

A Taxonomy of Research Visibility Indicators: From Discoverability to Knowledge Reach

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Abstract

The measurement of research visibility requires a systematic distinction between the underlying dimensions of visibility and the observable indicators used to represent them. Building on the ResearchTrics Research Visibility Framework established in ResearchTrics Research Bulletins Nos. 001-003, this bulletin develops a preliminary taxonomy of indicators for assessing the visibility of research outputs, researchers, research groups and institutions.

The taxonomy organises observable indicators across eight dimensions: discoverability, accessibility, scholarly recognition, engagement, connectivity, citation visibility, openness and knowledge reach. It distinguishes direct indicators, relational indicators, network indicators and contextual indicators, and proposes that indicators should not be interpreted as interchangeable measures of research value. Particular attention is given to metadata completeness, persistent identifiers, indexing, open access, researcher identity, downloads, citations, co-authorship, citation networks, disciplinary reach and geographical reach.

Recent evidence indicates that visibility-related concepts such as discoverability, findability and academic search-engine optimisation are frequently used inconsistently in the literature, supporting the need for clearer operational definitions. A 2025 scoping review of the digital-repository literature identified substantial conceptual overlap among these terms (Reyes-Lillo, Morales-Vargas, & Rovira, 2025). Recent research has also demonstrated the importance of metadata quality for discoverability and interoperability (Salaudhin, 2026), while empirical work on ORCID has reported positive associations between ORCID-linked metadata and publication usage and citations among Arab university publications (Ibrahim & Ramzy, 2025).

The proposed taxonomy is intended as a conceptual measurement map rather than a finalised scoring system. Future research should establish the reliability, validity, independence, disciplinary comparability and fairness of individual indicators before they are incorporated into a composite Research Visibility Metric.

Research visibility has become increasingly important as scholarly communication moves from predominantly journal-centred dissemination toward interconnected digital research ecosystems.

A contemporary research output may be represented simultaneously through:

journal platforms institutional repositories scholarly search engines bibliographic databases persistent identifier systems researcher profiles citation indexes research networks data repositories software repositories professional or public communication channels

The result is an increasingly complex research-information environment. Research visibility therefore cannot reasonably be represented by publication counts or citation counts alone.

Keywords: research visibility, research indicators, scholarly metrics, bibliometrics, altmetrics, discoverability, metadata, research evaluation, open science, research intelligence

Introduction

A conceptual construct is not directly observable.

For example, discoverability is an abstract property. It must be represented through observable evidence such as:

- whether an article is indexed
- whether its metadata are complete
- whether it can be retrieved using relevant search terms
- whether it has a persistent URL
- whether scholarly search systems can identify it

This distinction is fundamental to measurement. Figure 1 sets out the general hierarchy that connects an abstract construct to an interpretable measurement.

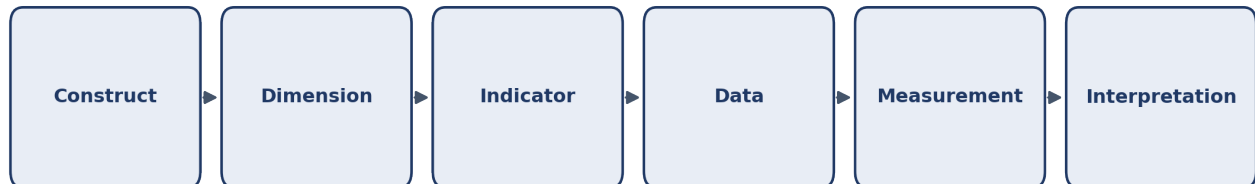


Figure 1. From construct to interpretation: the general measurement hierarchy.

Applied to ResearchTrics, research visibility sits at the top of the hierarchy, is expressed through eight dimensions, and is in turn represented by observable indicators drawn from research-system data. The existence of an indicator does not automatically establish that it is a valid measure of the construct.

Recent literature demonstrates considerable conceptual overlap among terms such as visibility, discoverability, findability, search-engine optimisation and academic search-engine optimisation. A 2025 scoping review of the digital-repository literature found that these concepts are often used interchangeably despite meaningful conceptual distinctions, and catalogued the optimisation techniques proposed to strengthen visibility in digital repositories (Reyes-Lillo, Morales-Vargas, & Rovira, 2025).

