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van de Kaa, Geerten

Publication date
2017

Document Version
Final published version

Citation (APA)
van de Kaa, G. (2017). *Positioning the Journal of ICT Standardisation*. (pp. 1-12).

Important note
To cite this publication, please use the final published version (if applicable).
Please check the document version above.

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Positioning the Journal of ICT Standardisation

Geerten van de Kaa; Henk de Vries

Abstract
Next to the *Journal of ICT Standardisation* (JIS), three other scientific journals exist that address ICT standardisation. In previous papers we have analysed two of these, *International Journal of IT Standards and Standardization Research* and *Computer Standards and Interfaces*, in the form of a citation analysis. In this analysis the main issue was to analyze to which extent the journals have a technical or a non-technical focus. This paper adds the analysis of the third journal: *IEEE Communications Magazine*. JIS itself is too young to already do such an analysis for. However, building on the analysis of the three other journals we discuss the current and possible future positioning of the JIS. We conclude that JIS can position itself as the journal that provides practitioners with comprehensive insights of ICT standardization based on sound academic research.

Keywords: Communications, technical journal, citation analysis.

1. INTRODUCTION

In 2013 the landscape of scientific journals on standardization was enriched with the Journal of ICT Standardisation. The journal 'aims to publish standardized as well as related work making "standards" accessible to a wide public - from practitioners to new comers,' and 'aims at publishing in-depth as well as overview work including papers discussing the standardization process and those helping new comers to understand how standards work'. Its scope is to 'bring up-to-date information regarding standardisation in the field of Information and Communication Technology (ICT) covering all protocol layers and technologies in the field.' Aim and scope show overlap with the journals *Computer, Standards & Interfaces* (hereafter abbreviated to CSI), the *International Journal of IT Standards & Standardization Research* (IJITSSR), and the Standardization Supplement of *IEEE Communications Magazine* (hereafter IEEE CM).

De Vries (1999) refers to Kuhn (1962) in describing how the field of standardisation has developed. Kuhn's fourth phase of the development of a discipline, the cluster period, includes the emergence of scientific journals. CSI was the first one, in 1986. In 2003, the first issue of IJITSSR was released. In 2016, its scope was broadened to all technical and business fields without a focus on IT anymore and the name was changed into *International Journal of Standardisation Research* (IJSR).

Van de Kaa, G., De Vries, H.J. 2017. Positioning the journal of ICT standardization. Working paper, Delft, The Netherlands

This paper aims to discuss this new journal in relation to the three other journals. In two previous papers we have analysed CSI (van de Kaa & de Vries, 2015) and IJITSSR (van de Kaa, Blind & de Vries, 2013) by studying citations in these journals and references to these journals. In this paper we will first summarize the findings of those studies. Then we do a similar analysis for the third journal, IEEE CM. JIS itself is too young to already do such an analysis. However, building on the analysis of the three other journal we end this paper with a discussion of the current and possible future positioning of the JIS.

2. COMPUTER STANDARDS & INTERFACES

CSI states at its home page that the journal: 'provides information about activities and progress on the definition of computer standards, software quality, interfaces and methods, at national, European and international levels; publishes critical comments on standards and standards activities; disseminates user's experiences and case studies in the application and exploitation of established or emerging standards, interfaces and methods; offers a forum for discussion on actual projects, standards, interfaces and methods by recognised experts; stimulates relevant research by providing a specialised refereed medium'. This description suggests a technical focus. Our previous analysis of CSI adresses the question if CSI has indeed such a technical focus or a more non-technical one. We investigated this by means of a citation analysis: to which journals do papers in CSI refer and which journals have references to articles in CSI. We found that the majority of the publications in the journal are indeed of a technical nature. Furthermore, the papers that are cited in CSI are also mostly of a technical nature. In fact, the top ten technical primary disciplines of research papers cited in CSI articles include the categories '*Computer Science, Hardware & Architecture', 'Computer Science, Information Systems', and 'Engineering, Electrical & Electronic'* (Van de Kaa and De Vries 2015). Articles published in CSI constantly cite research from various technical disciplines, but there are also a limited number of references to non-technical literature. Mostly technical journals cite CSI papers, with a few exceptions of non-technical journals. We conclude that CSI stays within its scope of computer standards and interfaces interpreted in a technical sense. Also, the top three journals that cite CSI articles (in 2011, 2012, and 2013) are 'Computer Standards & Interfaces', 'Expert Systems with Applications', and 'IEEE Transactions on Instrumentation and Measurement'. Thus, it appears that both CSI is mostly welcoming technically oriented contributions and that these papers are cited in other technical journals.

