Data 4 Policy
Indicators: Special Statistical Vehicles

IPSDS
INTERNATIONAL PROGRAM IN SURVEY & DATA SCIENCE

BERD @NFDI

LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN

WALTER J. RADERMACHER

Indicator????

EXAMPLES, FIRST DEFINITIONS

Index vs. Indicator (no clear distinction)

Index: ~~From~~ *Latin index (“a discoverer, informer, spy; of things, an indicator, the forefinger, a title, superscription”), from indicō (“point out, show”); see indicate.*

- In statistics, it represents historically a very generic term applied with multiple meanings.
- Example: An index number of prices shows the average percentage change of prices from one point of time to another, where the average is calculated using a weighting (e.g., arithmetic mean).

Indicator: ~~From~~ *Late Latin indicātor (“one who points out”), from Latin indicō (“point out”). By surface analysis, indicate + -or; see indicate.*

- In statistics, it represents indirect metrics of economic or social phenomena not directly measurable. An indicator is not simple crude statistical information but represents a quantification connected to a conceptual model aimed at describing aspects of reality.

Index vs. Indicator: related, not the same

Index: determined by its design and construction

Indicator: determined by its purpose and relevance

Indicator quality: a first checklist

adapted from (Spangenberg 2018)https://www.taylorfrancis.com/chapters/edit/10.4324/9781315561103-9/world-views-interests-indicator-choices-joachim-spangenberg?context=ubx&refId=63ebd396-5323-4e22-87c6-7ae42f14adcd)

Relevance:

- Capture the essence of the issue at hand.
- Provide a clear message and an unbiased representation of the state or trend of the phenomenon that the indicator is intended to report on.
- To be effective, indicators must resonate with their intended audience, which may comprise multiple groups

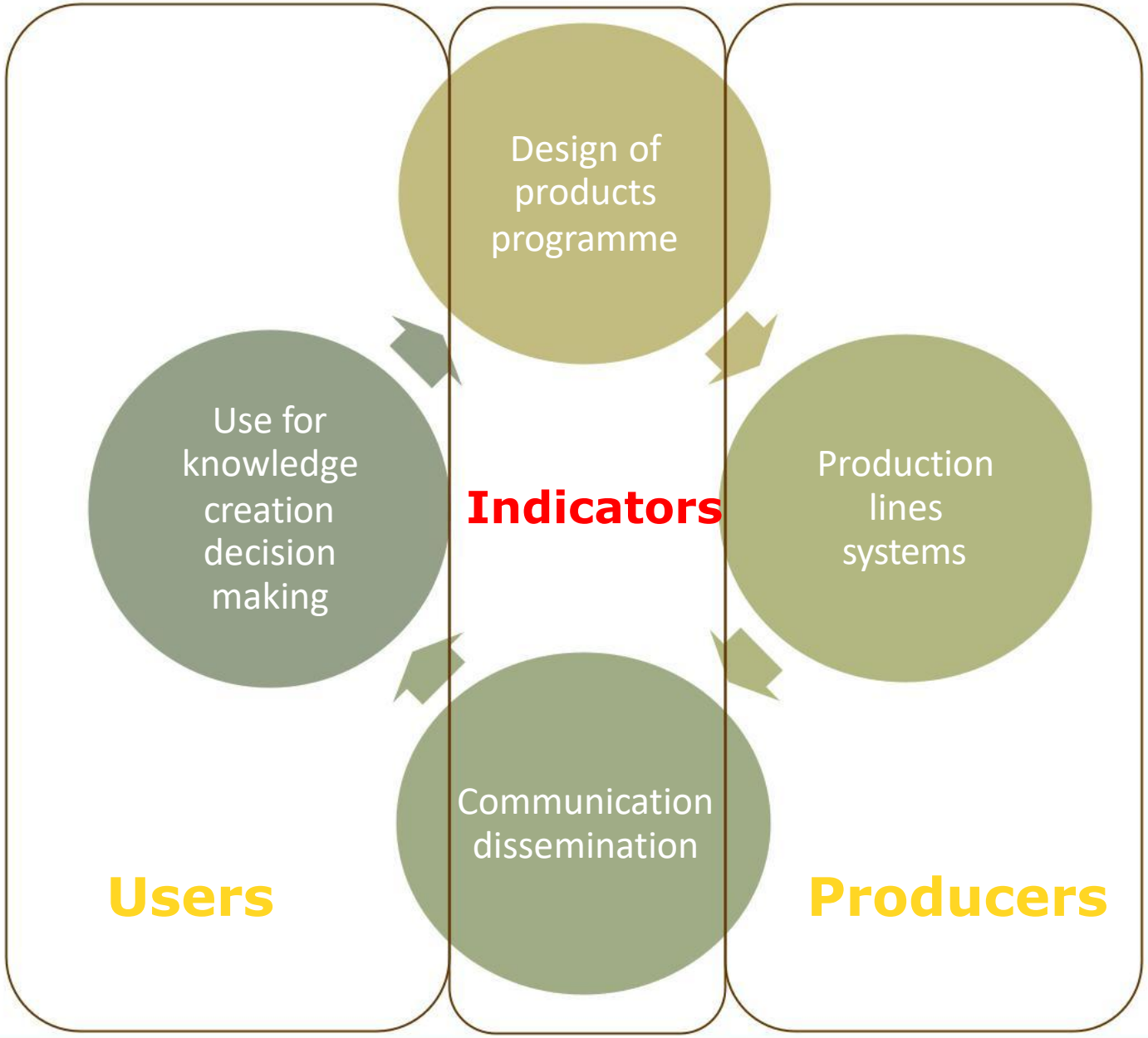
Credibility:

- They must have a solid scientific basis, a clearly defined methodology, reliable data
- and be reproducible, robust and sensitive

Legitimacy:

- Transparency with regard to data sources and processing methods.
- Involving stakeholders as partners who influence the process and outcome can increase credibility, but only if conflicting groups and interests are included in a balanced manner

Factory Statistics: Main Processes



Case: University Ranking

RANKINGS AS A LAZY PROXY FOR QUALITY?

Ludwig-Maximilians-Universität München
221,945 followers
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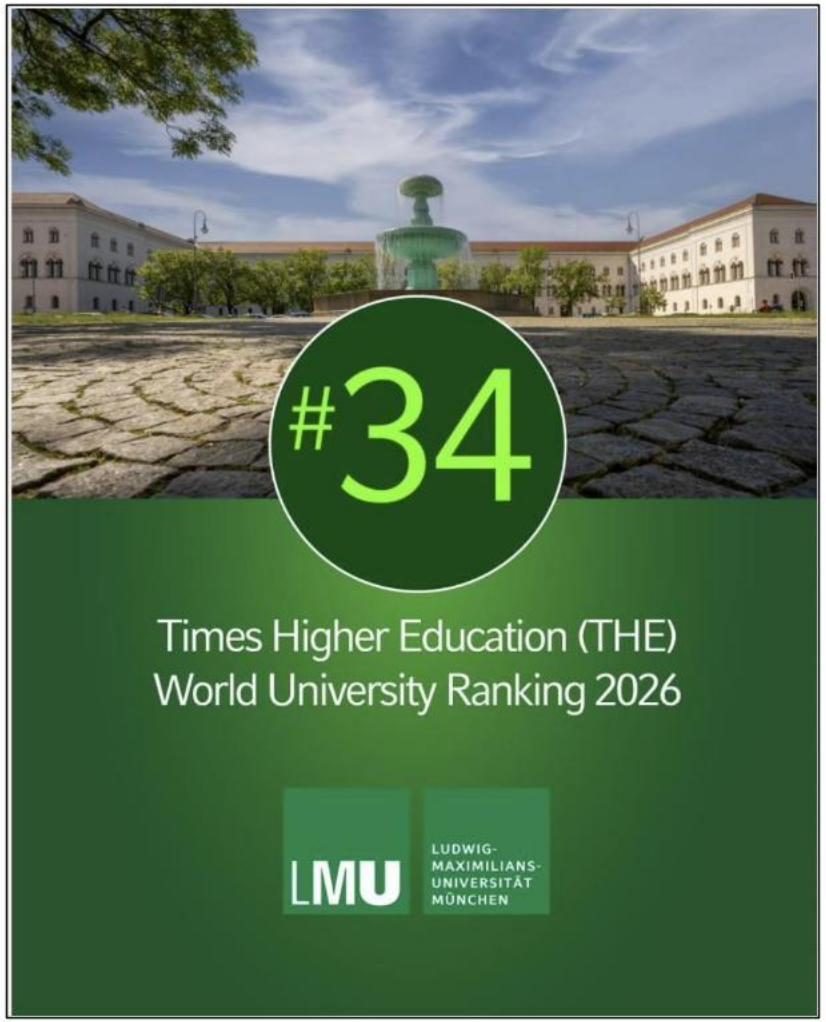
#LMU rises to 34th in the world in THE Rankings

In the highly regarded **Times Higher Education** (THE) World University Rankings 2026, LMU has placed 34 in the world – a significant improvement on last year's result (ranked 38). LMU thus retains its standing as one of the best universities in the world. In the **#EU**-wide comparison, moreover, it has maintained its strong position at #2 in the ranking.

