Highly Cited Researchers 2018

Identifying top talent in the sciences and social sciences

Web of Science

Clarivate Analytics

Highly Cited Researchers are selected for their exceptional research performance, determined by production of multiple highly cited papers that rank in the top 1% by citations for field and year in *Web of Science*..

Of the world population of scientists and social scientists, the *Clarivate Analytics Highly Cited Researchers* are one in 1,000.

Overview

The *Clarivate Analytics* list of *Highly Cited Researchers* for 2018 identifies scientists and social scientists who have demonstrated significant influence through publication of multiple highly cited papers during the last decade.

Researchers are selected for their exceptional performance in one or more of 21 fields (those used in *Essential Science Indicators* (*ESI*)) or across several fields.

Approximately 6,000 researchers are named *Highly Cited Researchers* in 2018 — some 4,000 in specific fields and about 2,000 for Cross-Field performance. This is the first year that researchers with Cross-Field impact are identified.

The number of researchers selected in each field is based on the square root of the population of authors listed on the field's highly cited papers. The number of those with Cross-Field influence is determined by finding those who have influence equivalent to those identified in the 21 fields.

For the 2018 *Highly Cited Researchers* analysis, the papers surveyed were those published and cited during 2006-2016 and which at the end of 2016 ranked in the top 1% by citations for their *ESI* field and year (the definition of a highly cited paper).

The threshold number of highly cited papers for selection differs by field, with Clinical Medicine requiring the most and Agricultural Sciences, Economics & Business, and Pharmacology & Toxicology the fewest.

A second criterion for selection is a citation count to highly cited papers that ranks a researcher in the top 1% by total citations in an *ESI* field for the period surveyed.

To identify researchers with Cross-Field impact, highly cited paper and citation counts are normalized through fractional counting according to the thresholds required for each field (thus, each Clinical Medicine paper has a smaller unit fraction, or counts less, than one in Agricultural Sciences). Citation counts are treated in a similar manner. If the sum of the fractional publication counts and the sum of the fractional citation counts for a researcher equals 1.0 or more, the individual exhibits influence equivalent to a researcher selected in one or more *ESI* defined fields and is therefore selected as a *Highly Cited Researcher* for exceptional Cross-Field performance.

There is no unique or universally agreed concept of what constitutes extraordinary research performance and elite status in the sciences and social sciences. Consequently, no quantitative indicators will reveal a list that satisfies all expectations or requirements. Moreover, a different basis or formula for selection would generate a different — though likely overlapping — list of names. Thus, the absence of a name on our list cannot be interpreted as inferior performance or stature in comparison to those selected. To understand both the meaning and the inevitable limitations of our analytical approach, a careful reading of the methodology is required.

This year, for the first time, *Highly Cited Researchers* introduces a new Cross-Field category to identify researchers with substantial influence across several fields during 2006-2016

Who would contest that in the race for knowledge it is human capital that is most essential?

Talent — including intelligence, creativity, ambition, and social competence (where needed) — outpaces other capacities such as access to funding and facilities, although these are typically also necessities for success.

The advancement of scientific endeavor represents a critical activity for individual research institutions and entire nations.

The 2018 *Highly Cited Researchers* from *Clarivate Analytics* is a contribution to the identification of that small fraction of the researcher population that contributes disproportionately to extending the frontier and gaining for society knowledge and innovations that make the world healthier, richer, sustainable, and more secure."

Professor Kate McGrath, Deputy Vice-Chancellor (Research), University of Technology Sydney

"At UTS we strive for excellence in research and support our researchers to achieve their ambitions. A critical element of their success is that their research findings attract attention and create impact within the scholarly community and more broadly for society, with the latter being significantly aided by the former, establishing the reputation of both our researchers and UTS. Clarivate's Highly Cited Researchers List helps validate our researchers' success, confirming the standing of our researchers and their research in their fields of specialisation. As UTS continues to grow as a research-intensive university and the number of our researchers who are recognised on the HCR List increases we increase the ability for our researchers to use their research to deliver the greatest benefits for society and to aspire our researchers to aim higher.

Citations: Pellets of peer recognition

When Eugene Garfield created the first citation index for science in 1964, he did so to make searching the literature more efficient and effective. He called his creation an "association-of-ideas index."[1] And the connections he captured between topics, concepts, or methods discussed in indexed papers could be trusted, he argued, because they were based on the informed judgments of researchers themselves, as recorded in the references they appended to their papers.

