
Career Perspectives for Women Engineers in Germany

Claudia Eckert

Director of the Fraunhofer Institute for Secure Information Technology (SIT), Darmstadt

Technical University of Darmstadt,
Chair of Information Security

Outline

1. Women in Leadership Positions
2. The Occupational Situation of Women Engineers in Germany
3. Professional and Career Support Network
4. Career Paths at Fraunhofer Gesellschaft
5. My own way

1. Women in Leadership Positions - Selected Facts

- **Background:**

- 25% of people in leadership positions are recruited from engineering disciplines

- **Professional goals:**

- In their first position, 48% of the men and **only 29% of the women** consider a later leadership role as the natural development

- **Prejudices:**

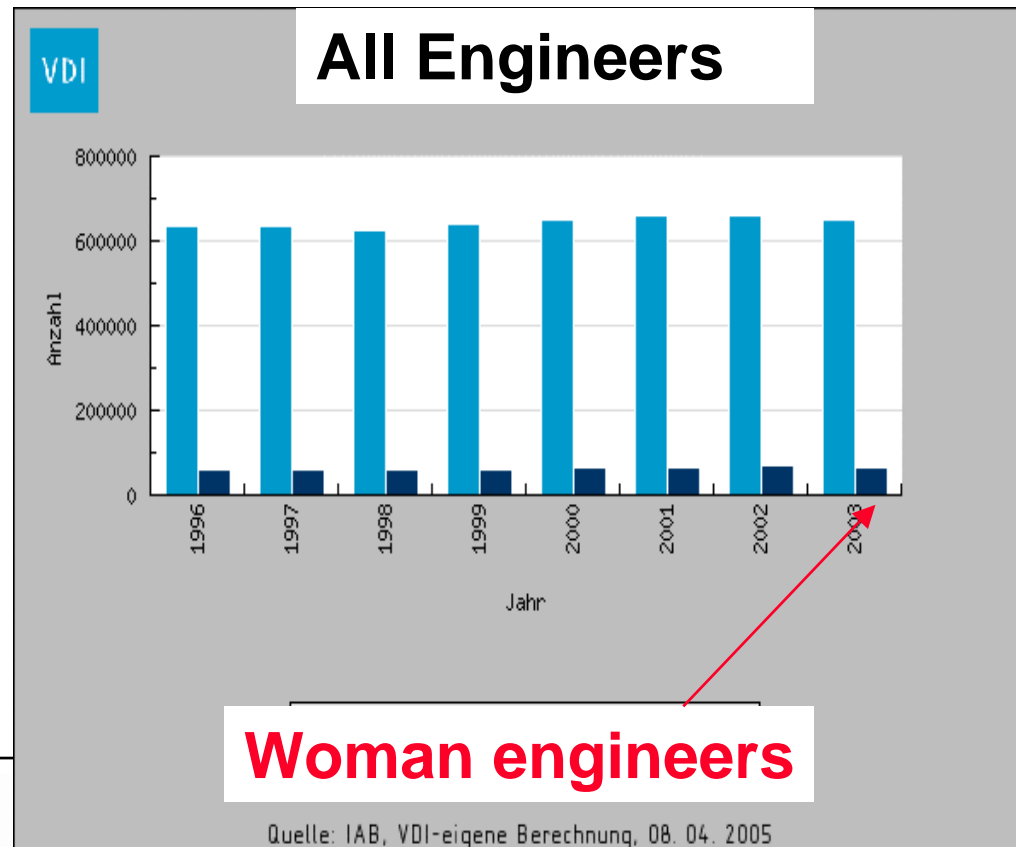
- At career start, 16% of the women denote **prejudices** as a hurdle;
- this increases **to 33%** in the course of their career development

