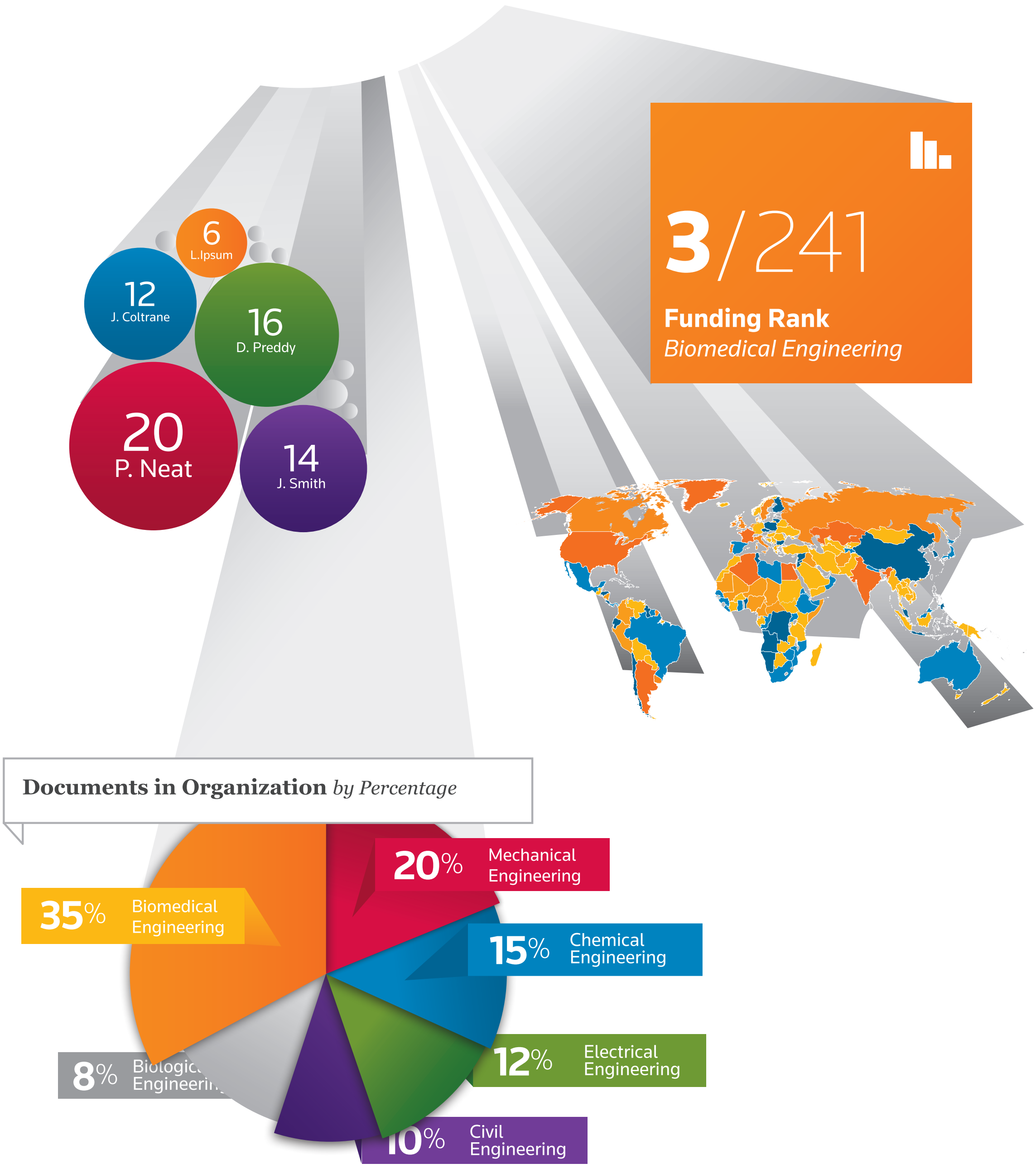
# InCites

# METRICS GUIDEBOOK




THOMSON REUTERS

*"The total number of expressions [citations] is about the most objective measure there is of the materials importance to current research."*

***– Dr. Eugene Garfield***

INCITES 2.1

# GUIDEBOOK CONTENTS

# ABOUT THE INDICATORS GUIDEBOOK

This Indicators Guidebook is intended to provide an overview of the data sources for the Benchmarking & Analytics services of InCitesTM. It explains where the data comes from and how the data is cleaned, categorized, indexed and processed to provide meaningful indicators of research performance. It also provides detailed explanations on each of the indicators, how they are calculated, their value and examples of appropriate use.

This Guidebook should provide a useful background to help users understand the value and limitations of InCites. However, it does not provide instruction on how to use the InCites interface.

For more information on our training programs, customer support and other useful materials, or to login to InCites please go to:
http://incites.thomsonreuters.com

# INCITES CONTENT

## WEB OF SCIENCE CORE COLLECTION CONTENT

InCites uses data from seven editions of the Thomson Reuters Web of ScienceTM Core Collection for its publication counts and indicators. These seven editions represent more than 12,000 journals, 12,000 annual conferences and 53,000 scholarly books. Currently source publications from 2004-2013 are used within InCites, and all document types are included. Data and baselines are updated every two months.

- Science Citation Index Expanded (SCIE)
- Social Science Citation Index (SSCI)
- Arts & Humanities Citation Index (AHCI)
- Conference Proceedings Citation Index – Science (CPCI-S)
- Conference Proceedings Citation Index – Social Science & Humanities (CPCI – SSH)
- Book Citation Index – Science (BKCI-S)
- Book Citation Index – Social Sciences & Humanities (BKCI-SSH)

These citation indices capture the most influential, global content in all published areas of the sciences, social sciences, and humanities.

## PUBLICATION EVALUATION AND SELECTION

The Web of Science Core Collection is based on the foundational Thomson Reuters philosophy of content collection, evaluation, development and management. Content selection is based on a decades-long practice by expert editorial staff within the Thomson Reuters organization. One of the basic tenets of this selection process is Garfield's Law of Concentration which postulates that a relatively small core of journals (10-20 percent) account for the bulk (80-90 percent) of what is cited by all published literature, and that these core journals are frequently cited across a wide range of disciplines.

Identifying and capturing these core journals creates a strong, multidisciplinary resource that represents the published network of foundational and influential research. This core coverage is supplemented by coverage of regional journals and early coverage of up and coming disciplines to provide comprehensive coverage across all fields of scholarly research and geographical regions.

Thomson Reuters is not a primary publisher and is therefore able to evaluate content in a fair and unbiased way. Publications are evaluated in detail for their contribution to research, citation impact, timeliness of publication, and bibliographic standards. Commercial publishers, academic and society publications are all evaluated by the same standards. Journals may be published in print, electronically, or hybrid format and may operate with traditional subscription journals or they may be open access journals. Currently, more than 1,200 open access journals are included in the Web of Science Core Collection.

A complete list of titles available online and searchable by index is here: http://ip-science.thomsonreuters.com/mjl/

Find out more about Garfield's Law of Concentration at: http://www.garfield.library.upenn.edu/essays/V1p222y1962-73.pdf

For more details on the selection policy for publications, please see our online essays:

Journal selection:

http://wokinfo.com/essays/journal-selection-process/

Book selection:

http://wokinfo.com/media/pdf/BKCI-SelectionEssay_web.pdf

**Conference selection:**

http://wokinfo.com/products_tools/multidisciplinary/webofscience/cpci/cpciessay/

## BIBLIOGRAPHIC DATA ELEMENTS

Content sources for the Web of Science Core Collection are fully indexed from cover-to-cover, meaning every scholarly item is indexed and all significant publication types are included. See the Appendix for a complete list of Document Types. Filters can be applied to InCites to analyze document types of interest.

Bibliographic data from each source publication is captured and strictly controlled. In addition to standard article bibliographic elements (title, author, source, etc.), complete cited reference metadata is captured for all publications.

## AUTHORS

A complete list of authors is always captured for all publications in Web of Science, including given name (from 2008-now), surname and initials.

Authors may also be associated to ResearcherID profiles.

> **ResearcherID:** IDs are available for more than 270,000 authors and are a valuable aid in author disambiguation. They are fully integrated with the source data, and unique identifiers are attached to each publication that is claimed by an author.

ResearcherIDs can be claimed and maintained by authors at: http://www.researcherid.com

## INSTITUTIONS

In addition to all author names, all author affiliations are captured from each publication, including (where available on the source publication) organization name, city, state or province, postal code, country or territory. In InCites, the full organization name is displayed and searchable. Since 2008 author names, of multi author papers, are associated with their affiliated institutions.