Thus, the network of citations linking items in the *Web of Science* offers a cognitive road map for those seeking to follow the progression of a finding or advancement — a map sometimes leading to unexpected regions that can turn research in a new, promising direction.

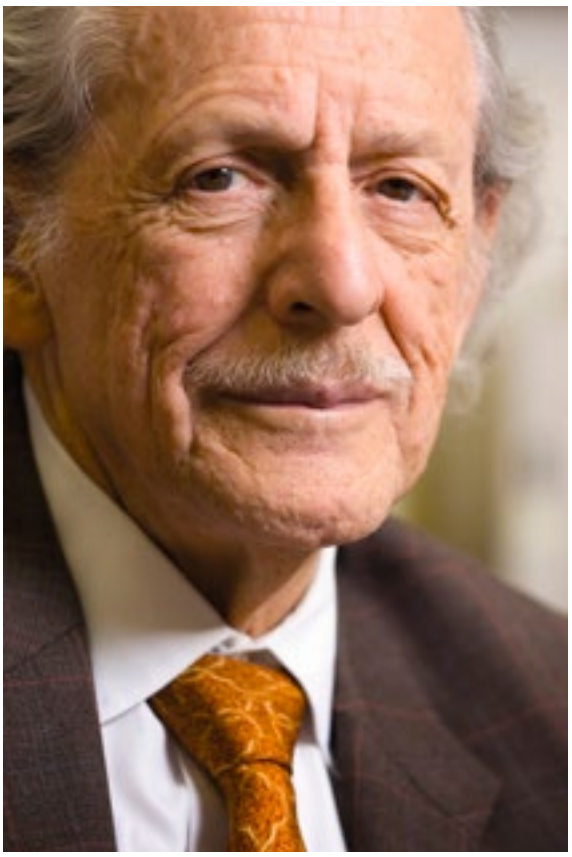
The *raison d'être* of the *Web of Science* is and always has been to help researchers find the information they need to carry out their investigations. And today *Clarivate Analytics* continues the work of Garfield by providing trusted insights and analytics to enable researchers to accelerate discovery.

A secondary use of a citation index for science evolved in the decade after its introduction: analysis of research performance. Citations, when tallied and especially at high frequency, reveal influence, utility, and often significance (quality, however, requires expert judgment). In 1972, the U.S. National Science Foundation included publication and citation data in its first Science Indicators report, which permitted comparisons of national research activity, focus, performance, and growth. In the 1980s, and in Europe particularly, publication and citation data were harvested and deployed for analysis of the research performance of universities.

New Public Management, introduced in universities in the United States, the United Kingdom, and Australia in the 1980s and 1990s, applied business management methods to academia and emphasized performance indicators and benchmarks. Academic scientists and social scientists, who previously roundly rejected evaluation by outsiders and insisted on traditional peer review, have gradually accepted bibliometric assessments because opportunities and rewards tied to such assessments have become institutionalized. Some researchers now list citation data on their CVs and websites, such as a total citation count or their h-index.

What citations represent and how to interpret citation statistics have been debated for many years. Some assert that they convey importance or popularity; others say they function largely as rhetorical devices and collectively create a socially constructed reality. The late Robert K. Merton, the 20th century's leading sociologist of science, called the citation "a pellet of peer recognition."[2] Citations, he said, were given as repayments of intellectual debt to others. He emphasized that citation was an essential part of normative behavior among researchers, that it was a considered, formal, and obligatory activity, one that included a moral imperative to cite others when appropriate. It is largely this perspective that supports citation analysis to identify research influence and success. In most fields, there is a moderate positive correlation between peer esteem and citation frequency of papers and people, shown in a variety of so-called validation studies.

> *"In the institution of science, the tail wags the proverbial dog. Highly Cited Researchers wield a vastly disproportionate influence on their fields.*[3]
>
> John N. Parker (U.S. National Science Foundation and Arizona State University), Christopher Lortie (York University), and Stefano Allesina (University of Chicago)



Eugene Garfield

Evaluating the research performance of individuals is the most contentious application of publication and citation data. Apart from being an emotionally charged exercise, difficulties include finding comparable researchers or research publications to enable fair comparisons, expecting that influence and impact can be detected quickly when it may require many years, and selecting appropriate indicators, ones in alignment with the agreed priorities and values of a research program. A specific hazard is false precision – making distinctions without any meaningful differences – which frequently arises in dealing with small numbers, so often encountered in analyzing the work of an individual rather than that of an institution or nation.

