

Citation Laureates 2018

Web of Science



Of Nobel Class

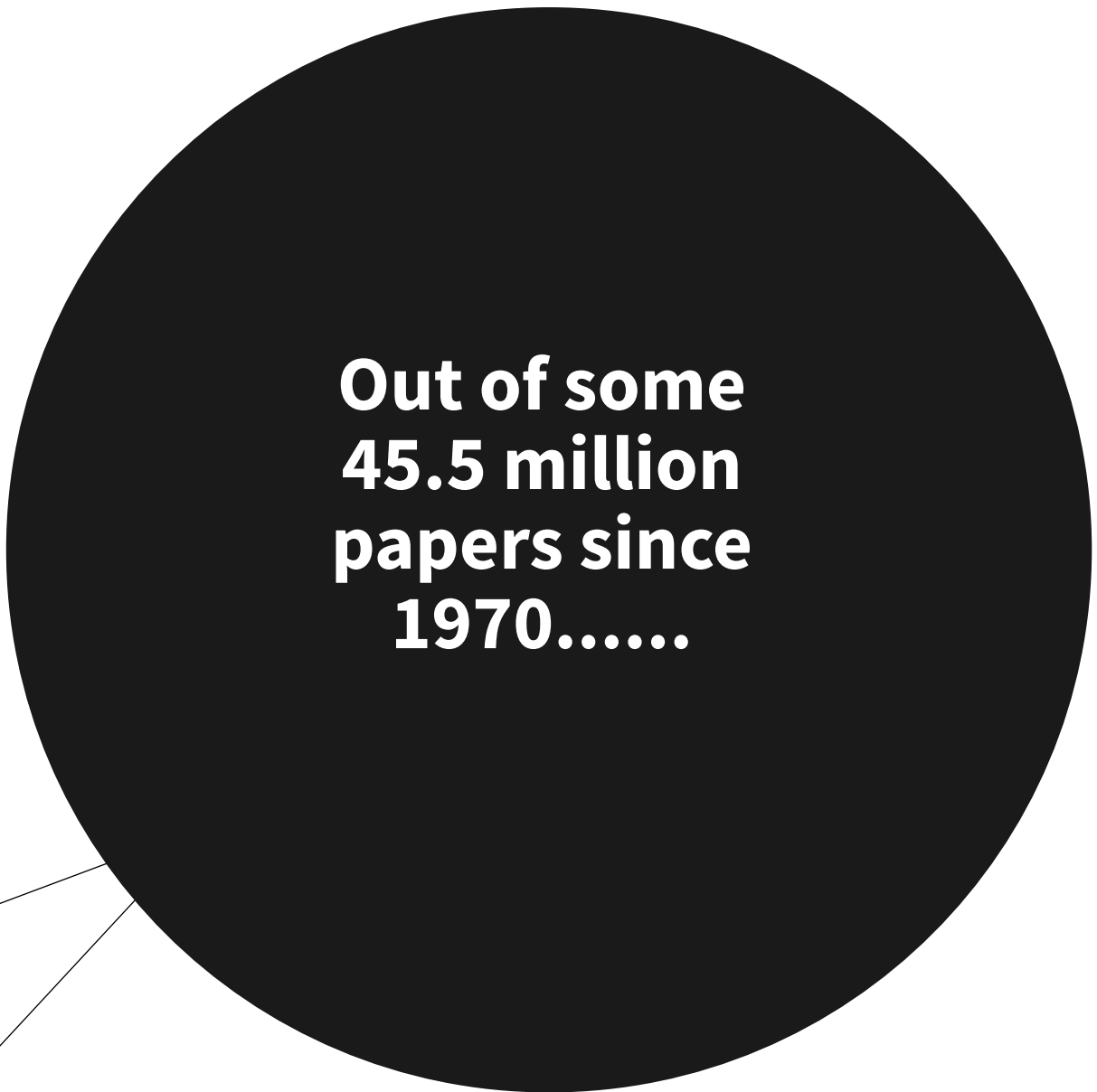
Clarivate Analytics announces the 2018 additions to its cohort of Citation Laureates – researchers whose work is deemed to be of Nobel stature, as attested by markedly high citation tallies recorded in the Web of Science citation index.

On October 1, 2018, the Nobel Assembly will vote to confer science's highest honor and announce the first of the 2018 Nobel Prizes. While this annual rite inspires worldwide speculation about possible winners, *Clarivate Analytics* has since 2002 brought special insight into identifying researchers likely to receive Nobel recognition.

