

The Leiden Ranking of World Universities

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1. The Leiden Ranking

- Focus: Research performance
- Target: The ~500 largest research universities in the world
- Data: Web of Science (SCIE, SSCI, AHCI)
- No compound ranking statistic but separate indicators

1. The Leiden Ranking

- <http://www.cwts.nl/ranking/>
- European vs. World
- Top 100 and Top 250 largest universities
- 4 Indicators: P, CPP, CPP/FCSm, P*CPP/FCSm
- Derivative of CWTS benchmarking studies

1. Benchmarking Studies

- More indicators: (e.g. highly cited papers)
- Differentiation into disciplines and fields
- Trend analysis
- Detailed comparison with universities of choice
- and more ... (Leiden Benchmarking)

2. Bibliometric indicators

| <i>Indicator</i> | <i>What it measures</i> |
|--|-----------------------------------|
| No. Published Articles (P) | Scale of research activity |
| No. Citations (C) | Impact, influence |
| Mean citation score (CPP) | Efficiency of utility, usefulness |
| Field Normalised Citation Impact (CPP/FCS _m) | Prominence, authoritativeness |

2. Bibliometric indicators - continued

| <i>Indicator</i> | <i>What it measures</i> |
|---|--|
| No. Highly Cited Papers (P _{top}) | Scale of prominence, authoritativeness |
| Brute force indicator (P*CPP/FCS _m) | Scale of prominence, authoritativeness |

2. Bibliometric Indicators - Limitations

- Interdependence
- Size dependency
- Lack of input indicators
- Only journal literature

| | | |
|-----------|--|-------------------|
| AU | Moed, HF; Garfield, E. | in W O S |
| TI | In basic science the percentage of 'authoritative' references decreases as bibliographies become shorter | |
| SO | SCIENTOMETRICS 60 (3): 295-303, 2004 | Y |
| RF | <u>ABT HA, JAM SOC INF SCI T, v 53, p 1106, 2004</u> | Y |
| | GARFIELD, CITATION INDEXING, 1979 (BOOK!) | N |
| | GARFIELD, SAYS INFORMATION S, v 8, p 403, 1985 | N |
| | <u>GILBERT GN, SOC STUDIES SCI, v 7, p 113, 1977</u> | Y |
| | <u>MERTON, SOC SCI, v 13, p 563, 1936</u> | Y |
| | <u>RIPSTEAD, SOC SCI, v 13, p 63, 1998</u> | Y |
| | <u>ZUCKERMAN, SOC SCI, v 12, p 329, 1987</u> | Y |

Not in WoS

WoS Coverage
= 5/7 = 71%

Table 1: Internal coverage of the citation index by main field for the University of Heidelberg

