Trying to make sense of university rankings

RWTH Publishing Forum (#11) 04.12.2025

Mark Neijssel, Director of Services, CWTS B.V. (Centre for Science and Technology Studies), Leiden University, Netherlands

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Some Housekeeping

- this session is *not recorded*

- slides will be available on the website of the RWTH University Library (→ Research → Scholarly Publishing → Publishing Forum) and in RWTH Publications

- **Save-the-date: next Publishing Forum**

  January 22, 2026, 1:00 p.m. (Zoom)

  Ideas for further topics?
  ⇒ Let us know! rtp@ub.rwth-aachen.de

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CWTS
Meaningful metrics

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https://www.cwtsbv.nl/people/

@cwtsleiden

Centre for Science and Technology Studies

- Part of Faculty of Social and Behavioural Science at Leiden University
- CWTS is working on improving how science is practiced and governed and how it serves society
- Services for research evaluation, research management and science policy
- *Leiden Manifesto* – Nature 2015
- *Responsible Metrics* report for the EC
- The Leiden Ranking

Contents

- Methodological issues in university rankings

- CWTS Leiden Ranking

- The new Open Edition based on CWTS' enhanced version of OpenAlex

Methodological issues in university rankings

Popular university rankings

2025-2026 Best Global Universities Rankings

These institutions from the U.S. and more than 100 other countries have been ranked based on 13 indicators that measure their academic research performance and their global and regional reputations. Students can use these rankings to explore the higher education options that exist beyond their own countries' borders and to compare key aspects of schools' research missions. These are the world's 2,250 top universities. Read the methodology »

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U.S.News & WORLD REPORT

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World University Rankings 2026

Explore the *Times Higher Education* World University Rankings 2026 below. Trusted worldwide by students, academics, governments and industry experts, the list of the best universities in the world includes 2,191 institutions from 115 countries and territories.

University rankings 2026: highlights

- **Oxford** retains the number one spot for the tenth consecutive year, driven by strong research environment score
- **Princeton** rises to joint third place, and is the only US university to achieve its best-ever finish this year
- **China** has five universities in top 40, up from three last year, but top universities remain steady
- **Hong Kong** occupies a record six spots in the top 200 as a result of improvements in teaching metrics
- **India** now has the second highest number of ranked universities for the first time, behind only the US

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QS WORLD UNIVERSITY RANKINGS

QS WORLD UNIVERSITY RANKINGS 2026

QS World University Rankings 2026: Top global universities

Discover the top universities around the world with the QS World University Rankings 2026.

Over 1,500 of the world's top universities are included in the 2026 edition of the QS World University Rankings, with over 100 locations represented around the world.

Read more

CWTS Leiden Ranking
Meaningful metrics

Welcome to the CWTS Leiden Ranking. We offer two editions of our ranking: the **Traditional Edition** and the **Open Edition**. Please choose which edition you'd like to use!

🏛 Leiden Ranking Traditional Edition

The **Leiden Ranking Traditional Edition** provides bibliometric indicators based on the **Web of Science database**. The 2025 release includes over **1500 universities** worldwide. The Traditional Edition is based on **two decades of experience** of our center in compiling university-level bibliometric analytics.

⊕ Leiden Ranking Open Edition

The **Leiden Ranking Open Edition**, launched in 2024, provides bibliometric indicators based on the **OpenAlex database**. The 2025 release includes over **2800 universities** worldwide. Unlike the Traditional Edition, the Open Edition is based on open data, offering **fully transparent analytics** and supporting a **more inclusive perspective** on the global university landscape.

Universiteit Leiden

2025 Academic Ranking of World Universities   [2025 ▾]

The Academic Ranking of World Universities (ARWU) was first published in June 2003 by the Center for World-Class Universities (CWCU), Graduate School of Education (formerly the Institute of Higher Education) of Shanghai Jiao Tong University, China, and updated on an annual basis. Since 2009 the Academic Ranking of World Universities (ARWU) has been published and copyrighted by ShanghaiRanking Consultancy. ShanghaiRanking Consultancy is a fully independent organization on higher education intelligence and not legally subordinated to any universities or government agencies. ARWU uses six objective indicators to rank world universities, including the number of alumni and staff winning Nobel Prizes and Fields Medals, number of highly cited researchers selected by Clarivate, number of articles published in journals of Nature and Science, number of articles indexed in Science Citation Index Expanded and Social Sciences Citation Index in the Web of Science, and per capita performance of a university. More than 2500 universities are actually ranked by ARWU every year and the best 1000 are published.(See full Methodology)

Indicators used in the popular university rankings

- Publications:
    - Total
    - Per faculty
    - % interdisciplinary
    - % international collaboration
    - Nature and Science

- Citations:
    - Total
    - Per publication
    - Per faculty
    - Highly cited researchers

- Reputation survey

- Others:
    - Nobel Prizes/Field Medals
    - Post-docs per faculty
    - Research income per faculty
    - Faculty/student ratio
    - Institutional income

Rankings based on composite indicators

Composite indicator

Example Shanghai Ranking

3. Indicators and Weights for ARWU

Criteria	Indicator	Code	Weight
Quality of Education	Alumni of an institution winning Nobel Prizes and Fields Medals	Alumni	10%
Quality of Faculty	Staff of an institution winning Nobel Prizes and Fields Medals	Award	20%
	Highly Cited Researchers	HiCi	20%
Research Output	Papers published in Nature and Science*	N&S	20%
	Papers indexed in Science Citation Index-Expanded and Social Science Citation Index	PUB	20%
Per Capita Performance	Per capita academic performance of an institution	PCP	10%

*For institutions specialized in humanities and social sciences such as London School of Economics, N&S is not considered, and the weight of N&S is relocated to other indicators.

Mixing up different concepts of university performance

- Shanghai, THE, QS, and US News use composite indicators
- These composite indicators combine indicators that reflect very different concepts of university performance

It is unclear which concept of university performance is measured by Shanghai, THE, QS, and US News

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What do we mean by university performance?

Size-dependent concept of university performance:

- Overall performance of a university

- Total number of 'performance points' (e.g., publications, citations, expert recommendations, awards)

Size-independent concept of university performance:

- Performance of a university relative to available resources

- Number of 'performance points' divided by available resources (e.g., number of faculty, research budget)

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Some university performance indicators

Size-dependent indicators   **Size-independent indicators**

- Publications:
  - Total
  - Per faculty
  - % interdisciplinary
  - % international collaboration
  - Nature and Science
- Citations:
  - Total
  - Per publication
  - Per faculty
  - Highly cited researchers
- Reputation survey
- Others:
  - Nobel Prizes/Field Medals
  - Post-docs per faculty
  - Research income per faculty
  - Faculty/student ratio
  - Institutional income

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Mixing up size-dependent and size-independent university performance

3. Indicators and Weights for ARWU

Criteria	Indicator	Code	Weight
Quality of Education	Alumni of an institution winning Nobel Prizes and Fields Medals	Alumni	10%
Quality of Faculty	Staff of an institution winning Nobel Prizes and Fields Medals	Award	20%
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Per Capita Performance	Per capita academic performance of an institution	PCP	10%

*For institutions specialized in humanities and social sciences such as London School of Economics, N&S is not considered, and the weight of N&S is relocated to other indicators.

RANKING INDICATOR	WEIGHT
Global research reputation	12.5%
Regional research reputation	12.5%
Publications	10%
Books	2.5%
Conferences	2.5%
Normalized citation impact	10%
Total citations	7.5%
Number of publications that are among the 10% most cited	12.5%
Percentage of total publications that are among the 10% most cited	10%
International collaboration – relative to country	5%
International collaboration	5%

Shanghai and US News mix size-dependent and size-independent concepts of university performance

Responsible use of rankings

- Ten principles developed by CWTS
- Supporting animation video

4. University rankings should be sufficiently transparent

8. Dimensions of university performance not covered by university rankings should not be overlooked

The Leiden Ranking

Differences with other rankings

Aligned with our vision on responsible/meaningful metrics

- No composite indicators

- Multi-dimensional

- Size-dependent and size-independent indicators kept separated

- Focused on research, not on teaching

- Based purely on bibliometric indicators; no survey data or data provided by universities

- High-quality bibliometric methodology

- Multiple views, not just a simple list

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CWTS Leiden Ranking Traditional Edition 2025

- 1594 universities from 77 countries
- Provides bibliometric indicators for four dimensions:
  - Scientific impact
  - Collaboration
  - Open access
  - Gender
- Based on Clarivate's Web of Science data, with enhancements by CWTS

