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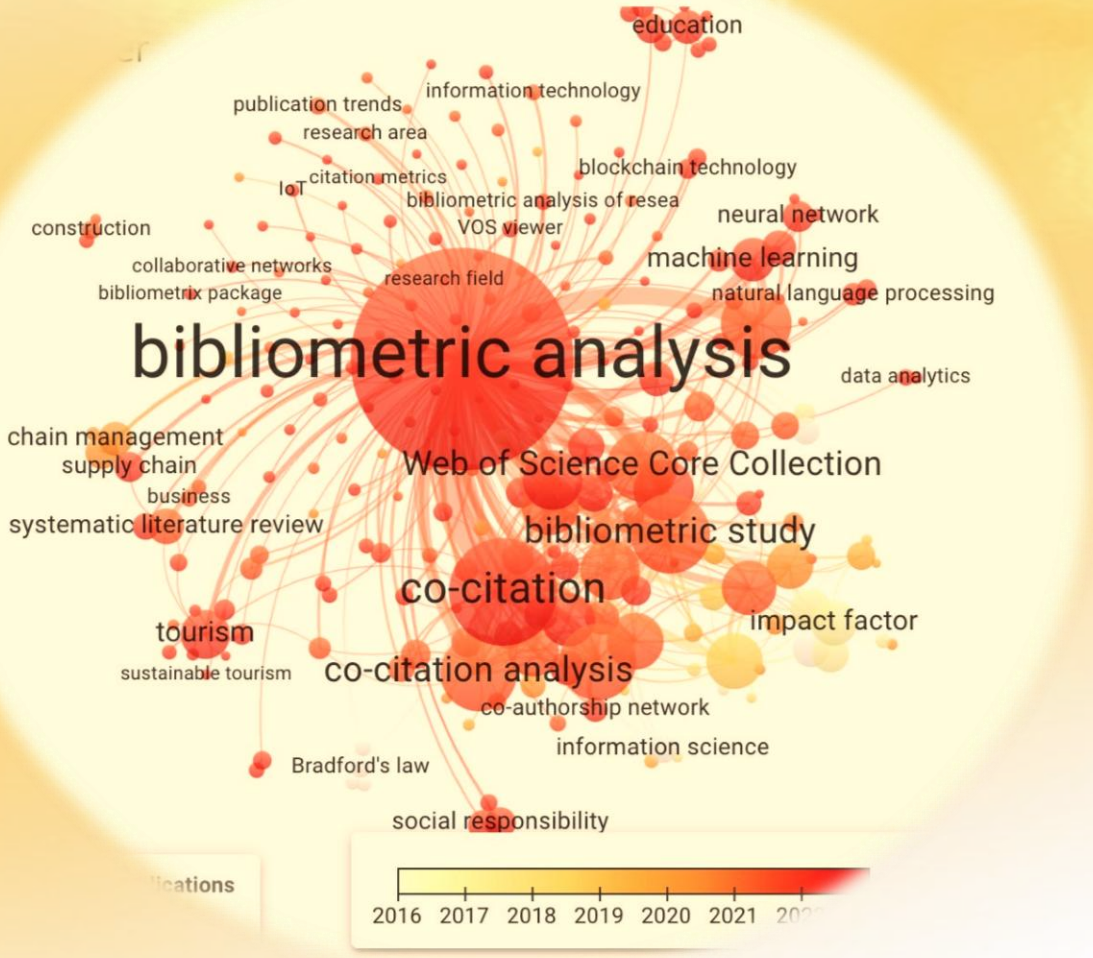
Navigating the Modern Ecosystem of Research Outcomes Assessment



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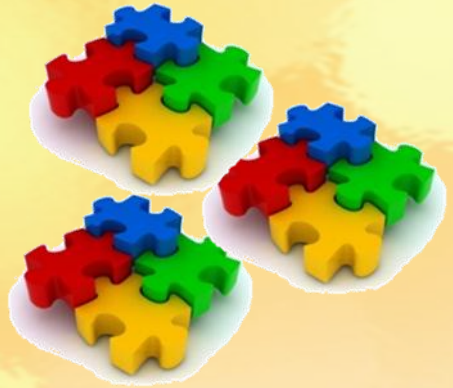
Prof Ahmed Hassan Fahal

MBBS, FRCS, FRCSI, FRCS(Gal),
MS, MD, FRCPath, FRCP(London)

Professor of Surgery



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I declare
No conflict of interest
In this presentation

Informed consent
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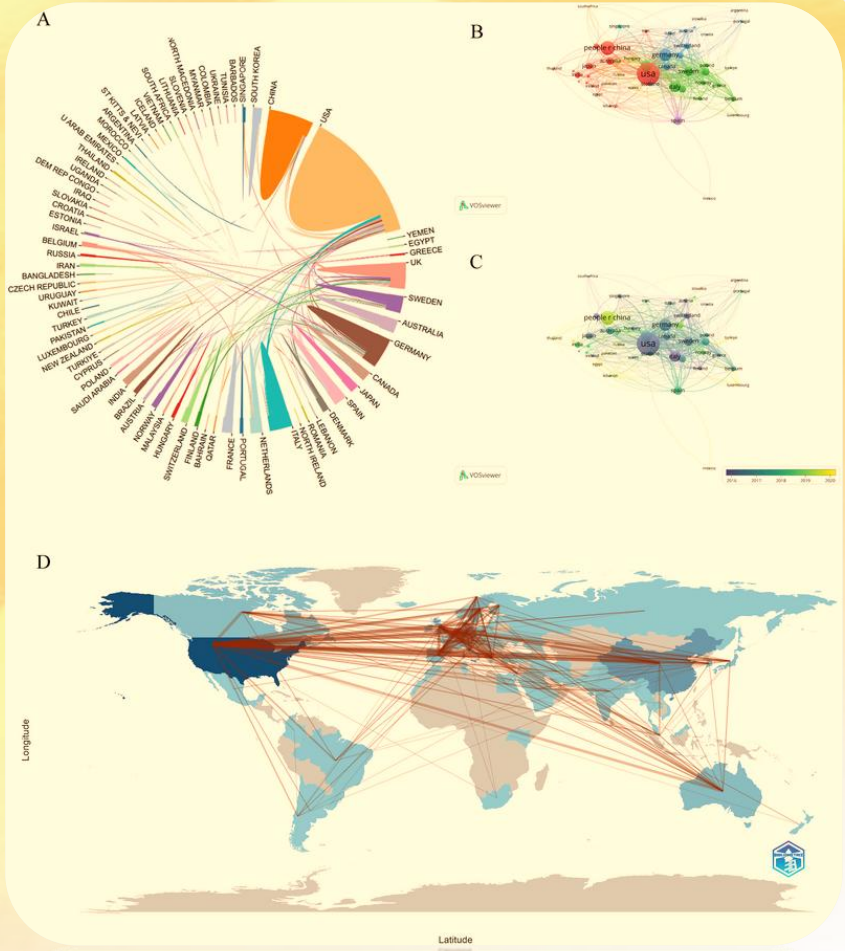

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Objectives

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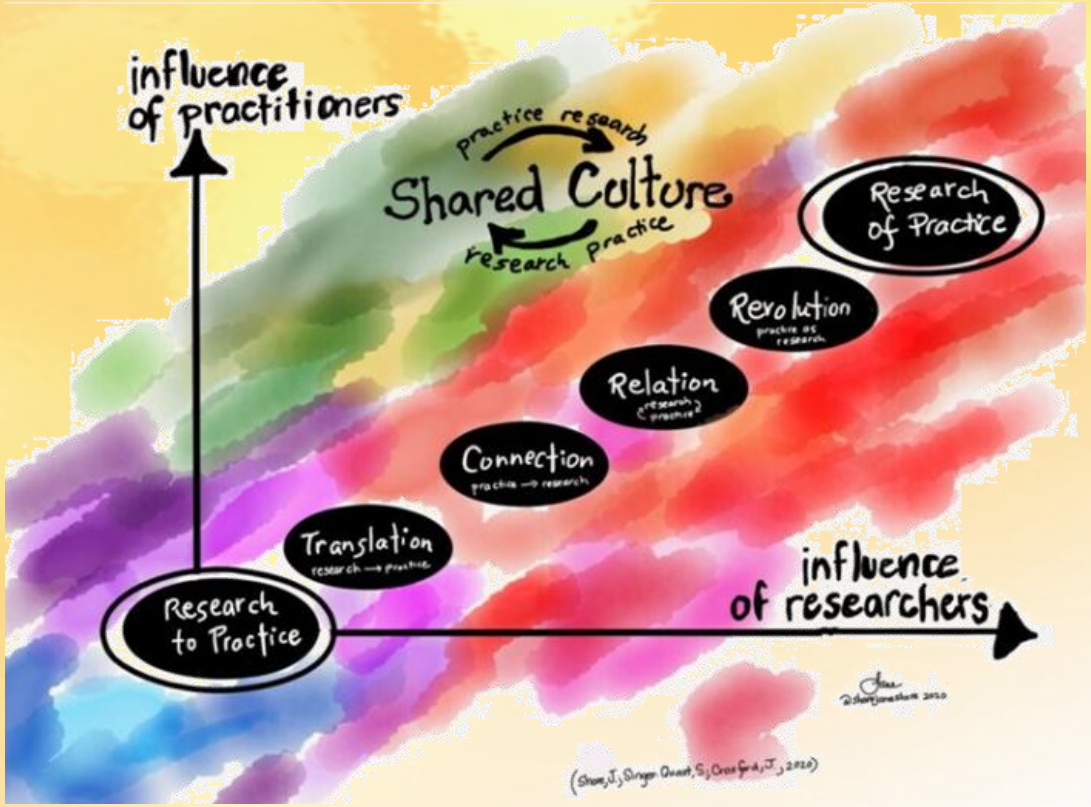
Objectives

Unpacking The Machinery Behind Modern Research Evaluation

Balancing Quantitative Bibliometrics

Qualitative Bibliometrics

Societal Impact



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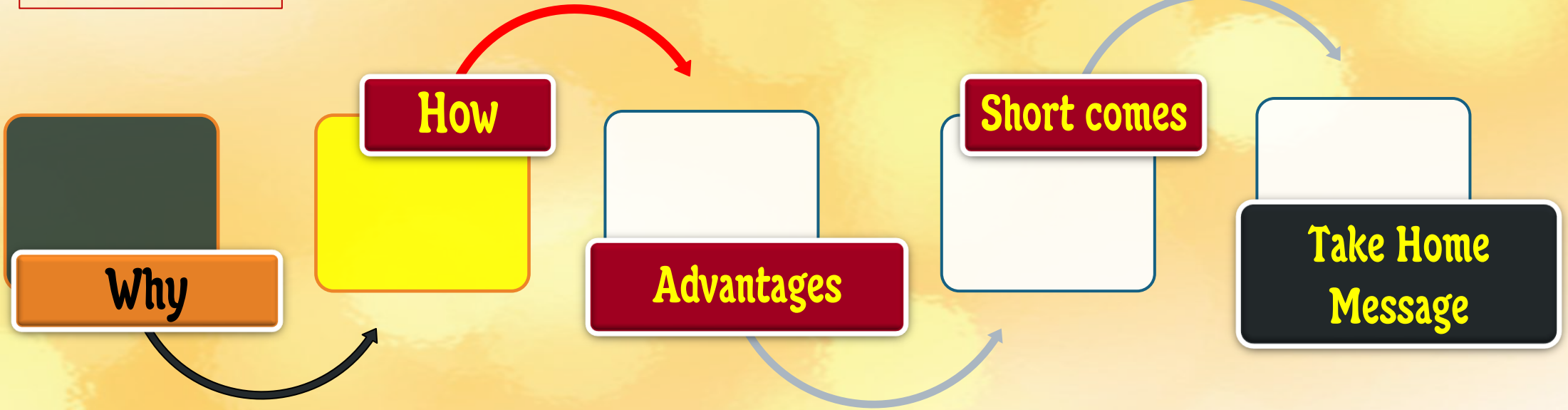
Outline



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Why is it essential

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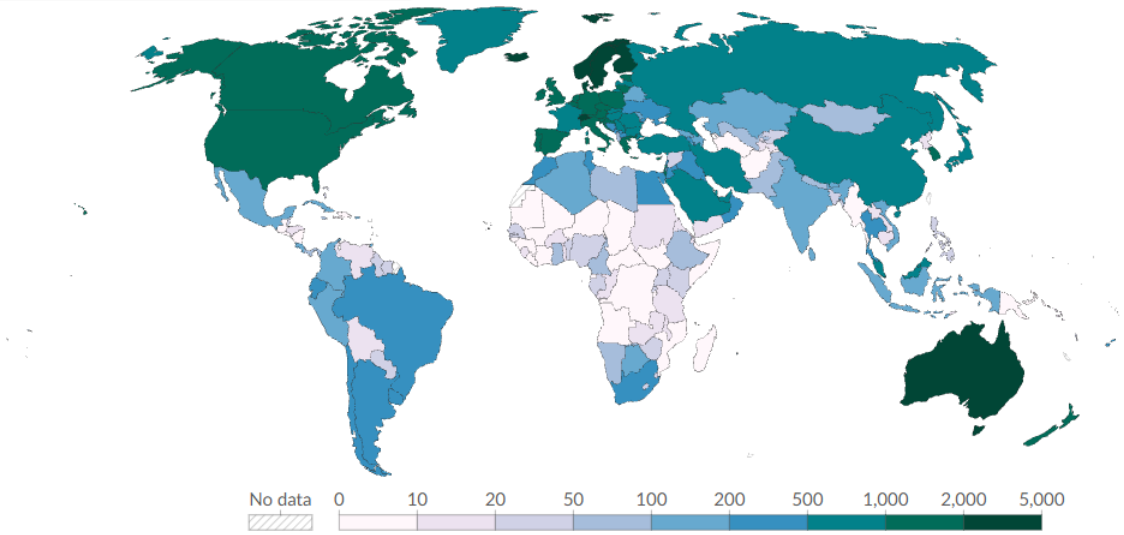
The global publishing volume bursts out

Annual articles published in scientific and technical journals per million people, 2022

Our World in Data

Includes physics, biology, chemistry, mathematics, clinical medicine, biomedical research, engineering and technology, and earth and space sciences.

Table | Map | Line | Bar



1996 — 2022

Data source: National Science Foundation Science and Engineering Indicators, via World Bank (2026); United Nations Population Division, national statistical offices, and Eurostat, via World Bank (2026) – Learn more about this data

Note: Articles are assigned based on the country of the first author's institution.

OurWorldinData.org/research-and-development | CC BY

Related: In absolute numbers

SELECT COUNTRIES AND REGIONS

Search for a country or region

Egypt	213
Middle East, North Africa, Afghanistan and Pakistan (WB)	264
Switzerland	2.76k
Denmark	2.73k
Norway	2.58k
Australia	2.39k
Singapore	2.25k
Finland	2.16k
Sweden	2.13k
Iceland	2k
Netherlands	1.94k
Slovenia	1.93k
Portugal	1.88k
New Zealand	1.81k
Luxembourg	1.79k
Ireland	1.78k

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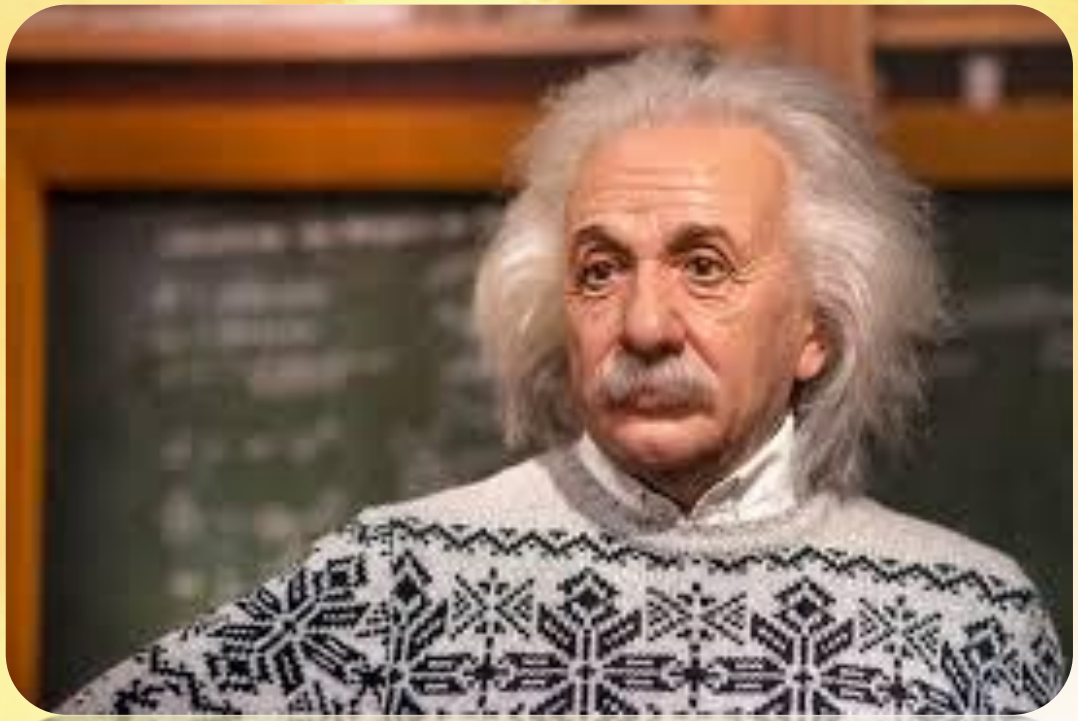
Why is it essential

As global publishing volume bursts out, there is a need to **Assess** this to:

- Measure scientific success
- Dictate universities rankings
- Shape funding streams
- Define academic careers

Scientific Success

- It is defined by a researcher's ability to identify solvable questions that significantly advance the frontier of knowledge.
- It blends resilience, creative problem-solving and a willingness to take risks
- With a commitment to high ethical standards and collaboration.



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Scientific Success

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12 subjects in the global top 10

QS World University Rankings by Subject 2026

Dictated Universities Ranking

9th in the world

QS World University Rankings 2026

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Scientific Success

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Shapes funding streams

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Scientific Success

Defines
Academic Careers

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How can it be done

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Assessing Impa… Dimensions of …

A Mature, Multi-dimensional Assessment Ecosystem

Rosy Jan [1] *, Aaqib Mir [1], …

Author information | Cite this Article

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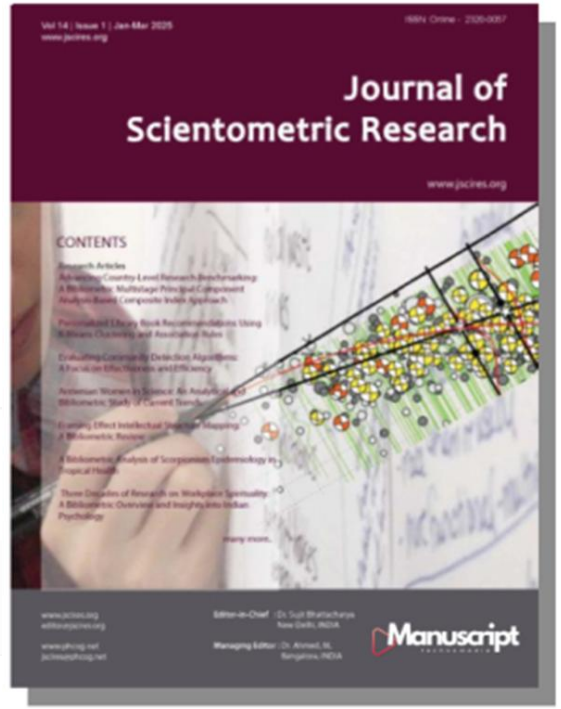

Vol. 5, No. 2 | 2016

Sep 1, 2016

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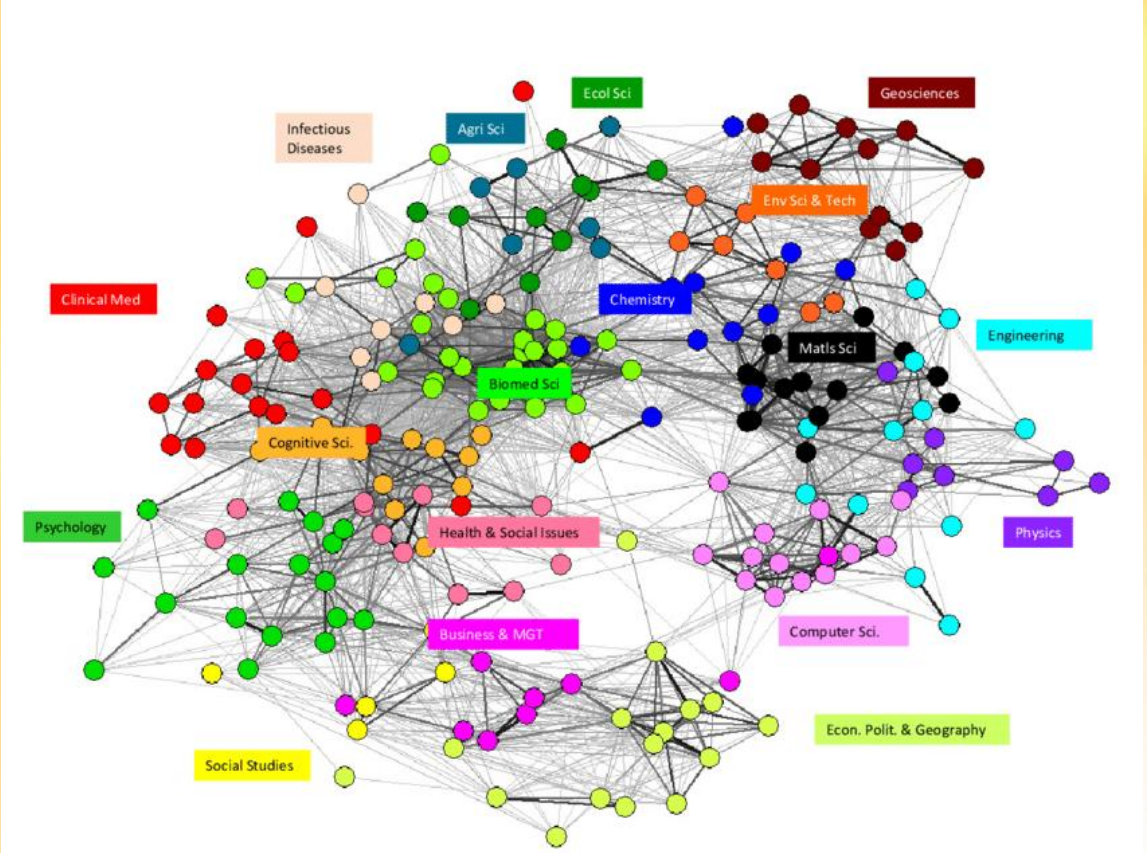
Bibliometrics

- It is the application of mathematical and statistical methods to analyse scholarly publications, such as books, journal articles, and datasets.



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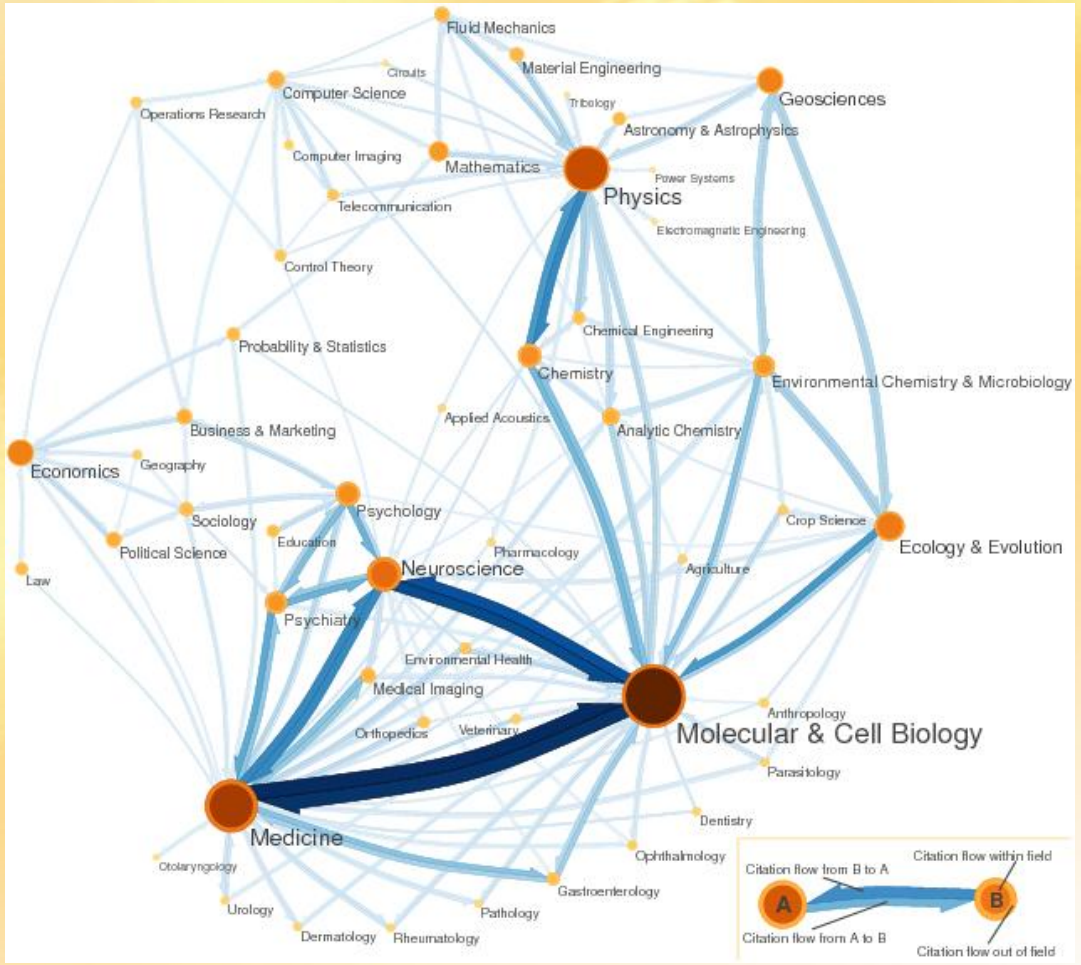
Bibliometrics

- It helps researchers, institutions, and **Funding Agencies** evaluate
  - Research impact
  - Funding projects
  - Identify collaboration networks
  - Map trends in scientific literature



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Scientometrics

It is an international, peer-reviewed, monthly journal that publishes original research on all quantitative aspects of the production, communication, and use of scientific and technological information.

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Scientometrics

It refers to a

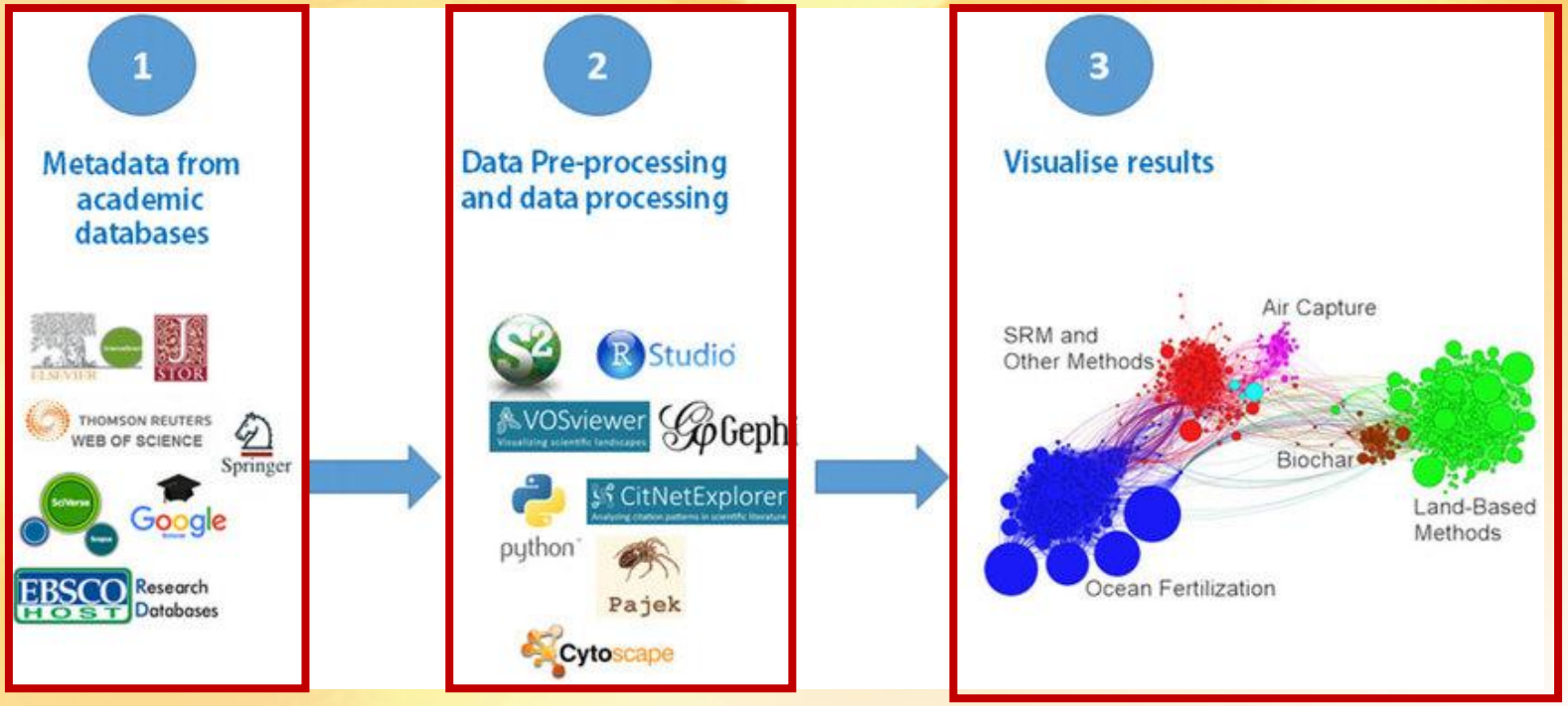
Scientific Mapping Approach

that analyses

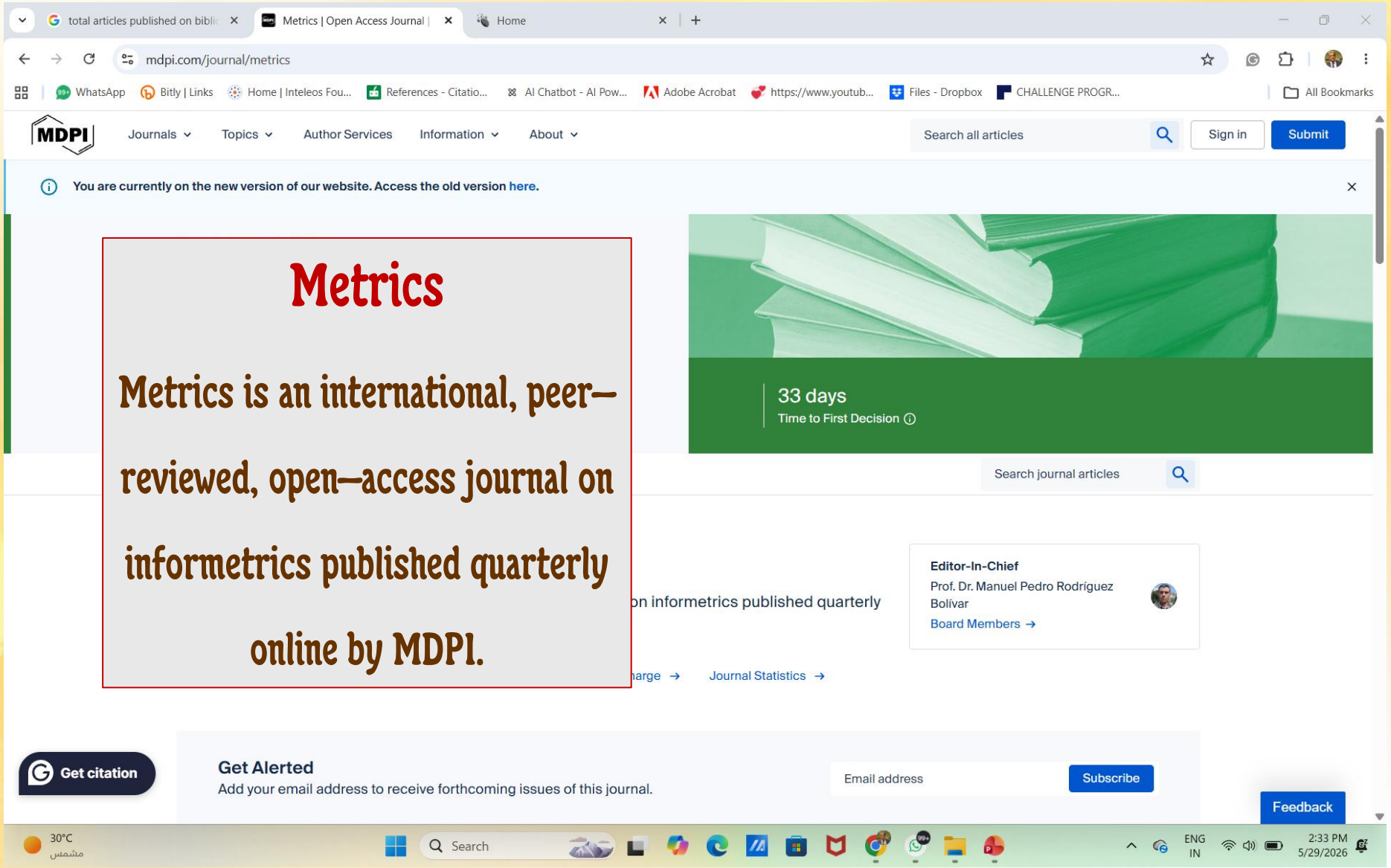
Academic Knowledge

& Contributions

within a field



Using statistical techniques, measurements, and indicators to identify trends and patterns in the scientific literature.



