

# **EUR-ACE criteria versus industry needs – a critical comparison**

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## Structure of my presentation

- **Siemens – example of an international company; recruiting trends and jobs performed by engineers**
- **A selection of international surveys: What recruiters want regarding graduates and what they miss**
- **Universities and companies – structural differences explain the different priorities and results**
- **The EUR-ACE-criteria compared to industry requirements**
- **Conclusion**

# Siemens: Key attributes

(Fiscal 2011: Oct.1, 2010 –Sept. 30, 2011)

**SIEMENS**

## Since 1847

- **International**
- **Innovative** (dynamo in 1866)
- **Focused on electrical engineering and infrastructure solutions**
- **Oriented toward sustainability**
- **Socially responsible**

## In 2011

- 360,000 employees in 190 countries (68% outside Germany)
- Sales of € 73,5 billion (85% outside Germany)
- Active in four „Sectors“; 3.93 billion R&D spending
- **In 2011: 74,400 employees hired worldwide, 38% with a university degree, 21% scientists and engineers (65.5% thereof with a bachelor degree).**

**Hiring is local – in the country and for the country according to local business needs!**



Pole of the 1868 Indo-European telegraph line

# Siemens: We don't create demand – we satisfy it!

## Sectors and Divisions as of October 1, 2011

**SIEMENS**

### Energy

#### Divisions

- Fossil Power Generation
- Wind Power
- Solar & Hydro
- Oil & Gas
- Energy Service
- Power Transmission



### Healthcare

#### Divisions

- Imaging & Therapy Systems
- Clinical Products
- Diagnostics
- Customer Solutions



