

# Gender and Diversity as Structural Components of Quality in New (Engineering) Study Programs

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# 1. Relevant Questions

- The discussion about the role and importance of gender and diversity concepts in the process of Quality Assurance in Engineering Education has just been started and gains dynamics due to several developments:
- In 2005 an „excellence initiative“ for HEIs was started in Germany to enhance German universities‘ success in international rankings and to support the development of their research profiles
  - One important aspect in the application was the inclusion of so called „gender issues“
- In February 2006 the German Accreditation Council decided to review gender-mainstreaming concepts of HEI (higher education institutions)
  - **The existence of Gender Mainstreaming has an impact on study programs**
  - **Effects have to be evaluated in accreditation procedures**
  - HEI have to decide themselves about appropriate ways to integrate gender mainstreaming into their new study programs
- Both, HEIs and accreditation agencies need criteria and procedures for observing the effects of gender mainstreaming concepts in higher education

## Some Definitions

- Gender Mainstreaming: „(...) to incorporate the different living situations and interests of men and women within all societal projects a priori and regularly, because there is no such thing as a gender neutral reality.“(BMFSFJ 2006)
- Diversity: umbrella term describing individual varieties (e.g. gender, age, culture, sexual orientation, religion, handicaps)
- Quality: stakeholders (professors, students, administration, future employers) in the process of university education define the requirements making quality for each single study program
  - **within a specific environment**
  - **with specific political, juridical and economic constraints**
  - **they define their interests**
  - **they bring in believes and convictions**

## 2. Why we connect excellence with gender

- The „Excellence initiative“ (as an invention of the DFG Deutsche Forschungsgemeinschaft and BMBF German Ministry for Research) asked for the promotion of young researchers and gender issues in combination with top-level research
- The initiative is split into three lines of funding:
  - Graduate schools
  - Clusters of Excellence
  - Institutional Strategies for advancing top-level university research
- Germany's institutions were faced with highly-regarded scientists from abroad, claiming that there was a connection between excellence and equal opportunities
- But exactly where does this connection come in?

## Retrospection

- Robert Merton 1942: science as a democratic project, not excluding anyone
- Lack of a pool of women in science only partially true  
=> there must be other reasons for their under-representation in science
- Belief that only a diverse work force will foster creativity in the best possible way
- Creativity and innovation as key indicators for good research and new developments  
=> thus the basis for economic success