Metrics

Metrics is an international, peer–reviewed, open–access journal on informetrics published quarterly online by MDPI.

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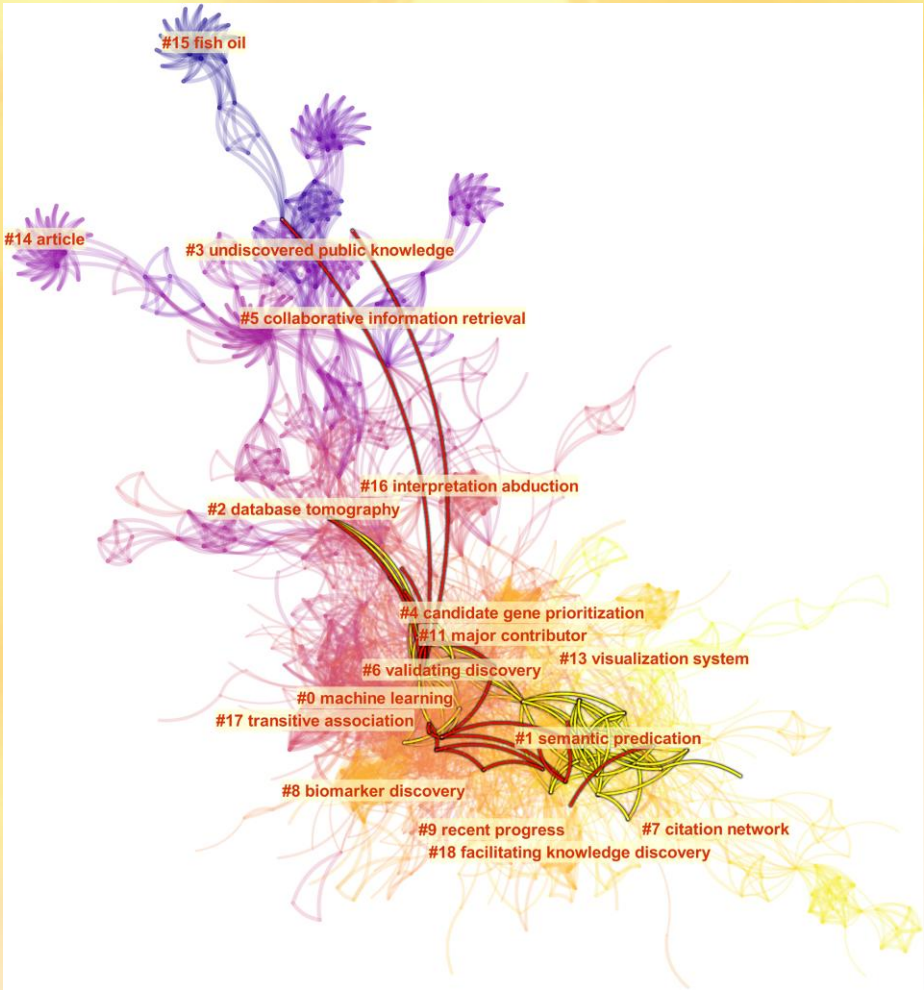
Bibliometrics

There are over **30,000** published documents (articles, reviews, and conference papers) specifically focused on bibliometric studies or analyses indexed in major databases like Scopus



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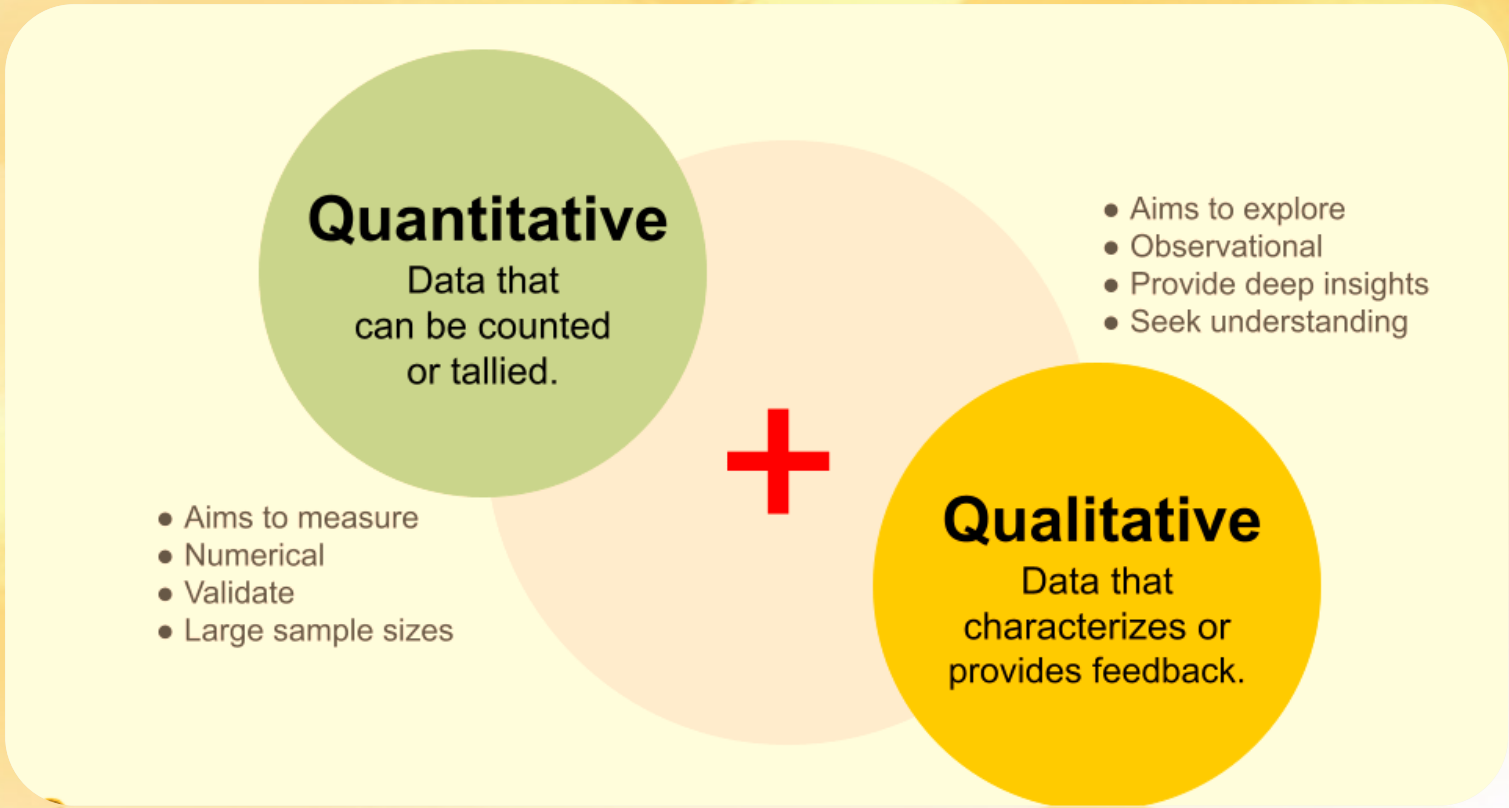
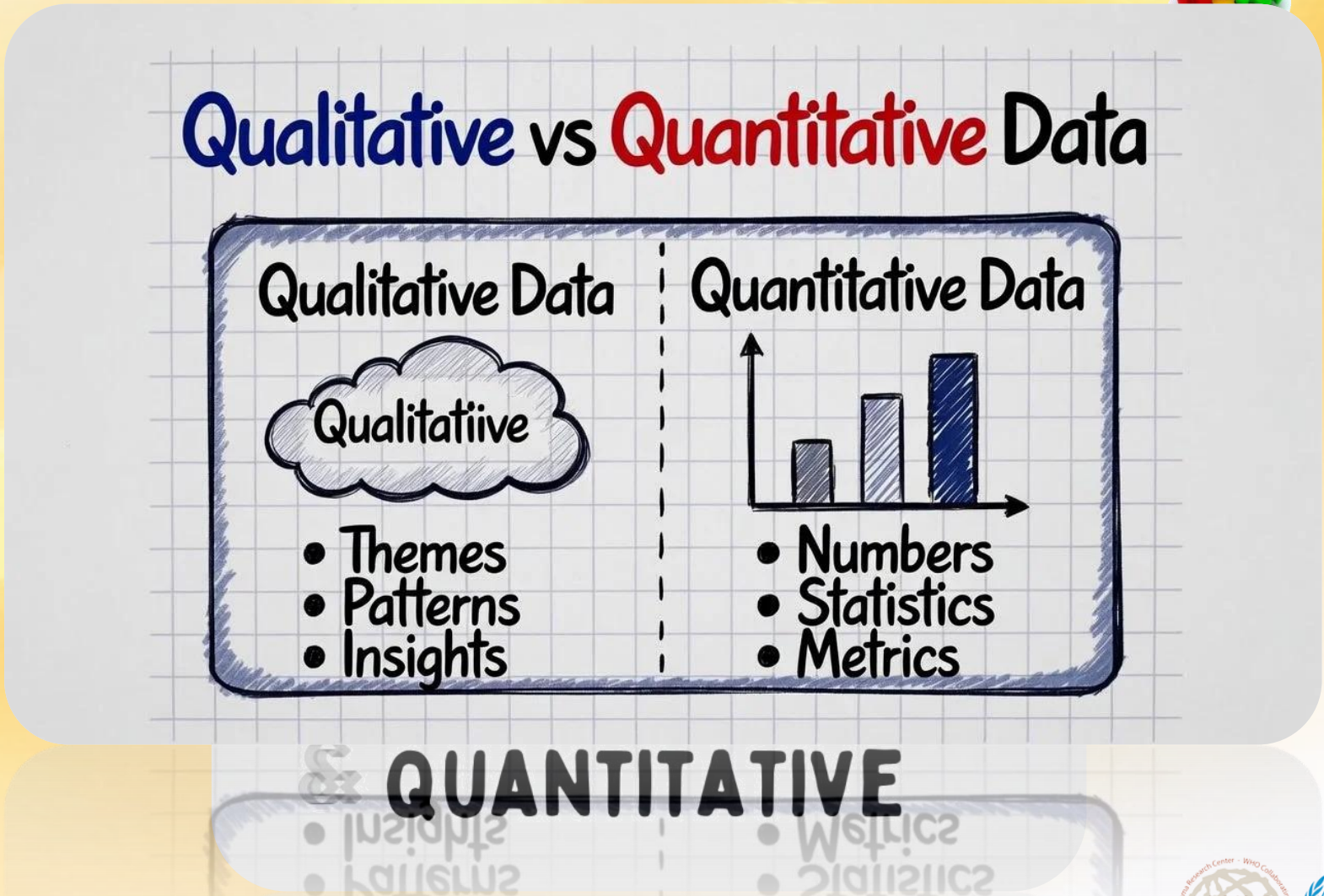
Research Metrics Classification

- Quantitative Metrics
- Qualitative Metrics



Research Metrics Classification

- Quantitative Metrics
- Qualitative Metrics



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The Quantitative Drive:

Accelerated by

- Digitisation
- Algorithmic indexing
- Mass data compilation

- Highly scalable but vulnerable to gaming.

The Qualitative Mandate:

- Historically rooted in expert consensus.
- Deeply accurate to scientific distinction
- Slow, expensive
- Prone to cognitive bias.

The Systemic Challenge:

Over-indexing on what is easy to **Measure** rather than what is scientifically **Valuable.**

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The fundamental challenge of
Research Assessment
Lies in this divide.

Bibliometrics give clean,
Structured Data at scale.

Qualitative assessment gives
Meaning.

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The fundamental challenge of
Research Assessment
Lies in this divide.

Institutions rely purely on

Quantitative Data

because it is easier to read on a spreadsheet

The fundamental challenge of Research Assessment

- Quantitative Metrics

- Qualitative Metrics

The Core Conflict

Metrics vs. Meaning

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The fundamental challenge of Research Assessment

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" Work hard in Silence, let your success be your Noise."

"The true essence of **Scientific Discovery** gets lost in the noise."
Hence **Assessment** is mandatory

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The fundamental challenge of Research Assessment

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Shifting from

Macro-level Venue Prestige

Down to immediate

Public Engagement.

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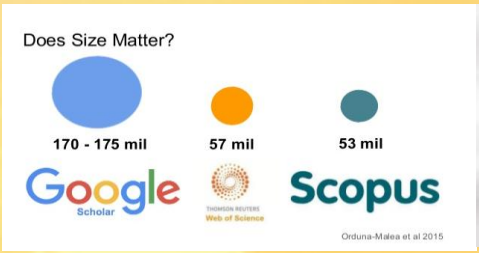
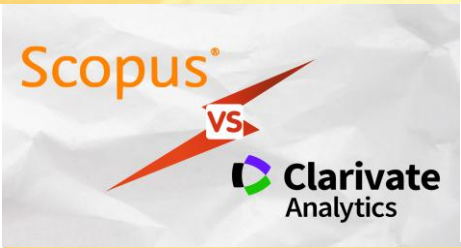
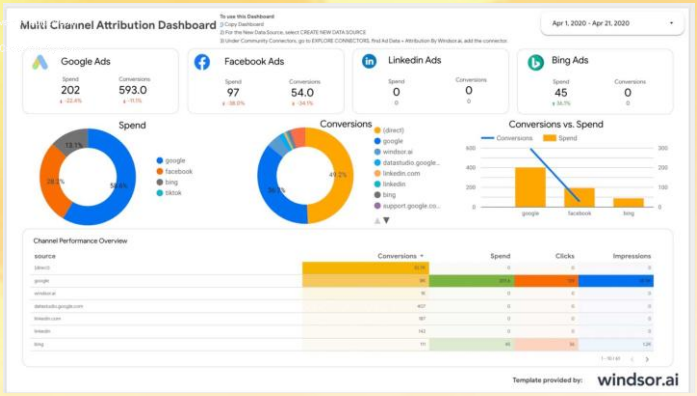
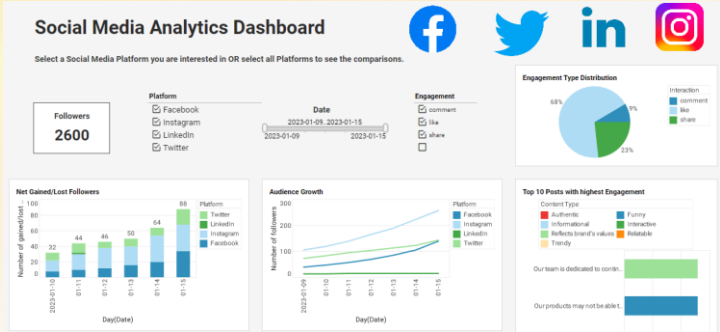
Research Metrics Platforms & Tools









Research Metrics Platform & Tools

Clarivate Analytics Company

- Clarivate Plc is a British-American publicly traded analytics company operating a
- Collection of subscription-based services in the areas of
- Bibliometrics and scientometrics,
- Business and market

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Research Metrics Platform

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Clarivate

- Clarivate is an independent, global information and analytics company (publicly traded on the NYSE).
- Unlike Elsevier, Clarivate is not a primary publisher—they do not own or publish scientific research journals.
- Instead, they act as an independent auditor and indexer of the world's literature.
- Core Business:
  - Providing data analytics
  - Subscription-based indexing
  - Intellectual property insights
  - Metric-tracking tools to assess research quality.

Research Metrics Platforms

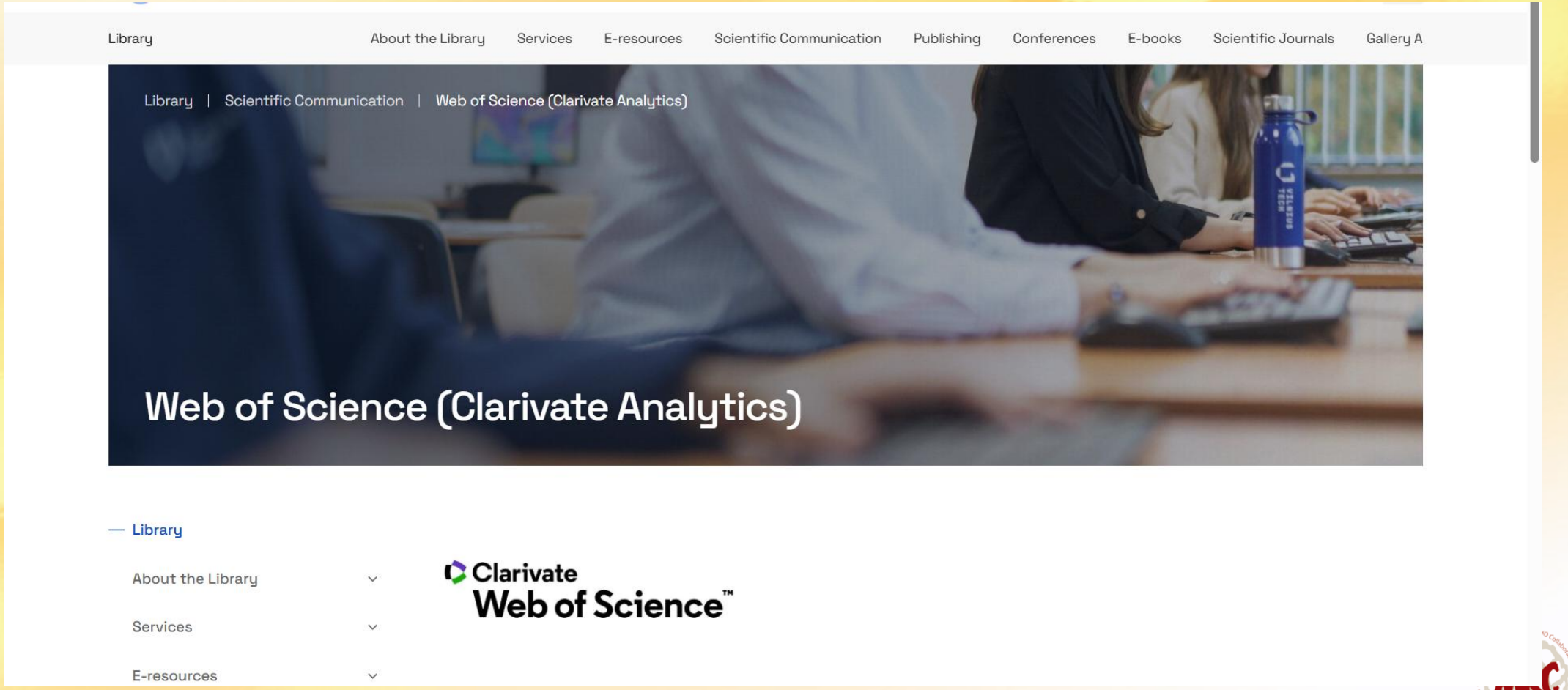
Clarivate

Key Platforms & Products:

- **Web of Science (WoS):** The gold-standard citation index that tracks high-impact global journals.
- **Journal Citation Reports (JCR):** The official body that calculates and issues the annual Journal Impact Factor (JIF).
- If a journal gets "suppressed" or loses its Impact Factor due to citation manipulation, it is Clarivate that hands down that punishment.
- **EndNote:** The industry-standard reference management and bibliographic software.
- **ScholarOne:** The widespread workflow software used by journals to manage peer reviews and manuscript submissions.

Research Metrics Tools

Clarivate – Web of Science



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Research Metrics Tools

Web of Science

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Web of Science includes metrics about

- Publications
- Authors
- Journals

Based on citations from other documents indexed in the Web of Science databases.

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Research Metrics Tools

Web of Science

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Author metrics include the percentage of papers on which a researcher was

The first, last or corresponding author.

Clarivate Analytics

WEB OF SCIENCE

Research Metrics Tools

Web of Science

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- Web of Science links to **Journal Citation Reports**, a tool that provides journal-level metrics.

JIF

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Research Metrics Tools

Elsevier

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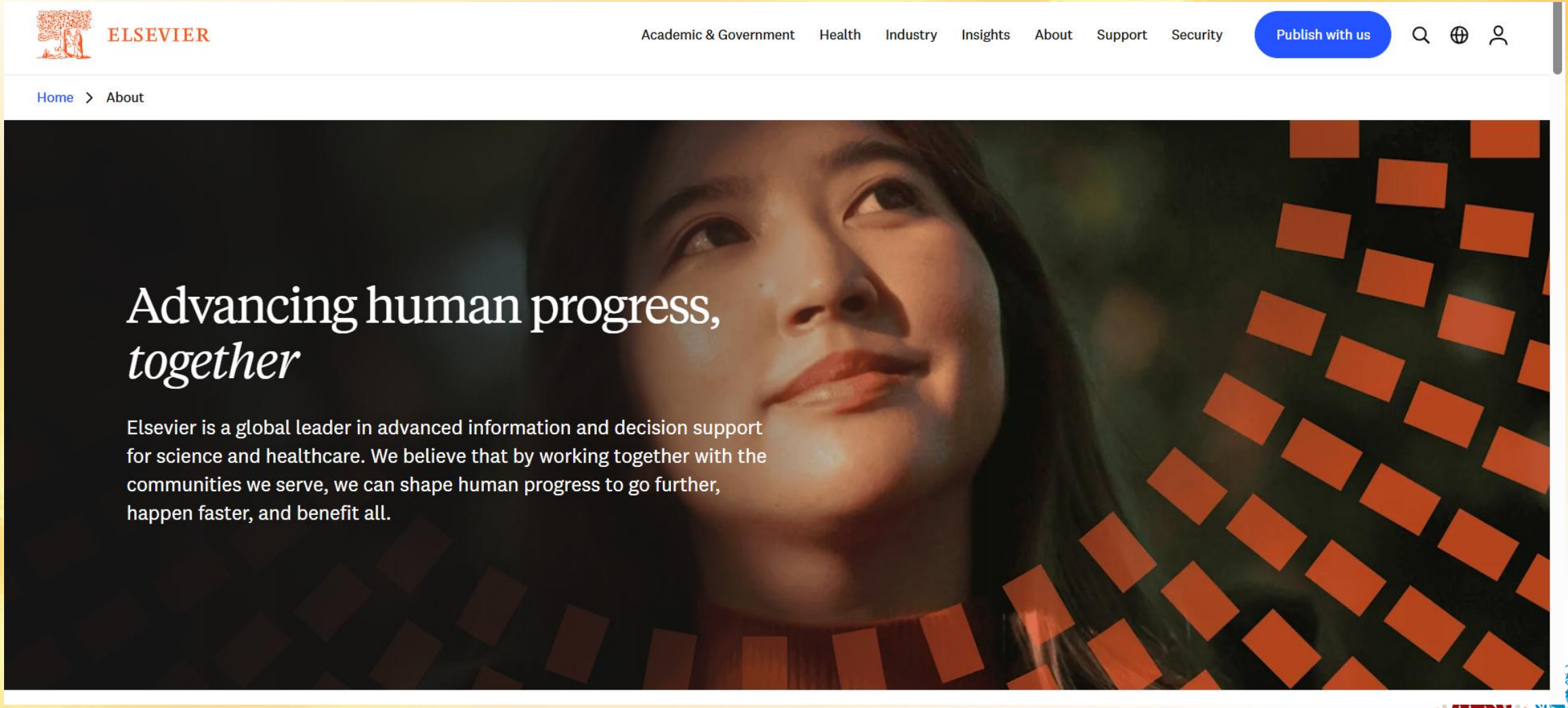

Elsevier

- Elsevier is a massive, traditional **Academic Publisher** and **Data Analytics Provider**
- Headquartered in the Netherlands.
- It is a subsidiary of the RELX Group.

Core Business:

- They actually publish the scientific research
- They own and print thousands of prestigious academic journals.

Elsevier

Key Platforms & Products:

Scopus:

- Their massive citation and indexing database (the direct competitor to Web of Science).

ScienceDirect:

- The hosting platform where millions of their published journal articles are read.

SciVal:

- Their executive analytical tool used by universities to evaluate institutional research performance.

Mendeley:

- A widely used digital reference manager.

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Research Metrics Tools

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Scopus

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Research Metrics Tools

Analytical Frameworks
(Scopus vs SCImago)

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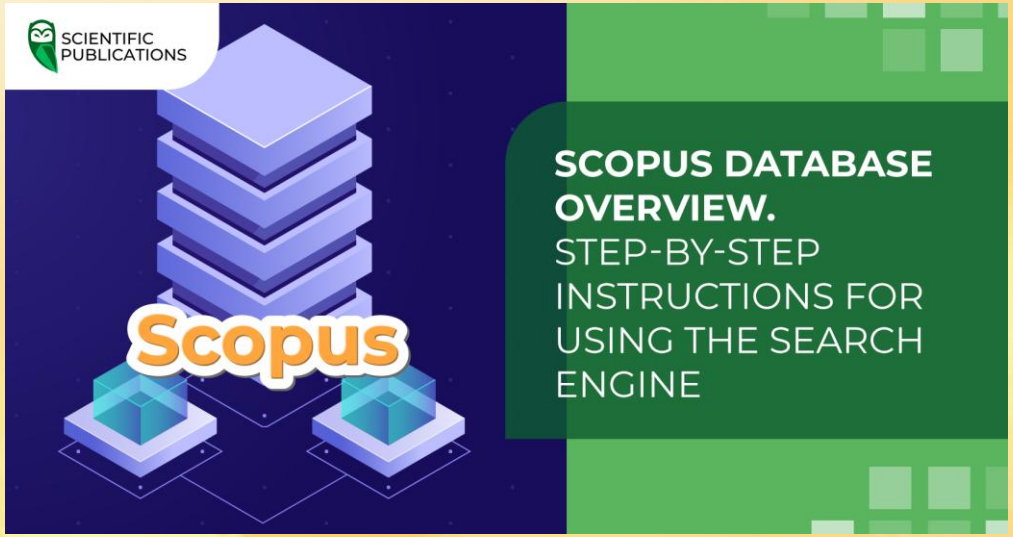

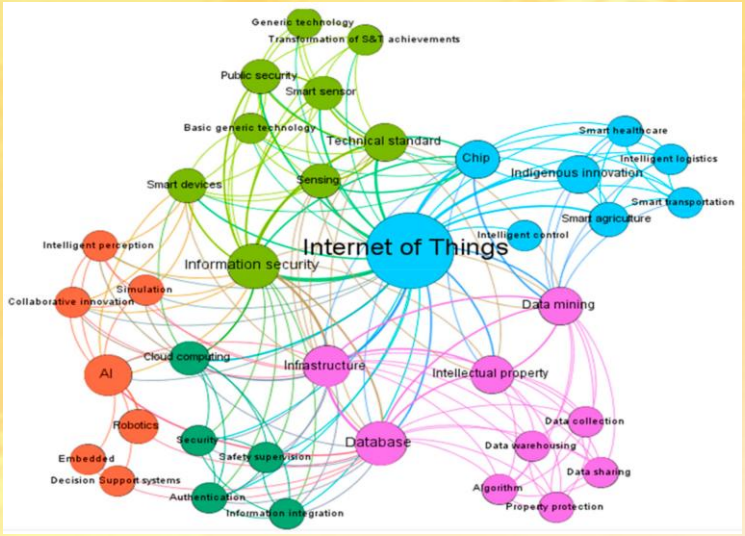

Scopus

Is the core big-data Engine

SCImago

Serves as a specialised analytical Lens for evaluating network journals

Research Metrics Tools
Scopus

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Scopus provides four platform-specific metrics on a publication's metrics page:

- Total citations within a user-selected date range
- Citations per year for a chosen period
- Citation Benchmarking (Percentile ranking)
- Field Weighted Citation Impact.

Research Metrics Tools

Scopus-Proprietary Framework

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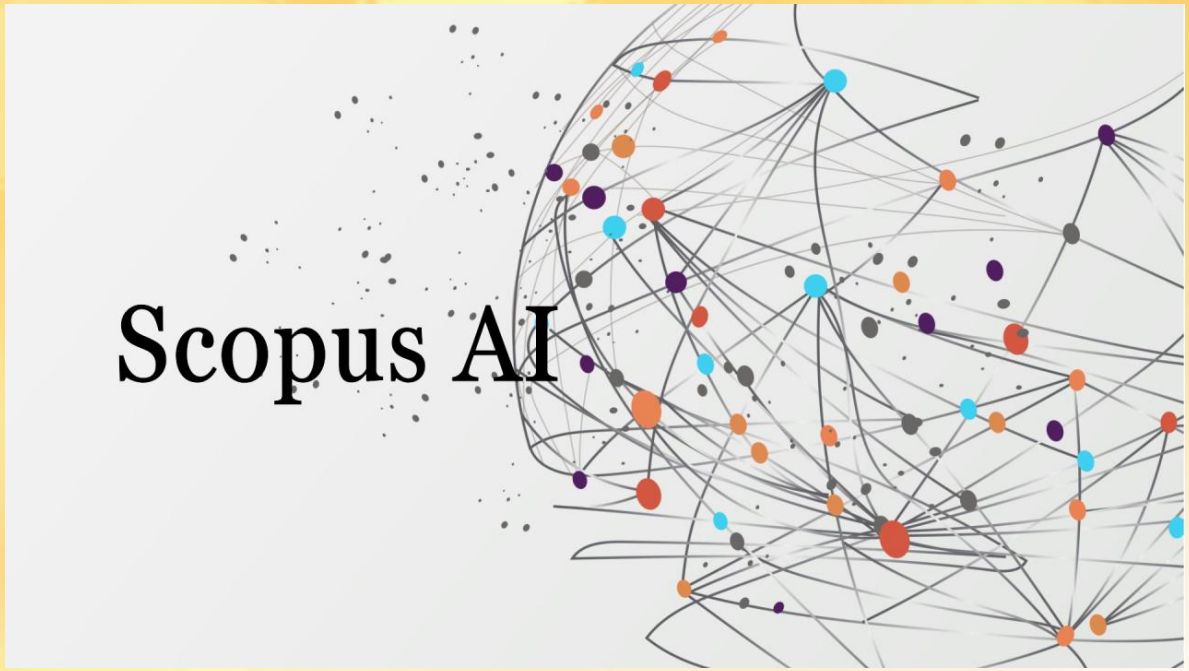
- Scopus focuses heavily on Article-Level Metrics (ALMs)
- Real-time data tracking via integrated tools like
  - Plumx metrics (https://www.Elsevier.Com/insights/metrics/plumx)
  - Explicitly categorises usage (clicks/downloads)
  - Captures (bookmarks)
  - Mentions (blogs/news)
  - Social media engagement
  - Raw citation counts on every article page.

