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# The EGOV Research Community: An Update On Where We Stand

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**Abstract.** The body of practical and academic knowledge in e-government has significantly grown over the past decade. New publication outlets in e-government have emerged, and the research agenda has deepened and widened. The paper assesses the current topical orientations and trends in e-government and also updates an earlier study, which profiled the researcher community. The paper documents the productivity and impact of the most prolific scholars in e-government. The center of gravity of e-government research in terms of the location of most prolific scholars has shifted away from North America.

**Keywords:** Electronic Government Research (EGR), EGR topics and themes, EGR disciplinary breakdown; leading EGOV scholars; preferred outlets of publication, Electronic Government Reference Library (EGRL); EGOV-LIST.

## Introduction

Inspecting and assessing the “state of play” in any given academic study domain is beneficial to domain insiders and outsiders alike: It can, for example, provide both parties with insights about (a) where the domain is topically headed and what the major themes under investigation are, (b) who the major contributors are, (c) what the size of the academic community and its output is, and (d) what the most popular outlets for publication are, among a number of other aspects.

For domain insiders such inquiry helps identify and confirm trends in research and also gives feedback to an insider’s own research interest and contribution relative to others in the same study domain. To domain outsiders such inquiry helps overview the domain along a range of criteria that make possible informed comparisons to other domains of study. In particular, in tenure and promotion situations with reviewers and review boards little familiar with the standards and norms of the particular study domain such inquiry and its findings can play an important informative role. For the study domain of Electronic Government this study updates in part the results and findings of earlier studies on the subject [9-12]. It also complements recent findings on “Forums for Electronic Government Scholars” [13].

As the “Release History” of the Electronic Government Reference Library (EGRL, <http://faculty.washington.edu/jscholl/egrl/history.php> – accessed 3/28/2014) shows, which records the peer-reviewed publications in the English language, the volume of new entries into the EGRL has significantly increased in more recent years.

While the worldwide output of peer-reviewed publications in the English language used to average around 300 in the previous reporting period, it more than doubled to an annual volume of over 640 publications between 2009 and 2013 (see Tables 1 and 2).

From its first recognizable beginnings as a new domain of study in the late 1990s through the better part of two decades Electronic Government Research (EGR) has emerged into a solidly multi-disciplinary academic endeavor at the intersection of research streams such as public administration, information systems, computer science, political science, and information science to name a few [8, 11]. As assessed before, the study domain has grown past its infancy [10]. However, except for a recent survey study, which reported on recent topical directions in EGR [12], no comprehensive inquiry on the topical distribution of EGR has been conducted in half a decade. In that way, it appears reasonable and timely to assess the “state of play” as it presents itself based on the entries in the most recent version of the EGRL (version 9.5 as of March 2014). Previous studies have topically portrayed the EGR study domain and also presented the domain’s community structure in terms of geographical provenance, research productivity, and disciplinary breakdown. In this update, we also add the dimension of scholarly impact measured by means of citations (Google Scholar) as well as the Hirsch and I10 indices also reported at Google Scholar.

## **Literature Review**

According to the data in the EGRL versions 9.5, by the end of 2008, the entire body of EGR knowledge amounted to 2974 publications in the English language, 42.3 percent of which represented journal papers, while 48.6 percent were published at conferences and the rest in monographs and chapters in edited books (see Table 1). With these numbers we update and correct some findings presented before [11], which were based on an earlier version of the EGRL (4.4), which had not yet included a number of publications that were added to the EGRL at a later date. However, as found before the study domain in its first decade used conferences as preferred outlets for publications slightly more frequently than journals. This might be owed also to the fact that during that period of time some journals were newly introduced, which have become EGR core journals since [11].

After the discovery and wide recognition of the multidisciplinary nature of contributions to EGR, early discourses from a solely single-disciplinary perspective ceded, and the study domain began accepting its disciplinary diversity as strength rather than a liability [8, 10].

Since 2008 a number of studies have appeared, which presented journal-related geographic, institutional, and academic profiles of the EGR community, mainly for single journals, for example, *Electronic Government*, *International Journal of Electronic Government Research*, and *Transforming Government* [2, 3, 6]. More comprehensive profiles, disciplinary backgrounds, and topical mainstays were presented and discussed based on the data found in the EGRL, which amounted the core group of EGR scholars to 55 individuals and the extended core (of less prolific) EGR scholars to 225 individuals [9, 10].