The policy of including all affiliations is particularly important for multi-authored papers which may contain hundreds of different affiliations, all of which are searchable and displayable. This ability to comprehensively identify an institution's publications is a key benefit of InCites when compared to other databases of scholarly literature which may only capture some of the affiliations and may not accurately capture all name variants.

> **Address Unification:** Care is taken to unify variant institution names from Web of Science addresses, including name variants, such as previous names, affiliated sub-organizations and spelling variants.
>
> More than 4,600 institutions have undergone the unification process, and work is ongoing to extend it to more organizations. The unification process is a combination of background research by Thomson Reuters staff and feedback from organizations.
>
> **Organization Types:** Each unified organization is assigned an organization type by Thomson Reuters to facilitate filtering by broad grouping:

Organizations may contact Thomson Reuters to discuss the unification process for their institution by contacting Customer Technical Support: http://ip-science.thomsonreuters.com/techsupport/

TABLE 1: ORGANIZATION TYPES .

| ORGANIZATION | DESCRIPTION |
|---|---|
| Academic | Universities and other institutions that focus on a combination of education and research |
| Corporate | Commercial organizations such as pharmaceutical companies |
| Government | Governmental organizations such as ministries and military |
| Health | Primarily hospitals, but also other organizations that focus on providing health care services |
| Research Council | Primarily research funding organizations (may also do research) |
| Research Institute | Organizations that are primarily focused on research |
| University System | University systems and umbrella organizations, such as the University of California |
| Unknown | Where the type of institution is unknown or does not fit within the label parameters above |

## SUBJECT SCHEMAS

Subject schemas, alongside baselines, are important to place bibliometric data into context. A citation count of a paper in isolation is a relatively meaningless number. But by looking at it in the context of peer publications, one can understand the performance, see if it is above or below average and by how much. Through benchmarking, data becomes actionable knowledge.

It is necessary to understand performance within the context of subject areas because publication rates and citation behavior can vary considerably from discipline to discipline, document type and over time. For example, mathematics papers are usually cited at a relatively low rate but the citation rate can persist over a long period of time. Whereas molecular biology papers are typically cited more frequently and the citations tail off after a few years as the research is superseded. By understanding the underlying trends and comparing the publications of interest to publications in the same subject area, year and document type will have more meaningful results.

There are 11 different subject schemas available in InCites. Three are exclusive to Thomson Reuters and are described below.

A further eight are based on mapping Thomson Reuters data to external subject classification systems. These schemas are designed to enable the use of bibliometric indicators in the context of a regional research evaluation program, for example the Research Excellence Framework in the United Kingdom. Alternatively, the Organization for Economic Cooperation and Development (OECD) subject classification schema is a valuable tool for looking at national level bibliometric indicators in the context of demographical and financial data provided by the OECD. Typically, schemas based on external subject classifications are developed in partnership with research evaluation bodies in that region. They may be based on journal classifications or the mapping of Web of Science categories. Please see the Appendix (Regional Subject Schemas) for details of these schemas.

Which schema to use will depend on the objectives of the analysis. Typically if looking at small sets of publications, such as the output of a single department or individual author, it is advisable to use the higher precision of a narrow subject classification such as the Web of Science schema. This approach may be useful to overcome differences between things such as applied and theoretical research of the same topic.

However, if you wish to have a broader view, for example, to understand the overall subject mix of an organization or a country, a broader schema may be more appropriate.

**Web of Science:** The narrowest categorization.
The Web of Science schema is comprised of 252 subject categories in science, social sciences, arts and humanities. The schema is created by assigning each journal to one or more subject categories. Broad disciplines such as physics are represented as smaller subfields, for example "Physics, Applied" and "Physics, Nuclear." This narrow definition of subject is an important characteristic of the schema as citation behavior may significantly vary among subfields. The Web of Science subject schema is generally considered the best for detailed bibliometric analysis as its granularity enables the user to objectively measure performance against papers that are similar in scope and citation characteristics. However, because it is often not possible to assign a journal to a single category, there can be overlapping coverage of categories which may complicate an analysis.

Coverage of books and conferences follow the same definitions of subject area.

**Essential Science Indicators:** A broad categorization.
The Essential Science Indicators schema comprises 22 subject areas in science and social sciences and is based on journal assignments. Arts & Humanities journals are not included. Each of the 22 subject areas covers journals exclusively and there is no overlap between categories which can facilitate simpler analysis.

**GIPP:** A very broad categorization.
The GIPP schema comprises six broad disciplines but covers all fields of scholarly research. The GIPP schema is based on an aggregation of the Web of Science subject categories and contains significant overlap between disciplines. Initially developed as part of the Thomson Reuters Institutional Profiles project, the GIPP schema is also used in the Times Higher Education World University Rankings.

## RECLASSIFICATION OF PAPERS IN MULTIDISCIPLINARY AND MEDICAL JOURNALS

Thomson Reuters reassigns publications in multidisciplinary journals such as Nature and Science to their most relevant subject area. While these journals publish articles on a wide array of topics, individual articles in those journals focus on one area of research. By using the information found in the cited references of each publication it is possible, in most cases, to algorithmically reassign them to a subject area. In cases where it is not possible to accurately reassign the publications (for example when the article does not have cited references) the articles are left as multidisciplinary.

This reclassification process allows articles to be appropriately compared with articles of similar citation characteristics and topic focus. The reclassification is applied to articles in the categories of "Multidisciplinary Sciences" and "Medicine, General and Internal" in the Web of Science (and therefore any subject schema that is based on aggregations of Web of Science categories) and the "Multidisciplinary" field in the Essential Science Indicators schema.

List of categories, scope notes, and journal coverage is available at:
Science Citation Index Expanded: http://ip-science.thomsonreuters.com/mjl/scope/scope_scie/
Social Science Citation Index: http://ip-science.thomsonreuters.com/mjl/scope/scope_ssci/
Arts & Humanities Citation Index: http://ip-science.thomsonreuters.com/mjl/scope/scope_ahci/

Mapping of the Web of Science schema to the GIPP schema is available in the Appendix (GIPP subject mapping table).

See the scope notes for each category here:
http://incites-help.isiknowledge.com/incitesLive/ESIGroup/overviewESI/scopeCoverageESI/esiScopeNotes.html
See the list of journals for each category here:
http://incites-help.isiknowledge.com/incitesLive/ESIGroup/overviewESI/esiJournalsList.html

**For details, please see:**
**http://incites-help.isiknowledge.com/incitesLive/globalComparisonsGroup/globalComparisons/subjAreaSchemesGroup/wosSubjectAreas/reclassificationMultiDiscPapers.html**

# INDICATORS: AN INTRODUCTION

Research evaluation is increasingly being conducted using bibliometric methodology and citation analysis. Because no individual bibliometric indicator can account for all aspects of research performance, it is recommended that selections of bibliometrics indicators are utilized to provide a broader view and to discover any data artifacts.

Thomson Reuters InCites supports a comprehensive class of advanced bibliometric indicators assessing various aspects of research performance.

For each indicator, the following are explained:

- What the indicator measures
- How it is calculated
- What is its value and role in the process of research performance evaluation?
- Guidance for appropriate usage.

## BASELINES

A baseline is the average performance of a global set of publications with the same subject area, document type and year. For example, all the articles in the field of chemistry in 2006. Baselines and subject schemas create useful reference points for comparison and they are the basis of normalization to overcome subject bias.

Baselines are calculated using a whole counting method, this means that all papers in a subject area are counted towards the baseline calculation regardless of whether those papers are also in other subject areas or not.

**TABLE 2: BASELINE CALCULATION EXAMPLE**

| ARTICLE ID | TIMES CITED | SUBJECT AREAS | DOCUMENT TYPE | YEAR |
|---|---|---|---|---|
| A | 0 | Chemistry, Organic | Article | 2010 |
| B | 12 | Chemistry, Organic & Chemistry Physical | Article | 2010 |
| C | 5 | Chemistry, Physical | Article | 2010 |
| D | 8 | Chemistry, Organic | Review | 2010 |

Table 2 shows some sample publications A-D that are in different subjects, and have different document types. For simplicity of the demonstration of the calculation all papers are in the same year, but in reality, baselines are also calculated for each year. The citation impact (average citations per paper) baseline for each variant of subject, year and document type will be calculated as the mean average:

$$e_{f,t,d} = \frac{\sum_f \sum_t \sum_d c}{\sum_f \sum_t \sum_d p}$$

Where: $e$ = the expected citation rate or baseline, $c$ = Times Cited, $p$ = the number of papers $f$ = the field or subject area, $t$ = year and $d$ = document type.

