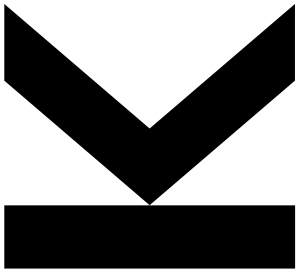
# POSITIONING COMPUTER SCIENCE IN A UNIVERSITY - RESEARCH PERSPECTIVE VERSUS MANAGEMENT PERSPECTIVE



Gabriele Anderst-Kotsis

Johannes Kepler University Linz, Austria

## Computer Science in the Scientific Landscape

- Classification of disciplines
- Research staff
- Research output

## Computer Science at (Austrian) Universities

- Contributions to objectives and key performance indicators
- Organisational structures
- Expectations

## University Management and Computer Science

- Involvement of computer scientists in management positions
- (How) should we manage (computer) scientists?
- Expectations

## Impact of/on Interdisciplinary Work

- Mutual understanding
- Joint Projects
- Academic careers in interdisciplinary fields

# COMPUTER SCIENCE IN THE SCIENTIFIC LANDSCAPE

- Classification of Disciplines

- Science Theory
- European Union
- Worldwide Academic Organisations
- Statistik Austria

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# COMPUTER SCIENCE IN THE SCIENTIFIC LANDSCAPE

- Classification of Disciplines (ÖFOS 2002 versus 2012)

| Code | Element |
|---|---|
| ▼ 1 | NATURWISSENSCHAFTEN |
| ▶ 101 | Mathematik |
| ▶ 102 | Informatik |
| ▶ 103 | Physik, Astronomie |
| ▶ 104 | Chemie |
| ▶ 105 | Geowissenschaften |
| ▶ 106 | Biologie |
| ▶ 107 | Andere Naturwissenschaften |
| ▶ 2 | TECHNISCHE WISSENSCHAFTEN |
| ▶ 3 | HUMANMEDIZIN, GESUNDHEITSWISSENSCHAFTEN |
| ▶ 4 | AGRARWISSENSCHAFTEN, VETERINÄRMEDIZIN |
| ▶ 5 | SOZIALWISSENSCHAFTEN |
| ▶ 6 | GEISTESWISSENSCHAFTEN |

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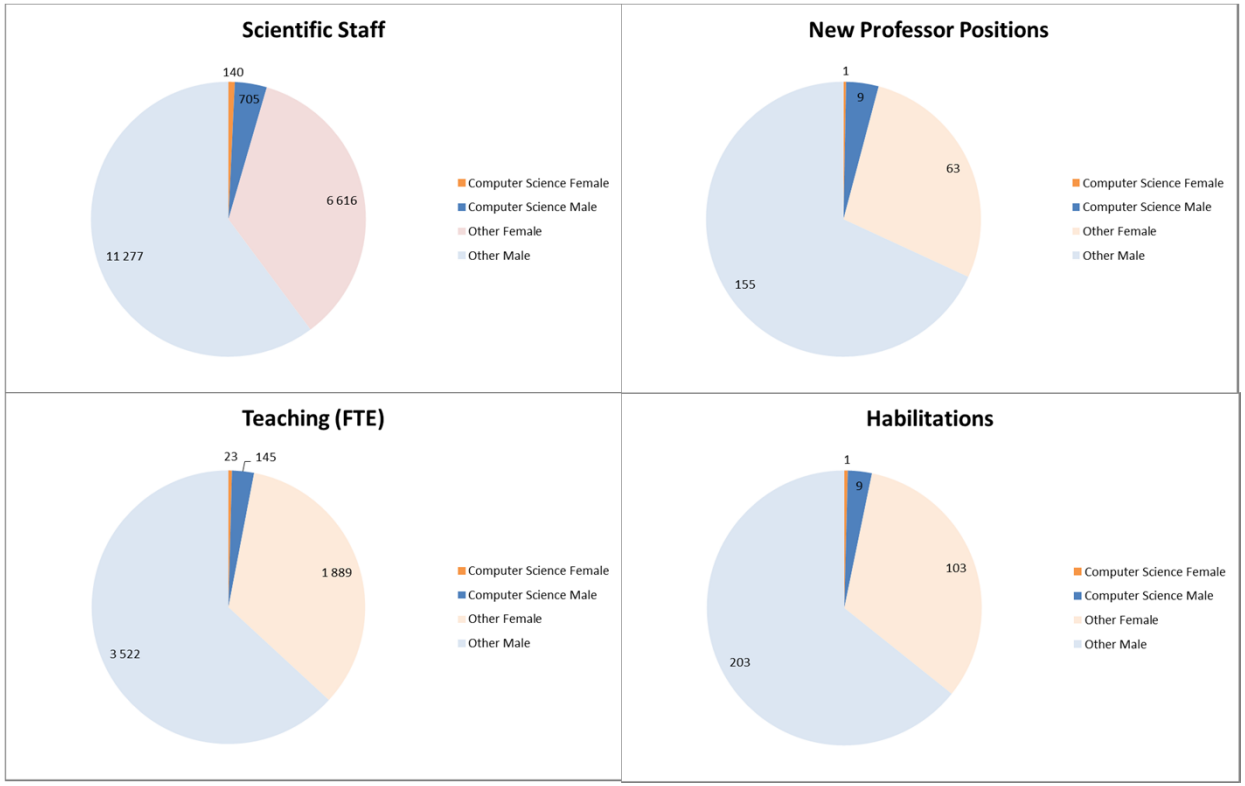
# COMPUTER SCIENCE IN THE SCIENTIFIC LANDSCAPE

