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CHEMNITZ

Impact & visibility in scientific research

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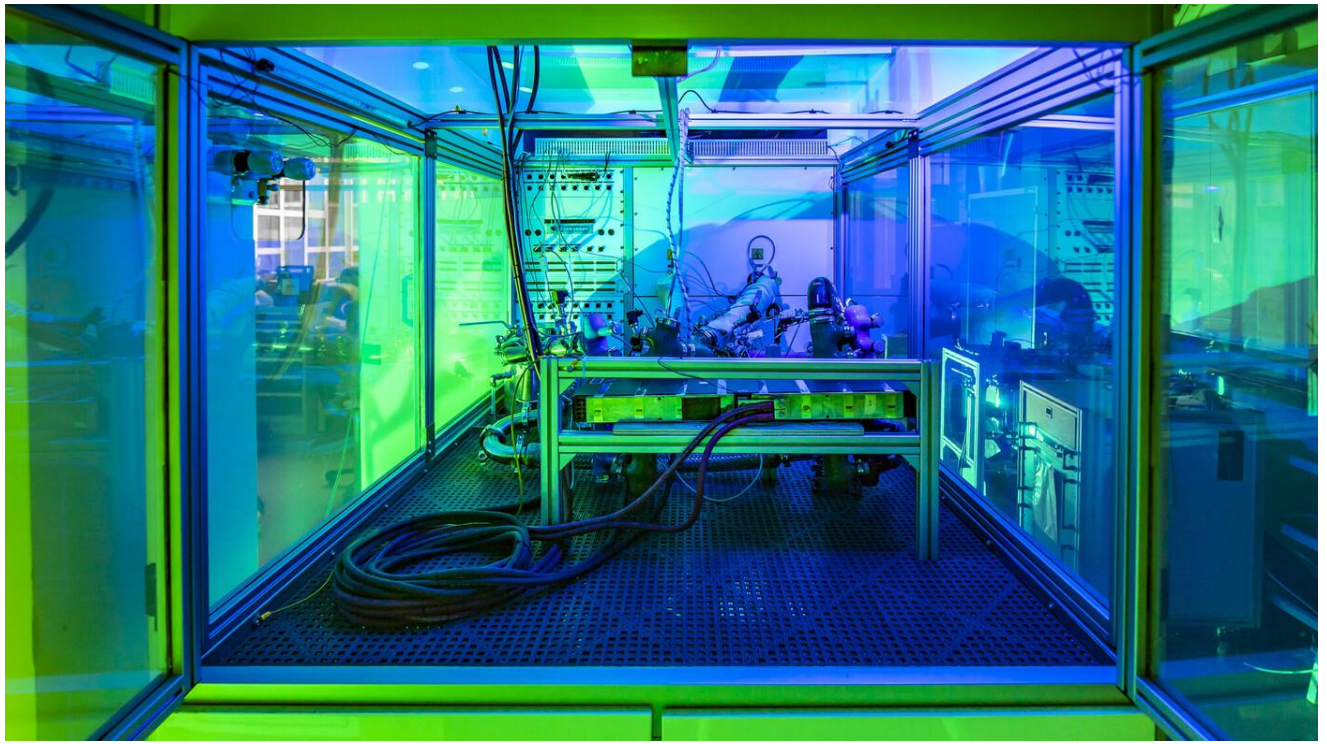
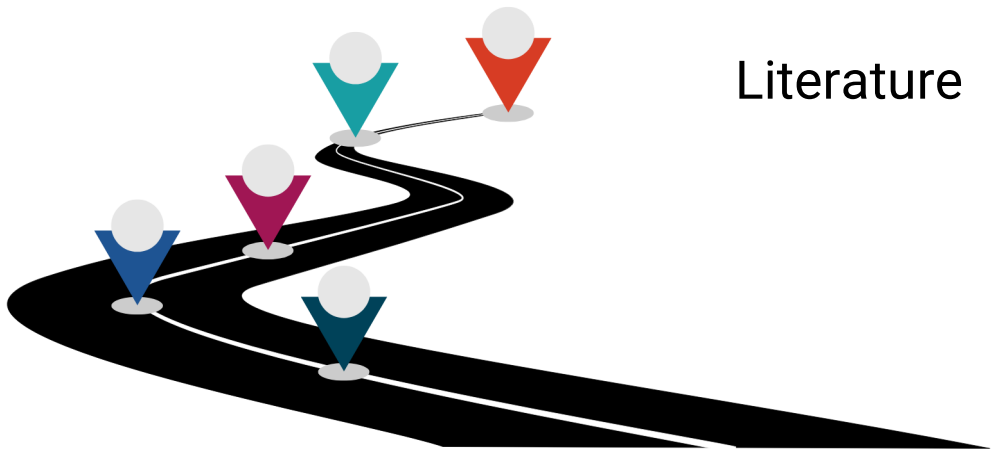


Image 1 by Jacob Müller: Research – Fuel cell laboratory Chemnitz University of Technology

What we are going to talk about

1. Impact – what is the impact of your publication?
2. Metrics – how to measure impact
3. Visibility – how to improve the impact of your publication
4. Responsible Research Assessment (RRA)

Literature



What is the impact of your publication?

(Ravenscroft, 2017)

Definition

- Impact should show how scientific work, especially publications, affect the world around us
- Impact is often equaled with value, prestige or relevance – actually shows dissemination of knowledge among scientists

Aspects of impact

What is changing?

(Williams, 2020)

- Effective (comprehensive) impact increasingly involves not only scholarly or economic outcomes but also the ability to affect (and assess) change via **policy, practice, or the media**
- Attainment and maintenance of **capital (i.e. symbolic power or status)** in various fields beyond academia

Types of impact

Into society – comprehensive impact

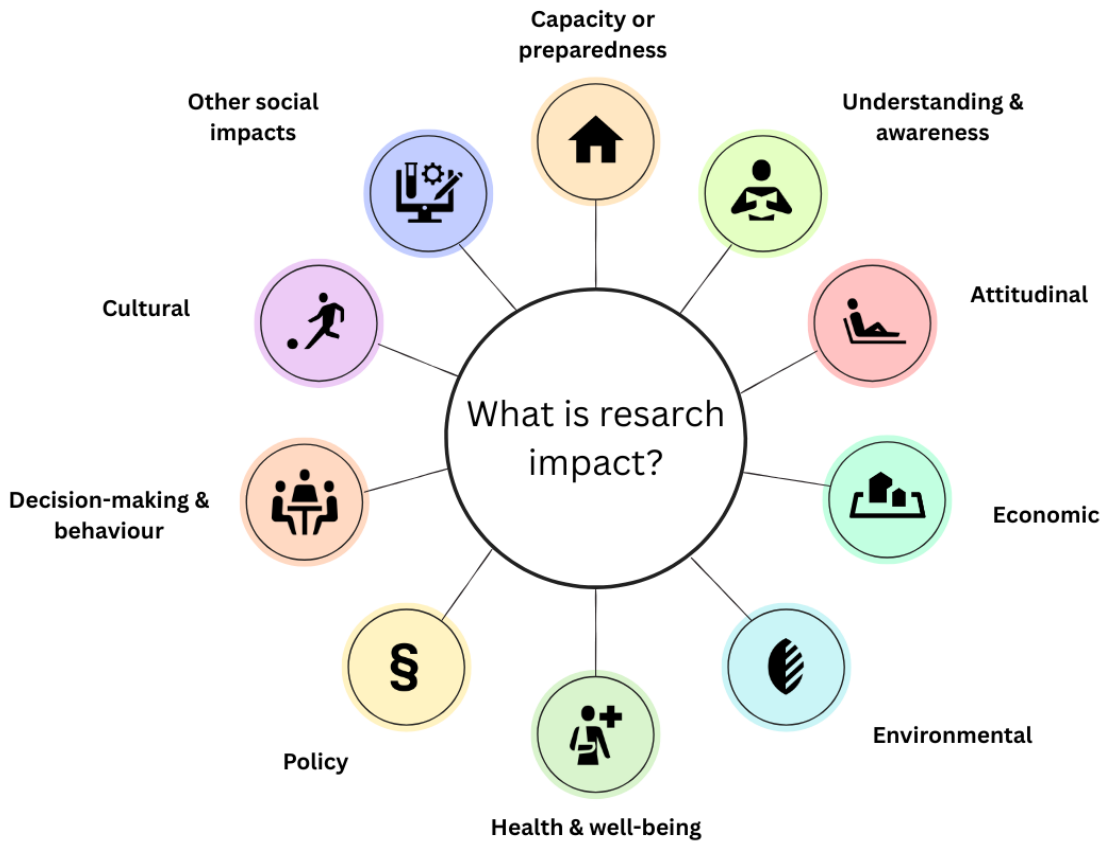


Image 2: Ten types of impact; based on the work of Mark Reed

[Categorisation by Mark S. Reed]:

- Checklist for full range of possible impact
- Impact in the sense of benefits to society
- Benefits or changes to individuals/groups in society or society itself

Problems with societal impact

Complex pathways and time-lag

(Rogers & Filchenko, 2026)

- Lack of data
- Balancing quantitative and qualitative assessment
- Multiple assessment needs require multiple approaches
- Time lag between research and observed impact
- Attribution of societal impact to any given piece of research

Impact vs. quality

Quality of scientific output

Impact is also often referred to as a quality signal, **but:**

Impact depends on many factors, like length of career, discipline/ subject, networks or past publications

→Impact should not be equated with quality!