For *Articles* in the filed *Chemistry, Organic* published in 2010 (A&B) it would be:

$$Baseline = \frac{0 + 12}{1 + 1} = 6$$

For more information about bibliometric methods in general and some of the indicators found in other Thomson Reuters services please see: http://thomsonreuters.com/products/ip-science/04_030/using-bibliometrics-a-guide-to-evaluating-research-performance-with-citation-data.pdf

For *Articles* in *Chemistry, Physical* in *2010* (B&C) it would be:

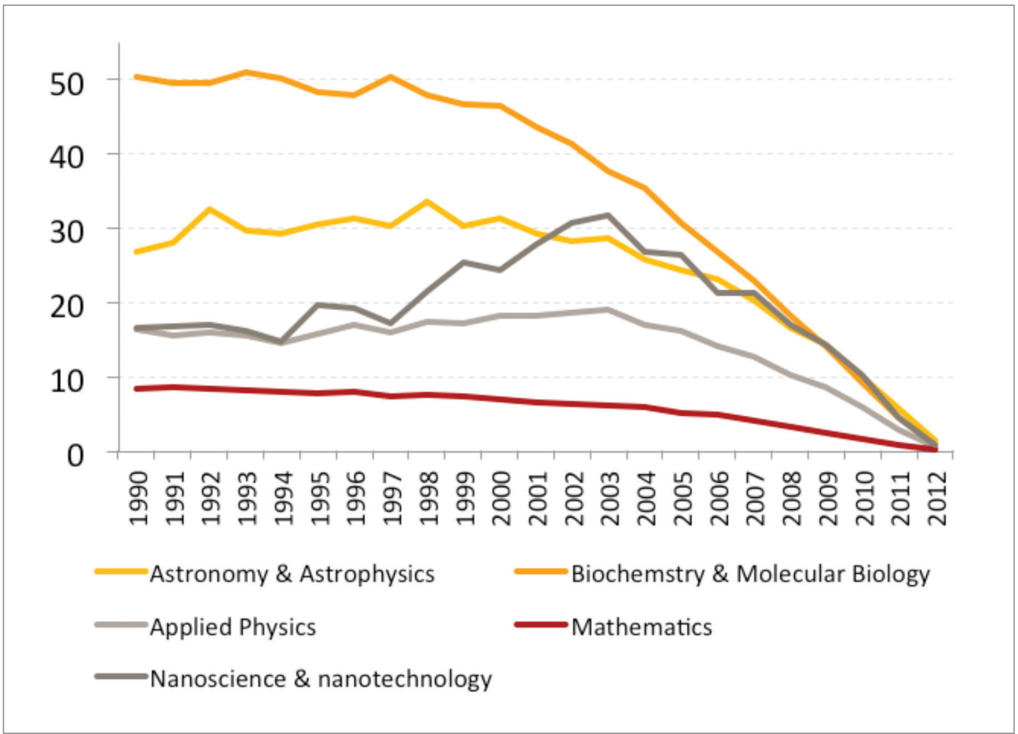
$$Baseline = \frac{12 + 5}{1 + 1} = 8.5$$

For *Reviews* in *Chemistry, Organic* in 2010 (D) it would be:

$$Baseline = \frac{8}{1} = 8$$

**Note:** The citation distribution for any set of publications is typically skewed towards a small number of highly cited papers and a large number of papers with relatively few citations. Because baselines are based on the mean of a set of papers and the mean is influenced by the presence of highly cited papers, the mean average will be considerably higher than the median. Therefore more than half the publications are below the mean average.

CHART 1: EXAMPLES OF CITATION IMPACT (BASELINE) FOR VARIOUS SAMPLE FIELDS OVER TIME.



## CITATION IMPACT

One of the most commonly used bibliometric indicators for evaluating sets of documents is the Citation Impact indicator. Citation Impact (also called "citations per publication" or "average citation rate") should not be confused with the Journal Impact Factor which is a different indicator used for evaluating journal performance and is found in the Journal Citation Reports.

Citation Impact of a set of documents is calculated by dividing the total number of citations by the total number of publications. Citation Impact shows the average number of citations that a document has received.

$$Citation\ Impact = \frac{\sum Citations}{\sum Papers}$$

Citation Impact has been extensively used as a bibliometric indicator in research performance evaluation and can be applied at all organizational levels (author, institution, country/region, research field or journal). However, there are limitations to the indicator. For example, it ignores the total volume of research outputs.

**TABLE 3: EXAMPLE OF CITATION IMPACT AT THE AUTHOR LEVEL**

| | TOTAL PUBLICATIONS | TOTAL CITATIONS | CITATION IMPACT |
|---|---|---|---|
| Researcher A | 1 | 50 | 50 |
| Researcher B | 10 | 200 | 20 |

Table 3 shows an example of the Citation Impact for two Researchers. Researcher A has only one publication that has received 50 citations while Researcher B has published 10 documents that have received 200 citations. Researcher A has a higher Citation Impact (50) than Researcher B (20), even though Researcher B has published more documents and received more citations overall.

At the field level, the *Citation Impact* of certain disciplines is often higher than in other scientific fields due to several factors, such as the degree to which references from other fields are cited.

Chart 1 shows the differences between the *Citation Impac*t of various subject categories. Mathematics has a lower *Citation Impact* than biochemisty & molecular biology. Citation Impact can vary significantly across different disciplines and time periods so it cannot be used effectively to compare entities that are in different subjects or years. In these cases it is preferable to use some form of normalization to allow for the differences in fields and time (see Normalized Citation Impact, % Documents in Top 1% and % Documents in Top 10%, Average Percentile).

## IMPACT RELATIVE TO WORLD

Impact Relative to World indicator is the ratio of the Citation Impact of a set of documents divided by the world Citation Impact for a given period of time. This indicator can be applied at the institutional, national and international level. It shows the impact of the research in relation to the impact of the global research and is an indicator of relative research performance. The world average is always equal to one. If the numerical value of the Impact Relative to World exceeds one, then the assessed entity is performing above the world average. If it is less than one, then it is performing below the world average.

$$Impact\ relative\ to\ World = \frac{Citation\ Impact}{Baseline\ (world\ citation\ impact)}$$

Note that although this indicator does normalize for year, it does not take into account the differences in the subject mix that an institution or a country is publishing in; therefore it is recommend to use it in conjunction with bibliometric indicators that do take into account the differences in the average citation rates of the set of documents under evaluation (see Normalized Citation Impact, % Documents in Top 1% and % Documents in Top 10%, Average Percentile).

## NORMALIZED CITATION IMPACT

As discussed above, citation rates vary across disciplines, citations grow over time, and different publication types have different citation behaviors. For accurate and fair research assessment, citation data should be normalized by discipline, year and publication type.

The Normalized Citation Impact (NCI) of a single publication is calculated by dividing the actual count of citing items by the expected citation rate (baseline) for publications with the same document type, year of publication and subject area. When a document is assigned to more than one subject area, an average of the ratios of the actual to expected citations is used. The NCI of a set of documents, for example, the collected works of an individual, institution or country, is the average of the NCI values for all the documents in the set.

For a single paper that is only assigned to one subject area, this can be represented as:

$$NCI = \frac{c}{e_{ftd}}$$

For a single paper that is assigned to multiple subjects, the NCI can be represented as the average of the ratios for of actual to expected citations for each subject area:

$$NCI = \frac{\sum \frac{c}{e_{f(n)td}}}{n} = \frac{\frac{c}{e_{f(1)td}} + \frac{c}{e_{f(2)td}} \ldots + \frac{c}{e_{f(n)td}}}{n}$$

For a group of papers, the NCI value is the average of the values for each of the papers, represented as:

$$NCI_i = \frac{\sum_i NCI_{each\ paper}}{p_i}$$

Where: e = the expected citation rate or baseline, c = Times Cited, p = the number of papers, f = the field or subject area, t = year, d = document type, n = the number of subjects a paper is assigned to and i = the entity being evaluated (institution, country, person, etc).

NCI is a valuable and unbiased indicator of impact irrespective of age, subject focus or document type. Therefore, it allows comparisons between entities of different sizes and different subject mixes. An NCI value of one represents performance at par with world average, values above one are considered above average and values below one are considered below average. An NCI value of two is considered twice world average.