3. INTERNATIONAL JOURNAL OF ICT STANDARDS & STANDARDIZATION RESEARCH AND INTERNATIONAL JOURNAL OF STANDARDIZATION RESEARCH.

During the years of its existence, 2003-2016, IJITSSR intended to be 'a platform for presenting, and discussing, the broad variety of aspects that make up IT standards research. This includes, but is certainly not limited to, contributions from the disciplines of computer science, information systems, management, business, social sciences (especially science and technology studies), economics, engineering, political science, public policy, sociology, communication, and human factors/usability. In particular, the journal wants to both support and promote multi-disciplinary research on IT standards; 'IT' should be understood in a very broad sense'. Again we did a citation analysis. We found that although the scientific impact of JITSR is comparatively low, it is recognized in different disciplines. The top three journals cited in JITSR publications in 2008, 2009, and 2010 are in fact from particular disciplines: economics, business and management. However, disciplines that cite papers in JITSR include management, computer science/information systems, and information science & library science. Still, one can conclude that JITSR publications are sometimes IT-specific but more often more general and relating to business management and economics. So the main focus is non-technical and this is really the journal's policy – purely technical submissions get a desk-reject.

The recent decision to drop the IT focus and change the journal title into *International Journal of Standardization Research* lead to a reformulation of the journal's mission: 'to publish research findings that will advance knowledge relating to standards and standardization for diverse settings and applications. IJSR aims to be an authoritative reference source and a prime outlet for scholarly information within the standardization research community. By focusing on emerging research and trends in this field, IJSR targets researchers, scholars, policy-makers, managers, and practitioners from both businesses and standards organizations and decision makers.' Because of the non-technical focus of its predecessor the change in scope is actually not that big because the contribution already were more on standardisation as such than on IT standardisation but now also empirical data from outside the ICT field are welcomed as well.

4. IEEE COMMUNICATIONS MAGAZINE

4.1 Introduction

IEEE CM is an international journal that provides a platform for publishing research work in the areas of light-wave telecommunications, high-speed data communications, personal communications systems (PCS) and ISDN. The magazine is published by the *IEEE Communications Society* and includes special features, technical articles, book reviews, conferences, short courses, standards, governmental regulations and legislation, new products, and

Society news. This paper presents a citation analysis of IEEE CM for the years 2011-2013. The scope of the journal is:

"The IEEE Communications Society promotes the advancement of science, technology and applications in communications and related disciplines. It fosters presentation and exchange of information among its members and the technical community throughout the world. The Society maintains the highest standard of professionalism and technical competency." (IEEE Communications Magazine, 2014[1]).

Thus, IEEE CM. aims to publish papers that are primarily related to (tele)communications and its related fields. Telecommunication systems are designed, produced, installed and used – all human activities – so telecommunications might be studied by social sciences as well such as design sciences, business science, psychology and ergonomics. Moreover, the systems are intended to be beneficial for stakeholders, which might be studied by business scientists or economists. Furthermore, legal issues apply – something for researchers in the field of law. The role of governments might be studied by political scientists or researchers in the area of policy studies. Therefore, articles in IEEE CM cite journals in such social sciences. These journals are outside the field of communications but still relevant for the discipline. Similarly, we expect many articles which are outside the scope of communications to cite papers from IEEE CM. Thus, our objective is to analyse to which extent IEEE CM extends the technical and non-technical fields.

We perform a citation analysis of IEEE CM for the years 2011-2013 and focus on determining the number and type of journals that the articles in IEEE CM refer to and vice versa. This includes the journal's primary field, the articles' date of publication and the name of the journals. Next, a keyword analysis is done. Keywords used in the articles were divided based on the two categories in Web of Science – Science and Social Science. Once this was completed, we analysed the keywords under the Science category further to see how much the keywords matched with the mission statement of the journal. Analysing the keywords is one way of knowing what the research is about, hence it is a valuable and suitable indicator to find out the different types of articles that are published in IEEE CM. We start with describing our methodology and then we present our results. We conclude with a discussion of the results and the limitations of the analysis.

4.2 Methodology

The electronic database that was used for the citation analysis is ISI Web of Science that is available on the Internet by Thomas Reuters. Web of Science provides a citation analysis and search service addressing thousands of academic and scientific journals in a huge variety of research fields. The

[1] *http://www.comsoc.org/about/VisionandMission.*

two main databases that will be dealt with in this analysis are Science and Social Science. Both databases have indexed journals dating back to 1900 and have information of bibliographic information and citations data.