When, however, a researcher's record exhibits top-tier status quantitatively, demonstrated by the production of papers in the top 1%, top .1%, or even top .01% of a citation distribution, researchers can be more certain of having positive and reliable evidence that the individual under review has contributed something of utility and even significance. Having multiple contributions of this type increases confidence in attributing significant impact to a researcher's oeuvre.

The **application** of the data (or of the *ESI* designation "Highly Cited") — for example in the context of appointment or promotion decisions or in awarding research funds — demands informed interpretation. One should never rely on publication and citation data as a substitute for reading and assessing a researcher's publications — that is, for human judgement.

This perspective is consistent with two of the recommendations of the Leiden Manifesto (2015), namely:

> *"That quantitative evaluation should support qualitative, expert assessment," and that "assessment of individual researchers [should be based] on a qualitative judgement of their portfolio.*[4]

Beyond questions of evaluation, Garfield was fascinated by the power of citations to discriminate the typical from the truly exceptional researcher. The power-law nature of the citation distribution allows one to rapidly focus on a small number of top-end 'events,' including papers and people. Over the years he produced many lists of most-cited researchers in almost every field of inquiry. And he took special interest in using citation data to forecast Nobel Prize winners by identifying a group of researchers he termed 'of Nobel class.'[5]

The *Highly Cited Researchers* list from *Clarivate Analytics* extends Garfield's work in recognizing investigators whose citation records position them in the top strata of influence and impact. This year's list includes 17 Nobel laureates, including two announced this year: James P. Allison, Physiology or Medicine, and William D. Nordhaus, Economic Sciences. Also included are 56 *Clarivate Analytics Citation Laureates,* individuals who, through citation analysis, we have identified as researchers 'of Nobel class' and potential Nobel Prize recipients.

Credit where credit is due

Garfield, who passed away in February 2017, would be most gratified by those instances in which our designation of *Highly Cited* gave a deserving but underappreciated researcher the recognition and opportunity he or she deserved. Professor Eun-Jung Park, of Kyung Hee University, South Korea, who studies nanotoxicology and immunotoxicology, is an example.

"While I was aware that my research was being cited regularly, it was a huge surprise when an email appeared in my inbox telling me I had been announced as a Highly Cited Researcher for 2017. It's incredibly hard to describe how this moment felt in one word — I felt touched, elated, consoled and excited all at the same time — but most of all, I felt proud of myself.

Being recognized as a Highly Cited Researcher has triggered what can only be described as a miraculous trail of events for me over the last few months. Before the news, I was preparing to retire as a researcher. I suffer from gastritis, and I was in so much pain towards the end of last year that I was ready to give up for good — a decision I had not taken lightly. But receiving this award has spurred me on to continue with the work I've been doing. The enthusiasm I first felt as a researcher has now been reignited, and a whole new future lies ahead of me."[6]

Professor Eun-Jung Park, Kyung Hee University Graduate School of East-West Medicine Science, Seoul, South Korea

Highly Cited Researchers 2018

Highly Cited Researchers from *Clarivate Analytics* is an annual list recognizing influential researchers in the sciences and social sciences from around the world. The 2018 list contains 6,078 *Highly Cited Researchers*, 4,058 in 21 fields of the sciences and social sciences and 2,020 *Highly Cited Researchers* identified as having exceptional performance across several fields.*

The list focuses on contemporary research achievement: only highly cited papers in science and social sciences journals indexed in the *Web of Science Core Collection* during the 11-year period 2006-2016 were surveyed. Highly cited papers are defined as those that rank in the top 1% by citations for field and publication year. This percentile-based selection method removes the citation advantage of older papers relative to recently published ones, since papers are weighed against others in the same annual cohort.

The data derive from *Essential Science Indicators* (*ESI*), a component of *InCites*. The fields are also those employed in *ESI* — 21 broad fields defined by sets of journals and exceptionally, in the case of multidisciplinary journals such as *Nature* and *Science*, by a paper-by-paper assignment to a field based on an analysis of the cited references in the papers.

