

*At home in Bavaria -
successful in the world.*

**TUM's New Framework for
Interdisciplinary Research:
The 'International Graduate School of
Science and Engineering'**

**Ernst Rank
Vice President
Technische Universität München
Germany**

TUM. Facts & Figures

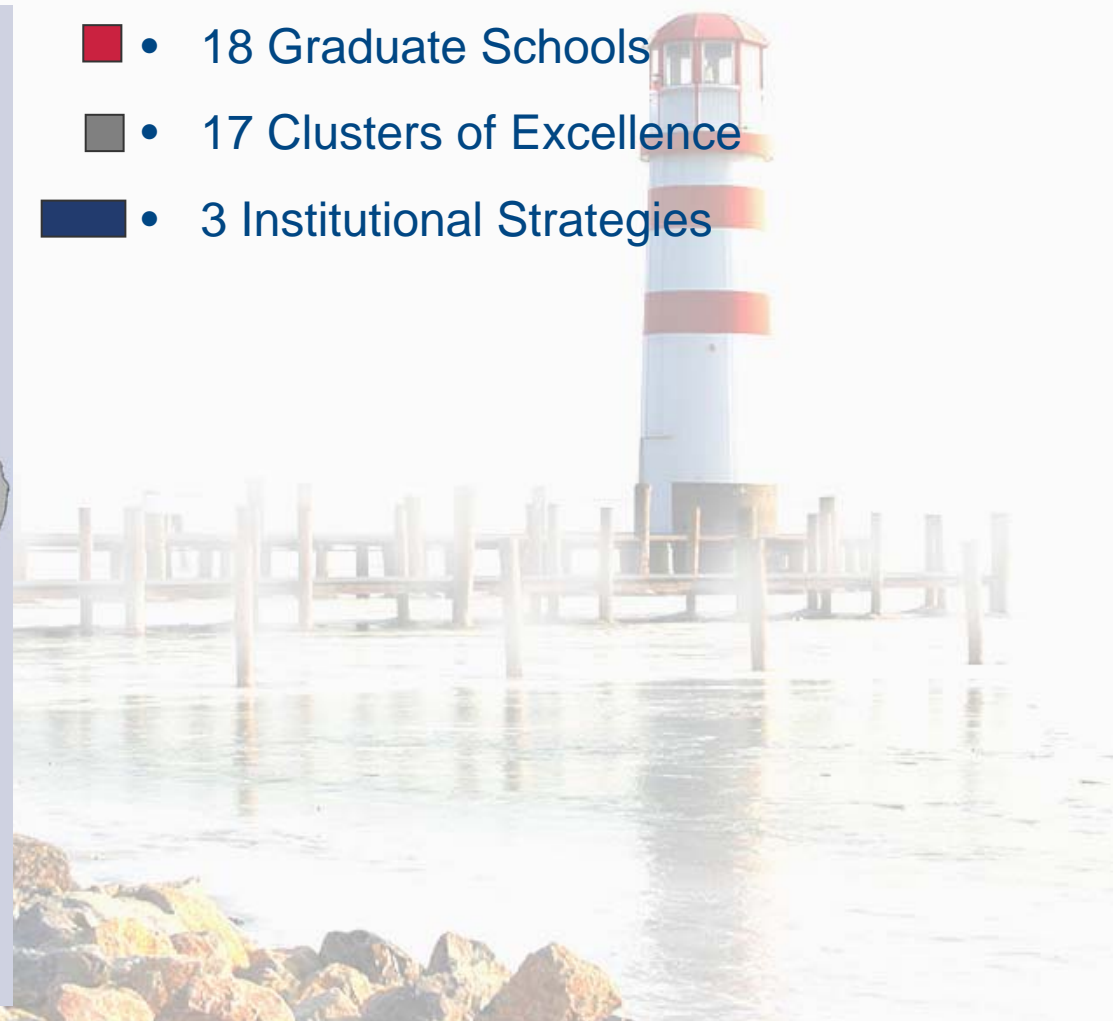
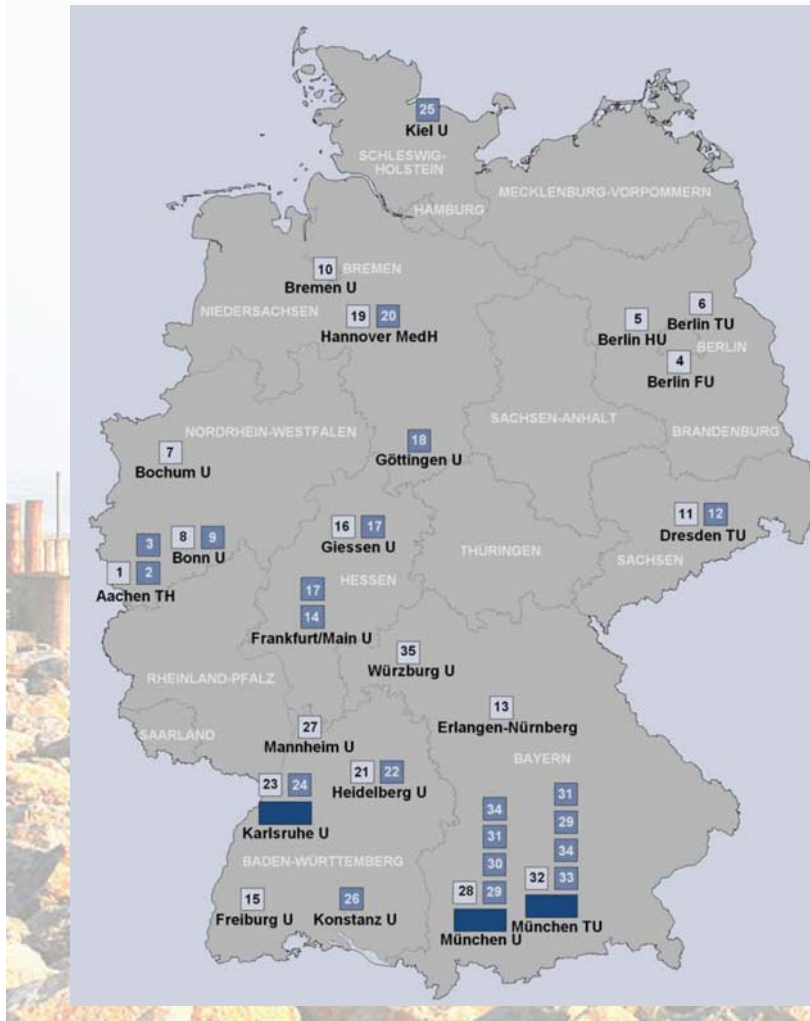
12 Departments	410 Professors (including university hospital)
127 Courses of Study	4.200 Academic Staff Members (including university hospital staff)
21.600 Students	2.800 Non-Academic Staff Members (not including university hospital staff)
31% Female Students	10 Collaborative research centres funded by the German Research Foundation (2005)
22% Foreign Students	14 Participations in other Collaborative Research Centers (2005)
5.900 First-Years (2006)	10 Winners of the Gottfried Wilhelm Leibniz Award
3.000 Graduations	55 Winners of the Alexander von Humboldt Award (2001 - 2005)
750 Doctorates	
60 Professorial Theses	