This year's **#THE** Rankings encompass almost 2,200 universities from 115 different countries. The evaluation is based on 18 indicators in categories such as **#teaching**, **#research**, **#knowledge** transfer, and in particular **#citations** in academic publications.

As usual, the list is topped by leading universities from Britain and the United States. The University of Oxford is in first place, followed by Massachusetts Institute of Technology in second, while Princeton University and the University of Cambridge share third.

#LMUMunich #THERanking #TimesHigherEducation



https://www.linkedin.com/posts/lmu%2Emuenchen_lmu-eu-the-activity-7382314268987404289-tT9Q?utm_source=share&utm_medium=member_desktop&rcm=ACoAABa-g44B69Plc4H-20rRu3hQuwG8zVA7GwI

Sapienza Università di Roma
488,145 followers
1d ·

📸 La #fotoSapienza di oggi ⬆️ TOP
Sapienza sale al 170° posto nella classifica internazionale stilata dall'agenzia THE-Times Higher Education

La nuova edizione del "World University Rankings" pubblicata questa mattina vede un miglioramento della nostra Università di 15 posizioni a conferma di un costante trend di crescita

📈 In particolare Sapienza migliora la sua performance in 3 dei 5 ambiti che considera la classifica: Teaching, Research Environment e International Outlook

🔗 [leggi tutto su ➡️ bit.ly/sapienza-the2026]

. . .

#fotoSapienzadelgiorno #TheUniRankings
#orgoglioSapienza #IoScelgoSapienza
(foto da Instagram.com/SapienzaRoma)

https://www.linkedin.com/posts/sapienzauniversitadiroma_fotosapienza-fotosapienzadelgiorno-theunirankings-activity-7382172509586157568-dAIY?utm_source=share&utm_medium=member_desktop&rcm=ACoAABa-g44B69Plc4H-20rRu3hQuwG8zVA7GwI

World University Rankings 2026

https://www.timeshighereducation.com/world-university-rankings/latest/world-ranking

2024

=30	Technical University of Munich Germany	82.5
=38	LMU Munich Germany	79.0

2026

27	Technical University of Munich Germany	83.4
34	LMU Munich Germany	79.7

=170	Sapienza University of Rome Italy	

Rank	Name	Overall
1	University of Oxford United Kingdom	98.2
2	Massachusetts Institute of Technology United States	97.7
=3	Princeton University United States	97.2
=3	University of Cambridge United Kingdom	97.2
=5	Harvard University United States	97.1
=5	Stanford University United States	97.1
7	California Institute of Technology United States	96.3
8	Imperial College London United Kingdom	94.7
9	University of California, Berkeley United States	94.4
10	Yale University United States	94.1

2025 Academic Ranking of World Universities

https://www.shanghairanking.com/rankings/arwu/2025

University of Munich

Academic Ranking of World Universities

42
Academic Ranking of World Universities

2021	2022	2023	2024	2025
48	57	59	43	42

Technical University of Munich
Germany
ARWU 2025 45

101-150 Sapienza University of Rome
Italy

Harvard University United States	ARWU 2025	1
Stanford University United States	ARWU 2025	2
Massachusetts Institute of Technology United States	ARWU 2025	3
University of Cambridge United Kingdom	ARWU 2025	4
University of California, Berkeley United States	ARWU 2025	5
University of Oxford United Kingdom	ARWU 2025	6
Princeton University United States	ARWU 2025	7
Columbia University United States	ARWU 2025	8
California Institute of Technology United States	ARWU 2025	9
University of Chicago United States	ARWU 2025	10

QS WORLD UNIVERSITY RANKINGS

QS World University Rankings 2026: Top global universities

https://www.topuniversities.com/world-university-rankings

=22	Technical University of Munich	Munich, Germany
=58	Ludwig-Maximilians-Universität München	Munich, Germany
128	Sapienza University of Rome	Rome, Italy

The top 10 in the QS World University Rankings 2026

1. Massachusetts Institute of Technology (MIT), US
2. Imperial College London, UK
3. Stanford University, US
4. University of Oxford, UK
5. Harvard University, US
6. University of Cambridge, UK
7. ETH Zurich, Switzerland
8. National University of Singapore (NUS), Singapore
9. University College London (UCL), UK
10. California Institute of Technology (Caltech), US