ESI fields

Agricultural Sciences
Biology & Biochemistry
Chemistry
Clinical Medicine
Computer Science
Economics & Business
Engineering
Environment/Ecology
Geosciences
Immunology
Materials Science
Mathematics
Microbiology
Molecular Biology & Genetics
Neuroscience & Behavior
Pharmacology & Toxicology
Physics
Plant & Animal Sciences
Psychiatry/Psychology
Social Sciences
Space Science

*The number of unique *Highly Cited Researchers* is 5,836, including 3,816 in the *ESI* fields and 2,020 in the Cross-Field category. The analysis reported here is based on appearances of *Highly Cited Researchers* in specific fields, and a small number are selected in more than one *ESI* field.

Researchers who, within an *ESI*-defined field, publish highly cited papers are judged to be influential, so the production of multiple top 1% papers is interpreted as a mark of exceptional impact. Relatively younger researchers are more likely to emerge in such an analysis than in one dependent on total citations over many years. To be able to recognize early and mid-career as well as senior researchers is one of the goals in generating *Highly Cited Researchers* lists. The determination of how many researchers to include in the list for each field is based on the population of each field, as represented by the number of disambiguated author names on all highly cited papers in that field, 2006-2016. The *ESI* fields vary greatly in size, with Clinical Medicine being the largest and Agricultural Sciences, Economics & Business, and Pharmacology & Toxicology the smallest in terms of researchers and number of highly cited papers produced.

One of two criteria for selection is that the researcher must have enough citations to his or her highly cited papers to rank among all authors in the top 1% by total citations in the *ESI* field in which that person is considered. Authors of highly cited papers who meet this criterion in a field are ranked by number of such papers, and the threshold for inclusion is determined using the square root of the population represented by the number of disambiguated authors names on the highly cited papers in a field. All who published highly cited papers at the threshold level are admitted to the list, even if the final list then exceeds the number given by the square root calculation.

In addition, and as a concession to the somewhat arbitrary cut-off, any researcher with one fewer highly cited paper than the threshold number is also admitted to the list if total citations to his or her highly cited papers rank that individual in the top 50% by total citations of those at the threshold level or higher. The justification for this adjustment is that it seems to work well in identifying influential researchers, in the judgment of *Clarivate Analytics* citation analysts.

Of course, there are many highly accomplished and influential researchers who are not recognized by the method described above and whose names do not appear in the 2018 list. This outcome would hold no matter what specific method were chosen for selection. Each measure or set of indicators, whether total citations, h-index, relative citation impact, mean percentile score, etc., accentuates different types of performance and achievement. Here we confront what many expect from such lists, but what is unobtainable: that there is some optimal or ultimatemethod of measuring performance. The only reasonable approach to interpreting a list of top researchers such as ours is to fully understand the method behind the data and results, and why the method is used. With that knowledge, in the end, the results may be judged by users as relevant or irrelevant to their needs or interests.

Professor Nicholas Fisk, Deputy Vice Chancellor (Research), UNSW Sydney

“Release of the Highly Cited Researcher list by Clarivate Analytics is a major annual event at UNSW. It is internationally respected, and now even more influential with the new cross field category embracing interdisciplinary research. HCR status is testimony to the pinnacle of achievement of our 19 selected academics in 20 fields, and such is its prestige, we recognise annually those academics who make the list at our celebration of research excellence.

New: Identifying researchers with Cross-Field impact

This year, for the first time, *Highly Cited Researchers* introduces a new Cross-Field category to identify researchers with substantial influence across several fields during 2006-2016. As mentioned above, 2,020 researchers with Cross-Field impact now join 4,058 who have been selected in one or more of 21 broad *ESI* fields. An increase of 50% is substantial, but 6,078 researchers still represents a very small fraction of all scientists and social scientists actively publishing today.

Since introducing *Highly Cited Researchers* in 2014, *Clarivate Analytics* has received the suggestion from many that limiting the methodology for selection to only those with a required number of highly cited papers in a single field, as defined in *ESI*, discriminates against researchers who publish highly cited papers in several fields but not enough in any one field to be chosen. We responded to this concern. In line with recommendations on best practice, we want to ensure that any metrics or analyses that we produce are structured and presented in a responsible manner. Extending the identification of *Highly Cited Researchers* to cross-disciplinary work fulfills that goal.