- Research Staff: 4.5% in Computer Science Austrian wide




Wissensbilanz der Österreichischen Universitäten 2015

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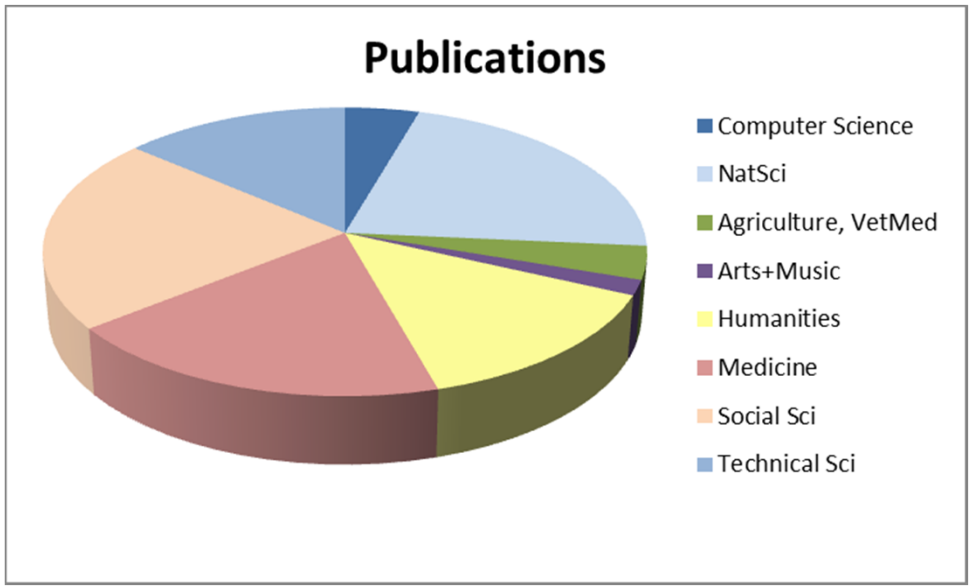
# COMPUTER SCIENCE IN THE SCIENTIFIC LANDSCAPE

- Research Output: 4.5% in Computer Science Austrian wide

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# COMPUTER SCIENCE IN THE SCIENTIFIC LANDSCAPE

- A variety of views on „Informatics“

  - Applied Mathematics
  - Engineering Science
  - Interdisciplinary Research versus new Scientific disciplines
  - Information Technology
  - Office Programs
  - Its the future, but not mine (young girl at career fair)

# COMPUTER SCIENCE AT AUSTRIAN UNIVERSITIES

- Contributions to objectives & KPIs
- Organisational structures
- Expectations






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# COMPUTER SCIENCE AT AUSTRIAN UNIVERSITIES

- Objectives of an University

§ 1. Die Universitäten sind berufen, der wissenschaftlichen **Forschung** und **Lehre**, der Entwicklung und der Erschließung der Künste sowie der Lehre der Kunst zu dienen … verantwortlich zur Lösung der Probleme des **Menschen** sowie zur gedeihlichen Entwicklung der **Gesellschaft** und der natürlichen **Umwelt** beizutragen. … in Forschung und in forschungsgeleiteter akademischer Lehre auf die **Hervorbringung** neuer **wissenschaftlicher Erkenntnisse** sowie auf die Erschließung neuer Zugänge zu den Künsten ausgerichtet … **Streben** nach **Bildung** und Autonomie des Individuums durch Wissenschaft … Förderung des **wissenschaftlichen Nachwuchses** … Bewältigung der **gesellschaftlichen Herausforderungen** … in größtmöglicher **Autonomie** und Selbstverwaltung.