Publications in University Bibliography

All publications should be entered in University Bibliography; evaluations take these as database

✓hosted at the university

✓scientists can manage publications on their own

✓no impact measured except through publication itself

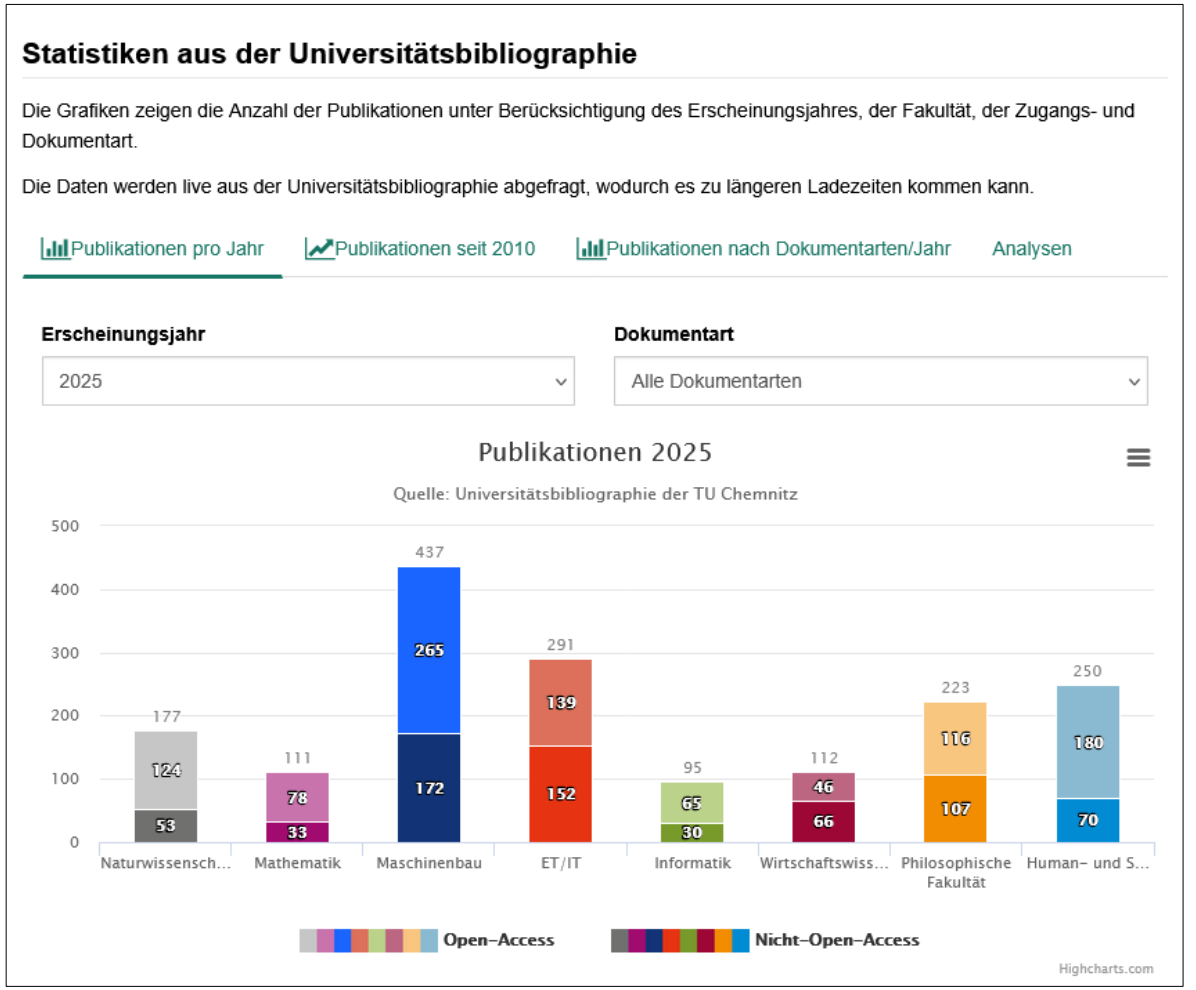


Image 3: Chemnitz University Publications 2025

Building blocks for impact

[Model by DORA](#) (San Francisco Declaration of Research Assessment); wide variety of academic achievements and outcomes that could be considered “impactful”

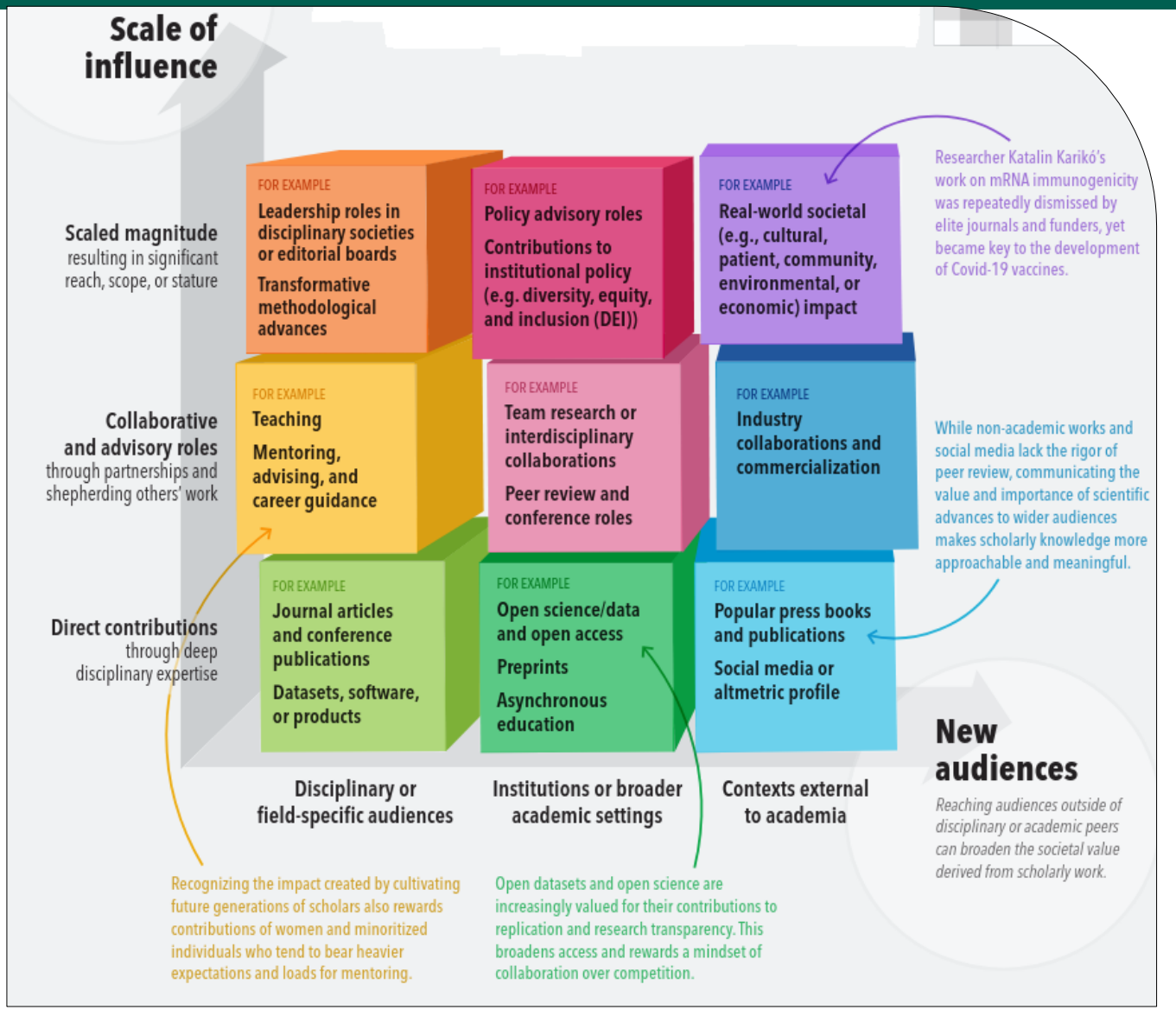


Image 4: Building blocks for impact by DORA

Field-specific impact

Section 1 – peers in the subject

Disciplinary or field-specific audience:

- **direct contributions** to scientific discourse: journal articles, conference papers, book chapters, research data, software
- **collaborative & advisory roles:** teaching, mentoring, advising
- **scaled magnitude:** leadership roles, board membership, new methods

Section 2 – academic audience

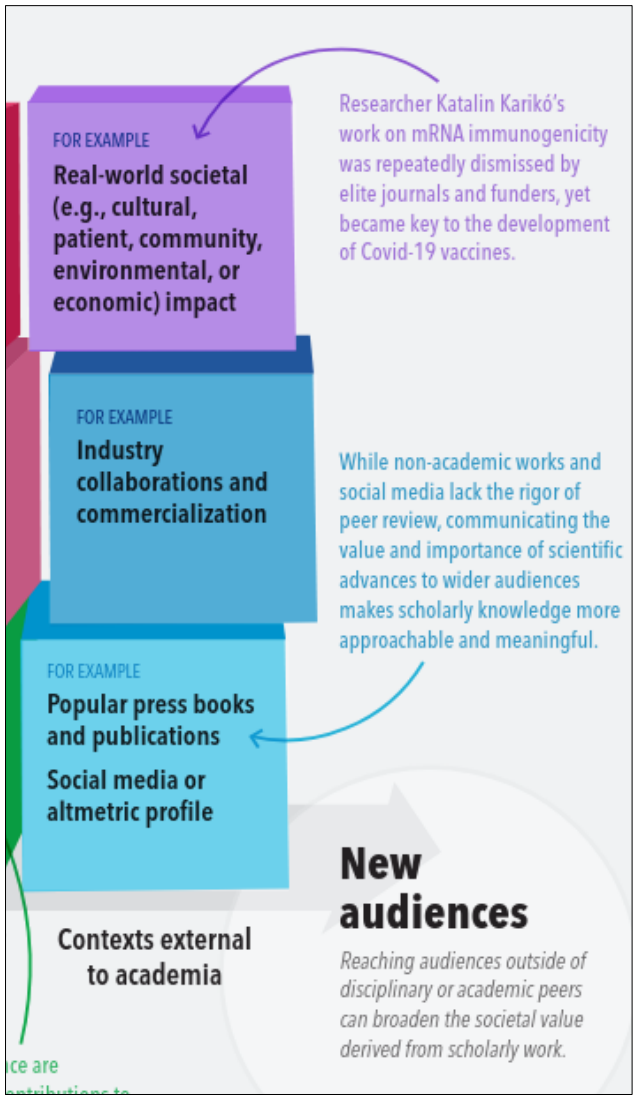
Institutional or broader academic setting:

- **direct contributions:** publishing open access; open science (open data, open source, etc.) preprints → collaboration, replication
- **collaborative & advisory roles:** team research, interdisciplinary projects, peer review, active roles in conferences
- **scaled magnitude:** policy advisory roles, contributions to policies