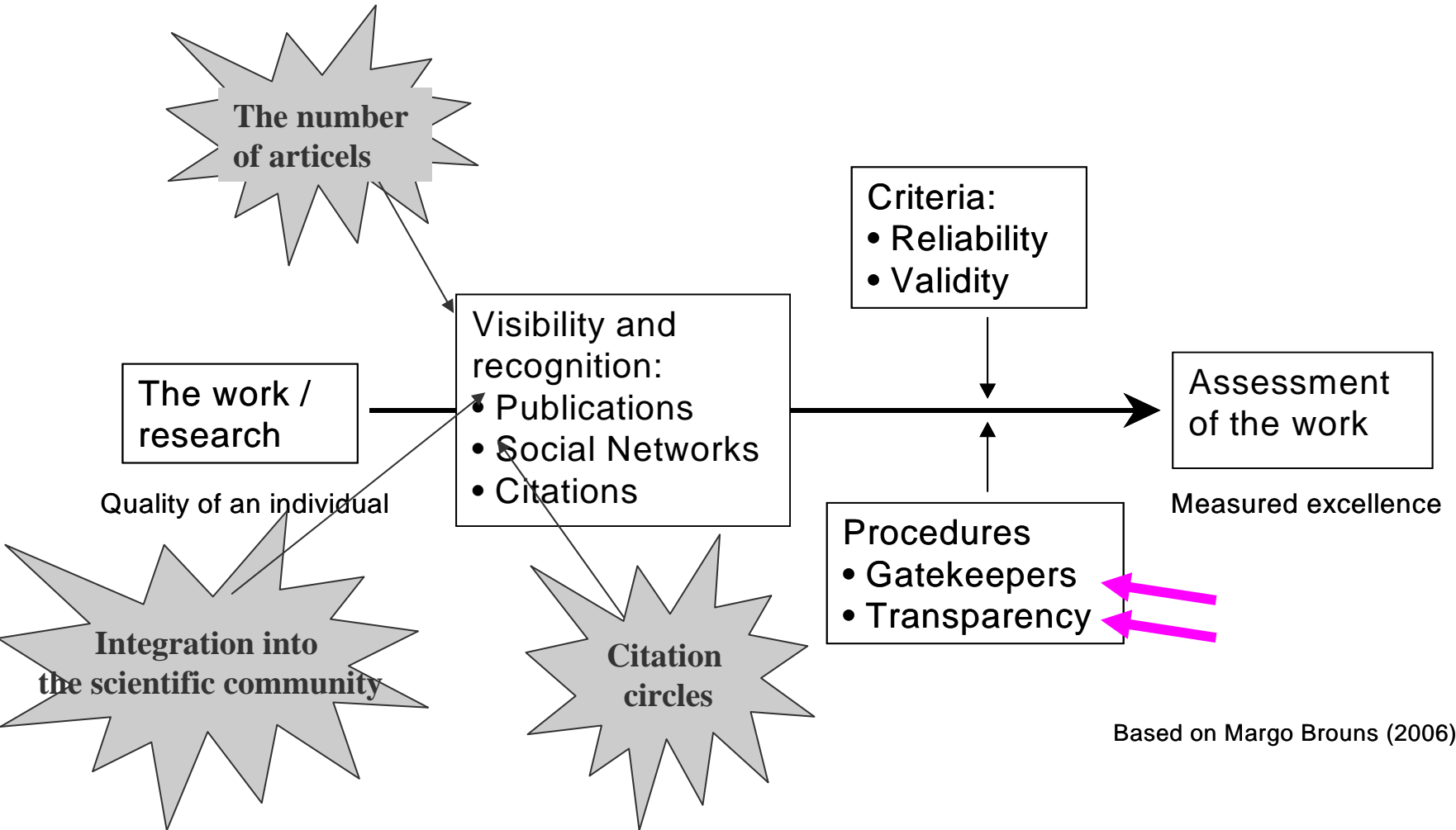
### Conclusions:

- **Labour market needs diverse graduates, concerning their sex as much as their specific knowledge and ideas, including the gender dimension in scientific research**
- **Quality has a social, political, historical and diverse aspect, quality is not a (gender-)neutral word, quality is not well-defined but used by individuals**

