

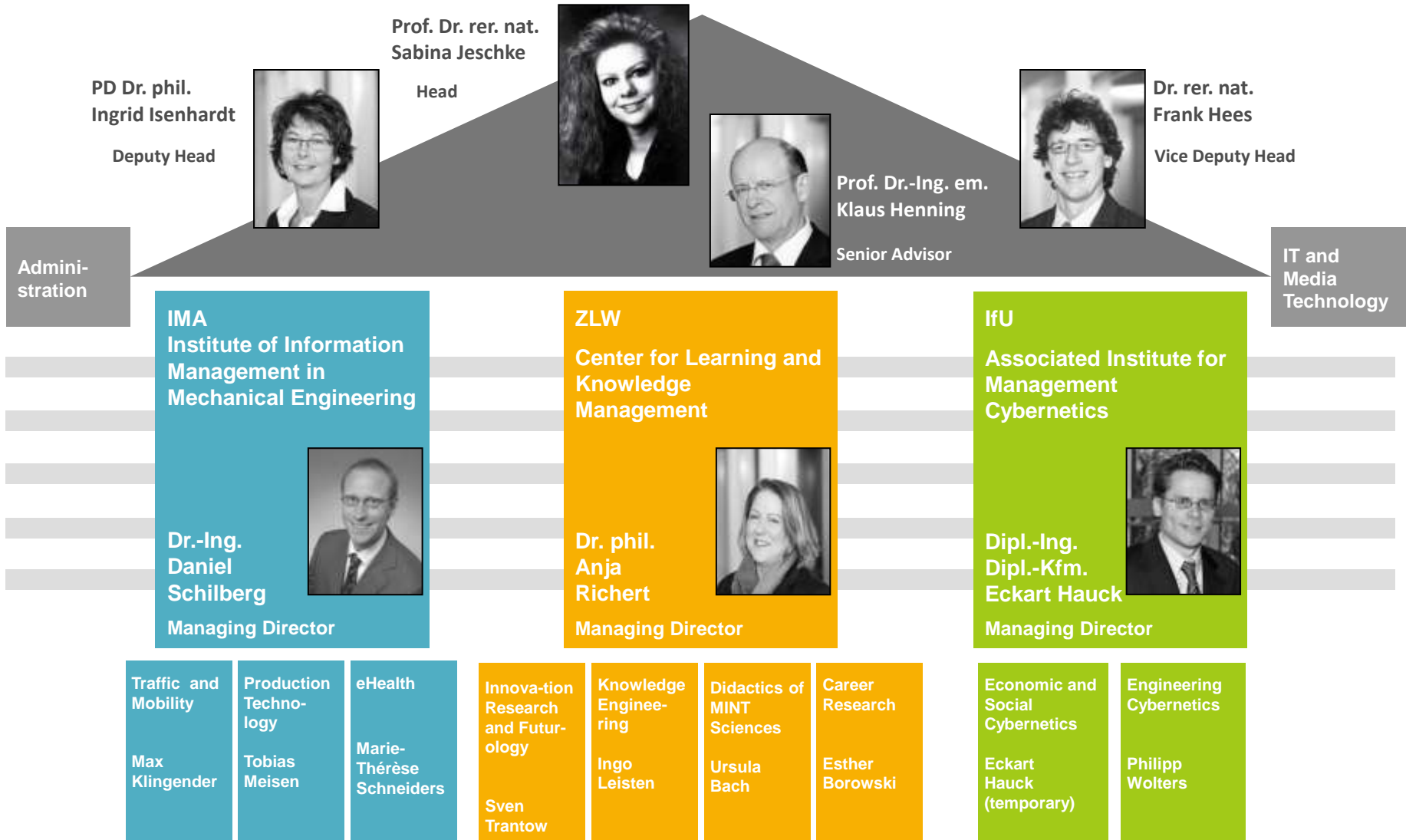


Engineering Education and Quality in Teaching

Dr. rer. nat. Frank Hees
Valerie Stehling M.A.

Aachen, 21. Juli 2011

Institute Cluster IMA/ZLW & IfU





Administration

agile and turbulence-suitable processes for knowledge and technology intensive organizations

next-generation teaching and learning concepts for universities and the economy

cognitive IT-supported processes for heterogeneous and cooperative systems

target group-adapted user models for innovation and technology development processes

semantic networks and ontologies for complex value chains and virtual environments

multidisciplinary teams work interdisciplinary on projects



altogether ca. 200 employees

ca. 50 scientists

50% engineers and natural scientists
50% social scientists

50 % women, 50 % men

ca. 15 employees for service and technology

ca. 135 student assistants

ca. 80 % financed by external funds

ca. 8,2 million € annual turnover (gross)



Kompetenz- und Dienstleistungszentrum
für das Lehren und Lernen in den
Ingenieurwissenschaften

Dr. rer. nat. Frank Hees

Valerie Stehling M.A.