The challenge for us was finding a method that took account of the different threshold number of highly cited papers in each field so that those contributing papers in several fields could be compared in an equal manner with those selected in one or more *ESI* fields. The solution chosen was to fractionally count the credit for each highly cited paper such that a paper in a field with a high threshold number of papers was weighted less than a paper in a field with a lower threshold number of papers.

The fictional researcher Joseph Savant *(Table below)* published 15 highly cited papers in the period 2006-2016 in four *ESI* fields. Seven papers in Field 6, with a threshold number of eight for selection, earned Savant a credit of .875 (or 7/8ths). Three papers in Field 14, with a threshold number of six for selection, were worth .5. The sum of the fractional paper counts in each field yielded a total Cross-Field paper score of 1.67. A score of 1 or more indicates that the individual achieved equivalent impact to a researcher chosen in a specific *ESI* field.

Example of Cross-Field selection methodology

ESI field	First name	Last name	Number of HCPs	Field paper threshold	Field paper score	Citation to HCPs	Field citation threshold	Field citation score
Field 3	Joseph	Savant	1	22	0.045	98	1857	0.053
Field 6	Joseph	Savant	7	8	0.875	2937	946	3.105
Field 14	Joseph	Savant	3	6	0.500	663	676	0.981
Field 16	Joseph	Savant	4	16	0.250	3397	2223	1.528
Cross-Field	**Joseph**	**Savant**			**1.670**			5.667

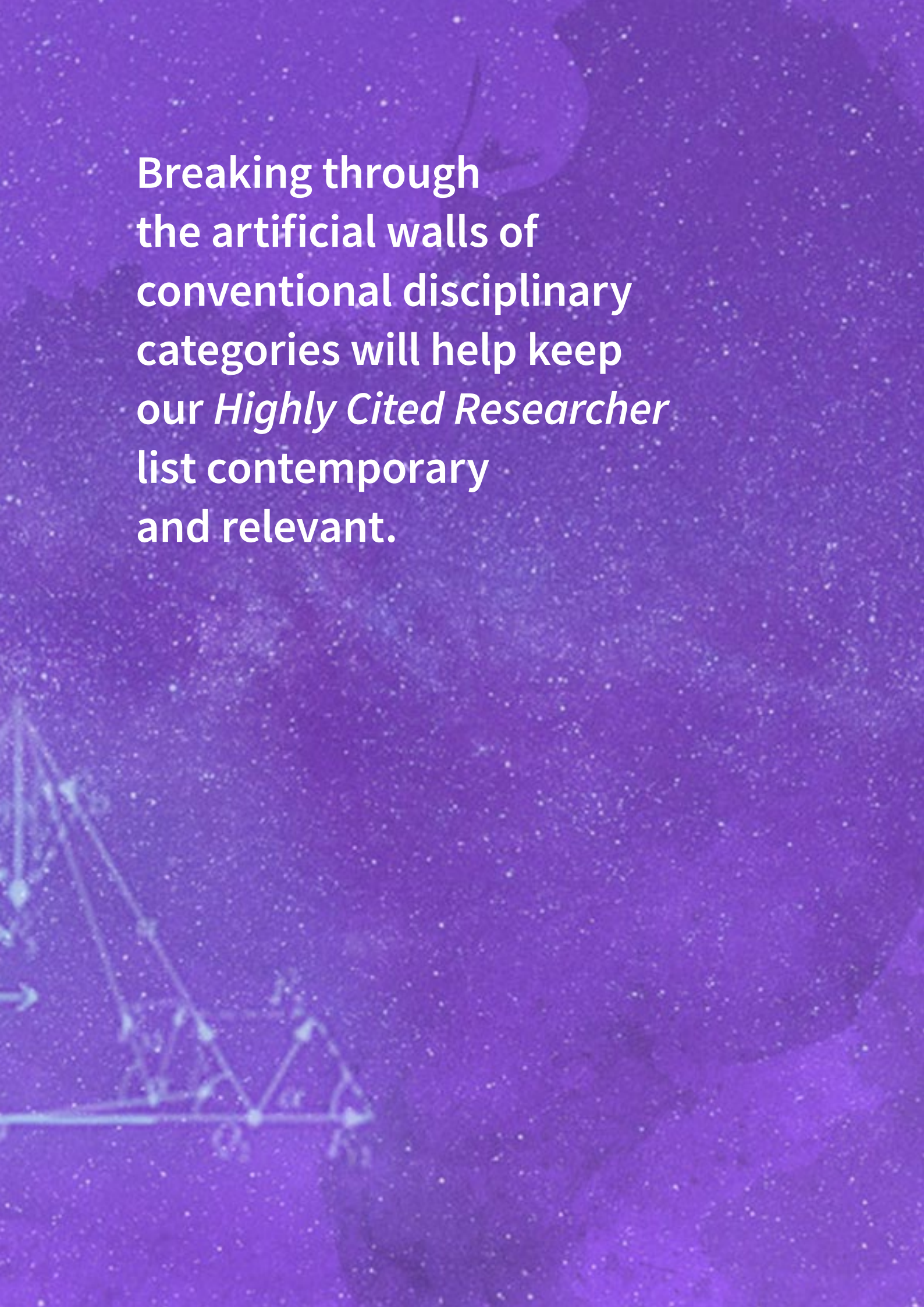
The second criterion for selection as a *Highly Cited Researcher* is enough citations to rank in the top 1% by citations for a field. Again, citations in different fields were fractionated in a similar manner to the treatment of papers. In the example above, Professor Savant earned more than five times the number of citations needed for selection as an influential Cross-Field researcher. Both criteria had to be met for selection as a Cross-Field *Highly Cited Researcher*, just as required for selection in one or more *ESI* fields.