Women in Leadership Positions - Selected Facts

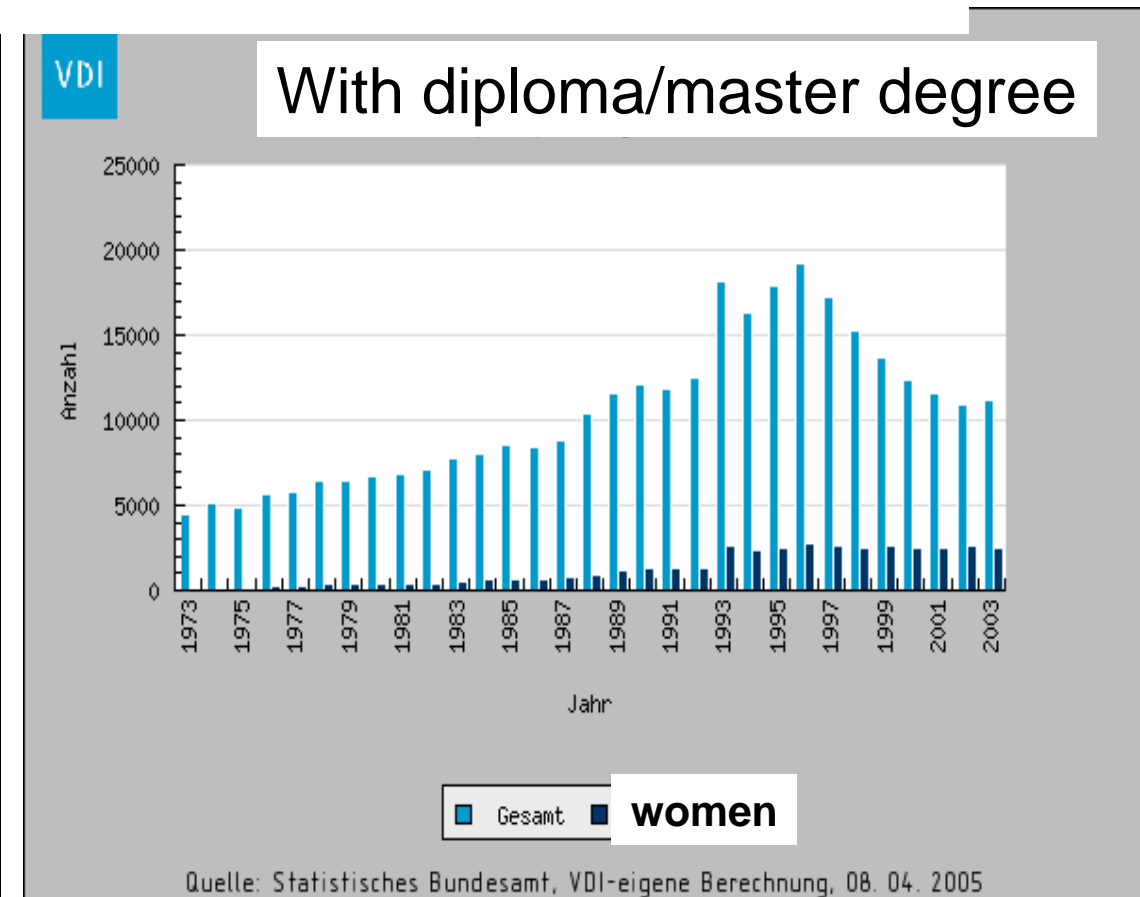
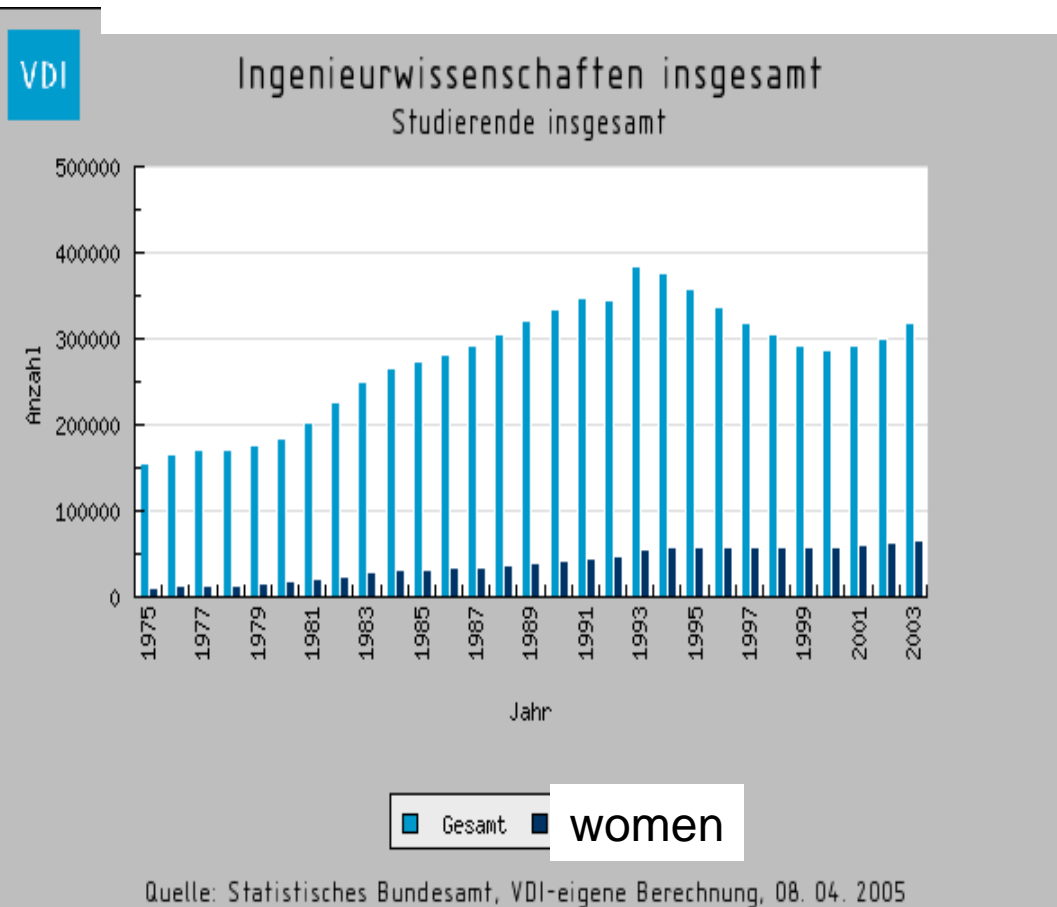
- **Women's representation in leadership positions and in research:**
 - Germany with **11% lies below** the European average of 14%
 - The proportion of female participation in **industrial research is less than 10%**, in government- **sponsored research it reaches 20%**
- **Salary levels:**
 - Salaries of women average **25% less** than those of men in comparable positions
 - The **higher** the educational level is, **the larger is the discrepancy**

2. The Occupational Situation of Women Engineers in Germany

- VDI, VDE, Prognos und VDMA: There is a lack of around 15.000 engineers per year
- But: The employment practices of companies remain constant....,



Female Students and Graduates in Numbers



- Slight increase in 93 but relatively constant
- market need has no significant influence

Survey “Occupational Situation of Engineers”

Survey of ca. 6000 each, men and women engineers with respect to their professional situation:

- Technological studies
- Branch
- Work-place environment/equipment
- Work satisfaction
- Relevant private factors

Goal: Qualitative baseline data accurately reflecting today’s occupational situation

Initial Results

- Prior to university entrance 33,9% of the female and 19,1% of the male engineers have completed a vocational training program (Apprenticeship)
- Of the women graduates, two-thirds of those with university degrees and half of those having technical college degrees are not employed in engineering
- Female engineers are generally found in lower positions, male engineers typically in mid-level positions
- 95,5% of the men and 78,9% of the women engineers work full-time, 75% of the full-time women engineers do not have children
- Men don't alter their employment situation, if their partners are equally well-qualified. Women are more inclined to reduce
- Women with children are not professionally less successful than women without children, although they more often reduce the size of the position

Career Planning for Women Engineers...

... formulated as challenges to be faced:

- Development and expansion of “network thinking” (e. g. via mentoring)
- Perseverance and patience at begin or resumption of employment and throughout career development
- Practical experience
- Assertiveness and diplomacy: in advancement or salary issues and by negotiation of individual terms of work
- Self management: selling soft skills as developed capabilities

Self confidence: Knowledge of personal market value

3. Professional and Career Support Network

The women engineers network comprises:

- Deutscher Akademikerinnenbund
- NUT - Women in Science and Technology Association
- dib – German Association of Women Engineers
- European Women in Management and Development
- VDI-Bereich Frauen im Ingenieurberuf
- „Women Give New Impetus to Technology“ Association

Founded in 2004 with the goals:

- Organizational cooperation at a regional level
- Technological and political coordination at the federal level

VDI: WomanEngineers (www.vdi.de/fib)

Their Goals:

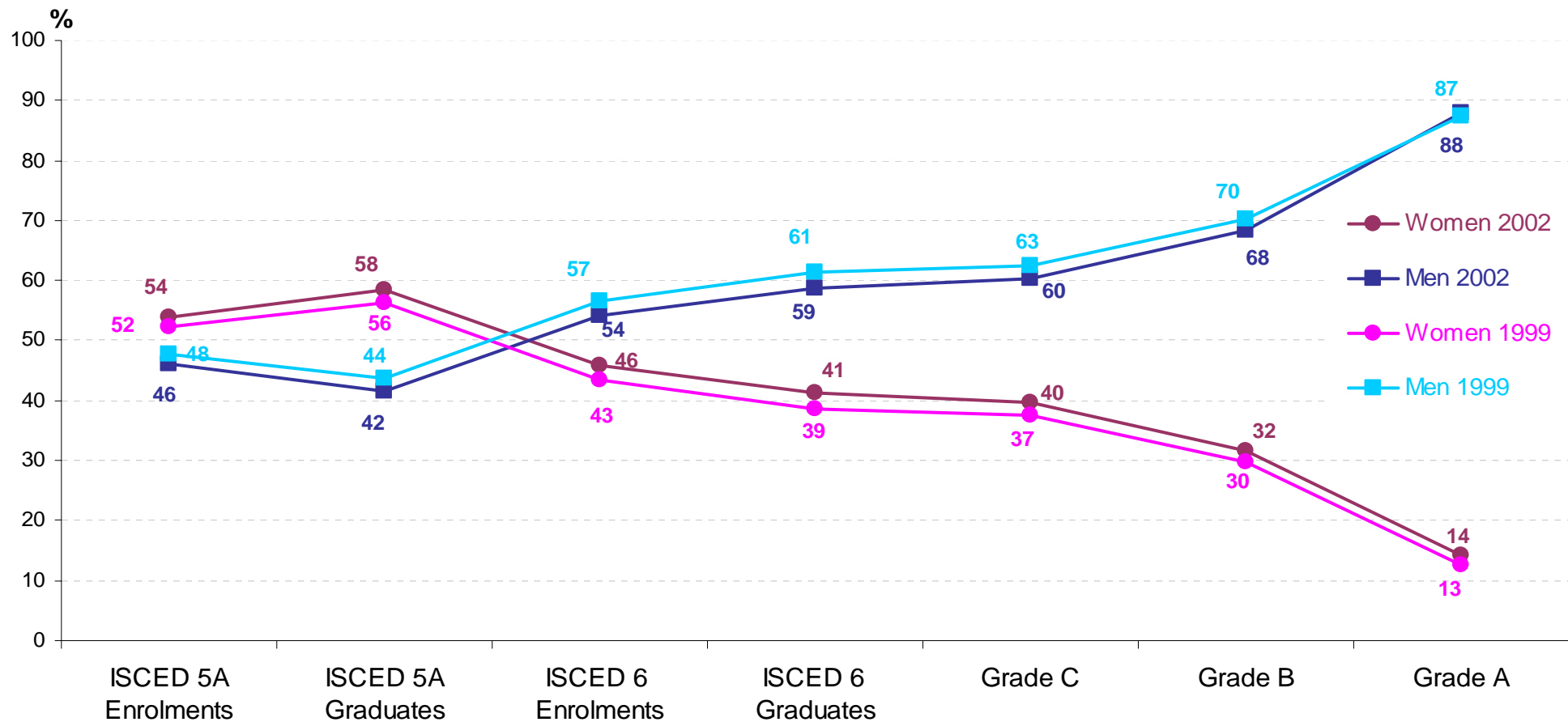
- To represent women engineers in politics and society
- To ease the path for girls to consider careers in technology, especially in engineering
- To responsibly participate in technological development and direction
- To improve the compatibility of professional and private life for both men and women

Activities: e.g.

- Information events and brochures
- Counseling services for female school girls, students and professional engineers
- Every two years - a congress „Women in Engineering Occupations“

Differences in the Realization of Potentials

Male/Female Ratios - from Student to Professor, EU 25



Sum up:

„Wenn wir technische Innovation nicht mehr ausschließlich durch die männliche Brille betrachten, dann werden wir den Weg für zusätzliche Ideen ebnen und zusätzliche Kreativität für Innovationen erschließen.“

If we stop to regard technical innovation exclusively from a masculine point of view, then we open a path for new ideas and can tap a further pool of creative potential for innovation.

Heinrich v. Pierer (Former Head of the Board of Directors, Siemens, 5th February 2004

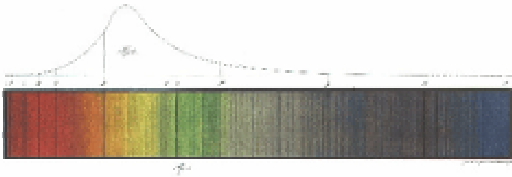
4. Career paths in the Fraunhofer-Gesellschaft



ZV-A2/ Nov 04

Joseph von FraunhoferFraunhofer-Gesellschaft (1787 - 1826)

discovery of
“Fraunhofer Lines”
in the sun spectrum



new methods of
lens processing

Head of
Royal Glass
Factory

ZV-A2/ May 05

Researcher

Inventor

Entrepreneur

e.g.: Innovation Award 2004 of
the German Federal President
for Electric Biochip Technology



e.g.: 2 patent applications each
working day



e.g.: ~ €350 million revenues from
industry (about 4000 contracts) p. a.

Mission

The Fraunhofer-Gesellschaft promotes and undertakes

- **applied research and contract research** in an international context,
- of **direct utility** to private and public enterprise and
- of wide benefit to society as a whole.

By developing **technological innovations** and novel systems solutions for their customers, the Fraunhofer Institutes help to

- reinforce the **competitive strength** of the economy

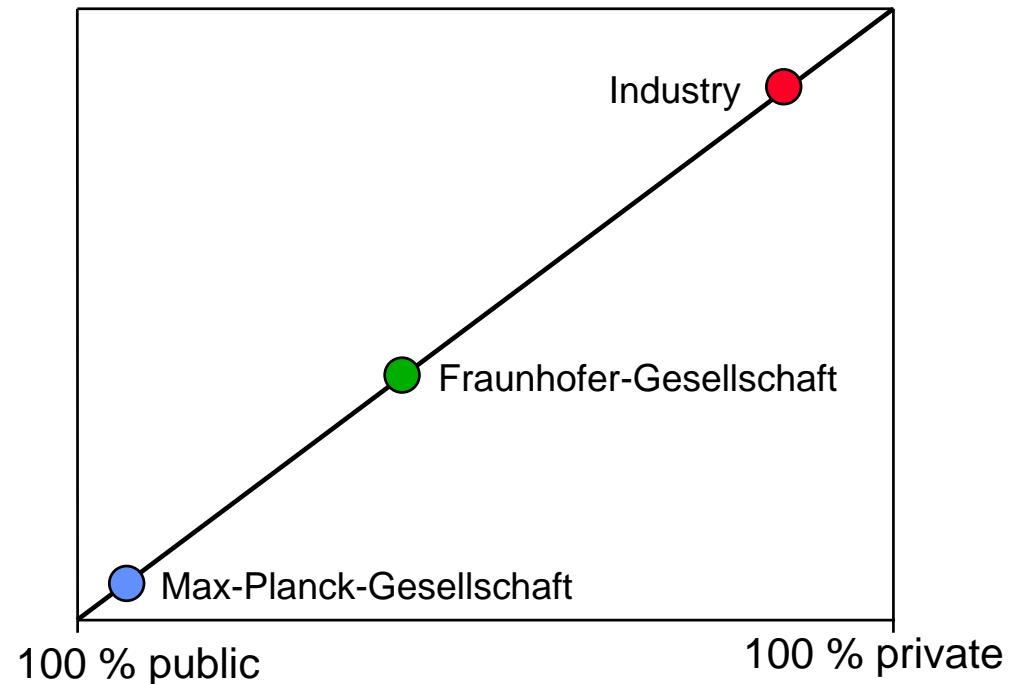
The purpose of Fraunhofer-Gesellschaft is to

- **transform scientific findings into useful innovations.**
- to help to further economic growth, and structural evolution.