**Note:** A quirk of the way baselines are calculated (whole counting of subjects for papers in more than one subject category) and the way NCI is calculated (fractional counting of subjects for papers in more than one subject category) results in the NCI of the world not being equal to one exactly.

NCI is an ideal indicator for benchmarking at all organizational levels (author, institution, region etc). One can also use NCI to identify impactful sub-sets of documents and assess any research activity. For example, an institution may use the NCI to assess which collaborations are the most impactful or identify new potential collaboration opportunities. Or to identify the performance of up-and-coming researchers compared to established ones and to aid with faculty recruitment by assessing candidates. As a funding organization, one may use the NCI as a quantitative performance indicator to monitor the performance of funded projects, or assess the track record of a research teams applying for a new funding.

**There are known issues with using NCI:**

- When dealing with small sets of publications, for example, the publications of one individual, the NCI values may be inflated by a single highly cited paper.
- Because it is an average, even when looking at larger sets of publications, such as the collected works of an institution, very highly cited papers can have an unduly large influence on the NCI value.
- As discussed elsewhere, the baseline values for current year can be very low and therefore the NCI values for current year can fluctuate more than expected.

**To overcome these issues there are some steps that can be taken:**

- Use the NCI value alongside other indicators to have a picture of performance as a whole and to identify anomalies and data artefacts.
- Use larger sets of publications when possible, for example, by extending the time period or expanding the number of subjects to be covered.
- Do not include publications from the most recent year in the analysis.
- Limit your analysis to significant research publications by limiting to those papers that have the document type of Article or Review. If appropriate, to aid increased coverage of some fields, the document types of Book Chapters and Conference Proceedings may also be considered.
- Always use citation indicators to aid human judgment rather than to replace it.

**Complementary indicators that can be used alongside the NCI include:**

- Journal Normalized Citation Impact
- % Documents in Top 1% and % Documents in Top 10%
- Average Percentile

## JOURNAL NORMALIZED CITATION IMPACT

The Journal Normalized Citation Impact (JNCI) indicator is a similar indicator to the Normalized Citation Impact, but instead of normalizing per subject area or field, it normalizes the citation rate for the journal in which the document is publishing.

The Journal Normalized Citation Impact of a single publication is the ratio of the actual number of citing items to the average citation rate of publications in the same journal in the same year and with the same document type. The JNCI for a set of publications is the average of the JNCI for each publication.

The JNCI indicator can reveal information about the performance of a publication (or a set of publications) in relation to how other researchers perform when they publish their work in a given journal (or a set of journals). It can provide the answers to questions, such as "How do my papers perform in the journals I publish?" If the numerical value of the JNCI exceeds one, then the assessed research entity is performing above average. If it is less than one, then it is performing below the average.

The JNCI indicator is also useful for publishers as a measure of post–publication performance and it can reveal which research work exceeds average performance and therefore increases the citation rates of a journal.

**TABLE 4: EXAMPLE OF NORMALIZED CITATION IMPACT AND JOURNAL NORMALIZED CITATION IMPACT INDICATORS AT THE AUTHOR LEVEL**

| | TOTAL PUBLICATIONS | TOTAL CITATIONS | CITATION IMPACT | H-INDEX | NORMALIZED CITATION IMPACT | JOURNAL NORMALIZED CITATION IMPACT |
|---|---|---|---|---|---|---|
| Researcher D | 66 | 290 | 4.39 | 9 | 1.32 | 1.86 |
| Researcher E | 62 | 289 | 4.66 | 9 | 0.45 | 0.72 |

Table 4 shows an example of the application of the NCI and JNCI indicators at the author level. Researcher D and Researcher E both have very similar numbers of publications and citations. Their Citation Impact is almost the same, and their h-index is identical. Using only the first four indicators featured in table 4 (above), it is not possible to distinguish the performance of the two researchers. However, the two researchers may in fact be conducting research in very different fields and may have a different history of publication (older papers vs new papers). Using the NCI and JNCI indicators gives us a better understanding of their performance relative to their peers in terms of subject, document type and age of publication.

From the normalized indicators, one can quickly identify that Researcher D has both NCI (1.32) and JNCI (1.86) values that are above average (>1). While Researcher E has a NCI (0.45) and JNCI (0.72) that are below average (<1).

It should be noted that the JNCI is a relative research performance indicator. Even though in many cases NCI and JNCI might correlate positively, this might not always be the case. For example, if for a given researcher the NCI indicator is above average while at the same time the JNCI indicator is below average, this might mean that the researcher receives more citations than the average for his/her published research work in the scientific field that the researcher is active in overall, but he/she publishes in journals that have very high citation rates (e.g. Nature or Science) and has received less citations than the average published work does for the given journals.

## H-INDEX

The h-index (also known as Hirsch index) was introduced by J. Hirsch in 2005 and can be defined as follows: A researcher has an h-index, if he/she has at least h publications for which he/she has received at least h citations. For example, Researcher A has an h-index = 13 if he/she has published at least 13 documents for which he/she has received at least 13 citations. Its popularity as a bibliometric indicator has derived from the fact that it combines productivity (number of documents) and impact (number of citations) in one index.

The h-index can be applied to any level of aggregation (author, institution, journal, etc.) and it can reveal information about how the citations are distributed over a set of documents. At the author level, it is considered to be an indicator of a researcher's lifetime scientific achievements. Some clear advantages of the h-index are that it is a mathematically simple index, it encourages large amounts of impactful research work while at the same time discourages publishing unimportant output and that single highly cited publications do not influence the h-index (unlike the Citation Impact).

However, the h-index is a time-dependent measure, as it is proportional to the length of a researcher's career and how many articles they have published. For example, early career researchers would be at a disadvantage when compared to more senior researchers because the latter would have had more time to produce more work and receive more citations for their output.

**TABLE 5: EXAMPLE OF H-INDEX AT THE AUTHOR LEVEL**

| | TOTAL PUBLICATIONS | TOTAL CITATIONS | CITATION IMPACT | H-INDEX |
|---|---|---|---|---|
| Researcher A | 1 | 50 | 50 | 1 |
| Researcher B | 10 | 200 | 20 | 10 |
| Researcher C | 10 | 200 | 20 | 5 |

Table 5 shows an example of how h-index can be applied at the author level. Researcher A has only one publication that has received 50 citations, while Researcher B has published 10 documents that have received 20 citations each. Researcher C has the same number of publications and citations as Researcher B. According to the definition of the h-index, Researcher A, who has only one publication and has received 50 citations will have an h-index = 1, whereas Researcher B who has 10 publications and has received 20 citations for each publication will have an h-index = 10. Researcher C has an h-index = 5, which means that even though he/she has published the same number of documents and received the same number of citations as Research B, Researcher's C citations are more concentrated in five documents that are more cited than the rest of his/her publications.

Note, however, that in this example we have not taken into account the researchers' ages (the time interval between when the first and last document were published) and the disciplines that the researchers are active in. The h-index can be very different across disciplines due to the differences in the average citation rates and therefore, sensitive to the disciplinary background of research output, as research entities publish in different subject mixes.

Assessing the productivity of a large set of publications is the first step in a series of bibliometric analyses that we can apply in order to obtain a deeper understanding of the performance of our research output.

## AVERAGE PERCENTILE

The percentile of a publication is determined by creating a citation frequency distribution for all the publications in the same year, subject category and of the same document type (arranging the papers in descending order of citation count), and determining the percentage of papers at each level of citation, i.e., the percentage of papers cited more often than the paper of interest. If a paper has a percentile of one percentit means that one percent of papers in the same subject, year and of the same document type have a citation count that is higher, and 99 percent of papers have a citation count that is lower.

**TABLE 6: SAMPLE CALCULATION OF PERCENTILE FOR A SET OF 11 DOCUMENTS**

| TIMES CITED | PERCENTILE |
|---|---|
| 1,000 | 9.1 |
| 50 | 18.1 |
| 10 | 27.3 |
| 3 | 36.3 |
| 2 | 45.5 |
| 2 | 45.5 |
| 1 | 63.6 |
| 1 | 63.6 |
| 1 | 63.6 |
| 0 | 100.0 |
| 0 | 100.0 |

A percentile indicates how a paper has performed relative to others in its field, year and document type and is therefore a normalized indicator. For any set of papers, an Average Percentile can be calculated as the mean of all the percentiles of all the papers in the set. In the case that a paper is assigned to more than one category, the category in which the percentile value is closest to zero is used (i.e. the best performing value).