This finding has an important implication for ResearchTrics. Before constructing a composite metric, it is necessary to establish:

- what each indicator represents
- which dimension it belongs to
- whether it overlaps with another indicator
- whether it is direct or indirect
- whether it is influenced by external contextual factors
- whether it can be compared across research fields

The taxonomy proposed below is intended to provide that foundation.

The taxonomy organises observable indicators of research visibility across eight dimensions, shown in Figure 2. Each dimension groups indicators that provide a distinct kind of evidence about how a research output, researcher, group or institution is represented within scholarly and knowledge ecosystems.



Figure 2. The eight dimensions of the ResearchTrics Research Visibility Framework.

4.1 Discoverability

Discoverability concerns whether research can be located through relevant information systems.

Indicator	Operational interpretation
Scholarly indexing	Presence in recognised scholarly discovery systems
Search retrieval	Ability to retrieve the work using relevant queries
Metadata completeness	Proportion of required bibliographic fields populated
Metadata richness	Depth and specificity of descriptive information
Persistent URL	Availability of a stable individual research-output URL
DOI presence	Availability of a persistent digital identifier
Abstract availability	Presence of a searchable scholarly abstract
Keyword alignment	Match between research content and discoverable terminology
Full-text crawlability	Ability of search systems to access machine-readable content
Repository presence	Availability through an institutional or disciplinary repository
	Google Scholar's publisher guidance emphasises individual URLs, accessible scholarly content, bibliographic metadata and crawlability as components of successful indexing (Google Scholar Help, n.d.). Recent empirical work also suggests that metadata quality is relevant to academic repository discoverability and interoperability (Salaudinn, 2026).

Potential composite construct: a Discoverability Index could eventually combine normalised evidence from indexing, metadata, retrieval, persistent identification and crawlability. Such a composite should only be constructed after empirical validation.

4.2 Accessibility

Accessibility concerns whether users who discover research can actually obtain and use it.

Core indicators:

- open-access status
- full-text availability
- repository availability
- free-to-read status
- accessibility of supplementary materials
- dataset accessibility
- software accessibility
- language accessibility
- machine-readable format
- mobile accessibility
- assistive-technology compatibility

A 2025 systematic review of 45 peer-reviewed studies found that open access can improve academic visibility, although effects vary across disciplines, geographic settings and open-access models (Dote Pardo, 2026). Green open access and preprints showed relatively consistent visibility advantages, while effects associated with gold open access were more heterogeneous.

Open-access route	Reported visibility pattern
Green open access / preprints	Relatively consistent positive association with citations and readership
Gold open access (medicine, biology)	Positive association reported
Gold open access (economics, library science, translation studies)	Neutral or negative association reported
Accessibility is a pathway to visibility, not synonymous with visibility.	

4.3 Scholarly Recognition

Recognition concerns whether research can be accurately attributed to the correct researcher, institution and scholarly entity.

Indicator

ORCID iD
Author disambiguation
Institutional affiliation
DOI
ROR-linked institution
Journal identifier
Researcher profile completeness
Publication-author linkage
Funding attribution
Research-group affiliation

Purpose

Persistent researcher identification
Correct attribution of publications
Attribution to research organisation
Persistent output identification
Standardised institutional identity
Journal-level attribution
Identity representation
Connection between output and researcher
Connection to supporting funder
Connection to collaborative unit

This dimension is increasingly important because fragmented identities can cause publications to become disconnected from their researchers. A large 2025 Scientometrics study analysed 569,038 publications by Arab universities indexed in the Web of Science between 2019 and 2023 and found statistically significant positive associations between ORCID-linked metadata and publication usage and citation outcomes after propensity-score matching (Ibrahim & Ramzy, 2025).

This does not establish that ORCID itself universally causes greater research impact, but it provides empirical justification for treating persistent identity as an important visibility-related variable.