In selecting these Nobel-class researchers, our analysts focus on data in *Web of Science*, an online resource reflecting the indexed contents of more than 34,000 scientific journals and other source materials. Of particular interest for us are authors of extremely highly cited papers (those cited more than 1,000 times in the *Web of Science Core Collection*). Each citation is a marker of influence, a “pellet of peer recognition,” as the late sociologist of science Robert K. Merton observed. He also noted that a citation is a repayment of an intellectual debt, since authors use citations to acknowledge the previous, foundational work on which they are building.

Papers cited more than 1,000 times are rarities. The table below shows the citation distribution of articles and proceedings papers indexed in the Web of Science from 1970 to 2018.

Citations	Number in range	Cumulative count
100,000 - 243,788	2	2
50,000 - 99,999	9	11
10,000 - 49,999	171	182
5,000 - 9,999	532	714
3,000 - 4,999	1,145	1,859
2,000 - 2,999	2,325	4,184
1,000 - 1,999	12,112	16,296
500 - 999	48,762	65,058
0 - 499	45,493,904	45,558,962



**Out of some
45.5 million
papers since
1970.....**

Only 16,300 (or .04 percent) have been cited 1,000 or more times.

Only 4,200 (or .01 percent) have been cited 2,000 or more times.

It is among this relatively small group of publications that the names of most past and future Nobel laureates may be found as authors.

In seeking *Citation Laureates*, our analysts refine their search for instances in which this highly cited work is clearly associated with a significant discovery or advance on a scale that the Nobel committees typically reward. Another pointer is provided by “predictor” prizes that often precede Nobel recognition – for example, the Lasker Awards in biomedicine. Information on receipt of prestigious awards supplements our quantitative, citation-based analysis – an approach unique to *Clarivate* in identifying Nobel-worthy scientists – with qualitative considerations arising from past peer-review decisions.

Candidates who meet these criteria are officially designated *Citation Laureates*.

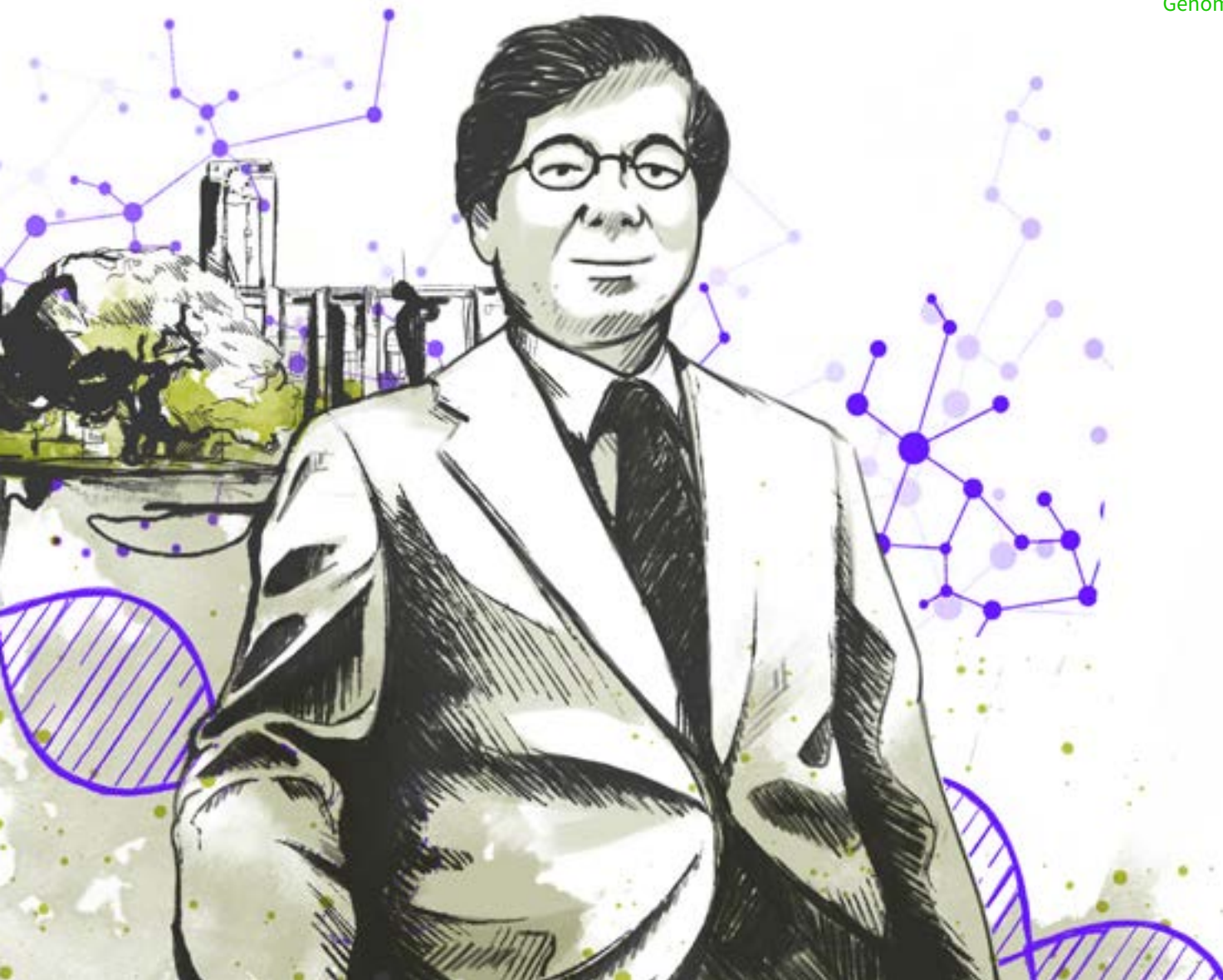
The 2018 class of honorees joins [a group that now numbers upwards of 300](#).