Balance between R&D-Value Chain and Financing

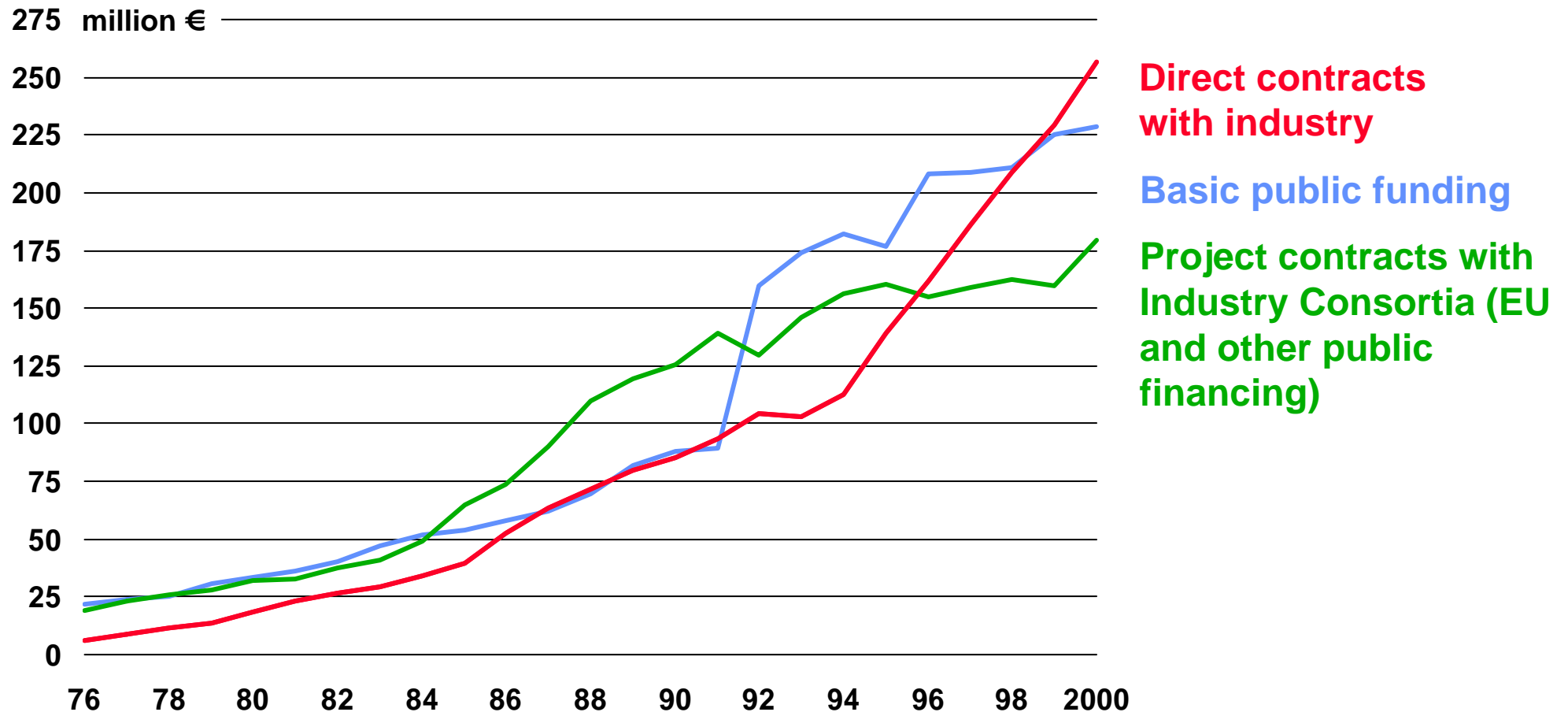
R&D-Value Chain

Prototyping,
Technology Transfer
Development,
Engineering
Applied research
Application-oriented
basic research
Basic
research



Financing

Financing Structures of Fraunhofer (average)



Success Criteria for Fraunhofer Institutes

- **Scientific competence**
well recognized in the worldwide scientific community and in cooperation with universities / other research organizations
- **Market success and entrepreneurial competence**
proven by contracts with industry, EU, other public financing, by creating SpinOffs, and by technology transfer and licensing
- **Well-balanced financing mix**
up to 60% industry, up to 30% public projects (EU,others), up to 40% basic public finding
- **Professional networking**
within and across Fraunhofer competence groups; with competence partners from science, industry and politics

Fraunhofer Profile in 2005

58 Institutes:

- Only **one female**

director: ratio 1: 64

12 600 employees

€1 billion
research budget

7 Alliances

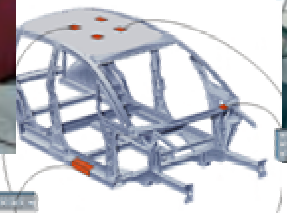
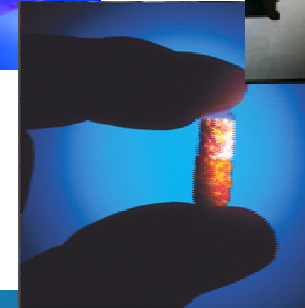
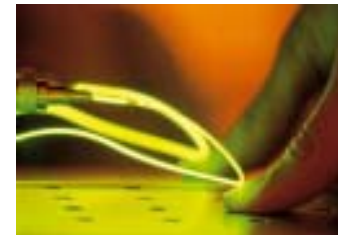
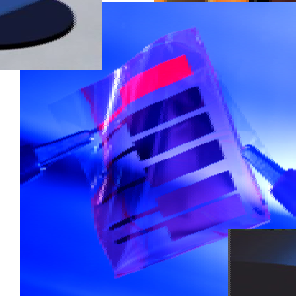
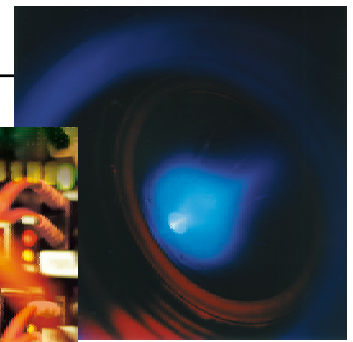
- Information and Communication Technology
- Life Sciences
- Materials and Components
- Microelectronics
- Production
- Surface Technology and Photonics
- Defense



ZV-A2/ Febr 05

12 Fraunhofer-Key areas for innovation

1. Ambient Intelligence - elektronische Assistenz
2. Polytronic – Displays und Chips aus Kunststoff
3. Digital Medizin
4. Accelerating drug development
5. Intuitive man – machine - cooperation
6. Integrative Production – fast track to products
7. Success factor Logistics
8. Adaptive Structures
9. Simulated reality – calculating processes und products
10. Tailored light: universal tool of Photonics
11. Extreme Ultraviolet for Nanostructures
12. Tailored energy supply



ZV-A2/ Dez 03

“HR-Profile 2003“ Award

This prize is awarded by the “Frankfurter Allgemeine Zeitung” and “access” in three categories: In two of those categories, the Fraunhofer-Gesellschaft is placed in the top three.

