Jointly published by Akadémiai Kiadó, Budapest
and Kluwer Academic Publishers, Dordrecht

Scientometrics,
Vol. 53, No. 1 (2002) 3–20

Feature Report

The Web of Scientometrics
A statistical overview of the first 50 volumes of the journal

ANDRÁS SCHUBERT

Library of the Hungarian Academy of Sciences, Budapest (Hungary)

A statistical overview is given of the first 50 volumes of the journal *Scientometrics.* Authorship and co-authorship characteristics, as well as citation and reference patterns of the journal are analysed. Geographic and thematic maps of its papers are presented. A brief outlook to the future prospects and challenges is attempted.

Introduction

It is common understanding that the word "scientometrics" has been first used as a translation of the Russian term "naukometriya" (measurement of science) coined by Nalimov and Mulchenko (1969). The word gained a wider acquaintance for the public through the second edition of De Solla Price's "Science Since Babylon" (De Solla Price, 1975; see, particularly, the Postscript to Chapter 8). It was, however, the launching of the journal *Scientometrics* (*Scientometrics. An International Journal for All Quantitative Aspects of the Science of Science and Science Policy*. ISSN 0138-9130. Vol. 1, No. 1, September 1978. Elsevier Science Publishing Company, Amsterdam and Akadémiai Kiadó, Budapest. Latest available issue (as of September 2001): *Scientometrics. An International Journal for All Quantitative Aspects of the Science of Science, Communication in Science and Science Policy*. Vol. 52, No. 1, September 2001. Kluwer Academic Publishers, Dordrecht and Akadémiai Kiadó, Budapest) that persuaded all those concerned that a self-contained research field under this name really exists. Actually, the founder and present Editor-in-Chief of the journal, Tibor Braun, meant the journal to provide a common umbrella for all kind of quantitative science studies – as it is stated up to this very day in the subtitle of the journal. It seems,

0138–9130/2002/US $ 15.00

therefore, reasonable to believe that an overview of the journal will reflect also the development of the research field as the past decades are considered.

As a researcher in the field of scientometrics for some 25 years and a member of the editorial staff of the journal *Scientometrics* for almost 20 years, I cannot guarantee an unbiased and objective overview. What I can offer is a "first-hand" collection of facts and figures about the journal.

This paper is an extended version of a part of a chapter which appeared in a recent book (*Schubert*, 2001).

Scientometrics: the journal

The journal *Scientometrics* was launched in 1978 as a joint venture of Elsevier Science Publishing Company, Amsterdam and Akadémiai Kiadó (Publishing House of the Hungarian Academy of Sciences), Budapest. Several of the most prominent members of the "invisible college" of scientometricians (G. M. Dobrov, E. Garfield, D. De Solla Price, M. J. Moravcsik) assumed honorary or active roles in the Editorial Board, but the motor of the new journal was the then Managing Editor (now Editor-in-Chief) Tibor Braun of the Library of the Hungarian Academy of Sciences, Budapest, Hungary. He and the Information Science and Scientometrics Research Unit (ISSRU) at the Library have made constant efforts to keep the journal in the forefront of research and development in scientometrics. The material of practically all major international conferences in the field was reported there, and several national issues related the world-wide developments (beside the US and the major European countries India and Latin America were represented, as well).

As a result, *Scientometrics* has reached and maintained a leading role not only in its immediate field but also in the broader field of Library and Information Science. As the representative communication channel of its field, it reflects the characteristic trends and patterns of the past decades in scientometric research, that's why this study – like several of its predecessors (*Anderl*, 1993; *Schubert* and *Maczelka*, 1993; *Wouters*, 1999; *Schoepflin* and *Glänzel*, 2001) – uses the journal as a representative model of scientometrics research.

Summary statistics

The statistical overview given in what follows is based on the first 50 volumes of the journal which were published between September 1978 and April 2001. Citations were retrieved from ISI's *Science Citation Index* (SCI), *Social Science Citation Index* (SSCI)

and *Web of Science* (WoS) databases for the 1978-2000 period. All *Scientometrics* articles, letters, notes, reviews and bibliographies were considered independently of their length, as well as other document types provided that they were more than 2 pages long. Meeting abstracts, corrections, editorials, obituaries and other personal items were thus automatically excluded.

A total of 1443 items were published by 1223 authors from 60 countries. They contained 25200 references to about 16500 different items (the exact number is practically impossible to determine because of a certain number of incomplete or erroneous bibliographic data of the referred items). 1061 *Scientometrics* papers received 7242 citations during the 1978-2000 period (i.e., 382 papers remained uncited).

Geographic view

As mentioned, authors from 60 countries contributed to the first 50 volumes of the journal (the authors' nationality was determined according to their institutional affiliation as given in the by-line of the publication). Figure 1 presents a proportional map of the 29 countries with more than 8 papers. The area of the countries is proportional to the number of the publications while their relative position is intended to resemble to the natural topography.