4.4 Scholarly Engagement

Engagement measures observable interaction with research. Potential indicators include:

- article views
- full-text downloads
- abstract views
- repository downloads
- saves and bookmarks
- reference-manager captures
- social-media mentions
- academic discussions
- requests for materials
- conference presentations
- educational use
- practitioner engagement

Engagement indicators require particularly careful interpretation. A high number of views may indicate substantial attention, but it does not establish research quality, scholarly agreement, methodological validity, or societal impact.

Recent systematic work on altmetrics emphasises that alternative indicators can complement traditional bibliometrics but vary substantially in their relationship with citation-based indicators and across disciplines. ResearchTrics should therefore classify engagement indicators as attention and interaction evidence, rather than automatically labelling them impact measures.

4.5 Connectivity

Connectivity represents the structural position of research within knowledge networks.

Category

Author connectivity

Institutional connectivity

Research-output connectivity

Network indicators

Example indicators

Number of co-authors; co-author diversity; collaboration centrality; international collaboration; interdisciplinary collaboration

Number of collaborating institutions; institutional network centrality; international institutional links; cross-sector collaboration

Citation links; references; shared datasets; shared methods; shared instruments; project relationships

Degree centrality; betweenness centrality; eigenvector centrality; clustering coefficient; network density; community membership

Connectivity changes the conceptual unit from “How visible is this paper?” to “How connected is this research within the knowledge ecosystem?” This distinction becomes particularly important when ResearchTrics develops its future research graph.

4.6 Citation Visibility

Citation visibility concerns the incorporation of research into subsequent scholarly literature.

Basic indicators

Total citations; citations per year; citation velocity; citations by discipline; citations by country; citations by institution; citing-author diversity; citing-journal diversity; self-citation proportion; citation-network centrality; citation trajectory

More advanced indicators

Normalised citation impact; field-weighted citation impact; citation percentile; citation half-life; citation acceleration; citation-network position; cross-disciplinary citation reach

Citation indicators should be interpreted carefully. The Leiden Manifesto emphasises that quantitative indicators should support rather than replace expert assessment, and that indicators must be interpreted in disciplinary context (Hicks, Wouters, Waltman, de Rijcke, & Rafols, 2015).

Citation visibility is evidence of scholarly circulation, not a complete representation of research value.

4.7 Openness

Openness concerns the availability and reusability of research resources.

Category

Publication openness

Data openness

Example indicators

Open-access status; licence; repository deposit; embargo duration

Data availability; data repository; data licence; machine readability; documentation

Methodological openness	Protocol availability; analysis-code availability; statistical syntax; preregistration; reproducibility documentation
Software openness	Source-code availability; repository; versioning; software licence
Scholarly transparency	Funding disclosure; conflict-of-interest disclosure; methodological transparency; reporting transparency
UNESCO's Recommendation on Open Science provides an international framework for making scientific knowledge and associated research resources more openly accessible and reusable (UNESCO, 2021).	

4.8 Knowledge Reach

Knowledge reach concerns the breadth of communities and contexts into which research travels.

Category

Academic reach	Disciplinary reach; interdisciplinary reach; international reach; institutional reach
Professional reach	Practitioner uptake; professional guidelines; training use; clinical or educational use
Policy reach	Policy-document references; government use; legislative references; policy implementation
Societal reach	Public dissemination; community use; media coverage; public educational use
Geographic reach	Number of countries represented among users or citing researchers; regional reach; global reach

This dimension is particularly important because conventional citation databases can underrepresent forms of knowledge use that occur outside scholarly publishing.

The indicators can also be classified according to their measurement role.

Indicator class	Examples	Function
Structural	DOI, ORCID, metadata	Establish research identity and infrastructure
Discovery	Indexing, retrieval	Evidence that research can be found
Access	Open access, downloads	Evidence of availability
Attention	Views, mentions	Evidence of interaction
Relational	Citations, co-authorship	Evidence of scholarly connection
Network	Centrality, collaboration	Evidence of structural position
Reach	Countries, disciplines, professions	Evidence of dissemination breadth
Reuse	Data / software / method reuse	Evidence of research utility
Influence	Policy / practice references	Evidence of consequential use

This classification helps prevent the common mistake of treating all indicators as equivalent.

ResearchTrics should also distinguish direct from indirect indicators.

Direct indicators

Measure an observable characteristic closely related to the research object, e.g. article indexing, DOI, ORCID linkage, open-access status, article downloads.