Excellence Initiative by the German Government

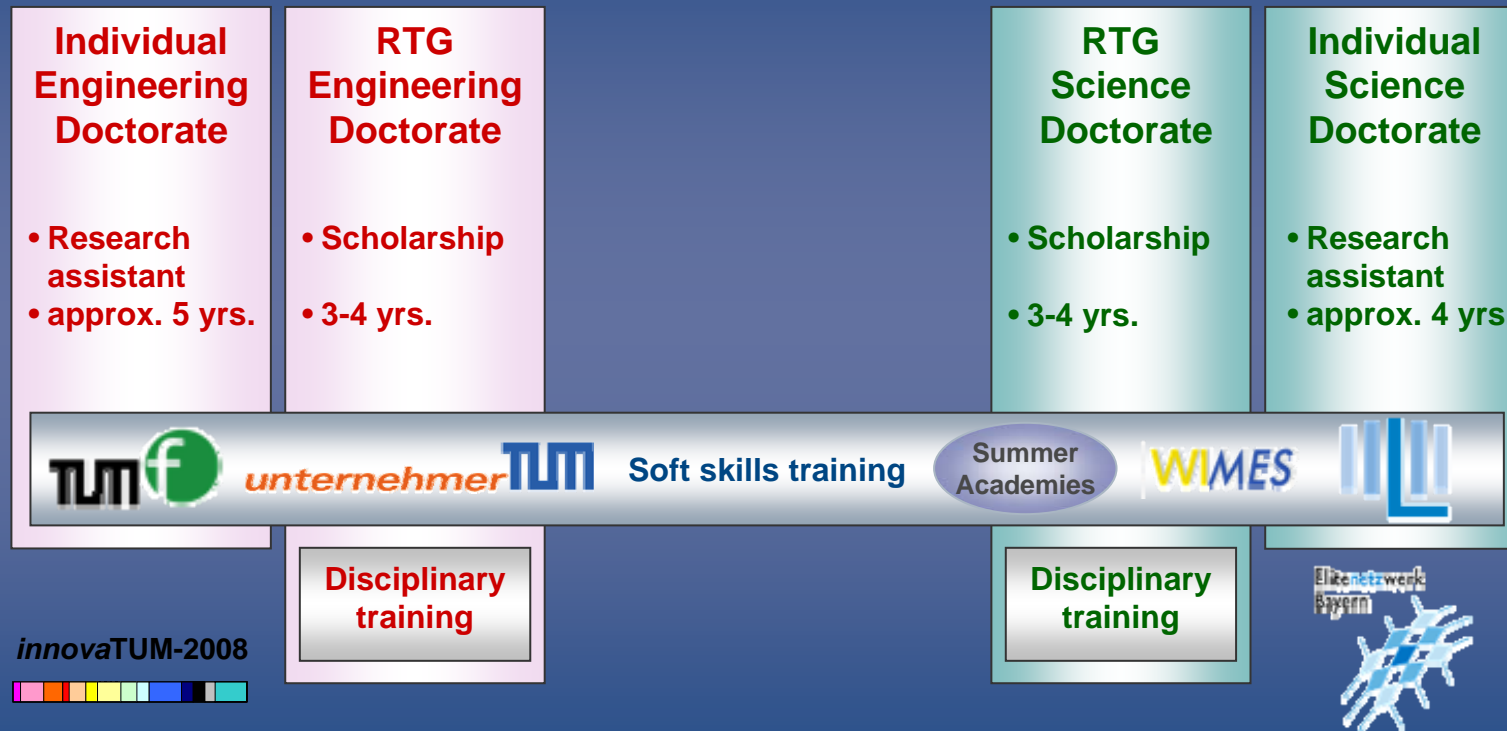
- “**promote top-level research** and improve the quality of German universities and research institutions, thereby making a significant contribution to strengthening science and research in Germany.”
- **1,9 billion €** “fresh money“ for German universities 2006 - 2011 (2 funding periods 2006-2010 and 2007-2011, 5 yrs. each)
- **Financing** by federal (75%) and state governments (25%)
- **Three Funding Lines:** Graduate Schools, Research Clusters and Institutional Strategies
- **Decision (first round):** 13 October 2006

Results of the Excellence Initiative (1st Round)

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



The traditional path to doctorate at a German university



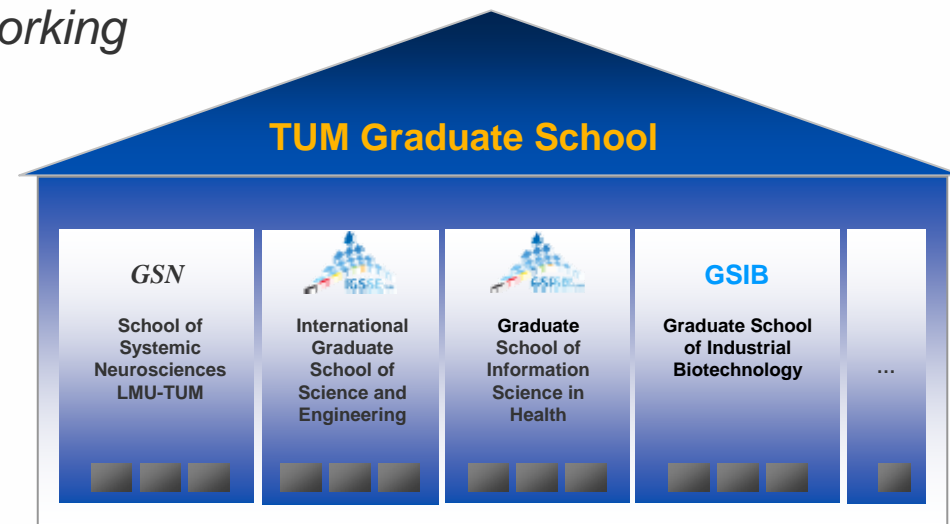
International Graduate School of Science and Engineering