Fraction

- China
- United States
- India
- United Kingdom
- Japan
- Germany
- South Korea
- Italy
- Iran
- Spain
- Turkey
- Brazil
- Poland
- Australia
- France
- ROW

25% 22% 13% 5% 4% 4% 4% 3% 3% 3% 3% 3% 2% 2% 2% 2%
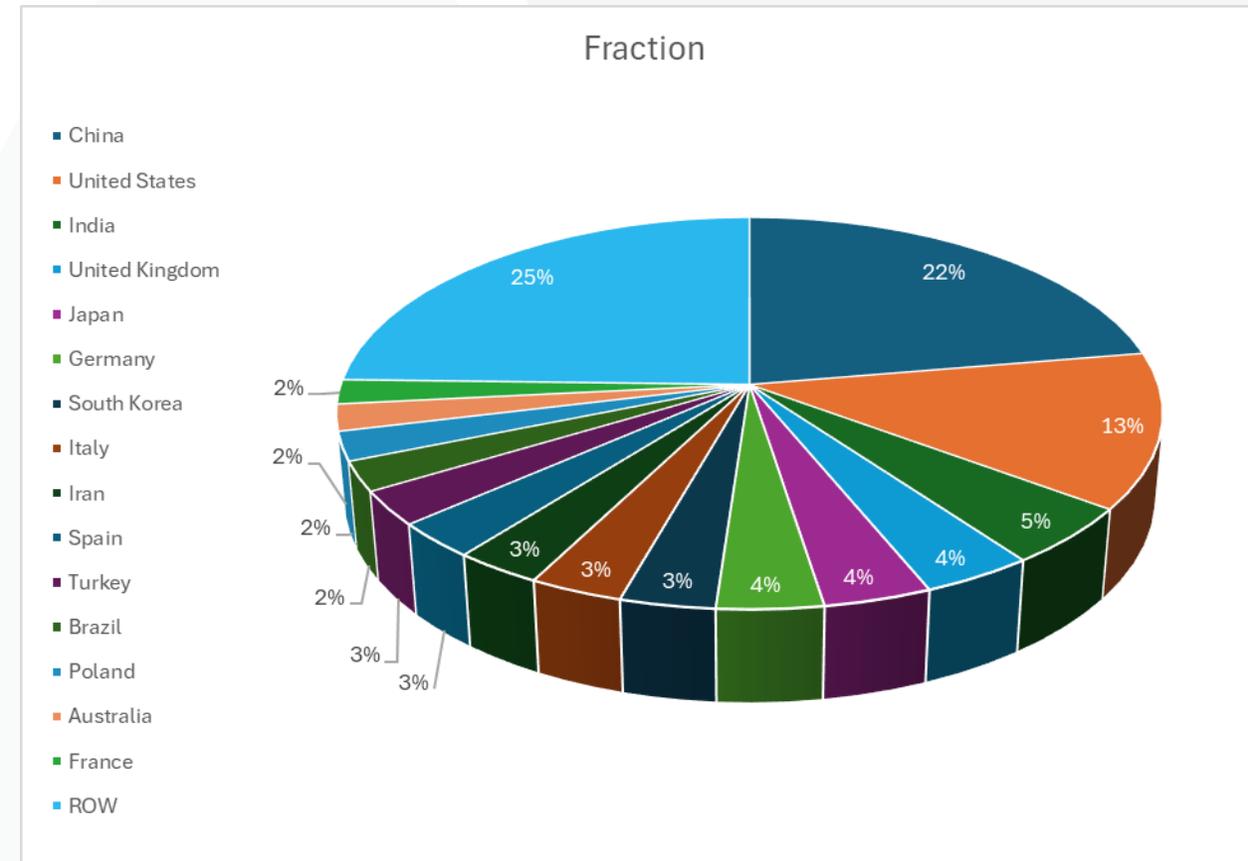
Inclusion criteria

- In-house enhanced version of Web of Science
- Articles and reviews in <u>core publication set</u>
- Period 2020-2023/2024
- Fractional counting
- >800 publications

Enhanced version of Web of Science

- Science Citation Index, Social Science Citation Index, Arts & Humanities Citation Index
- Not included: CPCI, ESCI and BCI
- Own algorithms for counting citations and filtering of self-citations
- Unification of name- and address variants: **dedicated team**
- Systematic allocation of affiliated institutions
    - Component
    - Joint research facility or organization
    - Associated organization
- Linking to other data sources: PATSTAT, Orbis, Unpaywall, CED, Gender API etc.
- Own classification system of science

Core publication set

Level the playing field

- The publication has been written in English.

- The publication has one or more authors. (Anonymous publications are not allowed.)

- The publication has not been retracted.

- The publication has appeared in a core journal.
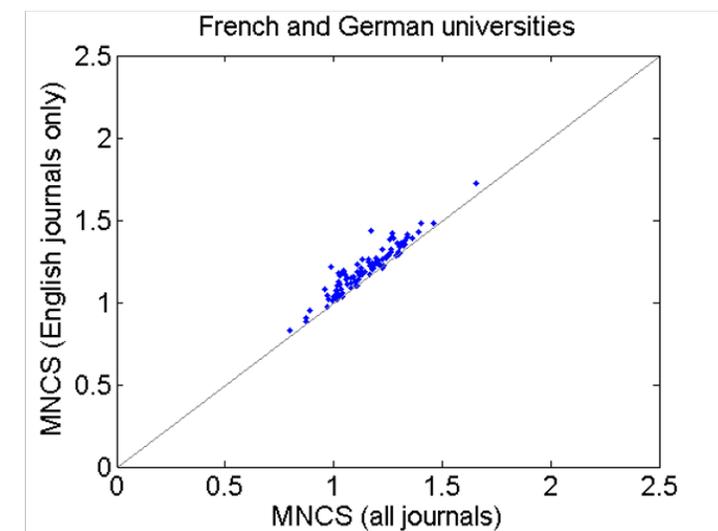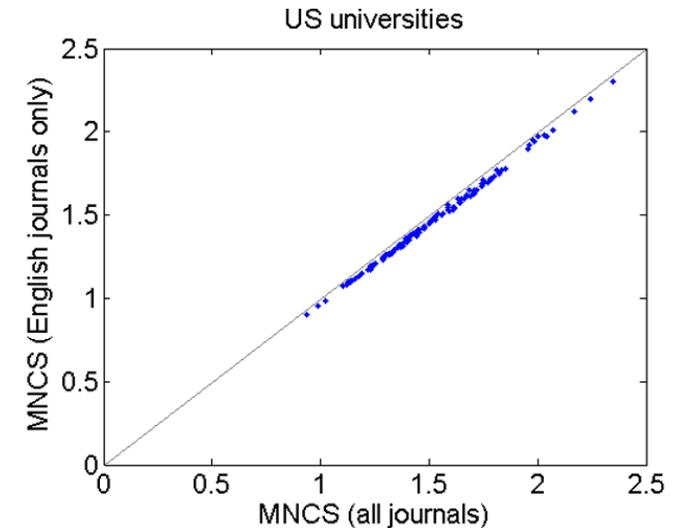
Fractional counting

level the playing field: no bias towards biomedical sciences

- Publication includes five authors of which two belong to a particular university, the publication is counted with a weight of 2/5 = 0.4 for that university.