In 2010, the same study also presented the topical orientations in EGR in this order as mainly focused on

- a) *Management, Organization, and Transformation* followed by topics such as
- b) *Digital Democracy,*
- c) *Electronic Services,*
- d) *Design Studies and Tools,*
- e) *Policy, governance, and law,*
- f) *Infrastructure, Integration, and Interoperability,*
- g) *Information Security,* and
- h) *EGR Foundations and Standards of Inquiry* [10].

A more recent study [12], which was based on survey data from 206 EGR scholars, found a slightly different set of the topical interests, which might indicate that some shift in emphasis and focus might have occurred in EGR. When inspecting the topical areas it is apparent that some topics are new (for example, Social Media, Cloud Services, and Open Data/Big Data), while others are fused into different categories (for example, Digital Democracy into Open Government and Participation). The rank-ordered topical list in the more recent study included

- a) *Open Government and Participation,*
- b) *Transformational Government,*
- c) *Services and Information,*
- d) *Social Media and Social Networking in the Public Sector,* and less prominently on
- e) *Policy, Governance, Ethics, and Law,*
- f) *Cloud Services,*
- g) *Enterprise Architecture,*
- h) *Interoperability in the Public Sector* and
- i) *Open Data/Big Data*

However, while the EGRL-based data reveal what actually has been studied and published, the survey data represent the individual scholarly interest at the time the survey was taken, which may or may not have resulted in actual studies and publications.

In summary, the study domain of EGR has remarkably thrived since the appearance of its initial contributions by the end of the 20<sup>th</sup> century. A sizable global community of scholars has formed around the topics of EGR, and EGR scholars apparently have embraced the multi-disciplinary composition of their domain. Topical interests and orientations in EGR might have slightly changed as a recent study suggests. However, this potential shift has not yet been documented on the basis of hard data from publication records.

## **Research Questions and Methodology**

### **Research Questions**

Taken the insights from the literature review, the current “state of play” in EGR can be assessed along three areas: Based on bibliographic data in the EGRL (version 9.5, March 2014), it can be determined (1) which types of publication outlets are

mostly used in EGR, (2) who are major contributors to the advancement of the study domain in terms of publication output, and what is the leading EGR Scholars' academic impact, and (3) what are the salient topics in EGR in recent years.

**Research Question #1** (RQ #1): What types of publication outlets do EGR scholars preferably use (journals, conferences, and other)?

**Research Question #2** (RQ #2): What publication output do the most prolific EGR scholars contribute, and what is their impact in terms of citations in Google Scholar and citation indices such as the h-index and the i10 index?

**Research Question #3** (RQ #3): Based on the bibliographic data in EGRL version 9.5, what are major topics of interest in the reporting period of 2009 to 2013?

### **Data Selection and Analysis**

*Data Selection.* The Electronic Government Reference Library (EGRL, version 9.5, March 2015) provided the data source for this study. The EGRL was first made publicly available in the fall of 2005 and has been semi-annually updated ever since (see <http://faculty.washington.edu/jscholl/egrl/history.php>). It originally contained 922 references of peer-reviewed academic publications in the English language, which met certain criteria (see <http://faculty.washington.edu/jscholl/egrl/criteria.php>). It has been estimated that the EGRL consistently captures and contains at least 95 percent of the eligible peer-reviewed EGR literature [11], which shields against potential topical, geographical, or author-related bias. Version 9.5 contained a total of 6,283 references, of which 6,242 were selected for data analysis, since they fell into the period from the early beginnings of EGR publication until the end of calendar year 2013.

*Data Extraction and Preparation.* The EGRL 9.5 EndNote X7.1 (Build 9529) reference manager version (see <http://endnote.com>) was used to export the references into the standard tagging Refman (RIS) file format, which is widely used to format and exchange references between digital libraries. By means of the tags, for example, "TY - JOUR" for publication type journal, "AU - Janssen" for an author's name, or "KW - social media," references were extracted and prepared for further processing and analysis. Data had to be harmonized. For example, author names were found in different forms with regard to first names (abbreviated or full). Also, spelling of certain keyword or title terms differed with regard to differences in US versus other spelling variants (for example, "organization" versus "organisation"). Keywords containing multiple terms were concatenated by double equal symbols (==) between the terms so to avoid separation in subsequent analyses of term frequencies. Pre-analysis data preparation and harmonization was performed in part with TextEdit version 1.9 (Build 310) and with Mac Excel 2008 version 12.2.3 (Build 091001). All terms were converted to lower case, the punctuation was removed except for dashes and double equal symbols, as were sparse terms and stop words.