Develop a new way of graduate education at TUM:

- Bridge the two cultures of science and engineering:
 - *Multidisciplinary building on disciplinary excellence*

- Prepare young scientists for cosmopolitan leadership
 - *International exchange & networking*
 - *Research Training Program*

- Establish the basis for the future *TUM Graduate School*



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 institutions***

Current state:

- 20 research team already started
- Collaborating institutions:
 - ***Univ. Stanford, Univ. Tokyo, DTU, Weizman Inst., ETH Zürich, TU Vienna, Univ. New South Wales, NUS, ...***
 - ***DLR, NASA, Siemens, General Electrics, Fujitsu Labs, ...***

IGSSE Research Areas & Projects

Computational Science & Engineering

CeSIM
Center for Simulation
Technology in Engineering

exploraTUM
Computational and Visual
Data Exploration

- 1-2 Surface coupled 3 D structures
- 1-4 Polyisobutenes
- 1-5 Modeling of fibrous composites
- 1-6 3D city models
- 1-7 Computational steering
- 1-8 Hardware-aware simulation
- 2-1 Energy 2030
- 2-2 Re-entry aerothermodynamics
- 2-4 Dynamic Earth
- 2-5 Room acoustical simulations
- 2-6 Catalysts for fuel cells
- 2-7 Chemicals from renewable resources
- 2-8 Buildings, users, climate
- 2-9 Mass transport in the Earth system
- 2-10 Silk materials
- 2-11 FSI in hemodynamics

Biomedical Engineering

BioMedTUM
Biomedical Microsystems
Engineering



- 1-3 Coated implantation surfaces
- 1-5 Modeling of fibrous composites
- 1-7 Computational steering
- 1-8 Hardware-aware simulation
- 2-10 Silk materials
- 2-11 FSI in hemodynamics
- 2-12 Diamond-Based Biosensor Arrays

Energy, Geodynamics & Environment

ESPACE-GS
Earth Oriented Space
Science & Technology

EnSE
Energy Science
& Engineering

- 1-6 3D city models
- 2-1 Energy 2030
- 2-2 Re-entry aerothermodynamics
- 2-4 Dynamic Earth
- 2-5 Room acoustical simulations
- 2-6 Catalysts for fuel cells
- 2-7 Chemicals from renewable resources
- 2-8 Buildings, users, climate
- 2-9 Mass transport in the Earth system