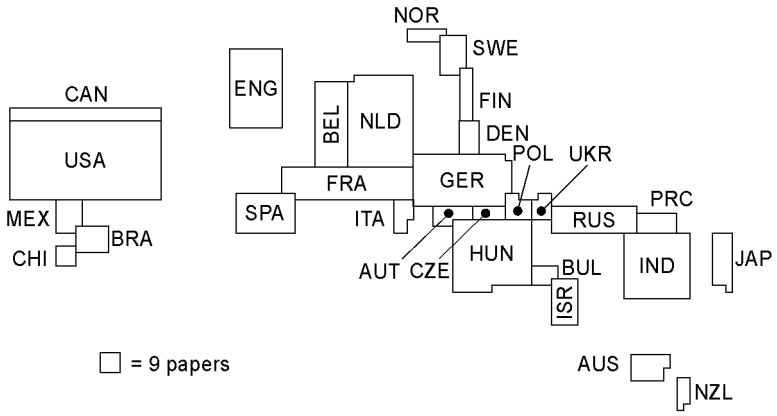

Figure 1. Proportional map of countries according to their publication activity in the journal *Scientometrics* (country codes: see Table 1)

It is striking at first sight that small countries like the Netherlands, Belgium and, most remarkably, Hungary (the birthplace and homeland of the journal) compete with the superpowers USA, England, Germany, France, Russia and India. A rather aborted Italy, and the completely absent Switzerland and the African continent are on the losing side.

Table 1
Activity Indexes of countries publishing in the journal *Scientometrics* relative to their total science and social science publication activity

Country	Code	% share in *Scientometrics* publications	AI relative to science	AI relative to social science
Australia	AUS	1.52	0.60	0.55
Austria	AUT	1.18	1.50	3.51
Belgium	BEL	4.50	3.65	10.06
Brazil	BRA	1.39	1.79	n.a.
Bulgaria	BUL	0.76	3.45	n.a.
Canada	CAN	3.19	0.68	0.61
Chile	CHI	0.62	3.02	n.a.
Czech Republic	CZE	0.69	1.45	2.76
Denmark	DEN	1.04	1.02	2.81
England	ENG	6.65	0.70	0.69
Finland	FIN	1.11	1.27	2.17
France	FRA	6.79	1.08	4.10
Germany	GER	8.11	1.02	2.69
Hungary	HUN	8.73	19.76	67.47
India	IND	6.93	3.71	13.63
Israel	ISR	1.94	1.61	1.89
Italy	ITA	0.90	0.23	0.98
Japan	JAP	1.73	0.19	1.56
Mexico	MEX	1.32	3.28	5.05
Netherlands	NLD	9.63	3.79	5.31
New Zealand	NZL	0.62	1.22	1.14
Norway	NOR	0.76	1.26	1.51
Poland	POL	0.97	0.95	7.03
P.R. China	PRC	1.25	0.80	10.32
Russia	RUS	3.60	0.91	5.02
Spain	SPA	3.74	1.52	5.76
Sweden	SWE	1.59	0.79	1.59
Ukraine	UKR	0.76	1.30	n.a.
USA	USA	19.13	0.55	0.39

The same 29 countries are given also in Table 1. Here not the absolute quantities but the Activity Indexes expressing the relative publication efforts are given for each country in the journal relative to its total activity in the sciences or the social sciences. The Activity Index (AI) is calculated as

AI = Percentage share of the country in *Scientometrics* papers/Percentage share of the country in all (social) science publications.

Activity Indexes higher than one indicate higher publication activity in the journal *Scientometrics* as expected on the basis on the country's weight in (social) science publication. Reference totals for all sciences and social sciences are taken from the 1994-1996 cumulated annual data from ISI's *Science Citation Index* (SCI) and *Social Science Citation Index* (SSCI), respectively.

Activity Indexes show even more spectacularly the outstanding relative activity of a few countries (first of all Hungary, but also Belgium, Bulgaria, Chile, Mexico, Netherlands and, if measured against social science standards, then P.R. China, Poland, Russia and Spain, as well). A conspicuously low relative activity is shown by Italy and Japan (not so much if social science standards are concerned); interestingly, most English-speaking countries (US, England, Australia, Canada) exhibit a lower-than-average activity.

It is worth mentioning that, as a rule, publishing activity in the journal *Scientometrics* appears to resemble to the countries' publishing pattern in the sciences rather than that in the social sciences (i.e., Activity Indexes relative to total science are closer to unity).

Thematic view

In their paper, *Schoepflin* and *Glänzel* (2001) classified the papers published in *Scientometrics* into six thematic categories, and studied the change in the weight of these categories by selecting three sample years: 1980, 1989 and 1997.