The Average Percentile can apply to any set of papers, such as an author's body of work, all the publications in a journal or the accumulated publications of an institution, country or region.

The average percentile will represent the average performance of the papers in the set having been normalized for field, year and document type. The main advantage of the Average Percentile indicator is that it can be used to compare to peer entities regardless of size, age or subject focus. In this regard, it is quite similar to and is a complement to, the Normalized Citation Impact indicator.

The advantage and also the disadvantage of the Average Percentile indicator is that it describes the relative position of a paper compared to similar papers, but it does not necessarily indicate the actual number of citations. In the example in Table 6, it can be seen that the most highly cited paper has 20 times more citations than the second most cited paper, however the percentile of the first paper has a relatively similar value to the paper in second position. Table 6 is purely for demonstration purposes with a small number of papers. In a more typical distribution, which may contain thousands of papers, these two papers may have very similar percentiles. This artifact of the methodology is advantageous as it overcomes the skewed nature of citation based indicators, but at the same time it is disadvantageous as it may not fully recognize the value of highly cited papers. As with other indicators, it is recommended that the percentile is used alongside and to complement other indicators.

Complementary indicators that can be used alongside the Average Percentile include:

- Normalized Citation Impact
- Journal Normalized Citation Impact
- % Documents in Top 1% and % Documents in Top 10%

## % DOCUMENTS CITED

The %Documents Cited indicator is the percentage of publications, in a set, that have received at least one citation.

It shows the extent to which other researchers in the scientific community utilize the research output produced by an entity. Another way of thinking about this indicator is as the inverse of the number of papers that didn't get cited at all.

Note that the %Documents Cited indicator will vary depending on the selected time period and publication types included in the analysis. The % Documents Cited is not a normalized indicator. For example, if the analysis includes documents that have been published during the current or recent years, some of these documents may not have had time to accrue citations.

**Complementary indicators include:**

- Citation Impact
- Impact Relative to World

## % DOCUMENTS IN TOP 1% AND % DOCUMENTS IN TOP 10%

The % Documents in Top 1% indicator is the top one percent most cited documents (as defined in the description of Average Percentile) in a given subject category, year and publication type divided by the total number of documents in a given set of documents, displayed as a percentage. A higher value is considered to be higher performance. A value of "1" for a set of documents represents that one percent of the publications in that set are in the top one percent of the world regardless of subject, year and document type and would therefore be considered to be performing at the same level as world average. A value above "1" represents that more than one percent of papers in the set are in the top one percent of the world and a value of less than "1" would represent that less than one percent of the papers in the set are in the top one percent of the world.

The % Documents in Top 1% indicator is considered to be an indicator of research excellence as only the most highly cited papers would make the top one percent in their respective field, year and document type. The indicator can be used in conjunction with other indicators to provide a more complete picture of performance. The % Documents in Top 1% indicator can be applied to any level of aggregation (author, institution, national/international, field).

Although the top one percent is a relevant measure of excellence, by its nature it is typically only a small percentage of any document set and therefore the statistical relevance of small sample sizes is a significant concern. The % Documents in Top 1% is best used with large datasets such as the accumulated publications of an institution, country or region and for a publication window of several years.

The % Documents in Top 10% is very similar to the % Documents in Top 1% simply with a threshold of 10 percent instead of one percent. Therefore, typical performance will be around a value of 10 and values of higher than 10 would be considered above average performance. The two indicators complement each other very well to give a broader picture of highly performing research (10 percent) and excellence (one percent).

The % Documents in Top 10% is also more appropriate than the % Documents in Top 1% when the size of the data set is smaller. However, it is still only appropriate for large to medium size data sets and should be used with a great deal of caution when looking at small datasets such as the output of an individual author.

**Complementary indicators include:**

- Normalized Citation Impact
- Journal Normalized Citation Impact
- Average Percentile

CHART 2: SAMPLE CITATION DISTRIBUTION

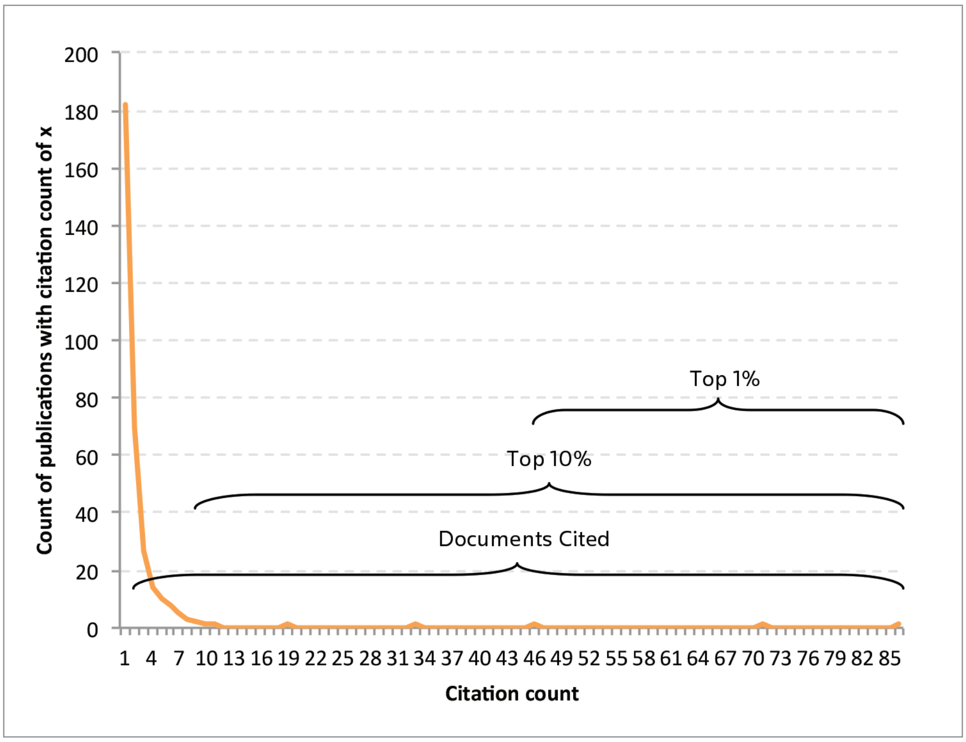
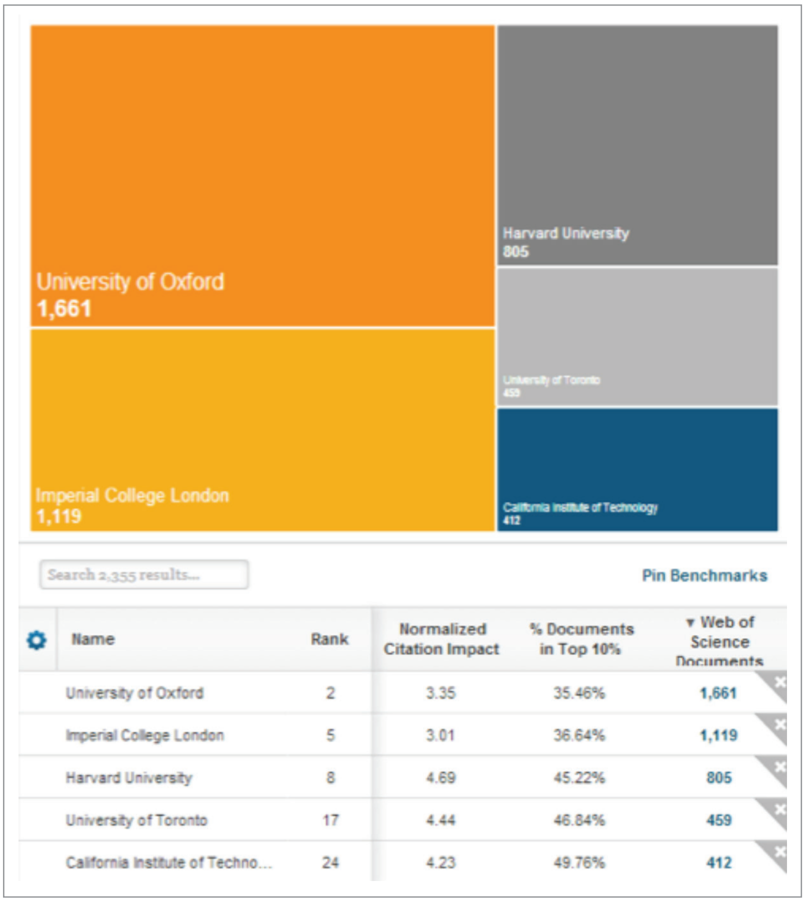



Chart 2 demonstrates the skewed nature of citation distributions, with a small number of highly cited papers and many papers with relatively few or no citations.