- Parameters
- Requirements for the engineering education
- Objective
- Research Fields
- Service Field
- Strategic Tools
- Impact TeachING-LearnING.EU

- Tender of  VolkswagenStiftung &  Stiftung Mercator
- in line with the initiative  BOLOGNAZUKUNFT
DERLEHRE
- Goal: Sustainable improvement of the engineering education
- Board: **S. Jeschke** **M. Petermann** **A. E. Tekkaya**
RWTH Aachen RU Bochum TU Dortmund
- Managing Director: F. Hees, K. Hellermann, T. Jungmann
- Period of time: 01.06.2010 – 31.05.2013
- Funding: 1,5 Mio €

Challenges

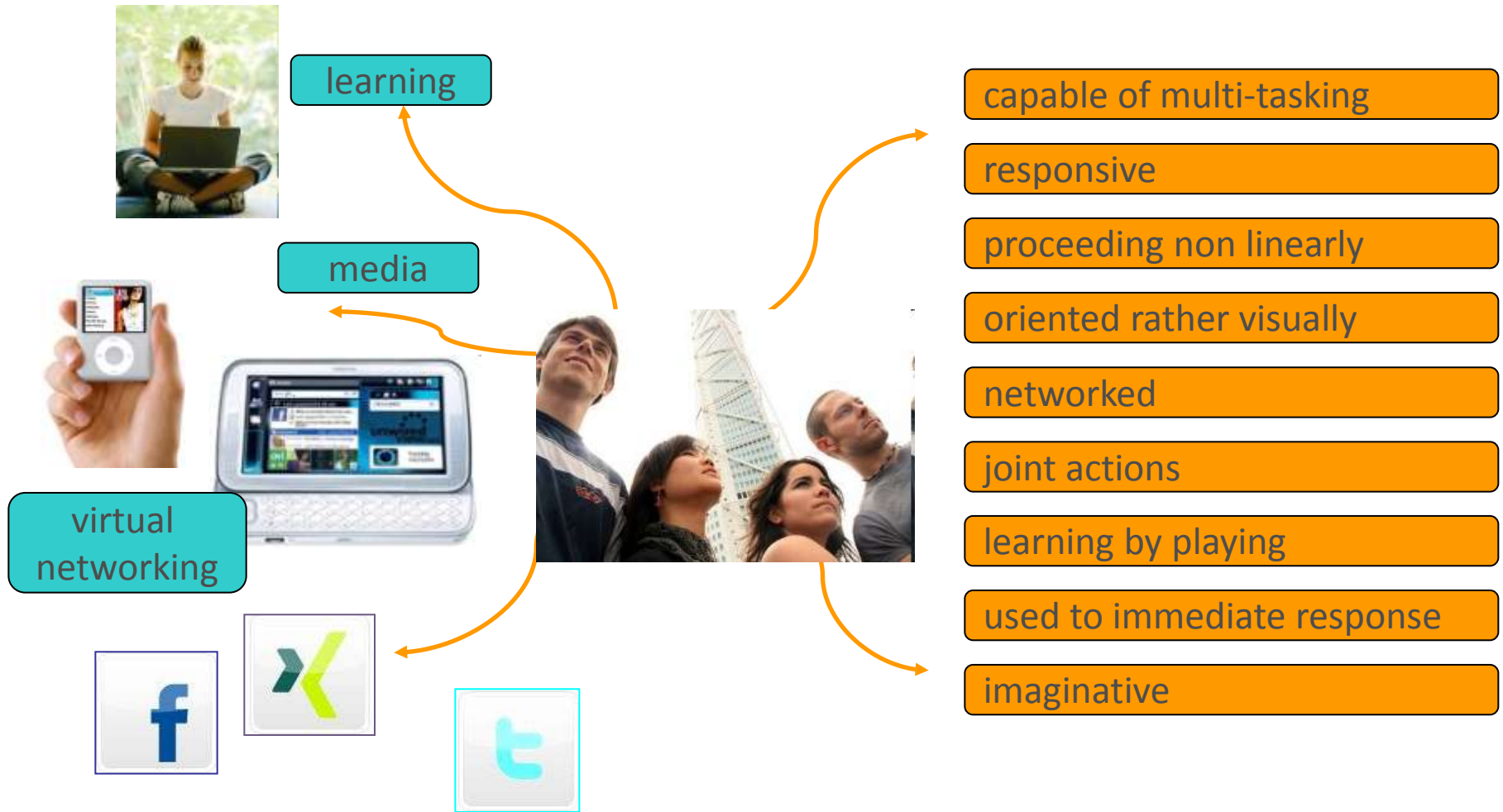


Resulting Competency Requirement

- Globalization of production
 - Increasing diversity of products
 - Shortening of innovation time
 - Increasing complexity of technical systems
 - New growth markets
 - Environmental loading and resource protection
 - Demographic change of the European Society
- Professional skills
 - Creative thinking in complex, interdisciplinary contexts
 - Adequate communication of scientific engineering questions
 - Responsible action in international and intercultural contexts
 - Dealing with diversity

- Alignment to competences as outcomes of learning
- Consideration of increasing diversity amongst students
- Maintaining the scientific quality of the courses of study
- „shift from teaching to learning“
- Improvement of the studyability as well as reduction of student attrition
- Intensification of communication and interaction between academic staff and students

Tomorrow's engineers are „digital natives“



Empiricism & surrounding parameters



Best Practice Monitoring

Collaboration of the CoP and the Advisory Board

Curricular development



Assessment

Orientation Phase

...

TopING

Concepts for Teaching and Learning



Shift from Teaching to Learning:

Problem-based Learning

Testing based on skills



Skill oriented