Traditional field definitions are useful in some contexts but less so in others. Today, an immunologist may identify herself as a biochemist and a molecular biologist. Another researcher may be hard pressed to say whether he is a chemist, materials scientist, or engineer. Breaking through the artificial walls of conventional disciplinary categories will help keep our *Highly Cited Researcher* list contemporary and relevant. Moreover, as frontier areas of research are frequently interdisciplinary, it is even more important to identify scientists and social scientists working and contributing substantially at the Cross-Field leading edge.

The 6,078 *Highly Cited Researchers* of 2018 are unevenly distributed by field, in accordance with the size of each. The table to the right summarizes the number of researchers in each *ESI* field and in the new Cross-Field category.

> *"Is there a formula for managing discovery making? …. First, and most important, are the people involved.*[7]
>
> The late Nobel Laureate Ahmed H. Zewail, California Institute of Technology

ESI field	Number of *Highly Cited Researchers*
Agricultural Sciences	158
Biology & Biochemistry	254
Chemistry	261
Clinical Medicine	497
Computer Science	96
Economics & Business	96
Engineering	204
Environment/Ecology	185
Geosciences	184
Immunology	146
Materials Science	208
Mathematics	90
Microbiology	148
Molecular Biology & Genetics	249
Neuroscience & Behavior	197
Pharmacology & Toxicology	161
Physics	211
Plant & Animal Sciences	223
Psychiatry/Psychology	157
Social Sciences, General	211
Space Science	122
Total	**4,058**
Cross-Field	2,020
Grand Total	**6,078**


Breaking through
the artificial walls of
conventional disciplinary
categories will help keep
our *Highly Cited Researcher*
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The following analysis is based on primary researcher affiliations, as specified by the *Highly Cited Researchers* themselves.

The United States is the institutional home for 2,639 of the 2018 *Highly Cited Researchers*, which amounts to 43.4% of the group. By contrast, of all papers indexed in the *Web of Science* for 2006-2016 the percentage with a U.S. author or co-author was 27.6%. The second ranked country / region is the United Kingdom with 546 *Highly Cited Researchers*, or 9.0%. Mainland China follows, with 482 researchers, or 7.9% (adding Hong Kong with 51 and Macau with 5 raises the total to 538, nearly that of the UK). Next, all with 100 or more *Highly Cited Researchers*, we list Germany (356), Australia (245), The Netherlands (189), Canada (166), France (157), Switzerland (133), and Spain (115).

The *Highly Cited Researchers* represent more than 60 regions, but 82.7% of them are from just 10 and 70.2% from the first five, a remarkable concentration of top talent.