Of these, 46 have received a call to Stockholm, 27 within two years of being designated *Citation Laureates*. For the current selectees and those named in previous years, exactly when their call might come, or even if it will arrive in time to conform to Alfred Nobel’s stipulation that the prize shall honor only living recipients, is impossible to say. In many instances, a Nobel Prize calls out work that took place decades ago, and attempting to forecast precisely which achievement is due for a prize can be a challenge. Therefore, as in every year, this latest batch of *Citation Laureates* should not be considered literal predictions for the 2018 Nobel Prizes.

The Citation Laureates are of Nobel class and worthy candidates for selection in this or future years.



Physiology/Medicine



For contributions to bioinformatics, specifically for his development of the Kyoto Encyclopedia of Genes and Genomes (KEGG)

We recognize Minoru Kanehisa for contributions to bioinformatics, specifically for his development of the Kyoto Encyclopedia of Genes and Genomes (KEGG).

This database of protein pathways involved in gene expression allows genomicists and other researchers to collect, compare and interpret data on cellular processes – for example, those that underlie disease.

Minoru Kanehisa

Professor, Institute for Chemical Research,
Kyoto University, Kyoto, Japan

We recognize Solomon H. Snyder for his identification of receptors for many neurotransmitters and psychotropic agents, including brain receptors associated with opiates. His insights have been applied in the development of many common prescription drugs, such as compounds for pain control.

For his identification
of receptors for many
neurotransmitters
and psychotropic
agents

Solomon H. Snyder

Distinguished Service Professor of
Neuroscience, Pharmacology and
Psychiatry, Johns Hopkins University
School of Medicine, Baltimore, USA





For the discovery of vascular endothelial growth factor (VEGF), a key regulator of angiogenesis

We recognize Napoleone Ferrara for the discovery of vascular endothelial growth factor (VEGF), a key regulator of angiogenesis, the process in which new blood vessels are formed, both in healthy tissue and in cancerous cells. Ferrara's work has led to the development of drugs that inhibit blood-vessel growth in cancer and in blinding eye disorders such as age-related macular degeneration.

Napoleone Ferrara

Distinguished Professor of Pathology,
Department of Pathology, University
of California San Diego, San Diego, USA