*Data Analysis.* The analysis was mainly carried out using the R statistical package (version 3.0.3, GUI 1.63 Snow Leopard build (6660)). For text mining under R the tm package version 0.5-10 by Feinerer and Hornik [4, 5] was downloaded from the Comprehensive R Archive Network (CRAN) (see <http://cran.us.r-project.org> –

accessed 3/12/2014) and used. Frequencies of author names were counted. For authors with frequency counts greater than 18, which represented the most prolific 51 scholars in EGR, an additional (manual) data collection was performed with regard to the individual author's Google Scholar entry. For each scholar in the list the citation count, the h-index, and the i10-index were recorded if publicly available (<http://scholar.google.com/> - accessed April 15, 2014). Unlike other indices, which only count journal citations, the Google Scholar citation index includes citations of academic work published in journals and also at other outlets such as conferences. The Google Scholar citation index represents a more accurate account of scholarly impact in those study domains and fields, in which weight and value of academic conferences are rated higher than in other fields relative to journals as, for example, it is the case in EGR, where journals and conferences have been rated as equally high [12].

Also, frequencies of entry types (journals, conferences, books, book chapters, and other types) were counted per period (that is, prior to 2004, 2004 through 2008, and annually for the years 2009 through 2013). This portion of the frequency counting was performed in the aforementioned version of Excel.

For the analysis of topical orientations and directions in the publications, the keyword entries (tag "KW") and title entries (tag "TI ") were used. Document term matrices were created via R tm, which listed the frequency counts for each year from 2009 through 2010. Synonyms (for example, "internet voting" and "e-voting" as well as differential spellings such as "e-government" as opposed to "egovernment" or "electronic government" were clustered and frequency counts summed up.

## **Findings**

In the following sections the findings are presented one research question at a time. The results regarding types of publication outlets are presented first (RQ #1) followed by findings with regard to scholarly productivity of the most prolific contributors in EGR (RQ #2), and topical interests and directions (RQ #3).

### **Types of Publication Outlets in EGR (RQ #1)**

As earlier studies had already shown for the period up to the end of calendar year 2008 [10, 12], in terms of number of peer-reviewed publications, conferences had been highly popular outlets for publication of manuscripts among EGR scholars. In that capacity conferences were slightly more popular than journals (see Table 1), which underlines their relative weight and importance in EGR. However, what this study reveals, is that initially journals were more frequently used as outlets of preference: Before 2004 (and for the lack of respective conferences on the subject matter) 47 percent of EGR publications appeared in journals, while (only) 32.2 percent of EGR manuscript were presented at conferences (see Table 1). This ratio between conferences and journals dramatically changed after conferences such as dg.o, the HICSS e-Government Track, and DEXA (later IFIP) EGOV almost concurrently emerged as dedicated forums for the presentation of EGR. In the period between 2004 and 2008, the percentage share of conferences rose from 32.2 percent to 54.7 percent

while the percent share of journals shrank from 47.0 percent to 40.5 percent (see Table 1). By the end of the early growth phase in 2008, conference publications had an overall share of 48.6 percent of EGR publications, while journals represented 42.3 percent of EGR publications. Monographs (3.4%) and book chapters (4.5%) were less frequently used for the presentation of EGR (see Table 1). By the end of the early growth phase the annual volume averaged about 300 EGR contributions with a higher average (433) for the period from 2004 to 2008 (see Table 1). While these results are not entirely new, they present new details about the domain's inaugural (1998 through 2003) and early growth phases (2004 through 2008), which also help better assess the evolution of the domain in the years from 2009 to 2013.

Year	Journal Papers	Conference Papers	Books	Book Chapters	Other	Per-period Totals
<b>Before 2004</b>	381	261	63	91	14	810
<b>Percentages (before 2004)</b>	47.0%	32.2%	7.8%	11.2%	1.7%	100.0%
<b>Averages (before 2004)</b>	76	52	13	18	3	162
<b>2004 through 2008</b>	876	1183	39	44	22	2164
<b>Percentages (2004 through 2008)</b>	40.5%	54.7%	1.8%	2.0%	1.0%	100.0%
<b>2004 to 2008 Averages</b>	175	237	8	9	4	433
<b>Before 2009 Totals</b>	1257	1444	102	135	36	2974
<b>Before 2009 Percentages</b>	42.3%	48.6%	3.4%	4.5%	1.2%	100.0%
<b>Before 2009 Averages</b>	126	144	10	14	4	297