While each region pursues its own portfolio of interests, often reflected in numbers of *Highly Cited Researchers* in different fields, some regions appear to follow less traditional, more transdisciplinary lines of investigation, at least if their scientific elite is representative. Across the group, there are two *Highly Cited Researchers* in the 21 *ESI* fields for each in the Cross-Field category. We might expect, therefore, to see this 2:1 ratio for each region. Not so. Instead of a third in the Cross-Field category, more than half of the *Highly Cited Researchers* from Sweden (53.2%) and Austria (52.5%) are recognized for high impact research spanning several areas. Nations with more than 40% of their *Highly Cited Researchers* selected in the Cross-Field category are Singapore (47.4%), Denmark (47.2%), Mainland China (42.7%), and South Korea (42.1%). This prompts the question: style or strategy?

Three regions have shown a notable increase in both number and percentage of *Highly Cited Researchers* since 2014: Singapore, Mainland China, and Australia. The following figures are based on the 21 *ESI* fields only, since there are no trends data for researchers in the Cross-Field category.

In 2014, we counted 17 *Highly Cited Researchers* from Singapore and this year 40 were named in the 21 *ESI* fields, for an increase of 135.3%. Mainland China increased by 126.2%, based on 122 researchers in 2014 and 276 in 2018 represented in the *ESI* fields. Australia was the third strongest performer, exhibiting growth of 112.5%, from 80 researchers named in 2014to 170 in the *ESI* fields in 2018.

By contrast, Japan declined 34.7% in number of *Highly Cited Researchers* named in the *ESI* fields, from 98 named in 2014 to 64 this year. Even when one includes the Cross-Field researchers, the total for Japan in 2018 is 90, so there has been an absolute decline in *Highly Cited Researchers* for the nation.

Rank	Country / region	Number HCRs	Percent HCRs
1	United States	2,639	43.4
2	United Kingdom	546	9.0
3	China Mainland	482	7.9
4	Germany	356	5.9
5	Australia	245	4.0
6	The Netherlands	189	3.1
7	Canada	166	2.7
8	France	157	2.6
9	Switzerland	133	2.2
10	Spain	115	1.9

The university with the greatest number of *Highly Cited Researchers* is Harvard, with 186. Other top-ranked universities are, in order, Stanford (100), University of California Berkeley (64), Oxford (59), Cambridge (53), Washington University in St. Louis (51), University of California Los Angeles (47), University of California San Diego (47), MIT (45), University of Pennsylvania (44), and Duke (44). The total for all campuses of the University of California is 267, the most of any organization or system.

Among governmental and other types of research organizations, the US National Institutes of Health (including all individual institutes) ranks first, with 148 *Highly Cited Researchers*. Next is the Chinese Academy of Sciences (99), the Max Planck Society (76), the Broad Institute (44), NIH's NIAID (39), and Brigham & Women's Hospital (38).

Table continues on next page

Institutions*	Country / region	Number HCRs	Institutions	Nation	Number HCRs
Harvard Univ	United States	186	Univ Edinburgh	United Kingdom	36
Natl Inst Hlth USA	United States	148	Northwestern Univ	United States	36
Stanford Univ	United States	100	Cornell Univ	United States	35
Chinese Acad Sciences	China Mainland	99	Univ North Carolina	United States	34
Max Planck Society	Germany	76	Erasmus Univ Rotterdam	Netherlands	34
Univ Calif Berkeley	United States	64	Univ British Columbia	Canada	33
Univ Oxford	United Kingdom	59	Univ Melbourne	Australia	33
Univ Cambridge	United Kingdom	53	Mayo Clinic	United States	32
Washington Univ St Louis	United States	51	Yale Univ	United States	31
Univ Calif Los Angeles	United States	47	King Saud University	Saudi Arabia	29
Univ Calif San Diego	United States	47	Imperial College London	United Kingdom	29
MIT	United States	45	European Bioinformat Institute	United Kingdom	29
Broad Institute	United States	44	Univ Toronto	Canada	28
Univ Penn	United States	44	Univ Queensland	Australia	28
Duke Univ	United States	44	Univ Copenhagen	Denmark	28
King Abdulaziz Univ	Saudi Arabia	43	Natl Univ Singapore	Singapore	28
Univ Washington	United States	42	Univ Calif San Francisco	United States	28
Johns Hopkins Univ	United States	41	Univ Colorado	United States	28
Univ College London	United Kingdom	41	Swiss Fed Inst Technol Lausanne	Switzerland	27
Nanyang Technol Univ	Singapore	40	VU Univ Amsterdam	Netherlands	26