Indirect indicators

Provide evidence through a related phenomenon, e.g. citation centrality, international collaboration, policy references, social-media activity.

Indirect indicators may be useful, but their interpretation requires stronger theoretical justification.

Type	Description	Examples
Input indicators	Describe infrastructure that supports visibility	DOI; ORCID; metadata; repository; institutional profile
Process indicators	Describe interaction	Views; downloads; sharing; discussions; collaboration
Outcome indicators	Describe consequences or downstream scholarly activity	Citations; reuse; methodological adoption; policy references; practice adoption
This classification is especially important because outcome indicators should not be retroactively treated as simple measures of visibility. The proposed taxonomy can therefore be summarised as follows.		

Visibility dimension	Primary indicators	Secondary indicators
Discoverability	Indexing, metadata, retrieval	Keywords, abstract, URL
Accessibility	Open access, full text, repository	Format, language, accessibility
Recognition	ORCID, attribution	Affiliation, ROR, researcher profile
Engagement	Views, downloads	Saves, mentions, discussions
Connectivity	Citations, co-authorship	Network centrality, collaboration
Citation visibility	Citations, citation velocity	Diversity, trajectory, centrality
Openness	Open access, data, methods	Software, protocols, licences
Knowledge reach	Disciplinary / geographic reach	Policy, professional, public reach

This matrix is intended to become a reference taxonomy for subsequent ResearchTrics studies.

A major methodological challenge is indicator redundancy. Consider the following, which may all reflect related aspects of discoverability:

- DOI presence
- Crossref registration
- Persistent URL
- Indexed record

Similarly, the following are not necessarily independent pieces of evidence:

- Citation count
- Citation velocity
- Citation percentile
- Citation centrality

If all are added together without modelling their relationships, a composite metric may effectively count the same underlying phenomenon several times.

Indicator selection should be based on theoretical coverage and empirical information value, not simply on the number of available variables.

Future ResearchTrics validation studies should examine correlations, redundancy, dimensionality and incremental validity before assigning weights.

Raw indicators can be misleading. A citation count of 100 may mean very different things across fields with different citation densities. Likewise, a publication in a small discipline, a rapidly expanding field, a low-resource research environment, or a highly collaborative field may have fundamentally different expected visibility trajectories.

Responsible research assessment therefore requires contextualisation. ResearchTrics should eventually consider normalisation across:

- Discipline
- Publication year
- Document type
- Geography
- Institution size
- Career stage
- Research field
- Language

This would help prevent the metric from simply reproducing existing structural inequalities in scholarly communication.

The taxonomy suggests a future technical development: a Research Visibility Indicator Ontology (RVIO).

Each indicator could be represented using structured metadata fields:

Metadata field

Indicator ID
Indicator name
Definition
Dimension
Unit of analysis
Validity evidence
Interpretation

Metadata field

Data source
Calculation method
Temporal window
Normalisation method
Known biases
Reliability evidence
Relationship to other indicators

For example, an initial ontology record might read as follows.

Attribute

Indicator ID
Name
Dimension
Unit
Type
Evidence

Value

RVI-DISC-001
Scholarly Indexing Coverage
Discoverability
Research output
Structural / discovery indicator
Indexed database records

Such an ontology could eventually support APIs, dashboards, research profiles and automated research evaluation.

The taxonomy provides a preliminary variable pool for a future Research Visibility Metric (RVM). However, the sequence set out in Figure 3 should be followed before a composite score is presented as a validated research visibility measure.