Research Metrics Tools
Scopus Dimensions AI

- It provides access to a large, linked research database.
- It offers various metrics to assess research impact, including traditional citation counts
- Alternative metrics (altmetrics) like social media shares and news mentions.



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Research Metrics Platform Tools

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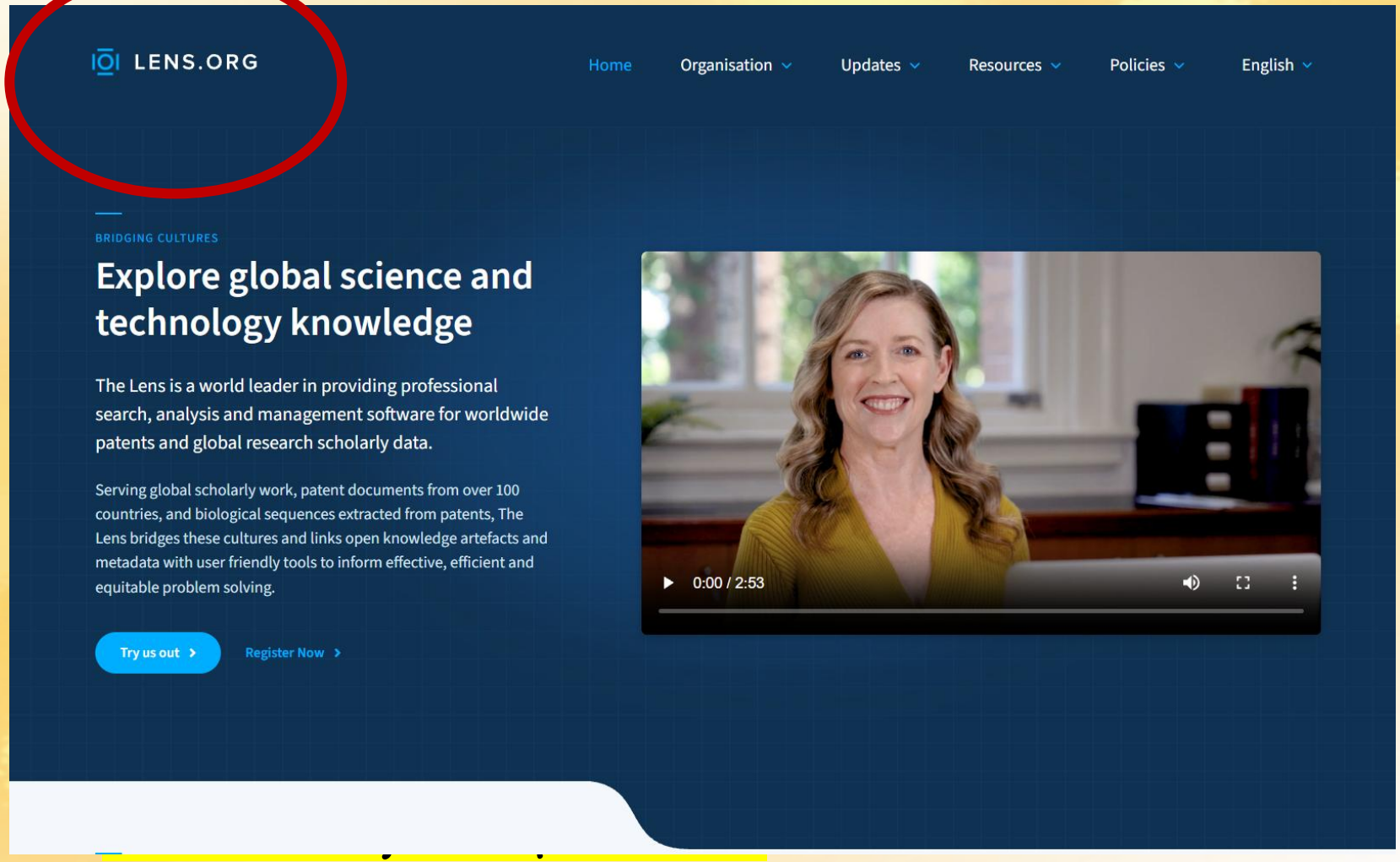

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Research Metrics Classification

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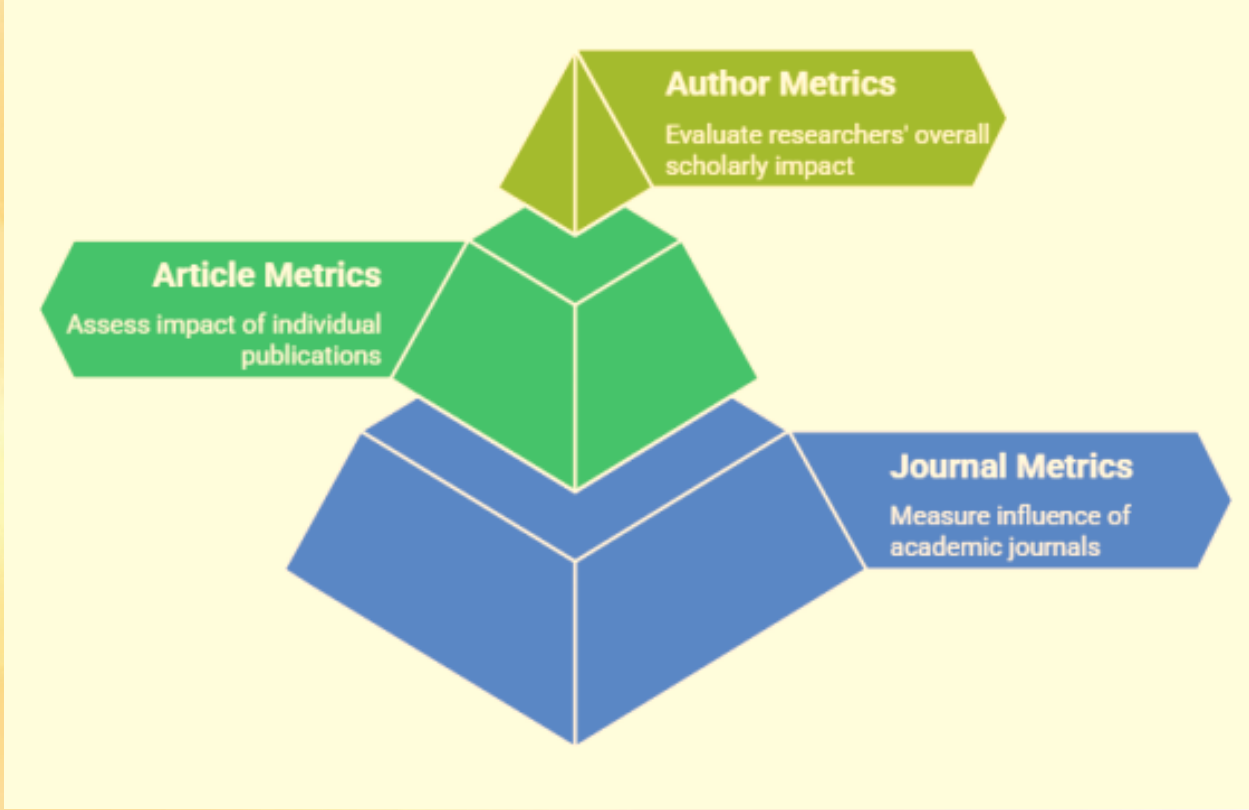
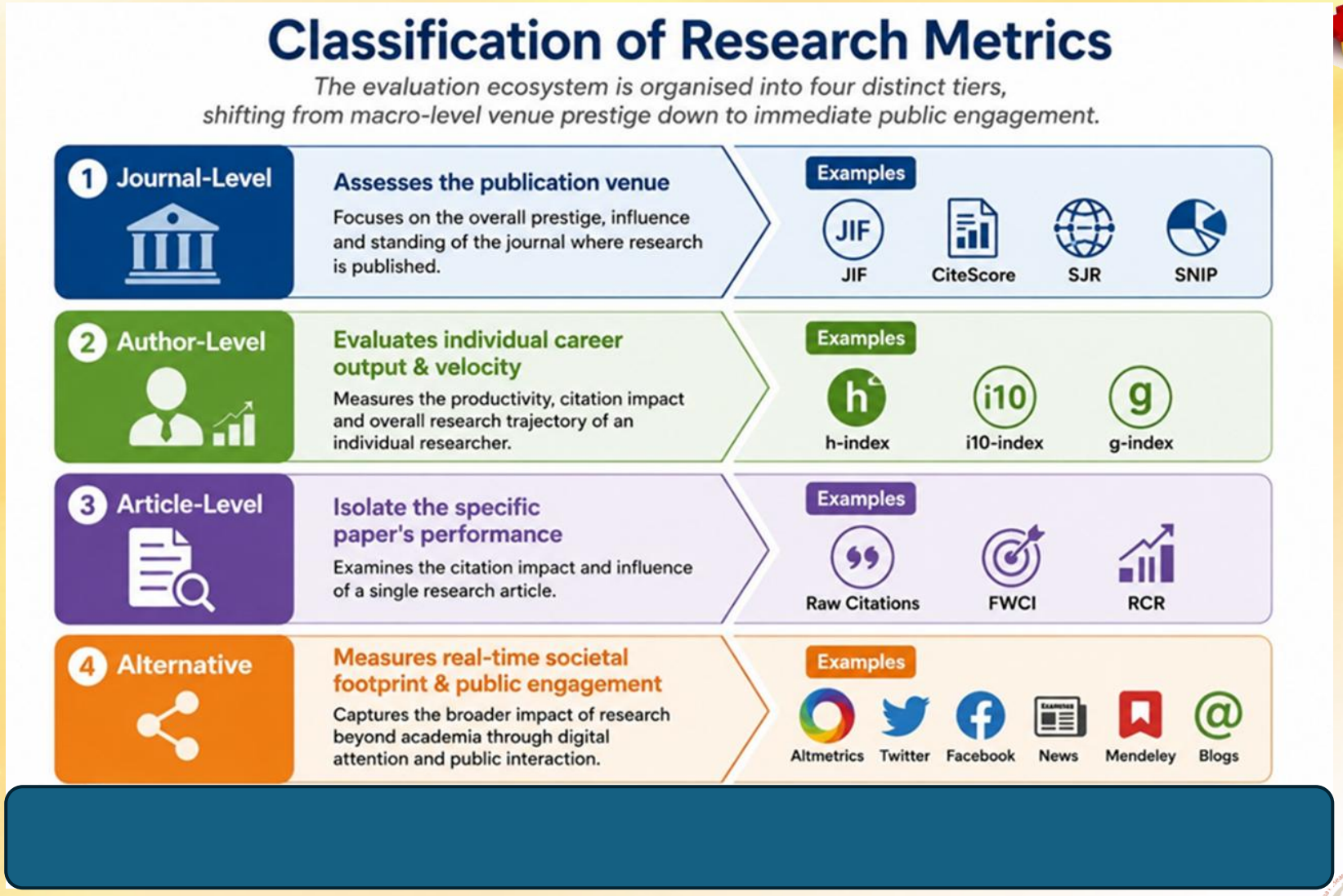
The evaluation ecosystem is organised into four distinct tiers

- Journal-Level
- Author-Level
- Article-Level
- Alternative



https://library.iihs.co.in/wp-content/uploads/2025/06/Research-Impact-Metrics.pdf

Research Metrics Classification



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Classification of Research Metrics
Journal-Level Metrics

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These metrics assess the

- Overall journal prestige
- Citation frequency
- Reach of a specific academic journal.

They reflect the properties of the **Venue**,
not necessarily the quality of an **Individual Article** published within it.

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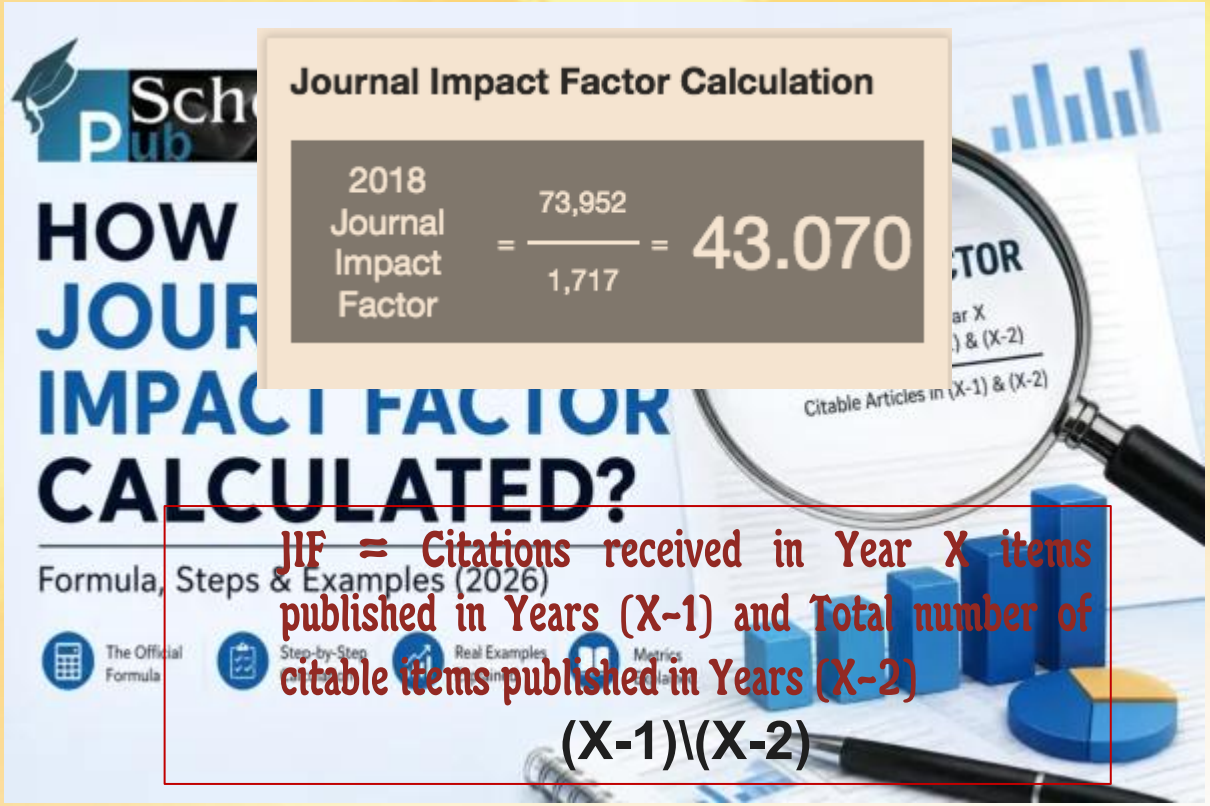
Classification of Research Metrics
Journal-Level Metrics

Journal Impact Factor (JIF)

- Managed by Clarivate (Web of Science)
- Calculates the average number of citations received by a journal's articles over the preceding two years.



JIF = Citations received in Year X items published in Years (X-1) and Total number of citable items published in Years (X-2)

(X-1)\(X-2)

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Classification of Research Metrics
Journal-Level Metrics

CiteScore

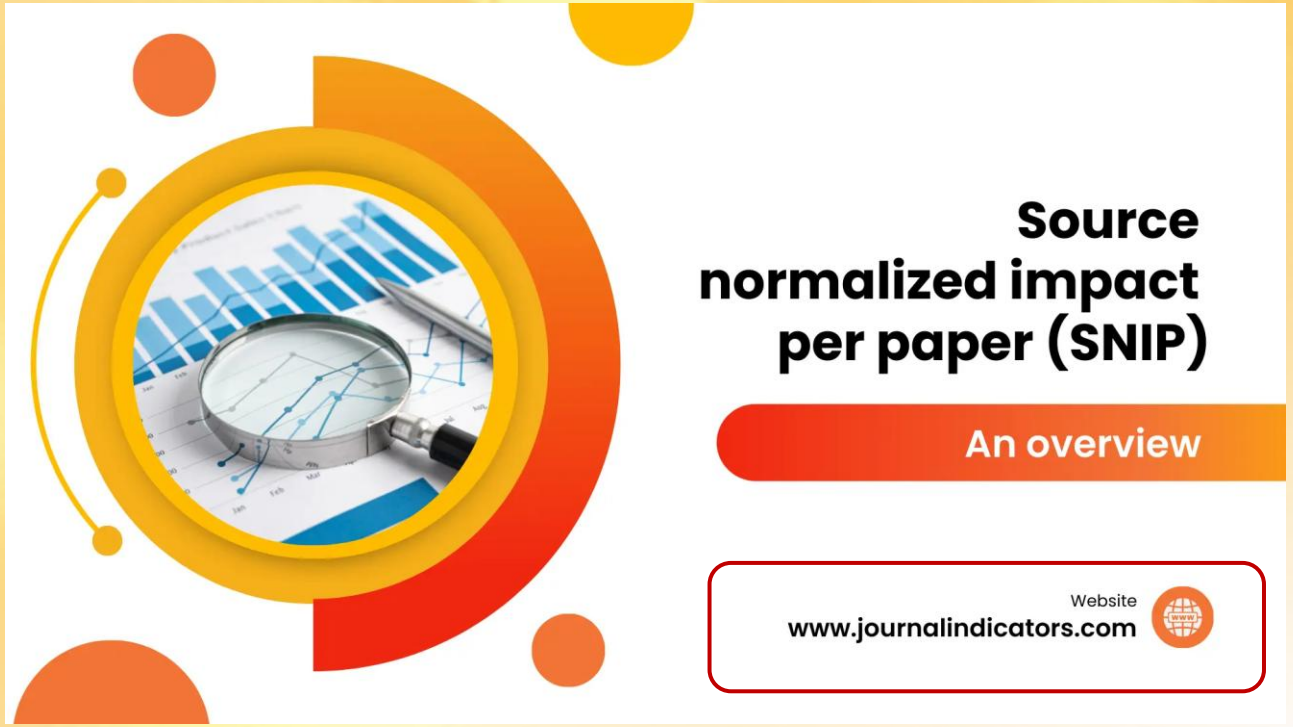
- Developed by Elsevier for the **Scopus Database** (https://www.elsevier.com/products/scopus)
- Tracks the average citations per document over a

Four-year Rolling Window

- Provides a more stable metric for slower-moving disciplines.

Source Normalised Impact per Paper (SNIP)

- SNIP normalises citation counts based on the total citation potential of a specific scientific field.
- It mathematically lowers scores for high-citation fields (e.g., Molecular Biology) and raises them for low-citation fields (e.g., Mathematics)
- To enable fair cross-disciplinary comparisons.



Classification of Research Metrics
Journal-Level Metrics

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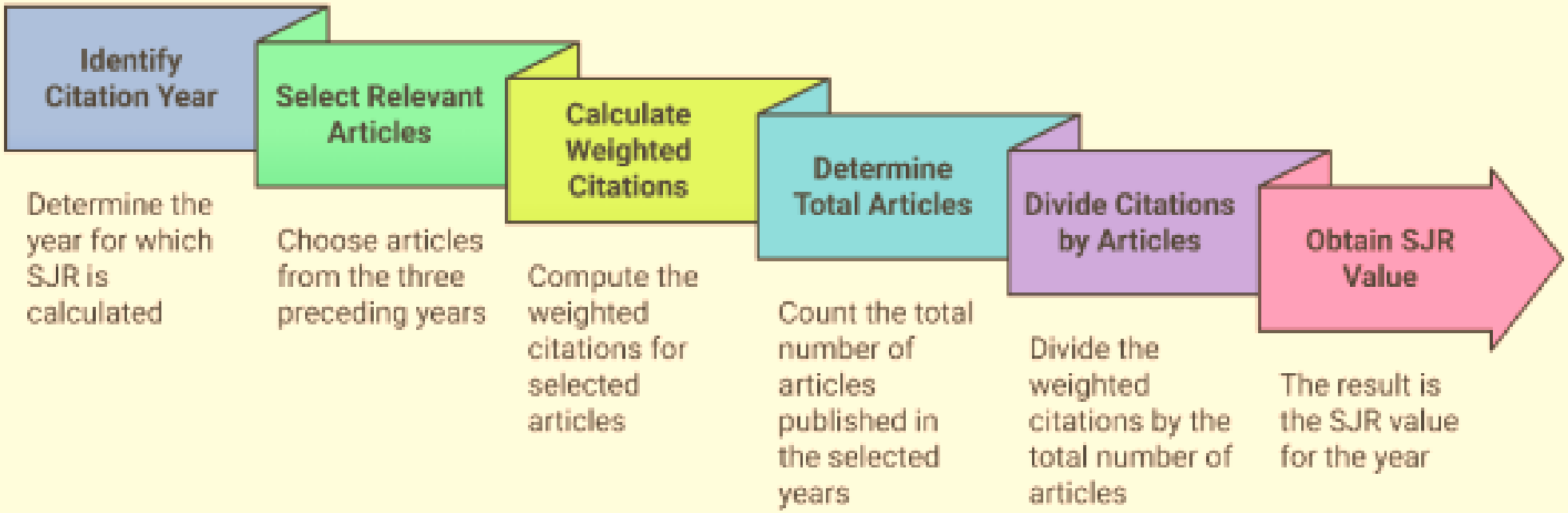
SCImago Journal Rank (SJR)

- Based on Scopus data (https://www.scimagojr.com/)
- Weighs citations by the network "prestige" of the citing journal using an **Eigenfactor** centrality algorithm similar to Google's PageRank.
- A citation from an elite journal influences this score far more than a citation from an obscure one.

Classification of Research Metrics
Journal-Level Metrics

SCImago Journal Rank Calculation Process



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Classification of Research Metrics
Journal-Level Metrics

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Eigenfactor Score

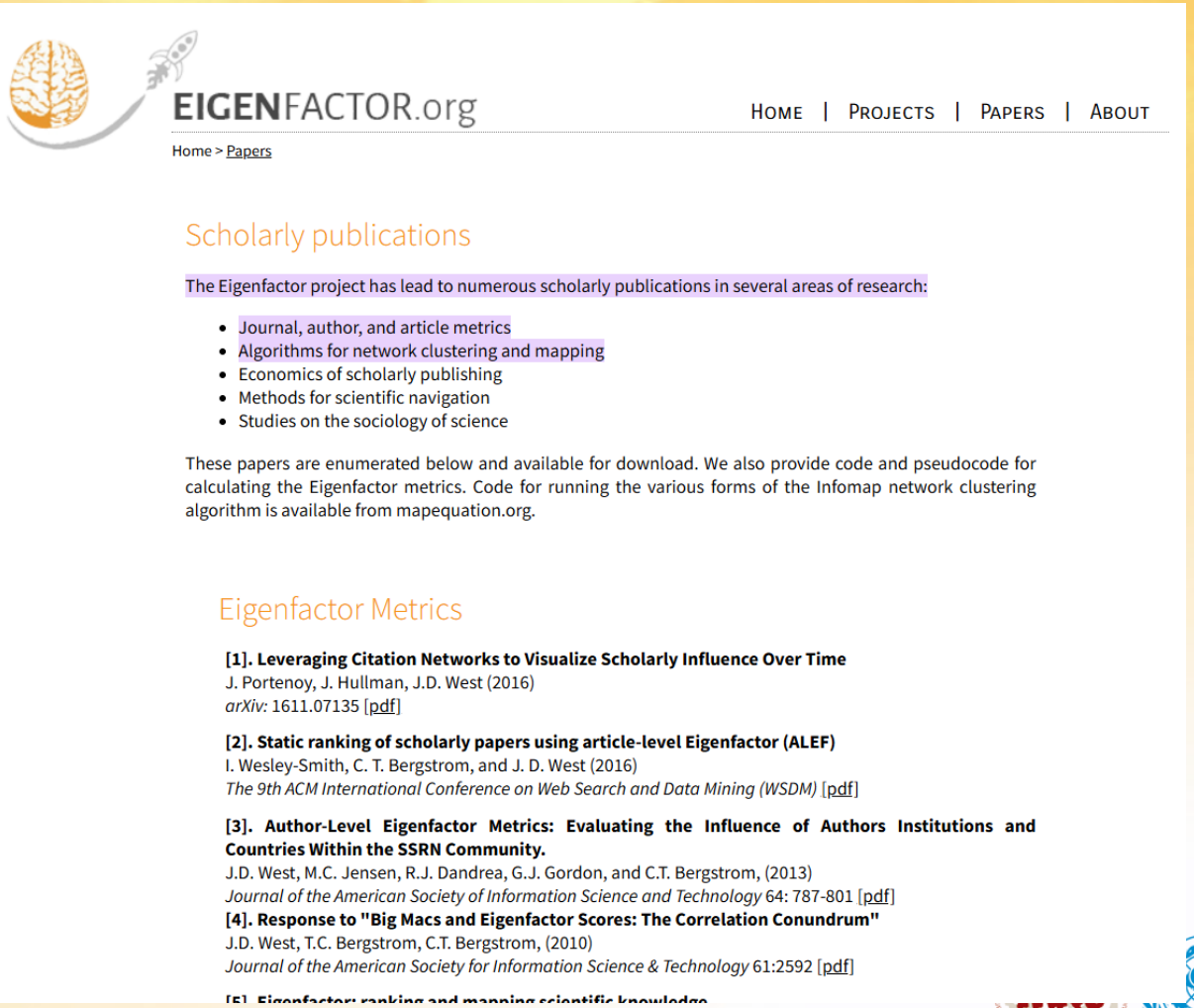
Measures the number of times articles from the journal published in the past

Five Years

have been cited in the

Journal Citation Reports

(JCR) year.



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Scholarly publications

The Eigenfactor project has lead to numerous scholarly publications in several areas of research:

- Journal, author, and article metrics
- Algorithms for network clustering and mapping
- Economics of scholarly publishing
- Methods for scientific navigation
- Studies on the sociology of science

These papers are enumerated below and available for download. We also provide code and pseudocode for calculating the Eigenfactor metrics. Code for running the various forms of the Infomap network clustering algorithm is available from mapequation.org.

Eigenfactor Metrics

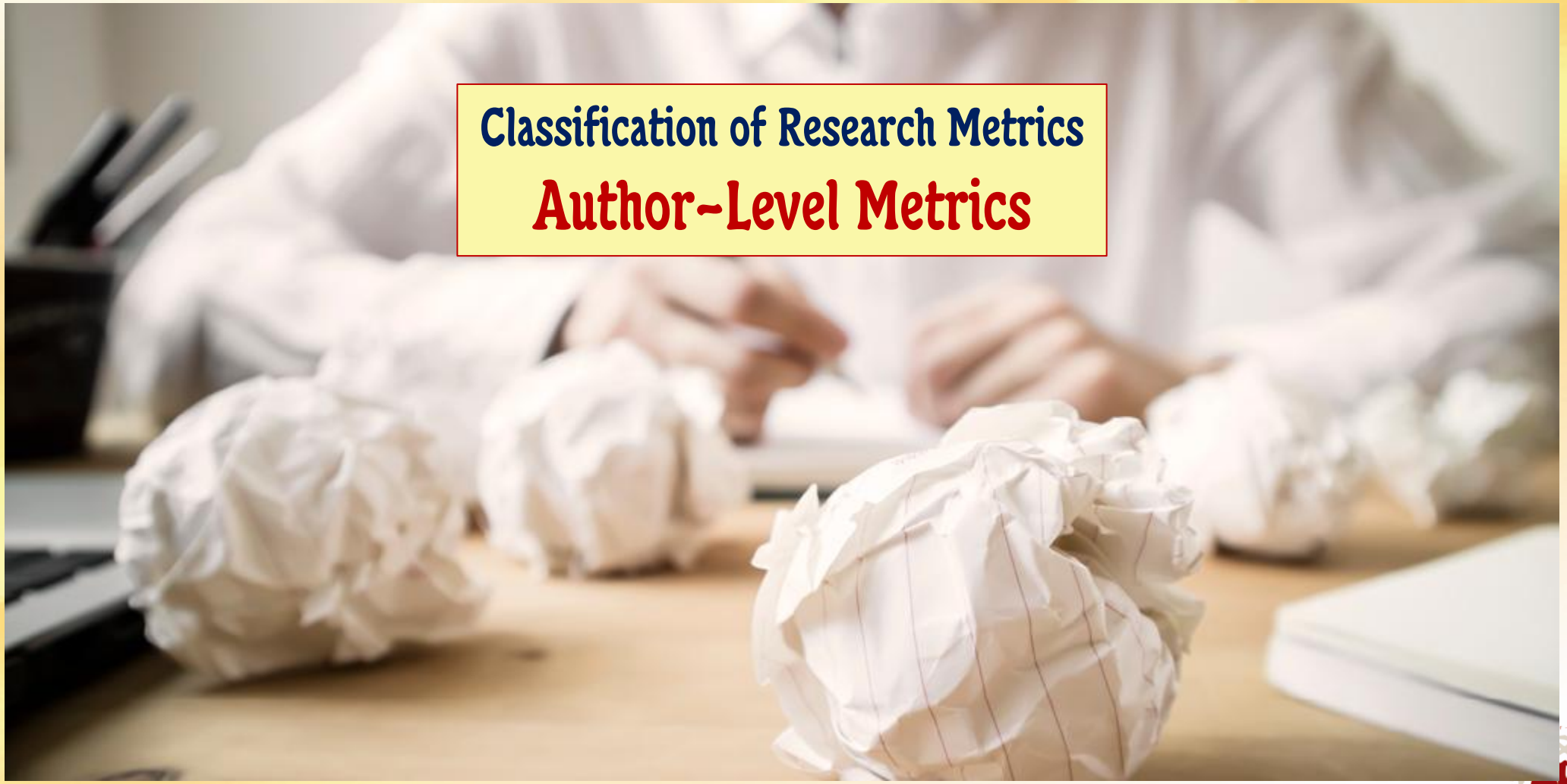
[1]. Leveraging Citation Networks to Visualize Scholarly Influence Over Time
J. Portenoy, J. Hullman, J.D. West (2016)
arXiv: 1611.07135 [pdf]

[2]. Static ranking of scholarly papers using article-level Eigenfactor (ALEF)
I. Wesley-Smith, C. T. Bergstrom, and J. D. West (2016)
The 9th ACM International Conference on Web Search and Data Mining (WSDM) [pdf]

[3]. Author-Level Eigenfactor Metrics: Evaluating the Influence of Authors Institutions and Countries Within the SSRN Community.
J.D. West, M.C. Jensen, R.J. Dandrea, G.J. Gordon, and C.T. Bergstrom, (2013)
Journal of the American Society of Information Science and Technology 64: 787-801 [pdf]

[4]. Response to "Big Macs and Eigenfactor Scores: The Correlation Conundrum"
J.D. West, T.C. Bergstrom, C.T. Bergstrom, (2010)
Journal of the American Society for Information Science & Technology 61:2592 [pdf]

[5]. Eigenfactor: ranking and mapping scientific knowledge



Classification of Research Metrics

Author-Level Metrics

Classification of Research Metrics
Author-Level Metrics

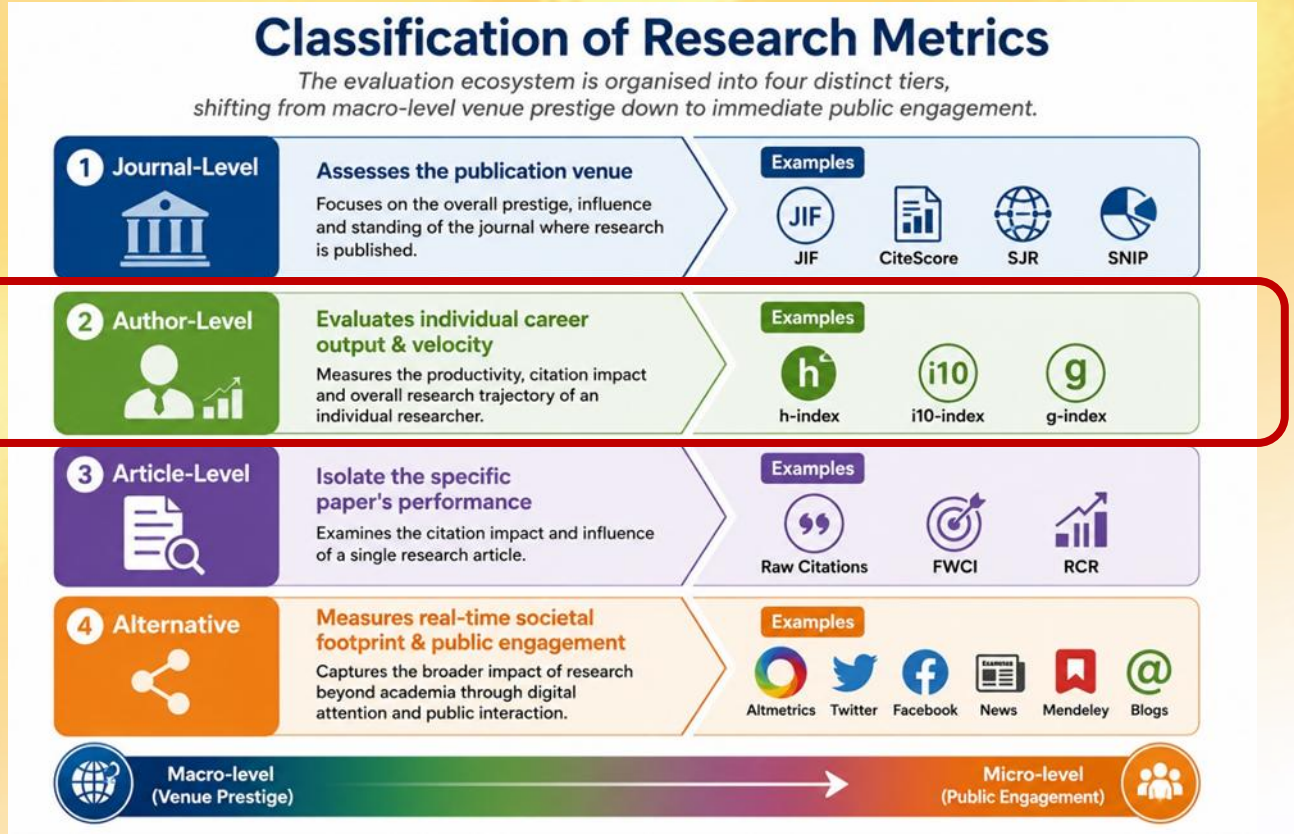
These indicators quantify an individual scientist's cumulative productivity and citation footprint over their career.