They used the following categories:

1. (THEO) Bibliometric theory, mathematical models and formalisation of bibliometric laws;
2. (CASE) Case studies and empirical papers;
3. (METH) Methodological papers including applications;
4. (INDI) Indicator engineering and data presentation;
5. (SOCI) Sociological approach to bibliometrics, sociology of science;
6. (POLI) Science policy, science management and general or technical discussions.

The classification permitted to group the material in several ways: the categories can be regarded from the viewpoint of core bibliometrics (2, 3, and 4) and background research (1, 5, and 6), but also with respect to theoretical (1, 3, and 5) and applied research (2, 4, and 6).

The distribution of the papers over the categories is given in Table 2.

Table 2
Thematic distribution of papers in the journal *Scientometrics*

	1980	1989	1997
Total number of papers	31	67	75
Category 1 (THEO)	3.2%	9.0%	4.0%
Category 2 (CASE)	16.1%	31.3%	46.7%
Category 3 (METH)	19.4%	35.8%	33.3%
Category 4 (INDI)	6.5%	9.0%	1.3%
Category 5 (SOCI)	16.1%	13.4%	8.0%
Category 6 (POLI)	38.7%	1.5%	6.7%

There are two obvious developments: an impressing and steady growth of case studies (Category 2) and methodology (Category 3) and the loss of position of articles on sociological (Category 5) and science policy (Category 6) issues.

Authorship characteristics

Author productivity. The 1223 authors contributing to the journal shared 2443 authorships, that means almost exactly 2 papers per author. The productivity distribution is, as usual, rather skew: 874 authors (71.5%) contributed one single paper each, while 26 authors (2.1%) published 10 or more papers. One or more of these overly productive authors (listed in Table 3) were co-authors in about 1/3 of the papers published in the journal.

Not too surprisingly, most of these extreme productivity authors are from the most active countries.

Author turnover. One of the potential dangers of running a journal in a relatively narrow research field is the tapering of the author population, forming eventually a kind of inbred, clannish community. To check the situation in the journal *Scientometrics*, the annual share of newcomers (authors publishing their first ever *Scientometrics* paper) in all authors in the given year is shown in Figure 2.

Table 3
The most productive authors in the journal *Scientometrics*

Rank	Author	Country	No. of papers
1	Schubert A	(Hungary)	75
2	Braun T	(Hungary)	46
3	Glänzel W	(Hungary/Germany)	45
4	Van Raan AFJ	(Netherlands)	30
5	Leydesdorff L	(Netherlands)	27
6	Egghe L	(Belgium)	21
7	Rousseau R	(Belgium)	21
8	Vinkler P	(Hungary)	21
9	Moed HF	(Netherlands)	19
10	Courtial JP	(France)	18
11	Gupta BM	(India)	18
12	Garg KC	(India)	14
13	Moravcsik MJ	(USA)	14
14	Small H	(USA)	14
15	Bonitz M	(Germany)	13
16	Haitun SD	(Russia)	13
17	Kretschmer H	(Germany)	13
18	Nederhof AJ	(Netherlands)	13
19	Persson O	(Sweden)	12
20	Gomez I	(Spain)	11
21	Mendez A	(Spain)	11
22	Narin F	(USA)	11
23	Tijssen RJW	(Netherlands)	11
24	Wagner-Döbler R	(Germany)	11
25	Eto H	(Japan)	10
26	Lewison G	(England)	10

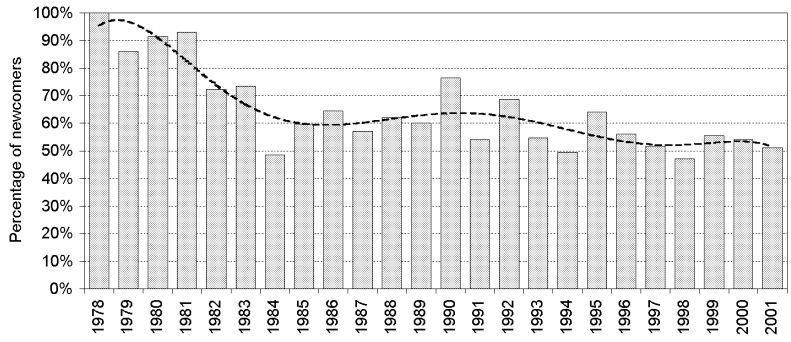

Figure 2. Percentage share of newcomers among the authors of the journal *Scientometrics*.
(Dashed line: polynomial smoothed trendline)

Obviously, in the first few years most of the authors were “new”. The emergence of a “new wave” of the early 90’s came to a standstill by the second half of the decade, but even in the last few years, the share of newcomers is above 50%. The fears of loss of supply in active researchers in the field thus appear to be unfounded.

Co-authorship characteristics

The ubiquitous trend of scientific collaboration does not avoid scientometrics, either. In this respect, however, scientometrics resembles rather to the social sciences(or, maybe, mathematics) than to the sciences: 55.1% of the papers published in the first 50 volumes of *Scientometrics* is single-authored and only 5.4% of them are multi-authored (more than 3 authors). The average number of authors per paper is 1.61. In the past decade, nevertheless, there is a slight tendency of growing collaboration (see Figure 3).