Nanotechnology & Advanced Materials

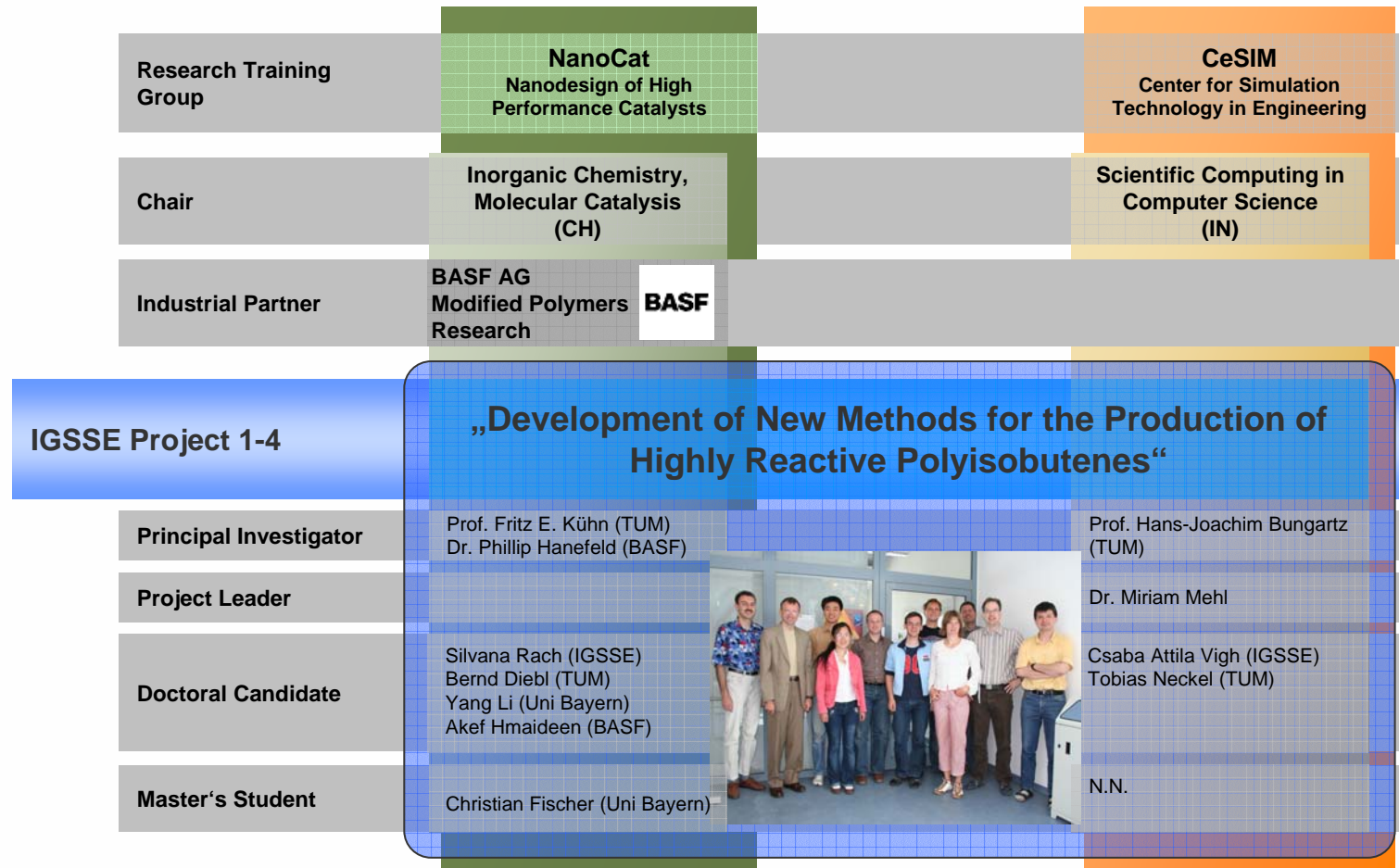
NanoCat
Nanodesign of High
Performance Catalysts

Complnt
Materials Science of
Complex Interfaces

- 1-1 Protein sensor
- 1-3 Coated implantation surfaces
- 1-4 Polyisobutenes
- 1-5 Modeling of fibrous composites
- 2-3 Control of catalytic properties
- 2-6 Catalysts for fuel cells
- 2-7 Chemicals from renewable resources
- 2-10 Silk materials
- 2-12 Diamond-Based Biosensor Arrays

Refer to: <http://www.igsse.de/teams.html>

IGSSE Project Team Structure



IGSSE Academic Track & Research Training



Services for international PhD students at TUM

- Support and bundling of relevant information concerning
 - how to apply at TUM
 - entry regulations
 - work permit
 - living in Munich, e.g. housing, costs of living

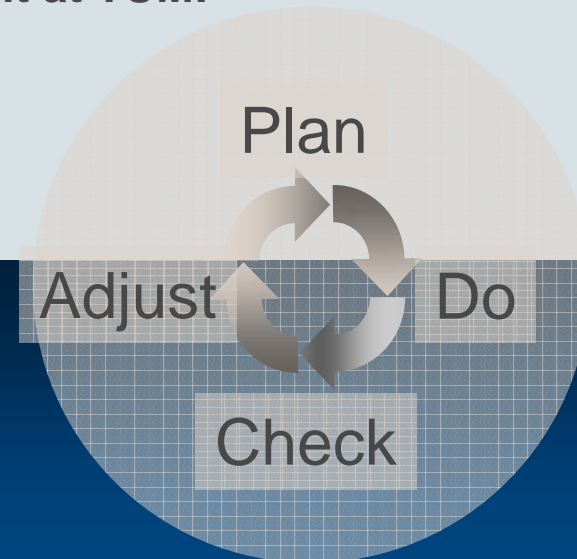
- Advanced training courses, lectures and excursions