We used Web of Science to collect the 667 papers published in IEEE CM from the year 2011 to 2013 to determine the number of citations in and references to each paper (see table 1). The year of publication citation, source, and the primary discipline of references and citations in IEEE CM were recorded in a database. Not all the articles referenced in IEEE CM were indexed in Web of Science. Books, book chapters, and conference proceedings were excluded from this analysis.

IEEE CM	2011	2012	2013	Overall
Total Listed References in IEEE CM	2487	1415	2002	5904
Total Web of Science Listed References	529	622	374	1525
Total Citations of IEEE CM	1052	309	12	1373
Total Web of Science Indexed Citations	671	225	12	908

Table 1: Number of References and citations in IEEE CM. Articles - Non-indexed and Indexed in Web of Science

Using Web of Science, the discipline of each reference and citation was determined and added to the database. If there was more than one discipline to which the journal of the article belonged to, then only the primary discipline was included for the analysis. Thus at the end of this step, we had a database of articles with their primary discipline cited in IEEE CM and cited by IEEE CM which are indexed in Web of Science. From these data, we constrained our analysis only to the primary discipline and the source of the references and the citations. The discipline and the source are sufficient to track the extent to which the journal extends the technical fields and beyond.

Next, the keywords mentioned in each of the articles were collected and categorized in two levels. The first categorization was done by mapping each keyword to the Science or Social Science category of Web of Science. This was done by skimming through the abstract of each paper and determining to which category the article contributes to. The second level categorization involved splitting the Science Category keywords into sub-disciplines, which we defined from the journal's mission statement.

4.3 Results Part 1: Articles cited by IEEE CM

4.3.1 Primary Field

Once the database was created, we ordered the database based on the number of articles indexed in a discipline, from highest to lowest. Table 2 shows a list of 10 most cited primary disciplines by the IEEE CM articles. Out of the 1525 references, 1298 references (85%) are from the first four most cited disciplines; (1) Engineering, Electric & Electronic, (2) Computer Science Information Systems, (3) Computer Science Hardware & Architecture, and (4) Automation & Control Systems.

Primary Discipline	**# Articles cited in IEEE CM**	**Median Impact Factor**	**Aggregate Impact Factor**	**Aggregate Immediacy Index**	**Cited Half Life**	**Citing Half Life**
Engineering, Electric & Electronic	794	1.104	1.631	0.271	7.0	7.2
Computer Science, Information Systems	223	0.922	1.394	0.264	7.0	7.3
Computer Science, Hardware & Architecture	217	0.981	1.238	0.235	9.0	7.3
Automation & Control Systems	64	1.235	1.835	0.277	6.9	8.0
Computer Science, Software Engineering	29	1.000	1.142	0.213	7.9	7.5
Optics	24	1.163	2.216	0.546	6.1	7.0
Telecommunication	23	1.000	1.341	0.213	6.3	6.8
Computer Science, Artificial Intelligence	16	1.236	1.879	0.299	7.5	8.1
Multidisciplinary Sciences	16	1.250	3.170	0.610	5.4	7.0
Operations Research & Management Science	16	1.365	2.769	0.559	5.9	6.6

Table 2: Details of top 10 most frequently cited primary disciplines by articles that are cited in IEEE CM Articles

In the top ten most cited primary disciplines, only one of them belongs to the social science category of Web of Science, namely Operations Research & Management Science which accounts for 16 references (1%). The top 4 of most cited disciplines are cited most in each the 3 years – 2011, 2012 and 2013.

Totally 17 references (1%) belong to the Social Science Category. The 17 references are from 12 primary disciplines including e.g. Economics and Business. Specific scientometric details of these disciplines are available upon request.

From the analysis of references and their primary disciplines, it can be observed that IEEE CM articles mostly refer to electric and electronic engineering, computer science and automation and control systems, substantially more than 'strictly' telecommunications. But of course these are related or even overlapping technical fields. IEEE CM still refers to some social science disciplines such as Business, Economics and Operations research but this is very limited. Apparently the journal prefers to be a technical journal.

4.3.2 Source Journal

The next phase of analysis involves categorizing the references based on their journal. This was done to see the further extent to which IEEE CM is technical. Table 3 shows the top 10 most cited journals. In line with the primary discipline results, the journals that were most frequently referred to belong to the top 4 primary disciplines.