| <i>Main Field</i> | <i>P</i> <i>00-04</i> | <i>Avg Nr</i> <i>Refs</i> | <i>Refs</i> <i><1980</i> | <i>%Refs</i> <i><1980</i> | <i>Refs</i> <i>Non-CI</i> | <i>Refs</i> <i>CI</i> | <i>%Refs</i> <i>CI</i> |
|--|--------------------------|------------------------------|--------------------------------|---------------------------------|------------------------------|--------------------------|---------------------------|
| CLINICAL MEDICINE | 4,477 | 33.2 | 8,240 | 6% | 14,066 | 126,277 | 90% |
| BIOL SCI: HUMANS | 2,260 | 40.1 | 4,107 | 10% | 6,257 | 24,756 | 93% |
| BIOL SCI: ANIMALS & PLANTS | 1,305 | 33.2 | 2,348 | 7% | 3,305 | 13,305 | 79% |
| MOLECULAR BIOLOGY & BIOCHEMISTRY | 1,258 | 45.7 | 2,584 | 4% | 3,313 | 51,533 | 94% |
| PHYSICS AND ASTRONOMY | 1,389 | 38.4 | 5,721 | 11% | 8,805 | 38,820 | 82% |
| CHEMISTRY | 816 | 37.4 | 4,028 | 13% | 5,081 | 21,374 | 81% |
| MATHEMATICS | 315 | 20.4 | 1,444 | 22% | 2,253 | 2,736 | 55% |
| GEOSCIENCES | 404 | 46.2 | 2,348 | 13% | 4,875 | 11,459 | 70% |
| APPLIED PHYSICS AND CHEMISTRY | 483 | 26.6 | 1,117 | 9% | 2,910 | 8,817 | 75% |
| ENGINEERING | 373 | 23.2 | 823 | 10% | 3,376 | 4,439 | 57% |
| MULTIDISCIPLINARY | 120 | 34.3 | 294 | 7% | 312 | 3,508 | 92% |
| ECONOMICS | 57 | 30.5 | 204 | 12% | 695 | 842 | 55% |
| PSYCHOLOGY, PSYCHIATRY & BEHAVIORAL SCIENCES | 228 | 39.8 | 939 | 10% | 2,140 | 5,985 | 74% |
| SOCIAL SCIENCES RELATED TO MEDICINE | 283 | 35.9 | 774 | 8% | 3,125 | 6,273 | 67% |
| OTHER SOCIAL SCIENCES | 69 | 32.7 | 324 | 14% | 1,297 | 633 | 33% |
| HUMANITIES & ARTS | 39 | 42.6 | 535 | 32% | 937 | 190 | 17% |

Problem of field-specific representation

3. Data collection: Aarhus University

| | | |
|------|-----------|------------------------|
| 8452 | AARHUS | AARHUS UNIV |
| 4886 | AARHUS | AARHUS UNIV HOSP |
| 4496 | AARHUS | UNIV AARHUS |
| 1421 | TJELE | DANISH INST AGR SCI |
| 896 | AALBORG | AALBORG HOSP |
| 765 | ROSKILDE | NATL ENVIRONM RES INST |
| 431 | SILKEBORG | NATL ENVIRONM RES INST |
| 316 | AARHUS | AARHUS KOMMUNE HOSP |
| 273 | AARHUS | AARHUS SCH BUSINESS |
| 257 | AALBORG | AARHUS UNIV HOSP |
| 242 | RISSKOV | UNIV AARHUS |
| 238 | SLAGELSE | DANISH INST AGR SCI |
| 227 | AARSLEV | DANISH INST AGR SCI |
| 214 | TJELE | RES CTR FOULUM |
| 198 | RONDE | NATL ENVIRONM RES INST |
| 159 | AARHUS | SKEJBY UNIV HOSP |
| 155 | AALBORG | AALBORG UNIV HOSP |
| 130 | RISSKOV | AARHUS UNIV HOSP |
| 113 | AARHUS | SKEJBY HOSP |

- 656 different name variations
- 351 (53%) of these name variations just appear once
- Name variations occurring more than 5 times capture at least 97% of all papers
- Searching for “AARHUS UNIV” or “UNIV AARHUS” captures at least 71% of all papers

3. Data collection

- Standardisation of addresses in Web of Science (e.g. Free Univ Brussels, Univ Guadalajara in Spain)
- Organisational changes (mergers, split-offs)
- Affiliated Hospitals

3. University Hospitals

- Differences across and even within national systems
- Tight integration with Medical Faculty (e.g. Netherlands, Belgium) to collaboration between autonomous organisations (UK, US)
- Medical researchers may not state their affiliation but their contact details (i.e. Hospital address) instead

3. The case of HMS: MGH & BWH

<http://www.mgh.harvard.edu/harvard.aspx>

“Massachusetts General Hospital is the original and largest teaching hospital of Harvard Medical School, where nearly all of our physicians are faculty members.”

| | Mass Gen Hosp | Brigham Womens H |
|-----------|---------------|------------------|
| Total | 17,618(100%) | 15,347 (100%) |
| With HMS | 9,771 (55%) | 9,973 (65%) |
| Only Hosp | 7,847 (45%) | 5,374(35%) |

3. Author analysis

Papers authored by researchers who show strong collaboration links with the university are included if the paper mentions only an address of an affiliated hospital.