CWTS Leiden Ranking Open Edition

Leiden University

Meaningful metrics

https://open.leidenranking.com

71	Sapienza Univ Rome	
92	Tech Univ Munich	
154	Ludwig-Maximilians-Univ München	

Time period, field, and region/country

Time period: 2020–2023

Field: All sciences

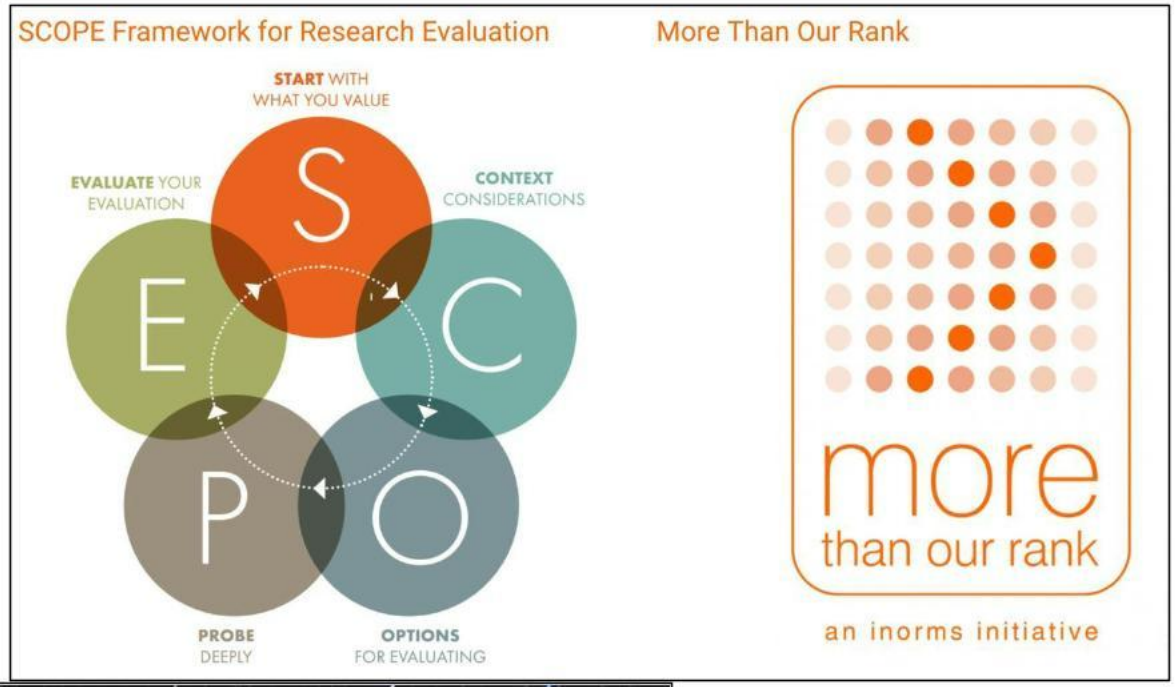
Region/country: World

Min. publication output: 100

	University	
1	Harvard Univ	
2	Shanghai Jiao Tong Univ	
3	Zhejiang Univ	
4	Sichuan Univ	
5	Cent S Univ	
6	Sun Yat-sen Univ	
7	Univ Toronto	
8	Huazhong Univ Sci & Technol	
9	Peking Univ	
10	Tsinghua Univ	

inorms

https://inorms.net/



DORA

San Francisco Declaration on Research Assessment

https://sfdora.org/
https://sfdora.org/read/

There is a pressing need to improve the ways in which the output of scientific research is evaluated by funding agencies, academic institutions, and other parties.To address this issue, a group of editors and publishers of scholarly journals met during the Annual Meeting of The American Society for Cell Biology (ASCB) in San Francisco, CA, on December 16, 2012. The group developed a set of recommendations, referred to as the San Francisco Declaration on Research Assessment. We invite interested parties across all scientific disciplines to indicate their support by adding their names to this Declaration.

Lessons learnt

Indicators/Indices

Single indicator or index

Set of indicator: multivariate collection of indicators

Scoreboard/dashboard: concise lists of key performance indicators (often derived from a larger set) which are used to assess progress against specific targets

Synthetic indicator: also obtained by aggregating several basic indicators, the aggregation takes place at the level of the 'individual'; a synthetic indicator can measure a uni-dimensional or multi-dimensional underlying theoretical concept that is well-defined in the literature

Composite indicator/index: individual indicators with different units of measurement are combined into a single measure

Ranking: Order according to an indicator/index

Composite Indicators Critique

"The second [argument against composite indicators] is a general criticism that is frequently addressed at composite indicators, i.e. the arbitrary character of the procedures used to weight their various components. ... The problem is not that these weighting procedures are hidden, non-transparent or non-replicable—they are often very explicitly presented by the authors of the indices, and this is one of the strengths of this literature. The problem is rather that their normative implications are seldom made explicit or justified."