Journal in which the article cited in IEEE CM was published	# Articles cited	Primary Discipline
IEEE CM	306	Engineering, Electric & Electronic
Journal of Lightwave Technology	75	Engineering, Electric & Electronic
IEEE Wireless Communications	61	Computer Science, Hardware & Architecture
IEEE Journal on Selected Areas in Communications	53	Engineering, Electric & Electronic
IEEE Transactions on Wireless Communications	51	Engineering, Electric & Electronic
IEEE Network	49	Computer Science, Hardware & Architecture
IEEE Transactions on Information Theory	48	Computer Science, Information Systems
IEEE Transactions on Communications	42	Engineering, Electric & Electronic
Proceedings of the IEEE	40	Automation & Control Systems
Computer Communication Review	39	Computer Science, Information Systems

Table 3: Details of top 10 most cited journals in IEEE CM Articles in 2011-2013

The few journals in the Social Science cited by IEEE CM were from 'Operations Research & Management Science', 'Psychology', 'Economics' and 'Business, finance'.

In order to determine the consistency of citing articles from other disciplines, we divided the cited disciplines based on the number of times each discipline had been referred to in the period 2011-2013. For example, Engineering, Electric & Electronic was referred to in all the three years whereas

Behavioral Science was referred to only for 1 year which is 2011. From the result of this analysis, 12 of 49 disciplines were cited for all three years and 9 disciplines were cited in 2 years while only 28 disciplines in one year. Of these 12 disciplines that were cited continuously for 3 years, Operations Research & Management Science is the only discipline from the Social Science category, the rest were from the Science category.

4.4 Results Part 2: Articles that cite IEEE CM

Once the analysis for the references was completed, we continued the same procedure to analyze the articles that cited articles of IEEE CM which were published in 2011, 2012 and 2013. Between 2011 and 2013, there were 667 articles published in IEEE CM. Table 4 shows that the number of articles that were cited only once was 97 whereas 41 articles were cited more than 7 times. Of the 667 articles, 395 articles have not been cited at all, which means 40% of IEEE CM have been cited.

Citation Count	2011	2012	2013	Total
0	98	183	114	395
1	45	50	2	97
2	25	19	1	45
3	28	8	0	36
4	14	6	0	20
5	13	2	0	15
6	7	1	0	8
7	9	1	0	10
>7	36	5	0	41
Total Articles Published in IEECM	275	275	117	667

Table 4: Frequency of Citations (2011-2013)

4.4.1 Primary Field

The top 10 list of primary disciplines that cite the IEEE CM articles are listed in Table 5 and, as expected, IEEE CM had a very high number of citations. However, the top 4 of primary disciplines that cite IEEE CM articles differs from the top 4 disciplines that IEEE CM articles cite. This shows that articles from other disciplines cite IEEE CM articles as well. 85% of the citations to IEEE CM articles come from the top 4 primary disciplines. Of the 10 top disciplines, Operations Research & Management Science is the only discipline that belongs to the social science category of Web of Science with 25 citations. Apart from that, there are no citations that belong to the Social science category. Apparently, IEEE CM is not recognized as a potential source for articles in the social science category.

Primary Discipline	# Article that cite IEEE CM
Engineering, Electrical & Electronic	466
Computer science, Information Systems	148
Telecommunications	75
Computer Science, Hardware & Architecture	73
Optics	40
Operations Research & Management Science	25
Automation & Control Systems	22
Computer Science, Software Engineering	10
Chemistry, Analytical	9
Computer Science, Artificial Intelligence	9

Table 5: Top 10 of Primary Disciplines of Articles that cite IEEE CM Articles (2011, 2012, and 2013)

4.4.2 Source Journal

Table 6 shows the list of top 10 sources of articles that cite IEEE CM articles. The sources of the articles that cite IEEE CM Articles are again very closely related to the electrical and electronic discipline but include 68 citations from the journal itself. The top 10 sources account to 48% approximately of the total number of citations. Complementing the results from comparing the primary discipline and citations, the results from comparing the source journal and the citations also shows that IEEE CM has been primarily a technical journal and is very much focused on its primary discipline of Engineering, Electrical & Electronic.