## COLLABORATION INDICATORS

InCites facilitates several views of collaborations (co-authored publications) within its interface that enable the user to identify and evaluate collaborations at various levels (country/region, institution, person). Any of the indicators described in this Guidebook are available as subsets of any document set, for example, it is very simple to create an analysis such as that shown in Chart 3 to evaluate the performance of any collaboration. Furthermore, once the collaboration has been identified, it is straightforward to drill down to identify the individual people, subjects or papers that make up the collaboration.

CHART 3: EXAMPLE OF INDICATORS FOR COLLABORATION WITH A UNIVERSITY




| Name | Rank | Normalized Citation Impact | % Documents in Top 10% | ▾ Web of Science Documents |
|---|---|---|---|---|
| University of Oxford | 2 | 3.35 | 35.46% | 1,661 |
| Imperial College London | 5 | 3.01 | 36.64% | 1,119 |
| Harvard University | 8 | 4.69 | 45.22% | 805 |
| University of Toronto | 17 | 4.44 | 46.84% | 459 |
| California Institute of Techno... | 24 | 4.23 | 49.76% | 412 |

However InCites also includes pre-calculated indicators of collaboration which can be used for complementary performance indicators. The section below describes those indicators.

## INTERNATIONAL COLLABORATIONS

The International Collaborations indicator shows the number of publications that have been found with at least two different countries among the affiliations of the co-authors. The International Collaborations indicator can be applied to any level of aggregation (author, institution, national, journal or field).

The definition of an internationally collaborative document is a relatively simple indicator that only takes into account if a document is international (two or more countries) or not. It does not take into account the total number of countries represented in the publication.

International collaborations are considered to be a way to develop and disseminate scientific knowledge and a driver of scientific impact (number of citations). Internationally co-authored documents gain more visibility in the global scientific community and tend to receive more citations.

## % OF INTERNATIONAL COLLABORATIONS

The % of International Collaborations is the number of International Collaborations for an entity (as described above) divided by the total number of documents for the same entity represented as a percentage.

The % of International Collaborations is an indication of an institution or author's ability to attract international collaborations.

## % OF INDUSTRY COLLABORATIONS

An industry collaborative publication is one that lists its organization type as "corporate" for one or more of the co-author's affiliations.

The % of Industry Collaborations is the number of industry collaborative publications for an entity (as described above) divided by the total number of documents for the same entity represented as a percentage.

Note: It is not possible to unify the data for every single affiliation of all the publications in InCites, therefore only those entities that have been unified will have an organization type. There will be corporate affiliations that have not yet been unified, will not have an organization type and therefore will not be identified as an industrial collaboration. Thomson Reuters has made considerable efforts to identify the largest corporations and unify them, however this tends to focus on large multinational corporations and may lead to regional bias. In the future, as more organizations are unified, the number of industry collaborative papers is expected to increase.

## HIGHLY CITED PAPERS

The Highly Cited Papers indicator shows the volume of papers that are classified as highly cited in the Thomson Reuters service known as Essential Science IndicatorsSM (ESI). ESI is a separate service also hosted on the InCites platform and should not be confused with the subject schema of the same name.

Highly cited papers in ESI are the top one percent in each of the 22 subject areas represented in the Web of Science, per year. They are based on the most recent 10 years of publications. Highly Cited Papers are considered to be indicators of scientific excellence and top performance and can be used to benchmark research performance against field baselines worldwide. Although Highly Cited Papers are synonymous with % Documents in the Top 1% in InCites, they are not the identical because of differences in subject schema, time period and document type.

## % HIGHLY CITED PAPERS

The % Highly Cited Papers indicator shows the number of ESI Highly Cited Papers for an entity (paper, author, institution, country, journal and field) divided by the total number of documents produced by the given entity, represented as a percentage.

It is a measure of excellence and can show what percentage of an institutions output is among the most impactful papers in the world.

## % HOT PAPERS

As with Highly Cited Papers, a Hot Paper is a designation of a paper within ESI.

The Hot Papers indicator shows the number papers in the top 0.1 percent worldwide that were published in the last two years, based on citation activity in the most recent two month period, per ESI subject field. Hot Papers are indicators of emerging scientific impact as they reveal which recent papers are currently attracting the attention of the global research community.

The % Hot Papers indicator shows the number of Hot Papers for an entity (author, institution, country and journal) divided by the total number of documents produced by the given research entity times 100.

## ESI MOST CITED

The ESI Most Cited indicator is only for organizations, and shows whether an institution is ranked within the top one percent worldwide, in terms of numbers of citations, based on 10 years of publications. The ESI Most Cited indicator is calculated at the institutional level and is normalized for each of the 22 ESI research areas. ESI Most Cited institutions have to be within the top one percent in at least one of the 22 ESI research areas.

# APPENDIX

**Tables of Indicators**

**Comparison of Indicators with Legacy Version of InCites**

**GIPP to Web of Science Subject Schema Mapping Table**

**Additional Subject Schema Descriptions**

**Document Type List**

## INDICATORS TABLES

### List of Indicators Available in InCites 2.1

| INDICATOR | DESCRIPTION |
|---|---|
| Organization Type | Type of organizations (Academic, Corporate, Government, Health, Research Council, Research Institute) |
| THE Ranked | Organizations that are included in the Times Higher Education World University Ranking (top 400) |
| ESI Most Cited | Entities that are included in ESI (top 1% for authors and institutions, top 50% for nations and journals) |
| Web of Science Documents | Number of Web of Science Documents |
| Times Cited | Number of times this set of publications has been cited |
| % Documents Cited | Percentage of publications that have been cited one or more times |
| Citation impact | Average (mean) number of citations per paper |
| Normalized Citation Impact | Citation impact (citations per paper) normalized for subject, year and document type |
| Journal Normalized Citation Impact | Citation impact (citations per paper) normalized for journal, year and document type |
| Average Percentile | Average (mean) of the percentiles for all publications |
| % Documents in Top 1% | Percentage of publications in the top 1% based on citations by category, year, and document type |
| % Documents in Top 10% | Percentage of publications in the top 10% based on citations by category, year, and document type |
| International Collaborations | Papers that contain one or more international co-authors |
| Highly Cited Papers | Papers (articles and reviews) that rank in the top 1% by citations for field and year |
| % Highly Cited Papers | Percentage of publications that are assigned as Highly Cited in ESI (top 1% by citations for field and year) |
| % Hot Papers | Percentage of publications that are assigned as Hot Papers in ESI (top .1% by citations for field and age) |
| International Collaborations | Papers that contain one or more international co-authors |
| % International Collaborations | Percentage of publications that have international co-authors |
| % Industry Collaborations | Percentage of publications that have co-authors from industry |
| Impact Relative to World | Citation impact of the set of publications as a ratio of world average (not normalized for subject) |
| h-index | H-index of the set of publications |

## Comparison of Indicator Labels Between Legacy Version of InCites and InCites 2.1

| INCITES LEGACY | NEXT GENERATION INCITES |
|---|---|
| Average Citations | Citation impact |
| % Documents in 99th Percentile | % Documents in Top 1% |
| % Documents in 90th Percentile | % Documents in Top 10% |
| Journal Actual/Expected Citations | Journal Normalized Citation Impact |
| Highly Cited (ESI) | Highly Cited Papers |