The h-index

i10-index

g-index

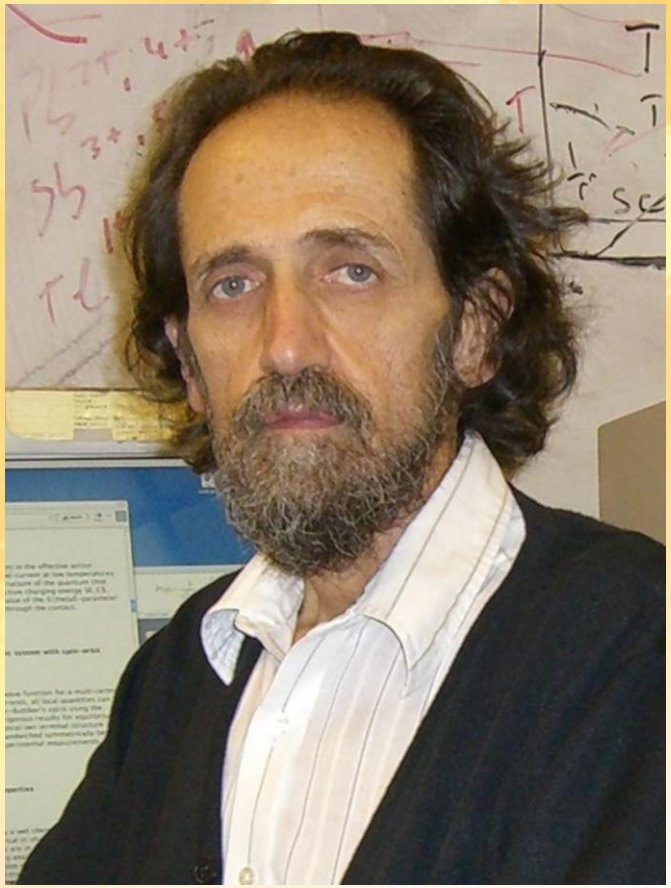
e. index



The h-index

Proposed by Jorge E. Hirsch

- An Argentine American professor of physics at the University of California, San Diego.
- He is known for inventing the h-index in 2005
- An index for quantifying a scientist's publication productivity and the basis of several scholar indices.



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Classification of Research Metrics
Author-Level Metrics

The h-index

- An h-index of **15** means a scientist has published **15 Papers**, each cited at least **15 Times**

- Effectively balancing **Volume** (number of papers) with **Impact** (number of citations).

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Classification of Research Metrics
Author-Level Metrics
The h-index

Prof. Ahmed Hassan Fahal

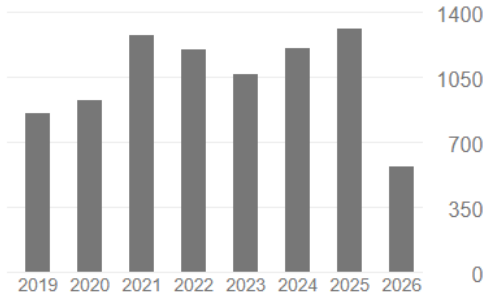
FOLLOWING

Professor of Surgery - University of Khartoum
Verified email at uofk.edu - Homepage
Surgery Mycetoma Medical Education

TITLE	CITED BY	YEAR
Genome-wide meta-analysis identifies 11 new loci for anthropometric traits and provides insights into genetic architecture SI Berndt, S Gustafsson, R Mägi, A Ganna, E Wheeler, MF Feitosa, ... Nature genetics 45 (5), 501-512	845	2013
Multiple independent variants at the *TERT* locus are associated with telomere length and risks of breast and ovarian cancer SE Bojesen, KA Pooley, SE Johnatty, J Beesley, K Michailidou, JP Tyrer, ... Nature genetics 45 (4), 371-384	685	2013

Cited by	All	Since 2021
Citations	14128	6662
h-index	60	39
i10-index	222	160

VIEW ALL



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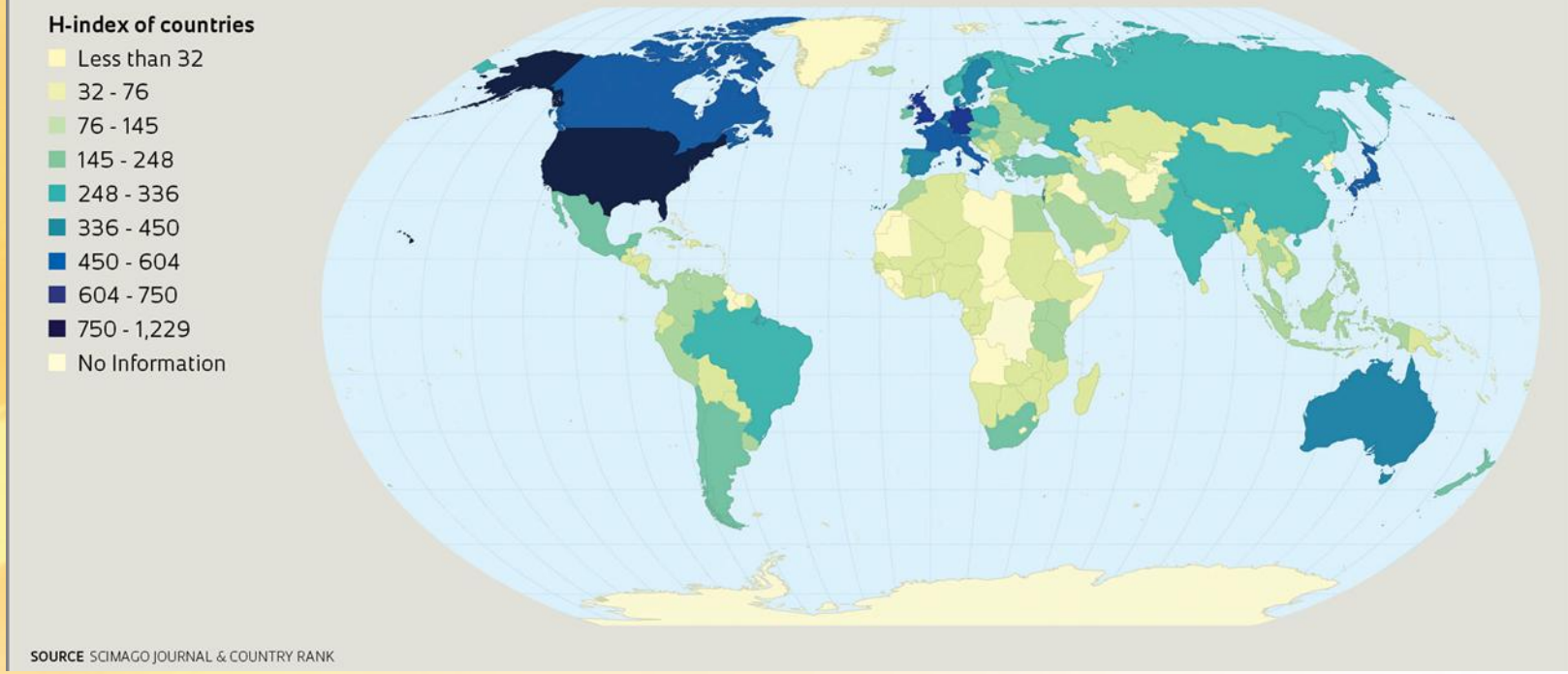
Classification of Research Metrics
Author-Level Metrics
The h-index

The h-index of nations

The world map of the h-index, based on articles indexed in the Scopus database published by researchers in each country, and citations for the period 1996–2010



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Classification of Research Metrics
Author-Level Metrics – h-index

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Academic Stage	Life Sciences	Physical Sciences	Engineering	Social Sciences	Humanities	Computer Science	Business & Economics
PhD Student	2-5	2-4	2-5	1-3	0-2	2-4	1-3
Postdoc	6-16	5-13	6-16	4-12	2-6	7-17	4-13
Assistant Professor	12-25	10-23	12-25	9-22	4-14	13-26	10-23
Associate Professor	20-40	18-38	20-40	17-35	10-26	21-40	18-36
Professor	32-60+	30-60+	32-60+	29-55+	20-40+	33-60+	30-56+

Classification of Research Metrics
Author-Level Metrics

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i10 -index

- Used primarily by Google Scholar https://scholar.google.com/
- This metric counts the total number of publications by an author that have received at least 10 citations.

Classification of Research Metrics
Author-Level Metrics

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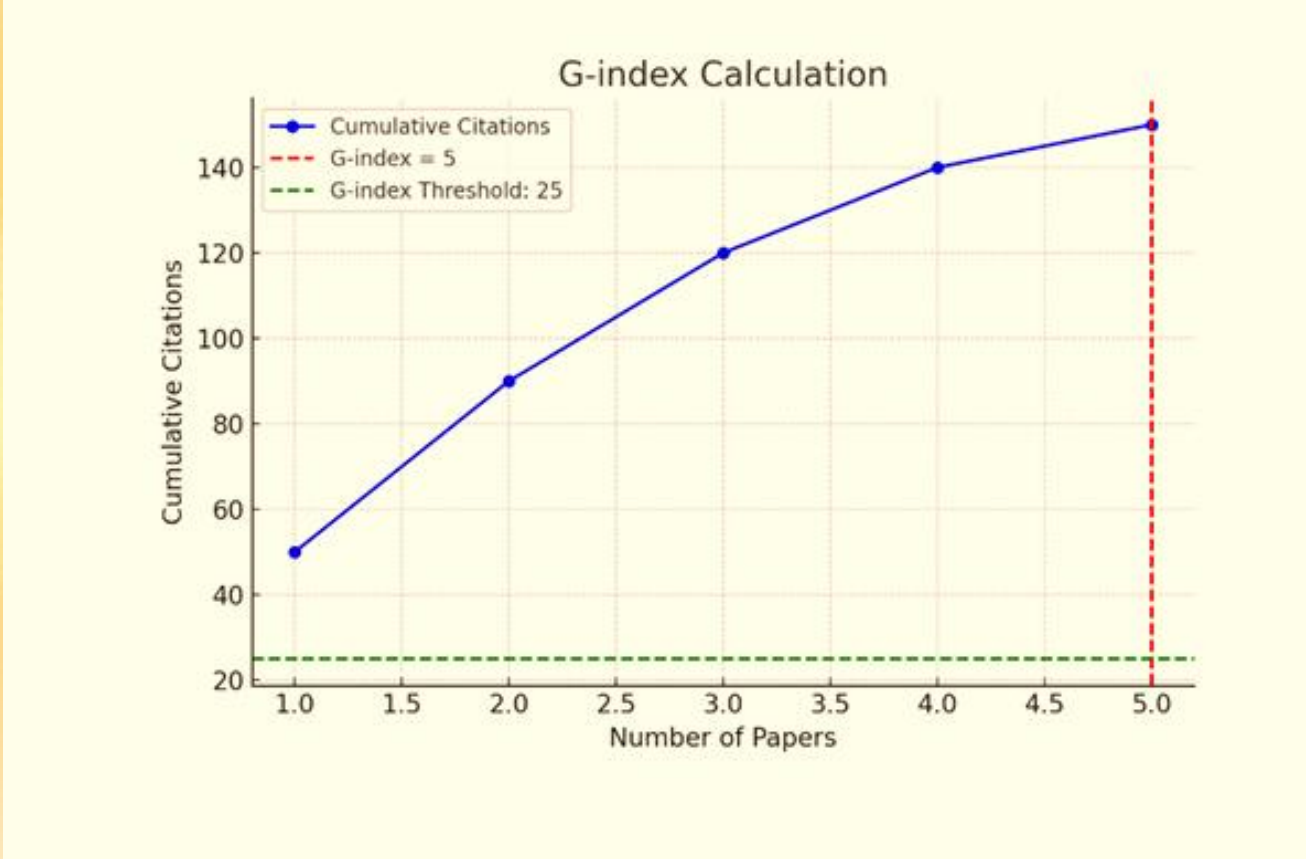
g- Index

Leo Egghe proposed the **G-Index** as an improvement on the **h-index** in 2006.



Classification of Research Metrics
Author-Level Metrics

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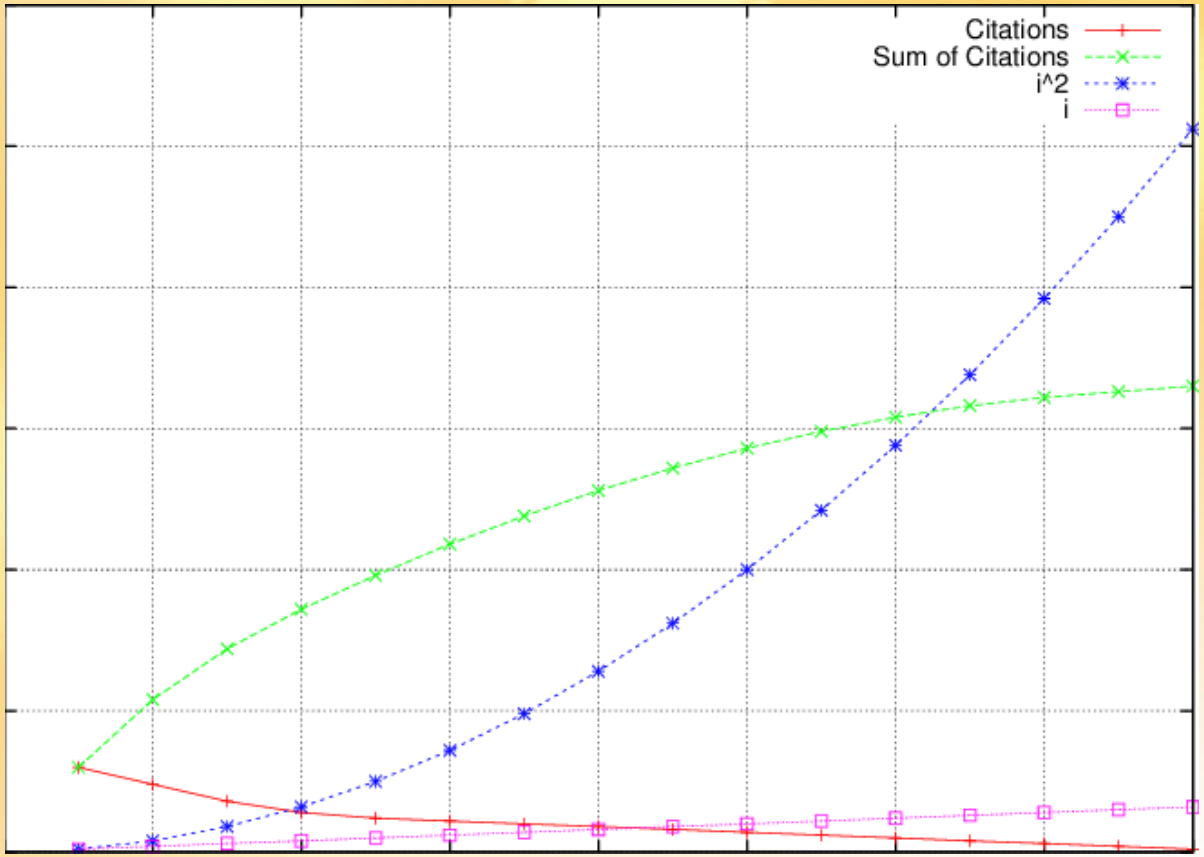
g- Index

Calculate the rank of a set of articles in decreasing order of the number of citations they received.

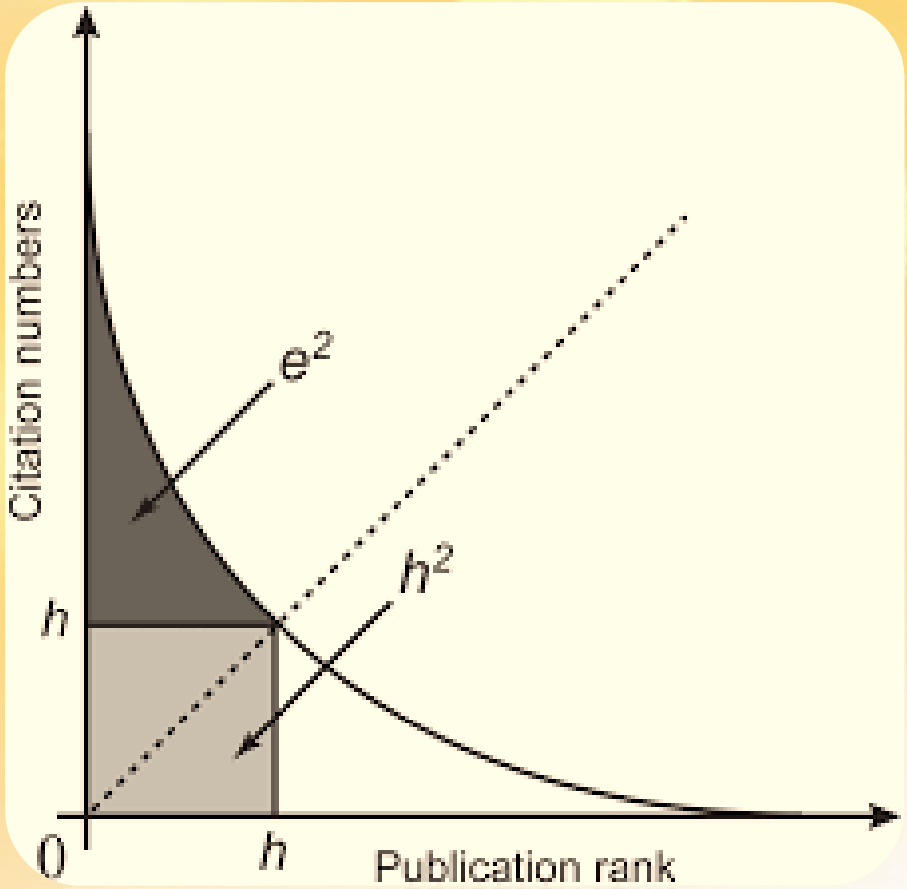
Then, find the largest number, G, such that the top G articles receive at least g^2 citations.



e- Index

The "e-index" is an academic bibliometric indicator used to evaluate a scientist's research **Impact & Productivity.**

It typically acts as a complement to the traditional h-index



Classification of Research Metrics
Author-Level Metrics

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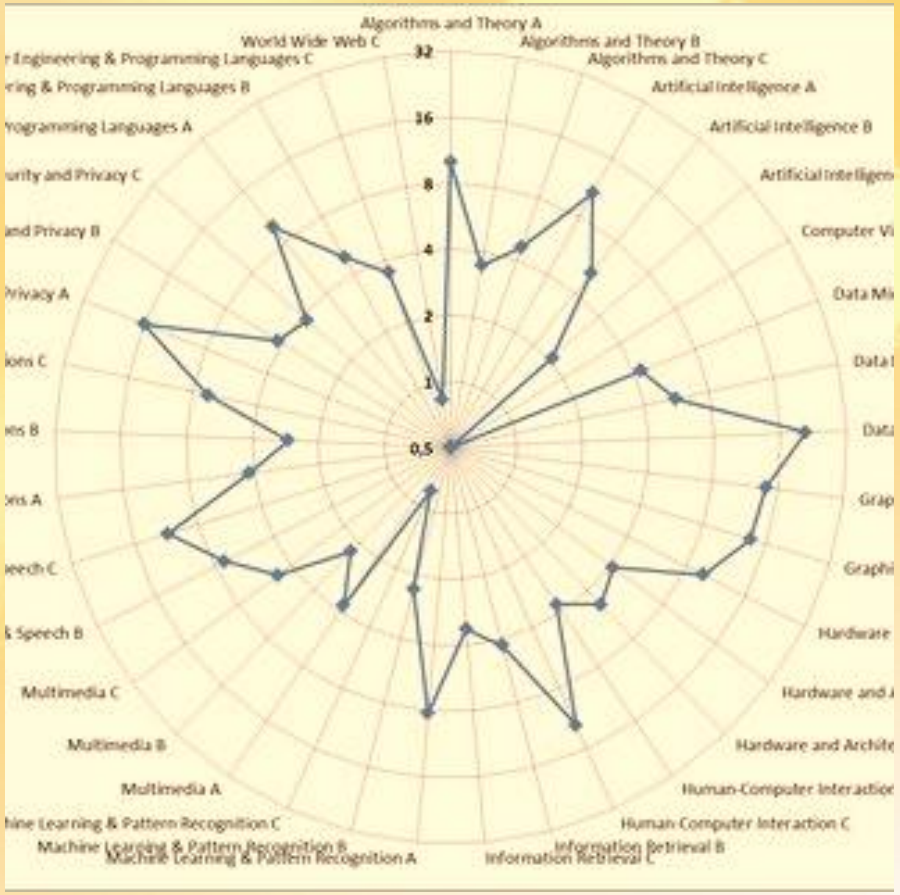
e- Index

- It is designed to account for citations in excess of the h-index
- Provides a means for differentiation between
- Researchers With The Same

H-index.



Zhang C-T (2009) The e-Index, Complementing the h-Index for Excess Citations. PLoS ONE 4(5): e5429. doi:10.1371/journal.pone.0005429

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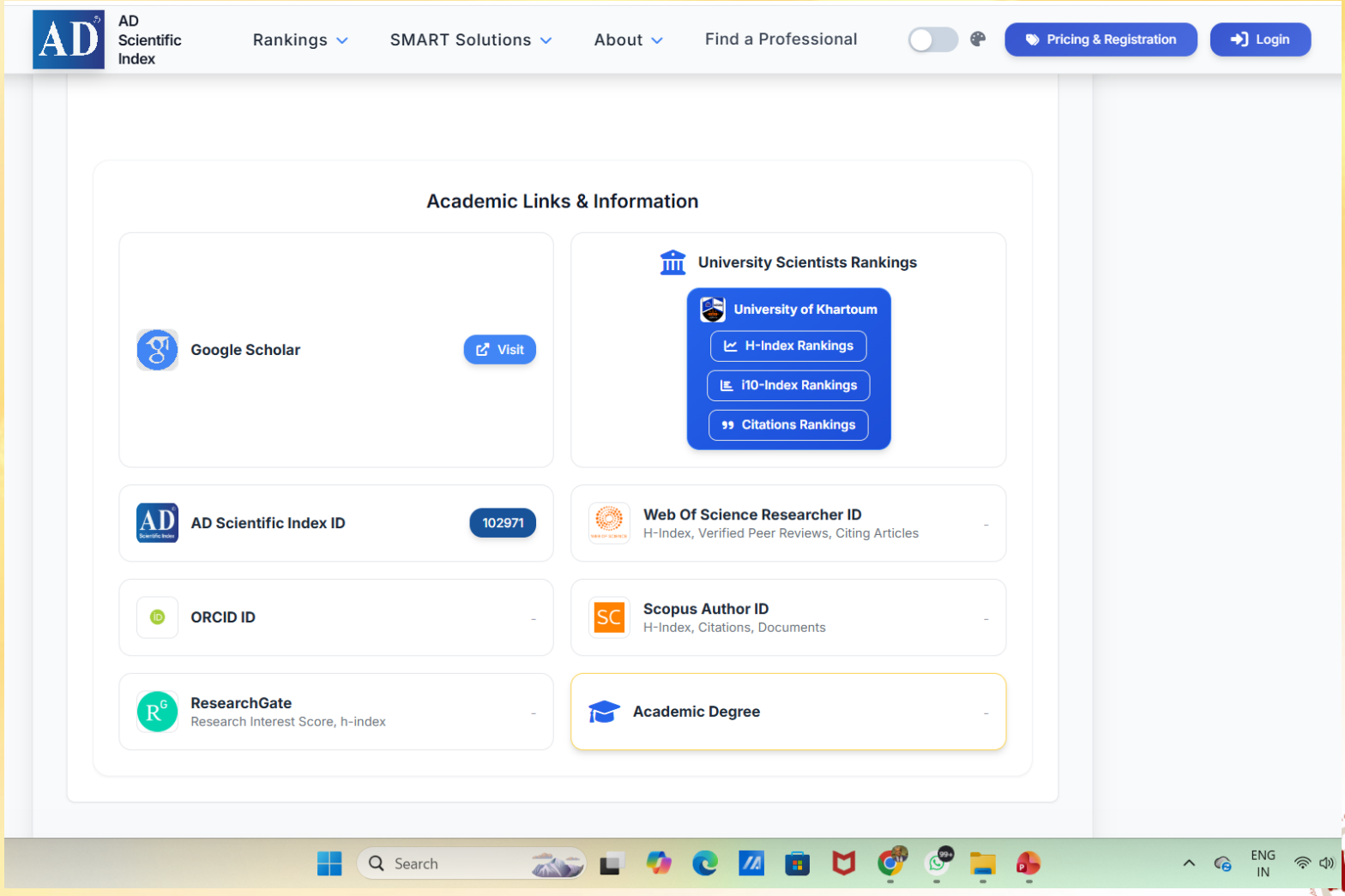
Research Metrics Platforms



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Research Metrics Tools
Google Scholar

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- Google Scholar is a very broad multidisciplinary database
- Used to track article citations and author impact metrics.
- It allows researchers to set up and curate their profiles.

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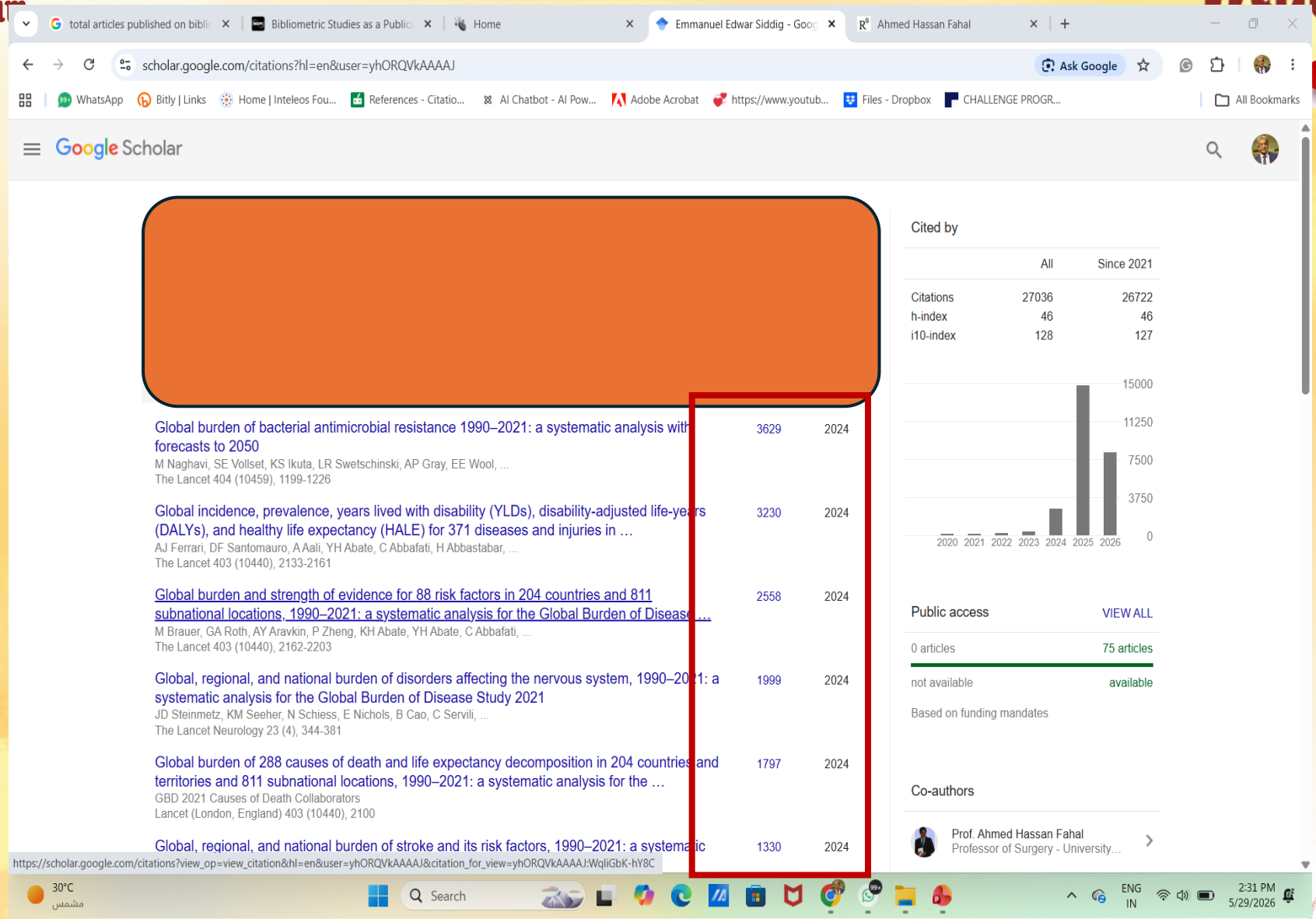
Research Metrics Tools

