An assessment of systems and software engineering scholars and institutions (2002–2006)

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Abstract

This paper summarizes a survey of publications in the field of systems and software engineering from 2002 to 2006. The survey is an ongoing, annual event that identifies the top 15 scholars and institutions over a five year period. The rankings are calculated based on the number of papers published in *TSE*, *TOSEM*, *JSS*, *SPE*, *EMSE*, *IST*, and *Software*. The top-ranked institution is Korea Advanced Institute of Science and Technology, Korea, and the top-ranked scholar is Magne Jørgensen of Simula Research Laboratory, Norway.

Keywords: Top scholars, top institutions, systems and software engineering, research publications

1. Introduction

Academic and industrial research institutions, along with their scholars, can be evaluated using many different criteria, based on either objective data or subjective surveys. Glass (1994) published the first report to answer the following two questions:

- Who are the most published scholars in the field of systems and software engineering?
- Which are the most published institutions?

A ranking system was devised based on the number of papers each institution and individual scholar, respectively, had published in the following six leading journals in the field of system and software engineering:

- *Transactions on Software Engineering* (*TSE*), IEEE
- *Transactions on Software Engineering and Methodologies* (*TOSEM*), ACM
- *Journal of Systems and Software* (*JSS*), Elsevier Science
- *Software Practice and Experience* (*SPE*), John Wiley & Sons
- *Software* (*SW*), IEEE
- *Information and Software Technology* (*IST*), Elsevier Science

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These journals were selected as the result of a survey of the editorial board of the Journal of Systems and Software conducted in 1991. This study has been repeated annually since then using the same set of journals and ranking formulae, with this being the thirteenth in the series. The objective is to answer the above questions and report the top scholars and institutions in systems and software engineering for 2002–2006.

A major difference between this year's report and the previous report for 2001–2005 (Wong et al., 2008) is the inclusion of the journal *Empirical Software Engineering* (*EMSE*), published by Springer. This change was made to emphasize the importance of applied software engineering research with a strong empirical component. Only the 2006 publications in *EMSE* are included, while those from 2003–2005 have not been considered. These earlier publications are omitted not because of resource or time constraints, but to ensure a smooth transition without disturbing the results of the previously published reports. Furthermore, conference proceedings are not included in the report as the result of an academic decision, not owing to limitations of the manual process as suggested by Ren and Taylor (2007).

Some critics argue that "quantity" should not be emphasized over "quality" or "value," but rather that the correctness, importance, novelty, and contribution of each paper should take precedence (Parnas, 2007). However, this style of assessment introduces subjective aspects such as the competence and biases of the reviewers (Meyer et al., 2009), and the significant time investment required to complete a thorough review of a paper substantially reduces the number of publications that can feasibly be surveyed. Counting citations is a proposed enhancement to the publication-counting method, although this also suffers from drawbacks. Parnas observes that a citation may imply critique rather than praise, or it may simply be a neutral inclusion by the author to prove familiarity with existing publications. Although the development of a more comprehensive and accurate assessment process for researchers and institutions is an important goal, the publication-based ranking method can still provide useful data (Geist et al., 1996).

In summary, we confine our study to the field of systems and software engineering, rather than attempting to address the entirety of computer science or information systems. Our publication-based ranking is not implied to be the only meaningful evaluation mechanism, but it does provide some quantitative guidance toward answering the two questions raised at the beginning of this section.

The rest of the paper is organized as follows: Section 2 reports our findings on the top scholars and Section 3 gives the top institutions. The correlation between top scholars and institutions is examined in Section 4.

2. Top Scholars

The top scholars in the field are shown in Table 1. The scores, based on their publication history in the seven journals we surveyed in 2002–2006, range from 10.50 to 4.00. We have two ties in the rankings at the 5th and 15th places, respectively. This brings the total to 16 top scholars. Geographically, seven scholars are from the Asia-Pacific region, six are from Europe, and three are from the North America. Taiwan has the highest number of top scholars (three), followed by Norway, Sweden, Korea, and USA with two scholars each. China, United Kingdom, Canada, Greece, and Australia have one each.

Magne Jørgensen from Simula Research Laboratory, Norway, the top scholar from the 2001-2005 survey, once again is in first place with a score of 10.50. The runner-up is Hai Zhuge from the

Chinese Academy of Sciences, China. The third place is Shih-Chien Chou from National Dong Hwa University, Taiwan.