**Table 1 EGR Publications by Outlet Type Before 2009**

As Table 2 details, the number of EGR publications grew despite some year-over-year fluctuations and peaked in 2012 with 747 publications in that year alone. This second rapid growth phase in EGR produced more publications (3268) in the years from 2009 to 2013 than what had been published in total (2974) until then. In other words, when comparing the three periods, it becomes evident that the majority of EGR-based academic knowledge (or, 52.4%) was published in the second rapid growth phase. The average annual volume rose from 162 publications (prior to 2004), over 433 (2004 to 2008) to 654 (2009 to 2013) (see Table 1 and Table 2).

While conference papers maintained the lead over journal publications (45% versus 44.1%), the gap shrank to less a percentage point, or just 29 publications (see Table 2 and Figure 1). When comparing the publication numbers of conferences and journals in a year-over-year fashion it becomes evident that the number of conference publications topped that of journal publications in every single year except for 2013 (see Table 2). In that year, the number conference papers dropped from the year before by 104 (or, over 30%) – see also Figure 1.

Year	Journal Papers	Conference Papers	Books	Book Chapters	Other	Per-year Totals
2009	239	292	29	104	15	679
2010	285	311	21	17	9	643
2011	291	294	17	1	7	610
2012	326	338	47	28	8	747
2013	299	234	14	33	9	589
Totals	1440	1469	128	183	48	3268
Percentages	44.1%	45.0%	3.9%	5.6%	1.5%	100.0%
5-year Averages	288	294	26	37	10	654

**Table 2 EGR Publications by Outlet Type in the Period from 2009 to 2013**

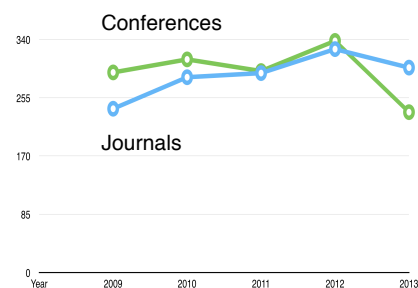
It is noteworthy that the number of book chapters reached an all-time peak in 2009 (a fact mainly owed to the publication of two handbooks with a high number of chapters [1, 7]). Two years later the number of book chapter publications fell to an all-time low of one.

As observed for the period from the beginnings to 2008, so for the period between 2009 and 2013, with about 90 percent conference and journal publications account for the lion's share of all peer-reviewed academic publications in EGR.

In summary, since its inception in the late 1990s the multi-disciplinary study domain of EGR has shown strong growth in peer-reviewed publication output indicating a rising interest in the domain and its phenomena. Despite a dip of publication numbers in 2013, the period of 2009 to 2013 has shown accelerated growth over the previous 5-year period. With 6242 publications the accumulated body of knowledge in EGR is significant in size, more than half of which appeared between 2009 and 2013, that is, most knowledge in EGR has been developed relatively recently.

### **Core EGR Community Academic Contributions and Impact (RQ #2)**

As in the aforementioned earlier study reported [9], a number of 8 publications sufficed in late 2008 to make it into the top group of 55 most prolific contributors in EGR. Five years later it took at least 18 publications to make it into the then smaller group of 51 most prolific contributors in EGR (see Table 4). In the previous study, 19 publications were enough to make the top group of 10 most prolific EGR scholars; 5 years later 36 publications were needed to make the top 10 (see Table 3). Interestingly, the top group remained relatively stable, that is, 7 of 10 of the previously most prolific contributors appeared again in this group 5 years later (Janssen, Gil-Garcia, Pardo, Scholl, Wimmer, Dawes, and Mactintosh).