Integrated in the learning-process

Checking of Learning Outcomes

Teaching experiments



Didactic skill enhancement of secondary- and impact-research

High numbers of student listeners



Appropriate teaching and learning concepts

Advanced didactic training



Seminars,
Workshops

Tutoring and Coaching



Interdiscipli-
-nary,
Target group
oriented

Flexible Funds



Separate
Project-
Calls for
Tenders

Doctorate phase



researching,
teaching,
leading

Recommendations



Bologna-
recommen-
-dations
for the struc-
-turing of
teaching and
learning

www.teachING-learnING.EU



„conventional“
Online-Services

new
Online-Services

OpenBologna



Student
Lead User =
Mastermind in the
Innovation process

Advisory Board & Comm. of Practice



International
skill amongst the
Review Board

Dynamic
amongst the CoP



- International and national board as „scientific advisers“
- Reflexion of international trends in the engineering education
- Proposal: Discussion of theses of the engineering education

Further inquiries
at
EENEE, EURYDICE,
CNE, ENAEE.



Bernd
Kassebaum (IGM)



Prof. John
Dickens (GB)



Lars Funk (VDI)



Günter Heitmann
(Berlin)



Michael F.
Zäh (acatech)



Anette Kolmos (DK)



Joachim
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Gerhard
Müller (4ING)

Ulla Bidian, Ph.D.



James Groves (USA)

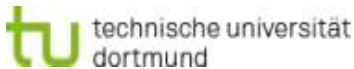
- Facilitation of the international mobility amongst European Universities
- Production of higher motivated, able students for the study of engineering sciences
- Enhancement of the employability after a successful graduation
- Networking of the European discussion about the progression of teaching and the study of engineering sciences



- **Project** „ELLI – Exzellentes Lehren und Lernen in den Ingenieurwissenschaften“ (Excellent Teaching and Learning in the Engineering Sciences)