- Waltman, L., & Van Eck, N.J. (2015). Field-normalized citation impact indicators and the choice of an appropriate counting method. *Journal of Informetrics*, *9*(4), 872-894.
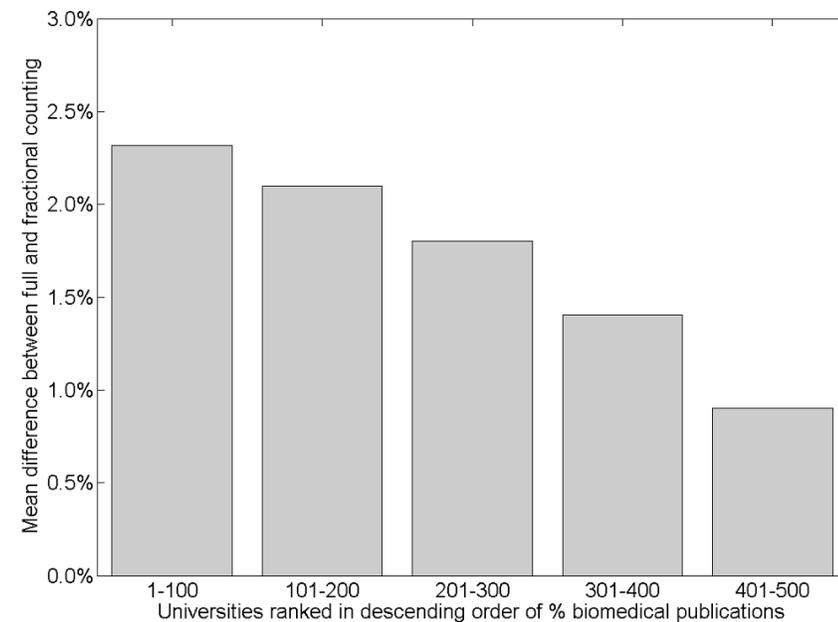
Differences among fields
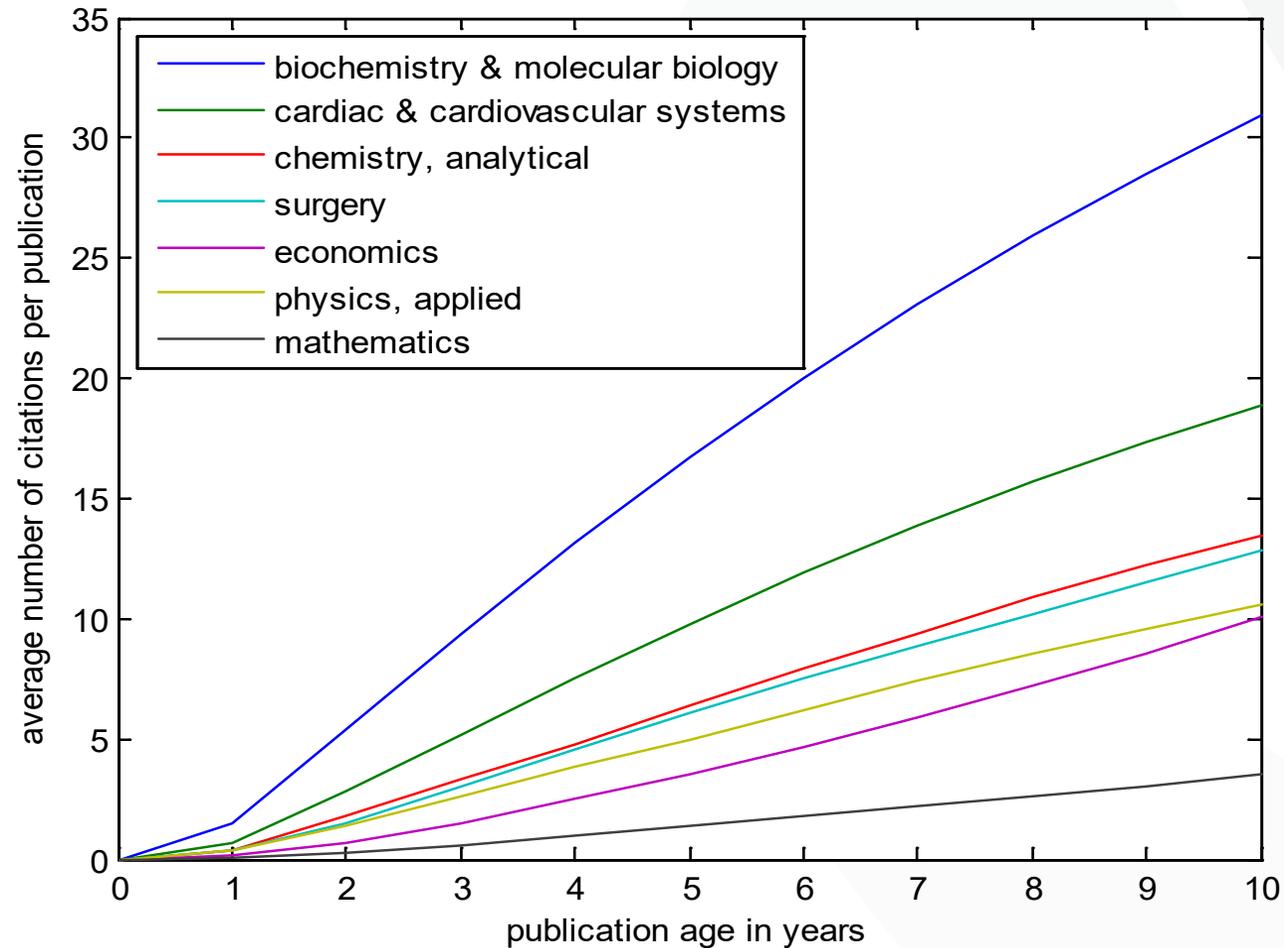
Classification of scientific literature into 4,277 (sub)fields

- The micro-level fields play an important role in the calculation of the field-normalised impact indicators in the Leiden Ranking.

Social sciences and humanities

Mathematics and computer science

Life and earth sciences

Biomedical and health sciences

Physical sciences and engineering

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VOSviewer
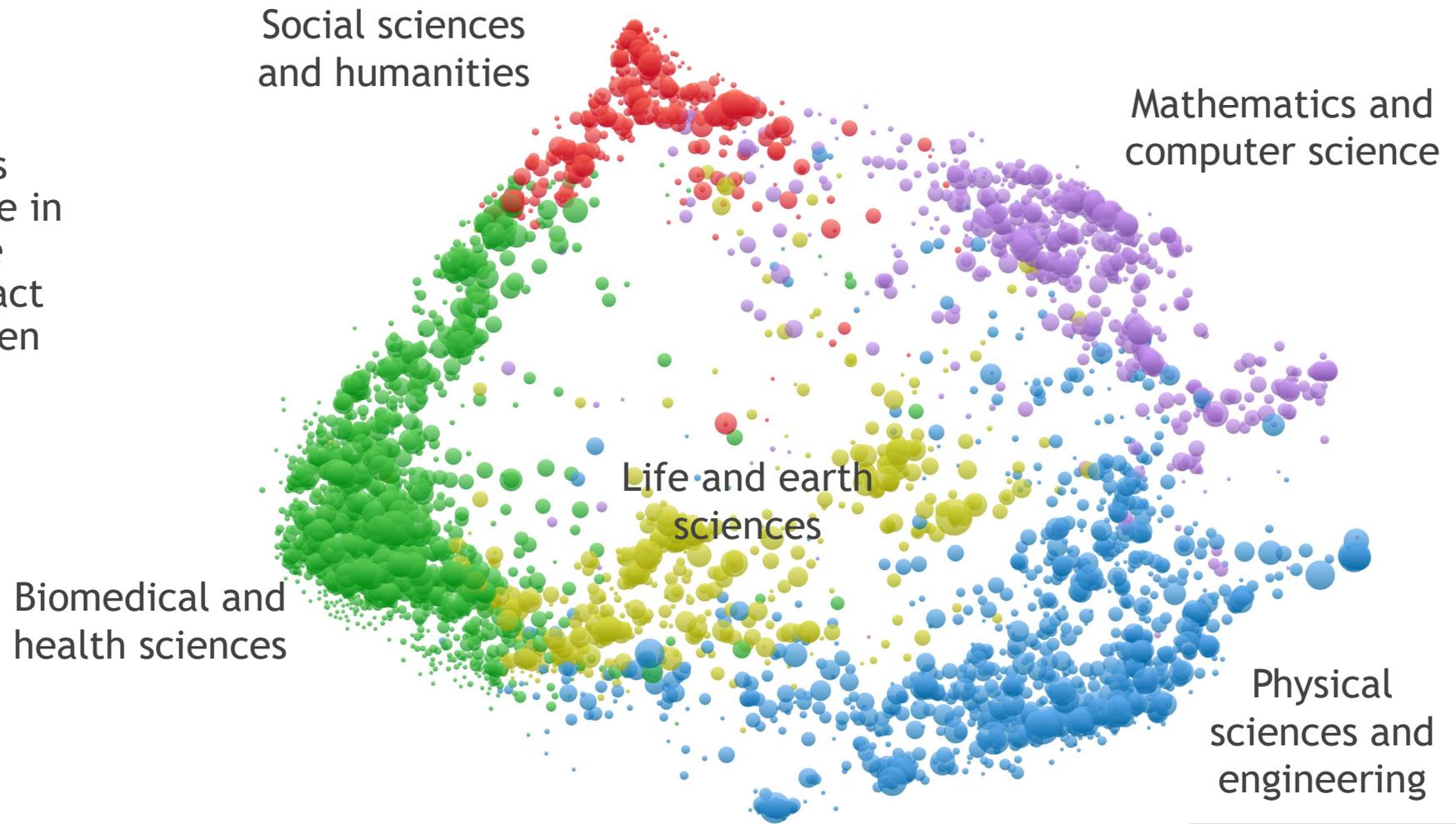
Multi-dimensional perspective