Table continued

Institutions*	Country / region	Number HCRs	Institutions	Nation	Number HCRs
Nanyang Technol Univ	Singapore	40	VU Univ Amsterdam	Netherlands	26
Natl Inst Allergy Infectious Dis (NIAID)	United States	39	Tsing Hua Univ	China Mainland	26
Columbia Univ	United States	39	Mem Sloan Kettering Cancer Ctr	United States	26
Brigham & Women's Hospital	United States	38	Caltech	United States	25
Univ Michigan	United States	37	Univ Maryland	United States	25

Among the 4,058 researchers named as *Highly Cited* in the 21 *ESI* fields, 194, or 4.8%, appear in two *ESI* fields and only 24, or .6%, appear in three fields. (Cross-Field researchers qualify in only one category, or else they would have been chosen in one or more *ESI* fields.)

The table below lists the 24 *Highly Cited Researchers* named in three *ESI* fields. They are a group remarkable in both output and impact. The high level of performance of these two dozen warrants special recognition as citation superstars.

Name	Primary Affiliation	Fields
Pulickel M. Ajayan	Rice Univ, United States	Chemistry, Materials Science, Physics
Zhenan Bao	Stanford Univ, United States	Chemistry, Materials Science, Physics
Jinde Cao	Southeast Univ, China Mainland	Computer Science, Engineering, Mathematics
Yi Cui	Stanford Univ, United States	Chemistry, Materials Science, Physics
Hongjie Dai	Stanford Univ, United States	Chemistry, Materials Science, Physics
Michael Graetzel	Swiss Fed Inst Technol Lausanne, Switzerland	Chemistry, Materials Science, Physics
Vinod Kumar Gupta	King Abdulaziz Univ, Saudi Arabia	Chemistry, Engineering, Environment/Ecology
Albert Hofman	Harvard Univ, United States	Clinical Medicine, Molecular Biology, Social Sciences
Frank B. Hu	Harvard Univ, United States	Agricultural Sciences, Clinical Medicine, Social Sciences
Guido Kroemer	Univ Paris Descartes, France	Immunology, Molecular Biology, Pharmacology

Table continued

Name	Primary Affiliation	Fields
Robert S. Langer	MIT, United States	Biology & Biochemistry, Materials Sciences, Pharmacology
Gang Li	Hong Kong Polytech Univ, Hong Kong	Chemistry, Materials Science, Physics
Zhuang Liu	Suzhou Univ, China Mainland	Chemistry, Materials Science, Physics
Mohammad Khaja Nazeeruddin	Swiss Fed Inst Technol Lausanne, Switzerland	Chemistry, Materials Science, Physics
Markus Reichstein	Max Planck Soc, Germany	Agricultural Sciences, Environment/Ecology, Geosciences
Rodney S. Ruoff	Ulsan Natl Inst Sci Technol, South Korea	Chemistry, Materials Science, Physics
Henry J. Snaith	Univ Oxford, United Kingdom	Chemistry, Materials Science, Physics
Zhong Lin Wang	Georgia Inst Technol, United States	Chemistry, Materials Science, Physics
Walter C. Willett	Harvard Univ, United States	Agricultural Sciences, Clinical Medicine, Social Sciences
Richard K. Wilson	Washington Univ St Louis, United States	Biology & Biochemistry, Clinical Medicine, Molecular Biology
Younan Xia	Georgia Inst Technol, United States	Chemistry, Materials Science, Physics
Peidong Yang	Univ Calif Berkeley, United States	Chemistry, Materials Science, Physics
Yang Yang	Univ Calif Los Angeles, United States	Chemistry, Materials Science, Physics
Jiaguo Yu	Wuhan Univ Technol, China Mainland	Chemistry, Engineering, Materials Science

It is important to understand the difference between selection as a *Highly Cited Researcher* in the Cross-Field category and selection in more than one *ESI* field. Both classes of individuals have demonstrated significant research impact across fields. Cross-Field researchers, however, qualify for selection based on the sum of their highly cited papers and citations that meets a normalized threshold equivalent to selection in any one field whereas those named in multiple fields qualify outright in each field.

The foregoing is but a 'tasting' of the riches of *Highly Cited Researcher* data from *Clarivate Analytics*. In early 2019, we will publish a more detailed analysis of the 2018 data, with attention paid to national and regional activity and performance.

Researchers are selected for their exceptional performance in one or more of 21 fields or across several fields.

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