UG 2002

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# COMPUTER SCIENCE AT AUSTRIAN UNIVERSITIES

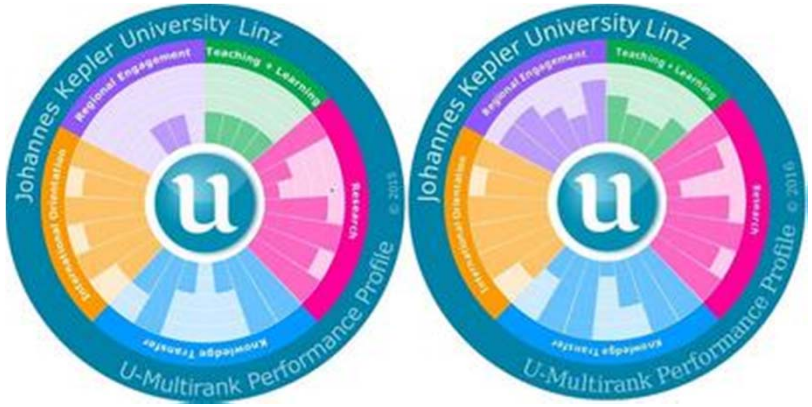
- Performance Indicators

- Try to measure and quantify the achievements (against the objectives?) of an institutions
  - Rankings (U-Multirank)
  - University Reporting Systems (JKU Fodok, Wissensbilanz)
- Can be used to allocate budget to organisational units
  - Within the University
  - In Austria „formelgebundenes Budget“
- Is it possible to quantify the contribution of individual disciplines?
- Is interdisciplinary work reflected or considered?

# COMPUTER SCIENCE AT AUSTRIAN UNIVERSITIES

- Performance Indicators – U-Multirank

- Categories
  - Teaching and Learning
  - Research
  - Knowledge Transfer
  - International Orientation
  - Regional Engagement

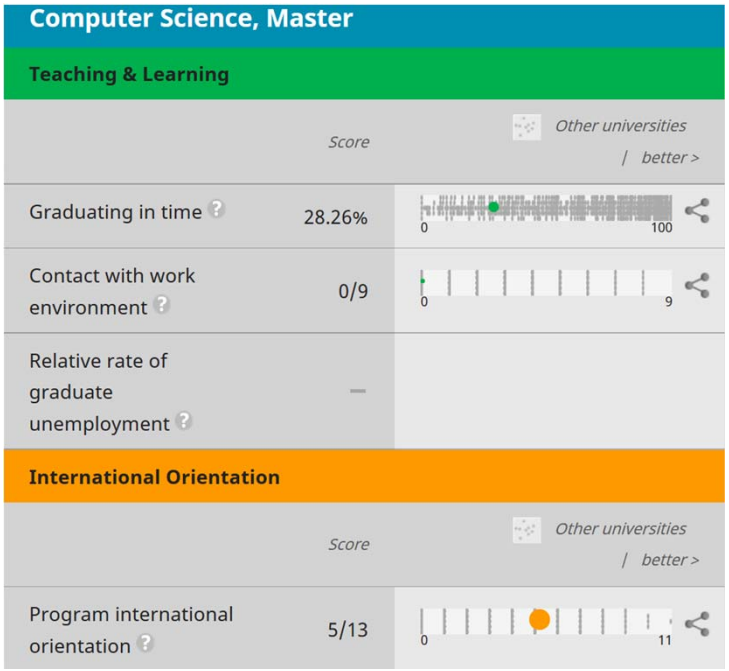



- One indicator are Interdisciplinary publications

# COMPUTER SCIENCE AT AUSTRIAN UNIVERSITIES

- Performance Indicators – U-Multirank

- Allows to drill down for individual subjects




U-Multirank 2016

# COMPUTER SCIENCE AT AUSTRIAN UNIVERSITIES

- Performance Indicators – JKU Fodok

**Aufsatz / Paper in Tagungsband (referiert)**

Performance Comparison of Information Encoding in Droplet-based Microfluidic Systems

> Haselmayr W., Wirth C., Buchberger A., Springer A.: Performance Comparison of Information Encoding in Droplet-based Microfluidic Systems, in: Proceedings of the 3rd ACM International Conference on Nanoscale Computing and Communication, Page(s) 37:1--37:2, 2016.