## List of Indicators Planned for Future Release (subject to change)

| INDICATOR | DESCRIPTION |
|---|---|
| Disciplinarity Index | A measure of the concentration of a set of papers over a set of categories |
| Interdisciplinarity Index | An entropy measure of the dispersion of papers over the categories |
| # ESI Most Cited Categories | # ESI categories in which an entity appears |
| Average Authors Per Document | Count of unique authors |
| % Collaborations | Percent of documents that are collaborative |
| Average Organizations Per Document | Count of unique organizations per document |
| Journal Impact Factor | The Journal Impact Factor |
| Journal Quartile | JCR journal quartiles of a journal |
| Journal Rank in Category | Overall numeric rank for a journal in a category |
| Average Countries/Territories Per Document | Count of unique number of countries per document |
| Impact Relative to Country | Impact in a particular subject area relative to the impact for the entire country/territory in all subject areas |
| Impact Relative to Institution | Impact of an institution in a particular subject area relative to the impact of the institution in all subject areas |

| GIPP DISCIPLINE | WEB OF SCIENCE CATEGORY |
|---|---|
| Arts & Humanities | History & Philosophy of Science |
| Arts & Humanities | Humanities, Multidisciplinary |
| Arts & Humanities | Language & Linguistics |
| Arts & Humanities | Linguistics |
| Arts & Humanities | Literary Reviews |
| Arts & Humanities | Literary Theory & Criticism |
| Arts & Humanities | Literature |
| Arts & Humanities | Literature, African, Australian, Canadian |
| Arts & Humanities | Literature, American |
| Arts & Humanities | Literature, British Isles |
| Arts & Humanities | Literature, German, Dutch, Scandinavian |
| Arts & Humanities | Literature, Romance |
| Arts & Humanities | Literature, Slavic |
| Arts & Humanities | Medieval & Renaissance Studies |
| Arts & Humanities | Music |
| Arts & Humanities | Philosophy |
| Arts & Humanities | Poetry |
| Arts & Humanities | Religion |
| Arts & Humanities | Theater |
| Clinical, Pre-Clinical & Health | Allergy |
| Clinical, Pre-Clinical & Health | Anesthesiology |
| Clinical, Pre-Clinical & Health | Cardiac & Cardiovascular Systems |
| Clinical, Pre-Clinical & Health | Clinical Neurology |
| Clinical, Pre-Clinical & Health | Critical Care Medicine |
| Clinical, Pre-Clinical & Health | Dentistry, Oral Surgery & Medicine |
| Clinical, Pre-Clinical & Health | Dermatology |
| Clinical, Pre-Clinical & Health | Emergency Medicine |
| Clinical, Pre-Clinical & Health | Endocrinology & Metabolism |
| Clinical, Pre-Clinical & Health | Gastroenterology & Hepatology |
| Clinical, Pre-Clinical & Health | Geriatrics & Gerontology |
| Clinical, Pre-Clinical & Health | Health Care Sciences & Services |
| Clinical, Pre-Clinical & Health | Hematology |
| Clinical, Pre-Clinical & Health | Infectious Diseases |
| Clinical, Pre-Clinical & Health | Integrative & Complementary Medicine |
| Clinical, Pre-Clinical & Health | Medical Ethics |
| Clinical, Pre-Clinical & Health | Medical Informatics |
| Clinical, Pre-Clinical & Health | Medical Laboratory Technology |
| Clinical, Pre-Clinical & Health | Medicine, General & Internal |
| Clinical, Pre-Clinical & Health | Medicine, Legal |
| Clinical, Pre-Clinical & Health | Medicine, Research & Experimental |

| GIPP DISCIPLINE | WEB OF SCIENCE CATEGORY |
|---|---|
| Clinical, Pre-Clinical & Health | Neuroimaging |
| Clinical, Pre-Clinical & Health | Nursing |
| Clinical, Pre-Clinical & Health | Nutrition & Dietetics |
| Clinical, Pre-Clinical & Health | Obstetrics & Gynecology |
| Clinical, Pre-Clinical & Health | Oncology |
| Clinical, Pre-Clinical & Health | Ophthalmology |
| Clinical, Pre-Clinical & Health | Orthopedics |
| Clinical, Pre-Clinical & Health | Otorhinolaryngology |
| Clinical, Pre-Clinical & Health | Pathology |
| Clinical, Pre-Clinical & Health | Pediatrics |
| Clinical, Pre-Clinical & Health | Peripheral Vascular Disease |
| Clinical, Pre-Clinical & Health | Pharmacology & Pharmacy |
| Clinical, Pre-Clinical & Health | Primary Health Care |
| Clinical, Pre-Clinical & Health | Psychiatry |
| Clinical, Pre-Clinical & Health | Public, Environmental & Occupational Health |
| Clinical, Pre-Clinical & Health | Radiology, Nuclear Medicine & Medical Imaging |
| Clinical, Pre-Clinical & Health | Rehabilitation |
| Clinical, Pre-Clinical & Health | Respiratory System |
| Clinical, Pre-Clinical & Health | Rheumatology |
| Clinical, Pre-Clinical & Health | Sport Sciences |
| Clinical, Pre-Clinical & Health | Substance Abuse |
| Clinical, Pre-Clinical & Health | Surgery |
| Clinical, Pre-Clinical & Health | Transplantation |
| Clinical, Pre-Clinical & Health | Tropical Medicine |
| Clinical, Pre-Clinical & Health | Urology & Nephrology |
| Engineering & Technology | Acoustics |
| Engineering & Technology | Automation & Control Systems |
| Engineering & Technology | Computer Science, Artificial Intelligence |
| Engineering & Technology | Computer Science, Cybernetics |
| Engineering & Technology | Computer Science, Hardware & Architecture |
| Engineering & Technology | Computer Science, Information Systems |
| Engineering & Technology | Computer Science, Interdisciplinary Applications |
| Engineering & Technology | Computer Science, Software Engineering |
| Engineering & Technology | Computer Science, Theory & Methods |
| Engineering & Technology | Construction & Building Technology |
| Engineering & Technology | Energy & Fuels |
| Engineering & Technology | Engineering, Aerospace |
| Engineering & Technology | Engineering, Biomedical |
| Engineering & Technology | Engineering, Chemical |
| Engineering & Technology | Engineering, Civil |

| GIPP DISCIPLINE | WEB OF SCIENCE CATEGORY |
|---|---|
| Engineering & Technology | Engineering, Electrical & Electronic |
| Engineering & Technology | Engineering, Environmental |
| Engineering & Technology | Engineering, Geological |
| Engineering & Technology | Engineering, Industrial |
| Engineering & Technology | Engineering, Manufacturing |
| Engineering & Technology | Engineering, Marine |
| Engineering & Technology | Engineering, Mechanical |
| Engineering & Technology | Engineering, Multidisciplinary |
| Engineering & Technology | Engineering, Ocean |
| Engineering & Technology | Engineering, Petroleum |
| Engineering & Technology | Ergonomics |
| Engineering & Technology | Imaging Science & Photographic Technology |
| Engineering & Technology | Information Science & Library Science |
| Engineering & Technology | Instruments & Instrumentation |
| Engineering & Technology | Materials Science, Biomaterials |
| Engineering & Technology | Materials Science, Ceramics |
| Engineering & Technology | Materials Science, Characterization & Testing |
| Engineering & Technology | Materials Science, Composites |
| Engineering & Technology | Materials Science, Multidisciplinary |
| Engineering & Technology | Materials Science, Paper & Wood |
| Engineering & Technology | Materials Science, Coatings & Films |
| Engineering & Technology | Materials Science, Textiles |
| Engineering & Technology | Mechanics |
| Engineering & Technology | Metallurgy & Metallurgical Engineering |
| Engineering & Technology | Microscopy |
| Engineering & Technology | Mining & Mineral Processing |
| Engineering & Technology | Nuclear Science & Technology |
| Engineering & Technology | Operations Research & Management Science |
| Engineering & Technology | Remote Sensing |
| Engineering & Technology | Robotics |
| Engineering & Technology | Telecommunications |
| Engineering & Technology | Transportation |
| Engineering & Technology | Transportation Science & Technology |
| Life Sciences | Agricultural Economics & Policy |
| Life Sciences | Agricultural Engineering |
| Life Sciences | Agriculture, Dairy & Animal Science |
| Life Sciences | Agriculture, Multidisciplinary |
| Life Sciences | Agronomy |
| Life Sciences | Anatomy & Morphology |
| Life Sciences | Andrology |