Quality Management & Output Orientation

- Long-standing Experience in Quality Management at TUM:
 - Student Admission Assessment
 - External Peer Review Policy

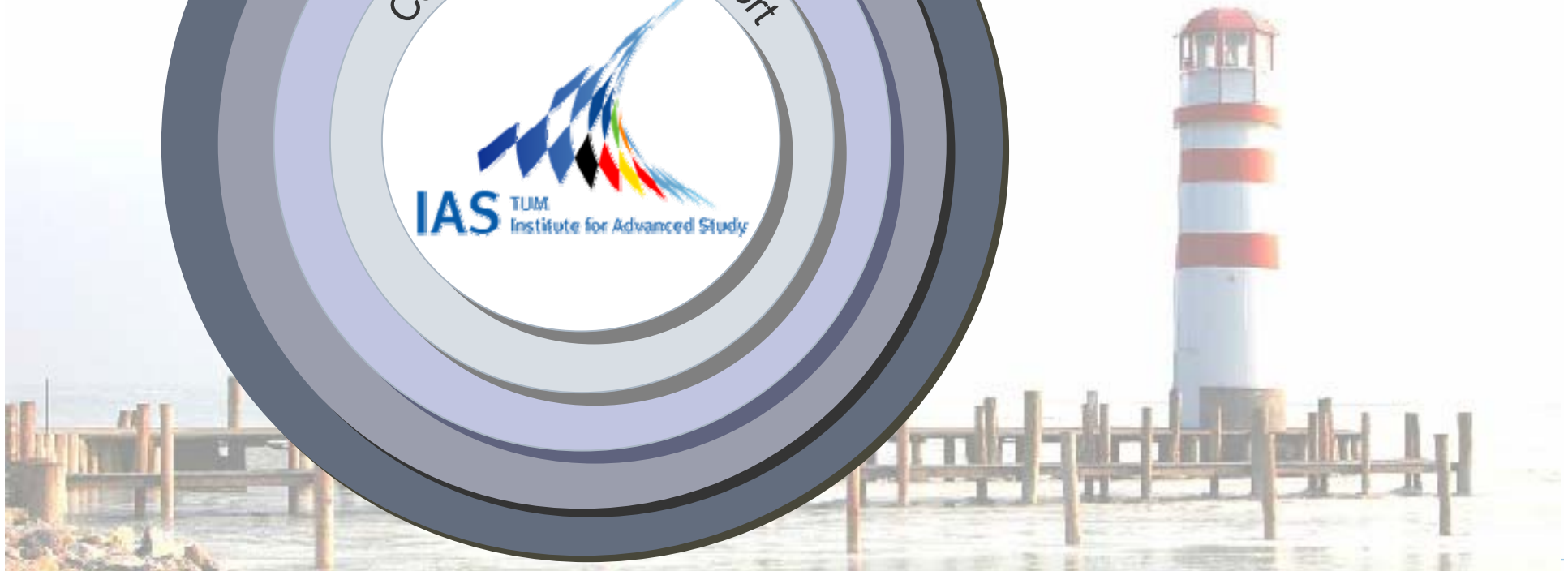
- Rating of faculty reputation and performance
- Evaluation of educational and research efficiency
- Quality control of student research, e.g.
 - authoring of scientific papers
 - time to degree, IGSSE certificate
- Monitoring careers of alumni



TUM

IGSSE

3rd Funding Line: TUM. The Entrepreneurial University.





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
- Building funded by BMW Group (10 M€)



Fellowship Programs: *Genuine, Competitive*



Carl von Linde Senior Research Fellowships
open to TUM faculty

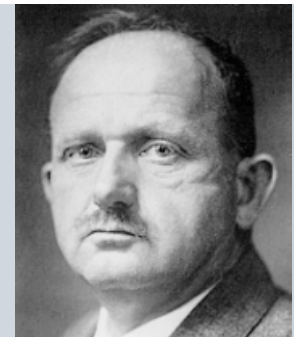
Carl von Linde Junior Researcher Awards
for postdoctoral fellows from TUM