- **Partners:**

- **Executives:**



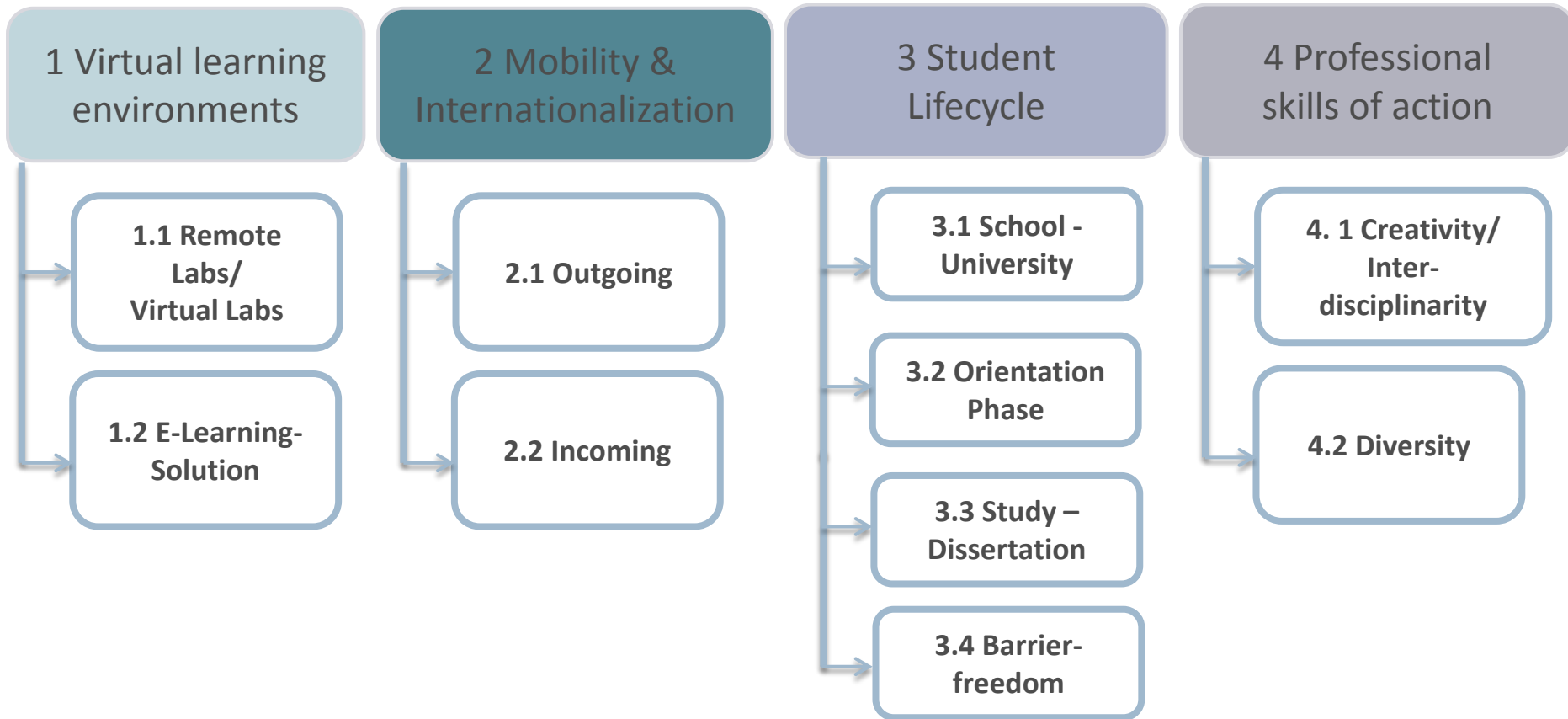
Zentrum für Lern- und Wissensmanagement



Hochschuldidaktisches Zentrum HDZ
Center for Research on Higher Education and Faculty Development

- **Vision:**

- Cooperating with schools
- Big Picture of the scientific work of engineers provided by a virtual learning environments
- Enabling higher Identification with the study and work of an engineer
- Enhancement of tutoring in the engineering education
- Coaching towards international mobility
- Increasing of professional skills of action of the BA-Students
- Facilitate access to the study of engineering sciences for minorities

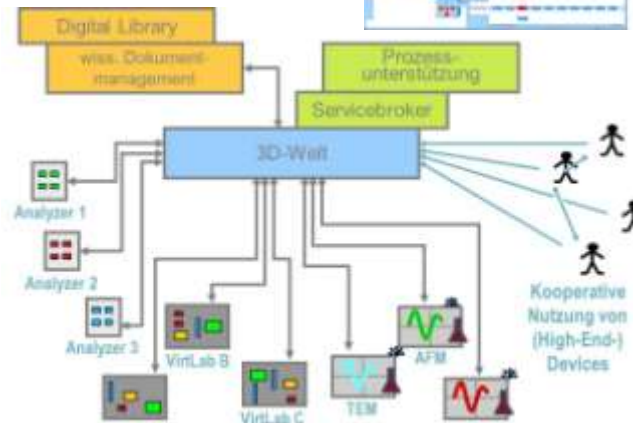


I.1 Resources for experiments: Remote Labs and Virtual Labs

- **Measure 1:** Baseline study of Labs in the engineering education



- **Measure 2:** Launch and extension of Remote Labs and Virtual Labs



2.1 Outgoing – German students abroad

- **Measure 1+3:** Programme to support studying abroad and the therefore required curricular embedding



- **Measure 2 :** Interactive map of mobility (international network of the three Universities)