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**AutorInnen / HerausgeberInnen**: Assist.-Prof. DI Dr. Werner Haselmayr, DI Christian Wirth, Andreas Buchberger, Univ.-Prof. DI Dr. Andreas Springer

**Forschungseinheiten**:

100.0% Institut für Nachrichtentechnik und Hochfrequenzsysteme

**Wissenschaftszweige**: 202030 Nachrichtentechnik | 202037 Signalverarbeitung | 202038 Telekommunikation

www.jku.at/fodok

# COMPUTER SCIENCE AT AUSTRIAN UNIVERSITIES

## ■ Performance Indicators - Wissensbilanz

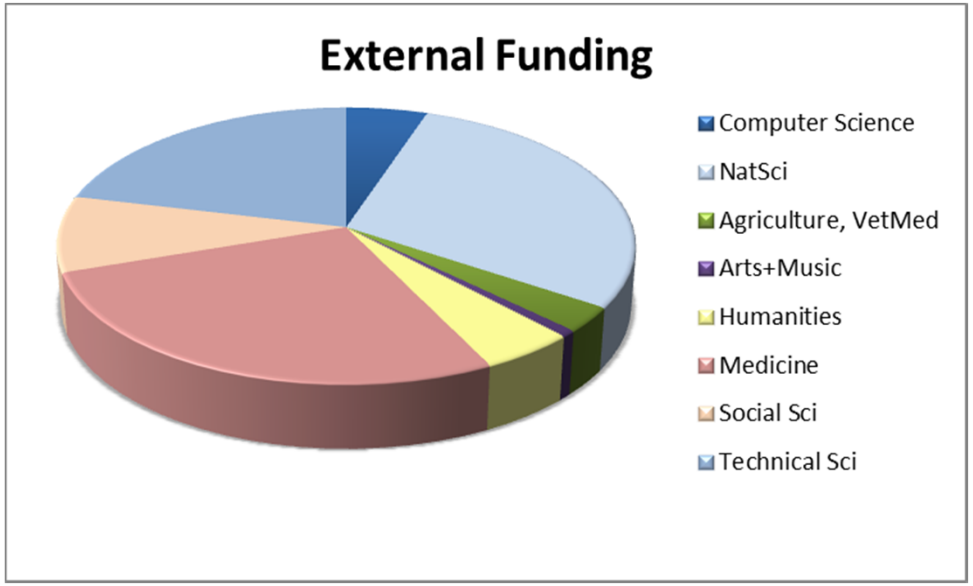
Anzahl der Publikationen

| Wissenschaftszweige (lt. Statistik Austria) | 2015 | 2014 | 2013 |
|---|---|---|---|
| 1 NATURWISSENSCHAFTEN | 742.4 | 742.4 | 778.6 |
| 11 Mathematik, Informatik | 0.0 | 0.0 | 492.6 |
| 12 Physik, Mechanik, Astronomie | 0.0 | 0.0 | 144.7 |
| 13 Chemie | 0.0 | 0.0 | 116.5 |
| 14 Biologie, Botanik, Zoologie | 0.0 | 0.0 | 18.3 |
| 15 Geologie, Mineralogie | 0.0 | 0.0 | 0.0 |
| 16 Meteorologie, Klimatologie | 0.0 | 0.0 | 0.0 |
| 17 Hydrologie, Hydrographie | 0.0 | 0.0 | 0.0 |
| 18 Geographie | 0.0 | 0.0 | 0.0 |
| 19 Sonstige und interdisziplinäre Naturwissenschaften | 0.0 | 0.0 | 6.4 |
| 101 Mathematik | 207.0 | 222.0 | 0.0 |
| 102 Informatik | 318.8 | 266.6 | 0.0 |
| 103 Physik, Astronomie | 114.2 | 144.6 | 0.0 |
| 104 Chemie | 68.0 | 86.8 | 0.0 |
| 105 Geowissenschaften | 2.9 | 2.3 | 0.0 |
| 106 Biologie | 30.7 | 18.2 | 0.0 |
| 107 Andere Naturwissenschaften | 0.8 | 1.9 | 0.0 |