Citing Article Source Name	# Article that cite IEEE CM
IEEE CM	68
Eurasip Journal on Wireless Communications and Networking	58
IEEE Transactions on Wireless Communications	49
Journal of Lightwave Technology	44
IEEE Communications Letters	35
IEEE Journal on Selected Areas in Communications	35
International Journal of Distributed Sensor Networks	30
IEEE Transactions on Communications	29

IEEE Transactions on Vehicular Technology	28
Optics Express	27

Table 6: Top 10 Journal Names of Articles that cite IEEE CM Articles (2011, 2012, and 2013)

5 DISCUSSION AND CONCLUSION

In previous research (Van de Kaa, Blind et al. 2013, Van de Kaa and De Vries 2015) we analysed the International Journal of IT Standards & Standardization Research (IJITSSR) and Computer Standards & Interfaces (CSI). We concluded that the first one is multidisciplinary and on-technical, whereas CSI focuses on the technical contents of standards. This also implies that IJITSSR is more about the process of developing standards, the implementation and the impacts, whereas CSI primarily addresses the resulting standards. This paper adds an analysis of a third journal, IEEE CM. Our analysis of IEEE CM articles shows that the journal's focus is almost entirely technical. Using the ISI Web of Science database to analyse the references that IEEE CM articles have used we found that only a negligible number of references belonged to the social science category and the rest are related to the science category of the ISI Web of Science. Similarly, most articles that cite articles in the IEEE CM are technical in nature and belong to the science category. The few non-technical ones (and that belong to the social science category) are mainly from business and economics. Thus, IEEE CM has interpreted its scope in a technical way. We have validated the results obtained through the citation analysis by means of a keyword analysis. This analysis confirms the technical nature of the papers. However, the recent addition of a standardization supplement may change this technical focus.

Here we should mention that two other standardisation journals are available. The *International Journal of Services and Standards* 'presents current practice, models, and theory in both services and standards development, design, management, implementation, and applications. Its objectives are to develop, promote and coordinate the development and practice in services and standards'. This touches JIS' scope in the case of the application of ICT standards and interfaces in service sectors. In the past, the *International Journal of Services and Standards* published only a few articles on the application of ICT standards, whereas recently many of the papers have focused on this subject. Surprisingly, quite some papers in this journal are not about standards or standardisation at all.

Another journal is the *Journal of Standards and Standardization*. It covers all areas of standards and standardization, with no limitation to a certain technical or business area. So far it mainly serves as an outlet for the growing South-Korean standardization research community and most papers are in Korean language.

The most recent initiative, by the International Telecommunication Union ITU, is the announcement at the WSC Academic Day 2016 of an ITU journal. This journal might publish papers presented at the yearly ITU Kaleidoscope conference. Then the focus would be rather technical.

To summarize, the landscape of scientific journals on ICT standardisation shows two well-established journals with a technical focus: CSI for the IT side and IEEE CM for the telecommunications side. Both in a technical and in a market sense an integration of IT and telecommunications can be observed and this can be seen in the topics addressed in these two journals – these overlap. The difference is that standardisation papers in IEEE CM used to be scarce whereas CSI has standardisation papers only, but the introduction of the Standardisation Supplement to IEEE CM changes this. Another difference is that IEEE CM is more practice oriented and whereas CSI is fully academic. The latter also applies to a large extent to the main non-technical standardisation journal IJSR. It got rid of its previous IT focus.

In this journal context, JIS has been launched. From the outset it has integrated IT and telecommunications in ICT, and in its first volume it had both technical and non-technical papers. In the next volumes it moved almost entirely to technical papers. The papers describe practice rather than develop scientific theories. If the journal keeps its current scope then the positioning is not fully clear and there is overlap with each of the mentioned journal, probably most with the announced ITU journal. Actually, JIS itself had a special issue filled with papers presented at an ITU Kaleidoscope conference. In terms of theoretical contribution the challenge for this journal may be to address the typical contents of ICT standards and the characteristics of its business domain with the way these standards are developed, selected and implemented, and the impacts they have. For example, The ICT sector has the largest share of consortia to develop standards whereas many other fields rely more on formal standardisation. Moreover, time to market is shorter and IPR plays a more prominent role. Often in the ICT sector, fierce standards war are fought (see e.g. (Khazam and Mowery 1994, Shapiro and Varian 1999, Fontana 2008, Van de Kaa, De Vries et al. 2014, Van de Kaa, Van den Ende et al. 2015, Den Hartigh, Ortt et al. 2016)). Currently ICT gets integrated in almost all other fields and this raises new challenges and thus topics for research. If the journal wants to combine this academic focus with a mission to serve practitioners, then the ideal positioning would be a kind of *Harvard Business Review* for ICT standardisation – lessons from sound academic research presented in a condensed form for practitioners.

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