Google Scholar



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Research Metrics Tools

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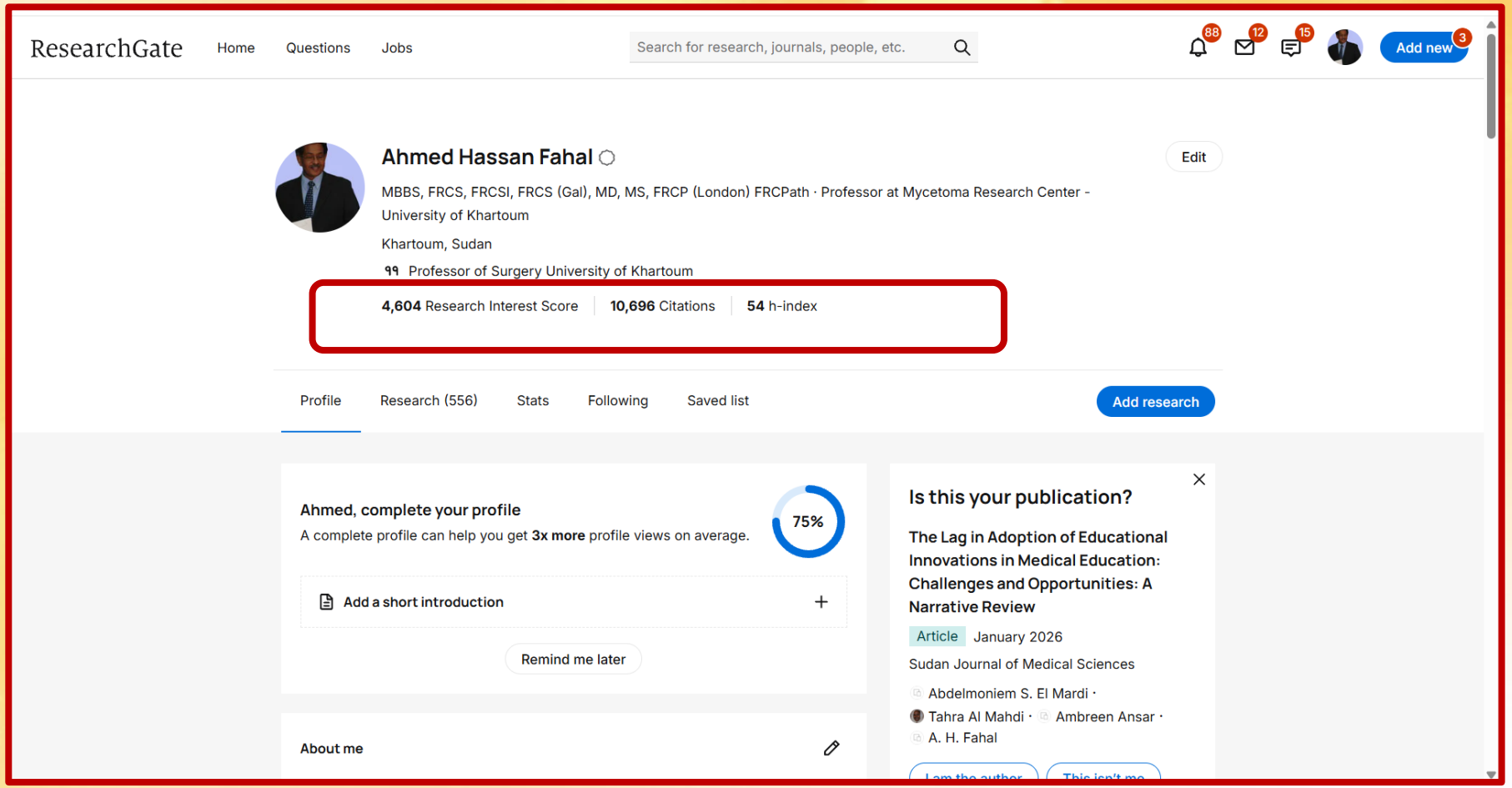
Research Gate



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Research Metrics Tools

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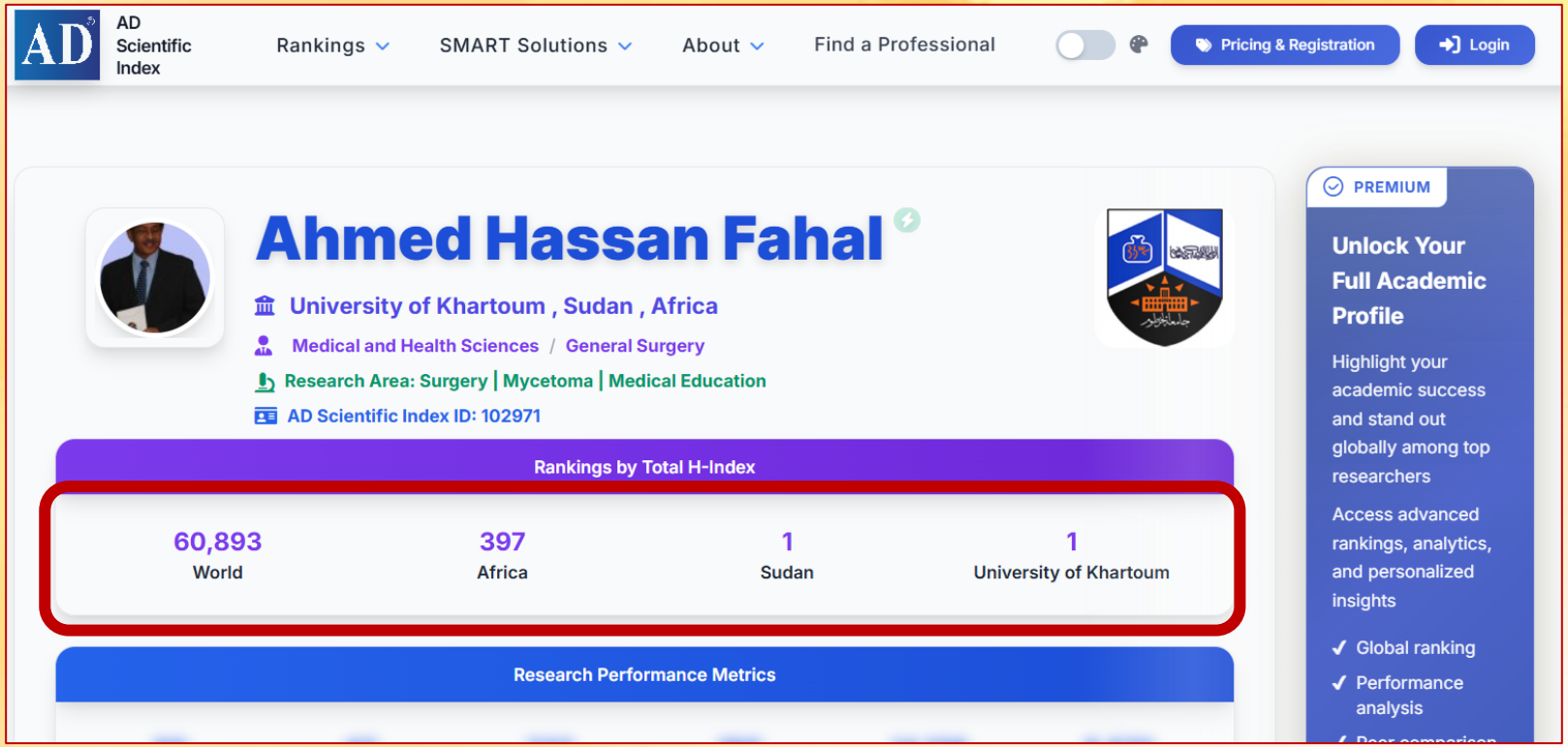
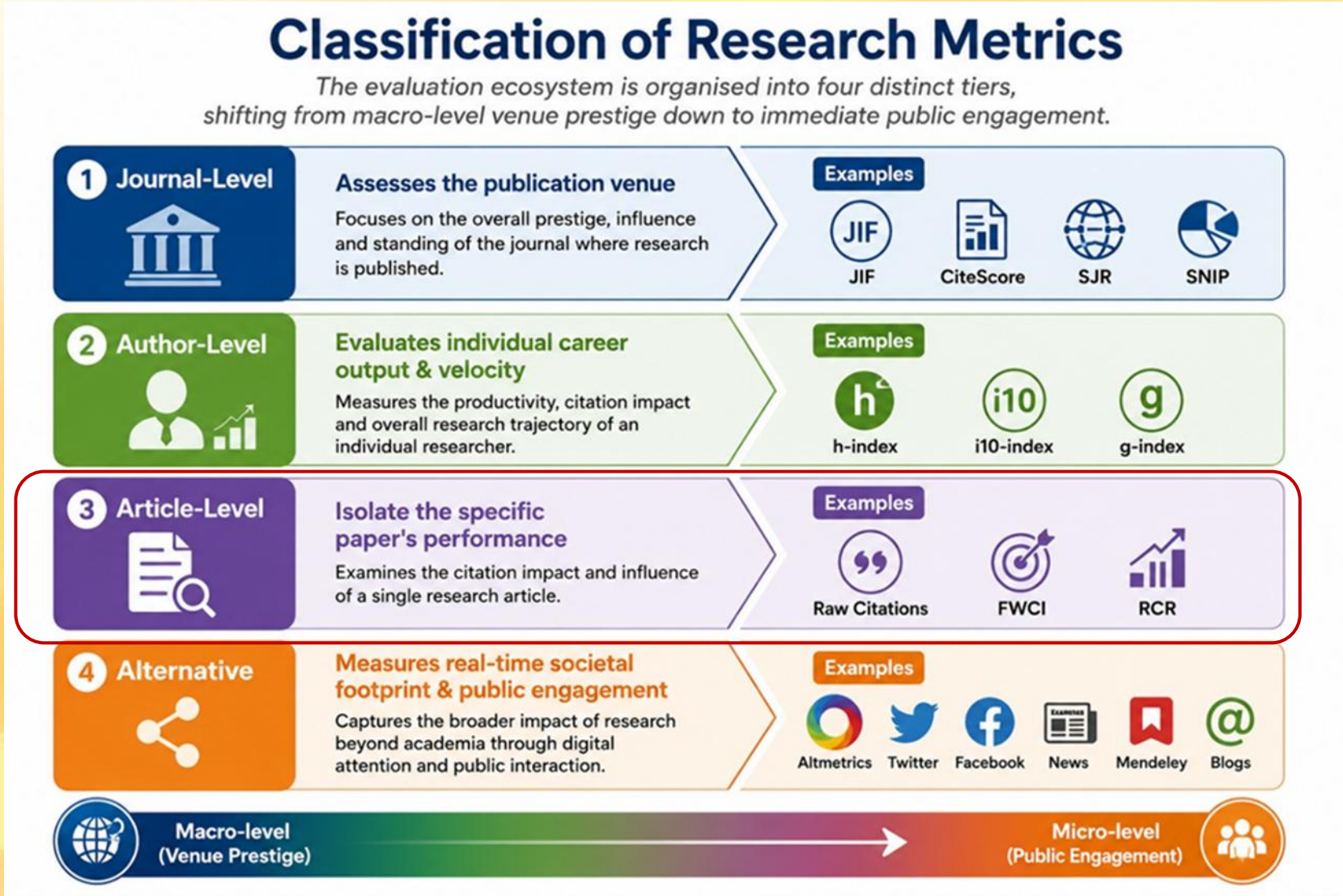
AD Scientific Index




Classification of Research Metrics
The evaluation ecosystem is organised into four distinct tiers, shifting from macro-level venue prestige down to immediate public engagement.
1 Journal-Level
Assesses the publication venue
Focuses on the overall prestige, influence and standing of the journal where research is published.
Examples
JIF
JIF
CiteScore
SJR
SNIP
2 Author-Level
Evaluates individual career output & velocity
Measures the productivity, citation impact and overall research trajectory of an individual researcher.
Examples
h-index
i10-index
g-index
3 Article-Level
Isolate the specific paper's performance
Examines the citation impact and influence of a single research article.
Examples
Raw Citations
FWCI
RCR
4 Alternative
Measures real-time societal footprint & public engagement
Captures the broader impact of research beyond academia through digital attention and public interaction.
Examples
Altmetrics
Twitter
Facebook
News
Mendeley
Blogs
Macro-level (Venue Prestige)
Micro-level (Public Engagement)

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Classification of Research Metrics

Article -Level Metrics

- These indicators isolate the performance of a **Single, Specific** research paper
- **Stripping away the biases of a Journal's Reputation.**

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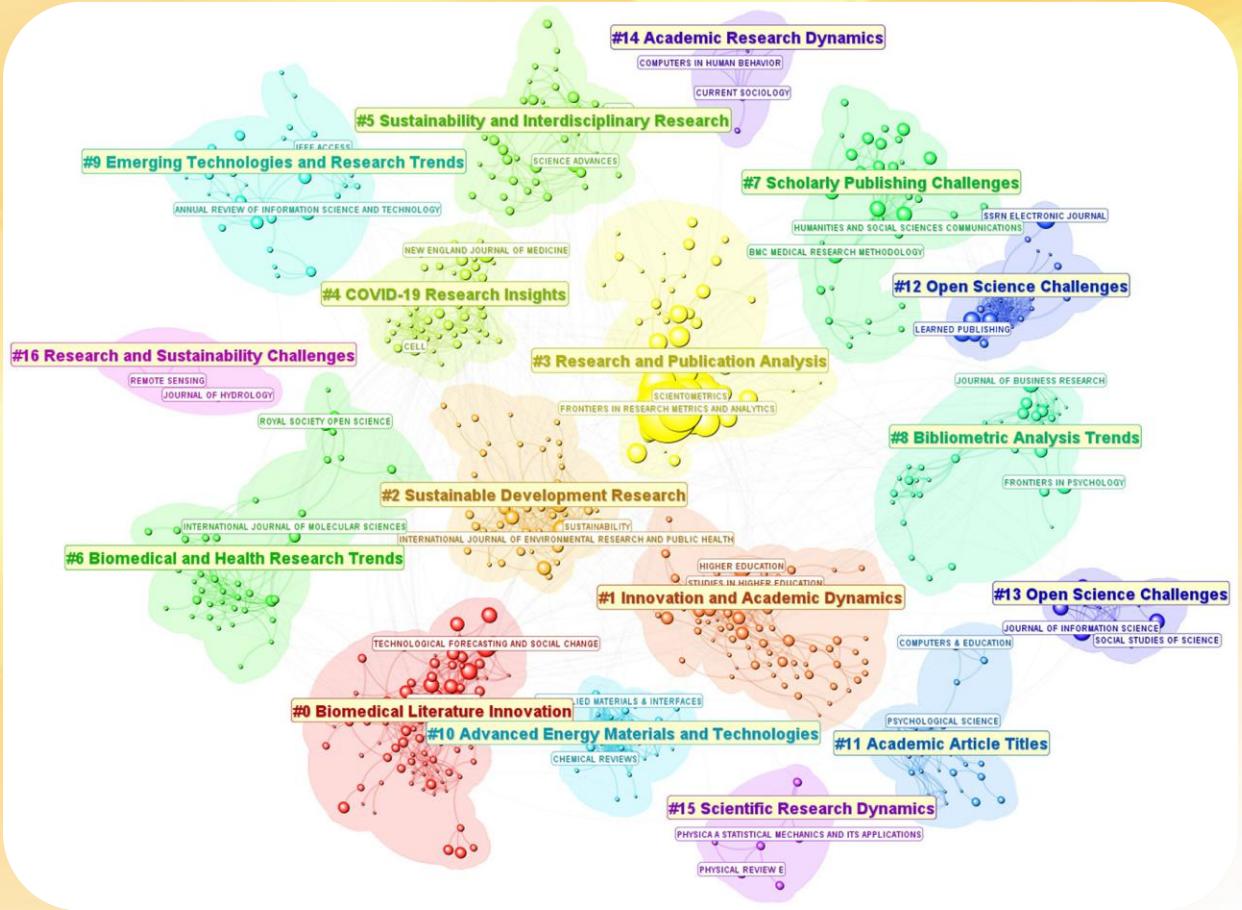
Classification of Research Metrics

Article -Level Metrics

- Raw Citation Count
- Field-Weighted Citation Impact (FWCI)
- Relative Citation Ratio (RCR)



Classification of Research Metrics
Article -Level Metrics

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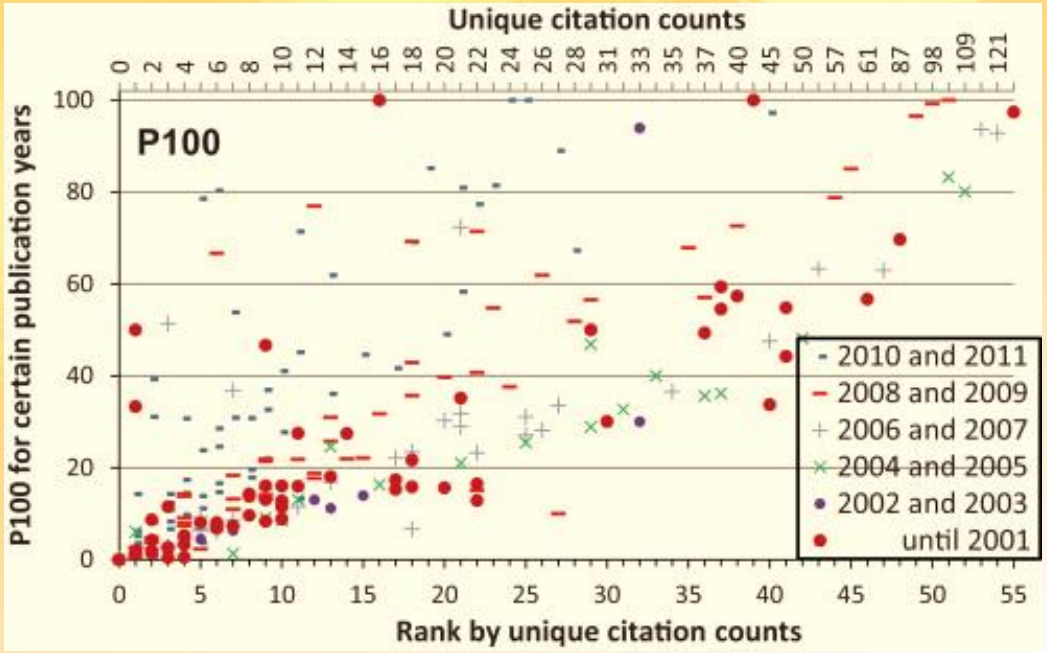
- The absolute, unadjusted number of times a specific paper has been

Referenced

by other

Indexed Peer-reviewed Articles.

Raw Citation Count



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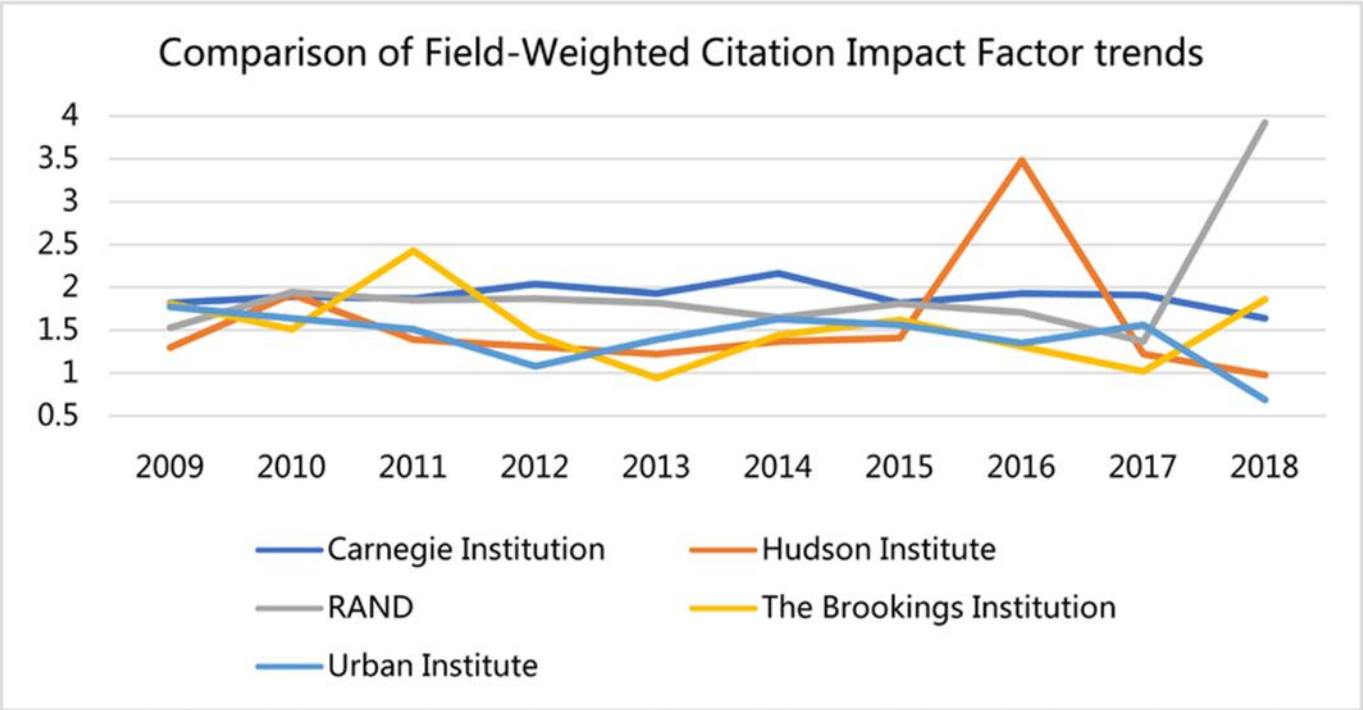
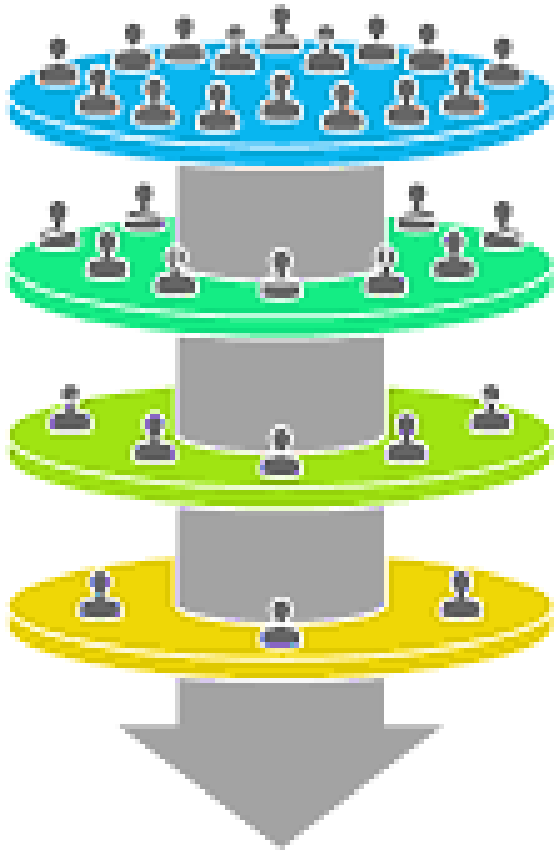
Classification of Research Metrics
Article -Level Metrics
Field-Weighted Citation Impact (FWCI)

- Maintained by Scopus
- Compares an article's raw citations to the average number of **Citations Expected** for similar documents of the same publication year, topic field, and document type
- A score of 1.00 represents the exact global average.



Field-Weighted Citation Impact Calculation



- Initial Citation Count
- Three-year Citation Period
- Field-specific Average
- Citation Impact Ratio

Classification of Research Metrics
Article -Level Metrics

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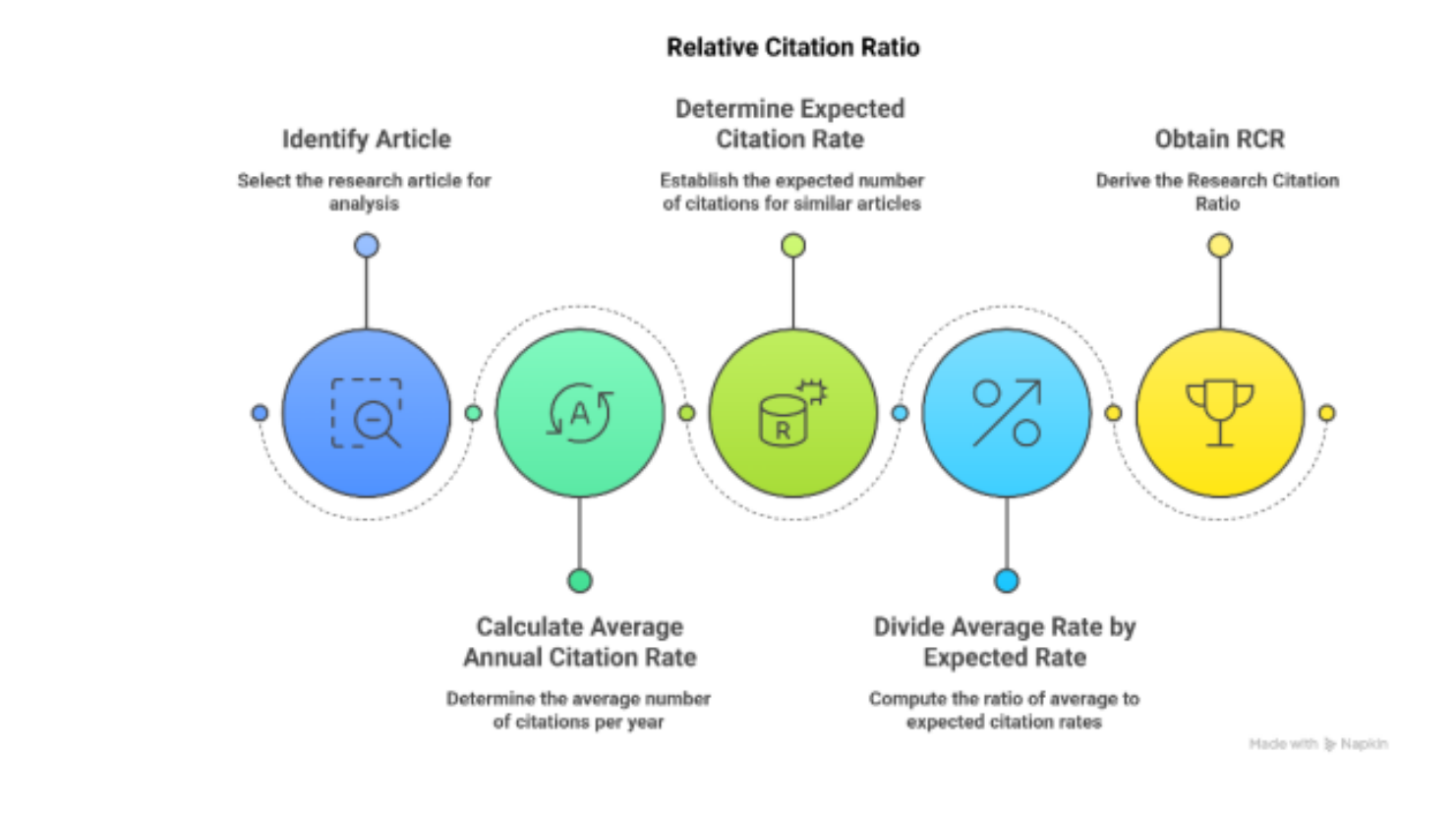
Relative Citation Ratio (RCR)

- Developed by the US National Institutes of Health (NIH)
- The RCR measures an article's scientific influence by **Dynamically Benchmarking** its citation rate against the co-citation network of papers published in that exact field.




Altmetric

Classification of Research Metrics

Alternative Metrics (Altmetrics)

- Traditional citations are lagging indicators that can take 3 to 5 years to accumulate.

- Altmetrics track
  - Immediate tracking
  - Real-world digital footprint of a Scientific Publication

- Across society and the broader internet.

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Classification of Research Metrics

Alternative Metrics (Altmetrics)

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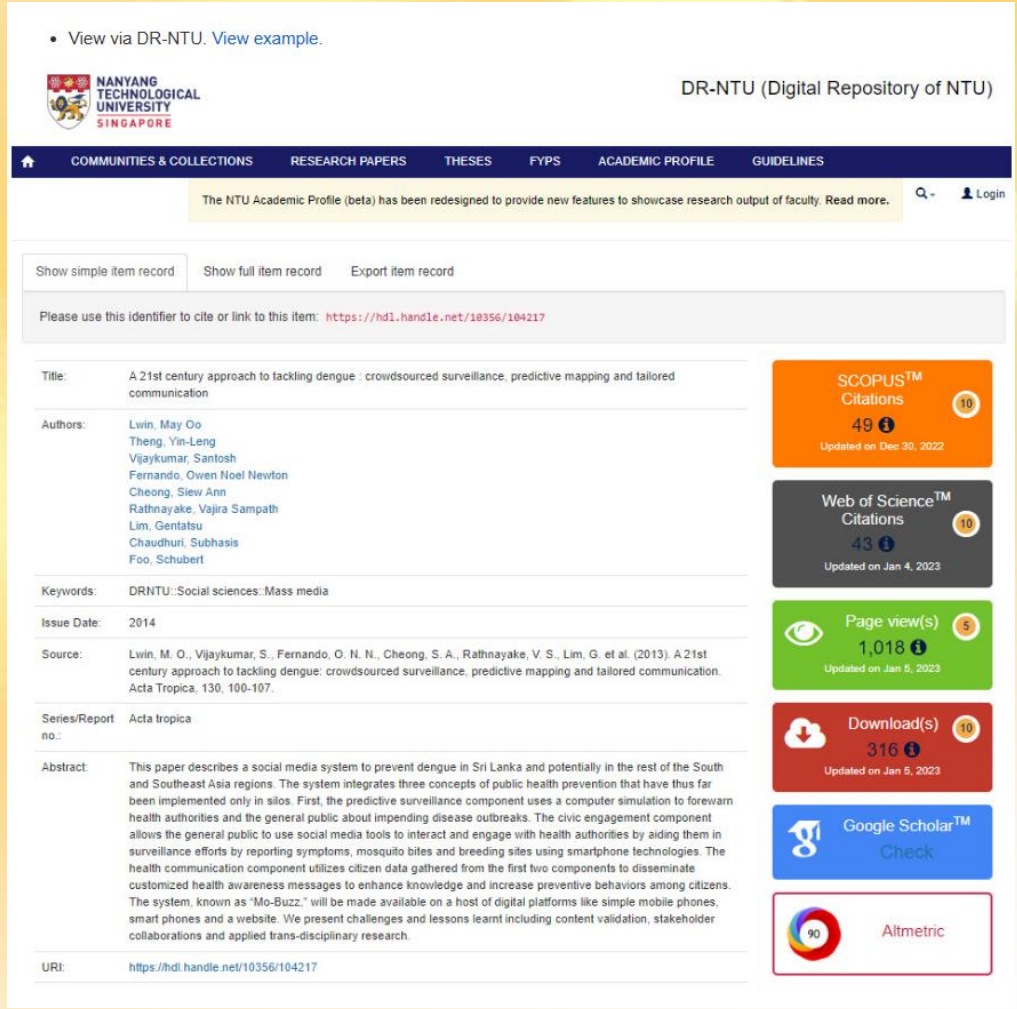
Classifications

- Policy Document Mentions (Purple)
- News and Media Captures (Red)
- Social Media Amplification (Blue/Cyan)
- Reader Bookmarks (Gold/Green)



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Classification of Research Metrics

Alternative Metrics (Altmetrics)

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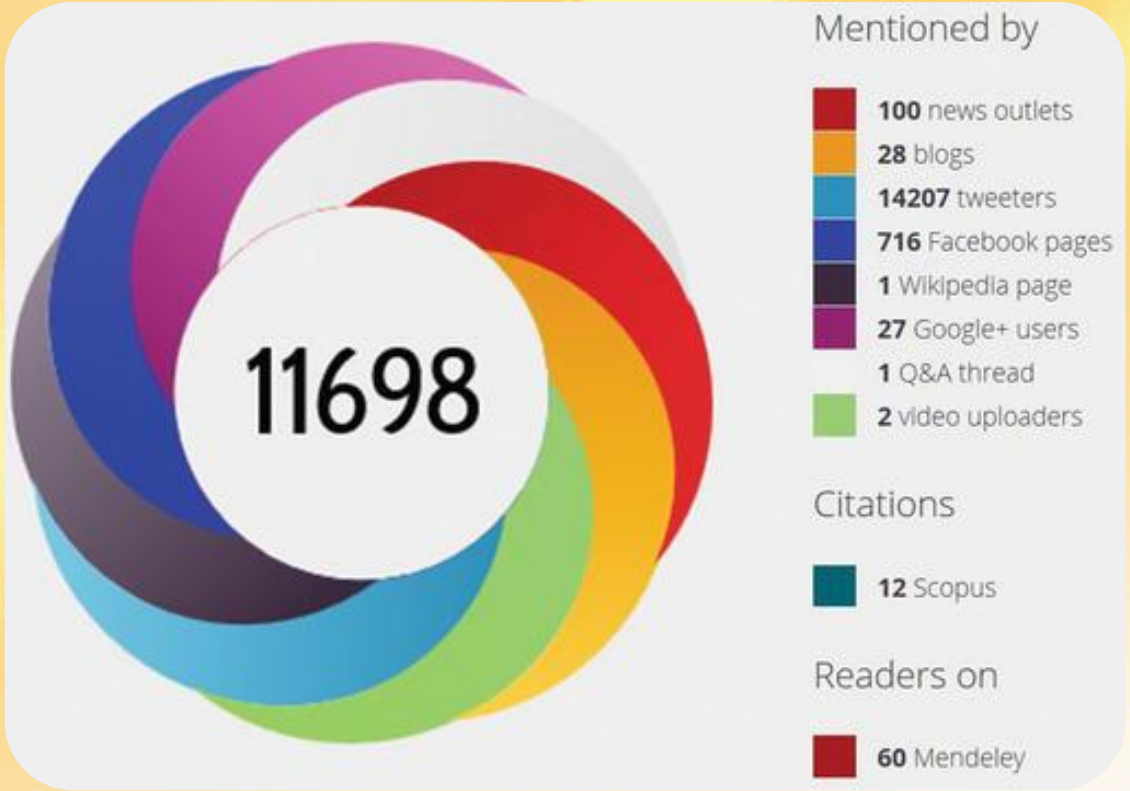

Policy Document Mentions

(Purple)

- Tracks when an article is formally cited in **White Papers** or **Clinical Guidelines** by organisations like the World Health Organization (WHO), the CDC, or **Global Governments.**

Classification of Research Metrics

Alternative Metrics (Altmetrics)

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News and Media Captures (Red)

- Measures how many **Mainstream News Outlets** (e.g., BBC, New York Times, Reuters) cover the paper's findings.