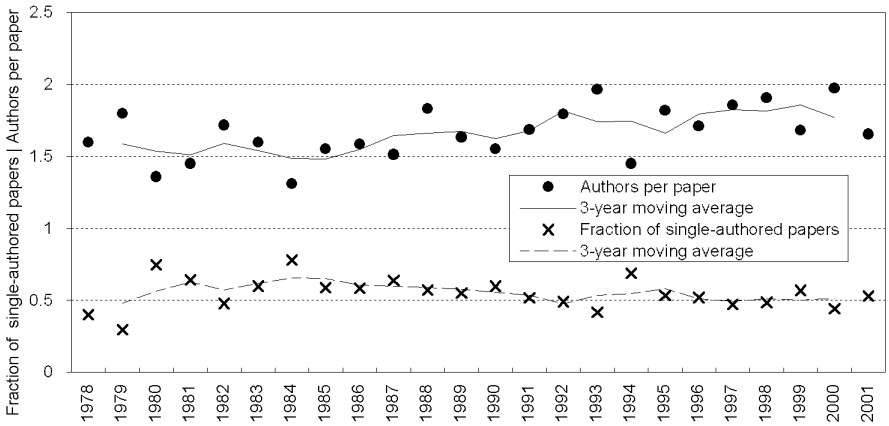

Figure 3. Fraction of single-authored papers and average number of authors per paper in the journal *Scientometrics*, 1978-2001

International collaboration is even less favourised in the scientometrics community. There is a modest 7% of *Scientometrics* papers having more than one country in the authors’ affiliation section in the by-line of the publication. Nevertheless, the tendency is unambiguous: the fraction of internationally co-authored papers more than doubled from the first to the second 25 volumes.

Figure 4 presents the international co-authorship network of the journal indicating all co-authorship links between pairs of countries with more than one joint publication.

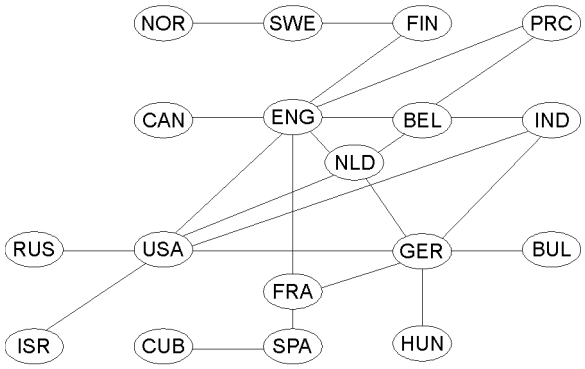

Figure 4. International co-authorship network of the journal *Scientometrics*

No distinction has been made in Figure 4 according to the strength of the links, since they are rather weak (representing typically 2-3 joint papers) and somewhat accidental. Yet, the diagram provides a surprisingly good picture on which countries are located in central (USA, England, Germany, France, the Netherlands, Belgium) and which in peripheral position. In this latter group, again, Hungary may attract special attention with its single (although extremely strong) link with Germany: this mainly reflects the activity of the prominent German-born researcher of the Budapest group, Wolfgang Glänzel.

Analysis of references

The 25200 references of the papers form, as it were, the intellectual "hinterland" of research reported in *Scientometrics*. Clearly, they constitute a vast treasury of information about the history, sociology, epistemology of the field and its journal, and several attempts were made to make the most of this information (*Schubert* and *Maczelka*, 1993; *Wouters* and *Leydesdorff*, 1994; *Schoepflin* and *Glänzel*, 2001).

Age of references. The age of references reflect the up-to-date nature of the research reported in a paper. *De Solla Price* (1970) introduced an index, later named after him, with the aim of distinguishing between "harder" and "softer" sciences. The Price Index is defined as the percentage share of references to items not older than five years at the time of publishing the citing paper. Typical "soft science" journals (*German Review*, *American Literature*, *Studies in English Literature*, *Isis*, in Price's original study) have

an index value less than 10%, while, e.g., some research front physics journals may reach 80%. The Price Index of the journal *Scientometrics* is around 45%, i.e., it occupies a medium position on the hardness scale.

In a previous paper (*Schubert* and *Maczelka*, 1993), it was conjectured that the Price Index of *Scientometrics* has an increasing tendency, thereby supporting the assumption that "the research field of scientometrics – as reflected in the journal of that name – has undergone a crystallization process, and moved from the 'soft' towards the 'harder' sciences" and "that the underlying research field is increasingly codified – although, in some aspects, it is still in a 'preparadigmatic' state." That study was based on the comparison of the reference patterns of the journal *Scientometrics* in two two-year periods: 1980-81 and 1990-91.