JKU Wissensbilanz 2015

# COMPUTER SCIENCE AT AUSTRIAN UNIVERSITIES

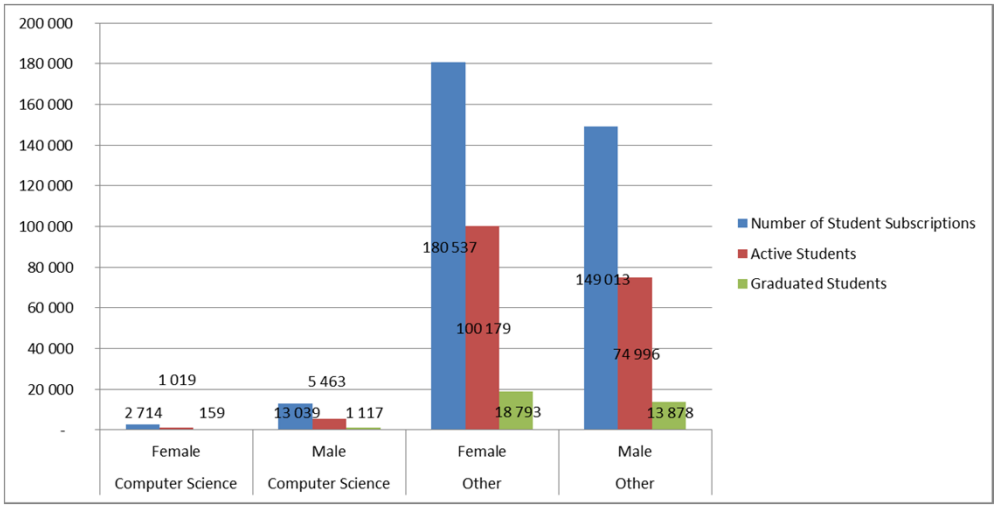
- Performance Indicators




Wissensbilanz der Österreichischen Universitäten 2015

# COMPUTER SCIENCE AT AUSTRIAN UNIVERSITIES

- Performance Indicators:
  - 80 Active Students per Prof (FTE)
  - 4.6% of student subscriptions in CS
  - 3.6% of active students in CS
  - 3.75% of Completed studies

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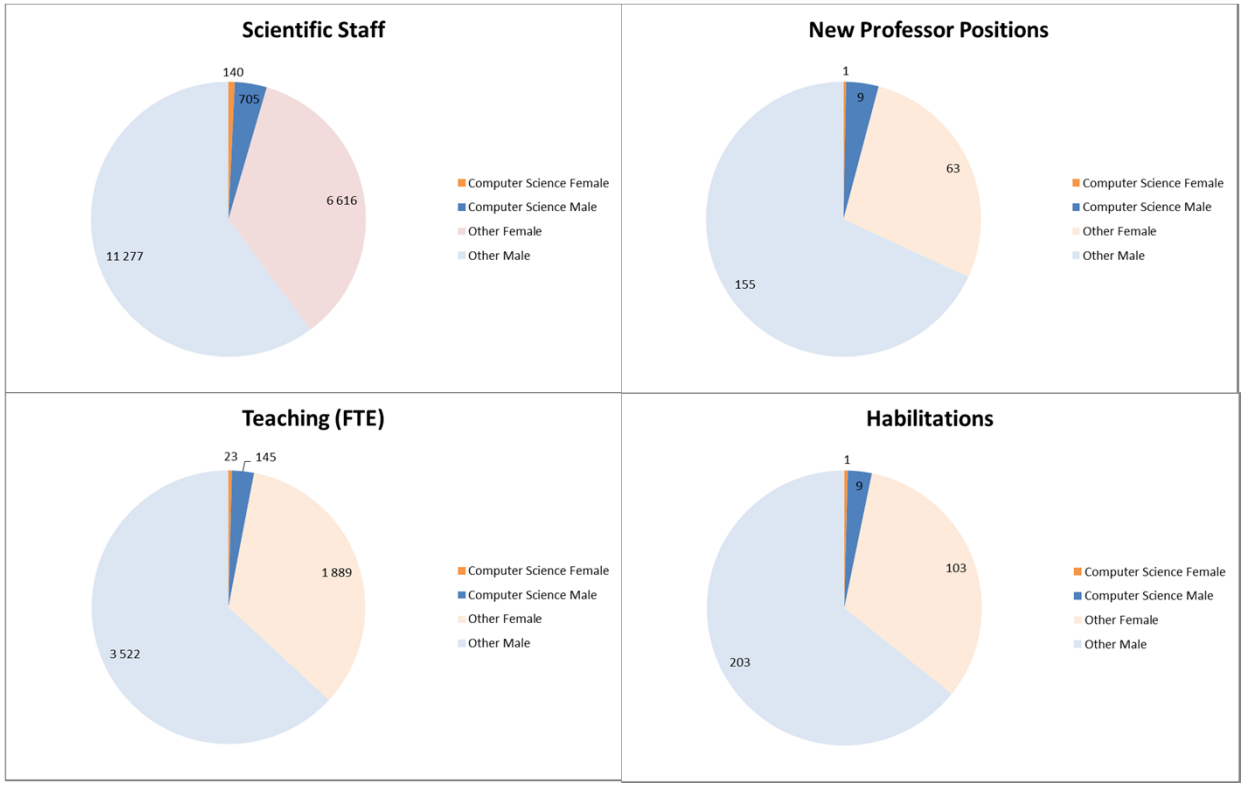
# COMPUTER SCIENCE AT AUSTRIAN UNIVERSITIES

## ■ Performance Indicators

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# COMPUTER SCIENCE AT AUSTRIAN UNIVERSITIES

- Organisational Structures
  - „CS only“ units
    - School of Computer Science, Fakultät für Informatik, Fachbereich Informatik
  - Embedded into larger structures
    - Department(s) of Computer Science (or even more specific identifiers for professor positions) as sub-units of schools or other organisational units
  - Matrix-oriented Structures trying to combine the advantages of both (and bearing the risk of adding the disadvantages of both)