Great Job

challenging tasks

Technical Area

1. Fraunhofer-Gesellschaft
2. DaimlerChrysler
3. Max-Planck-Gesellschaft

IT area

1. SAP
2. Fraunhofer-Gesellschaft
3. Boston Consulting Group

Great Balance

work-life balance

Technical Area

1. Fraunhofer-Gesellschaft
2. Max-Planck-Gesellschaft
3. BMW Group

IT area

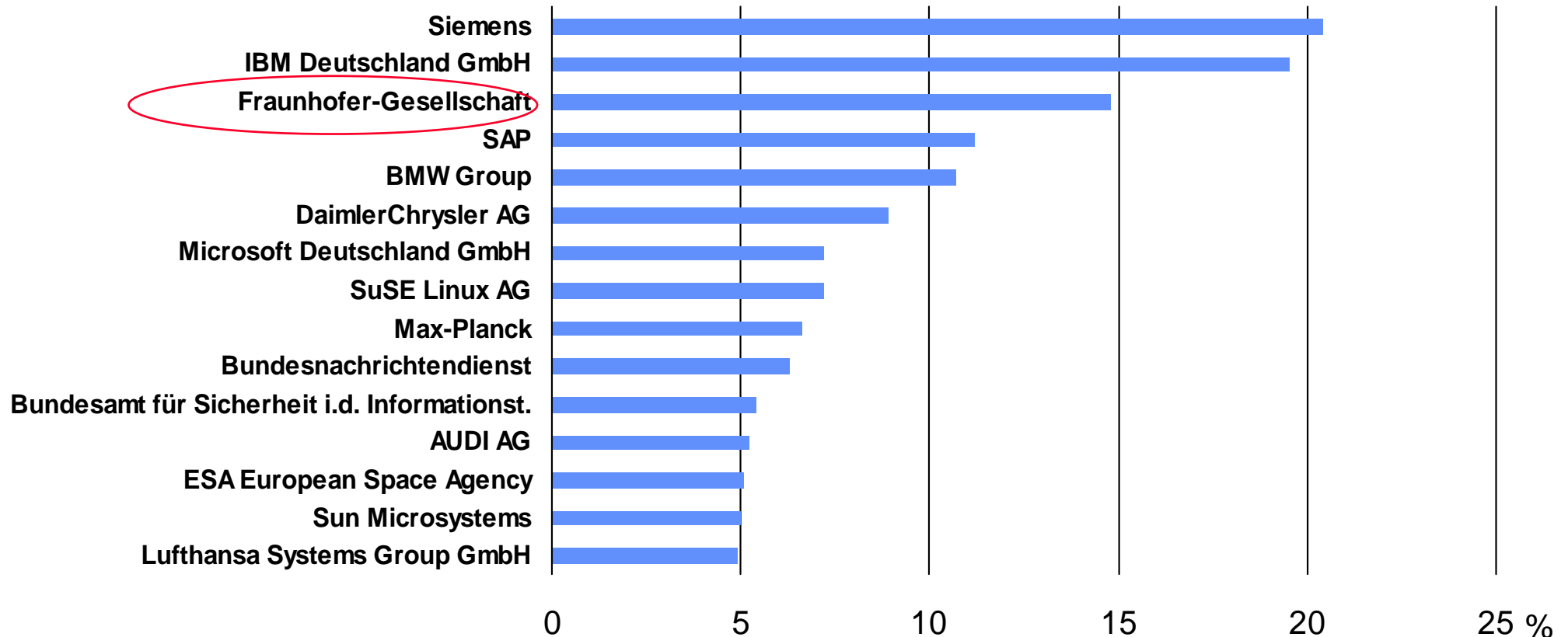
1. SAP
2. SUSE Linux
3. Fraunhofer-Gesellschaft

Source: TNS EMNID, Interviewees: 3.500 professionals with up to 7 years work experience

ZV-A2/ Febr 04

The Top Employers for Computer Scientists

Results of a 2004 Graduate Survey



Source: trendence 5527 interviewees at 89 German universities

ZV-A2/ Nov 04

The Top 10 Employers for German Students of Engineering and Natural Sciences in 2004



| Rank | Company | 1st Rank for |
|------|-------------------------|--------------|
| 1 | BMW | 24,14% |
| 2 | Fraunhofer-Gesellschaft | 20,28% |
| 3 | Siemens | 18,82% |
| 4 | DaimlerChrysler | 17,55% |
| 5 | Audi | 14,84% |
| 6 | Porsche | 14,84% |
| 7 | IBM | 14,66% |
| 8 | Bosch | 12,39% |
| 9 | EADS | 12,19% |
| 10 | Apple | 10,80% |