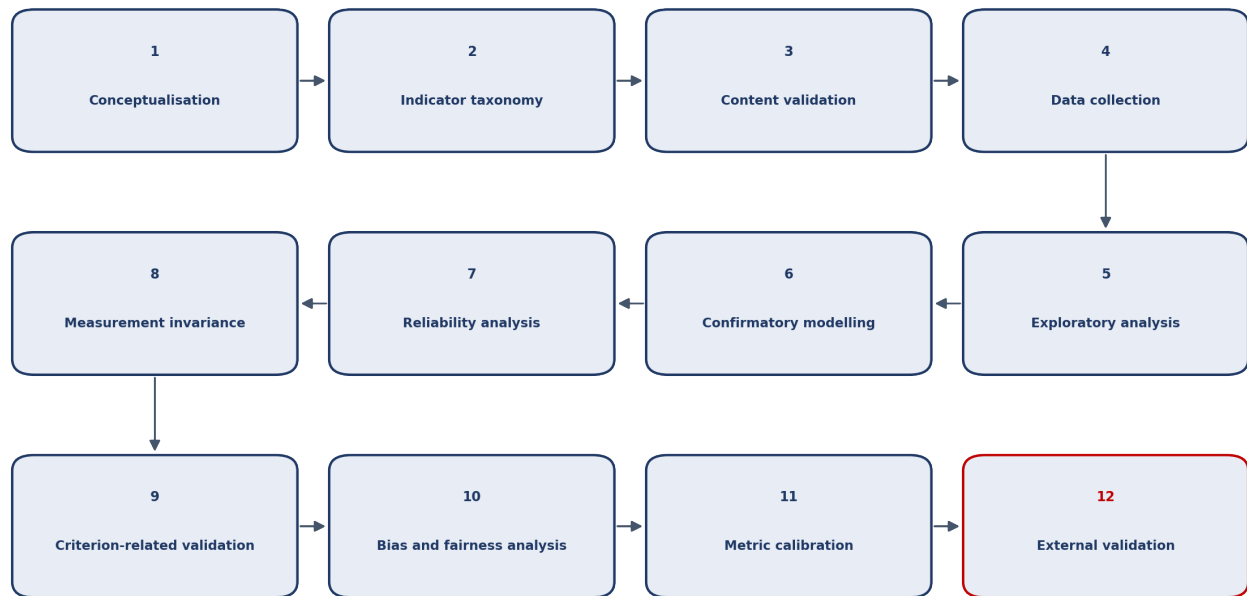


Figure 3. Proposed development sequence for the Research Visibility Metric.

This distinction is particularly important because a metric can be mathematically sophisticated while still lacking construct validity.

The taxonomy is particularly relevant to African research environments. Research visibility there may be constrained by:

- inconsistent metadata
- fragmented researcher identities
- limited repository coverage
- publication-access barriers
- inadequate digital infrastructure
- language differences
- limited international collaboration
- underrepresentation in global databases
- unequal access to scholarly infrastructure

Therefore, a visibility metric developed from data dominated by high-income research systems may not automatically be valid for African research. The ResearchTrics framework should consequently examine measurement equivalence and structural bias rather than simply importing existing bibliometric practices.

This is not merely an ethical consideration. It is a measurement validity problem.

The taxonomy produces the following propositions.

#

P1

Proposition

Research visibility indicators represent different dimensions of scholarly discoverability, accessibility, recognition, engagement, connectivity, citation visibility, openness and knowledge reach.

P2

Individual visibility indicators should not be interpreted as interchangeable measures of research visibility.

P3

Multiple indicators may provide overlapping evidence and therefore require empirical redundancy analysis before inclusion in composite metrics.

P4

Research visibility indicators require disciplinary and contextual normalisation before cross-field comparisons are made.

P5	Persistent researcher and publication identifiers constitute important infrastructure for scholarly recognition and discoverability.
P6	Open-access and open-science indicators represent important pathways through which research can become accessible and reusable.
P7	Network indicators provide information about structural research visibility that cannot be captured adequately through publication-level counts.
P8	Citation indicators provide evidence of scholarly circulation but should not be interpreted as complete measures of research impact.
P9	A valid Research Visibility Metric requires empirical evidence concerning construct validity, reliability, measurement invariance and fairness.
P10	Research visibility measurement should distinguish structural, discovery, access, attention, relational, network, reach, reuse and influence indicators. The taxonomy establishes a methodological foundation for the next phase of ResearchTrics research. Future bulletins should examine the topics below.