Choose your relevant Leiden Ranking

- Three different views:

| List view | Chart view | Map view |

- Four analytical dimensions:
    - Scientific impact
    - Collaboration
    - Open access
    - Gender

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Size dependent indicators

CWTS Leiden Ranking Traditional Edition 2025

Start tour

| List view | Chart view | Map view |

Time period, field, and region/country

Time period: 2020–2023

Field: All sciences

Region/country: Germany

Min. publication output: 100

Indicators

Type of indicators: Scientific impact

Indicators: P, P(top 10%), PP(top 10%)

Order by: P

☑ Calculate impact indicators using fractional counting

University		P	P(top 10%)	PP(top 10%)	
1	Tech Univ Munich	9805	1079	11.0%	
2	Ludwig-Maximilians Univ München	8509	1017	11.9%	
3	Heidelberg Univ	8274	967	11.7%	
4	RWTH Aachen Univ	7293	692	9.5%	
5	Univ Hamburg	6811	716	10.5%	

P: absolute number of publications

P(top 10%): absolute number of top-10% highly cited publications

Size independent (normalised) indicators

CWTS Leiden Ranking Traditional Edition 2025   Start tour

| | List view | Chart view | Map view |

Time period, field, and region/country

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Field: All sciences

Region/country: Germany

Min. publication output: 100

Indicators

Type of indicators: Scientific impact

Indicators: P, P(top 10%), PP(top 10%)

Order by: PP(top 10%)

☑ Calculate impact indicators using fractional counting

PP(top 10%): normalised citation impact

Stability intervals: indicate variance

	University		P	P(top 10%)	PP(top 10%)	
1	Univ Potsdam	🇩🇪	1985	258	13.0%	
2	Georg-August-Univ Göttingen	🇩🇪	5063	624	12.3%	
3	Julius Maximilian Univ Würzburg	🇩🇪	4027	490	12.2%	
4	Freie Univ Berlin	🇩🇪	5792	696	12.0%	
5	Humboldt Univ Berlin	🇩🇪	5320	637	12.0%	

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Difference between position 100 and 300: 1.9%

- PP(top 10%)
- All sciences
- Fractional counting

PP(top 10%) all Leiden Ranking universities ranked from high to low
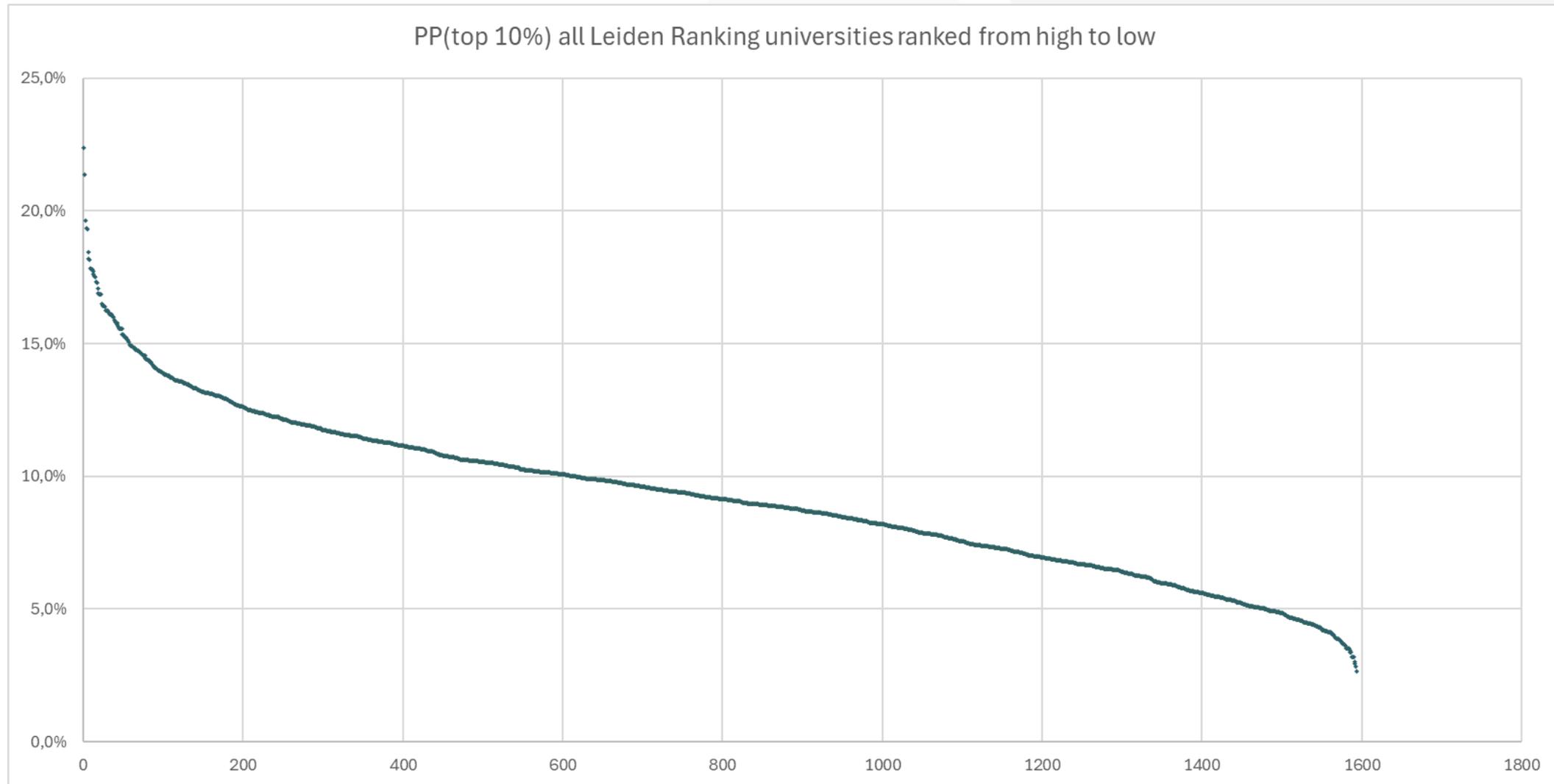
Fundamental problem of size-independent bibliometric indicators
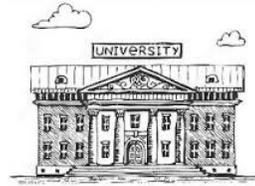
Univ. A

- Same resources as Univ. B
- P = 1000
- P(top 10%) = 200
- PP(top 10%) = 20%

Univ. B

- Same resources as Univ. A
- P = 2000
- P(top 10%) = 300
- PP(top 10%) = 15%

- Taking into account that both universities have the same resources, it is clear that university B has performed better
- However, according to the PP(top 10%) indicator, university A has performed better

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The CWTS Leiden Ranking
Open Edition

CWTS Leiden Ranking not compliant with our own ten rules for ranking universities

Rule number 4

4. Be transparent

Users of rankings require at least a basic understanding of their design. Rankings therefore need to explain their methodology. Ideally, they should also make their underlying data available. Users could then see, for example, not only how many highly cited publications a university has produced but also what they are. Most rankings do not do this, because of the proprietary nature of data and the commercial interests of rankers.