Source: Universum Communications 2400 interviewees at 35 German universities

ZV-A2/ Sept 04

The Top 10 Employers for Female Engineers in Germany

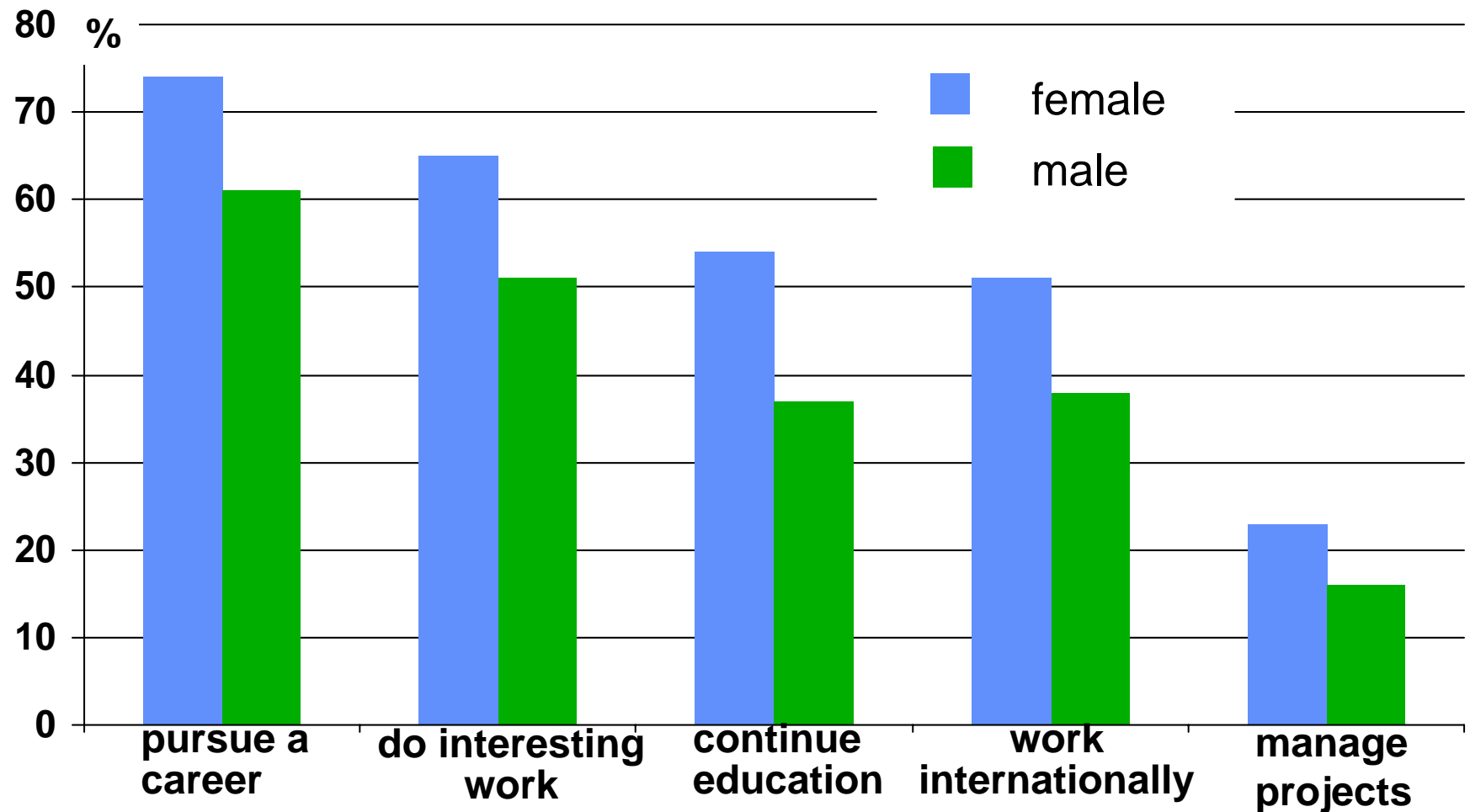


| Rank | Company |
|------|-------------------------|
| 1 | BMW |
| 2 | Siemens |
| 3 | DaimlerChrysler |
| 4 | Fraunhofer-Gesellschaft |
| 5 | Bosch |
| 6 | Audi |
| 7 | Porsche |
| 8 | Lufthansa |
| 9 | EADS |
| 10 | Volkswagen |

Source: trendence 2004

ZV-A2/ Sept 04

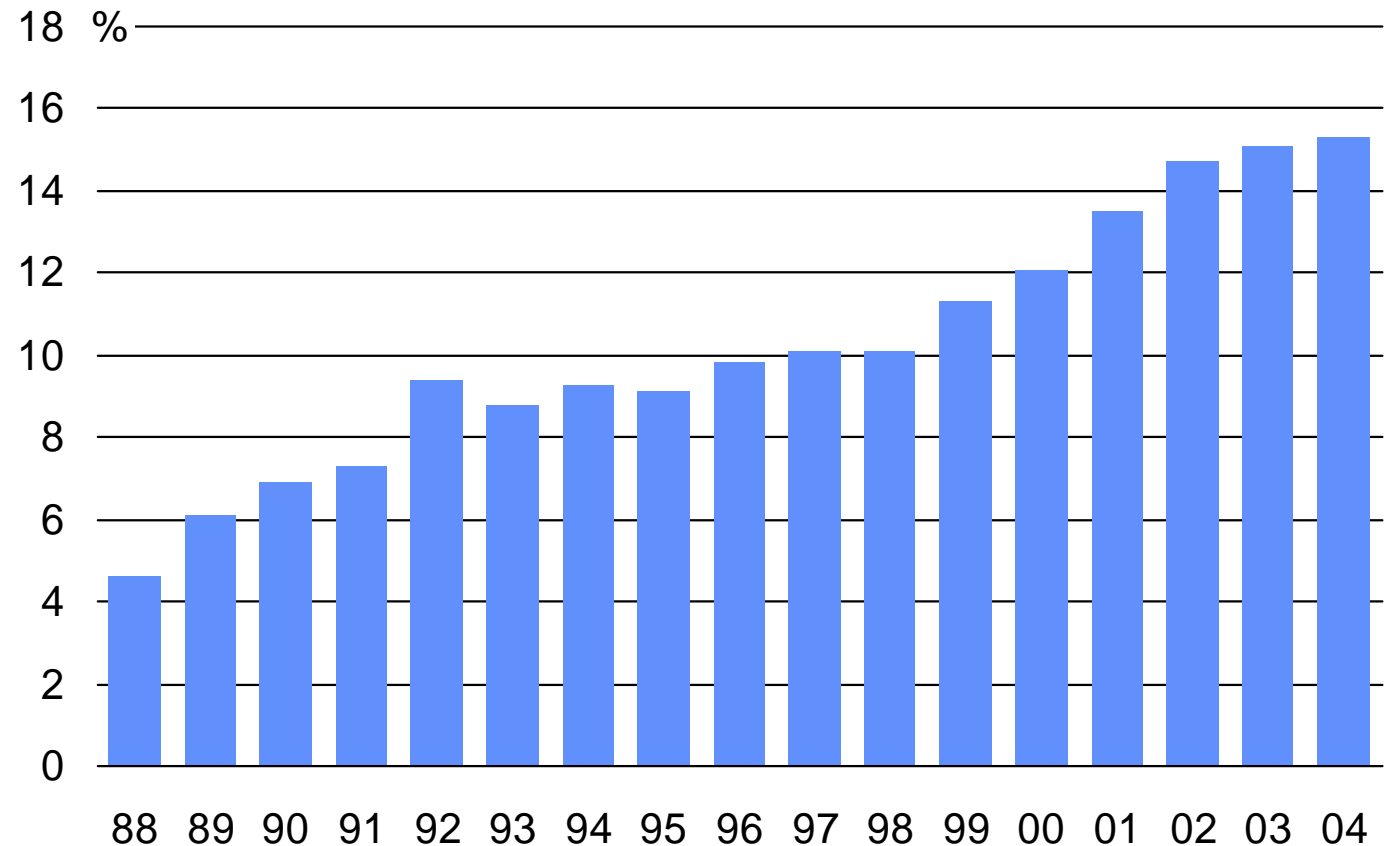
Personal priorities and career goals of the women and men who have chosen Fraunhofer as their preferred employer