Table 1. Top scholars in the field of systems and software engineering

Rank	Scholar	Scores of each journal							Total score	Previous rank
		TSE	TOSEM	SPE	JSS	IST	SW	EMSE		
1	Magne Jørgensen, Simula Research Laboratory, Norway	4.1	0	0	2	2.9	1.5	0	10.5	1
2	Hai Zhuge, Chinese Academy of Sciences, China	0	0	0	7.1	1	0	0	8.1	2
3	Shih-Chien Chou, National Dong Hwa University, Taiwan	0	0	0	5.4	2.5	0	0	7.9	4
4	Lionel Briand,[†] Simula Research Laboratory, Norway	4.4	0	0.5	0.8	0.5	0	0	6.2	4
5	Barbara Kitchenham, Keele University, UK	1.6	0	0	0.9	1.8	1.2	0	5.5	2
5	Per Runeson, Lund University, Sweden	1.2	0	0	0.6	0.5	2.5	0.7	5.5	-
7	Chin-Wan Chung, Korean Adv. Inst. Sci. & Tech., Korea	0	0	0	3.4	2	0	0	5.4	8
8	Claes Wohlin, Blekinge Institute of Technology, Sweden	1.2	0	0.7	1.1	0.7	0.8	0.7	5.2	-
9	James Miller, University of Alberta, Canada	0.7	0	0	2.3	2	0	0	5.0	10
10	Richard Lai, La Trobe University, Australia	1.4	0	0.7	1.3	1.5	0	0	4.9	-
11	Ioannis Stamelos, Aristotle University of Thessaloniki, Greece	0.5	0	0	2.6	1.1	0	0.5	4.7	12
12	Jeff Tian, Southern Methodist Universirty, USA	2.2	0	0	0.7	0	1.7	0	4.6	7
13	Myoung-Ho Kim, Korean Adv. Inst. Sci. & Tech., Korea	0	0	0	3	1.5	0	0	4.5	9
14	Chin-Yu Huang, National Tsing-Hua University, Taiwan	0.5	0	0	3.7	0	0	0	4.2	-
15	Jan Bosch,[‡] Intuit, USA	0	0	1	2.5	0.5	0	0	4.0	13
15	Chin-Chen Chang, National Chung Cheng University, Taiwan	0	0	0	4	0	0	0	4.0	-

[†]Lionel Briand was previously with Carleton University, Canada

[‡]Jan Bosch was previously with University of Groningen, The Netherlands.

There are five "new" scholars that were not on the previous list: Per Runeson from Lund University, Sweden (tied for 5th place); Claes Wohlin from Blekinge Institute of Technology, Sweden (8th place); Richard Lai from La Trobe University, Australia (10th place); Chin-Yu Huang from National Tsing-Hua University, Taiwan (14th place); and Chin-Chen Chang from National Chung Cheng University, Taiwan (tied for 15th place).

Table 1 also shows the score with respect to each journal for each scholar. None of them had any publication in *TOSEM* from 2002 to 2006. The next most missed journals are *SPE* (12 out of 16) and *SW* (11 out of 16). Every scholar had at least one publication in *JSS*. The data on *EMSE* should not be misinterpreted because, as explained in Section 1, only the publications in 2006 of that journal are included.

Table 2. Research focus of top scholars

Rank	Scholar	Research focus
1	Magne Jørgensen	Judgmental processes in software cost estimation
2	Hai Zhuge	Internet-based systems
3	Shih-Chien Chou	Software development process, software reuse, information flow control, and agent-based software development
4	Lionel Briand	Software testing and model-driven development
5	Barbara Kitchenham	Cost estimation, metrics, and evidence-based software engineering
5	Per Runeson	Empirical software engineering, testing, inspections, and software quality management
7	Chin-Wan Chung	Database, web, and multimedia
8	Claes Wohlin	Empirical software engineering, software management, software process, and requirements engineering
9	James Miller	Web engineering, security and privacy, and software testing
10	Richard Lai	Software process improvement, software measurement and testing, requirements engineering, component-based software engineering, and human centered computing
11	Ioannis Stamelos	Open source software and empirical software engineering
12	Jeff Tian	Testing and quality improvement, measurement and risk management, and web quality engineering
13	Myoung-Ho Kim	Database and distributed systems
14	Chin-Yu Huang	Software reliability, software testing, and software metrics
15	Jan Bosch	Software architecture design and assessment, software product families, software variability management, and strategic software reuse
15	Chin-Chen Chang	Data engineering, Database systems, Computer cryptography and Information security

Table 2 lists the key words that each top scholar feels best describe their research focus.

3. Top Institutions

The top 15 institutions in the field are shown in Table 3. The scores, based on their publication history in the seven journals we surveyed from 2002–2006, range from 33.38 to 11.73. All the top institutions except for Simula Research Laboratory are from academia. Geographically, eight of the institutions are from Asia (two from Korea, two from Taiwan, two from Hong Kong, one from Singapore and one from China), four from USA, and three are from Europe (with one each from Greece, Sweden and Norway, respectively). Korea Advanced Institute of Science and Technology tops the list with a score of 33.38. It was also in first place in the last survey (2001–2005). The runner-up is Simula Research Laboratory in Norway with a score of 22.35 which was listed at the third place in the 2001–2005 survey. The National Chiao Tung University in Taiwan with a score of 20.75 was the runner-up last time but slipped to third place this year.