The validity of this argument (although by no means that of the main inferences) was later questioned (*Wouters* and *Leydesdorff*, 1994) by showing that the two periods under study were just two random points in a strongly fluctuating series, where no definite tendency whatever can be uncovered. The validity of this criticism is hereby readily admitted with a penitential presentation in Figure 5 the time series of two much more commonly used statistics, the mean and median reference age.

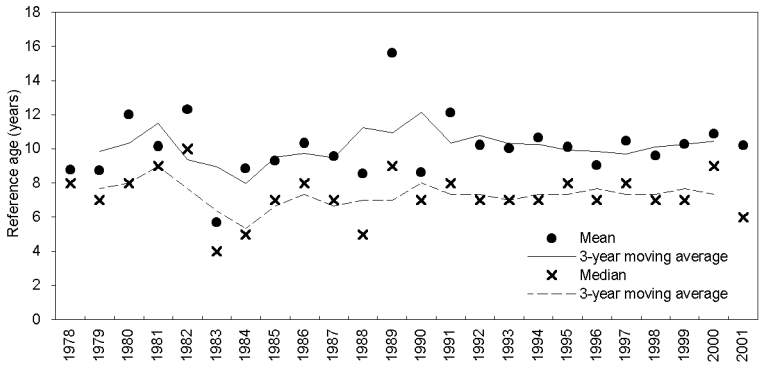

Figure 5. Mean and median reference age of the journal *Scientometrics*

Apparently, the hardening of scientometrics is still to be awaited.

Sources of references. Almost half of the 25200 references (namely, 12137) were made to articles of 762 journals covered either by the SCI or the SSCI database of the ISI. About 2000 references were made to a similar number of non-SCI or SSCI journals, the rest to other reference sources (books, non-periodical literature, proceedings, reports, etc.)

Most cited sources. The 25 most cited reference sources in the journal *Scientometrics* are given in Table 4.

Table 4
Most cited reference sources in the journal *Scientometrics*

Rank	Title	Times cited in *Scientometrics*
1	*Scientometrics*	3425
2	*J. Am. Soc. Inform. Sci.*	930
3	*Soc. Stud. Sci.*	616
4	*Res. Policy*	524
5	*Science*	488
6	*J. Documentation*	382
7	*Nature*	308
8	*J. Inform. Sci.*	288
9	*Czech. J. Phys.*	226
10	*Current Contents*	214
11	*Am. Sociol. Rev.*	185
12	*Am. Psychol.*	181
13	*Inform. Proc. & Manag.*	172
14	*Little Science Big Science (Price)*	167
15	*Nauchno-tekhnicheskaya Informatsiya**	156
16	*Handbook of Quant. Stud. S&T* (van Raan, Ed.)	127
17	*Sci. Stud.*	123
18	*Sci. & Public Policy*	120
19	*Informetrics (Proc. Series)*	106
20	*Citation Indexing* (Garfield)	94
21	*Am. Documentation***	93
22	*Am. J. Sociol.*	91
23	*Interciencia*	85
24	*Minerva*	82
25	*Sci. Technol. & Human Values*	75

*series 1 and 2 combined
**not covered by SCI or SSCI

Among the highly cited sources there is a clear dominance of SCI/SSCI-covered titles: 19 of the 25 titles belongs to this category. References to the journal itself (journal self-references) constitute 13.6% of all references – it is a typical value for a consolidated primary journal.

Most cited references. Table 5 lists the top 26 most cited references in the journal *Scientometrics*.

Table 5
The most cited references in the journal *Scientometrics*

Rank	First author	Publ. year	Source data	Times cited
1	Price D.De Solla	1963*	*Little Science Big Science*	167
2	Garfield E.	1979	*Citation Indexing*	90
3	Schubert A.	1989	*Scientometrics* 16:3	77
4	Narin F.	1976	*Evaluative Bibliometrics*	66
5	Lotka A.J.	1926	*J. Washington Academy* 16:317	59
6	Callon M.	1986	*Mapping the Dynamics of Science*	56
7	Cole J.R.	1973	*Social Stratification in Science*	53
8	Martin B.R.	1983	*Res. Policy* 12:61	52
9	Price D.De Solla	1965	*Science* 149:510	51
10	Schubert A.	1986	*Scientometrics* 9:281	51
11	Kuhn T.S.	1962	*Structure of Scientific Revolutions*	49
12	Small H.	1974	*Sci. Studies* 4:17	46
13	Small H.	1973	*J. Am. Soc. Inform. Sci.* 24:265	44
14	Garfield E.	1972	*Science* 178:471	43
15	Price D.De Solla	1976	*J. Am. Soc. Inform. Sci.* 27:292	43
16	Moed H.F.	1985	*Res. Policy* 14:131	42
17	Braun T.	1985	*Scientometric Indicators*	40
18	Egghe L.	1990	*Introduction to Informetrics*	39
19	Moravcsik M.J.	1975	*Soc. Stud. Sci.* 5:86	38
20	Merton R.K.	1968	*Science* 159:56	36
21	Beaver D.DeB.	1978	*Scientometrics* 1:65	35
22	Bradford S.C.	1934	*Engineering-London* 137:85	35
23	Schubert A.	1990	*Scientometrics* 19:3	35
24	Crane D.	1972	*Invisible Colleges*	34
25	Edge D.	1979	*History of Science* 17:102	31
26	Hagstrom W.O.	1965	*Scientific Community*	31