Source: The Universum Graduate Survey 2001

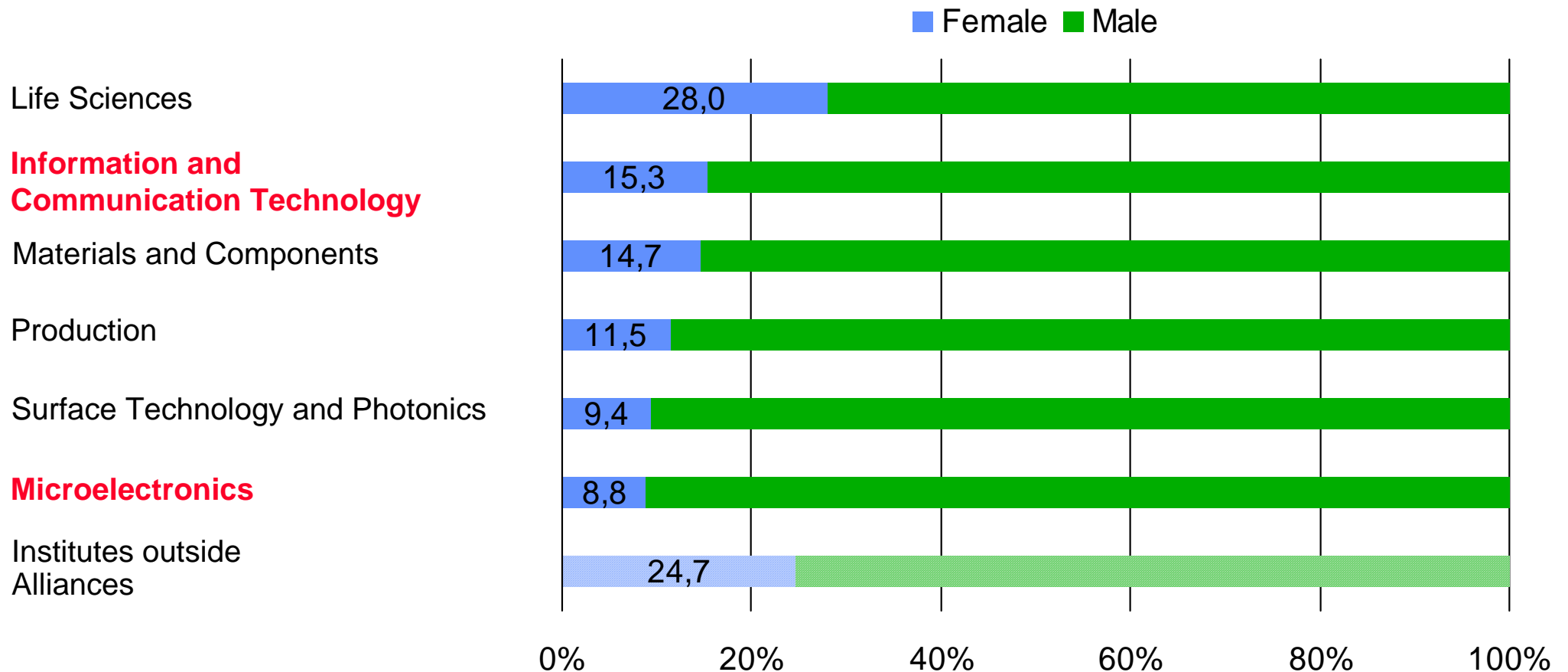
Percentage of Women in the Scientific Staff

In 2004:
Average of 15.3%



ZV-B2 Thieme-Dotzler/ Jan 05

Scientific Staff of the Fraunhofer Alliances in 2004



ZV-B2 Thieme-Dotzler/ Jan 05

What Fraunhofer offers to young women scientists

- **Unique focus on applied research.** Fraunhofer provides the opportunity to put results of scientific research into practice in many fields relevant for businesses and society
- Interdisciplinary **exchange** of scientific knowledge
- A proven stepping stone for **attractive positions** in the private and the public sector
- Cooperation in **international** projects and networks
- Promotion and support of **innovative spin-offs** by Fraunhofer employees
- Formation of **alumni** networks

Fraunhofer offers a broad range of staff development programs

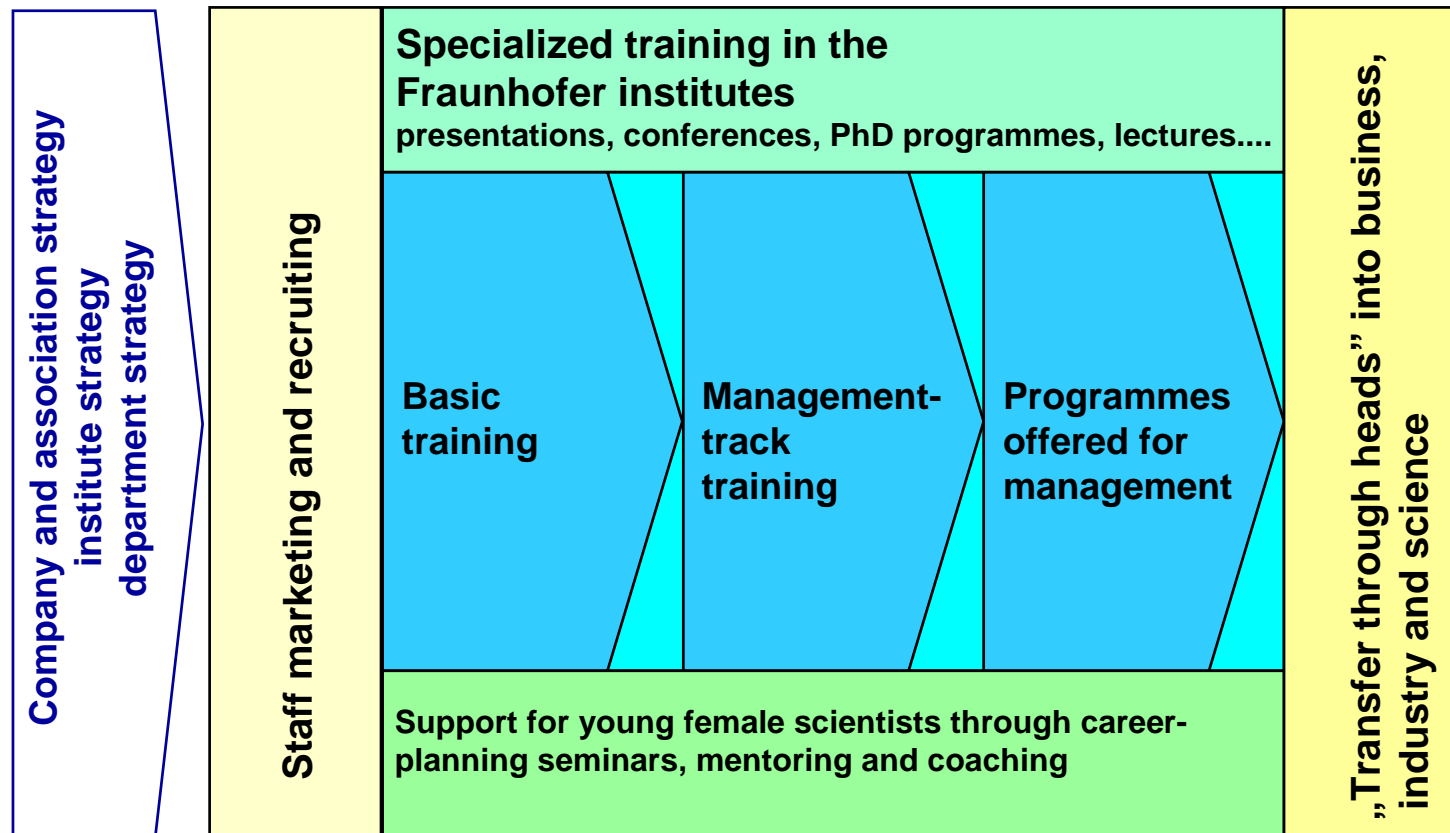
- **Continuing education courses** that meet today's needs
 - Seminars** on
 - staff management, project work,
 - communication und self-development
- **Optimal achievement of qualification** in
 - scientific (subject knowledge and methods)
 - entrepreneurial
 - social and international skills
- **Career planning and management training** to further develop skills
- **Awards** of merit for junior scientists
- A two-year **MBA programme**



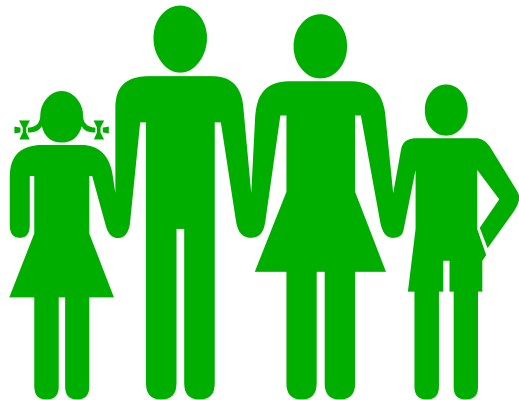
The management training concept

The concept is characterized by

- a **systematic and obligatory qualification process** for employees and managers,
- interconnected qualifying programs and
- The development of a **pool of candidates for top leadership positions**.