| GIPP DISCIPLINE | WEB OF SCIENCE CATEGORY |
|---|---|
| Life Sciences | Behavioral Sciences |
| Life Sciences | Biochemical Research Methods |
| Life Sciences | Biochemistry & Molecular Biology |
| Life Sciences | Biodiversity Conservation |
| Life Sciences | Biology |
| Life Sciences | Biophysics |
| Life Sciences | Biotechnology & Applied Microbiology |
| Life Sciences | Cardiac & Cardiovascular Systems |
| Life Sciences | Cell & Tissue Engineering |
| Life Sciences | Cell Biology |
| Life Sciences | Developmental Biology |
| Life Sciences | Ecology |
| Life Sciences | Endocrinology & Metabolism |
| Life Sciences | Entomology |
| Life Sciences | Environmental Sciences |
| Life Sciences | Evolutionary Biology |
| Life Sciences | Fisheries |
| Life Sciences | Food Science & Technology |
| Life Sciences | Forestry |
| Life Sciences | Gastroenterology & Hepatology |
| Life Sciences | Genetics & Heredity |
| Life Sciences | Horticulture |
| Life Sciences | Immunology |
| Life Sciences | Limnology |
| Life Sciences | Marine & Freshwater Biology |
| Life Sciences | Mathematical & Computational Biology |
| Life Sciences | Microbiology |
| Life Sciences | Multidisciplinary Sciences |
| Life Sciences | Mycology |
| Life Sciences | Neurosciences |
| Life Sciences | Oncology |
| Life Sciences | Ornithology |
| Life Sciences | Paleontology |
| Life Sciences | Parasitology |
| Life Sciences | Pathology |
| Life Sciences | Peripheral Vascular Disease |
| Life Sciences | Pharmacology & Pharmacy |
| Life Sciences | Physiology |
| Life Sciences | Plant Sciences |

| GIPP DISCIPLINE | WEB OF SCIENCE CATEGORY |
|---|---|
| Life Sciences | Reproductive Biology |
| Life Sciences | Soil Science |
| Life Sciences | Toxicology |
| Life Sciences | Transplantation |
| Life Sciences | Veterinary Sciences |
| Life Sciences | Virology |
| Life Sciences | Zoology |
| Physical Sciences | Astronomy/Astrophysics |
| Physical Sciences | Chemistry, Analytical |
| Physical Sciences | Chemistry, Applied |
| Physical Sciences | Chemistry, Inorganic & Nuclear |
| Physical Sciences | Chemistry, Medicinal |
| Physical Sciences | Chemistry, Multidisciplinary |
| Physical Sciences | Chemistry, Organic |
| Physical Sciences | Chemistry, Physical |
| Physical Sciences | Crystallography |
| Physical Sciences | Electrochemistry |
| Physical Sciences | Geochemistry & Geophysics |
| Physical Sciences | Geography, Physical |
| Physical Sciences | Geology |
| Physical Sciences | Geosciences, Multidisciplinary |
| Physical Sciences | Mathematics |
| Physical Sciences | Mathematics, Applied |
| Physical Sciences | Mathematics, Interdisciplinary Applications |
| Physical Sciences | Meteorology & Atmospheric Science |
| Physical Sciences | Mineralogy |
| Physical Sciences | Multidisciplinary Sciences |
| Physical Sciences | Nanoscience & Nanotechnology |
| Physical Sciences | Oceanography |
| Physical Sciences | Optics |
| Physical Sciences | Physics, Applied |
| Physical Sciences | Physics, Atomic, Molecular & Chemical |
| Physical Sciences | Physics, Condensed Matter |
| Physical Sciences | Physics, Fluids & Plasmas |
| Physical Sciences | Physics, Mathematical |
| Physical Sciences | Physics, Multidisciplinary |
| Physical Sciences | Physics, Nuclear |

| GIPP DISCIPLINE | WEB OF SCIENCE CATEGORY |
|---|---|
| Physical Sciences | Physics, Particles & Fields |
| Physical Sciences | Polymer Science |
| Physical Sciences | Spectroscopy |
| Physical Sciences | Statistics & Probability |
| Physical Sciences | Thermodynamics |
| Physical Sciences | Water Resources |
| Social Sciences | Anthropology |
| Social Sciences | Archaeology |
| Social Sciences | Area Studies |
| Social Sciences | Business |
| Social Sciences | Business, Finance |
| Social Sciences | Communication |
| Social Sciences | Criminology & Penology |
| Social Sciences | Demography |
| Social Sciences | Economics |
| Social Sciences | Education & Educational Research |
| Social Sciences | Education, Scientific Disciplines |
| Social Sciences | Education, Special |
| Social Sciences | Environmental Studies |
| Social Sciences | Ethics |
| Social Sciences | Ethnic Studies |
| Social Sciences | Family Studies |
| Social Sciences | Geography |
| Social Sciences | Gerontology |
| Social Sciences | Health Policy & Services |
| Social Sciences | History of Social Sciences |
| Social Sciences | Hospitality, Leisure, Sport & Tourism |
| Social Sciences | Industrial Relations & Labor |
| Social Sciences | International Relations |
| Social Sciences | Law |
| Social Sciences | Linguistics |
| Social Sciences | Management |
| Social Sciences | Planning & Development |
| Social Sciences | Political Science |
| Social Sciences | Psychology |
| Social Sciences | Psychology, Applied |
| Social Sciences | Psychology, Biological |

| GIPP DISCIPLINE | WEB OF SCIENCE CATEGORY |
|---|---|
| Social Sciences | Psychology, Clinical |
| Social Sciences | Psychology, Developmental |
| Social Sciences | Psychology, Educational |
| Social Sciences | Psychology, Experimental |
| Social Sciences | Psychology, Mathematical |
| Social Sciences | Psychology, Multidisciplinary |
| Social Sciences | Psychology, Psychoanalysis |
| Social Sciences | Psychology, Social |
| Social Sciences | Public Administration |
| Social Sciences | Social Issues |
| Social Sciences | Social Sciences, Biomedical |
| Social Sciences | Social Sciences, Interdisciplinary |
| Social Sciences | Social Sciences, Mathematical Methods |
| Social Sciences | Social Work |
| Social Sciences | Sociology |
| Social Sciences | Urban Studies |
| Social Sciences | Women's Studies |

## REGIONAL SUBJECT SCHEMAS

**ANVUR:** The ANVUR category scheme corresponds to the official Academic Disciplines and Fields list for Italian Universities Research and Teaching (http://www.cun.it/comunicazione/academic-fields-and-disciplines-list.aspx). This mapping exercise was the result of a cooperative effort between ANVUR and Thomson Reuters and is foundational for a bibliometric analysis carried by ANVUR in 2013. The study is required to develop indicators of international standing in research in the Italian scientific fields across which ANVUR assesses the quality of university research.

**Australia FOR level 1 &2:** The Fields of Research classification scheme is based on a report developed by the Australian Bureau of Statistics and Statistics New Zealand, and funded in part by the Australian Research Council (http://www.arc.gov.au/pdf/ANZSRC_FOR_codes.pdf). The classification detailed in the Australian and New Zealand Standard Research Classification document was produced to classify and assess the research output of Australia and New Zealand.

**China SCADC Subject 77 narrow:** The China Subject Categories by State Council of China scheme is based on the degree-granting and academic training directory as announced and published by the Ministry of Education of the People's Republic of China (http://www.moe.gov.cn/publicfiles/business/htmlfiles/moe/moe_834/201104/116439.html).

**FAPESP (Brasil):** The FAPESP classification scheme was created by the São Paulo Research Foundation – FAPESP as part of an effort to evaluate the scientific and technological development of the Brazilian State of São Paulo (http://www.fapesp.br/en/).

**OECD:** The OECD Category scheme corresponds to the Revised Field of Science and Technology Classification of the Frascati Manual 2002 (OECD Publishing) (http://www.oecd.org/dataoecd/36/44/38235147.pdf).

**UK RAE 2008 & REF 2014:** The UK 2014 Research Excellence Framework (REF) Units of Assessment (UoA) category scheme is based on the 2014 REF conducted out of the UK. The REF UoA fall into 36 units of assessment. Details on the individual units can be found here: http://www.ref.ac.uk/panels/unitsofassessment/. Historical classifications for the 2008 Research Assessment Exercise are also available.

## Document Types

Article*
Abstract of Published Item
Art Exhibit Review
Bibliography
Biographical-Item
Book
Book Chapter**
Book Review
Chronology
Correction
Correction, Addition
Dance Performance Review
Database Review
Discussion
Editorial Material
Excerpt
Fiction, Creative Prose
Film Review
Hardware Review
Item About An Individual
Letter
Meeting Abstract
Meeting Summary
Music Performance Review
Music Score
Music Score Review
News Item
Note
Poetry
Proceedings Paper**
Record Review
Reprint
Review*
Script
Software Review
TV Review, Radio Review
TV Review, Radio Review, Video Review
Theater Review

* Articles and Reviews are the most commonly used document types for research evaluation.

** Proceedings Papers and Book Chapters (when published in a journal already indexed in SCIe, SSCI or A&HCI) will have dual document types and are also assigned as Articles.

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