### Industry

#### Divisions

- Industry Automation
- Drive Technologies
- Customer Services



### Infrastructure & Cities

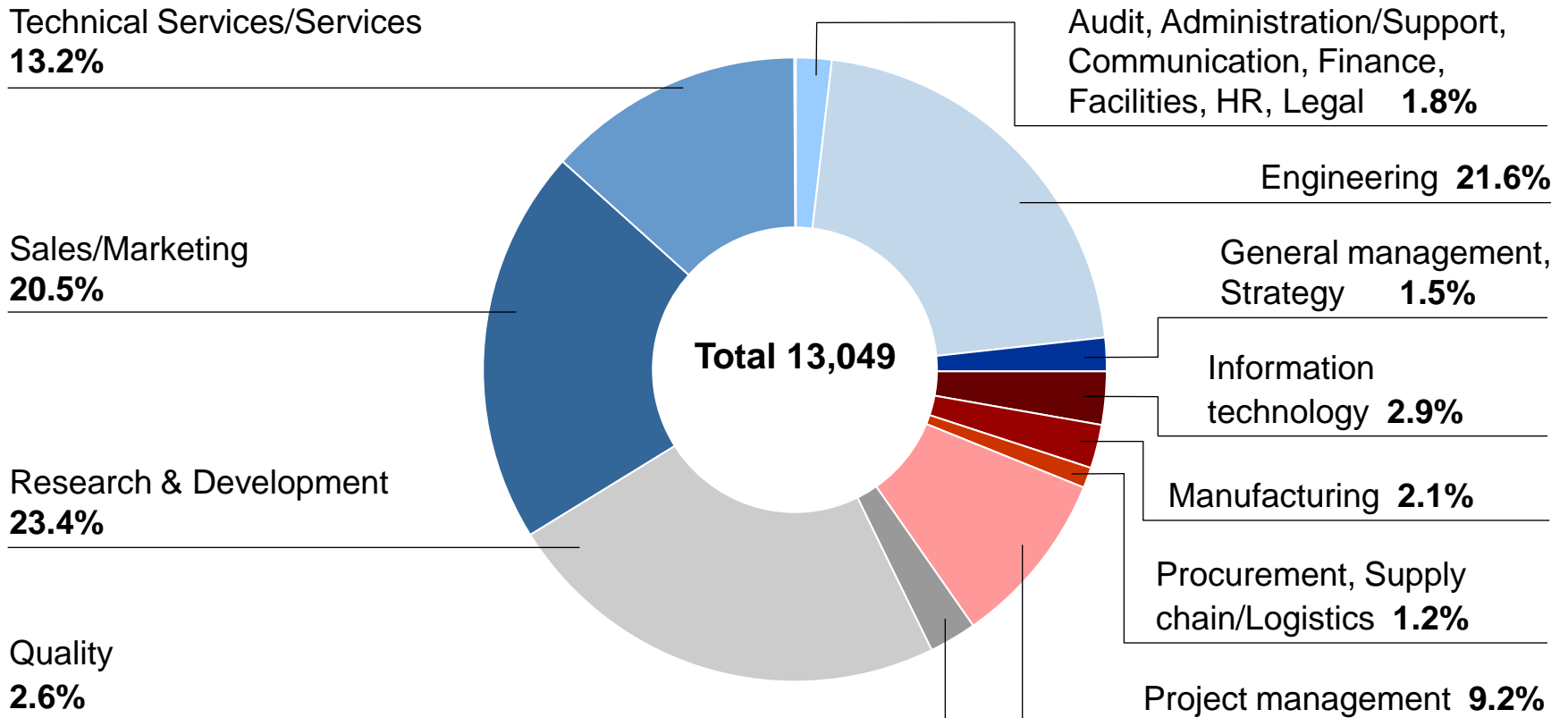
#### Divisions

- Rail Systems
  - Mobility and Logistics
  - Low and Medium Voltage
  - Smart Grid
  - Building Technologies
- 
- OSRAM <sup>1)</sup>



1) In fiscal 2011, Siemens announced its intention to publicly list OSRAM and, as an anchor shareholder, to hold a minority stake in OSRAM AG over the long term

# Siemens Germany: Engineers need a wide variety of skills for many different positions



Electrical engineers, as of 10/2010

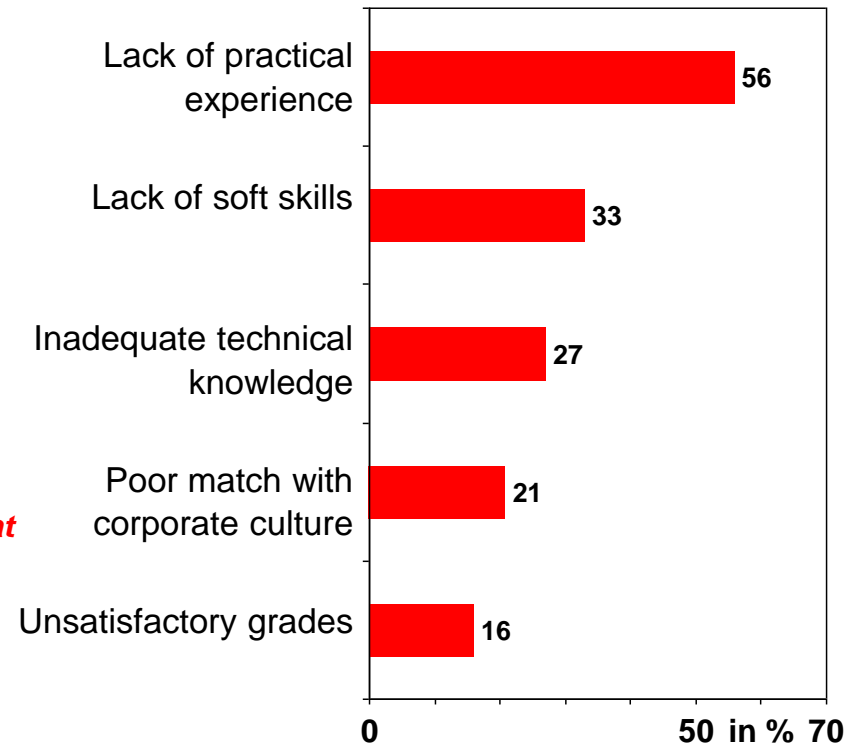
# Example Germany: What skills and qualifications are employers looking for?