* Combined with references to the 2nd edition in 1986

Among the cited references, the weight of books becomes significantly larger than it was among the cited sources: 10 of the 26 most cited items (and 5 of the top 10) are books. The majority of these trend-setting works are from the 60's and 70's. The founding fathers' (Price, Merton, Garfield) *Science* papers have lasting influence.

Disciplinary distribution of references. The 12137 references to articles of journals covered by the ISI databases could be categorised into science/social science subfields according to the subfield categorisation of journals given by ISI. Papers in journals categorised into more than one subfields were evenly divided among the subfields in question. The subfield profile of *Scientometrics* references is shown in Figure 6.

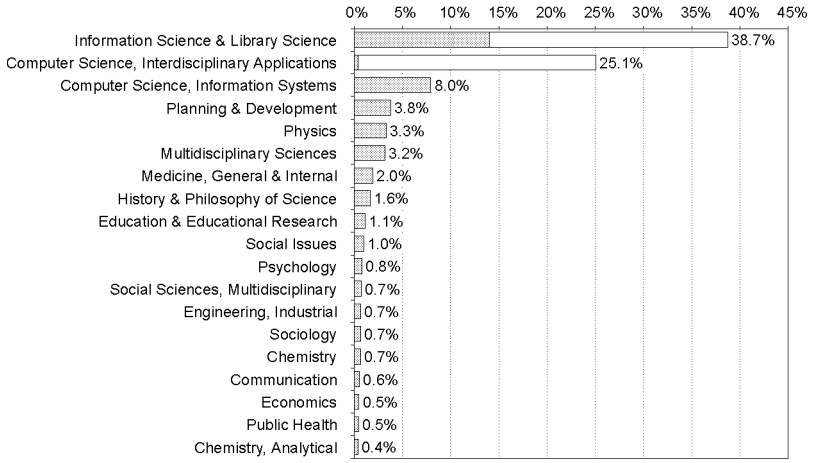

Figure 6. The subfield profile of references in the journal *Scientometrics*

The journal *Scientometrics* itself is categorised into two subfields: Information Science & Library Science and Computer Science, Interdisciplinary Applications. The share of the journal's self-references is indicated by the unshaded part of the corresponding bars in the chart. It can be seen that Information Science & Library Science would remain the main source of information for the journal even if self-references were disregarded, while Computer Science, Interdisciplinary Applications would disappear from the chart without them. Among science journals, those from broader-scope subfields (general physics, general chemistry, general medicine, multidisciplinary sciences) contribute the most to the reference base of *Scientometrics*. The presence of Analytical Chemistry among the top cited fields may be connected with the fact that this is the original and main fireld of the Editor-in-Chief of the journal.

Analysis of citations

Just like the references cited in *Scientometrics* hinted on the information sources of the research reported there, the citations to the journal indicate the diffusion of the reported information into the literature. Citations were retrieved from ISI's SCI, SSCI and WoS databases for the period 1978-2000. No adjustment for author self-citations has been made.

Sources of citations. Unlike in the case of references, we have no information on citations in journals not covered by the ISI databases or in non-journal sources. The 7242 citations were found in 442 journals. 182 of them cited *Scientometrics* only once; 47.3% of the citations are from the journal itself, another 31.7% from the other 19 journals in Table 6.

Table 6
Journals most frequently citing *Scientometrics*

Rank	Title	Number of citations to *Scientometrics*
1	*Scientometrics*	3425
2	*J. Am. Soc. Inform. Sci*	481
3	*Res. Policy*	253
4	*Czech. J. Phys.*	225
5	*J. Inform. Sci.*	218
6	*Inform. Process. Manag.*	141
7	*Ann. Rev. Inform. Sci.*	114
8	*Current Contents*	113
9	*Soc. Stud. Sci.*	92
10	*Int. Forum. Inform. Doc.*	88
11	*J. Doc.*	77
12	*Interciencia*	75
13	*Med. Clin. - Barcelona*	67
14	*J. Sci. Ind. Res. India*	62
15	*Libri*	62
16	*J. Chem. Inf. Comp. Sci.*	53
17	*Libr. Trends*	45
18	*Libr. Inform. Sci. Res.*	44
19	*Nauchno-technicheskaya Informatsiya**	42
20	*Sci. Technol. & Human Values*	38

* series 1 and 2 combined

The journal self-citation rate of 47.3% is rather high, particularly if compared with the self-reference rate of 13.6%. It indicated that the "outside world" pays less attention to the journal than vice versa. This is particularly true for the high prestige journals like *Science* and *Nature* ranking only 50th and 26th in the citing journal list, respectively. There is, nevertheless, an inevitable similarity between the cited and citing journal lists (Tables 4 and 6), showing a consistent "core" journal network around the field.