## State of Research

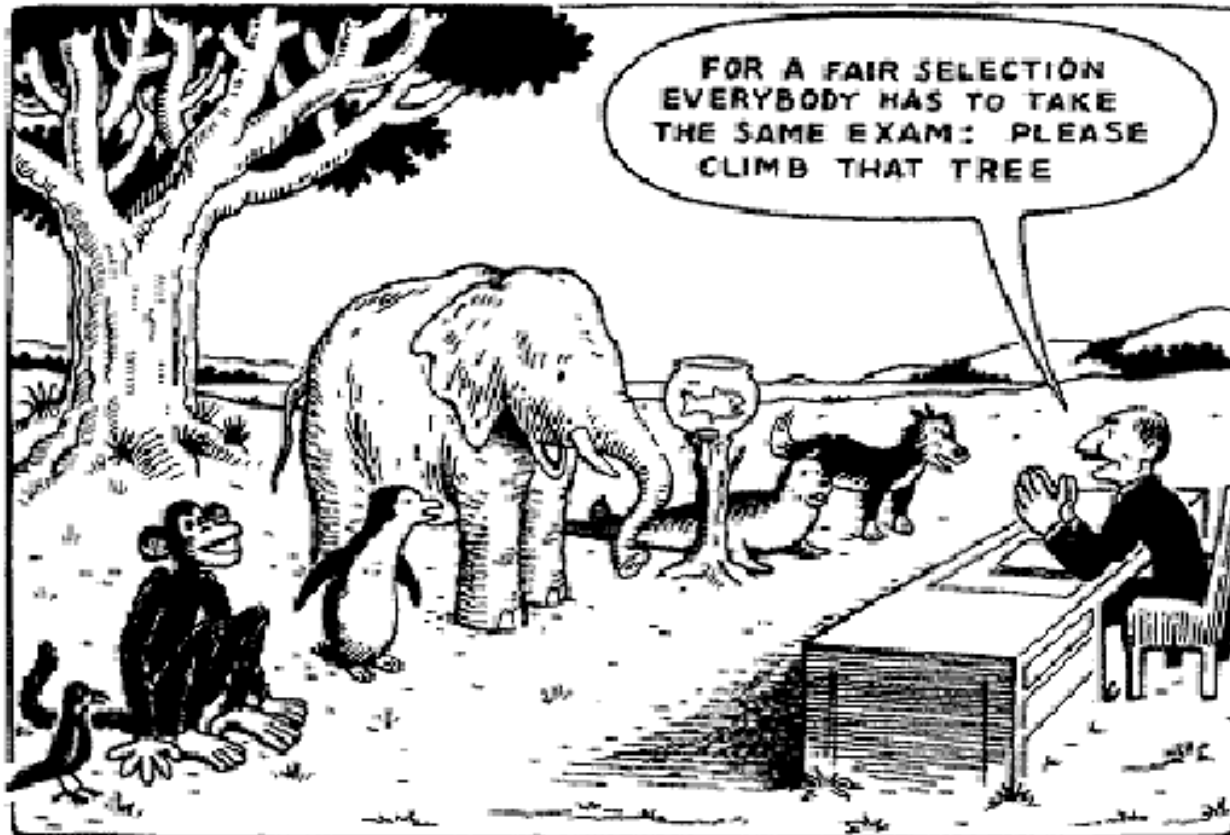
- Swedish study published in *Nature* 1997 showed that women need 2.5 more publications than men to be awarded postdoctoral fellowships by the Medical Research Council in Sweden
- Steinpreis et.al. (1999) found that professors evaluated job candidates' dossiers preferred a dossier with a male name over the very same with a female name
- Trix et.al. (2003) found that letters of recommendation were written differently for men and women
- Carly Fiorina (former CEO): Cloned minds produce cloned ideas
- Londa Schiebinger (Stanford University):
  - Examples for the cultural bias against women in science: one article with four different names:
    - John T. McKay (a man)
    - Joan T. McKay ( a woman)
    - J. T. McKay (supposedly sex-neutral)
    - Chris T. McKay (ambiguous with regard to sex)
  - Four different evaluations of the very same article. If sex don't matters the evaluations should be the same or similar

# Gender aspects in scientific publication



Based on Margo Brouns (2006)