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CWTS Leiden Ranking - Open Edition

- Open Edition of the Leiden Ranking was released on **January 30, 2024**

  - Instead of closed data from Web of Science, open data from **OpenAlex** was used

- Open Edition of the Leiden Ranking is an experimental tool, but we expect it will soon reach full maturity

CWTS Leiden Ranking Open Edition 2025

- 2831 universities from 120 countries
- Non-core publications included!!
- Provides bibliometric indicators for four dimensions:
  - Scientific impact
  - Collaboration
  - Open access
  - ~~Gender~~
- Based on OpenAlex data, with enhancements by CWTS

Fraction

- China
- United States
- India
- Indonesia
- Brazil
- Turkey
- Japan
- United Kingdom
- Iran
- France
- Germany
- Russia
- Italy
- South Korea
- Spain
- ROW

33% 14% 10% 7% 5% 4% 4% 3% 3% 4% 2% 2% 2% 2% 3% 3%

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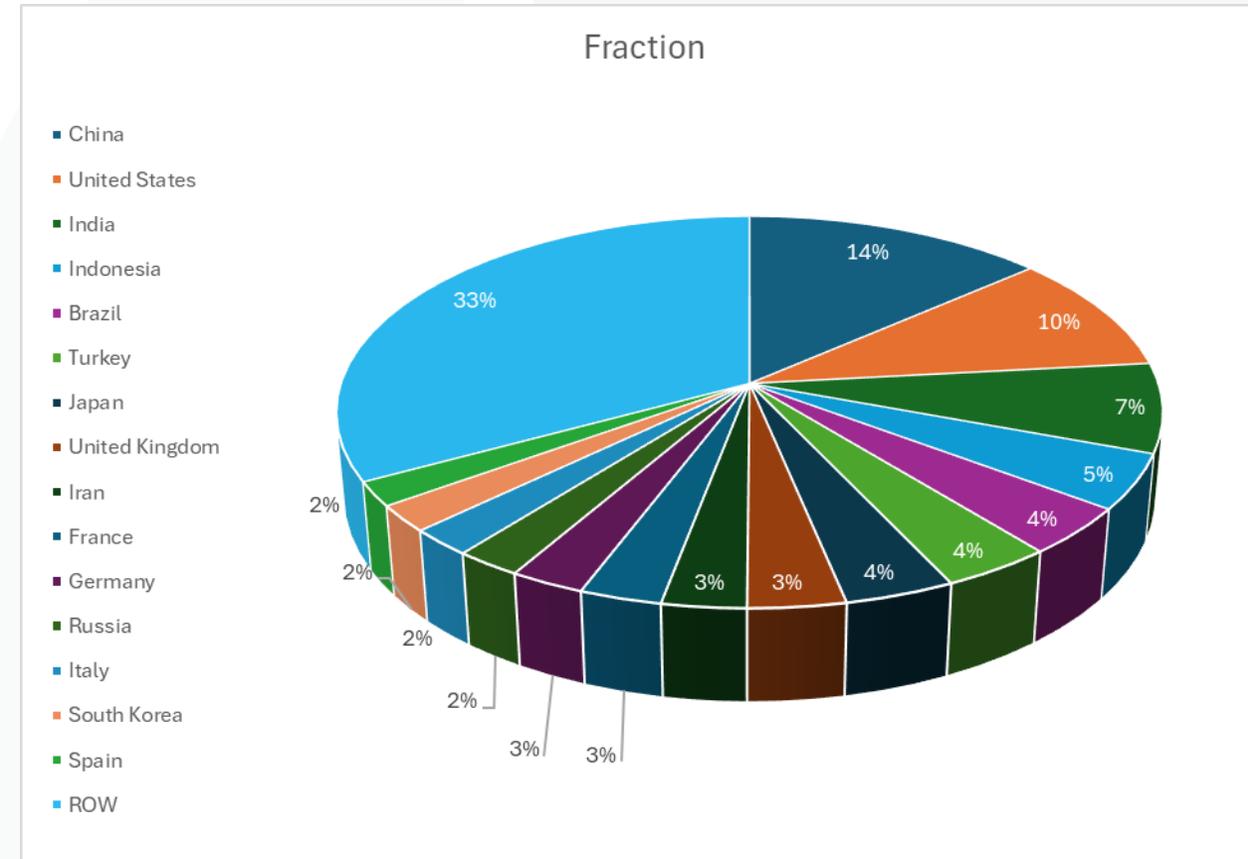
Summary of the process of creating the Leiden Ranking Open Edition
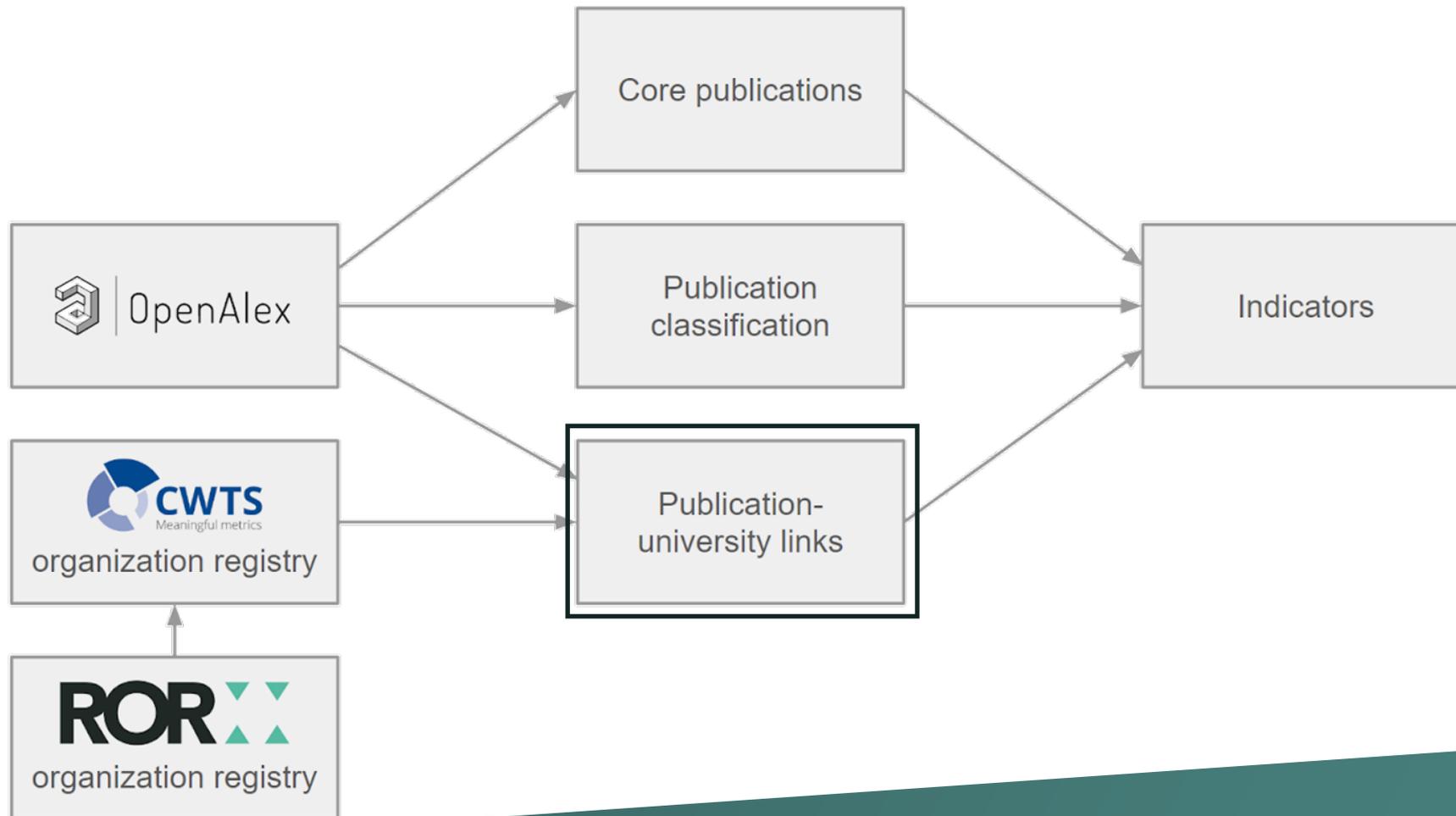
Linking publications to universities

Issues that have been addressed:

- Incomplete coverage of raw affiliation strings
- Incomplete institution identification
- Raw affiliation strings linked to no more than one institution

https://openalex.org/W1965914817

24 July 2014
SUAVE: a UV telescope for space weather and solar variability studies
L. Damé, M. Meftah, A. Irbah, A. Hauchecorne, P. Keckhut, E. Quémerais
Author Affiliations -
L. Damé,[1] M. Meftah,[1] A. Irbah,[1] A. Hauchecorne,[1] P. Keckhut,[1] E. Quémerais[1]
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'LATMOS, Institut Pierre-Simon Laplace, CNRS, Univ. Versailles Saint-Quentin en Yvelines (France)"