Section 3 - External audience

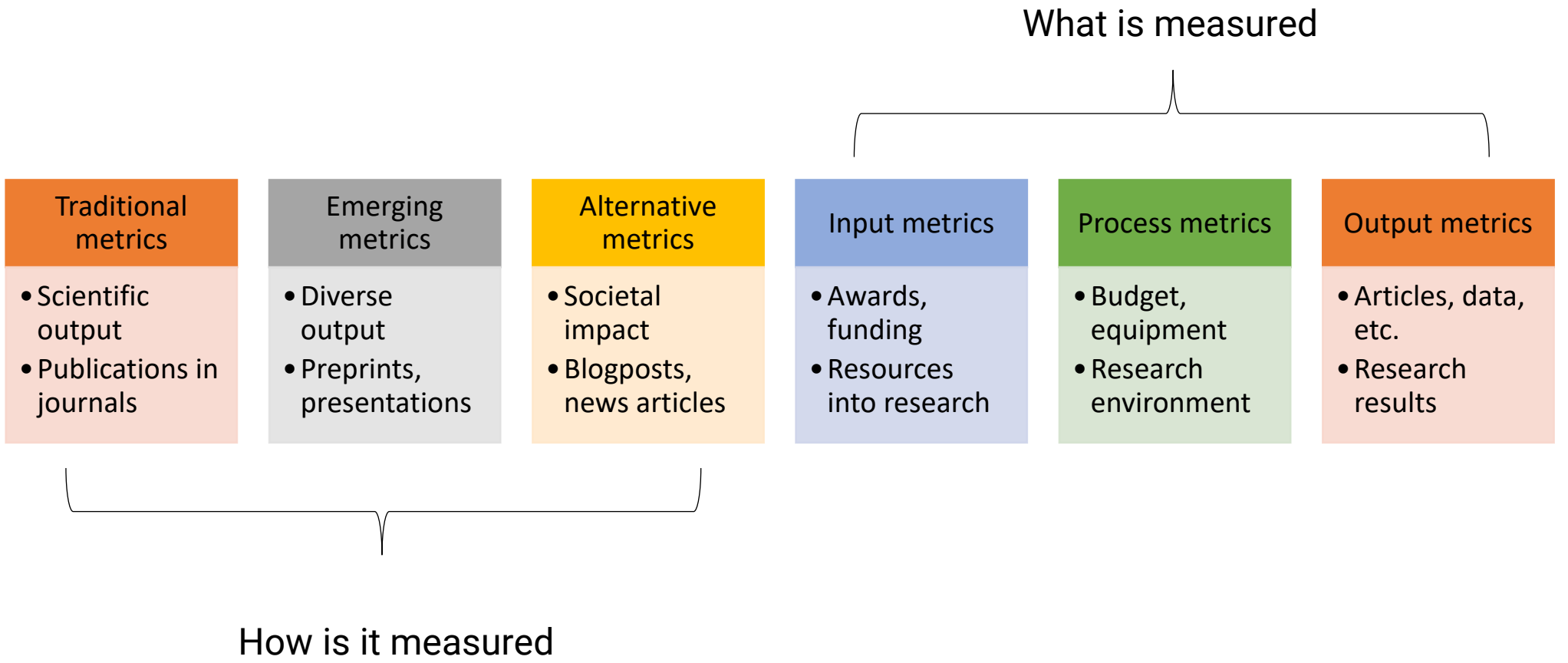
Contexts external to academia:

- **direct contributions:** popular press publications, (academic) social media profile
- **collaborative & advisory roles:** industry collaborations



- **scaled magnitude:** real-world societal impact (for example research on mRNA during Covid pandemic)

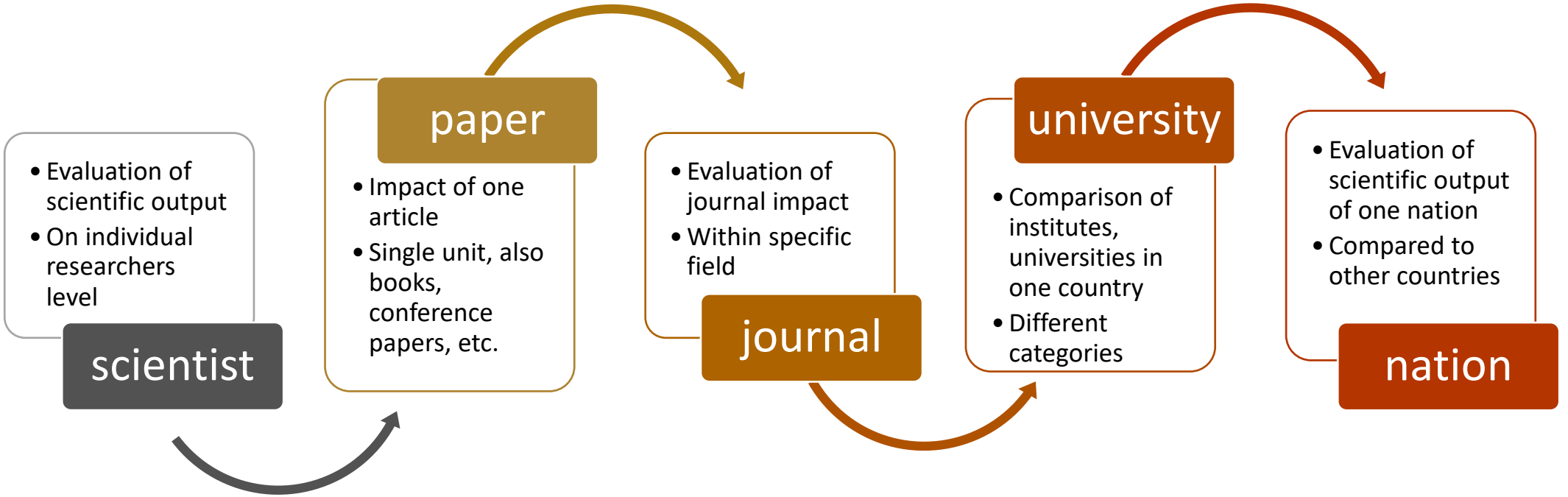
Impact and metrics



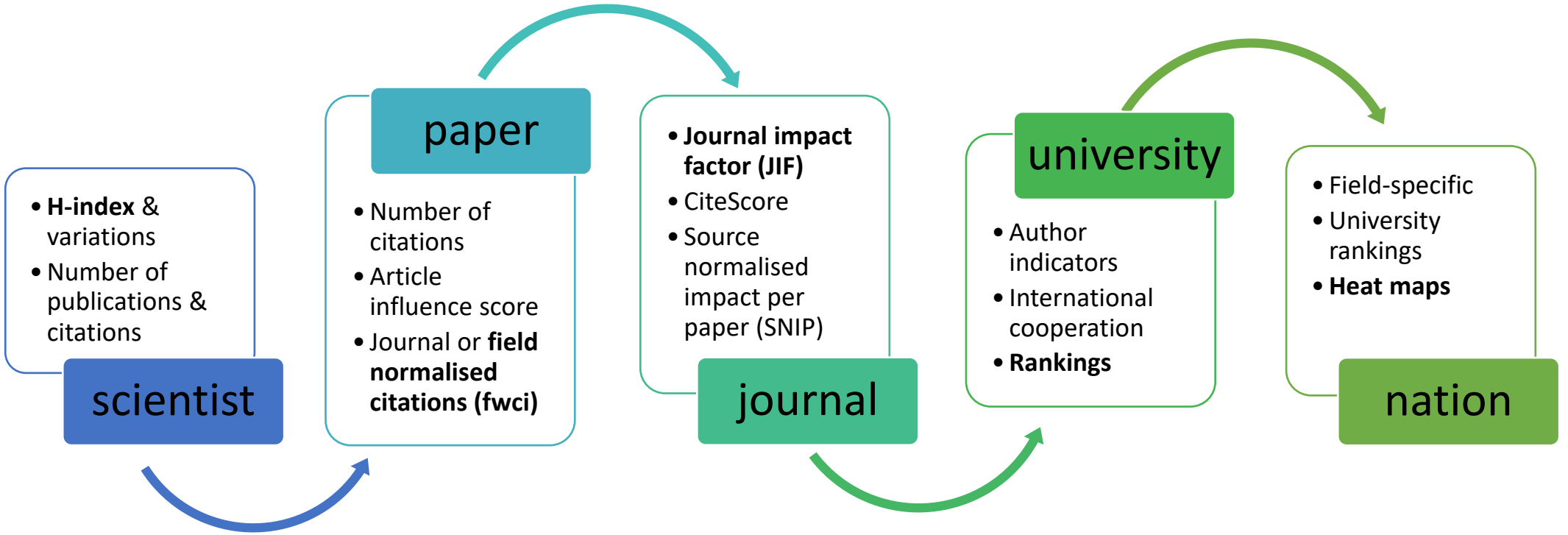
Traditional metrics

Traditional metrics are **often used** in research evaluation, but there are many **problems** connected with them

Traditional metrics on different levels



How is it often measured?



Input metrics

Definition

- focus on the resources and investments that go into scientific research
- inputs can include funding, human capital, and infrastructure
- more substantial investments = greater output and, ideally, more significant advancements in science and technology

Examples of input metrics

What can be measured?

(Colledge, 2017)

- **Applications volume** (calculates the number and price, or amount applied for, of research grant applications that are submitted to external funding bodies)
- **Awards volume** (calculates the number and value of awards from external funding bodies)
- **Research student funding** (number and proportion of research students whose tuition fees are funded by each category of funder types)

Process metrics

Definition

(Colledge, 2017)

➢ How research is done; focus on research environment and culture

Examples:

- **income volume**: value of awarded budget from external research awards that has been spent; answers the question of whether the institution is undertaking more or less externally funded research than in the past
- **research student to academic staff ratio** (average number of research students per researcher)

More diverse process metrics

What should be measured?

(Tijdink et al., 2024)

- **Collaboration** (competence to collaborate, teamwork – apart from publications)
- **Supervision** (scientific training and personal development)
- **Teaching** (hours spent, development of new courses, student evaluation)

Standardized research metrics

https://www.elsevier.com/insights/metrics/snowball-metrics

- Developed by universities
- Methodologies that were robustly and clearly defined
- Data source- and system-agnostic, meaning that they are not tied to any particular provider of data or tools
- Reliable information to help understand research strengths and monitor institutional strategies

Output metrics

Definition

➢ Traditional metrics focused on research output like articles, conference papers etc.

- Citation count
- H-index
- Field-weighted citation impact
- Outputs in top percentiles
- Collaboration (national or international, across fields)
- Number of patents
- Patent citation
- Technology transfer (moving research results from academic or public institutions to the commercial sector)

Traditional metrics on researcher level

Important questions to ask:

- What is going to be evaluated and why?
- What do you want to show?
- How can your output be recognised in full?
- What are subject specific difficulties you could encounter?

The h-index

https://www.youtube.com/watch?v=HSf79S3XkJw

Definition

- h number of papers that have been cited at least h times; for example: author with h-index of 10 has ten papers with at least ten citations