Rudolf Diesel Industrial Fellowships
for researchers from industry

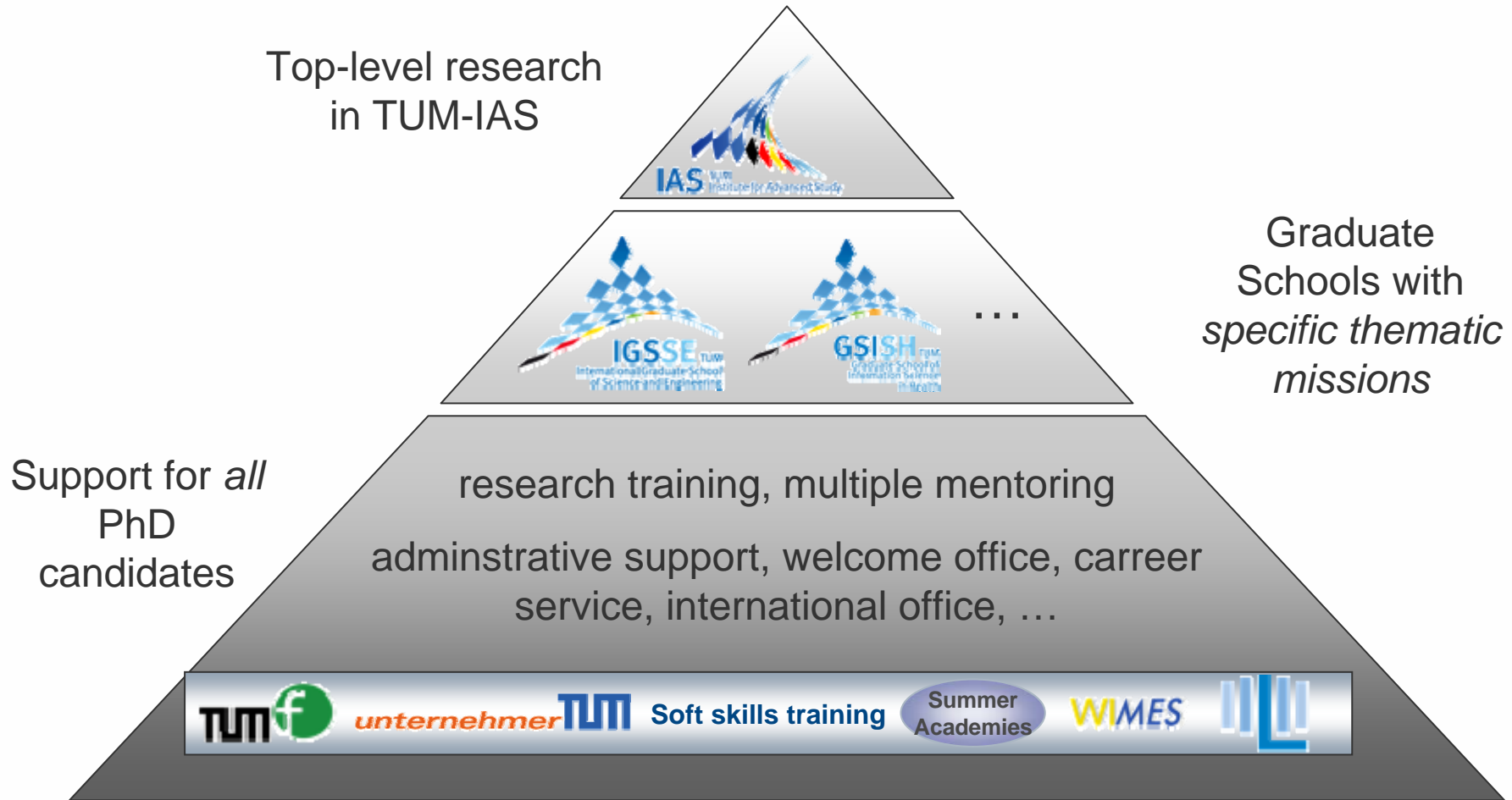
Hans Fischer Fellowships
open for international scientists

Hans Fischer Tenure Track Professorships
for young scientists from outside



Research Start-Up Support

Excellence in research and graduate education



Raitenhaslach TUM Study & Residence Center



Im barocken Prälatenstock des Klosters Raitenhaslach wird die TUM München einziehen.

Studienzentrum der TU München

Raitenhaslach als Ort der Begegnung und der Wissenschaft

in: *Hinterland*, 02. Mai 2007





International Graduate School of Science and Engineering

TUM

Technische Universität München

TUM MATHEMATIK INFORMATIK



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