## Traditional Recruiting Strategies...



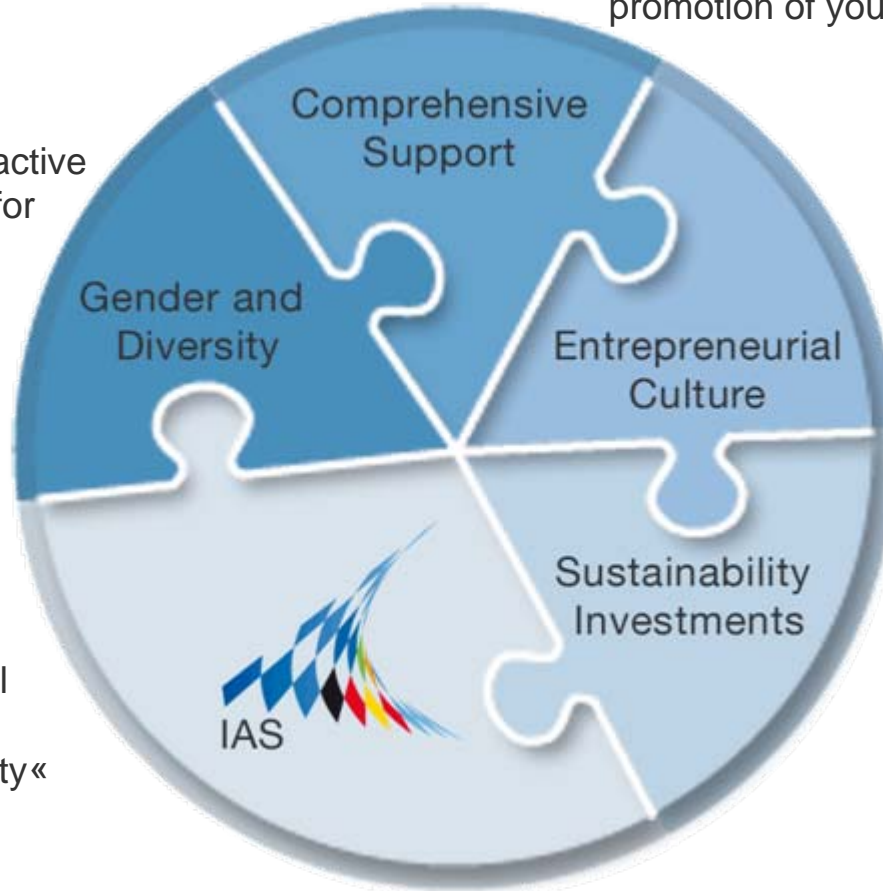
## ...and their results



**“You are exactly the right man for us.”**

### 3. The Gender concept in the TUM Excellence Initiative: The Entrepreneurial University.

Unbureaucratic processes, headhunting,  
promotion of young researchers



Germany's most attractive  
Technical university for  
female students and  
scientists

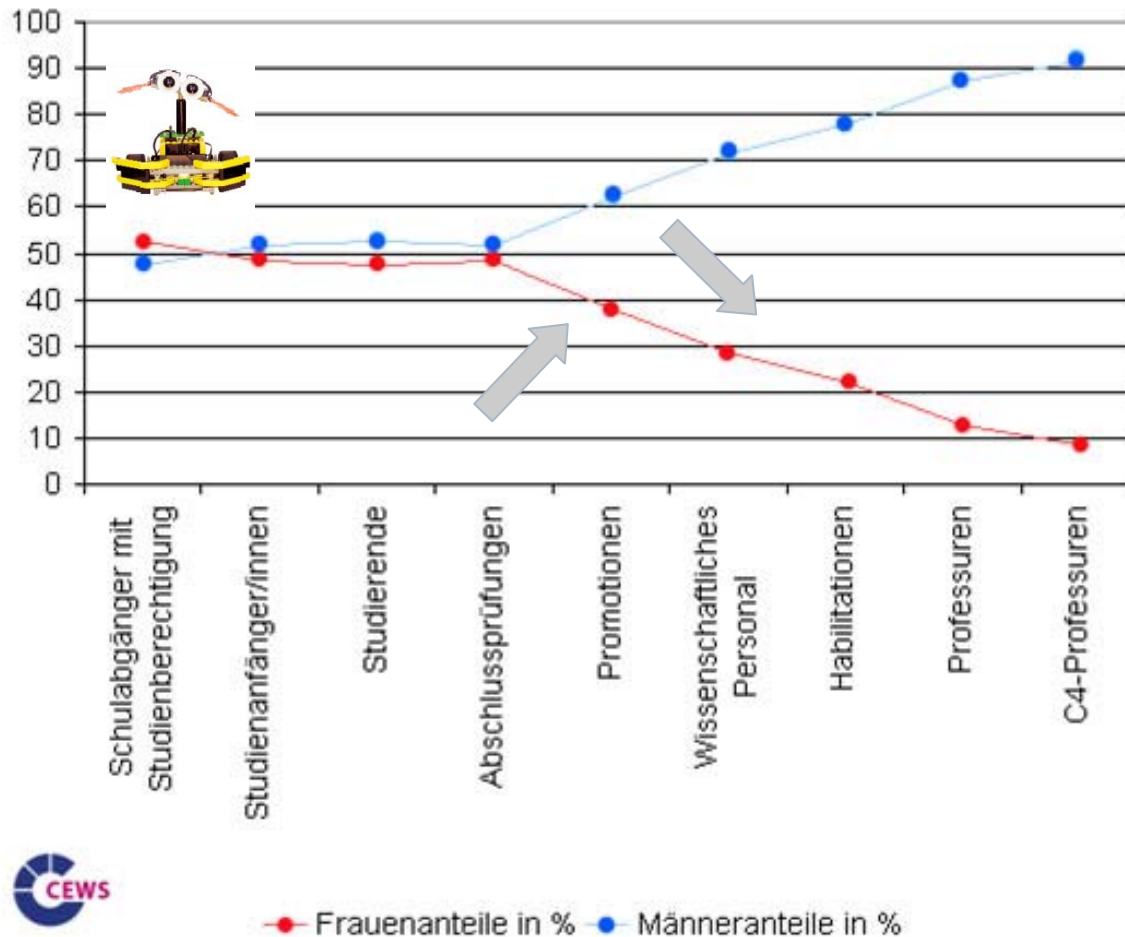
Supporting atmosphere  
for science

Freedom for top-level  
research  
»Scholarly Community«

Sustainable financing to  
ensure quality

**Grant:  
56 Mio € (2006-2011)**

## The „leaky pipeline“ problem



- Promotion of young researchers
- Gender-sensitive recruiting
- Gender-sensitive personnel development