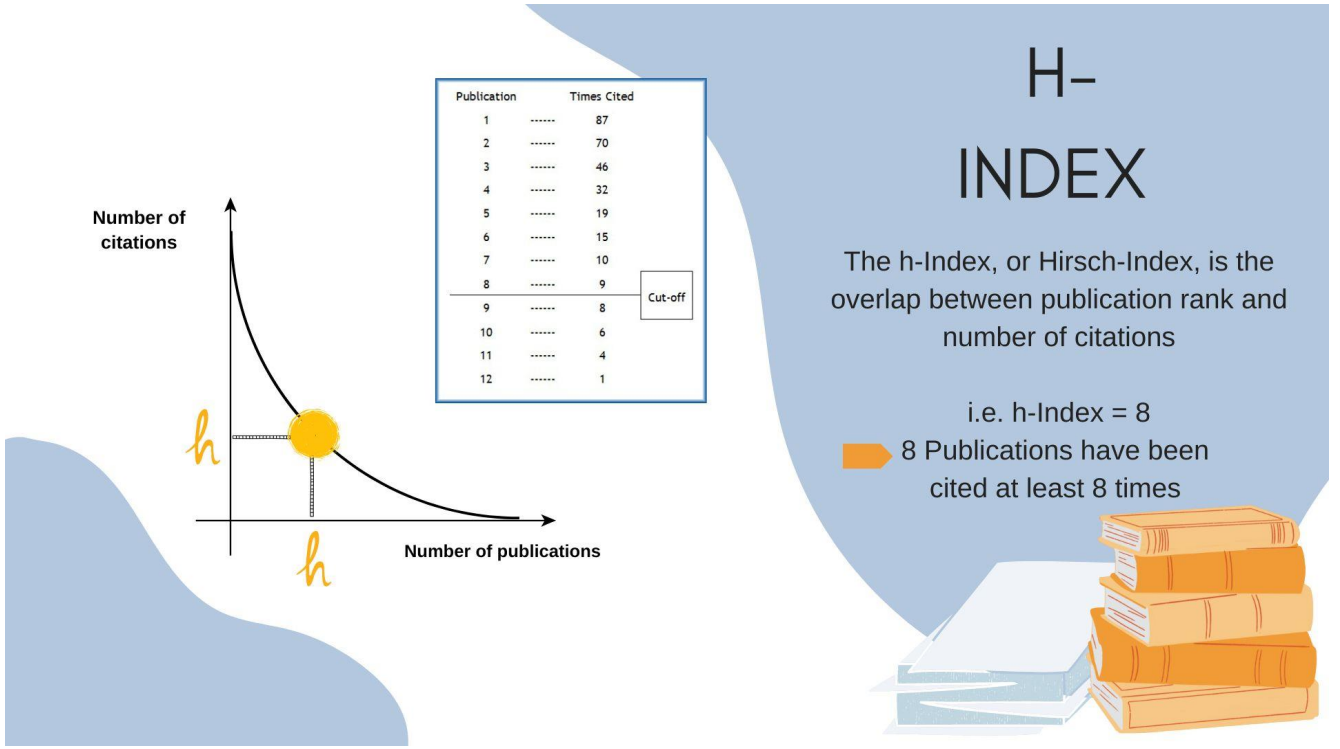


Image 5: H-index

Limitations

Problems of the h-index

- commonly used to compare researchers or monitor “**performance**” but is difficult to interpret meaningfully and can give **inconsistent or counterintuitive** readings of researcher impact
- value depends on the **database** used to derive it (e.g., Web of Science, Scopus, Google Scholar)

Limitations part 2

More problems

- favors researchers at **later career stages** or those who have not taken career breaks, and those in **disciplines with higher citation rates** (e.g., medical sciences vs. mathematics or humanities)
- does not account for the **nature** of the author's contributions to each of their papers; in collaborative disciplines, it may reflect participation in **large teams** rather than individual contributions

Comparison

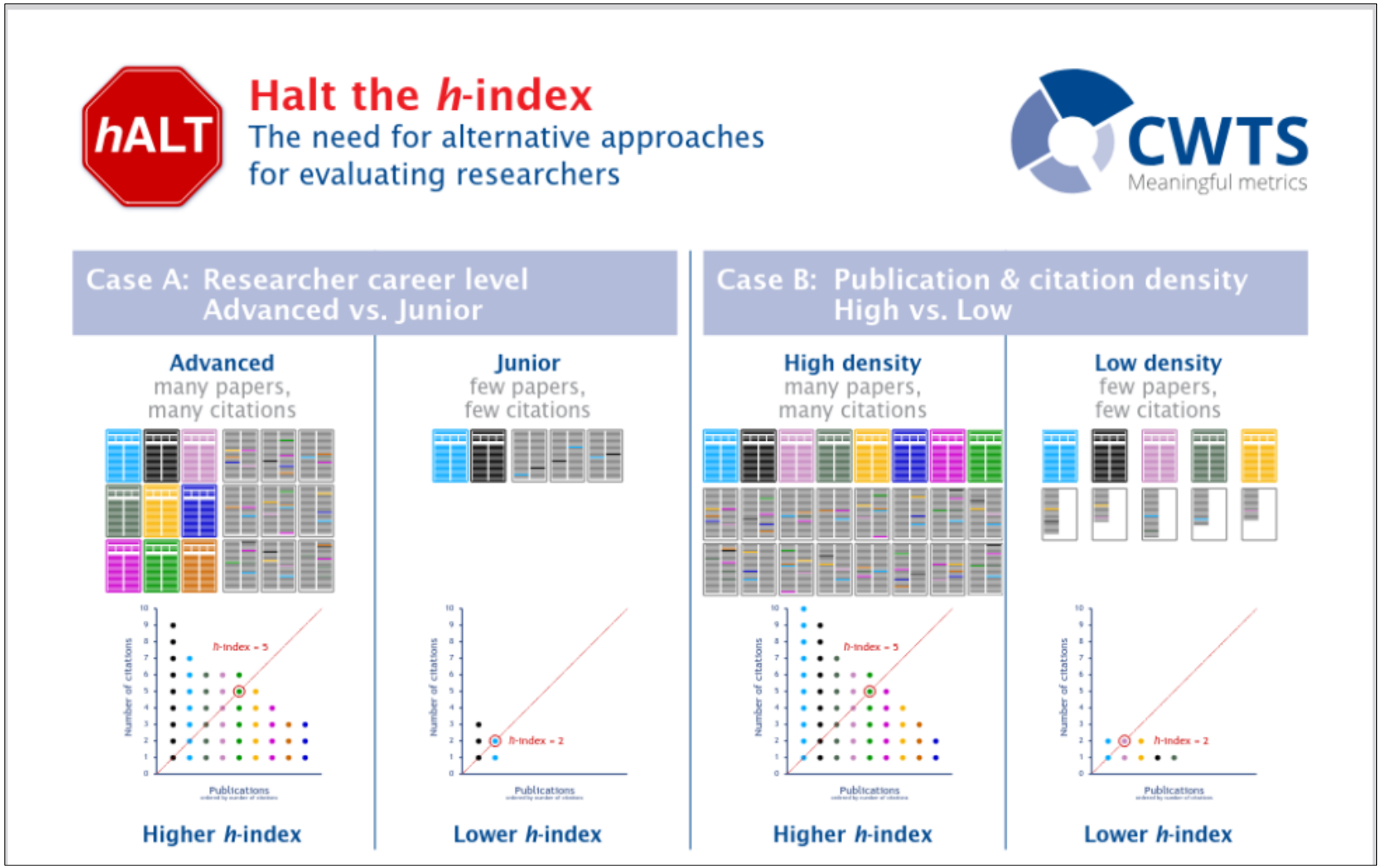


Image 6: Halt the h-index by CWTS Leiden

Field-normalised Indicators

Discipline

Field-normalized citation indicators, such as **Field Weighted Citation Impact (FWCI)** or **Relative Citation Ratio (RCR),** represent attempts to correct differences between fields, types, and ages of publications

FWCI = average ratio obtained by dividing the average number of citations per paper in a collection by the average expected for papers of the same type, year of publication, and field

FWCI – Field-Weighted Citation Index

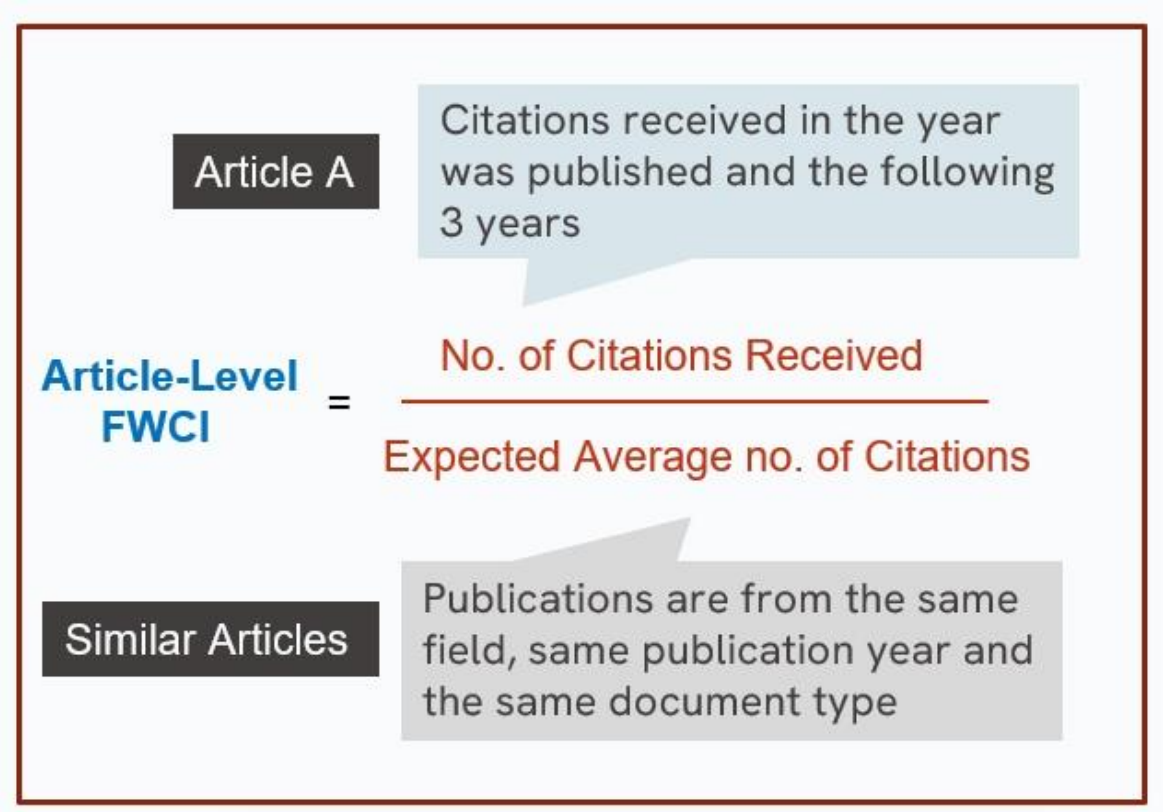


Image 7: Calculation of FWCI

- FWCI = 2 : research has twice the expected number of citations for papers in field
- Only available for Scopus-indexed publications
- Data sources: Scopus or other Elsevier products such as SciVal

Journal Impact Factor

https://youtu.be/4TnFESmd6Ec?si=jPKHmwxKbJeOMyq1

Journal Impact Factor

Definition

- Journal Impact Factor (JIF) is generated by Web of Science
- defined as the annual average number of citations to papers published in a given journal in the two preceding years

Important change to JIF

Reproducibility

- Beginning with the 2025 Journal Citation Reports, citations to and from retracted or withdrawn articles will be **excluded** from the Journal Impact Factor numerator, while those articles will remain in the denominator

Limitations JIF

No proof of article quality

- Measure of the “average citation performance” of papers in a particular journal in the past 2 years, **not a direct measure of the quality** of an individual paper or researcher
- Provides no indication of the wide variation in the **distribution of citations** among articles within a journal, which can span 2-3 orders of magnitude
- Temptation to assume that paper from high JIF journal is better, but: JIF = poor predictor of **citation performance** of individual articles
- No good evidence to support claims that **peer review quality** is higher in high JIF journals