| | Mass Gen Hosp | Brigham WH |
|-----------------|---------------|--------------|
| Only Hosp | 7,847(100%) | 5,374 (100%) |
| Author analysis | 2,682 (34%) | 2,716 (51%) |
| Not included | 5,165 (66%) | 2,658 (35%) |

Total papers assigned to Harvard before author analysis (1997 – 2008): 104,996

3. The problem of affiliated hospitals

- is alleviated by the author analysis procedure but is probably not solved completely
- to a large extent confined to Clinical Medicine
- Harvard is among the universities for which the problem appears most prominent

4. Sensitivity of indicators

- Work in progress -

4. Extension of Citation Indexes

Citation indexes (Scopus and Web of Science) adopt a more inclusive coverage policy in which citation impact is less important as a criterion for selection.

To what extent does this effect the interpretation of bibliometric indicators and rankings derived from these databases?

Table 2: Language of publications in Citation Index for the University of Heidelberg

| <i>Main Field</i> | <i>All papers 00-04</i> | <i>English Language papers</i> | <i>Other Language papers</i> | <i>% Other Language Papers</i> |
|-------------------------------------|-------------------------|--------------------------------|------------------------------|--------------------------------|
| CLINICAL MEDICINE | 5,577 | 4,477 | 1,100 | 20% |
| BIOL SCI: HUMANS | 2,381 | 360 | 21 | 1% |
| BIOL SCI: ANIMALS & PLANTS | 282 | 273 | 9 | 3% |
| MOLECULAR BIOLOGY & BIOCHEM | 1,258 | 1,258 | 0 | 0% |
| PHYSICS AND CHEMISTRY | 841 | 810 | 25 | 3% |
| MATHEMATICS | 315 | 315 | 0 | 0% |
| GEOSCIENCES | 410 | 404 | 6 | 1% |
| APPLIED PHYSICS AND CHEMISTRY | 504 | 483 | 21 | 4% |
| ENGINEERING | 378 | 373 | 5 | 1% |
| MULTIDISCIPLINARY | 120 | 120 | 0 | 0% |
| ECONOMICS | 60 | 57 | 3 | 5% |
| PSYCHOLOGY, PSYCHIATRY & BEHAV SC | 425 | 228 | 197 | 46% |
| SOCIAL SCIENCES RELATED TO MEDICINE | 335 | 283 | 52 | 16% |
| OTHER SOCIAL SCIENCES | 116 | 69 | 47 | 41% |
| HUMANITIES & ARTS | 107 | 39 | 68 | 64% |