# COMPUTER SCIENCE AT AUSTRIAN UNIVERSITIES

- Example JKU

- JKU | Informatik: The largest field of teaching @ TNF
  - ~ 1800 Students (Bakk, Master, PhD)
  - ~ 370 different courses / year
  - ~ 7000 exams / year
  - largest number of outgoing students of the TNF

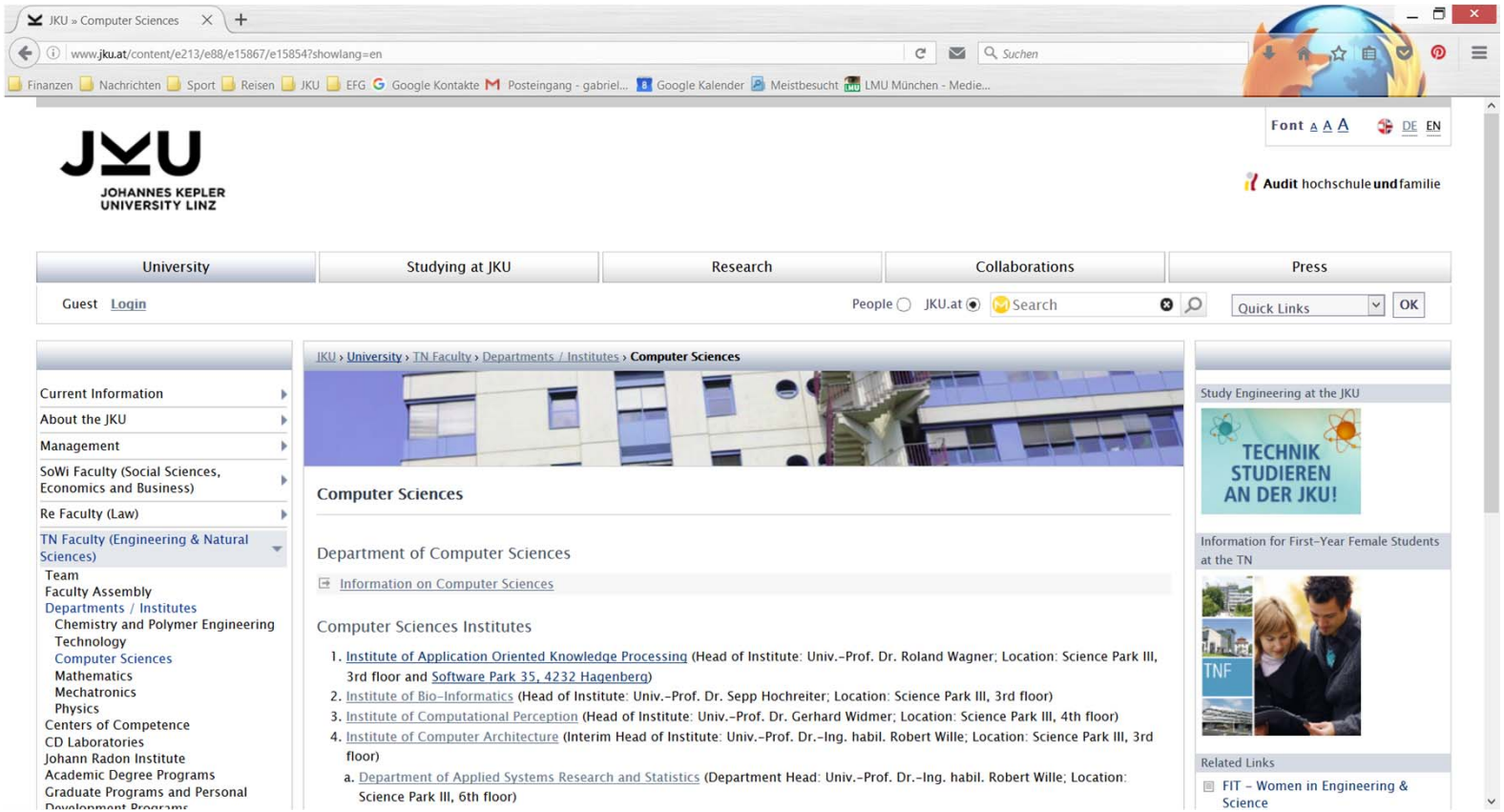
# COMPUTER SCIENCE AT AUSTRIAN UNIVERSITIES

- Example JKU

- JKU | Informatik: Research Funding
  - 5.8 Million EUR external research funding p.a.
  - EU Projects
  - 2 CD Labs
  - 1 NFN
  - FWF projects
  - FFG projects
  - Wittgenstein award
  - ERC Grant