2.2 Incoming – Foreign students from Industrial Nations

- **Measure 1:** Course offers for foreign students from industrial nations



- **3.1:** Transition school – university

- Measure: e.g. Roboscope



- **3.2:** Arrangement of the Orientation Phase

- Measure: e.g. „StartING meets Alumni“



- **3.3:** Transition study – dissertation

- Measure: seminars, trainings and coachings e.g. „How to become a Dr.-Ing.“



- **3.4:** A barrier free university

- Measures: e.g. support for handicapped students



4.1 Creativity and Interdisciplinarity

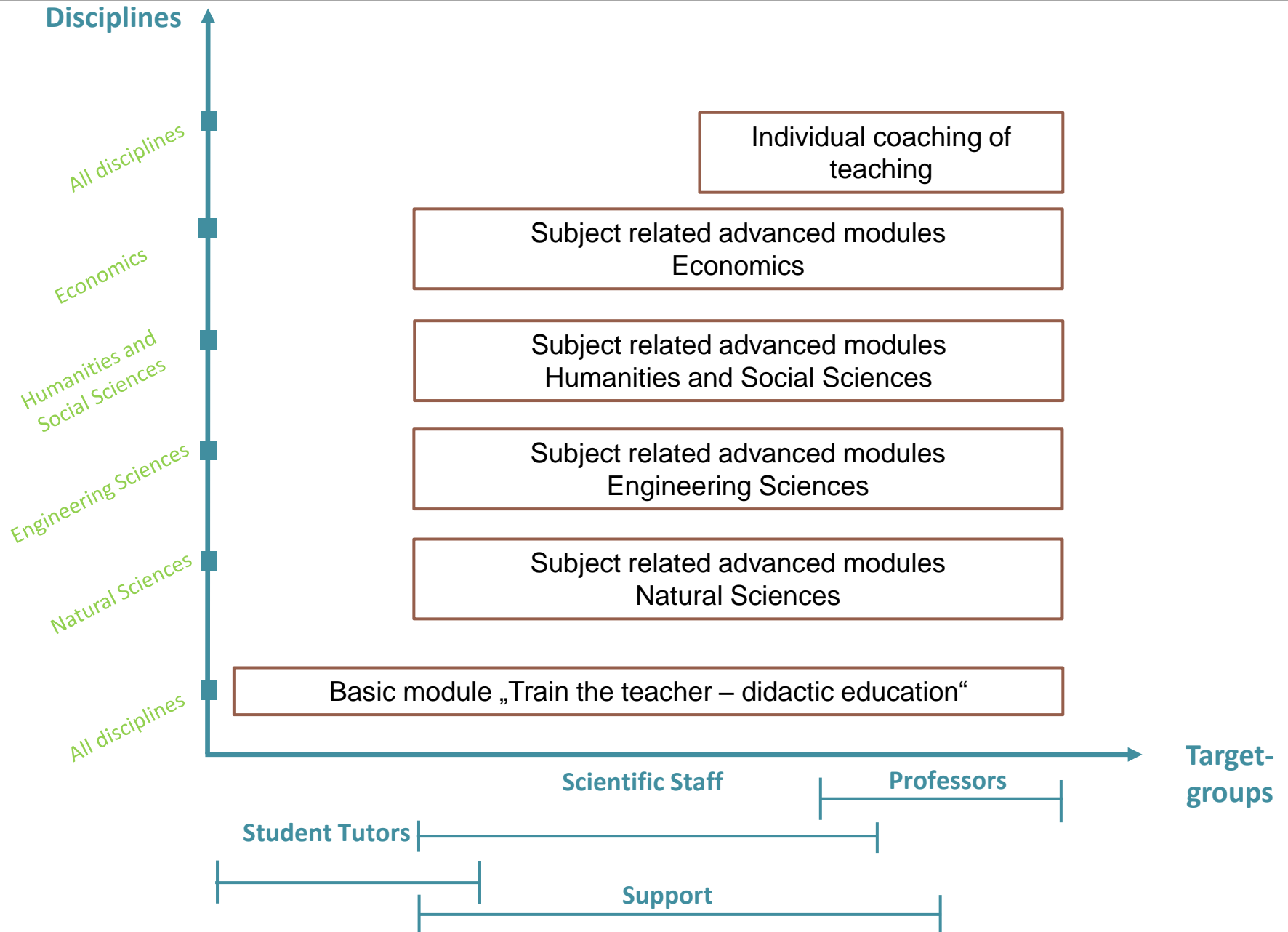
- **Measures:** e.g. creativity enhancing teaching, interdisciplinary discourse, enhancement of problem based learning etc.

4.2 Diversity as part of the engineering education

- **Measures:** e.g. intercultural workshops, lead student workshops etc.



Higher Education





Thank you very much
for your attention!

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