Citation based

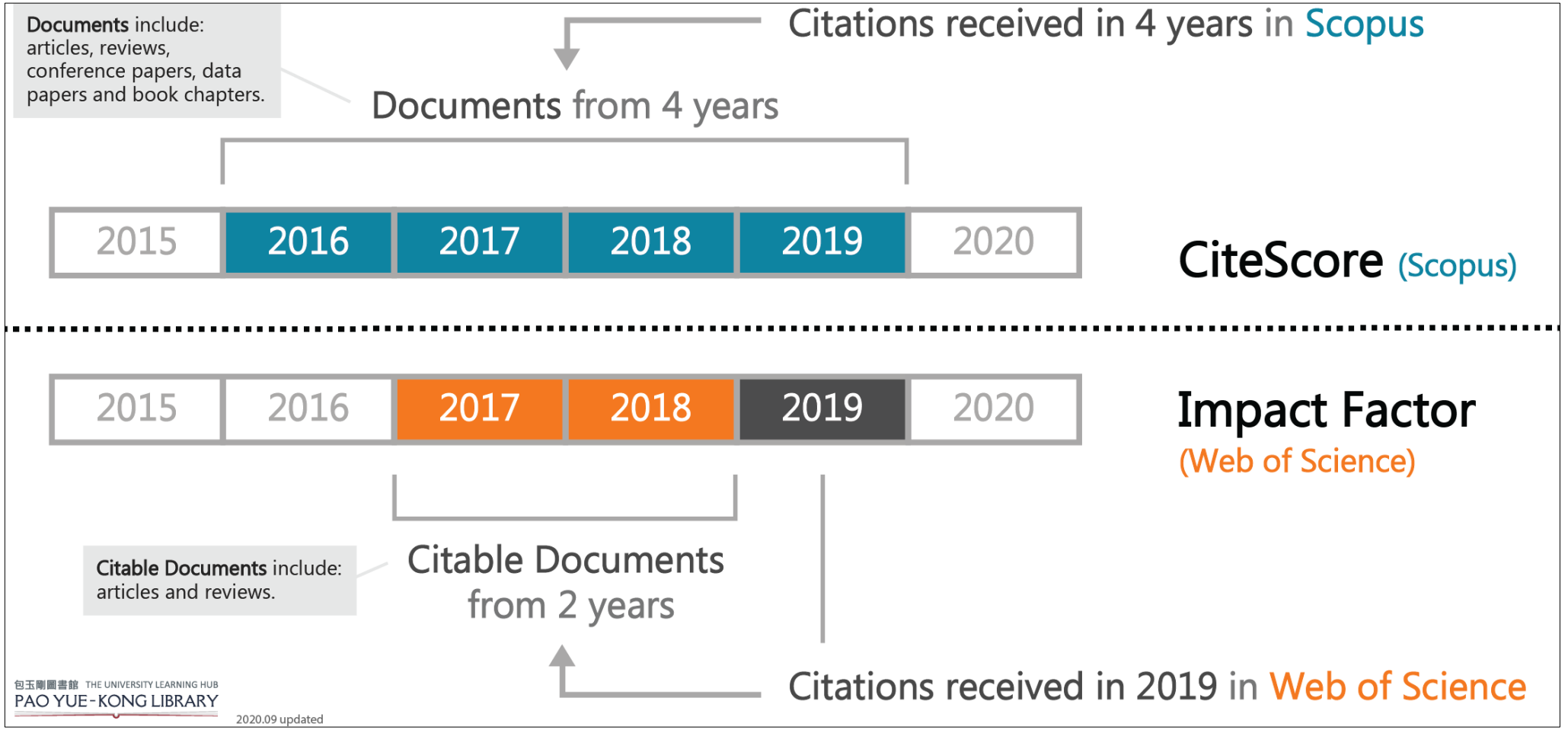


Image 8: Calculation of JIF and CiteScore

JIF & alternatives

- Journal Impact Factor & Journal Citation Indicator – Clarivate Citation Reports, based on Web of Science data; licensed by University Library
- Journal Citation Indicator – bases on Web of Science (licensed by University Library)
- Scimago Journal Rank – freely available, based on Web of Science data
- CiteScore – based on Scopus data (licensed by University Library)
- SNIP (Source Normalised Impact per Publication) – based on Scopus data; freely available via Leiden CWTS Journal Indicators
- Eigenfactor – based on Scopus data; freely available

Rankings

(Ferro & Dip, 2026)

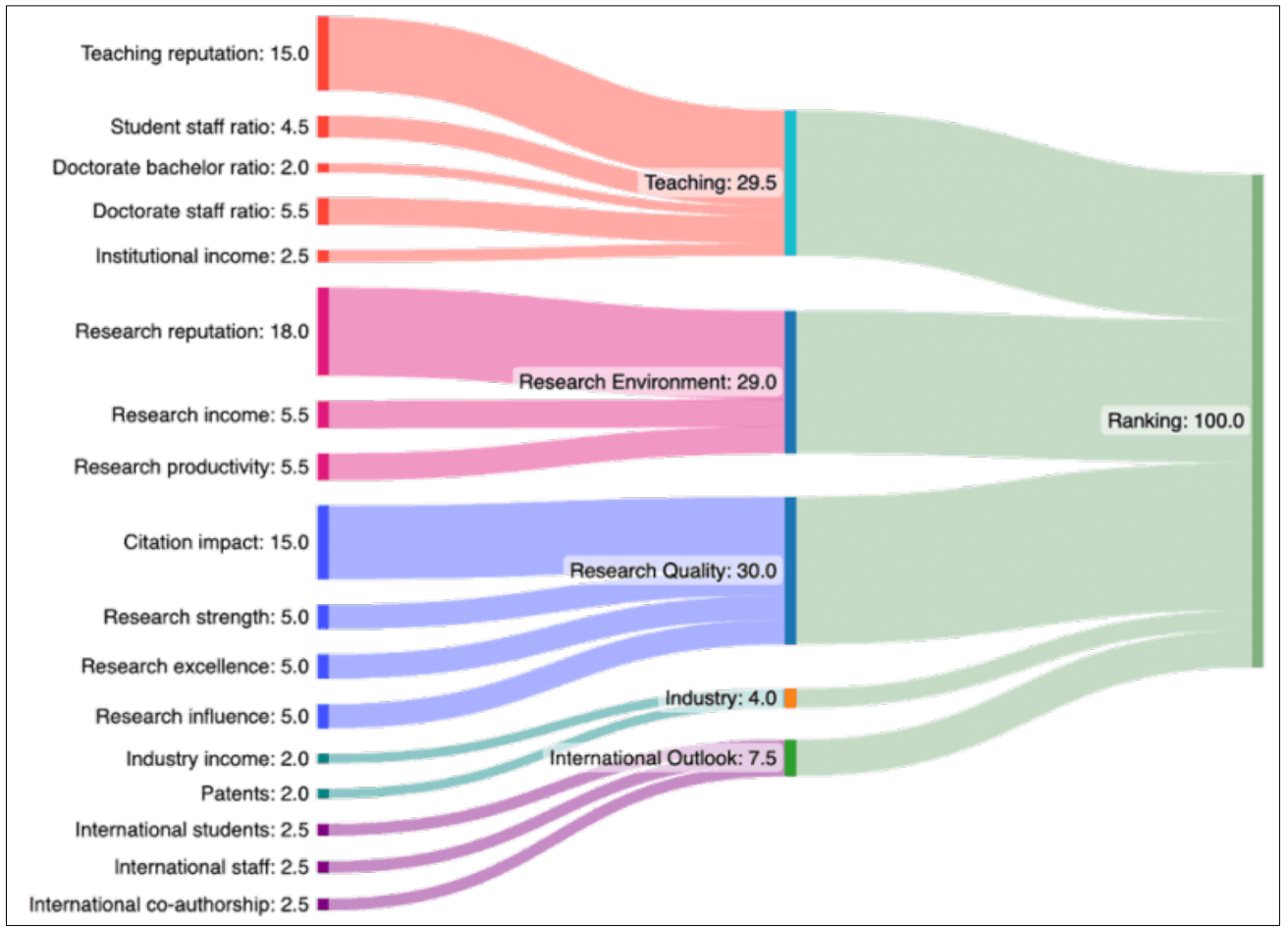


Image 9: THE Ranking methodology

- Times Higher Education THE World University Ranking – focused on research quality
- Academic Ranking of World Universities (ARWU) – focused on publication outputs
- Quacquarelli Symonds (QS) – focus on internationalization and sustainability

Heat map

(Wang et al., 2024)

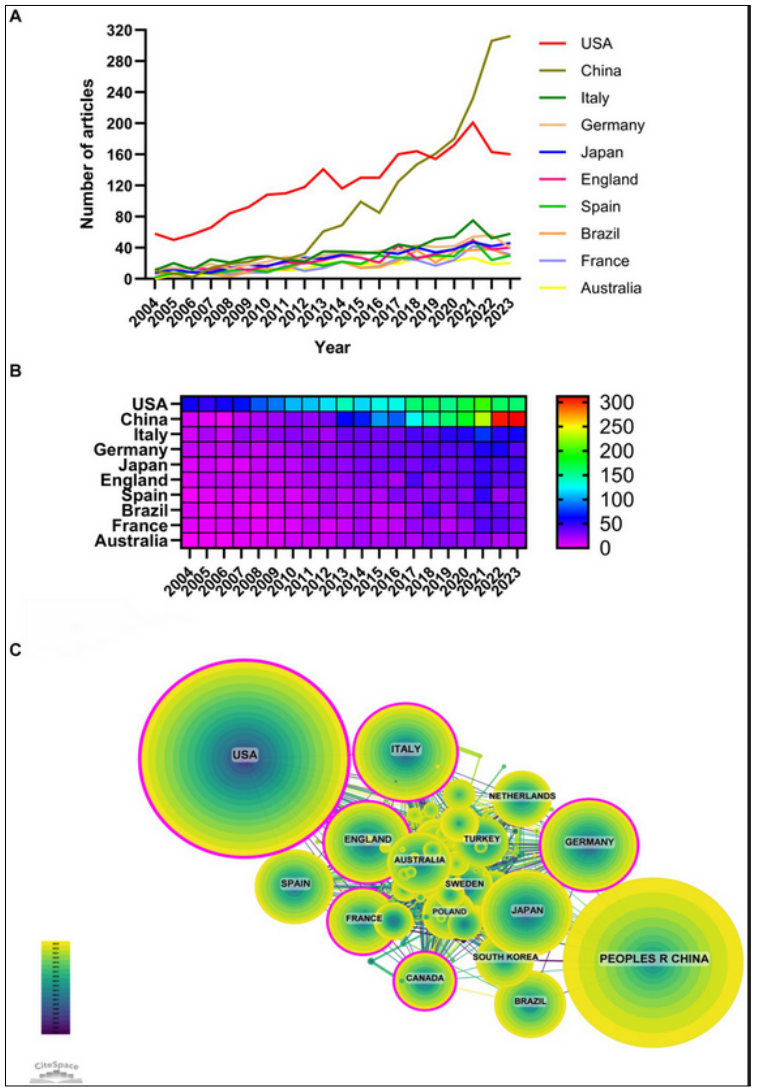


Image 10: Most productive countries with publications on Chronic Kidney Diseases and inflammation