### What employers are looking for in job applicants

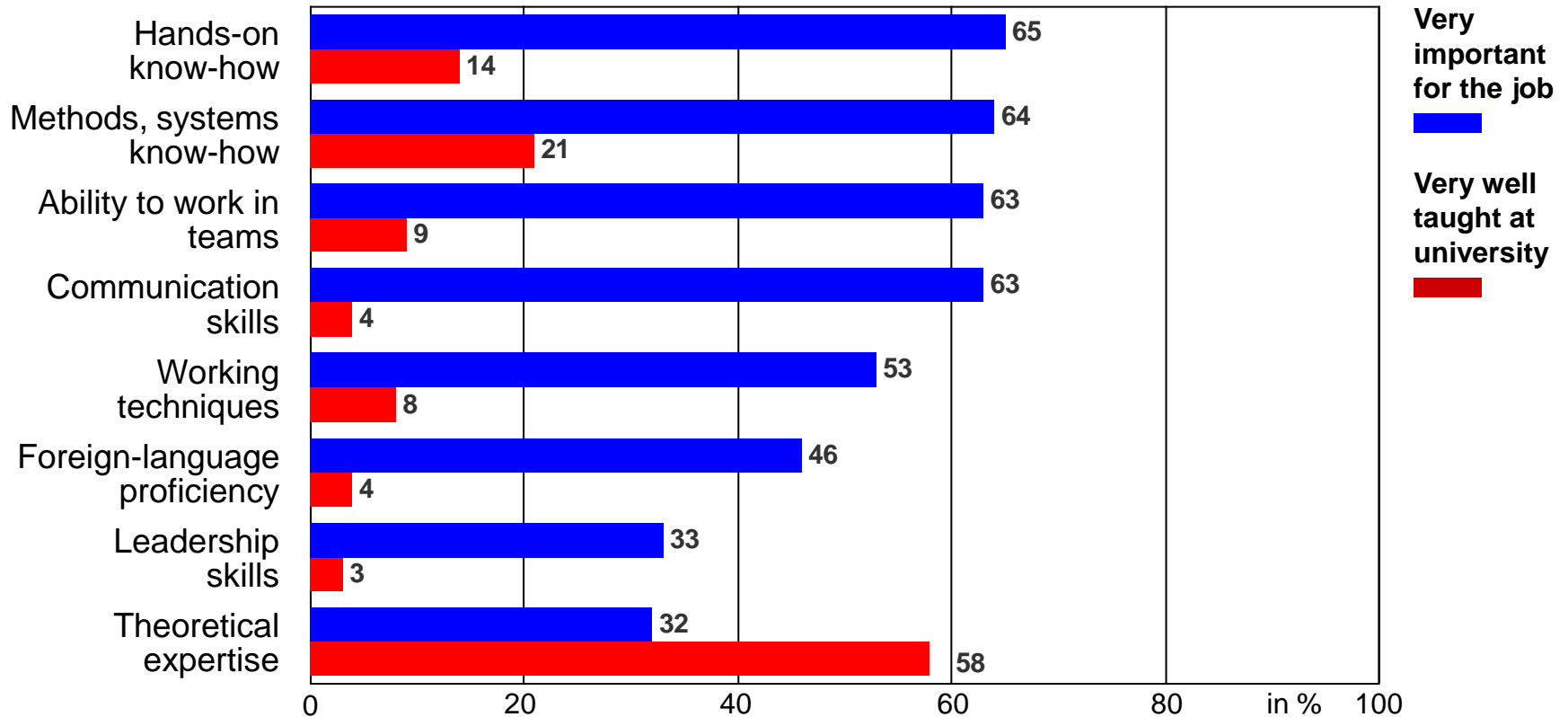


*Focus of the debate at German universities!*

### Criteria that put a candidate out of the running

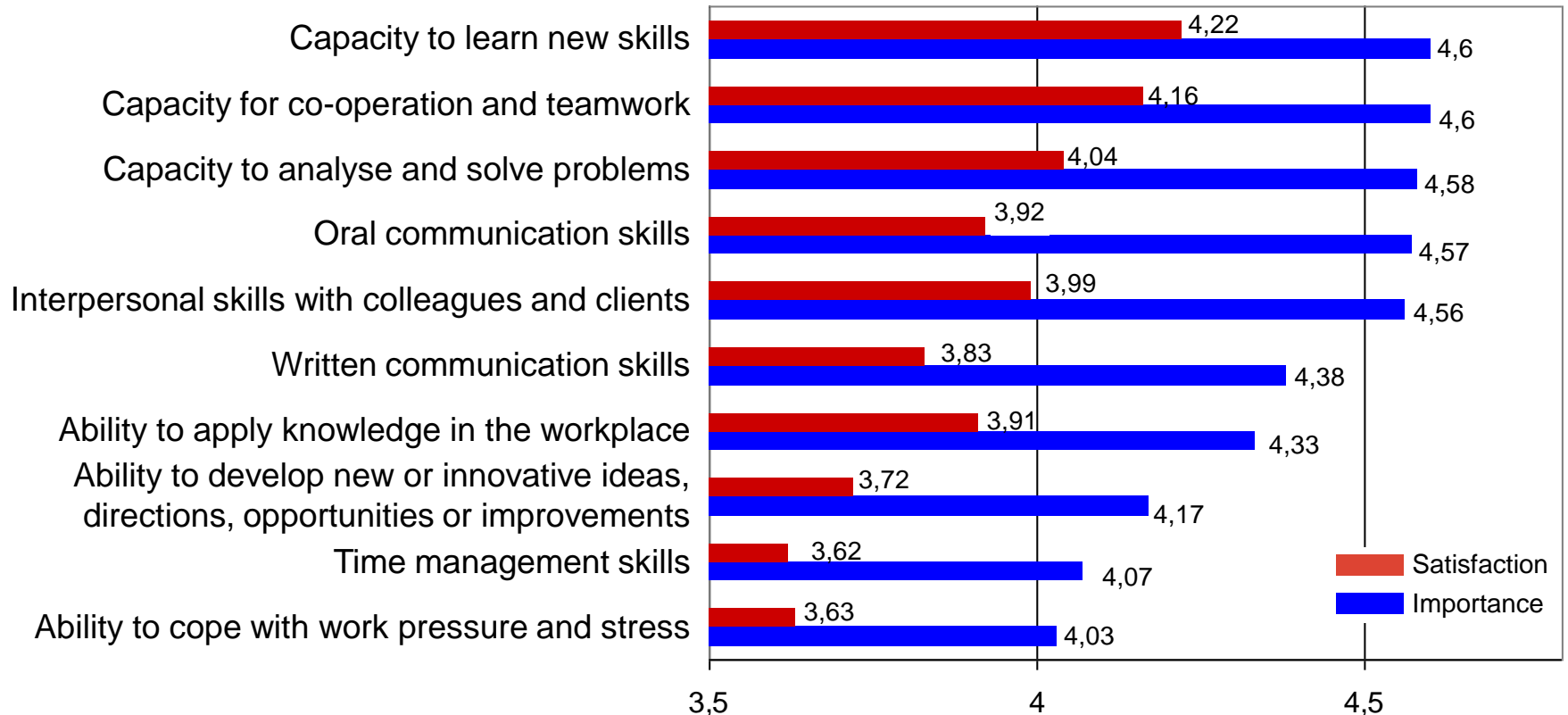


# Example Germany: Skills mismatch as observed by young professionals in electrical engineering



Answers of about 300 young professionals in electrical engineering; Source: VDE survey "Young Professionals 2009"