Stiglitz, Sen, Fitoussi Report (2009 http://library.bsl.org.au/jspui/bitstream/1/1267/1/Measurement_of_economic_performance_and_social_progress.pdf

"No single metric will ever provide a good measure of the health of a country, even when the focus is limited to the functioning of the economic system. Policies need to be guided by a dashboard of indicators informing about people's material conditions and the quality of their lives, inequalities thereof, and sustainability."

Stiglitz, Fitoussi, Durand Report (2018) https://www.oecd-ilibrary.org/content/publication/9789264307292-en

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Official Statistics

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To be covered in a conceptual frame

Theoretical: Definition of phenomena and selection of variables using a theory (i.e. qualitative); definition of the relevant survey system (geographical, content-related, etc.)

Empirical: Data sources and producers relevant for quantifying a phenomenon; survey methodology; sample; representativeness, etc.

Aggregation: Methods to reduce complexity; analysis of multivariate datasets; dimensional analysis; alignment of different scales; ordering; standardisation; normalisation; aggregation; averaging; weighing

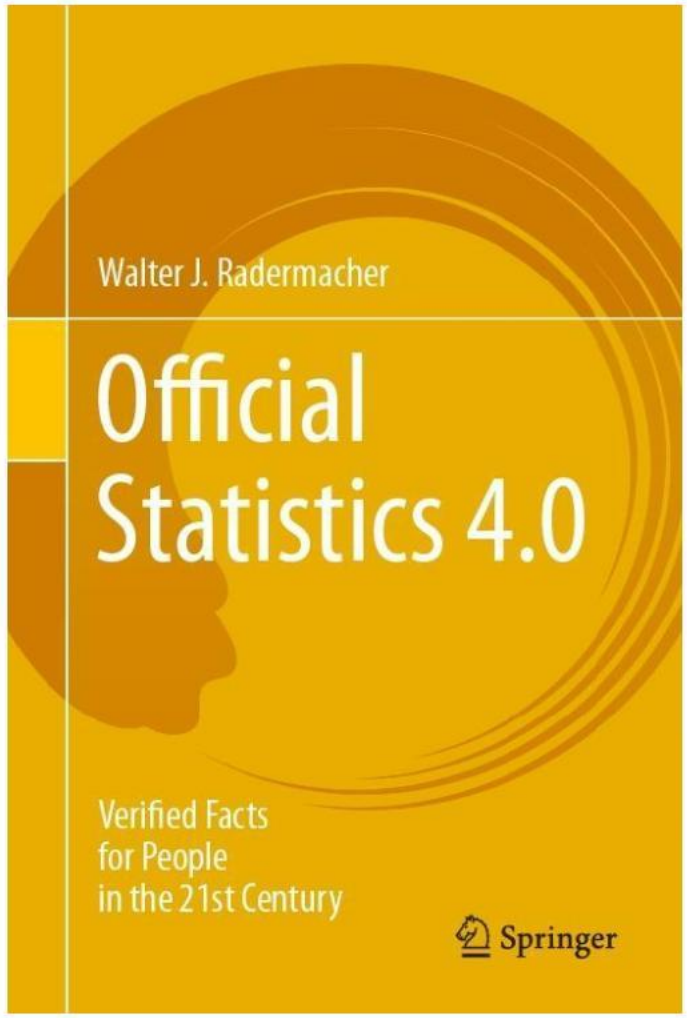
Political: Relevance for decision-making processes (augmented or automated); recognition, weight and authority in public discourse; observable feedback on the behaviour and actions of the clientele under observation; critical discussion of the indicator

Goals: Existence of quantitative targets (consistent with the indicator?), neutral monitoring and transparent feedback loop

Communication: Target group-specific communication; transparency; communication of methodological limitations, weaknesses and risks; labelling of quality levels

Governance: Professional independence (an arm‘s length distance from politics); neutral certification of quality; (social) mandate/licence that is adequate and comprehensible

MUCHAS GRACIAS
MUITO OBRIGADO
VIELEN DANK
THANK YOU
MERCI BIEN



https://www.springer.com/gp/book/9783030314910

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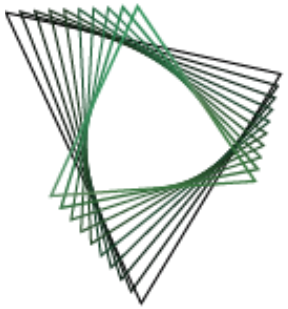

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