Overview Metrics

Metrics Toolkit

https://metrics-toolkit.org/

- Evidence-based information about research metrics across disciplines
- How each metric is calculated, where you can find it, and how each should (and should not) be applied
- Examples of how to use metrics in grant applications, CV, and promotion packages

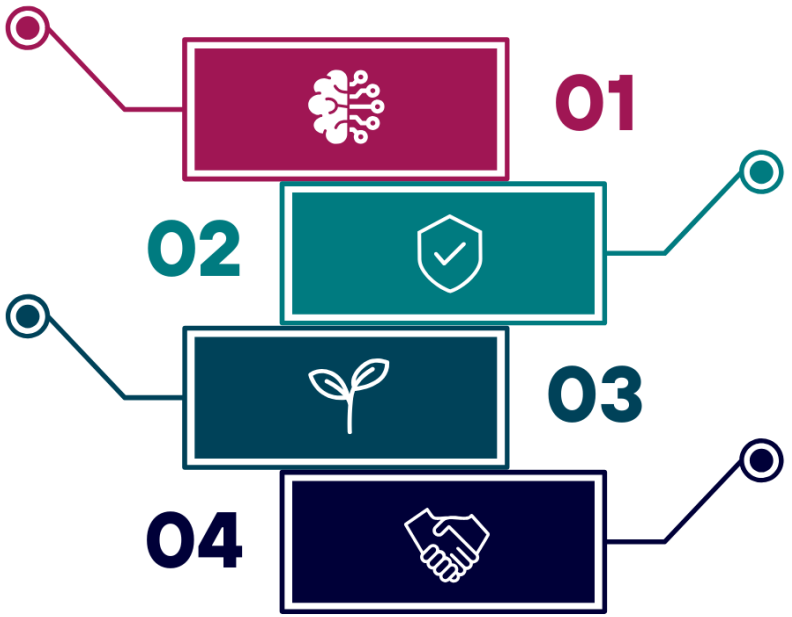
Overall limitations for traditional metrics

1. delayed reflection of impact
2. narrow focus on scholarly citations
3. bias toward certain disciplines, publication types and career stages
4. focus on numbers: numerical measures don't always take wider impact into account
5. lack of consistency: each metric calculated in a different way and often uses proprietary sources of information
6. potential for manipulation: practices such as self or honorary citations
7. developed for different purposes like decision making for libraries

Citations can be influenced by biases

Confirmation bias
The tendency to search for, interpret, favour, and recall information in a way that confirms one's pre-existing beliefs or hypotheses.

Halo effect
When a positive impression of a person in one area influences a positive impression in other areas.



Affinity bias
A tendency to favour people who are similar to us.

Matthew effect
Where resources (like funding) tend to flow to those who already have them, creating a cycle where established researchers gain more recognition and resources than equally talented but less established ones. This can perpetuate existing inequalities.

Flawed system

"The quantification of research impact has created a pressure to publish that harms all scholarly disciplines by creating adverse effects, such as plagiarism, gratuitous self-citation and honorary authorship." (Dorsch et al., 2020)

Alternative metrics

Definition

- to bring together the study of **web-based attention** to research under one term, to “reflect the broad, rapid impact of scholarship”; […] analysis of web hyperlinks, web citations and usage broadened to include **social media** and other similar data sources (Taylor, 2023)

Aggregators and data sources

Ressources for altmetrics

Aggregators:

- Altmetric.com,
- PlumX Analytics,
- ImpactStory,
- Lagotto

Data sources: Mendeley, X, news, blogposts, policies, Wikipedia

What is measured?

Altmetrics and PlumX

- Citations
- Usage (clicks, downloads, views)
- Mentions (in blog posts, Wikipedia, news articles, etc.)
- Readers
- Shares
- Comments
- Captures (bookmarks, code forks, favorites, etc.)

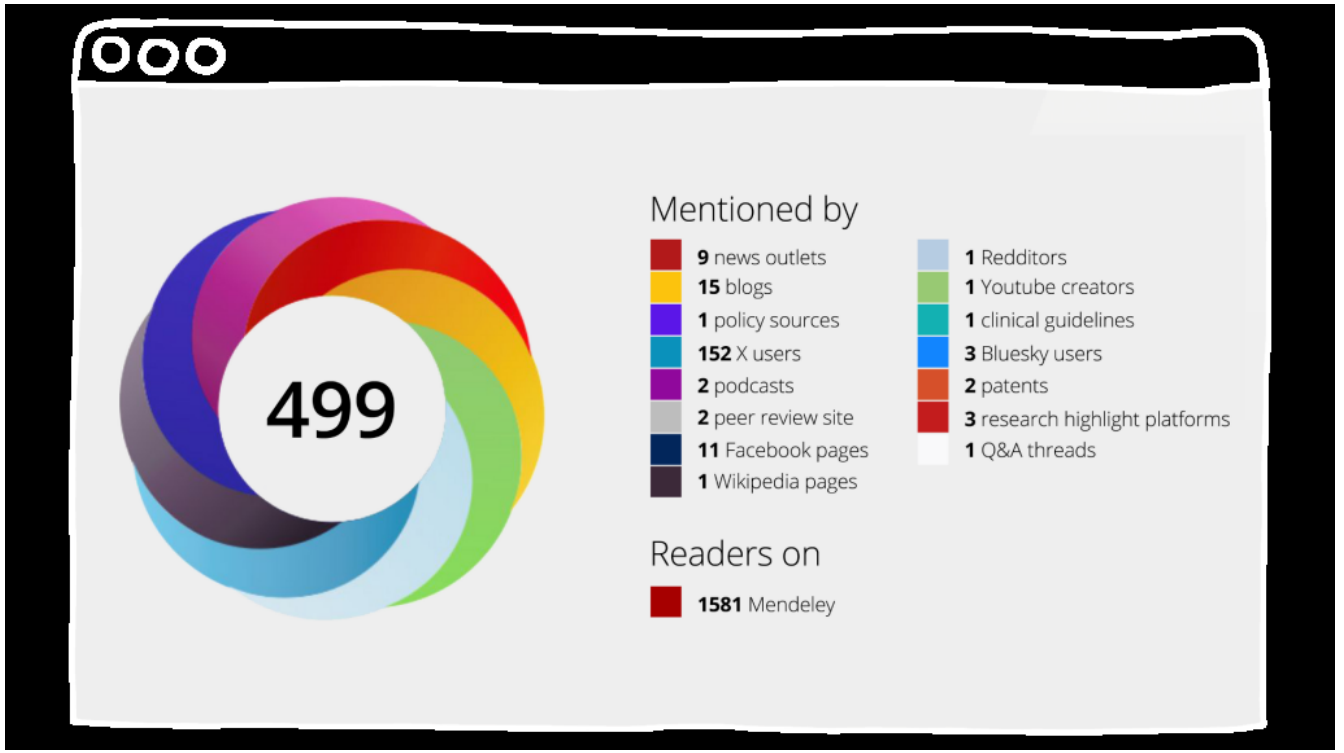


Image 11: Altmetrics donut

Weaknesses of altmetrics

Compared to traditional metrics

(Ellegaard, 2026)

1. lack of standardization across platforms
2. favoring disciplines with online visibility
3. lack of validated data

What is the visibility of your publication?

(Metag, 2021)

Definition

➢ Visibility is a construct consisting of three interrelated empirical attributes:

(1) the availability of information,
(2) approval to share information, and
(3) the accessibility of information to third parties

Publications in University Bibliography

All publications should be entered in University Bibliography; evaluations take these as database

✓hosted at the university

✓scientists can manage publications on their own

✓no impact measured except through publication itself

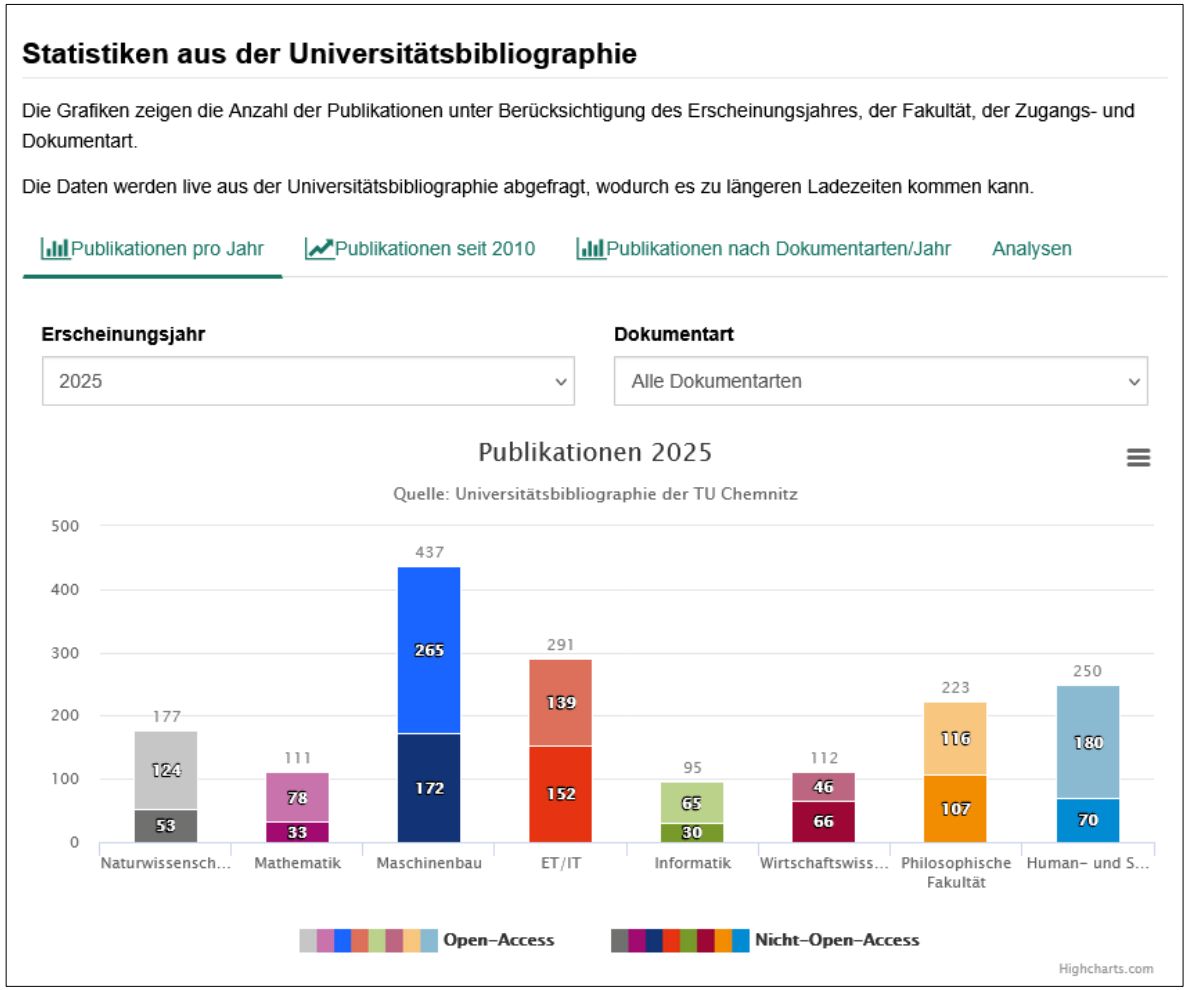


Image 2: Chemnitz University Publications 2025

Options

(Metag, 2021)

