TUM and partner universities all over the world.

Starting from the general policy of TUM, the lecture will first focus on the overall strategy of the successful proposals, highlight their most important aspects and discuss the expectation from the projects over the next years especially in the context of further improving our international networks in research and education.



TUM: A Unique Profile

Superb Community

- 21,000 Students
- 400 Tenured Professors
- 4,040 Researchers
- 2,800 Graduates p.a.
- 730 Ph.D/Habils. p.a.
- 6,800 Employees
- 12 Departments

Entrepreneurial Spirit

- **Internationality:**
 - #1 AVH Senior Research Awards
 - Off-Shore Branch, Singapore
 - Fundraising >100 M€ since 1999
 - Third Party Funding: 147 M€ (05) = 31% of total Budget; #1 GER
- **Entrepreneurial Assets:**
 - UnternehmerTUM, TUM+Tech Ltd.

Innovative Strategies

- **Advanced Organizational Structure:** 1999 TUM constitution pioneered Bavarian Higher Education Act 2006
- **Centers of Excellence Strategy:** Competitive restructuring program *innovateTUM* (2003) allocates 10% total TUM resources to areas of excellence until 2008
- **Social & Cultural Awareness:** Linde Academy, Gender Responsibility

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INTERNATIONAL NETWORK: more than 150 partner universities

German Institute of Science and Technology in Singapore

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Excellence Initiative by the German Government

- "promote top-level research and improve the quality of German universities and research institutions, thereby making a significant contribution to strengthening science and research in Germany."
- **1.9 billion € "fresh money"** for German universities 2006 - 2011 (2 funding periods 2006-2010 and 2007-2011, 5 yrs. each)
- **Financing** by federal (75%), and state governments (25%)
- **Three Funding Lines:** Graduate Schools, Research Clusters and Institutional Strategies
- **Decision:** 13 October 2006

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Results of the Excellence Initiative (1st Funding Period)



- • 18 Graduate Schools
- • 17 Clusters of Excellence
- • 3 Institutional Strategies

- Concentration on 22 Universities
- Fields of Natural Sciences and Life Sciences more successful than Engineering and Humanities
- TUM one of the most successful universities

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1st Funding Line at TUM: Graduate Schools



International Graduate School of Science and Engineering

Coordinator: Prof. Rank



Graduate School of Systemic Neurosciences

Prof. Brandt / Prof. Grothe (LMU)
Prof. Kemnerth (TUM)

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2nd Funding Line at TUM: Clusters of Excellence

All		Cognition for Technical Systems	Coordinator: Prof. Buss
Astrophysics	Origin and Structure of the Universe – The Cluster of Excellence for Fundamental Physics	Coordinator: Prof. Paul	
Proteins	Munich Center for Integrative Protein Science (CIPSV)	Coordinators: LMU: Prof. Carell TUM: Prof. Sierra	
Photons	Munich Center for Advanced Photonics (MAP)	Coordinators: LMU: Prof. Hubs / Prof. Krausz	
Nano	Nanosystems Initiative Munich (NIM)	Coordinators: LMU: Prof. Kathaus TUM: Prof. Abstreiter	

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3rd Funding Line: TUM. The Entrepreneurial University.



Funding:
56 Mio € (2006-2011)

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What does it take to be an entrepreneurial university?

"Entrepreneurship is the pursuit of opportunity beyond the resources one currently has under control."
Stevenson and Jarillo 1990

"How do universities, by means of entrepreneurial action, go about transforming themselves? Five elements constitute an irreducible minimum: a strengthened steering core; an expanded developmental periphery; a diversified funding base; a stimulated academic heartland; an integrated entrepreneurial culture."
Prof. Burton R. Clark (1998), Graduate School of Education, UCLA

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IAS TUM
Institute for Advanced Study

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TUM-IAS: The Vision

- Provide top-level scientists with the freedom and resources to pursue innovative research (*interdisciplinarity – high risk, high reward*)
- Interact with talented young scholars (*akademische Schulbildung*)
- Integrate distinguished visiting scientists (*internationality*)

➔ **Create a scholarly community of open scientific dialogue**




Headquarters Building

- Central location on Garching Campus
- Secured funding, doubled to 10 ME since submission of proposal

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Fellowship Programs: Genuine, Competitive



Carl von Linde Senior Research Fellowships
open to TUM faculty



Carl von Linde Junior Researcher Awards
for postdoctoral fellows from TUM



Rudolf Diesel Industrial Fellowships
for researchers from industry



Hans Fischer Fellowships
open for international scientists



Hans Fischer Tenure Track Professorships
for young scientists from outside



Research Start-Up Support

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Comprehensive Support

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... at all career stages

ε ducaTUM: Strengthens our alliance with High-School System

Student Admission Center (SAC) – International Recruiting Centers


Welcome Office – International Student Service Center

Academic Lecturer Program

Summer School Academy

Young Researchers Program:

- International Executive Headhunting
- Structural Fund for 'Rising Stars'
- Emeriti of Excellence Program
- Career Service Center



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Gender & Diversity

Comprehensive Support

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... a challenge for Good Corporate Governance

- Gender Consulting & Awareness
- Childcare / Home Office Workplaces
- Family Care Structural Fund
- Gender Issues Incentive Fund
- Vocational Training
- Parental Leave Compensation
- Munich Dual Career Center
- Fundraising Focus: Scholarships for talented women in science





IAS Liesel Beckmann
Symposium 2007:
dedicated to Gender & Diversity

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... to advance the spirit of community

- Best-Practice Administration
- Corporate Management Training
- Process and Quality Management
- Soft Skills and Cultural Awareness
- Good Corporate Governance – Health Care & Prevention Campaign
- TUM Corporate Communications Center

InnovaTUM-2008

Lehrstuhl für Wirtschaftsinformatik TUM

Stiftungsband

„Die deregulierte Hochschule“

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The TUM Graduate School System

Framework Policy Services

Thematic Missions

- Graduate School of Information Science in Health
- International Graduate School of Science and Engineering
- Graduate School of Systemic Neurosciences

Research Topics

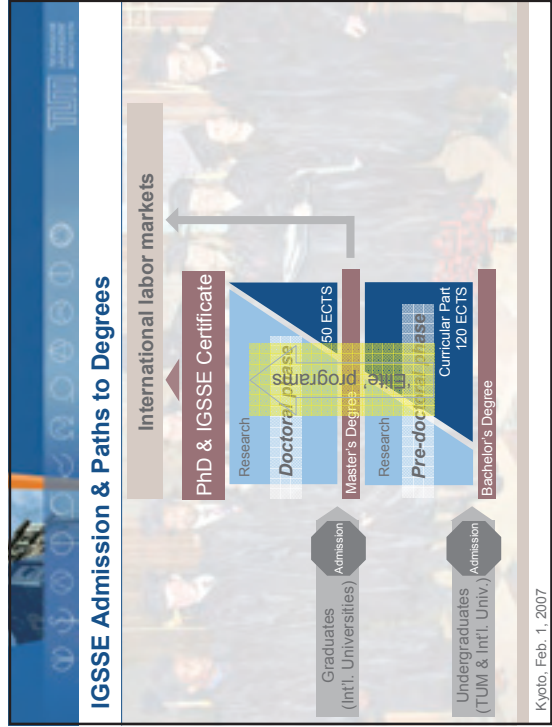
Graduate School of Information Science in Health

International Graduate School of Science and Engineering

Graduate School of Systemic Neurosciences

TUM-LMU

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IGSSE Research Training Program

Scientific Mentoring

- Multiple supervision (PhD phase)
- Individual research training schedule for every student
- Student research groups interlink MSc and PhD phase

Modular Training Program

- Disciplinary training
- Trans-disciplinary training: e.g. summer schools
- International and industrial exchange
- Scientific skills training: research proposals, conferences, scientific leadership
- Soft skills training: business plan seminars, social awareness and communication skills, intercultural & ethical competence

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IGSSE Research Training Groups & MSc Programs

- 7 Research Training Groups (PhD Programs)
- 10 Int'l. Master Programs
- Based on existing structures (functional & funding secured)
- Interconnected by common research topics

BioMedTUM Biomedical Microsystems Engineering	CaCYDE Computational and Visual Data Exploration	CeSIM Center for Simulation Technology in Engineering	
MSC Medical Engineering	MSC Computational Science & Eng. MSC Computational Mechanics (COME)	MSC Computational Science & Eng. MSC Computational Mechanics (COME)	
ComFit Material Science of Complex Interfaces	ESSE Energy Science & Engineering	ESPACE-GS Earth Oriented Space Science and Technology	NanoCat Nanodeviation of High Performance Catalysts
MSC Engineering Physics	MSC Renewable Energies MSC Electric Power Engineering	MSC ESPACE	MSC Chemistry MSC Chemical Process Eng. MSC Catalysis

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Multi-disciplinary IGSSE Young Researcher's Teams

Typical Team:

- 2 PhD students funded by IGSSE
- >= 2 PhD students funded by industry
- postdoc (team leader)
- Collaborating research groups at partner universities

Current state:

- 10 research team proposals approved
- Collaborating institutions:
 - Univ. Stanford, Univ. Tokyo, DTU, Weizman Inst., ETH Zürich, TU Vienna, Univ. New South Wales, Duke Univ., DLR, Fujitsu Labs, ...

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An Example: Numerical Simulation and Biomedical Technology

Optimize endoprosthesis and fracture fixation procedures

- Material identification
- Very fast transfer from CT-scan to simulation model for *individual surgery planning*
- Bone regeneration

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