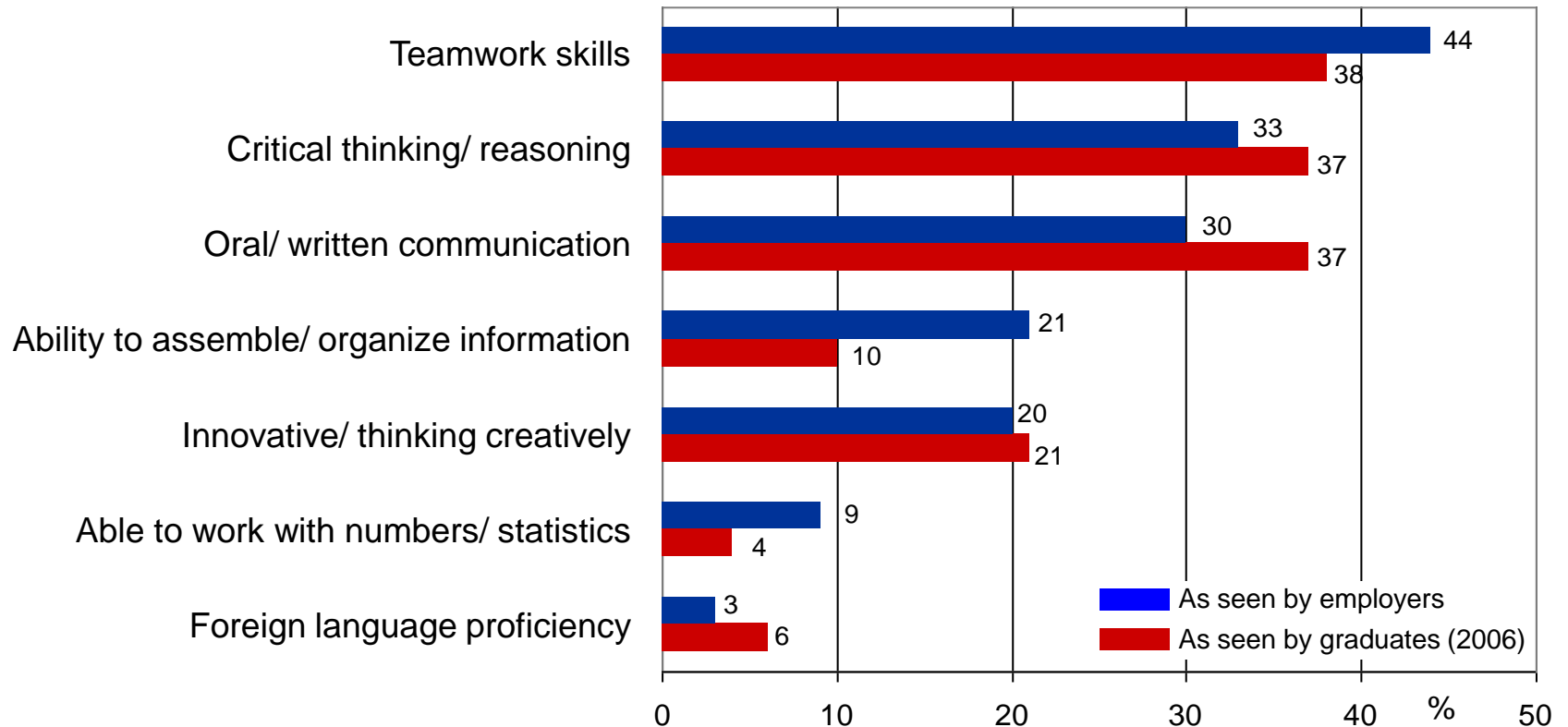
## Example Australia: Skills mismatch as seen by employers