#	Topic
1	Metadata quality and research discoverability
2	Google Scholar and scholarly search visibility
3	DOI and persistent identifier infrastructure
4	ORCID and researcher identity
5	Academic search-engine optimisation
6	Open access and research visibility
7	Preprints and visibility
8	Repository discoverability
9	Citation visibility
10	Citation network centrality
11	Research engagement indicators
12	Altmetrics and scholarly attention
13	Research collaboration networks
14	Geographic research reach
15	Interdisciplinary reach
16	Institutional research visibility
17	Visibility of African research
18	Measurement bias in research metrics
19	Psychometric validation of visibility indicators
20	Development of the Research Visibility Metric
	Research visibility cannot be adequately represented by a single indicator.
	This Bulletin has developed a preliminary taxonomy based on the eight dimensions established in the ResearchTrics Research Visibility Framework:

Discoverability !' Accessibility !' Scholarly Recognition !' Engagement !' Connectivity !' Citation Visibility !' Openness !' Knowledge Reach

Each dimension requires multiple forms of evidence, and individual indicators should be interpreted according to their theoretical role, empirical properties and contextual limitations.

The taxonomy also establishes an important measurement principle:

The availability of an indicator does not establish its validity as a measure of research visibility.

A rigorous Research Visibility Metric therefore requires systematic indicator selection, normalisation, validation and fairness analysis. The taxonomy developed here provides the bridge between the conceptual framework established in Bulletins 1-3 and the empirical measurement programme that will follow.

ResearchTrics can therefore move from asking “What is research visibility?” to asking “How can research visibility be operationalised, measured and validated?” That transition marks the beginning of the methodological phase of the ResearchTrics Research Bulletin programme, and sets the agenda for the longitudinal model to be developed in the next instalment of the series.

Recommended Citation

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Recommended citation sentence for future papers: “Research visibility can be operationalised through indicators representing discoverability, accessibility, scholarly recognition, engagement, connectivity, citation visibility, openness and knowledge reach, although individual indicators require contextual and empirical validation before aggregation (Oladunmoye, 2026c, 2026d).”

References

1. Dote Pardo, J. S. (2026). Impact of open access on academic visibility: A systematic review of the literature. *Journal of Documentation*, 82(1), 16-42. <https://doi.org/10.1108/JD-08-2025-0216> <https://doi.org/10.1108/JD-08-2025-0216>
2. Google Scholar Help. (n.d.). Inclusion guidelines for webmasters. Google. <https://scholar.google.com/intl/en/scholar/inclusion.html>
3. Hicks, D., Wouters, P., Waltman, L., de Rijcke, S., & Rafols, I. (2015). Bibliometrics: The Leiden Manifesto for research metrics. *Nature*, 520, 429-431. <https://doi.org/10.1038/520429a> <https://doi.org/10.1038/520429a>
4. Ibrahim, B., & Ramzy, M. (2025). The effect of using ORCID iD on improving the visibility and retrieval of Arab university publications. *Scientometrics*. <https://doi.org/10.1007/s11192-025-05505-w> <https://doi.org/10.1007/s11192-025-05505-w>
5. Oladunmoye, E. O. (2026a). Defining research visibility: A conceptual framework for understanding the discoverability, accessibility, engagement and scholarly reach of research. *ResearchTrics Research Bulletin*, 1.
6. Oladunmoye, E. O. (2026b). Research visibility versus research impact: Distinguishing related constructs in contemporary research evaluation. *ResearchTrics Research Bulletin*, 2.
7. Oladunmoye, E. O. (2026c). The dimensions of research visibility: A multidimensional framework for scholarly discoverability and reach. *ResearchTrics Research Bulletin*, 3.
8. Reyes-Lillo, D., Morales-Vargas, A., & Rovira, C. (2025). Visibility, discoverability, findability, search engine optimization (SEO) and academic SEO in digital repositories: A scoping review. *BiD: Textos Universitaris de Biblioteconomia i Documentacio*, 54. <https://doi.org/10.1344/BID2025.54.06> <https://doi.org/10.1344/BID2025.54.06>
9. Salauddin, N. (2026). Evaluating the role of metadata standards in enhancing data discoverability and interoperability in academic digital repositories. *Digital Library Perspectives*, 42(2), 367-395. <https://doi.org/10.1108/DLP-07-2025-0111> <https://doi.org/10.1108/DLP-07-2025-0111>
10. UNESCO. (2021). UNESCO Recommendation on Open Science. United Nations Educational, Scientific and Cultural Organization.

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