- Before publishing:
  - Keywords, clear title & abstract,
  - Clear and consistent naming (affiliation, researcher name, use of IDs like ORCID)
  - Publish in English (if appropriate)
- Publishing:
  - Open Access
  - Publishing data, code, etc. alongside paper (open if possible)
  - Check rights with publisher for green open access, use standardised licensing
- After publishing:
  - Using (academic) social media
  - Networking, conferences, co-authors across fields or nationality (if it makes sense)
  - Communication to society (if it makes sense) – news coverage, blogs, educational videos

OA Publisher

- DEAL
- funding

Image 12: Gold Open Access

Post-Print

- repository
- rights

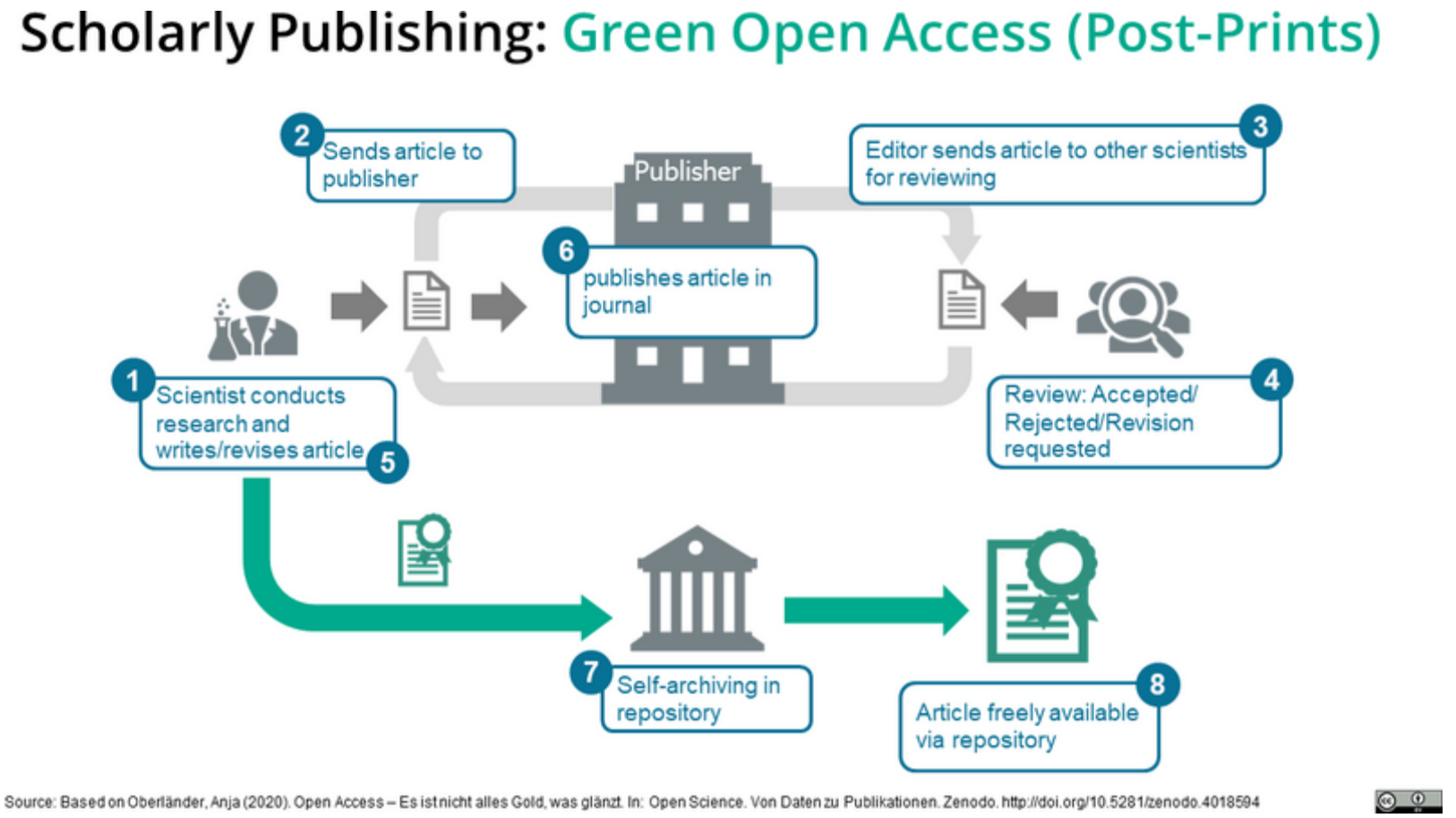
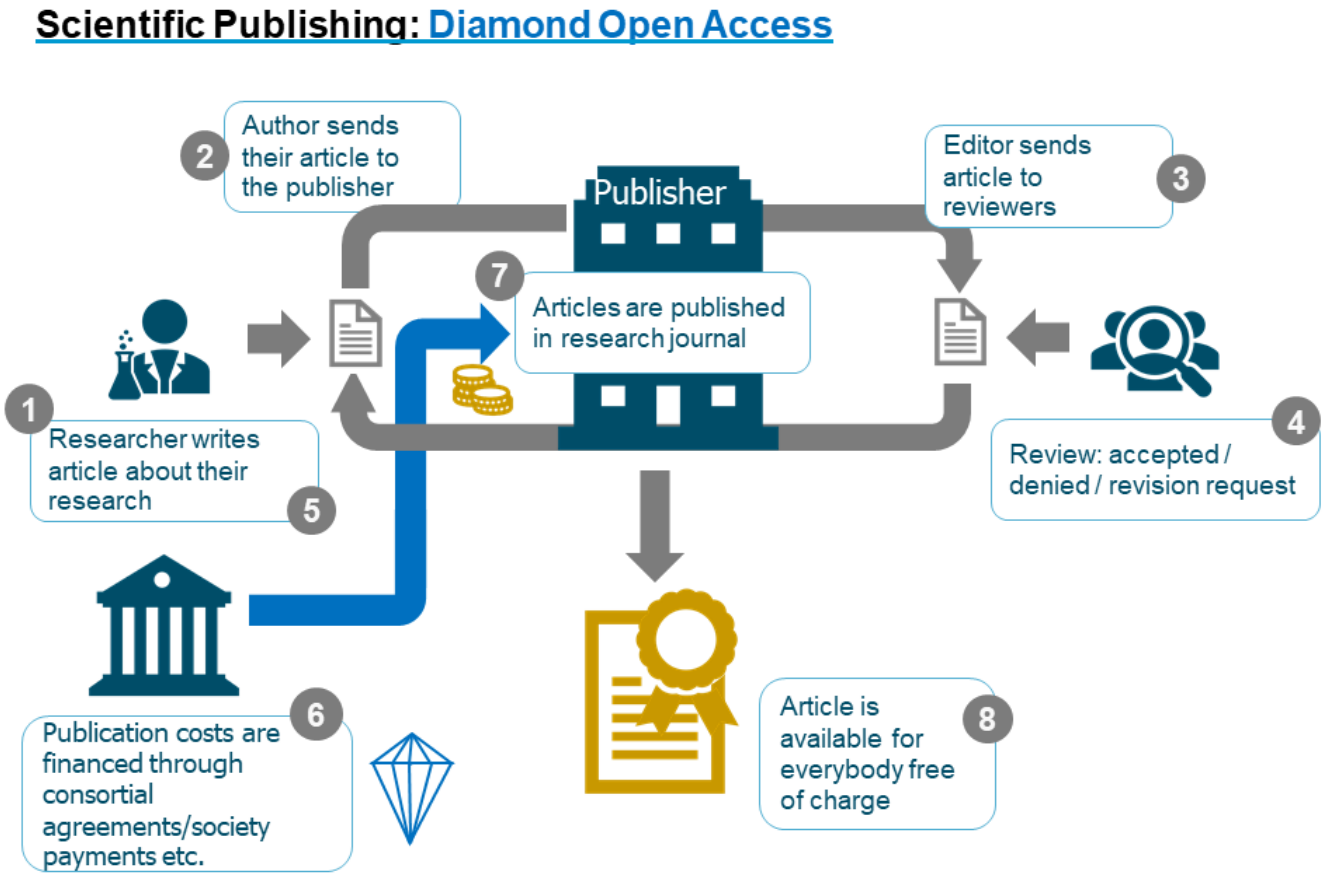


Image 13: Green Open Access

Non-commercial publisher

- Open Jourr System



Source: Based on Oberländer, A. (2020). Open Access – Es ist nicht alles Gold, was glänzt. In: Open Science. Von Daten zu Publikationen. Zenodo. http://doi.org/10.5281/zenodo.4018594 (CC BY 4.0 International)

Image 14: Diamond Open Access

Responsible Research Assessment

= umbrella term for approaches to assessment which incentivise, reflect and reward the **plural characteristics of high-quality research**, in support of diverse and inclusive research cultures

Status-quo & goal of RRA

- Growing consensus in academia that scientific achievements should no longer be evaluated with mainly quantitative indicators
- Greater weight should be given to the quality, transparency, reproducibility, and innovative strength of their scientific work

Organisations and Declarations on RRA

Schönbrodt et al., 2025)

- DORA (Declaration)
- The Metric Tide (Review on use of metrics in UK Research Excellence Framework)
- Leiden manifesto (Declaration)
- Barcelona Declaration on Open Research Information
- CoARA – Agreement and Coalition
- INORMS SCOPE Framework
- RESQUE Framework (Assessment tool for psychology papers – can be expanded)
- Stockholm Declaration – Reformation of Science Publishing