Problem of language

4. Collaborative work

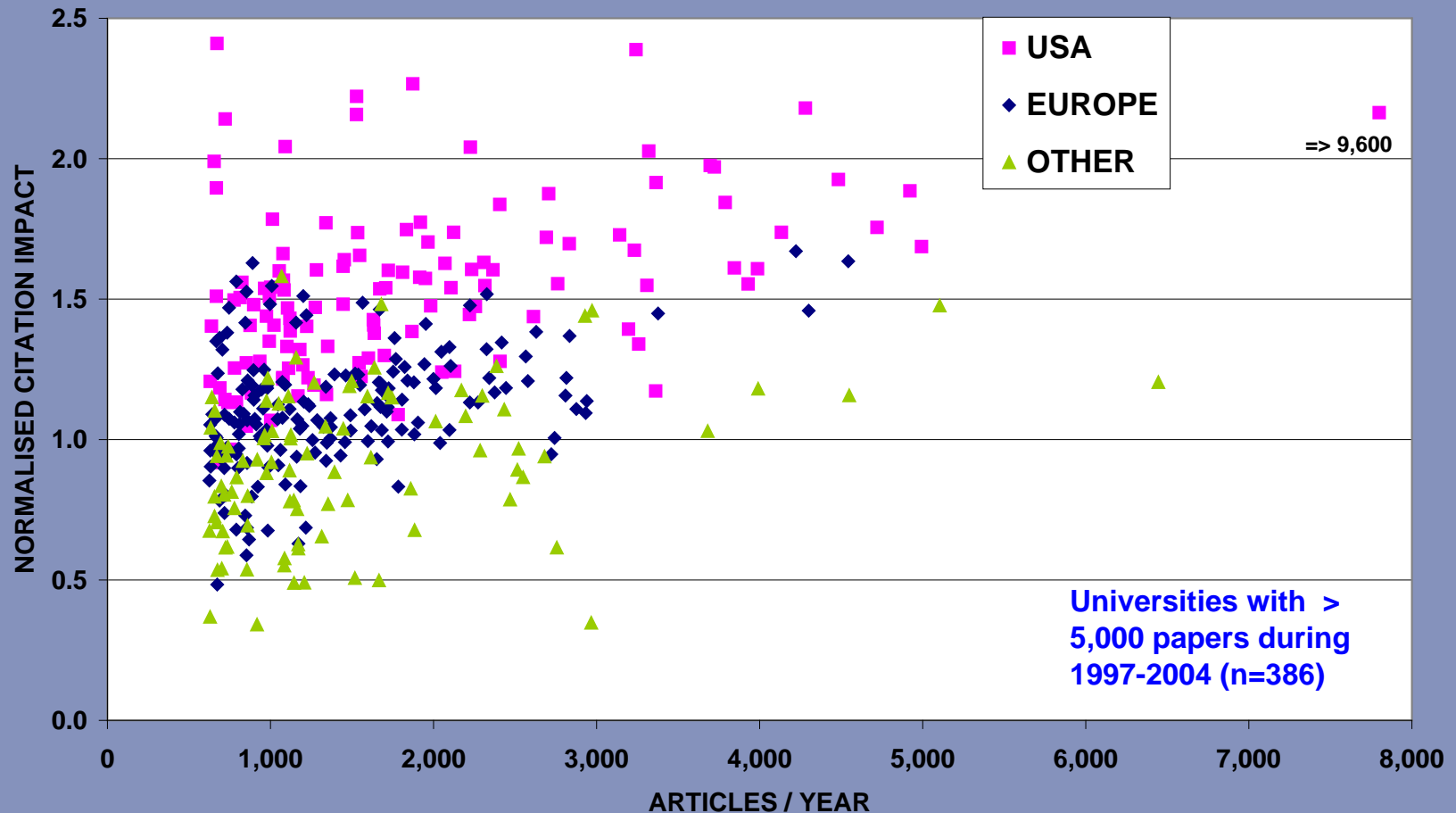
- Fractional counting: the number of university addresses divided by the total number of addresses
- First address counting: assumption that the first address indicates the leading research group
- Integer counting: the papers to which a university has contributed