Blekinge Institute of Technology, Sweden and Chinese Academy of Sciences, China are at the 11th and 13th places for this survey but were not on the previous list. Other notable advancements are made by the University of Maryland from 11th to 4th, Hong Kong Polytechnic University from 10th to 6th, Aristotle University of Thessaloniki from 13th to 7th, and National Cheng Kung University from 15th to 8th. Giving the most ground are the Georgia Institute of Technology from 6th to 15th, and City University of Hong Kong from 8th to 12th.

With respect to each journal, 12 of the 15 top institutions do not have any publications in *TOSEM* from 2002 to 2006, while only two (Seoul National University, Korea and Chinese Academy of Sciences, China) do not have any publications in *TSE*. The next most missed journal is *SW* (8 out of 15) followed by *SPE* (4 out of 15). All 15 top institutions have publications in *JSS* and *IST*. As explained in Section 1, the data on *EMSE* should not be misinterpreted.

Table 3. Top institutions in the field of systems and software engineering

Rank	Institution	Journals in which published	Score	Prev. rank
1	Korea Advanced Institute of Science and Technology, Korea	All but *TOSEM*, *SW*, and *EMSE*	33.38	1
2	Simula Research Laboratory, Norway	All but *TOSEM* and *SPE*	22.35	3
3	National Chiao Tung University, Taiwan	All but *TOSEM*, *SW*, and *EMSE*	20.75	2
4	University of Maryland, USA	All	18.50	11
5	Seoul National University, Korea	All but *TOSEM*, *TSE*, *SW*, and *EMSE*	14.79	4
6	Hong Kong Polytechnic University, Hong Kong	All but *TOSEM*, *SW*, and *EMSE*	14.61	10
7	Aristotle University of Thessaloniki, Greece	All but *TOSEM*, *SPE*, and *SW*	13.87	13
8	National Cheng Kung University, Taiwan	All but *TOSEM*, *SPE*, *SW*, and *EMSE*	13.54	15
9	Iowa State University, USA	All but *TOSEM* and *EMSE*	13.46	7
10	University of Texas at Dallas, USA	All but *TOSEM* and *EMSE*	12.94	9
11	Blekinge Institute of Technology, Sweden	All but *TOSEM*	12.59	–
11	City University of Hong Kong, Hong Kong	All but *SW* and *EMSE*	12.16	8
13	Chinese Academy of Sciences, China	All but *TOSEM*, *TSE*, *SW*, and *EMSE*	12.16	–
14	National University of Singapore, Singapore	All but *TOSEM*, *SPE*, and *EMSE*	11.78	14
15	Georgia Institute of Technology, USA	All but *EMSE*	11.73	6

4. Correlation between Top Institutions and Top Scholars

We have also analyzed the relationship between the ranking of an institution and the number of top scholars housed there, the results of which are shown in Table 4. Five[1] of the 15 institutions in 2002–2006 had at least one top scholar, with the 1st place Korea Advanced Institute of Science and Technology having two: Chin-Wan Chung (7th place) and Myoung-Ho Kim (13th place). Although an institution's score can be improved by the presence of top scholars, this is not the only important factor in achieving a high ranking.

Table 4. Top institutions and top scholars

Rank	Institution	Top scholar
1	Korea Advanced Institute of Science and Technology, Korea	Chin-Wan Chung and Myoung-Ho Kim
2	Simula Research Laboratory, Norway	Magne Jørgensen and Lionel Briand
3	National Chiao Tung University, Taiwan	
4	University of Maryland, USA	
5	Seoul National University, Korea	
6	Hong Kong Polytechnic University, Hong Kong	
7	Aristotle University of Thessaloniki, Greece	Ioannis Stamelos
8	National Cheng Kung University, Taiwan	
9	Iowa State University, USA	
10	University of Texas at Dallas, USA	
12	Blekinge Institute of Technology, Sweden	Claes Wohlin
12	City University of Hong Kong, Hong Kong	
13	Chinese Academy of Sciences, China	Hai Zhuge
14	National University of Singapore, Singapore	
15	Georgia Institute of Technology, USA	

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1Simula Research Laboratory (2nd place) currently houses two top scholars: Magne Jørgensen (1st place) and Lionel Brand (4th place), but only Dr. Jørgensen was employed there during the 2002-2006 period under consideration.

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