## The gender issues at the TUM Excellence Initiative

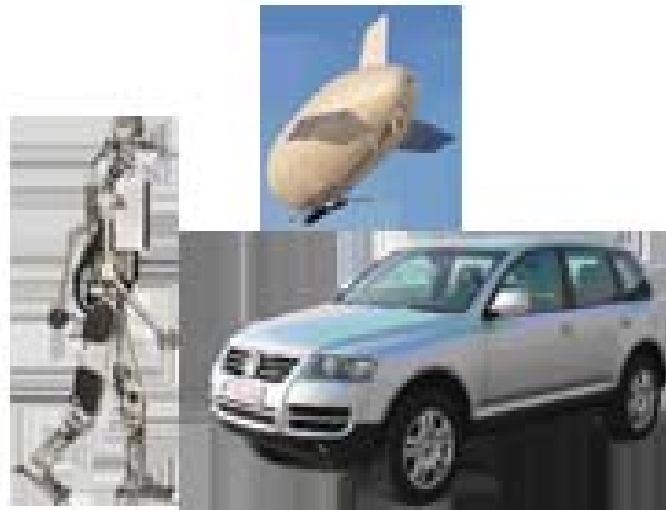
- Munich Dual Career Center
- Gender Issue Incentive Fund
- Work life balance
  - child-care facilities
  - new workplaces at home
  - part-time studies / re-entry studies
  - re-integration on return from parental leave
  - Family Care Structural Fund
- Gender consulting
- Professionalizing gender mainstreaming
  - Target agreements on Gender orientation
  - Gender sensitive personnel recruitment and development
  - quality management and controlling to gender issues



IAS Liesel Beckmann  
Symposium 2007:  
dedicated to Gender & Diversity

## Excellence cluster „Cognition for technical systems“

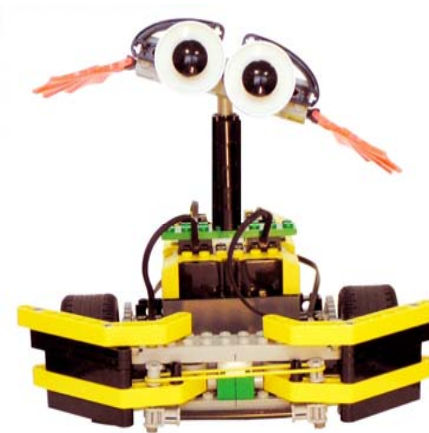
- The CoTeSys cluster of excellence investigates cognition for technical systems such as vehicles, robots, and factories
- *Cognitive technical systems* are equipped with artificial sensors and actuators, integrated and embedded into physical systems, and act in a physical world
- They differ from other technical systems in that they perform *cognitive control* and have *cognitive capabilities*



## Gender Issues

Goal: Raise the amount of women in the cluster from recently 14% to 20%

1. Accompany specific recruiting processes
2. Preparation and Realisation of further education measures and career development for female Cotesys-participants
3. Development of a network on gender and diversity in technical development
4. Development of strategies to raise the number of female engineering students



## Accompanying research

- Consulting and development of gender concepts in projects of the excellence initiative
- Integration of the topic „gender and diversity in technical development“ in research and teaching
- Development of a career-oriented network of female scientists in the clusters
- Process evaluation
- Continuing adjustment with gender and diversity concepts in companies
- „Gender“ as component of quality in organisational development and development of study programs
- Development of a concept of gender-oriented headhunting
- Specialized teaching modules
- Presentations and publications