# COMPUTER SCIENCE AT AUSTRIAN UNIVERSITIES

- Example: JKU

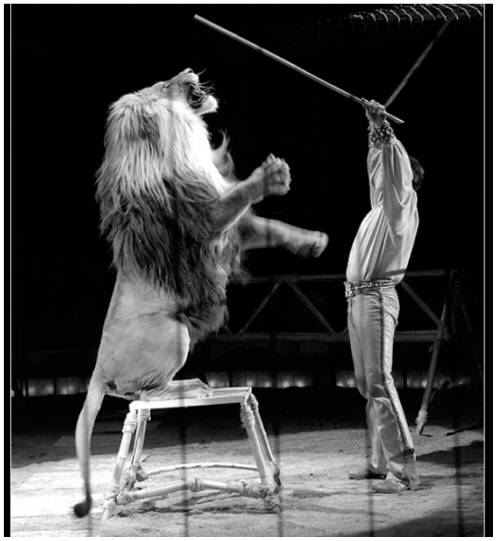


# COMPUTER SCIENCE AT AUSTRIAN UNIVERSITIES

- Expectations

- Comparatively large number of students per professor for technical subject, but lower number of “active” students
- Need for better integration of working students
- Specific scientific culture should be better reflected in KPIs
- Interdisciplinary work should be more visible, e.g. included in KPIs

# UNIVERSITY MANAGEMENT AND COMPUTER SCIENCE



- Involvement of computer scientists in academic management positions
- (How) should we manage (computer) scientists?
- Expectations

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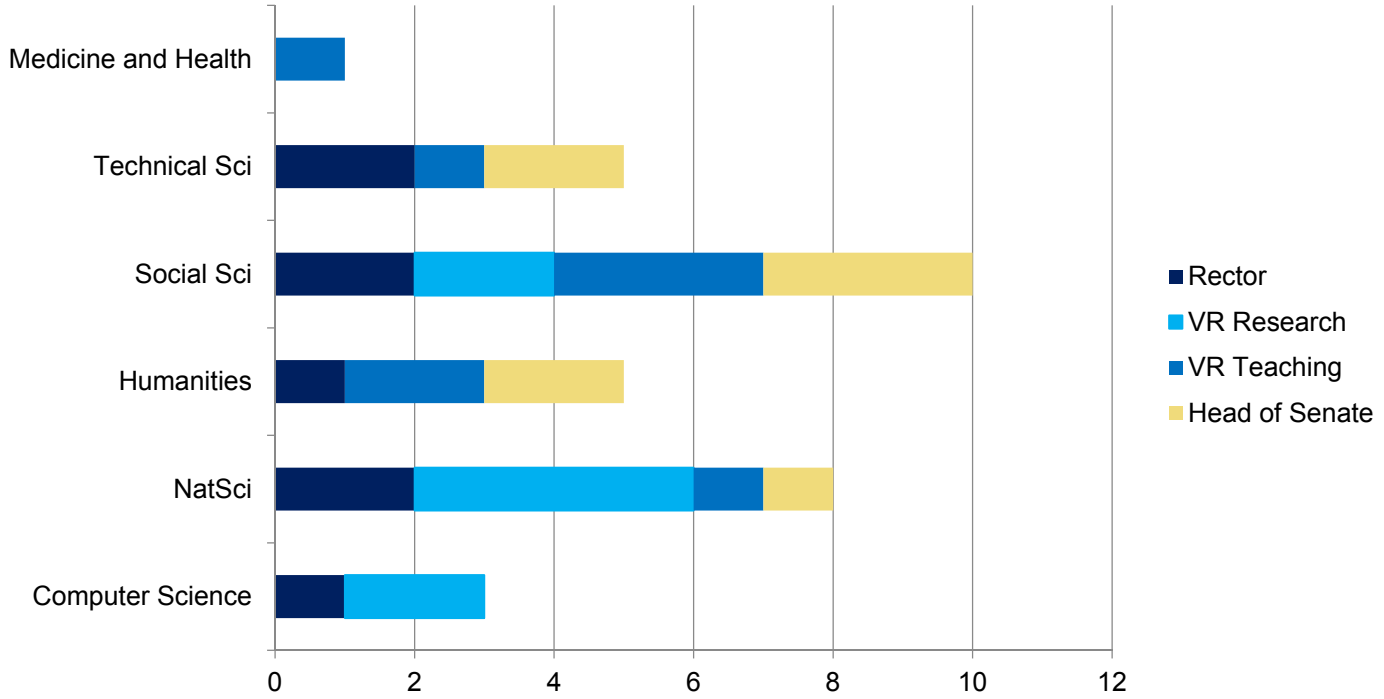
# UNIVERSITY MANAGEMENT AND COMPUTER SCIENCE