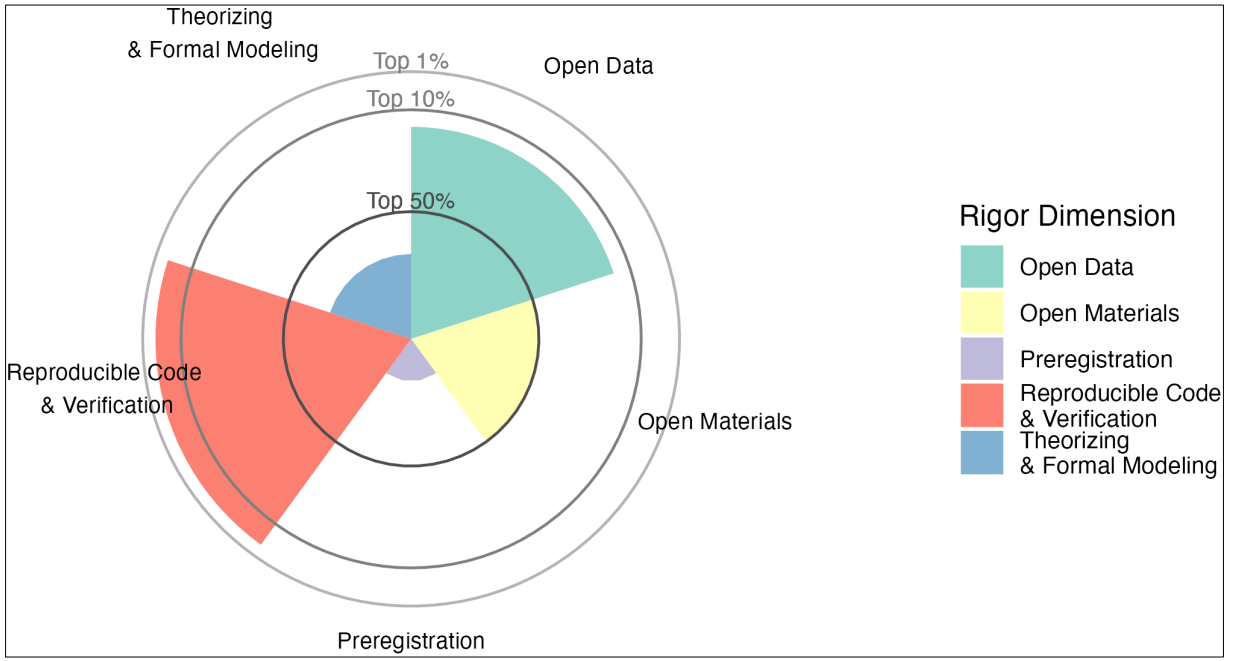


Image 15: RESQUE Framework - example researcher profile

Robust metrics

Recommendations

(Wouter et al., 2015)

- **Robustness**: basing metrics on the best possible data in terms of accuracy and scope;
- **Humility**: recognising that quantitative indicators should not supplant qualitative, expert assessment, but should be used where appropriate to strengthen or complement peer review

Recommendations Part 2

(Wouter et al., 2015)

- **Transparency**: opening up data collection and analytical processes, so those being evaluated are included in the design of the evaluations and can test and verify the results;
- **Diversity**: accounting for variation by field, and using a range of indicators to reflect and support a plurality of research, of research and researcher career paths across the system;
- **Reflexivity**: recognising and anticipating the systemic and potential effects of indicators, and updating them in response.

How to improve research assessment as an early career researcher

Narrative CVs

- Curated & annotated publication list
- Include different types of impact, using DORA building blocks or societal impact (where applicable)
  - teaching, mentoring, awards, openness, important projects, …

On individual researcher level

How to improve research assessment

- When involved in **committees** making decisions about funding, hiring, tenure, or promotion, make assessments based on scientific content rather than publication metrics.
- Wherever appropriate, **cite primary literature** in which observations are first reported rather than reviews in order to give credit where credit is due.

How to improve research assessment

- Use a **range** of article metrics and indicators on personal/supporting statements, as evidence of the impact of individual published articles and other research outputs.
- **Challenge research assessment practices** that rely inappropriately on Journal Impact Factors and promote and teach best practice that focuses on the value and influence of specific research outputs.

The End

Thank you for your attention! Any Questions?

Images - I

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- Image 4: DORA Building Blocks for Impact https://sfdora.org/resource/rethinking-research-assessment-building-blocks-for-impact/
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Literature - I

References and further reading

- Allen, L., Barbour, V., Cobey, K., Faulkes, Z., Hazlett, H., Lawrence, R., Lima, G., Massah, F., & Schmidt, R. (2025). *A Practical Guide to Implementing Responsible Research Assessment at Research Performing Organizations*. https://doi.org/10.5281/zenodo.15000683
- Arroyo-Machado, W., & Torres-Salinas, D. (2024). Stranger things: The vanishing of the Altmetric Attention Score values in information and library science. *Scientometrics*, *129*(10), 6287–6300. https://doi.org/10.1007/s11192-024-05011-5
- Barnes, K., Bannour, A., Török, L., & Molontay, R. (2026). Citation distance matters: Towards a new metric for evaluating journal impact. *Scientometrics*, *131*(3), 1505–1524. https://doi.org/10.1007/s11192-026-05586-1
- Curry, S., de Rijcke, S., Hatch, A., Pillay, D. G., van der Weijden, I., & Wilsdon, J. (2020). The changing role of funders in responsible research assessment: Progress, obstacles and the way ahead. *RoRI Working Paper*, *3*. https://eprints.whiterose.ac.uk/id/eprint/171602/
- Curry, S., Gadd, E., & Wilsdon, J. (2022). *Harnessing the Metric Tide: Indicators, infrastructures & priorities for UK responsible research assessment*. [Report]. Research on Research Institute. https://doi.org/10.6084/m9.figshare.21701624.v2

References and further reading

- Declaration on Research Assessment (DORA), D. on R. (2024). *Guidance on the responsible use of quantitative indicators in research assessment*. DORA. https://zenodo.org/records/13844873
- Dorsch, I., Ebrahimzadeh, S., Jeffrey, A., & Haustein, S. (2020). *Metrics Literacies: Introduction of researcher personas for the understanding and use of scholarly metrics*. Zenodo. https://zenodo.org/records/4046019
- Edmunds, T. (2025, Juni 5). *JCR 2025: Excluding Retracted Citations to Ensure Trust*. https://clarivate.com/academia-government/blog/the-upcoming-journal-citation-reports-release-and-changes-to-uphold-research-integrity-in-2025/
- Ellegaard, O. (2026). The method of bibliometric analysis: A critical evaluation. *Scientometrics*. https://doi.org/10.1007/s11192-026-05670-6
- Ferro, G., & Dip, J. A. (2026). The three global rankings of universities. The why, the how, and the what are they informing? *Scientometrics*. https://doi.org/10.1007/s11192-026-05663-5
- Gärtner, A., Leising, D., & Schönbrodt, F. D. (2024). Towards responsible research assessment: How to reward research quality. *PLOS Biology*, *22*(2), e3002553. https://doi.org/10.1371/journal.pbio.3002553

References and further reading

- González, P., Fors, M., & Torres, A. (2025). Altmetrics in the evaluation of scholarly impact: A systematic and critical literature review. *Frontiers in Research Metrics and Analytics*, *10*. https://doi.org/10.3389/frma.2025.1693304
- Hicks, D., Wouters, P., Waltman, L., de Rijcke, S., & Rafols, I. (2015). Bibliometrics: The Leiden Manifesto for research metrics. *Nature*, *520*(7548), 429–431. https://doi.org/10.1038/520429a
- Holmberg, K., Hedman, J., Bowman, T. D., Didegah, F., & Laakso, M. (2020). Do articles in open access journals have more frequent altmetric activity than articles in subscription-based journals? An investigation of the research output of Finnish universities. *Scientometrics*, *122*(1), 645–659. https://doi.org/10.1007/s11192-019-03301-x
- Metag, J. (2021). Tension between visibility and invisibility: Science communication in new information environments. *Studies in Communication Sciences*, *21*(1), 129–144. https://doi.org/10.24434/j.scoms.2021.01.009
- Morgan-Thomas, A., Tsoukas, S., Dudau, A., & Gąska, P. (2024). Beyond declarations: Metrics, rankings and responsible assessment. *Research Policy*, *53*(10), 105093. https://doi.org/10.1016/j.respol.2024.105093
- Mudditt, A. (2026, Mai 28). Beyond the Article, Beyond the APC: What We Learned from 18 Months of R&D. *The Scholarly Kitchen*. https://scholarlykitchen.sspnet.org/2026/05/28/beyond-the-article-beyond-the-apc-what-we-learned-from-18-months-of-rd/

References and further reading

- Peruginelli, G., & Pölönen, J. (2023). The legal foundation of responsible research assessment: An overview on European Union and Italy. *Research Evaluation*, *32*(4), 670–682. https://doi.org/10.1093/reseval/rvad035
- Rapple, C. (2023, Januar 25). *What is research impact?* https://blog.growkudos.com/news/what-is-research-impact
- Ravenscroft, J., Liakata, M., Clare, A., & Duma, D. (2017). Measuring scientific impact beyond academia: An assessment of existing impact metrics and proposed improvements. *PLoS ONE*, *12*(3), e0173152. https://doi.org/10.1371/journal.pone.0173152
- Rogers, G., & Filchenko, D. (2026). *Clarivate Societal Impact Framework: A guide to responsible impact measurement*. Clarivate Analytics. https://doi.org/10.14322/isi.research.clarivate.societal.impact.framework.responsible.impact.measurement
- Schönbrodt, F. D., Gärtner, A., Frank, M., Gollwitzer, M., Ihle, M., Mischkowski, D., Phan, L. V., Schmitt, M., Scheel, A. M., Schubert, A.-L., Steinberg, U., & Leising, D. (2025). Responsible Research Assessment I: Implementing DORA and CoARA for hiring and promotion in psychology. *Meta-Psychology*, *9*. https://doi.org/10.15626/MP.2024.4601
- Severin, A., Strinzel, M., Egger, M., Barros, T., Sokolov, A., Mouatt, J. V., & Müller, S. (2023). Relationship between journal impact factor and the thoroughness and helpfulness of peer reviews. *PLOS Biology*, *21*(8), e3002238. https://doi.org/10.1371/journal.pbio.3002238

References and further reading

- Taylor, M. (2023). Slow, slow, quick, quick, slow: Five altmetric sources observed over a decade show evolving trends, by research age, attention source maturity and open access status. *Scientometrics*, *128*(4), 2175–2200. https://doi.org/10.1007/s11192-023-04653-1
- Tian, W., Fang, Z., Wang, X., & Costas, R. (2024). A multi-dimensional analysis of usage counts, Mendeley readership, and citations for journal and conference papers. *Scientometrics*, *129*(2), 985–1013. https://doi.org/10.1007/s11192-023-04909-w
- Tijdink, J. K., Valkenburg, G., Rijcke, S. de, & Dix, G. (2024). Relational responsibilities: Researchers perspective on current and progressive assessment criteria: A focus group study. *PLOS ONE*, *19*(9), e0307814. https://doi.org/10.1371/journal.pone.0307814
- Wang, H., Chen, Y., Gou, Y., Yang, D., & Xiong, L. (2024). Chronic kidney diseases and inflammation research: A bibliometric analysis. *Frontiers in Medicine*, *11*. https://doi.org/10.3389/fmed.2024.1388665
- Williams, K. (2020). Playing the fields: Theorizing research impact and its assessment. *Research Evaluation*, *29*(2), 191–202. (142638986). https://doi.org/10.1093/reseval/rvaa001
- Wouters, P., Thelwall, M., Kousha, K., Waltman, L. (Ludo), De Rijcke, S., Rushforth, A., & Franssen, T. (2015). *The Metric Tide: Literature Review*.