Physics

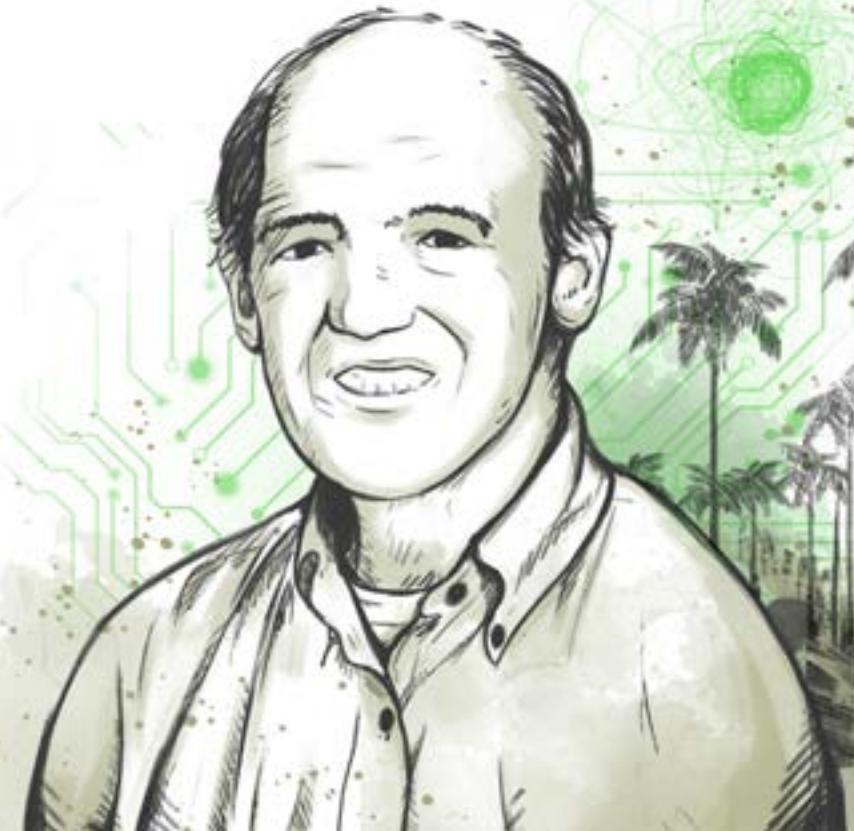
For observation of
the spin Hall effect
in semiconductors

We recognize David Awschalom and Arthur C. Gossard,
for observation of the spin Hall effect in semiconductors.
This insight into how electrons behave under the influence
of magnetic fields promises application in many areas,
including quantum computing.

David Awschalom Arthur C. Gossard

Liew Family Professor in Molecular Engineering,
Institute for Molecular Engineering,
University of Chicago, Chicago, USA

Professor Emeritus and Research Professor,
Materials and Electrical & Computer
Engineering, University of California
Santa Barbara, Santa Barbara, USA



We recognize Sandra M. Faber for pioneering methods to determine the age, size and distance of galaxies and for other contributions to cosmology, including work on the “cold dark matter” believed to constitute the universe’s “missing” matter.

For pioneering methods to determine the age, size and distance of galaxies and for other contributions to cosmology

Sandra M. Faber

Professor Emerita of Astronomy and Astrophysics, University of California Santa Cruz, Santa Cruz, USA



For discoveries advancing the understanding and development of carbon-based materials, including for capacitive energy storage and understanding the mechanisms of operation of supercapacitors

We recognize Yury Gogotsi, Rodney S. Ruoff and Patrice Simon for discoveries advancing the understanding and development of carbon-based materials including for capacitive energy storage and understanding the mechanisms of operation of supercapacitors.

Yury Gogotsi Rodney S. Ruoff

Distinguished University and Charles T. and Ruth M. Bach Professor, Department of Materials Science and Engineering, and A.J. Drexel Nanomaterials Institute, Drexel University, Philadelphia, USA

IBS Director of the Center of Multidimensional Carbon Materials and Distinguished Professor, Ulsan National Institute of Science and Technology, Department of Chemistry and Schools of Materials Science and Engineering and Energy and Chemical Engineering, Ulsan, South Korea

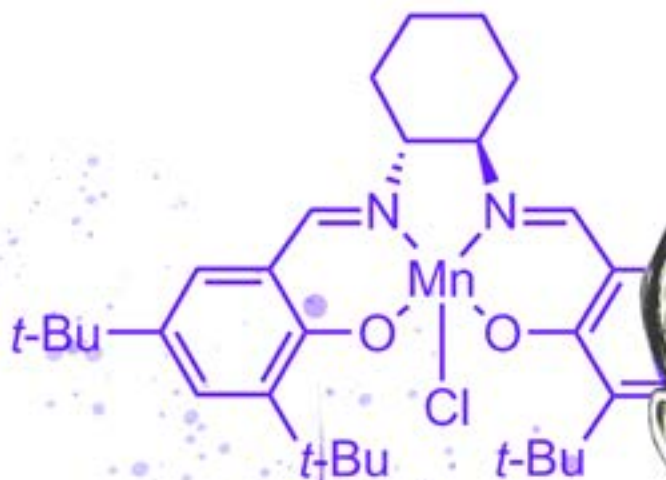
Patrice Simon

Professor in Materials Science, Université Paul Sabatier Toulouse III - CNRS, Toulouse, France



For contributions to
catalytic reactions for
organic synthesis

We recognize Eric N. Jacobsen for
contributions to catalytic reactions
for organic synthesis, especially for the
development of Jacobsen epoxidation.



Eric N. Jacobsen

Sheldon Emery Professor of Chemistry,
Department of Chemistry and Chemical
Biology, Harvard University, Cambridge,
USA

For his enormous
influence in structural
crystallography

We recognize George M. Sheldrick for his enormous influence in structural crystallography through the introduction and maintenance of the SHELX system of computer programs.