Most cited papers. Scientometrics papers most frequently cited within the journal are shown in Table 5. In order to complement them, Table 7 lists the top 26 *Scientometrics* papers cited most frequently in journals other than *Scientometrics*.

Table 7
Scientometrics papers most frequently cited in other journals

Rank	Author(s)	Volume:page	Number of citations
1	Schubert A., Glänzel W., Braun T.	16:3	57
2	Garfield E.	1:359	56
3	Pavitt K.	7:77	50
4	Small H., Sweeney E.	7:391	44
5	Small H., Craine D.	1:445	42
6	Haitun S.D.	4:5	39
7	Small H., Sweeney E.	8:321	39
8	Rushton J.P., Murray H.G., Paunonen, S.V.	5:93	37
9	Haitun S.D.	4:89	35
10	Narin F., Noma E.	7:369	33
11	Yablonsky A.I.	2:3	32
13	Beaver D.DeB., Rosen R.	1:65	29
14	Soete L.G., Wyatt S.M.E.	5:31	28
15	Small H., Greenlee E.	2:277	27
16	Haitun S.D.	4:181	27
17	Diamond A.M. (Jr.)	6:189	26
18	Vlachy J.	7:505	26
19	Vlachy J.	1:109	25
20	Rice R.E., Borgman C.L., Bednarski D., Hart P.J.	15:257	24
21	Cozzens S.E.	15:437	23
22	Beaver D.DeB., Rosen R.	1:231	23
23	Gordon M.D.	2:193	23
24	Moed H.F., Burger W.J.M., Frankfort J.G., Van Raan A.F.J.	8:177	23
25	Beaver D.DeB., Rosen R.	1:133	21
26	Narin F., Stevens K., Whitlow E.S.	21:313	20

It appears that the diffusion of the information is rather slow: 6 of the top cited papers is from the very first volume of the journals, only 4 of them were published after Vol. 10, and not a single one in the second half of the 50 volumes.

Disciplinary distribution of citations. Analogously to the subfield profile of references in Figure 6, Figure 7 shows the subfield profile of the 7242 citations. The unshaded area of the first two bars represents the journal self-citations.

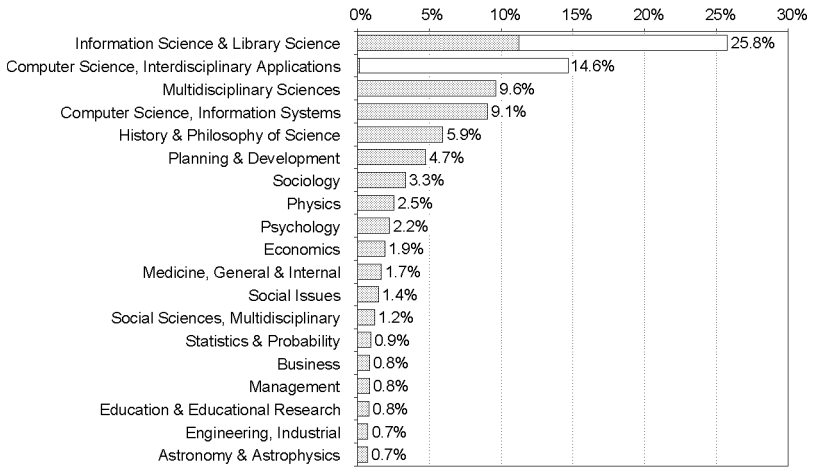

Figure 7. The subfield profile of citations to the journal *Scientometrics*

Challenges of the 21st century

Undoubtedly, the greatest challenge – not only for *Scientometrics*, but for the whole scientific publication system – is the advent of electronic publication and communication, in short, the Internet. *Scientometrics*, may I say, is multiply challenged, not only – similarly to all other areas of science and social science research – by getting somewhat confused about the most effective way of communicating its own results, but also by being compelled to properly describe, analyse and evaluate the new forms of communication in other science and social science fields.

As to the first part of the problem, the research community of scientometrics launched its own web-based fora: the electronic journal *Cybermetrics* (*Cybermetrics. International Journal of Scientometrics, Informetrics and Bibliometrics*. ISSN 1137-5019. http://www.cindoc.csic.es/cybermetrics) and the discussion forum SIGMETRICS (http://web.utk.edu/~gwhitney/sigmetrics.html). Articles of scientometric interest may be occasionally included in electronic archives of other disciplines, as well (*Barabási* et al., 2001 is just one example of the supposedly numerous items).