5ppf7q77   02haar591   02feahw73   03mkjjy25

Affiliations may refer to multiple
non-hierarchical related institutions

Publication coverage of LR2023 universities: False negatives in OpenAlex

%pubs in OpenAlex and linked to univ (February)
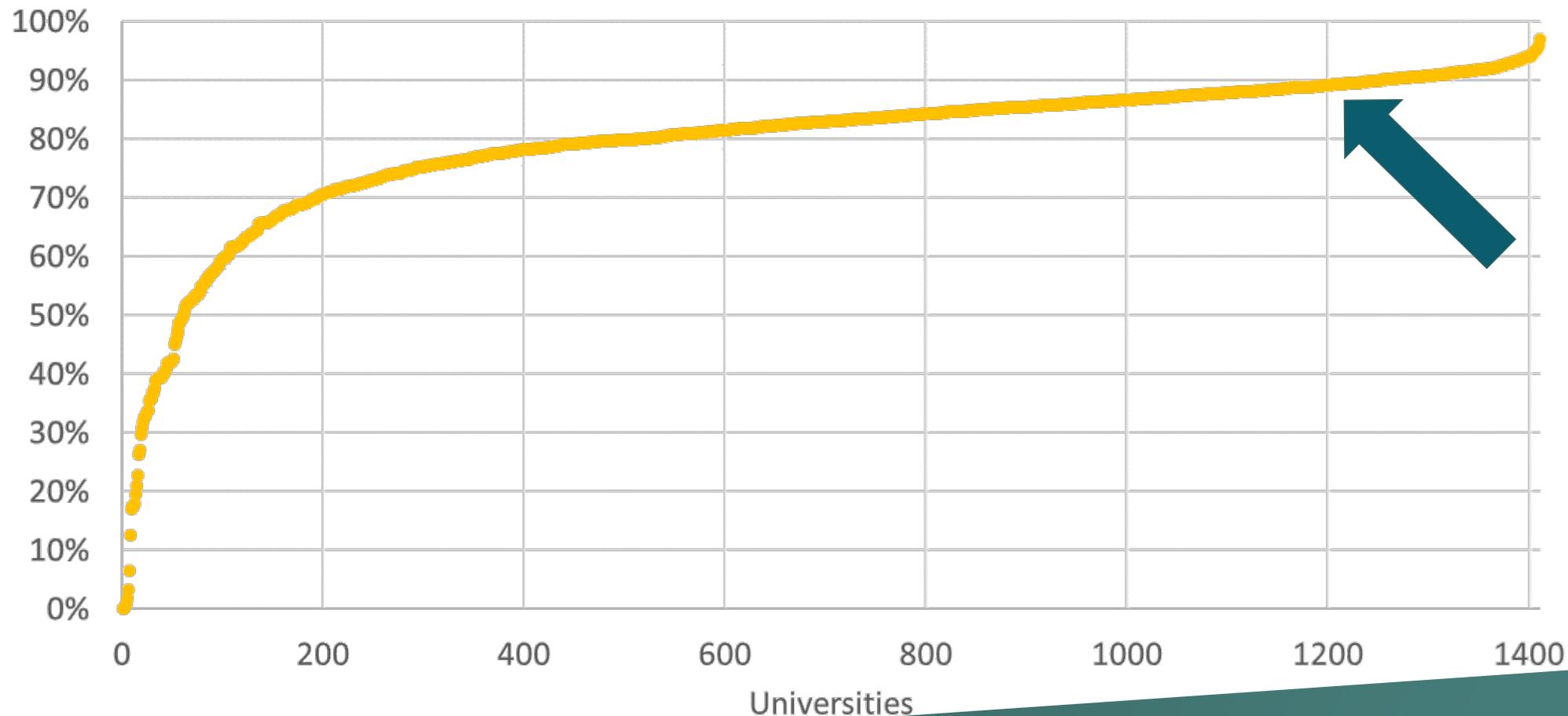
Publication coverage of LR2023 universities:
False negatives in OpenAlex

- %pubs in OpenAlex and linked to univ (November)
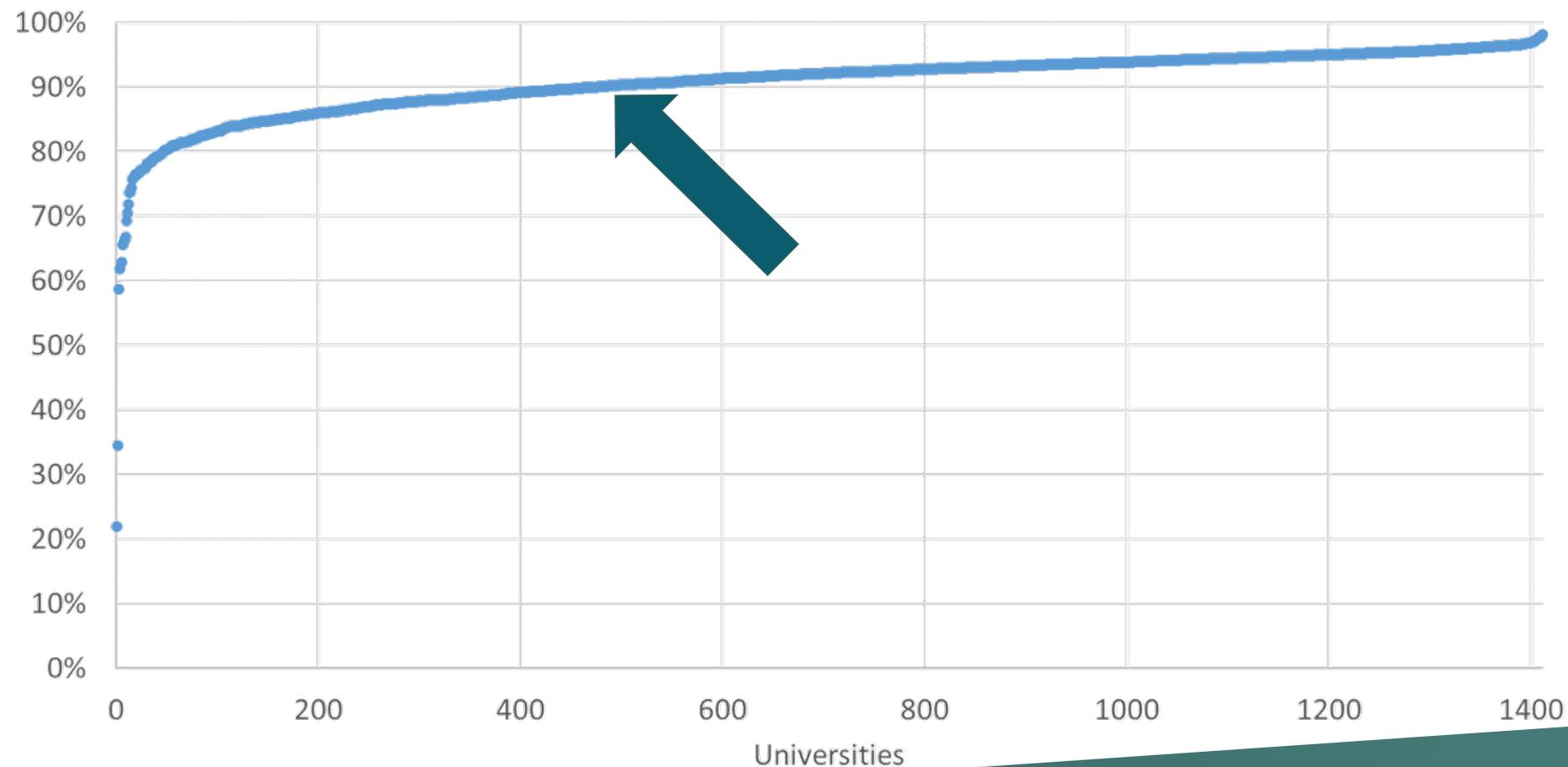
Summary of the process of creating the Leiden Ranking Open Edition
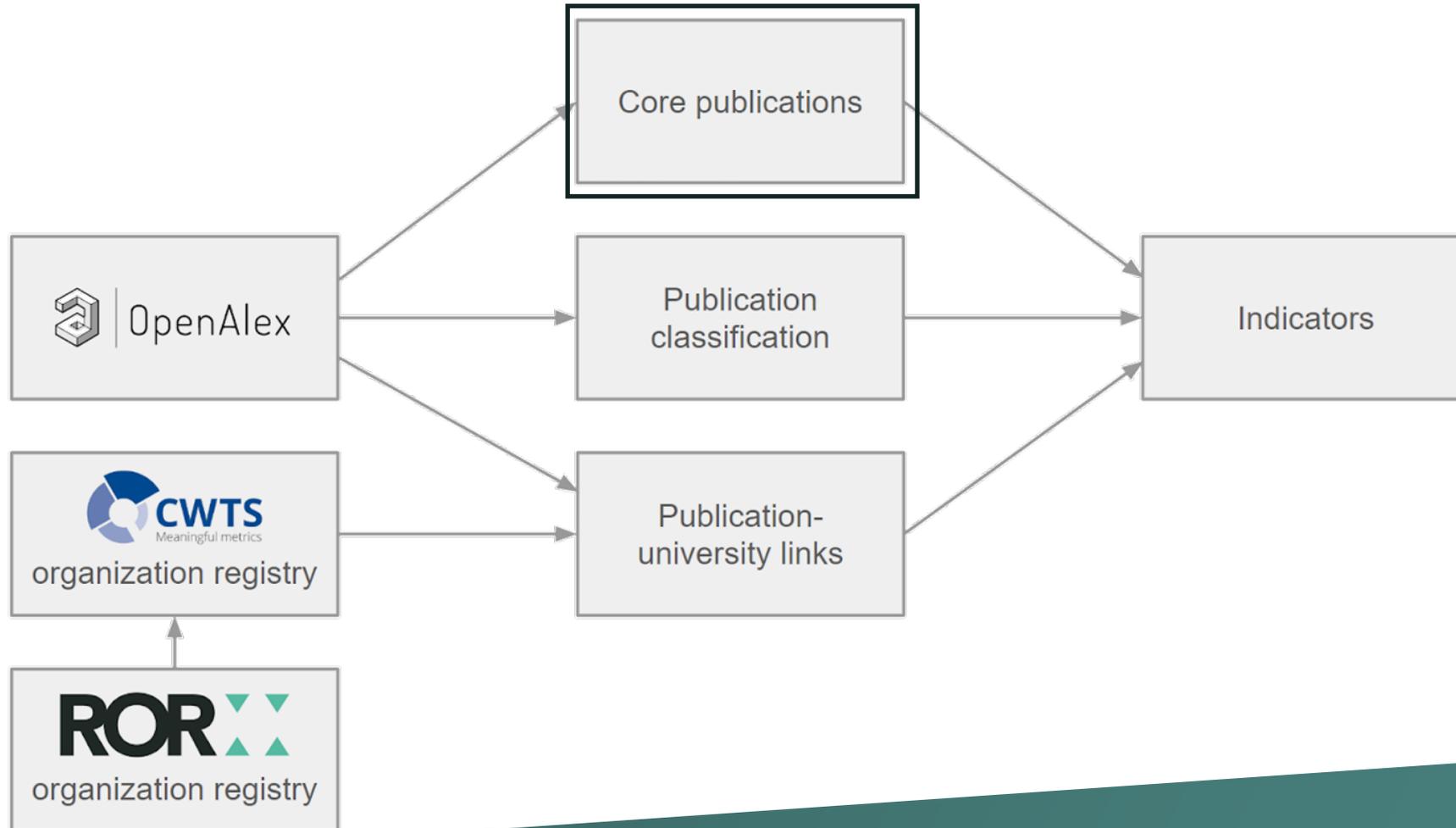
Adjusted methodology based on OpenAlex