George M. Sheldrick

Emeritus Professor of Structural
Chemistry, Georg-August-Universität
Göttingen, Göttingen, Germany



We recognize JoAnne Stubbe for her discovery that ribonucleotide reductases transform ribonucleotides into deoxyribonucleotides by a free-radical mechanism. These deoxyribonucleotides, in turn, are fundamental to the synthesis and repair of DNA.

For her discovery that ribonucleotide reductases transform ribonucleotides into deoxyribonucleotides by a free-radical mechanism

JoAnne Stubbe

Novartis Professor of Chemistry
Emerita,
Department of Chemistry,
MIT, Cambridge, USA



Economics

$$y = \begin{pmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{pmatrix}$$

$$X = \begin{pmatrix} x_1^T \\ x_2^T \\ \vdots \\ x_n^T \end{pmatrix} = \begin{pmatrix} 1 & x_{11} & \cdots & x_{1p} \\ 1 & x_{21} & \cdots & x_{2p} \\ \vdots & \vdots & \ddots & \vdots \\ 1 & x_{n1} & \cdots & x_{np} \end{pmatrix}$$

$$\beta = \begin{pmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_n \end{pmatrix}, \quad \varepsilon = \begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_n \end{pmatrix}$$

For contributions to panel data analysis, especially the Arellano-Bond estimator

We recognize Manuel Arellano and Stephen R. Bond for contributions to panel data analysis, especially the Arellano-Bond estimator. This method exploits time patterns in panel data to estimate the economic response to a change in a policy or other variable, while controlling for permanent unobserved confounding variation.

Manuel Arellano Stephen R. Bond

Professor of Econometrics, CEMFI, Madrid, Spain

Senior Research Fellow, Department of Economics and Nuffield College, Oxford University, Oxford, United Kingdom



For the introduction
and development
of the concept of
absorptive capacity
and its contribution to
our understanding of
technological innovation

We recognize Wesley M. Cohen and Daniel A. Levinthal for their introduction and development of the concept of absorptive capacity (i.e., the ability of firms to evaluate, assimilate, and apply external knowledge) and its contribution to advancing our understanding of the innovative performance of firms, industries and nations.

Wesley M. Cohen Daniel A. Levinthal

Professor of Economics and Management
and Snow Family Professor of Business
Administration, Fuqua School of Business,
Duke University, Durham, USA

Reginald H. Jones Professor of Corporate
Strategy, Management Department, Wharton
School, University of Pennsylvania,
Philadelphia, USA



For contributions to
dynamic economic
phenomena

We recognize David M. Kreps
for contributions to dynamic
economic phenomena, in choice
theory, finance, game theory,
and organization theory.

David M. Kreps

Adams Distinguished Professor of
Management and Professor of Economics,
Stanford University Graduate School of
Business, Stanford, USA



To find out more about the 2018
Citation Laureates, go to
clarivate.com/2018-citation-laureates

About Clarivate Analytics

Clarivate Analytics is the global leader in providing trusted insights and analytics to accelerate the pace of innovation. Building on a heritage going back more than a century and a half, we have built some of the most trusted brands across the innovation lifecycle, including *Web of Science*, *Cortellis*, *Derwent*, *CompuMark*, *MarkMonitor* and *Techstreet*. Today, *Clarivate Analytics* is a new and independent company on a bold entrepreneurial mission to help our clients radically reduce the time from new ideas to life-changing innovations.

For more information,
please visit clarivate.com

About Web of Science

Web of Science is the world's most trusted and largest publisher-neutral citation index, powering global discovery and citation analytics across the sciences, social sciences and art & humanities. With over 1.4 billion cited references going back to 1900 and millions of users per day – from leading government and academic institutions and research-intensive corporations – *Web of Science* citation network serves as the foundation for the *Journal Impact Factor*, *InCites* and other powerful and trusted citation-impact measures. The *Web of Science* helps researchers, research institutions, publishers and funders discover and assess the citation impact of over a century of research publications found in the most prestigious journals, books, and conference proceedings.

To learn more about *Web of Science*,
visit: clarivate.com/web-of-science

About Institute for Scientific Information (ISI)

ISI is the 'university' of the *Web of Science Group* at *Clarivate Analytics*: it maintains the knowledge corpus upon which *Web of Science* and related information and analytical content, products and services are built; it disseminates that knowledge internally through reports and recommendations and externally through events, conferences and publications; and it carries out research to sustain, extend and improve the knowledge base.