Source: Nair et al, EJEE 34-2, p.136

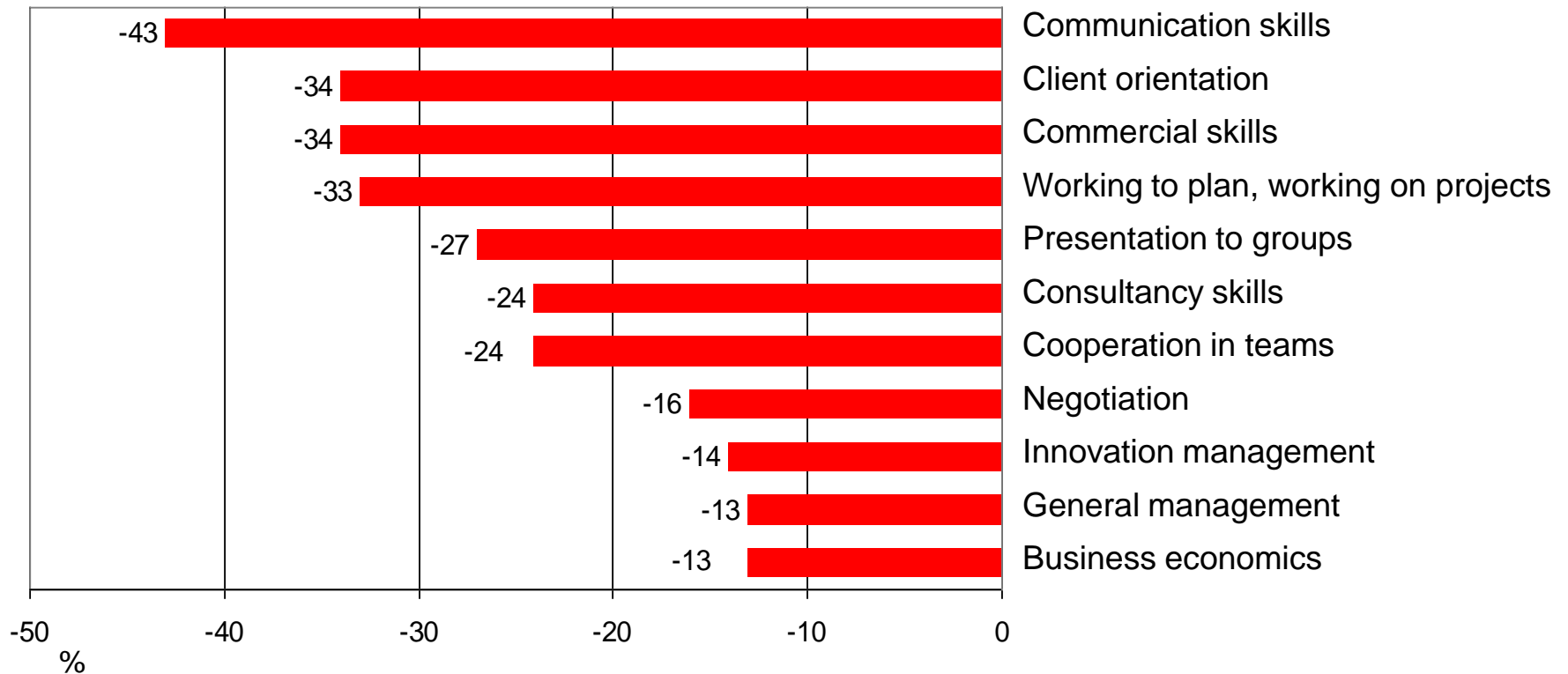


## Example USA: Most important skills employers look for in new hires



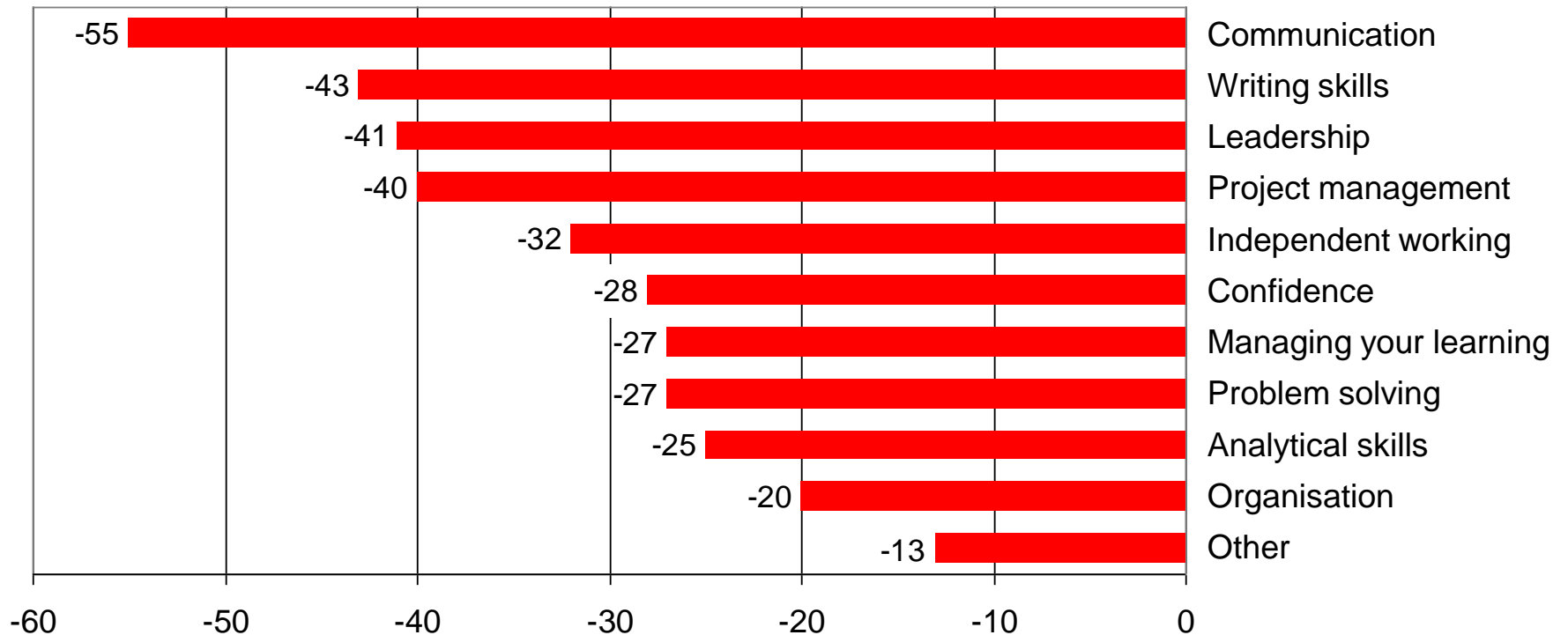
Source: P.D. Hart, (2006); <http://www.aacu.org/advocacy/leap/documents/Re8097abcombined.pdf>