5. A First Analysis of the Outcomes

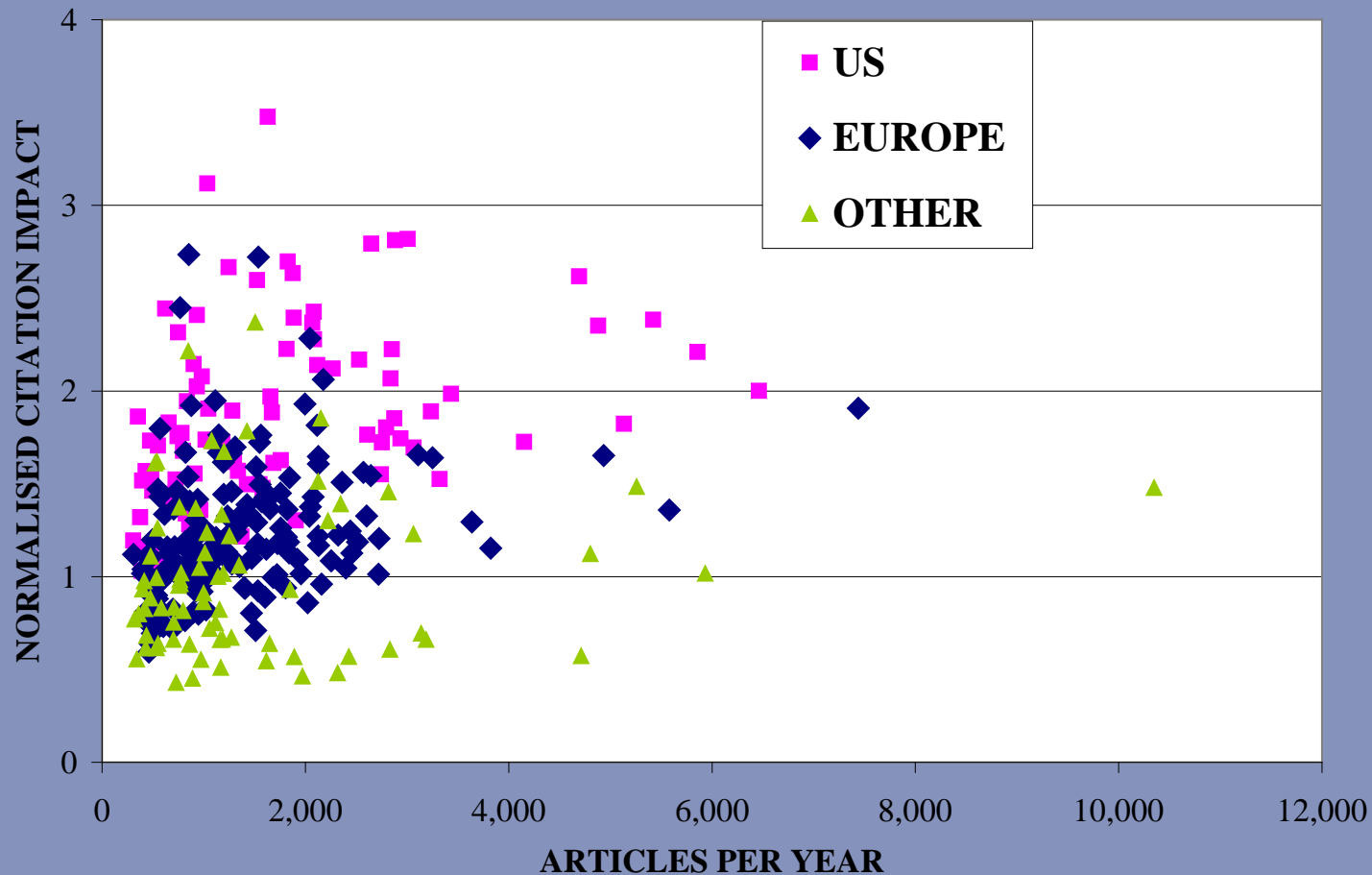
5. U.S. universities dominate global rankings

- Does the US constitute the most successful model for the organisation of higher education? (The Economist 2005)
- Are European universities mediocre? (Lambert & Butler 2006)
- Or does the ranking methodology favour U.S. universities?