## 4. Gender and Diversity in Engineering Education and Accreditation

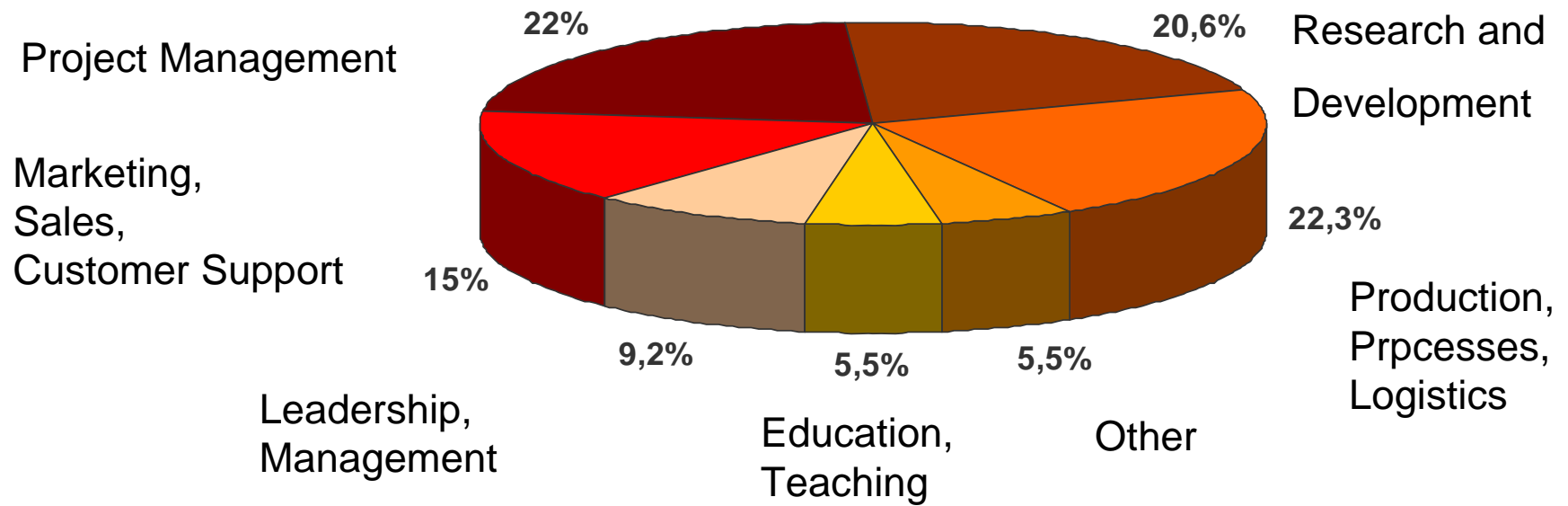
- Do curricula, didactic methods, structure and regulations (used or not used) reflect gender- and diversity-related elements?
- Are differentiations of the professional identification of different target groups / stakeholders recognised and taken into consideration?
- Do those responsible for a study program consider that different target groups / stakeholders act differently in the development of their individual potentials? How are these findings transferred into educational process?
- Are there resources available to train gender and diversity competencies of the students?

# Gender and Diversity Criteria in Quality Assurance when educating engineers

- **Lack of Personnel (48.000 missing engineers / year)**
  - 3,4% unemployed men but 9,7% unemployed women
- **Demographic Change**
- **Changes in Industry:**
  - Diversity as a management concept and
  - Diversity in products and services because of customizing
  - Leads to specific qualifications of job entrants
- **Impulses in Engineering Education:**
  - Take care for the further education of senior engineers
  - Take care for more continuous careers of female engineers (Re-entry)
  - Take care for strategical integrating of young people with a migration background
  - Integration of customizing into technical development



## Engineering Profession today: diverse working fields



Source: VDI-Nachrichten  
2006

## 5. Gender and Diversity in the Management of HEI

- Business level:
  - open, constructive and scientific climate of motivated colleagues including different target groups / stakeholders
- Economic level:
  - through demographic change and too small student numbers in engineering, the need for technical professionals raises and can become negatively influential on the economic cycle
- Technical level:
  - due to technical developments new markets for new products arise; based on the awareness for a broader customer's diversification, new technologies can define diversity benchmarks and specifications early in the development process

## 6. Perspectives

- Interdisciplinary arrangements in engineering education regarding new target groups
- Introduction of gender criteria in university can help implementing the growing diversity of societies, companies and educational institutions to meet future needs of the markets
  - What are gender- and diversity-related competencies of alumni and what does this mean for competence profiles of job entrants?
  - Which data can give valid information whether gender and diversity education effectively produces the competencies aimed at and how can this data be collected in an efficient way?
- Changes in the profession of engineers anticipate the steps HEI have to go to be successful in engineering education