- Include publications that:
    1. publication is classified as article, review, or book chapter and has appeared in a source that is classified as journal, book, book series, or conference proceedings

- Exclude publications that:
    2. are not in English
    3. do not have any authors
    4. do not have any affiliations
    5. do not have any references

- Exclude sources that:
    6. do not have a sufficiently international focus (to filter out national journals)
    7. do not have a sufficiently large proportion of publications with active references (to filter out trade magazines, business magazines, and popular scientific magazines)

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Selection of journal articles/reviews, book chapters in book series, and proceedings papers

All works 2019 – 2022 — 40.6M

Meta data availability (source) — 33.6M

Source type (journal, book series, conference) — 24.5M

Work type (article, review, book chapter) — 23.1M

Meta data availability (authors, affiliations, references) — 13.4M

Core publications — 10.3M

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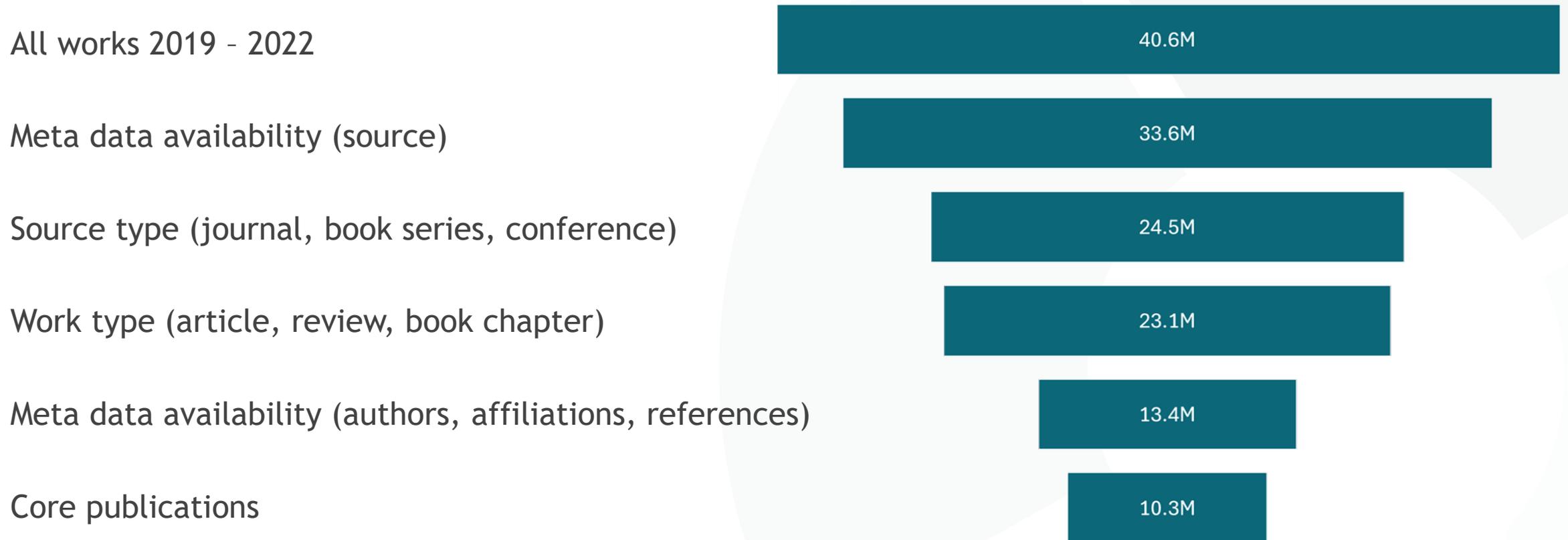
Core publications (2019-2022): OpenAlex vs. Web of Science
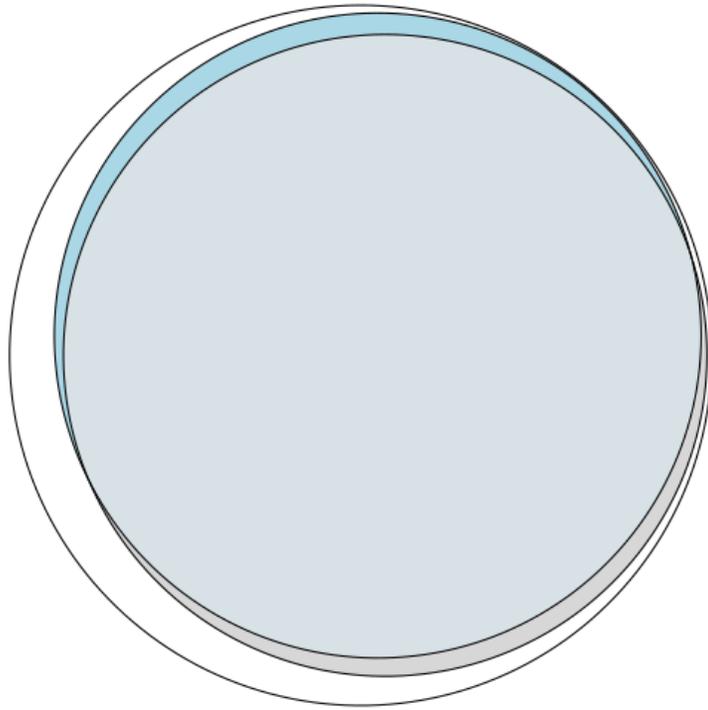
- ○ All publications
- ○ OpenAlex core publications
- ○ Web of Science core publications

		Web of Science	
		Core publication	Non-core publication
OpenAlex	Core publication	7,639,280	296,194
	Non-core publication	375,613	1,137,336

92% of the publications are classified in the same way (either as core publication or as non-core publication) in OpenAlex and Web of Science

Certain metadata elements are missing for some publications in OpenAlex

Our methodology for OpenAlex may exclude these publications

Our methodology for Web of Science excludes publications that do not have an 'article' or 'review' document type