Classification of Research Metrics
Alternative Metrics (Altmetrics)

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Social Media Amplification
(Blue/Cyan)

- Counts shares, saves, and public discussions on **Platforms** like X, Reddit, and Wikipedia.

Reader Bookmarks
(Gold/Green)

- Tracks save to **Digital Libraries** like

  Mendeley (https://www.mendeley.com/)
  Zotero (https://www.zotero.org/)

- Serving as a powerful leading indicator of future formal citations.

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Classification of Research Metrics

Qualitative Assessment

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The fundamental challenge of
Research Assessment
Lies in this divide.

Bibliometrics give clean,
Structured Data at scale.

Qualitative assessment gives
Meaning.

Expert Peer Review

Deep, sound analysis of

- Scientific truth
- Ethics
- Consistency
- Methodological soundness

Expert Peer Review

- Single
- Double-Blind
- Open
- PubPeer

Classification of Research Metrics

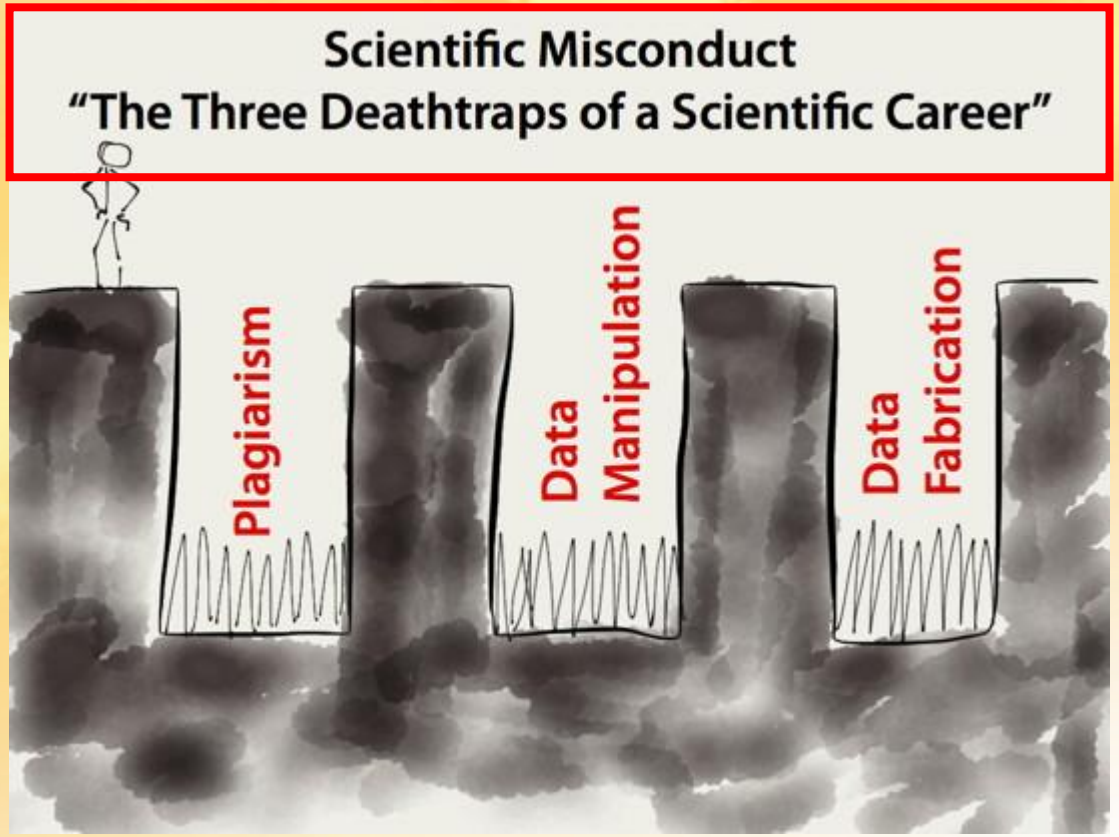
Qualitative Assessment

Post Publication Peer Review

- Crowdsourced auditing platforms like **PubPeer** allow the scientific community to critique papers after publication.

Post Publication Peer Review

- This has proven highly effective at identifying
  - Data fabrication
  - Image manipulation
  - Statistical errors
- That escaped traditional pre-publication vetting.



Classification of Research Metrics
Qualitative Assessment

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Post Publication Peer Review

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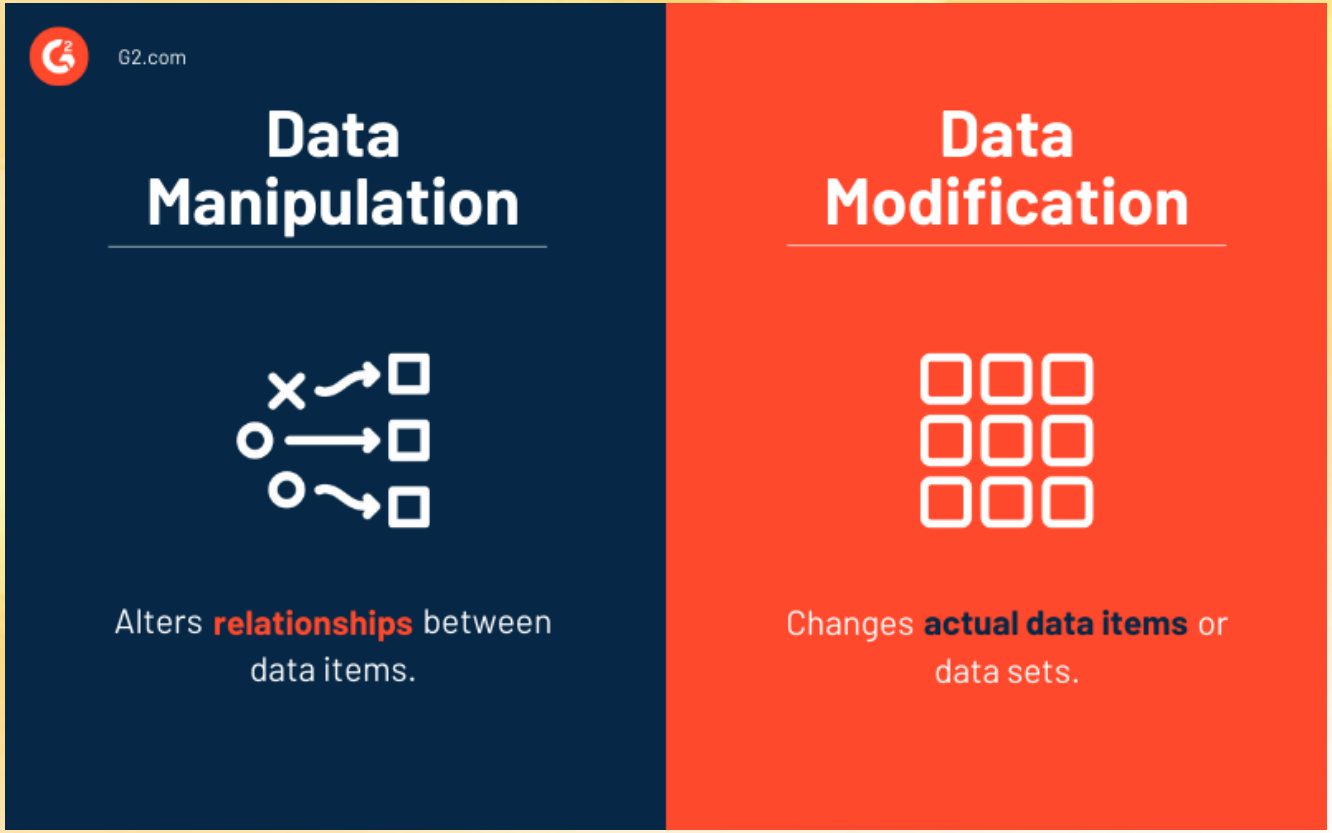

Classification of Research Metrics
Qualitative Assessment

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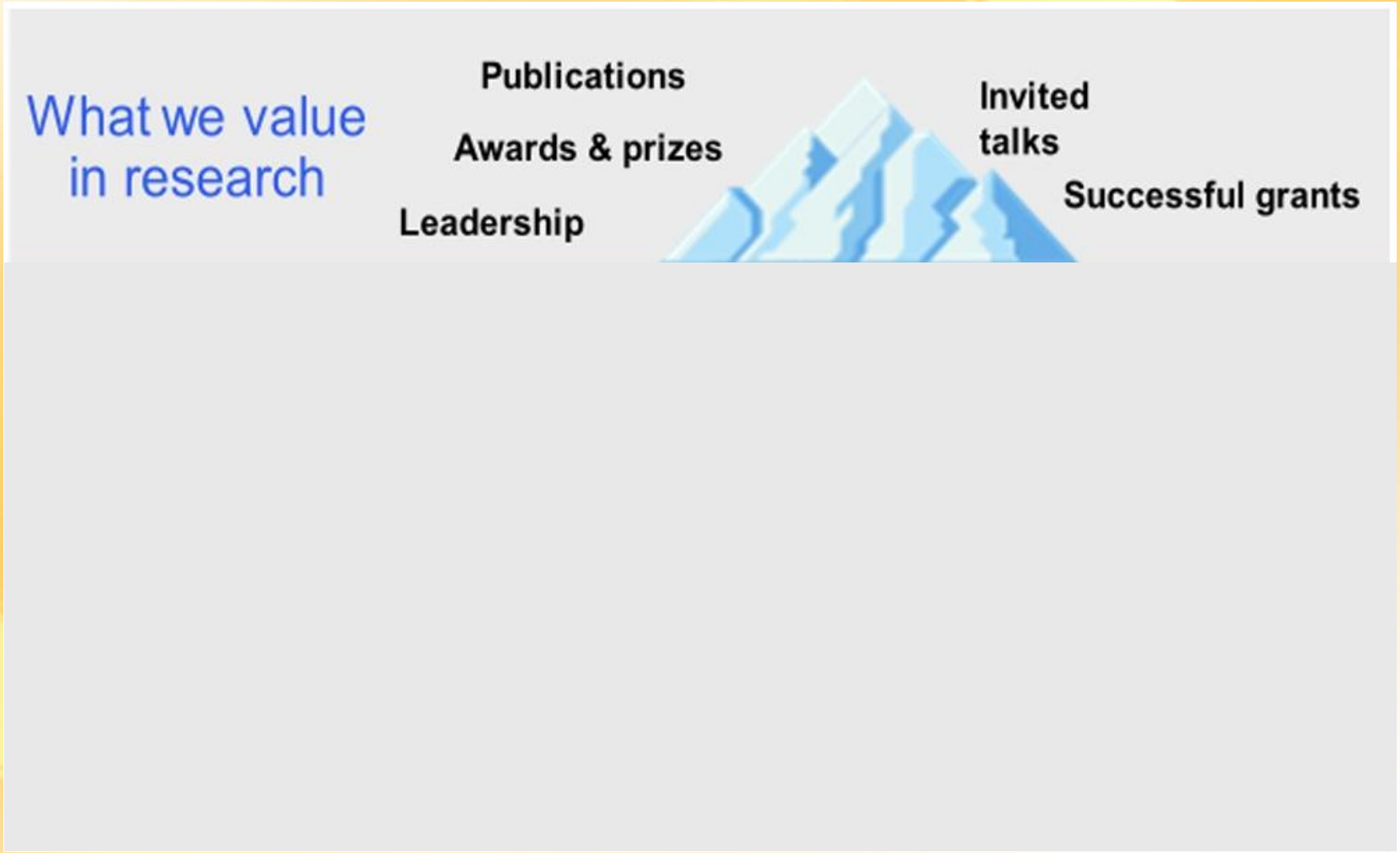
Structured Narrative CV

Global funding bodies and university tenure boards are swapping out long strings of metrics for

Structured Narrative CVs

Classification of Research Metrics
Qualitative Assessment

Structured Narrative CV



Structured Narrative CV

Shifts away from traditional quantitative lists, allowing you to

Tell The Story

of your impact. Instead of just itemising publications

Classification of Research Metrics
Qualitative Assessment

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Structured Narrative CV

Modular Format

is used to explain how a work has contributed to the field, detailing the context, significance, and the specific roles.

Structured Narrative CV

Ultimately, ensuring that science is judged by its

- Intrinsic truth
- Reproducibility
- Societal value

https://blogs.lse.ac.uk/impactofsocialsciences/2025/07/23/narrative-cvs-are-rewriting-academic-stories-and-identities/

Classification of Research Metrics
Qualitative Assessment

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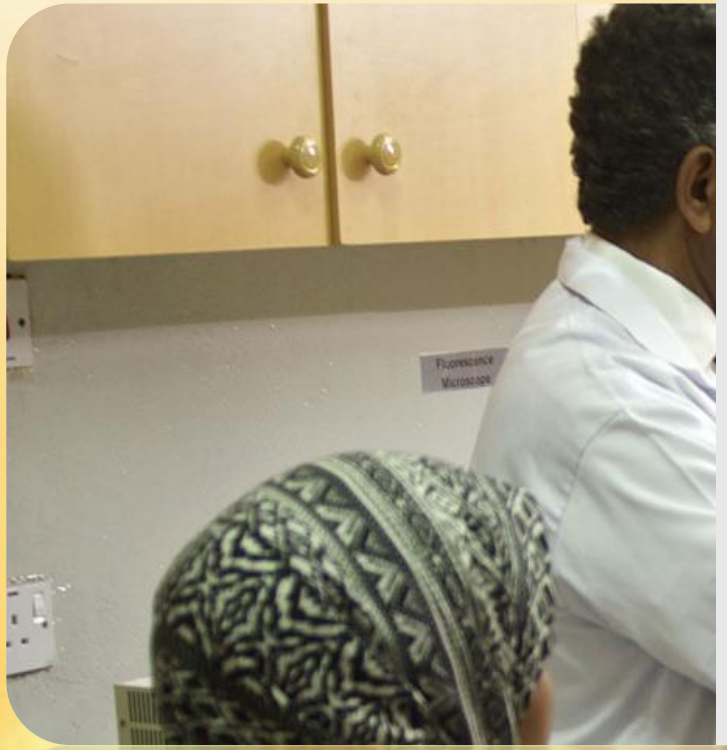
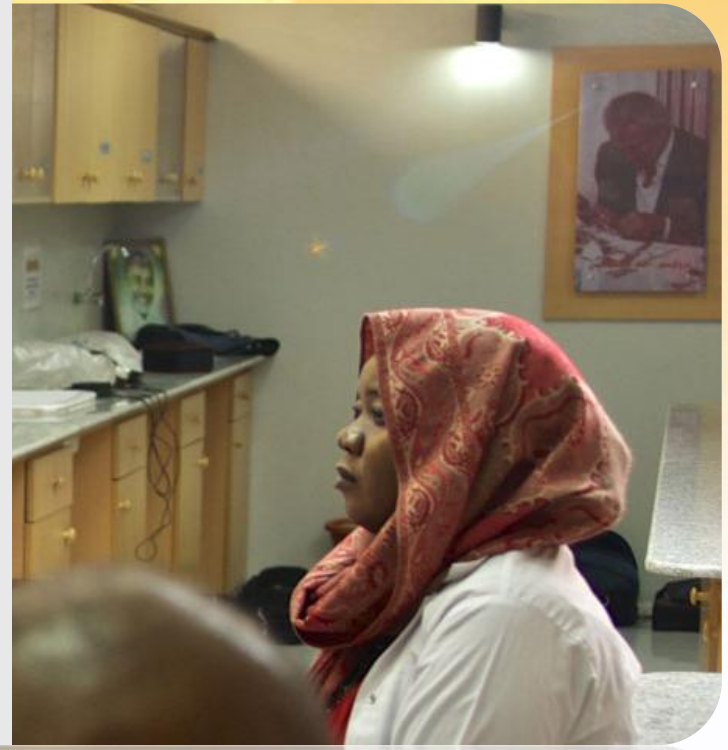
Structured Narrative CV



Researchers describe

- Their actual contributions to knowledge
- Open-source tool development
- Real-world societal impact
- In their own words



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Classification of Research Metrics
Qualitative Assessment

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Structured Narrative CV

Rather than **Posting** the cover of the journal
in which it is published

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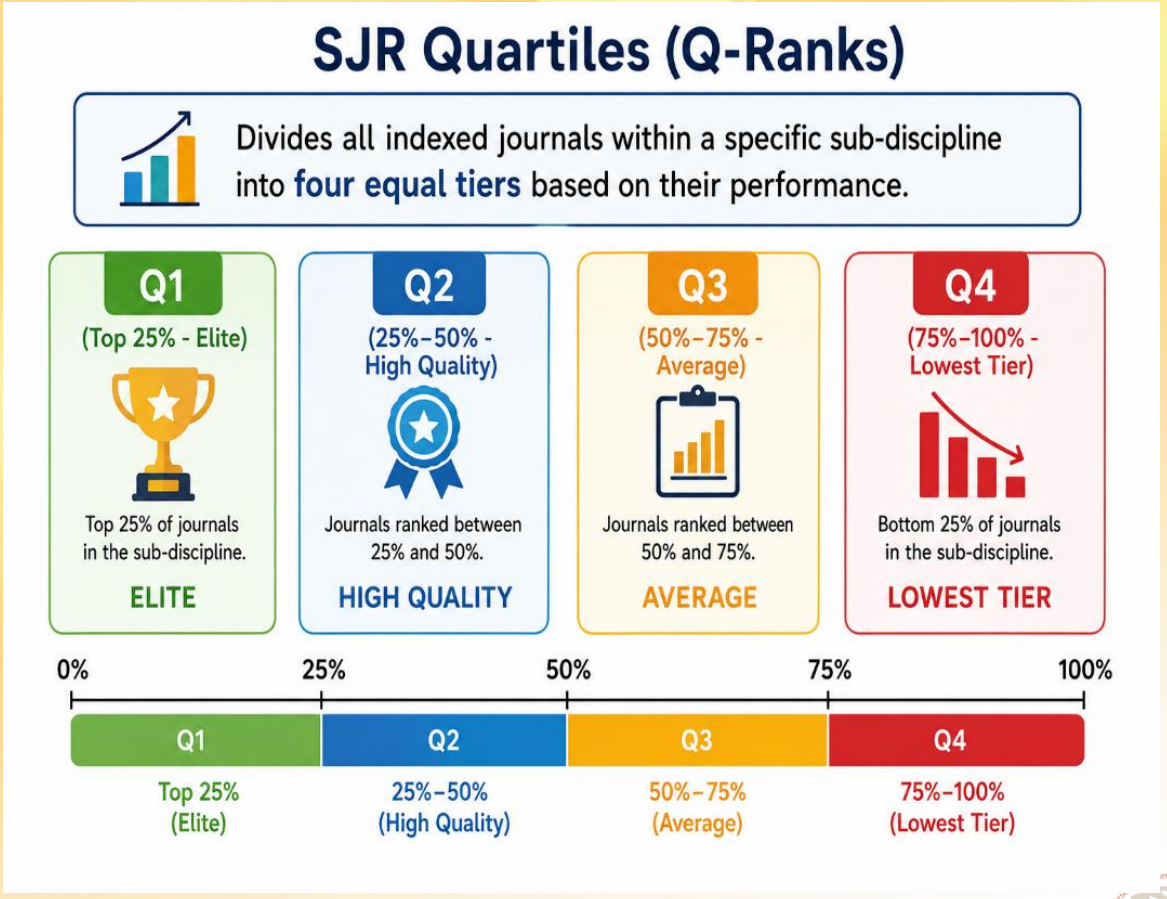
Classification of Research Metrics

SCImago Ranking

- The SCImago Journal & Country Rank (https://www.scimagojr.com/)
- It is a free, public portal that maps **Journal Network Dynamics** rather than individual papers
- Its primary tools include: SJR Quartiles (Q-Ranks)



Classification of Research Metrics

SJR Quartiles

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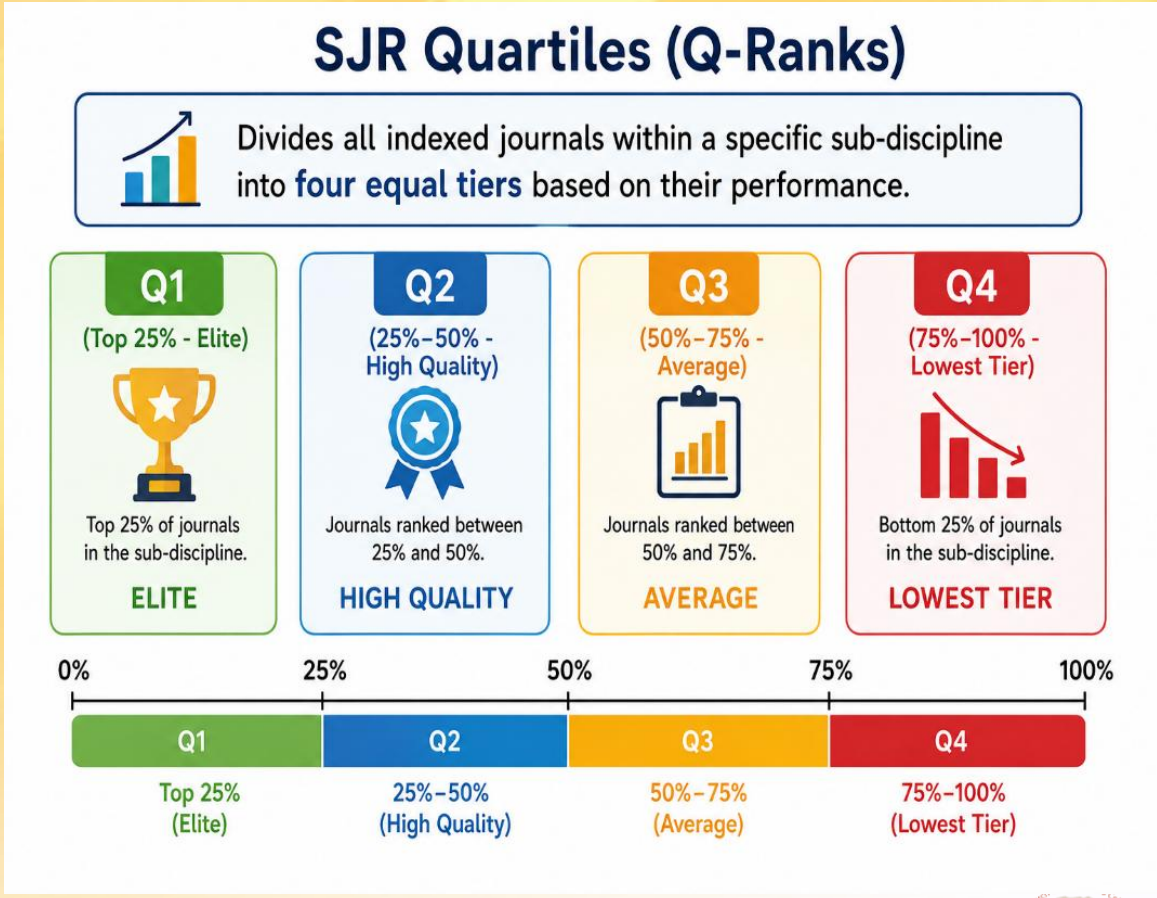
Divides all indexed journals within a specific sub-discipline into four equal tiers based on their performance:

- Q1 (Top 25% – Elite)
- Q2 (25%–50% – High Quality)
- Q3 (50%–75% – Average)
- Q4 (75%–100% – Lowest Tier).



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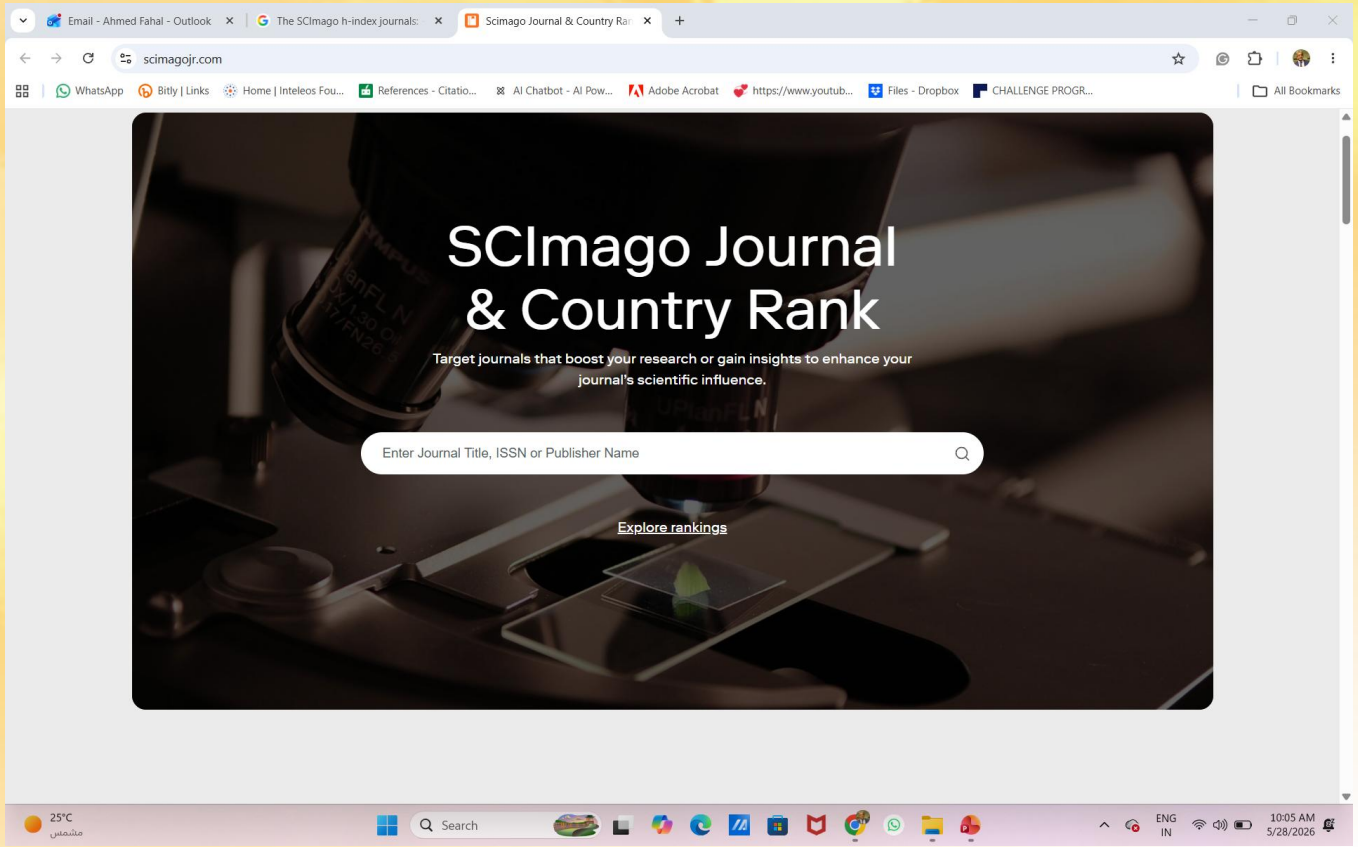
Classification of Research Metrics

The SCImago h-index

It quantifies both journals' scientific output and impact.

Identifying legacy journals with a long history of high-impact publishing.



https://www.scimagojr.com/

Classification of Research Metrics

The SCImago h-index

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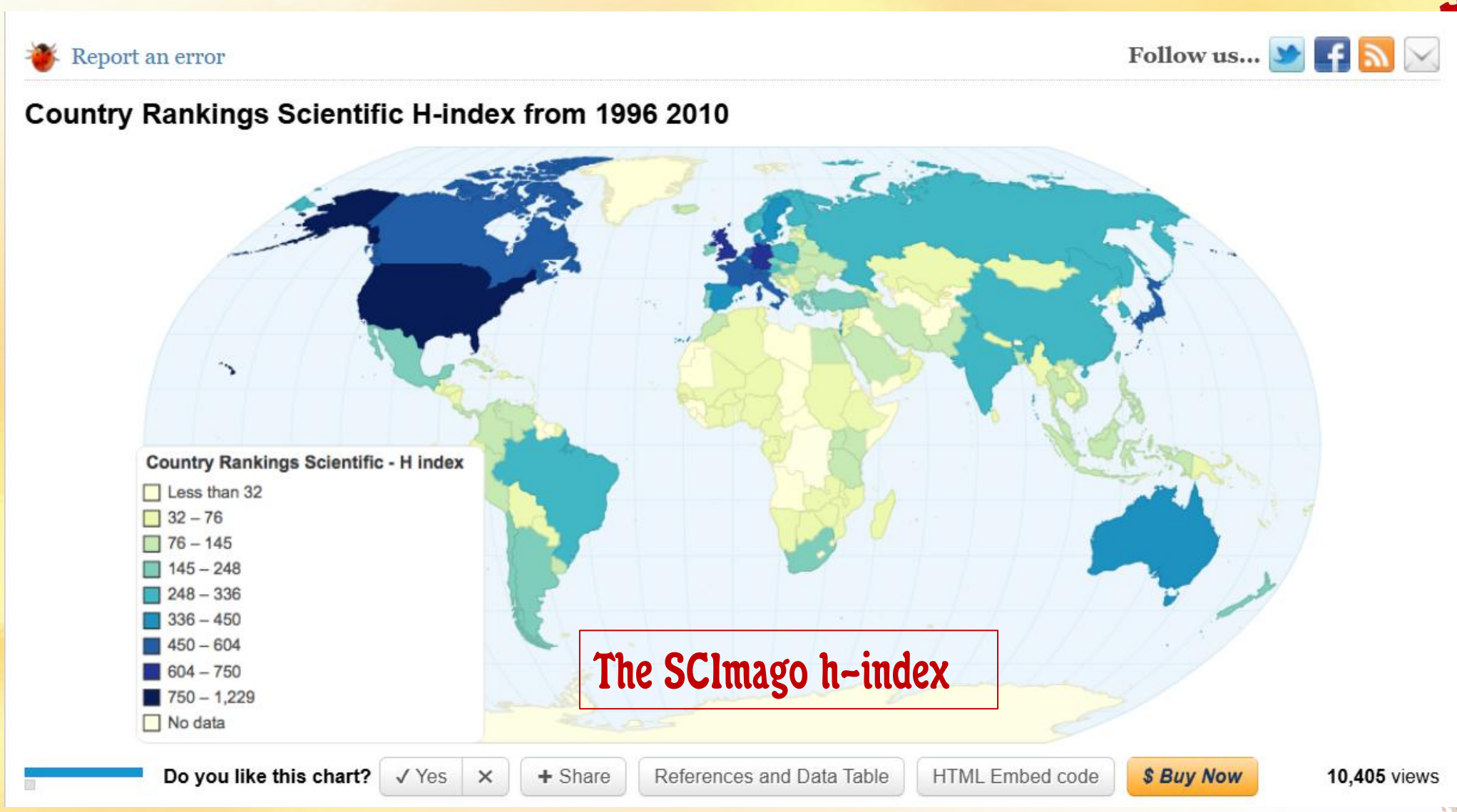
The SCImago h-index measures both the scientific productivity and the citation impact of a

Journal
Country
University

SCImago calculates this using citation data derived directly from the Scopus database.