# Example Netherlands: Deficits of S&T university graduates as seen by employers



Source: Careers for Science Alumni, Radboud University Nijmegen, OECD presentation, Amsterdam, 11- 2005  
<http://www.eair.nl/forum/valencia/authors.asp?achternaam=9410&wat=achternaam>

## Example Ireland: Deficits of university graduates as seen by employers



Source: P. Twomey, University of Limerick, presentation at the 2011 University Business Forum, <http://ec.europa.eu/education/higher-education/doc/business/forum2011/presentations/twomey.pdf>

# The skills mismatches observed are due to the intrinsic differences between organizations and goals:

## **Companies:**

- Entry qualification important only for first job, later performance in a variety of deliberately different functions determines career success.
- The goal is the transformation of new ideas into innovations, i.e. the solution of basically “open,” customer-specific problems (the best possible fulfillment of the market requirements) in order to earn money, for which flexible structures and teamwork are essential.

## **Universities:**

- Salary structure and opportunities for promotion are governed by the conditions of public service; (entry qualification is decisive; a caretaker can never become president); frequently lifelong specialization.
- Strong focus in first study phase on selection through “formula solving” i.e. reconstructing the solution to problems where the outcome is already defined; the emphasis is therefore on “regurgitating” knowledge for exams and the achievement of academic qualifications; later on research orientation to generate new knowledge.

***Accreditation can help to minimize these discrepancies.***

# The six Programme Outcomes of EUR-ACE accredited engineering degree programmes (1)

## Knowledge and Understanding

*e.g. knowledge and understanding of the scientific and mathematical principles underlying their branch of engineering;*

Focus of university teaching, usually with good results

## Engineering Analysis

*e.g. the ability to apply their knowledge and understanding to identify, formulate and solve engineering problems using established methods ...and to analyse engineering products, processes and methods;*

Danger of deficits, needs good cooperation between university and industry

## Engineering Design

*e.g. the ability to apply their knowledge and understanding to develop and realise designs to meet defined and specified (or unfamiliar) requirements; an ability to use their engineering judgement to work with complexity, technical uncertainty and incomplete information.*

Often deficits of graduates due to lack of experience

# The six Programme Outcomes of EUR-ACE accredited engineering degree programmes (2)

## Investigations

*e.g. the ability to conduct searches of literature, and to use data bases and other sources of information; the ability to design and conduct appropriate experiments, interpret the data and draw conclusions;*

Usually good proficiency of graduates,

## Engineering Practice

*e.g. the ability to select and use appropriate equipment, tools and Methods and the ability to combine theory and practice to solve engineering problems; an awareness of the non-technical implications of engineering practice*

Graduates may have problems due to lack of experience

## Transferable Skills

*e.g. function effectively as an individual and as a member of a team; demonstrate awareness of the health, safety and legal issues and responsibilities of engineering practice, the impact of engineering solutions in a societal and environmental context ...*

Deficits of graduates most often criticized by employers worldwide !

## Conclusion of my presentation

- **Discrepancies between the skills profiles of university graduates and the requirements of the workplace are widespread and caused by the different requirements of scientific research and commercial practice**
- **In the interest of the graduates, universities should do their best to minimize such differences and prepare their students as good as possible for the challenges of the workplace**
- **The EUR-ACE criteria are a good and meaningful yardstick to check if the curricula meet the requirements of the professional practice. They should be taken very serious by universities and used to actively market their offering.**
- **But employers will always focus on the person, not on the paper!**
- *See also: F.S. Becker: Quality in Engineering Education – an Industry View; SEFI Conference Paper; Lisbon, Sept. 2011: <http://www.sefi.be/wp-content/papers2011/T8/10.pdf>*

Employers are looking for skills  
that match real-life challenges!

**SIEMENS**



*Thank you for  
your attention*

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