The document type classification in OpenAlex is less fine-grained, and our methodology for OpenAlex is therefore less restrictive

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https://doi.org/10.5281/zenodo.13879947

Issues that have been addressed

- Issues that have been addressed:
  - Works without a work type
  - Incorrectly classified sources
  - Works with a missing primary source assignment
  - Journal articles incorrectly assigned to a repository
- Other improvements:
  - Availability of language
  - Availability of countries
  - Modified work type
  - First attempt to identify errata/corrections (identification of letters and editorials will be implemented later on)
  - Improved identification of institutions

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Non-core publications should not be included in field normalized citation impact calculations

- Non-core publications receive substantial less citations than core publications
- Universities with many non-core publications may be disadvantaged when calculating (size independent) citation indicators
- This applies in particular to universities in large non-English language areas

Correlation between the number of publications
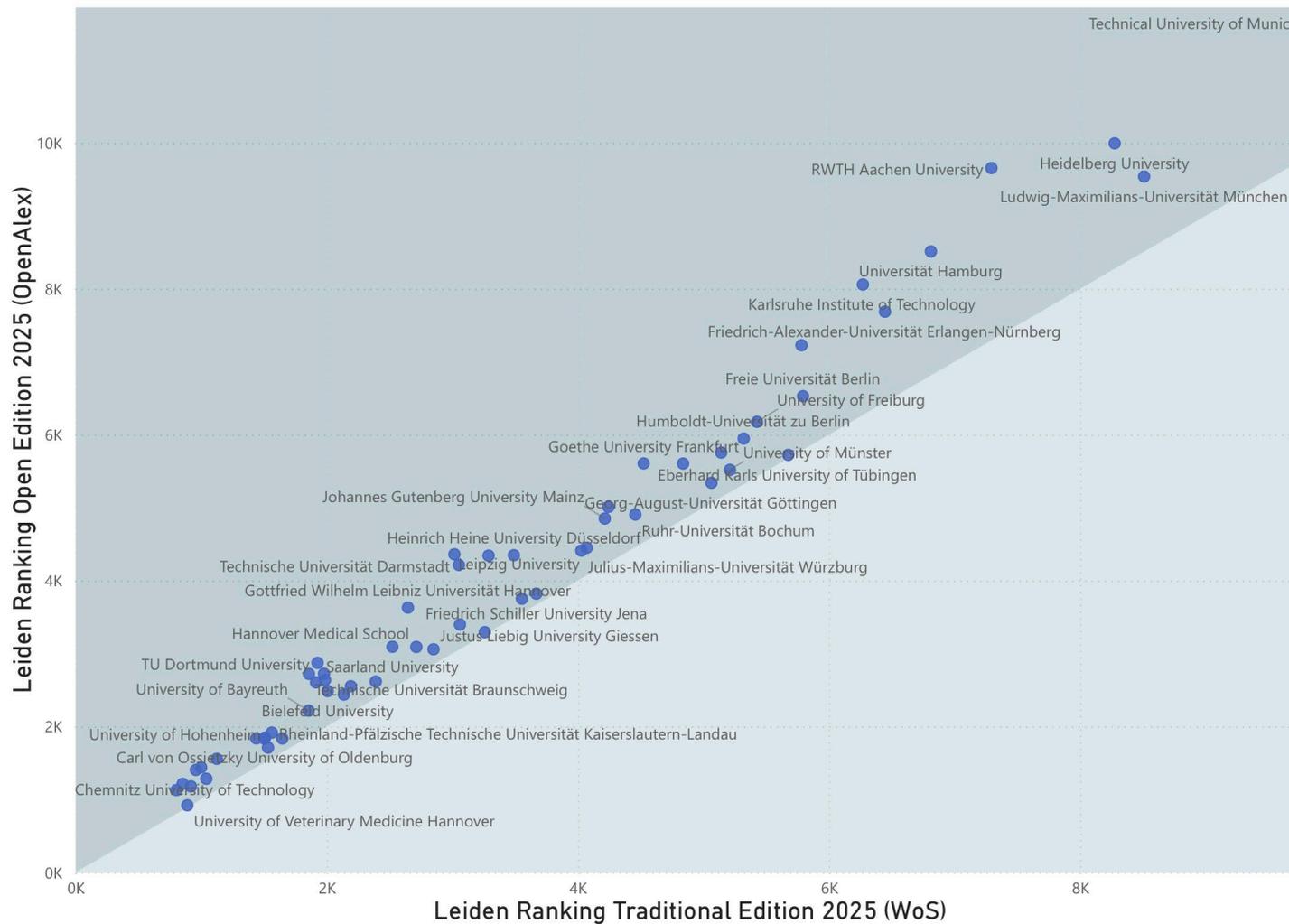
Correlation between top 10% publications

Leiden Ranking Open Edition – inclusion non-core

Leiden Ranking Open Edition – inclusion non-core

RWTH Aachen University

Overview (2020–2023)

All sciences ⇕

		Size-dependent		Size-independent	
Publications	P	12096			
Publications with at least 10 citations	P(≥ 10 cit)	2312	PP(≥ 10 cit)		19.1%
Publications with at least 20 citations	P(≥ 20 cit)	1050	PP(≥ 20 cit)		8.7%
Publications with at least 50 citations	P(≥ 50 cit)	247	PP(≥ 50 cit)		2.0%
Publications with at least 100 citations	P(≥ 100 cit)	74	PP(≥ 100 cit)		0.6%
Citations	TCS	89208	MCS		7.37

Publications per type (2020–2023)

All sciences ⇕
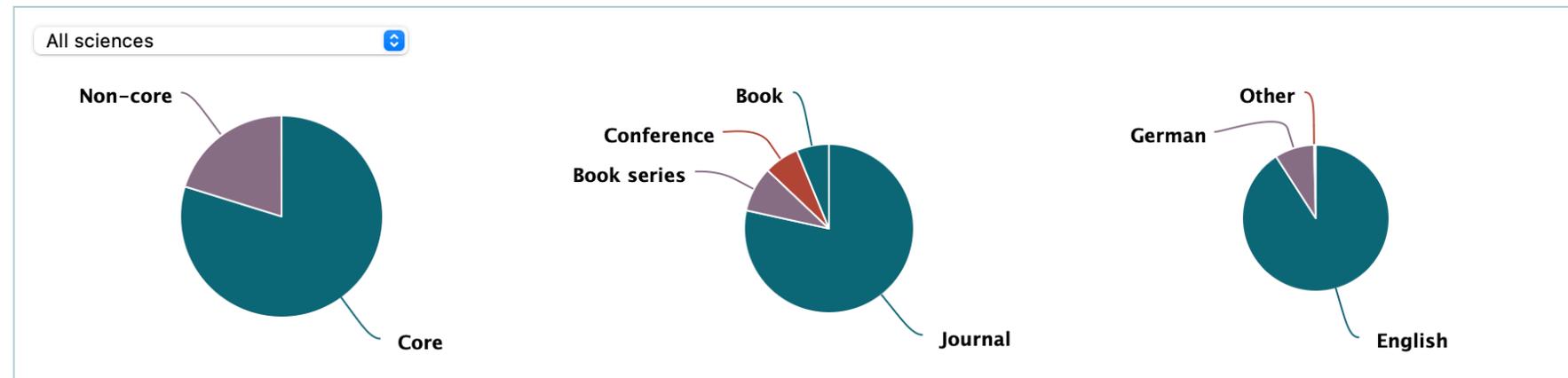
Opportunities and challenges with non-core publications

- Capture the diversity of research activities beyond international journal literature

- Highlight regional and local engagement/impact of universities

- Provide a more balanced representation of disciplines

- Technical challenges:
  - Inaccurate metadata: not all works classified as 'article' are real research contributions
  - Incomplete metadata, especially for non-core publications
  - Regional biases in coverage of non-core publications

- Conceptual challenge:
  - How to include research outputs not aimed at an international audience in a ranking tool designed to conduct international comparisons?

Considerations

- Engage with ROR to ensure good quality of name- and address harmonization for RWTH Aachen University

- Build infrastructure based on open-source software, e.g., DSPACE

- OpenAlex or OpenAIRE

- Bibliometric analyses at the level of department and higher aggregates, not at the individual level

- Conduct a qualitative validation/reflection on the results

BARCELONA DECLARATION ON OPEN RESEARCH INFORMATION

COMMITMENTS

1

We will make openness the default for the research information we use and produce

Many thanks! Questions? Comments?

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