SJR SCImago Journal & Country Rank


Report an error
Follow us...
Country Rankings Scientific H-index from 1996 2010
Country Rankings Scientific - H index
Less than 32
32 – 76
76 – 145
145 – 248
248 – 336
336 – 450
450 – 604
604 – 750
750 – 1,229
No data
The SCImago h-index
Do you like this chart?
✓ Yes
✕
+ Share
References and Data Table
HTML Embed code
$ Buy Now
10,405 views

The Loopholes

Mathematical Imperfections & Structural Vulnerabilities

- Quantitative metrics offer clean, numerical data.

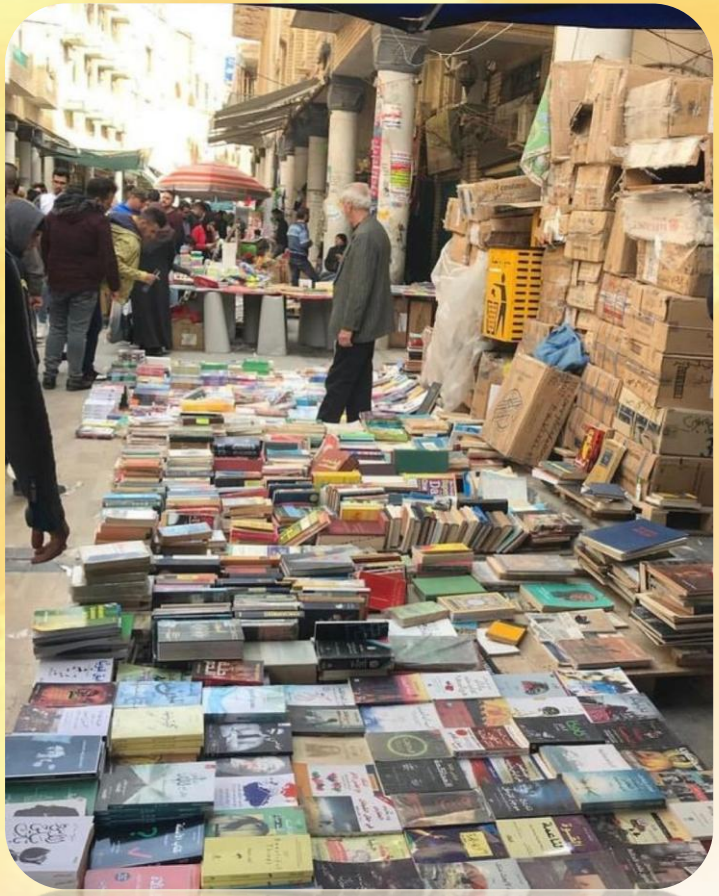
- They are governed by mathematical distributions that can **Heavily Distort** reality if misapplied.

The "Citable Items" Loophole

Editors can exploit this loophole by publishing **Large Volumes** of non-article commentary, such as

Editorials, letters to the editor, and book reviews, that do not increase the denominator but accumulate citations quickly,

Artificially inflating the overall JIF.



The classic h-index

Vulnerabilities

Career Length Bias

The h-index is a strictly increasing, cumulative metric.

It naturally disadvantages
brilliant early-career researchers
with a few groundbreaking papers

The classic h-index

Vulnerabilities

Career Length Bias

While favouring **Long-term, average Researchers** who have accumulated citations simply by remaining in academia for decades.

The classic h-index Vulnerabilities

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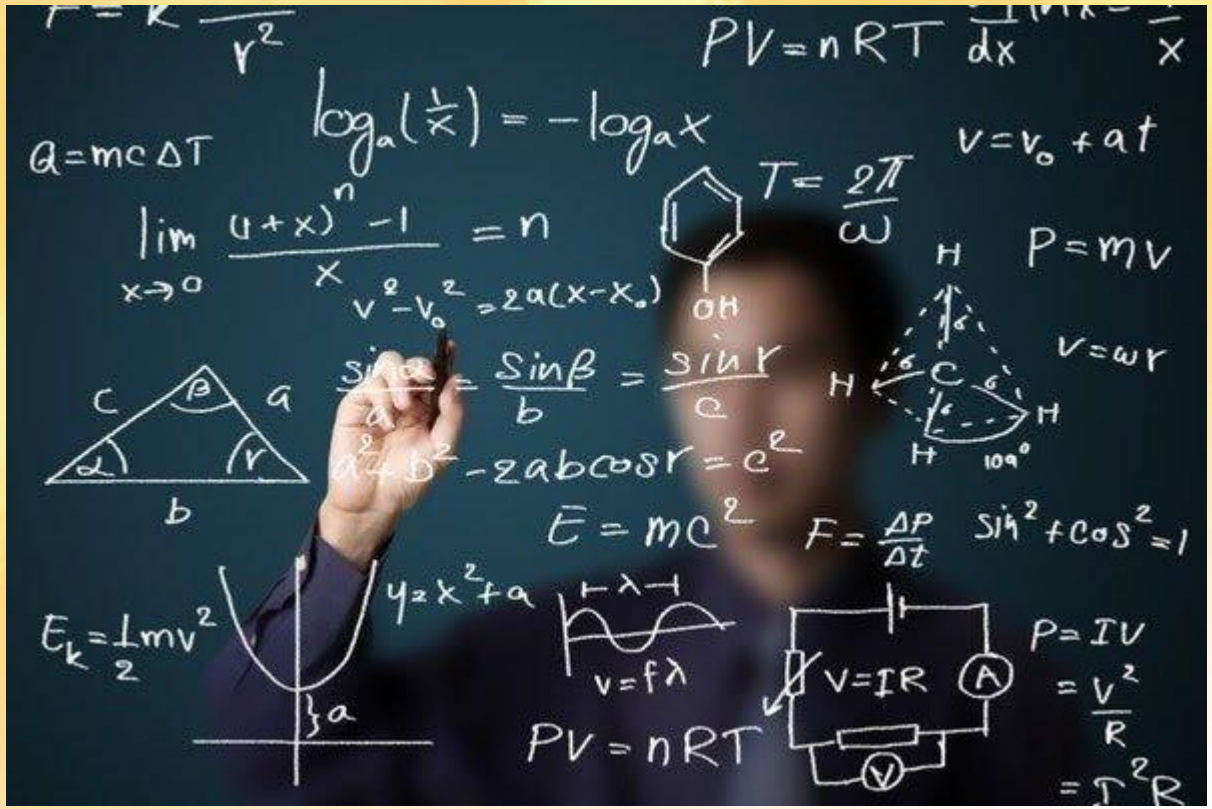
Field Dependency

An h-index of 20 in **Clinical Medicine** is average, whereas an h-index of 20 in **pure Mathematics** or the **Humanities** is extraordinarily high due to smaller author pools and lower reference densities.

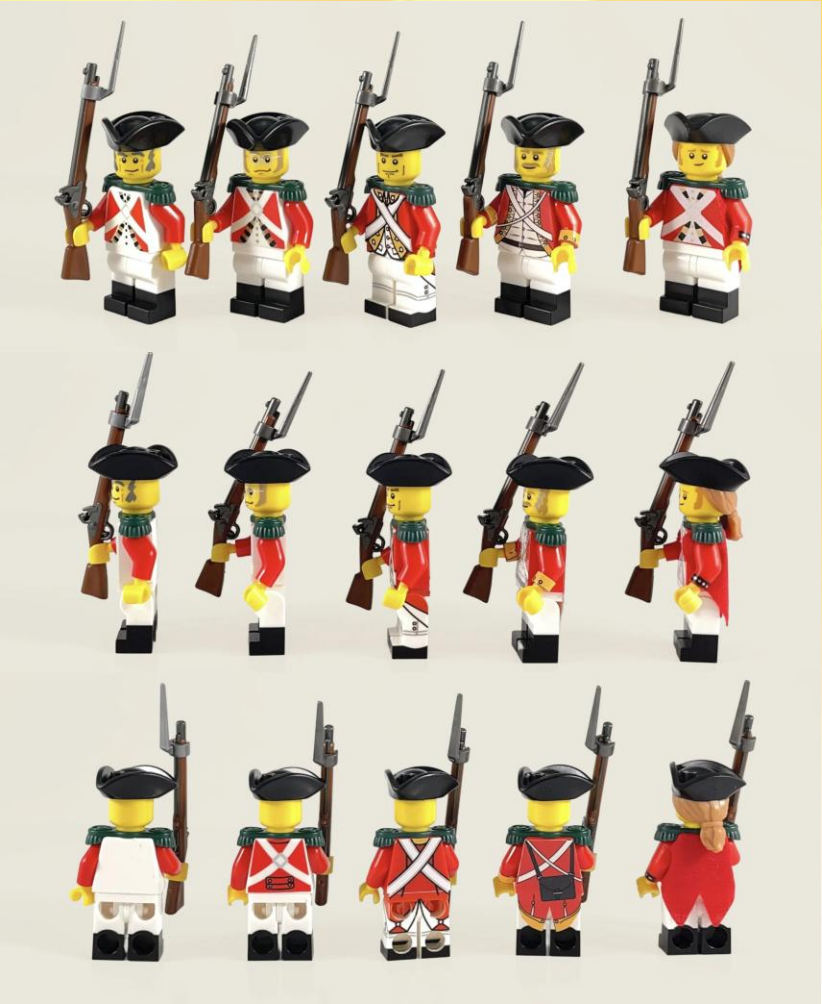


The classic h-index

Vulnerabilities

Inability to Capture Co-Authorship

The classic index treats **A Single-authored** paper exactly the same as a paper with **1,000 Co-authors.**



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The classic h-index Vulnerabilities

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Advanced Author Metrics

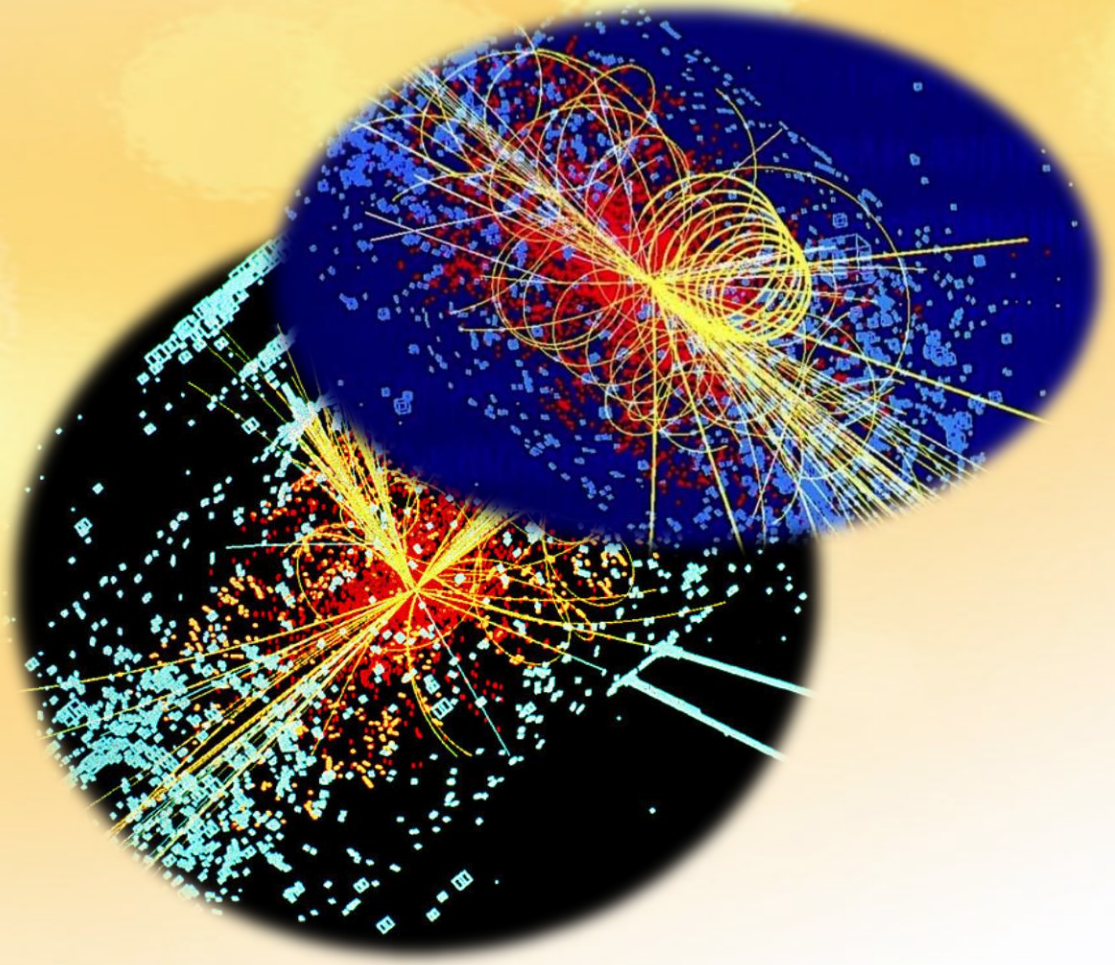
Difficult to isolate an

Author's True Structural

Accountability

in the era of

"Big Science,"



The classic h-index

Vulnerabilities

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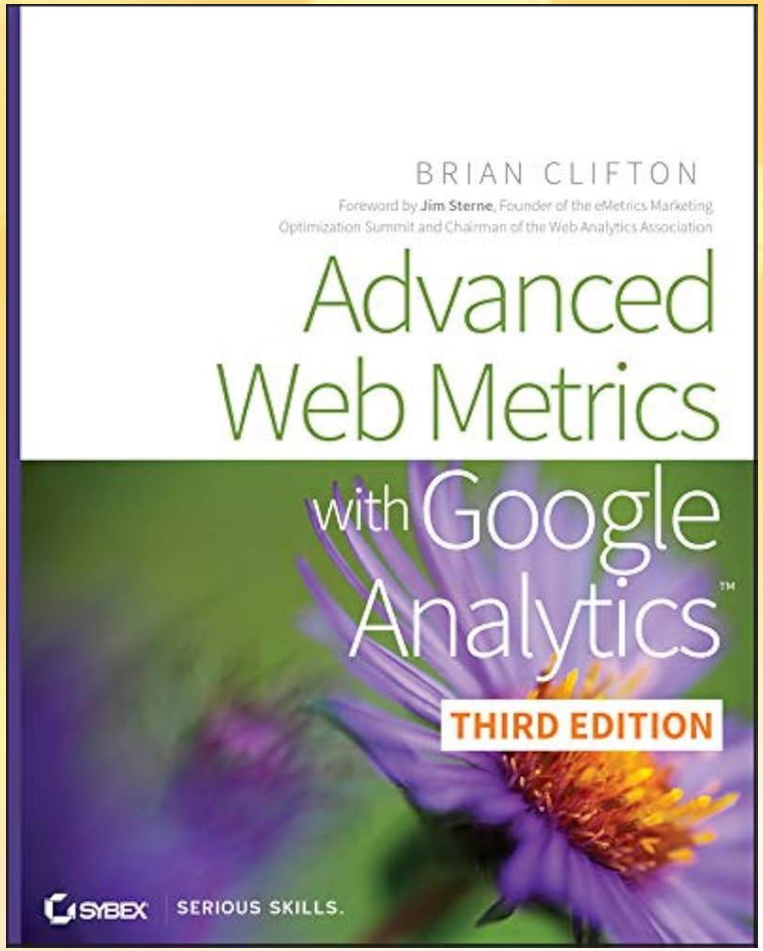
Advanced Author Metrics

Bibliometricians designed advanced variations to correct for

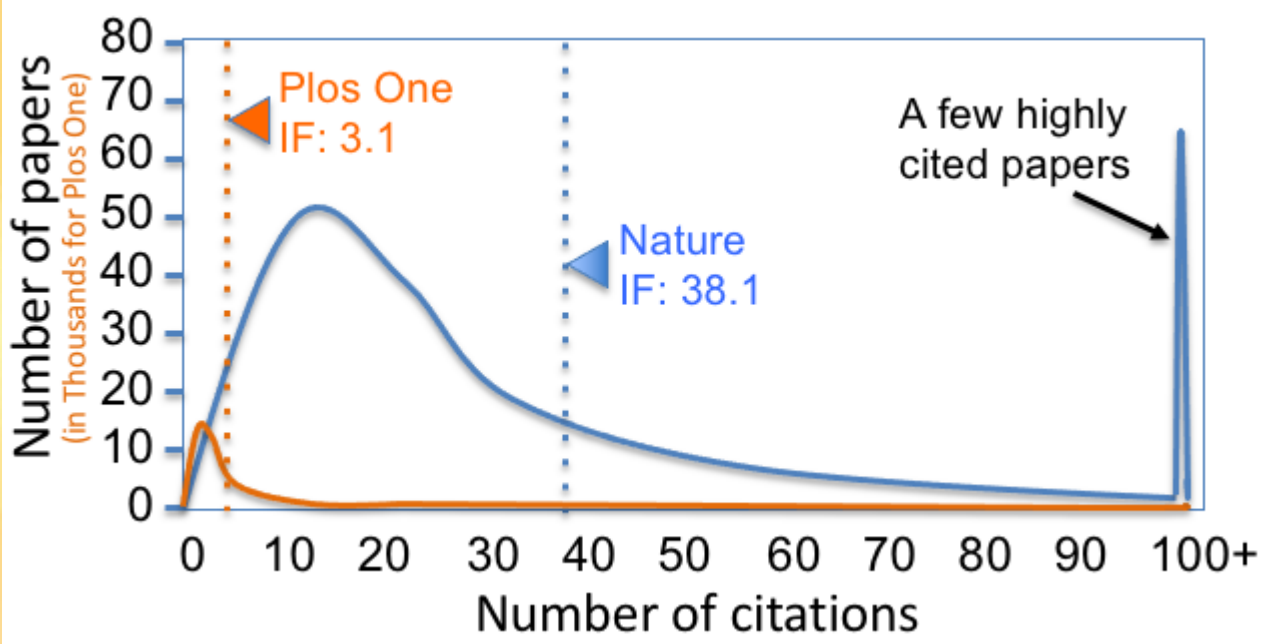
Collaboration Scale and **Time Decay.**



The Journal Impact Factor

Skewness

The underlying limitation of the JIF is that it utilises an arithmetic mean to measure a heavily skewed Power Law (Pareto) Distribution.



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The Journal Impact Factor

Skewness

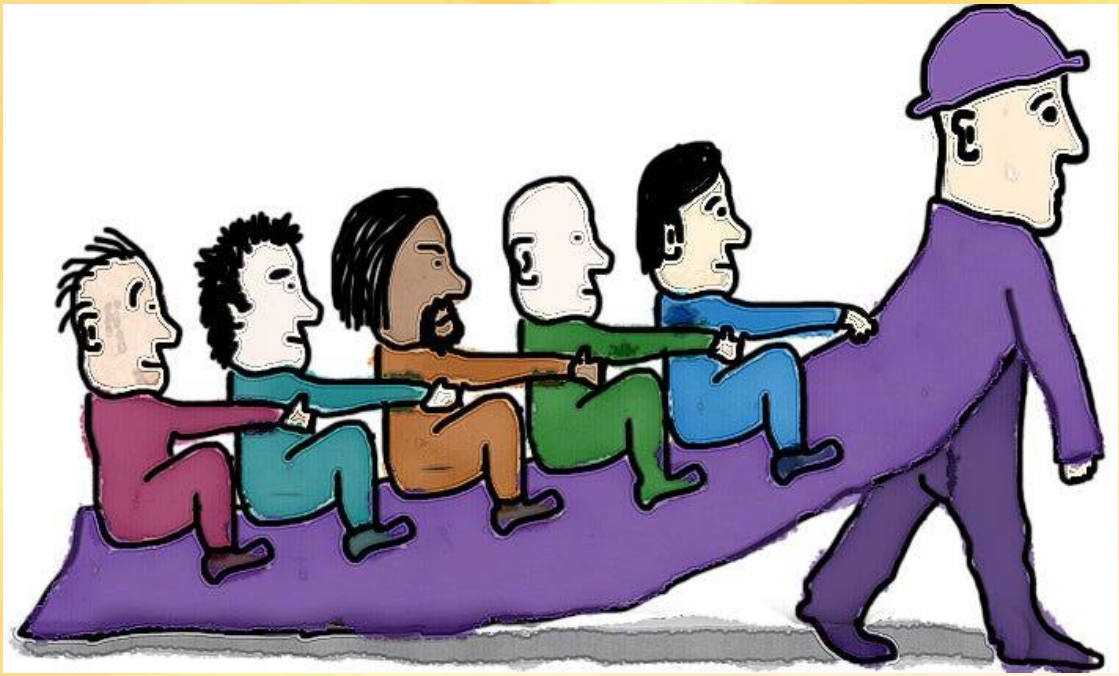
In almost any given journal, a tiny minority of papers (>10%) generate the vast majority (80%) of the citations.

The remaining 90% of the papers might receive very few, or even zero, citations.

The Journal Impact Factor

Skewness

Therefore, publishing in a high-JIF journal like **Nature** or **The Lancet** does not guarantee an individual paper's impact



It often means the article is riding on the statistical coat-tails of a few best seller studies

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The Problem of Hyper-Authorship

Hyper-authorship is a phenomenon in academic publishing that describes studies with massive co-authorship (often ranging from dozens to thousands of contributors).

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The Problem of Hyper-Authorship

Originally coined by information scientist Blaise Cronin, it is particularly prevalent in "Big Team Science" such as Particle physics, genomics, and global clinical trials.

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The Problem of Hyper-Authorship

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While it reflects extraordinary

- Global collaboration
- Data sharing

Raises significant challenges for the scientific community

The Problem of Hyper-Authorship

The Fractional h-index
(h-f)

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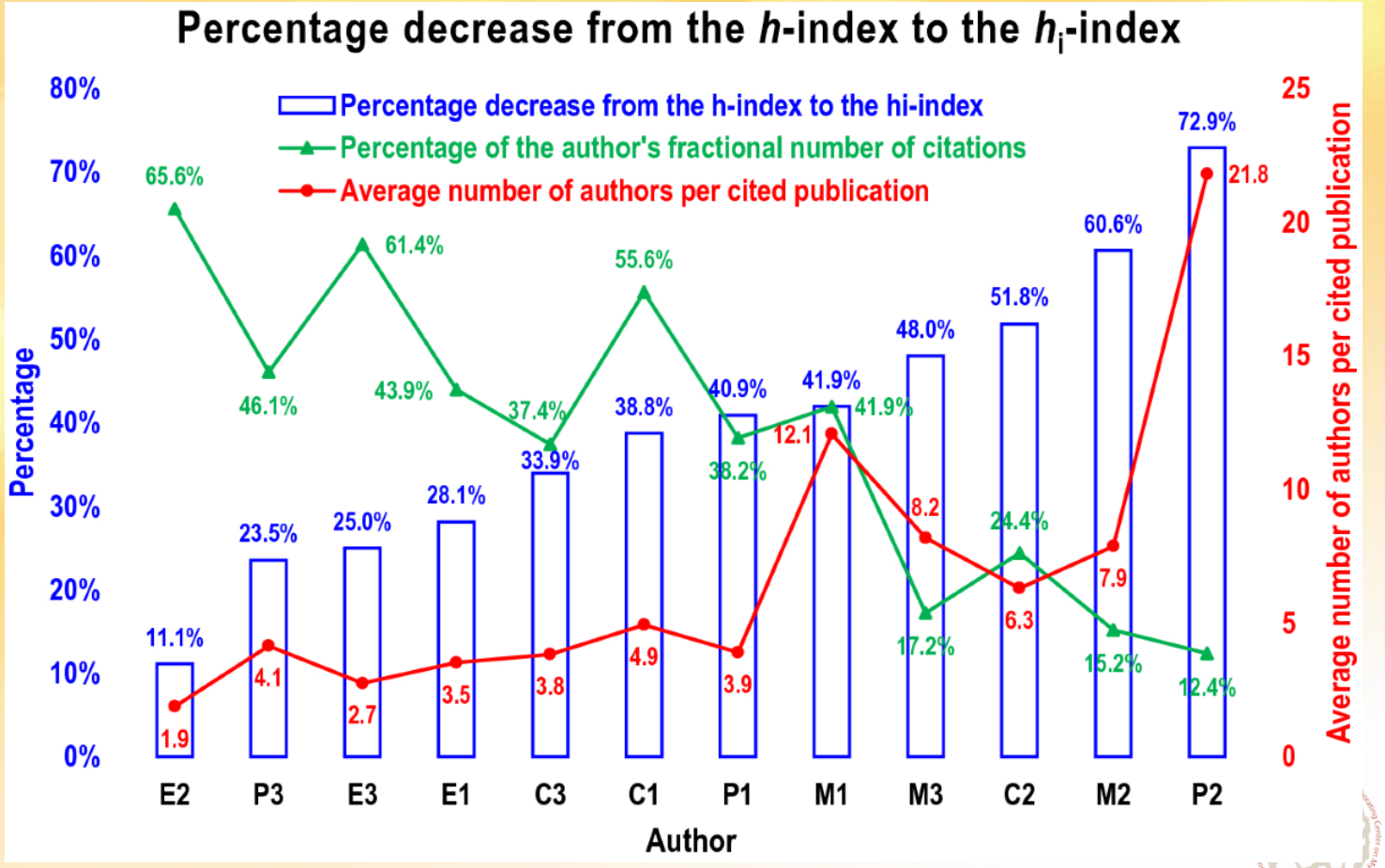
It addresses Hyper-Authorship by dynamically distributing credit based on the total author count (N).



The Problem of Hyper-Authorship

The Fractional h-index (h-f)

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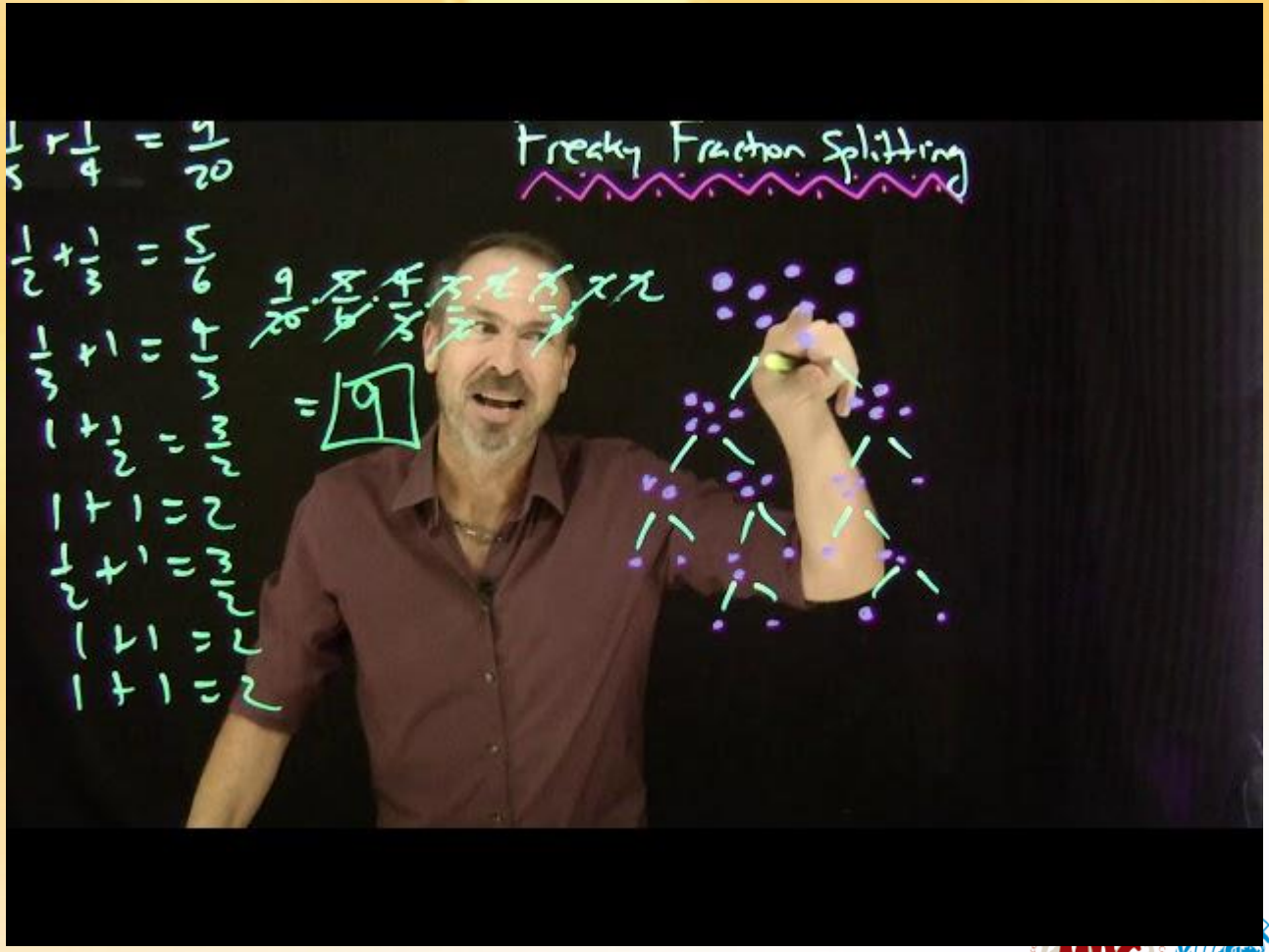
Pure Fractional Splitting (1/N)

- Every author gets an equal, fractional slice of the citation pool.
- For a paper with 500 citations and 1,000 authors, the adjusted citation value for an individual profile is:

Fractional Citations= 500/1,000 = 0.5 citations



The Problem of Hyper-Authorship

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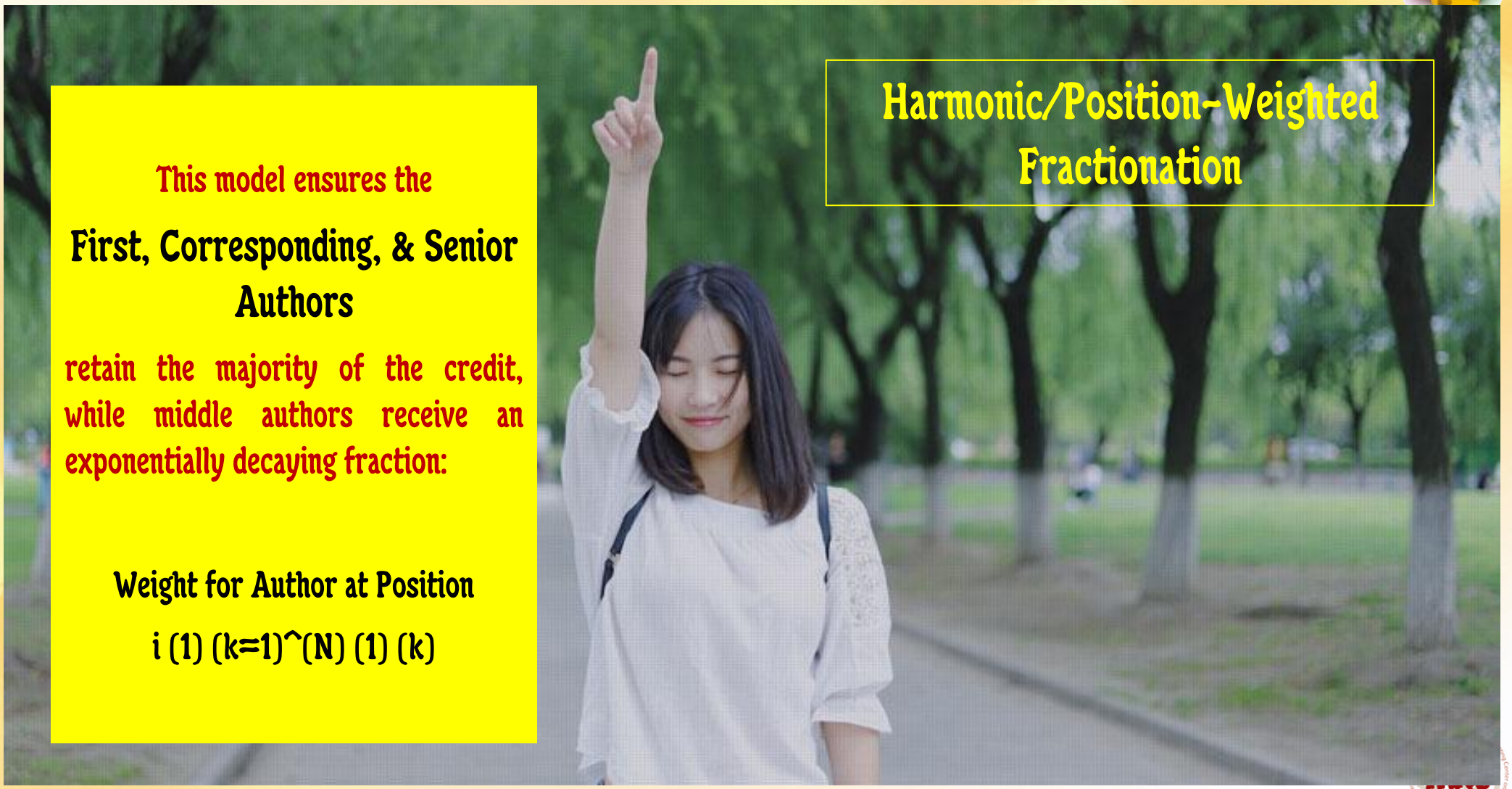
Harmonic/Position-Weighted Fractionation