- Involvement of computer scientists in management positions




Web sites of 8 Austrian Universities (JKU Linz, TU Graz, TU Vienna, Uni Innsbruck, Uni Klagenfurt, Uni Salzburg, Uni Vienna, WU Vienna)

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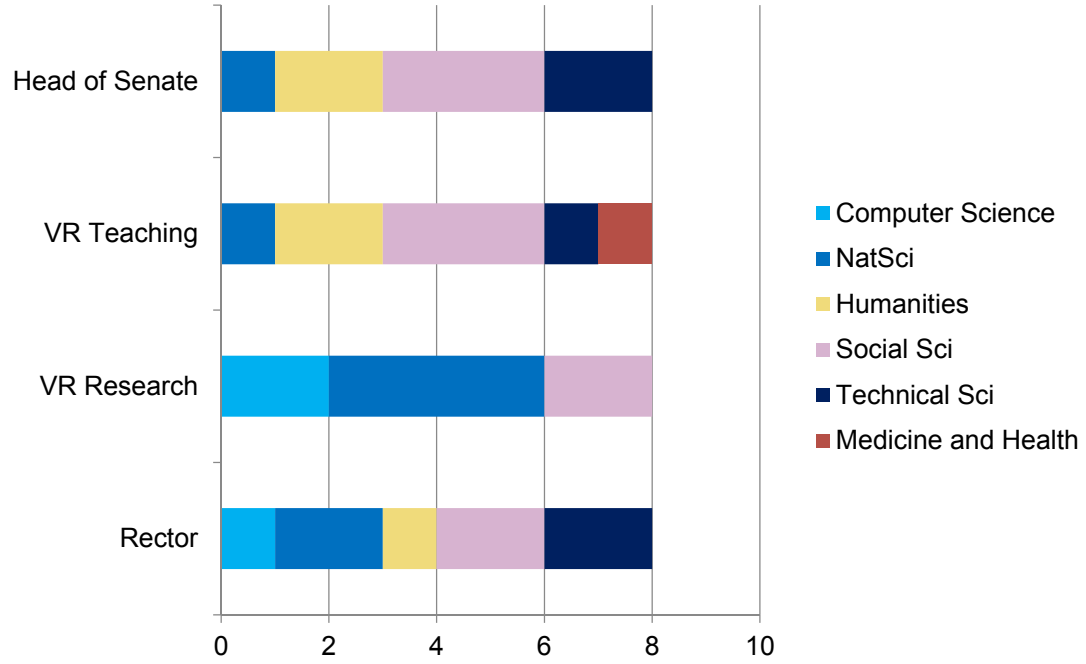
# UNIVERSITY MANAGEMENT AND COMPUTER SCIENCE

- Involvement of computer scientists in management positions

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# UNIVERSITY MANAGEMENT AND COMPUTER SCIENCE

- Expectations

- CS rather seen for its merits in research than in teaching
- CS Departments strong in acquisition of third party funding without requiring large investments in infrastructure
- Other disciplines reluctant to vote for a computer scientist?

# UNIVERSITY MANAGEMENT AND COMPUTER SCIENCE

- (How) should we manage (computer) scientists?

- Computer scientists know what´s technically feasible / useful, we do not accept a “that´s impossible”
- We are addicted to obtaining and processing information
- Keep intrinsic motivation at a high level

# IMPACT OF/ON INTERDISCIPLINARY WORK

- Mutual understanding
- Joint Projects
- Academic careers in interdisciplinary fields

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# IMPACT OF/ON INTERDISCIPLINARY WORK

- Mutual understanding

- Engage in University-wide management functions to learn about the specific characteristics and need of other disciplines
- Dedicate time to listening to talks beyond the own subject
- Create an atmosphere for social interaction across disciplines

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# IMPACT OF/ON INTERDISCIPLINARY WORK

- Joint Projects

- Difficulties in evaluating interdisciplinary work
  - Finding appropriate reviewers
  - Lack of accepted criteria in comparing the merits with other projects / disciplines

# IMPACT OF/ON INTERDISCIPLINARY WORK

- Academic careers in interdisciplinary fields

- Each discipline has specific criteria and requirements, interdisciplinary work must meet them all
  - Possible for joint projects, but difficult in evaluations of individuals
- Many steps in the scientific career depend highly on the embedding into one specific discipline (PhD, Habilitation, …)

# CONCLUSIONS

There seems to be an agreement on the value and importance of interdisciplinary work, but there is a lack of mechanisms, indicators, incentives or rewards to promote it!