Fraunhofer sets high goals for its human resources policy



- A **balanced** mix of men and women in its **research teams**
- A proactive culture of **equality**, namely programmes supporting female PhD candidates, mentoring and cross mentoring, coaching, **a manager responsible for ensuring equal opportunity**
- **Compatibility of family and work** (work-life-balance), namely establishment of child-care facilities, support for **fathers on paternity leave**, support for **dual-career couples**
- Research projects devoted to **women's issues**
- **Gender-mainstreaming** taken seriously

Company strategy for 2003 - 2005

- More women in applied research
- Fraunhofer promotes those with high potential for a **career in industry and science**
- Fraunhofer promotes those with high potential for a **career at Fraunhofer**
- The share of **female managers** is to increase noticeably in the coming years

5. My own Way

Some facts from my CV:

- Born in Germany, grown up in Switzerland and in Germany
- Diploma in Computer Science at the University of Bonn
- Computer scientist at several Universities in Germany
- PhD and Habilitation in Computer Science at the Technical University of Munich
- Professor at TUM, University of Munich, Kiel, Bremen
- Since 2001 Professor at the Technical University of Darmstadt
Director of the Fraunhofer Institute SIT
Director of the Darmstadt Centre of IT Security (University)
- Advisory Board Member in several research and industry boards



Christoph Krauß



Henny Walter



Thomas
Stibor



Taufiq
Rochaeli



Claudia Eckert



Thomas
Buntrock

Patrick
Röder



Horsten
Clausius



Lars Fischer

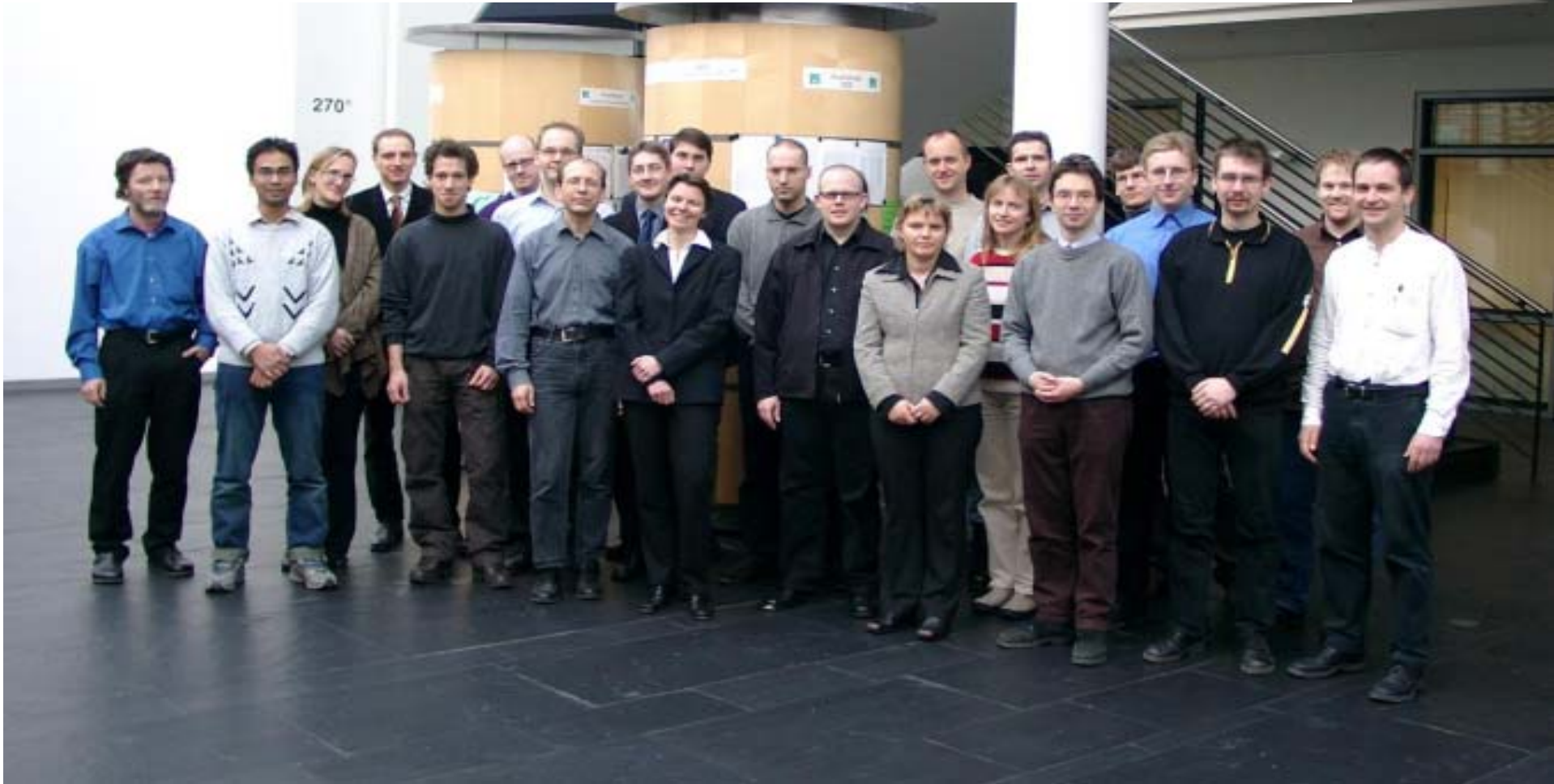


(Jan) Tafreschi

Darmstadt Centre of IT Security

5 Departments: CS, Electr. Eng. , Math, Phys, Law & Economy)

SiCari Researchers: a R&D Projects under my Leadership



Fraunhofer SIT Locations and Figures

- 100 employees (plus Students, PhD students)
- < 7.5 Mio € cost budget



Organisation

Director

Prof. Dr. Claudia Eckert

R&D and

Business Areas

SIT Experts cover all
aspects of IT Security

Secure mobile Systems (SIMS)

Secure Processs and Infrastructures (SPI)

Transaction and Document Security (TAD)

Smart Devices and Embedded Security (SDE)

Security Modelling and Validation (SMV)

Practical System Security (PSS)

Crosscutting Areas

Management and Administration,

Information- and Marketing-Management,

Innovatios- and Knowledge-Management

Thank you for your Attention

Contact

C. Eckert

Fraunhofer Institute for Secure Information Technology SIT

mail: eckert@sit.fraunhofer.de

www: <http://www.sit.fraunhofer.de>