Cybermetrics is both an electronic-only journal and a virtual forum devoted to the study of the quantitative analysis of scholarly and scientific communications. From 1997 the editors are organising a series of conferences to disseminate results from quantitative

analysis of the Internet. Cybermetrics also maintains a series of directories of electronic resources, including secondary archives of interesting web papers in pdf format. The topics covered are the methodologies and results of scientometric, bibliometric or informetric research; emphasis is placed on aspects related to Internet. Cybermetrics is an international peer-reviewed journal published in English and distributed free-of-charge in the World Wide Web by the Centro de Información y Documentación Científica (CINDOC) of the Consejo Superior de Investigaciones Científicas (CSIC) in Madrid, Spain. Cybermetrics is maintained by Isidro F. Aguillo.

SIGMETRICS is a listserv discussion group that covers bibliometrics, scientometrics and informetrics, but also metrics as related to the design and operation of digital libraries and other information systems interpreted broadly. The listserv also serves as the official "channel" for the American Society for Information Science Special Interest Group on Metrics. Bibliographic records, articles, web resources, and other news items of interest are routinely forwarded to the list, at a rate of approximately 8-10 items per week as they become available. Bibliographic notes from established databases are included as relevant. As of 26 July 2000, SIGMETRICS was not moderated, and anyone can post to the list, whether subscribed or not. The listserv included 216 members, and representatives from 31 countries. SIGMETRICS is maintained by Gretchen Whitney, School of Information Sciences, University of Tennessee-Knoxville, TN, USA.

Various research findings and opinions on the whole Scientometrics--Internet relationship complex were compiled in a recent special issue of the journal *Scientometrics* (2001). Let me close this overview with *Van Raan*'s conclusion: "Bibliometrics and the Internet: Plus ça change, plus c'est la même chose. 'Real time' web-based reporting and commenting about research results will be not 'replacing' but an additional facility in the whole of scientific communication. A much more revolutionary change in science will be the increasing availability and sharing of research data, i.e., the emergence of a real-time web-based collective use of research materials."

References

ANDERL, E.H. (1993), *Scientometrics* – Eine Zeitschrift als Spiegel einer Disziplin. Eine Inhaltsanalyse der wissenschaftlichen Fachzeitschrift *Scientometrics* für die Jahre 1978-1990. M. A. Dissertation, University of Vienna.

BARABÁSI, A.L., JEONG, H., NÉDA, Z., RAVASZ, E., SCHUBERT, A., VICSEK, T. (2001), *Evolution of the Social Network of Scientific Collaboration*, arXiv:cond-mat/0104162 (http://xxx.lanl.gov/abs/cond-mat/0104162)

CRONIN, B., ATKINS, H. (Eds) (2000), *The Web of Knowledge. A Festschrift in Honor of Eugene Garfield*. Information Today, Inc., Medford, NJ.

DE SOLLA PRICE, D. J. (1970), Citation measures of hard science, soft science, technology and non-science. In: C. E. NELSON, D.K. POLLAK (Eds): *Communication among Scientists and Engineers*. Heat, Lexington, MA, pp. 1–12.

DE SOLLA PRICE, D. (1975), *Science Since Babylon*. 2nd enlarged ed., Yale University Press, New Haven, 1975.

NALIMOV, V.V., MULCHENKO, Z.M. (1971), *Naukometriya. Izucheniye razvitiya nauki kak informatsionnogo protsessa*. Nauka, Moscow, 1969. English translation: *Scientometrics. Studying Science as an Information Process*. US Air Force Systems Command, Foreign Technology Division, Washington DC.

SCHOEPFLIN, U., GLÄNZEL, W. (2001), Two decades of Scientometrics. An interdisciplinary field represented by its leading journal. *Scientometrics*, 50: 301–312.

SCHUBERT, A. (2001) Scientometrics: The research field and its journal. In: A. Heck (Ed.), *Organizations and Strategies in Astronomy II*, Kluwer, Dordrecht, pp. 179-195.

SCHUBERT, A., MACZELKA, H. (1993), Cognitive changes in Scientometrics during the 1980's, as reflected by the reference patterns of its core journal. *Social Studies of Science*, 23: 571–582.

Scientometrics on the Internet – Internet in Scientometrics. *Scientometrics* 50(1) (2001) 3–98.

VAN RAAN, A. F. J. (2001), Bibliometrics and Internet: Some observations and expectations. *Scientometrics* 50: 59–63.

WOUTERS, P., LEYDESDORFF L. (1994), Has Price's dream come true? Is scientometrics a hard science? *Scientometrics*, 31: 193–222.

WOUTERS, P. (1999), *The Citation Culture*. PhD Dissertation, University of Amsterdam. (Particularly, Chapter 7: Scientometrics).

Received September 24, 2001.

Address for correspondence:
ANDRÁS SCHUBERT
Library of the Hungarian Academy of Sciences
P. O. Box 1002
H–1245 Budapest, Hungary
E-mail: schuba@helka.iif.hu