Because Pure Fractional Splitting penalises the **Lead Authors** who did the bulk of the work, advanced enterprise systems apply **Harmonic Weighting.**

The Problem of Hyper-Authorship



Harmonic/Position-Weighted Fractionation

This model ensures the

First, Corresponding, & Senior Authors

retain the majority of the credit, while middle authors receive an exponentially decaying fraction:

Weight for Author at Position

$$i \; (1) \; (k=1)^{(N)} \; (1) \; (k)$$

The Problem of Hyper-Authorship

If a paper has 4 authors, the total credit is distributed mathematically rather than split evenly:

Author Order	Pure Splitting (Fractional)	Harmonic Weighting	Role Representation
1st Author	25.0%	**48.0%**	Lead Researcher / Writer (Gets the lion's share)
2nd Author	25.0%	**24.0%**	Primary Co-Investigator
3rd Author	25.0%	**16.0%**	Supporting Researcher
4th Author	25.0%	**12.0%**	Senior Investigator / Advisor

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The Problem of Hyper-Authorship

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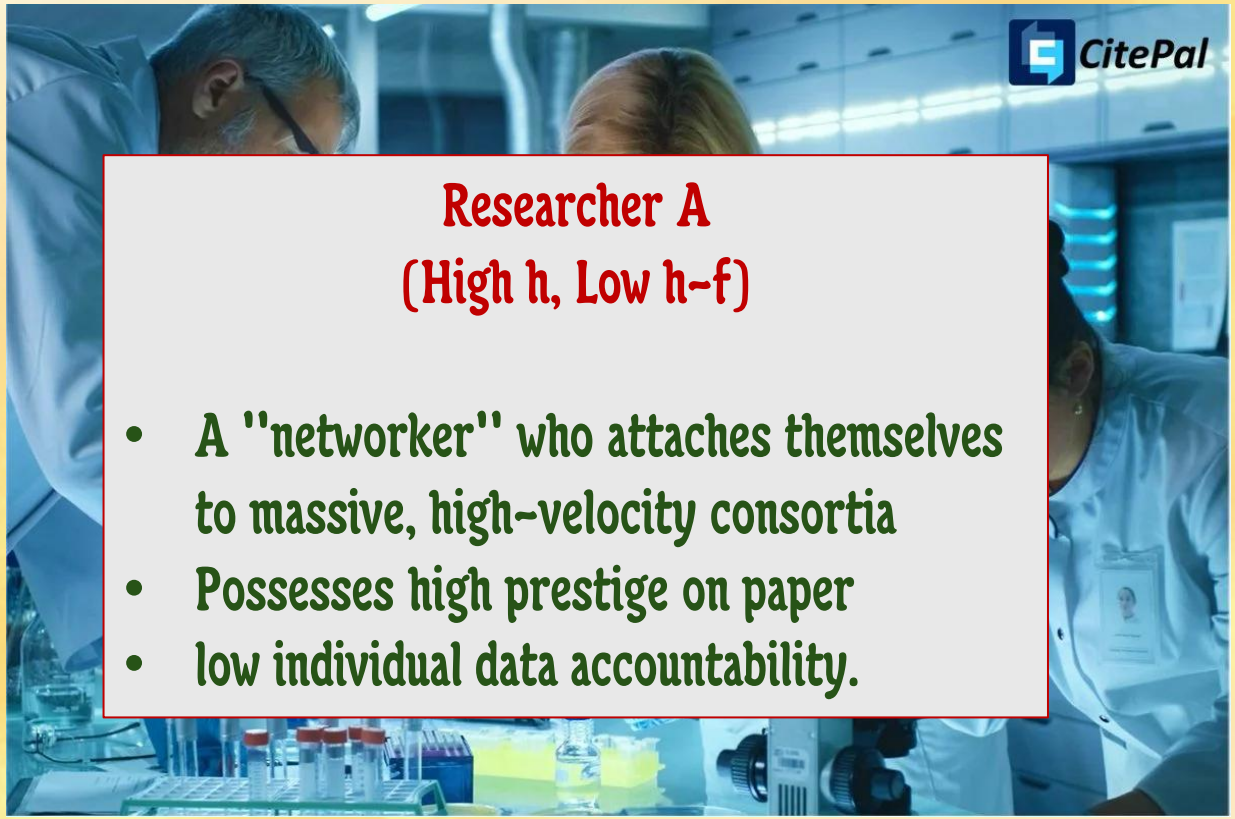
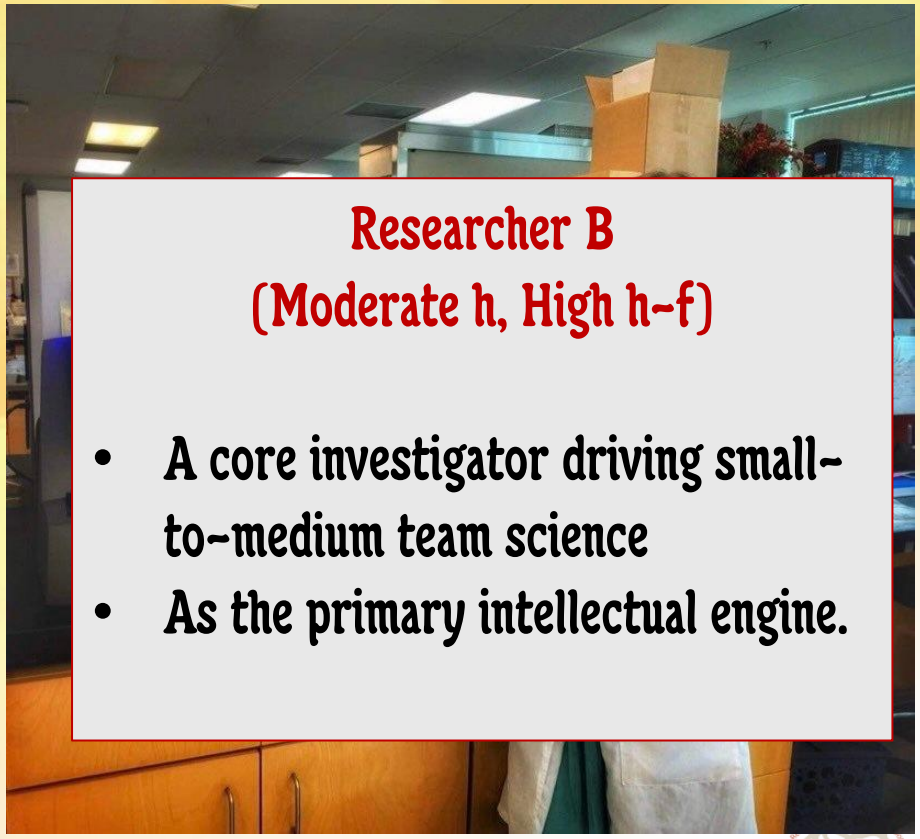
This math differentiates two distinct research profiles:



Researcher A
(High h, Low h-f)

- A "networker" who attaches themselves to massive, high-velocity consortia
- Possesses high prestige on paper
- low individual data accountability.



Researcher B
(Moderate h, High h-f)

- A core investigator driving small-to-medium team science
- As the primary intellectual engine.

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Publications Ethics

https://link.springer.com/chapter/10.1007/978-981-16-5248-6_14

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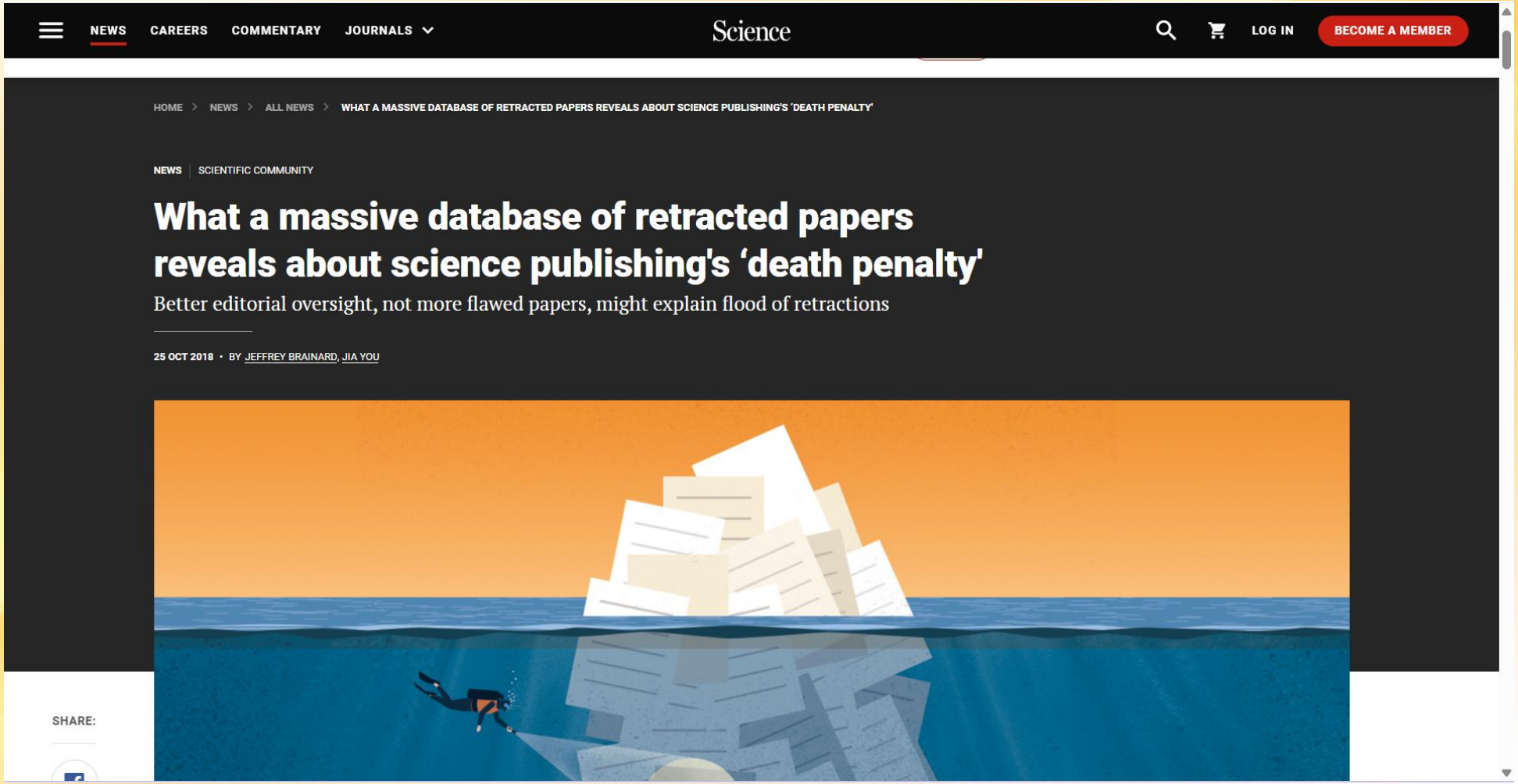

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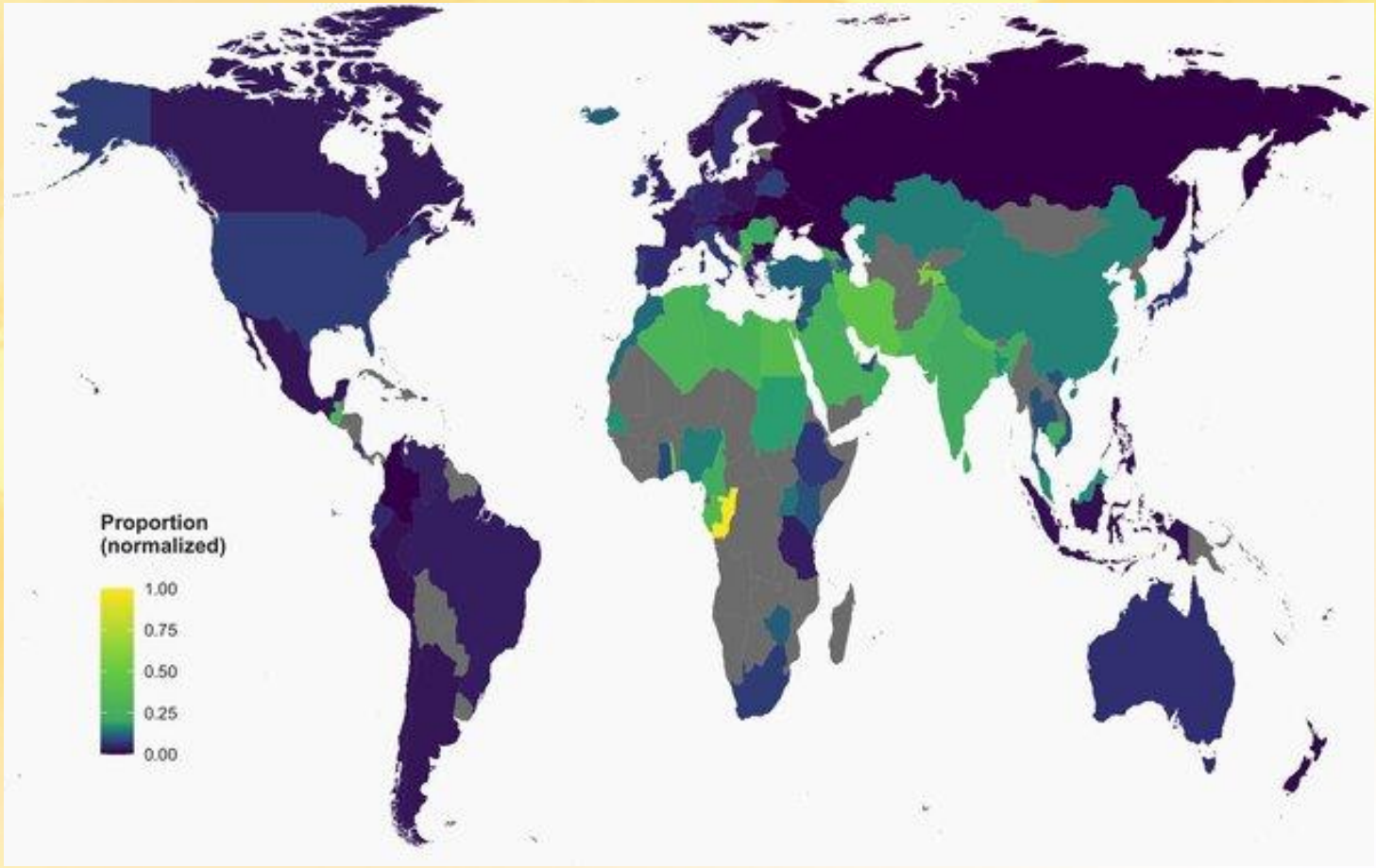
Paper Retraction



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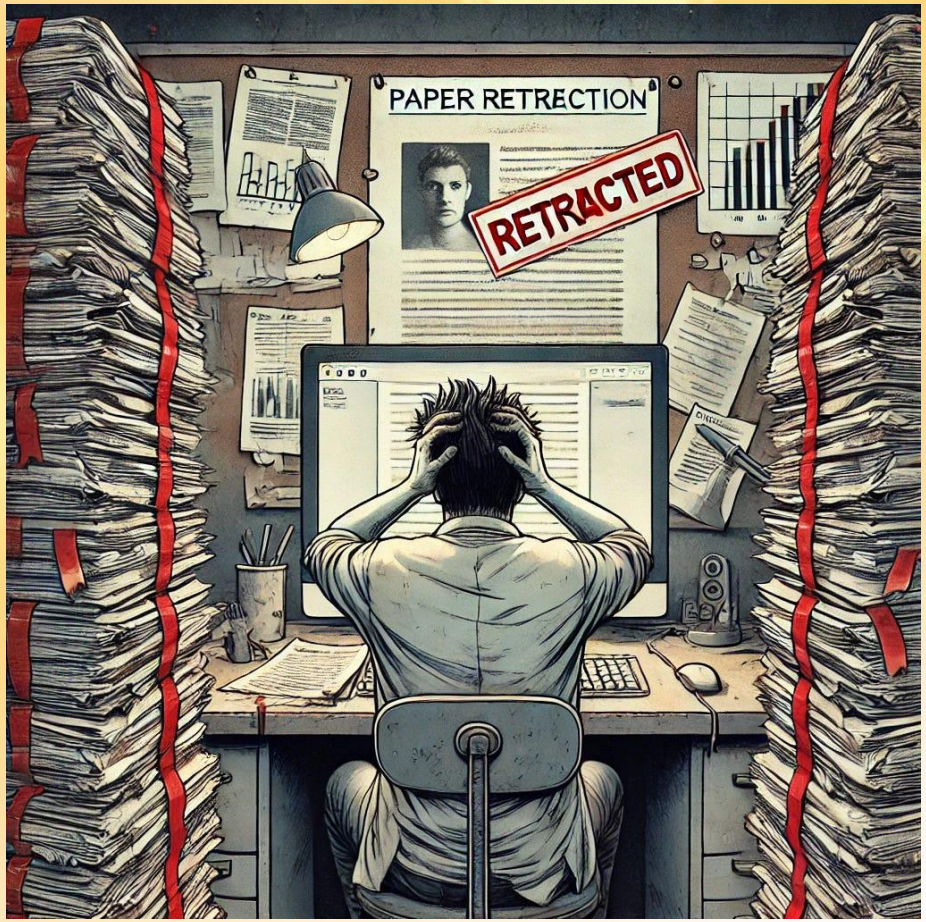
Publications Ethics

The historical over-reliance on metrics like the JIF created an unsustainable "Publish or Perish" culture, giving rise to maladaptive academic behaviours



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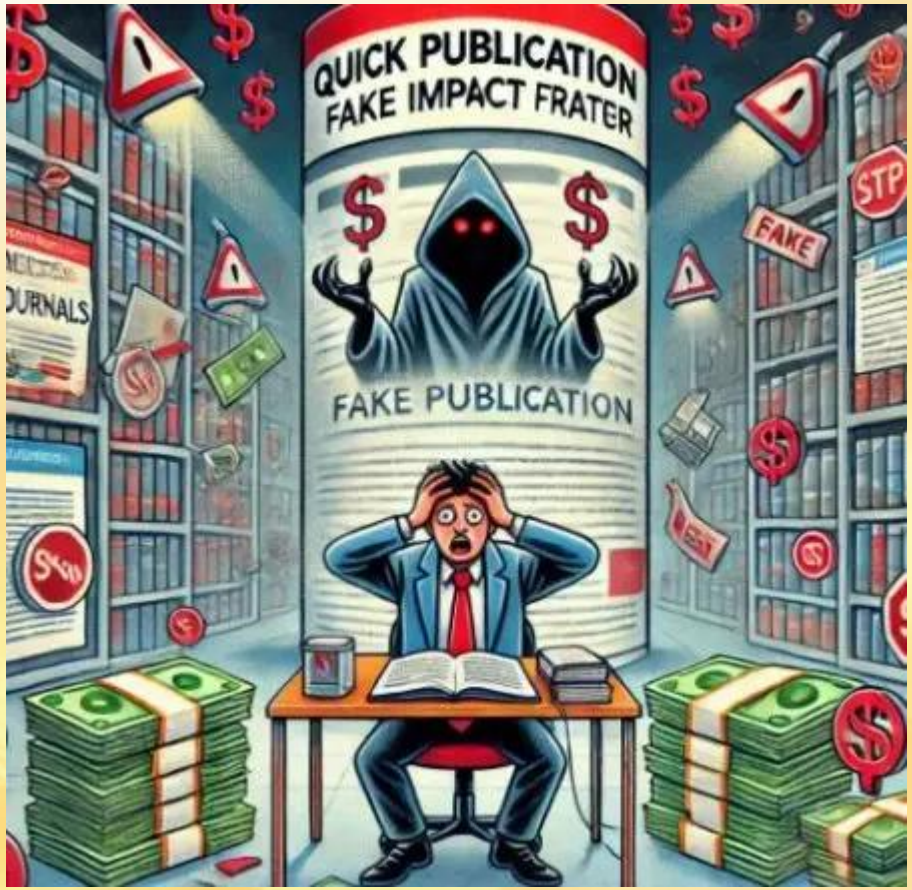

"Publish or Perish" Culture

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Publications Ethics

Salami Slicing

Fragmenting a single, cohesive study into multiple microscopic papers to inflate publication counts.

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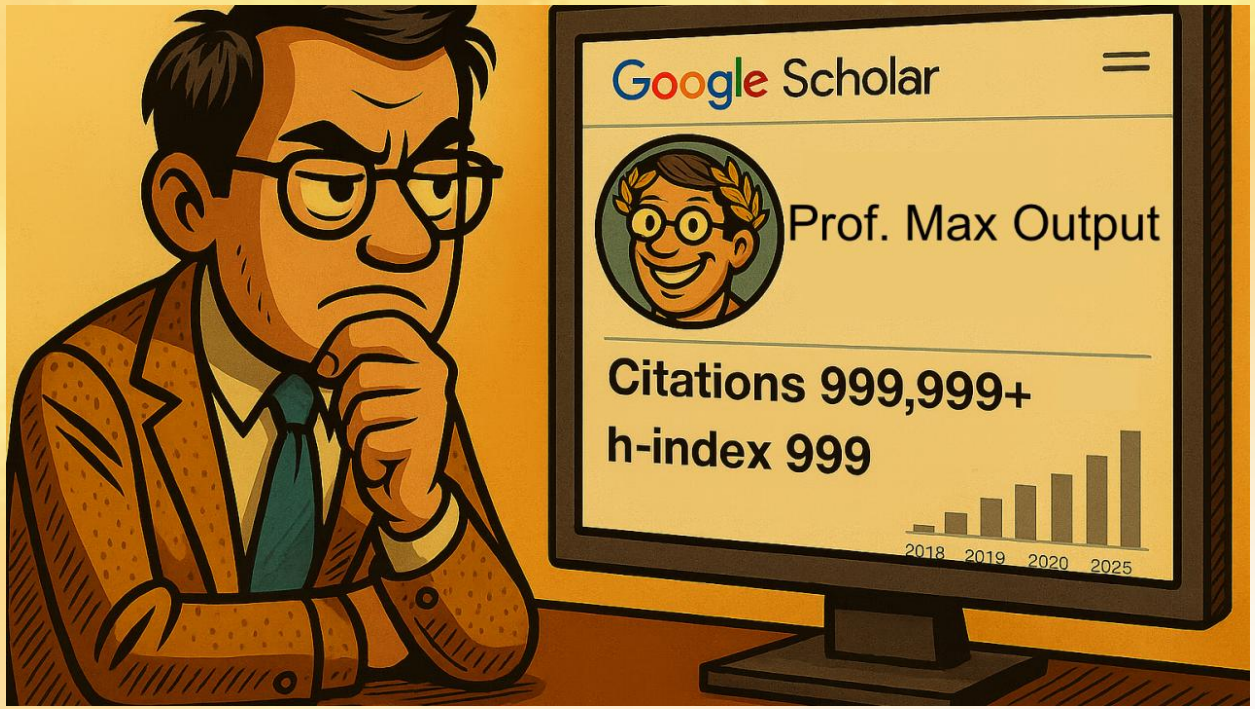
Publications Ethics

Citation Cartels

Networks of researchers who intentionally cite one another to artificially

Pump Up Personal h-indices.



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Publications Ethics

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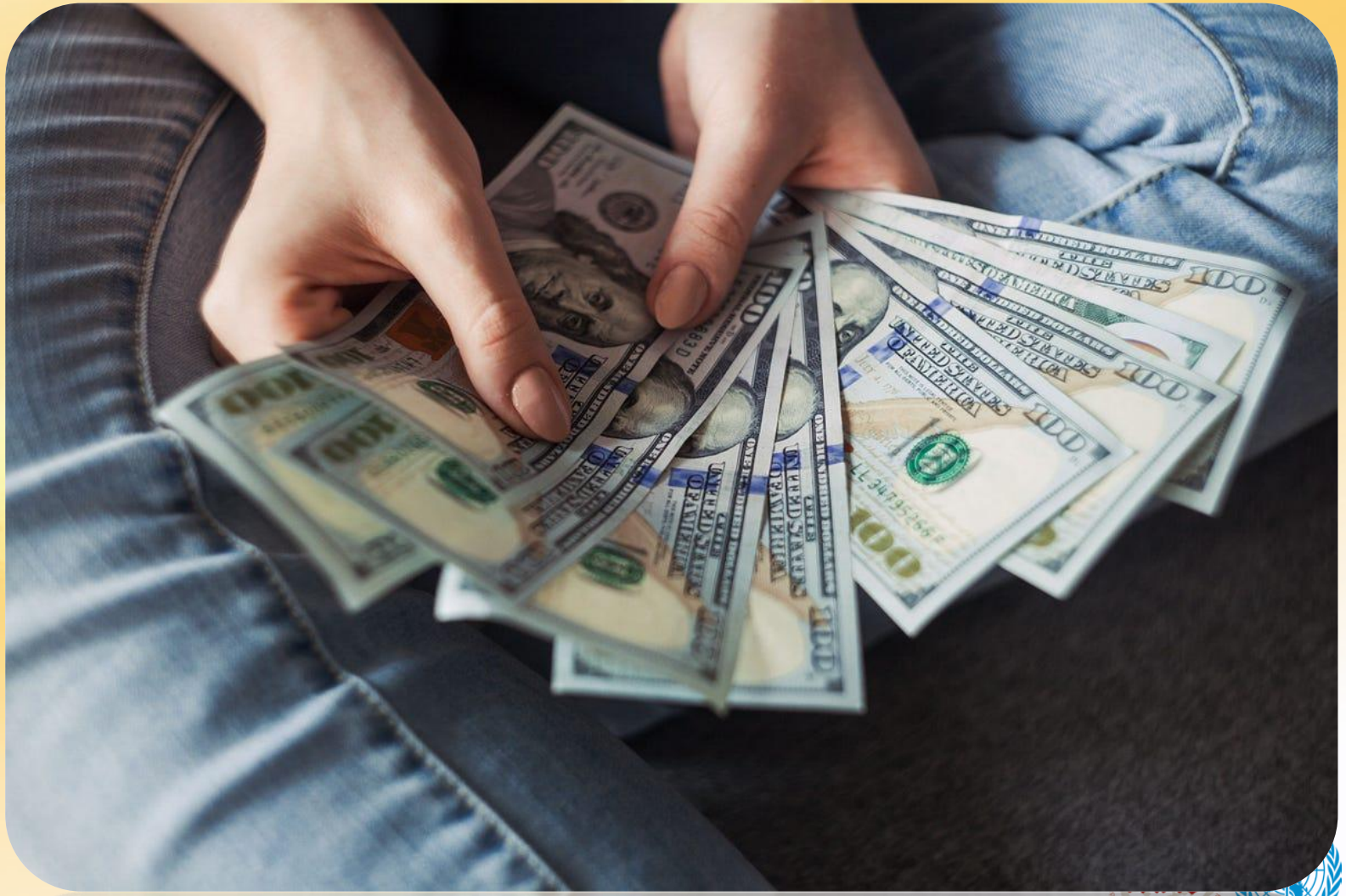
Predatory Publishing

Exploitative journals that bypass genuine peer review entirely, publishing unverified science in exchange for

Author Fees.



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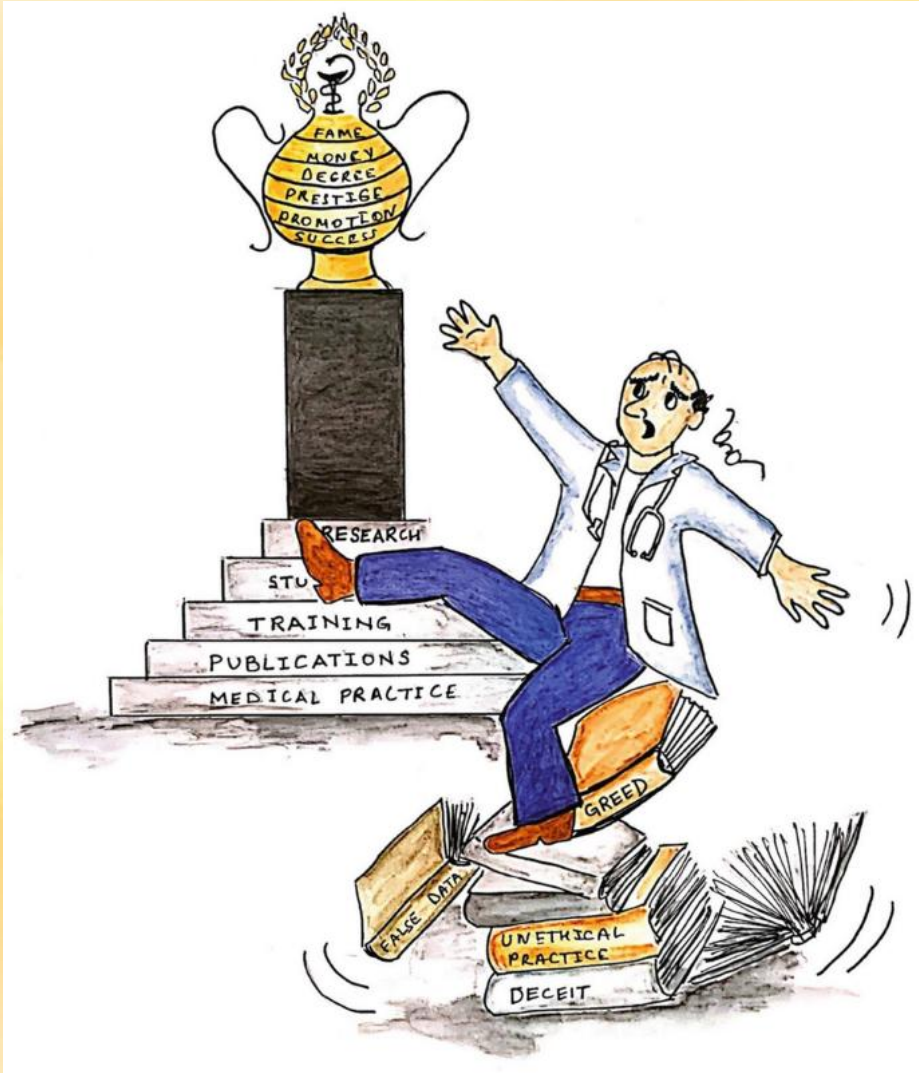
Publications Ethics



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Take-home Message

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Take-home Message

While **Research** uncovers
New Knowledge

Assessment ensures it
Serves Humanity

Take-home Message

The true measure of research success is not the final page of a journal article

But the first step of its Real-world Implementation

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Take-home Message

"We must evaluate research based on its **Intrinsic Merit** rather than the **Title of the journal** in which it is published."

The San Francisco Declaration on Research Assessment (DORA)

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Take-home Message

Excellent Research Assessment

separates

The publication volume noise

from the signal of

Historical Impact

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Thank you very much indeed for your kind attention

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Thank You

bitly

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