5. US universities are large and have high impact



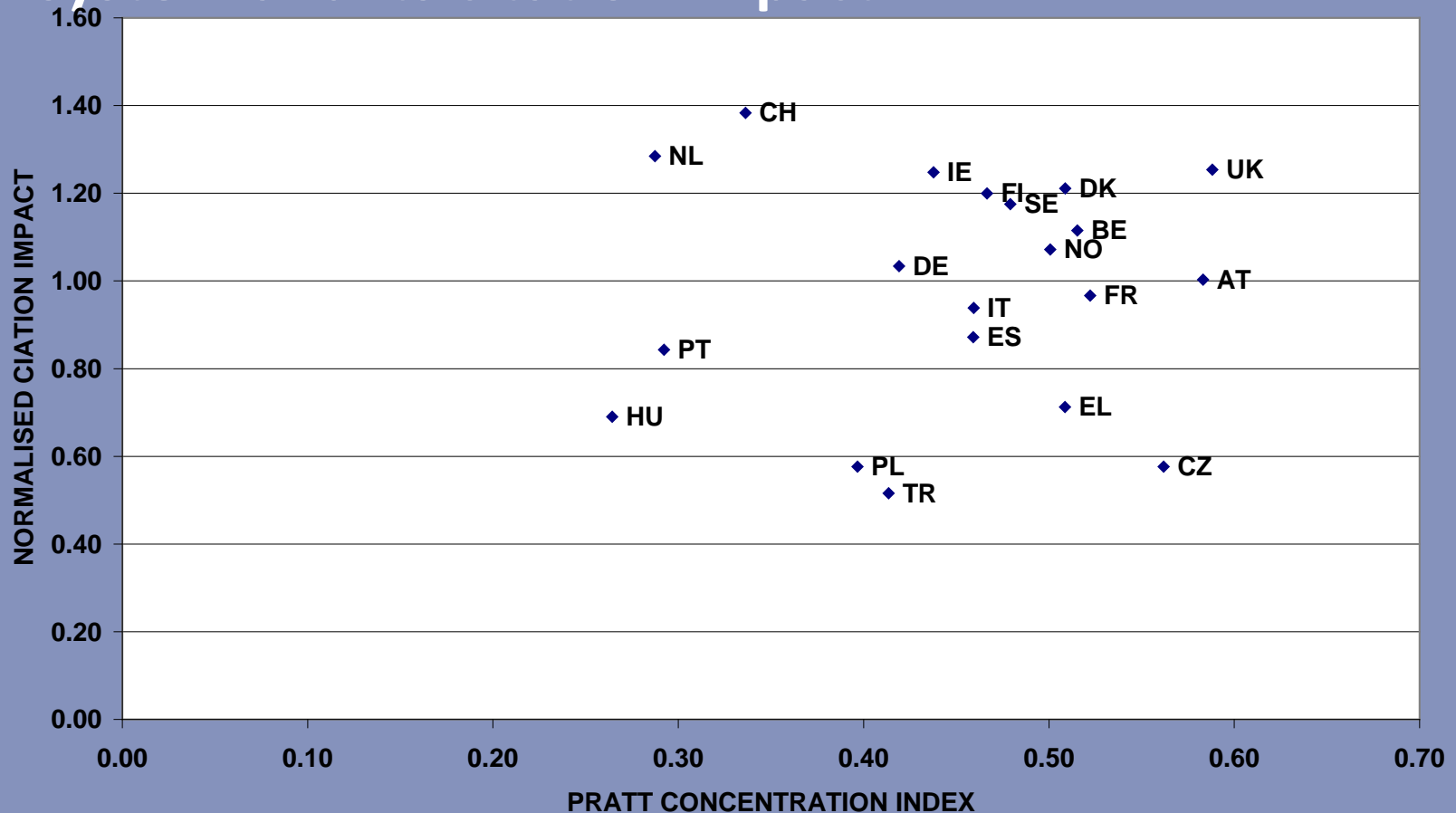
5. At level of disciplines US universities are less dominant (example = Physics & Astronomy)



5. Top European universities are world leader in substantially lower number of disciplines

| | <i>Top 25 % universities in</i> | |
|--|---------------------------------|------------|
| | Europe | USA |
| Number (%) of Universities among the world top 25 % in at least one discipline | 43 100% | 31 100% |
| Average number of world 'top' disciplines per university | 5.4 | 12.3 |

5. In Europe there is no correlation between a country's degree of concentration in the university system and its citation impact



Conclusions

- European universities may have a lower overall performance but it does not imply that their performance is lower in all disciplines
- Rankings tend to favour Concentration models over Distributed models of research performance
- There is no empirical evidence for the superiority of one of the two models

Discussion

Data collection for a worldwide ranking of large research universities is challenging but feasible although accuracy will never be 100%.

The loss of precision appears limited and results are robust.

Discussion

University rankings can only provide a first impression of the institutional performance and should be used as a starting point for further analysis

The analysis could focus on:

- Classification of universities according to their mission and goals and the
- Type of the academic system in which HEIs operate