**Figure 1 Number of Conference and Journal Publications between 2009 and 2013**



Rank	Name	# of Entries in EGRL v 9.5 (March 2014)	h-index (April 15, 2014)	i10-index (April 15, 2014)	# of Google Scholar Citations (April 15, 2014)
1	Marijn Janssen, TU Delft, The Netherlands	85	27	72	2570
2	Ramon Gil-Garcia, CIDE, Mexico City, Mexico	81	22	50	2103
3	Theresa A. Pardo, CTG, SUNY Albany, USA	78	25	56	2548
4	Hans Jochen Scholl, University of Washington, Seattle, USA	62	20	39	1591
5	Maria A. Wimmer, University of Koblenz, Germany	51	20	41	1654
6	Vishanth Weerakkody, Brunel University, Uxbridge, UK	50	23	48	1606
7	Sharon S. Dawes, CTG, SUNY Albany, USA	42	24	38	2302
8	Yannis Charalabidis, University of the Aegean, Samos, Greece	40	13	29	675
9	Ann Macintosh, University of Leeds, UK	37	n/a	n/a	n/a
10	Christopher G. Reddick, University of Texas, San Antonio, USA	36	15	26	1121
11	Luis F. Luna-Reyes, UDLA, Puebla, Mexico	34	16	23	961
12	Paul T. Jaeger, University of Maryland, College Park, USA	32	n/a	n/a	n/a
	Björn Niehaves, Hertie School of Governance, Berlin, Germany	32	19	38	1382
14	Kim N Andersen, Copenhagen Business School, Denmark	29	17	29	1405
	Yogesh K. Dwivedi, Swansea University, UK	29	27	59	2178
	Ake Grönlund, Örebro University, Sweden	29	n/a	n/a	n/a
17	Jörg Becker, University of Münster, Germany	28	38	141	7284
	John C. Bertot, University of Maryland, College Park, USA	28	n/a	n/a	n/a
	Efthimios Tambouris, University of Macedonia, Thessaloniki, Greece	28	16	30	990
20	Miriam Lips, Victoria University of Wellington, New Zealand	26	n/a	n/a	n/a
	Konstantinos Tarabanis, University of Macedonia, Thessaloniki, Greece	26	n/a	n/a	n/a
22	Dimitrios Askounis, National Technical University of Athens, Greece	25	n/a	n/a	n/a
	Muhammad M. Kamal, Brunel University, Uxbridge, UK	25	11	12	426
24	Anthony Cresswell, CTG, SUNY Albany, USA	24	22	31	1396
	Euripidis Loukis, University of the Aegean, Samos, Greece	24	13	23	707
26	Donald F. Norris, University of Maryland, Baltimore, USA	23	n/a	n/a	n/a
27	Zahir Irani, Brunel University, Uxbridge, UK	22	n/a	n/a	n/a
	Ralf Klischewski, German University Cairo, Egypt	22	20	36	1305
29	Frank Bannister, Trinity College, Dublin Ireland	21	n/a	n/a	n/a

**Table 3 Top 51 EGR Contributors (1 to 29)**

As mentioned above, for this study and to the extent they were made publicly available by the authors themselves, the citation indices for the most prolific contributors to EGR were collected from Google Scholar for documenting the relative academic impact of each scholar and the top group collectively..

Rank	Name	# of Entries in EGRL v 9.5 (March 2014)	h-index (April 15, 2014)	i10-index (April 15, 2014)	# of Google Scholar Citations (April 15, 2014)
	Lemuria Carter, North Carolina A & T State University, Greensboro, USA	21	15	17	2041
	Soon Ae Chun, City University of New York, USA	21	18	33	1041
	Ramzi EL-Haddadeh, Brunel University, Uxbridge, UK	21	n/a	n/a	n/a
	Tomasz Janowski, United Nations University, Macao, China	21	n/a	n/a	n/a
	Alberto Polzonetti, University of Camerino, Italy	21	n/a	n/a	n/a
	Yao-hua Tan, TU Delft, The Netherlands	21	n/a	n/a	n/a
36	Enrico Ferro, Enrico Ferro, Istituto Superiore Mario Boella, Italy	20	13	14	489
	M.P. Gupta, Indian Institute of Technology, Dehli, India	20	n/a	n/a	n/a
	Taewoo Nam, Myungji University, Seoul, Korea	20	n/a	n/a	n/a
	Reinhard Riedl, Berner Fachhochschule, Bern, Switzerland	20	n/a	n/a	n/a
	Roland Traunmüller, University of Linz, Austria	20	n/a	n/a	n/a
	Anne Fleur van Veenstra, TU Delft, The Netherlands	20	n/a	n/a	n/a
	Mirko Vintar, University of Ljubljana, Slovenia	20	11	13	526
43	Leif S. Flak, University of Agder, Norway	19	11	11	514
	Olivier Glassey, IDHEAP, Lausanne, Switzerland	19	7	5	176
45	Natalie Helbig, CTG, SUNY Albany, USA	18	9	9	430
	Helle Z Henriksen, Copenhagen Business School, Denmark	18	3	3	45
	Bram Klievink, TU Delft, The Netherlands	18	n/a	n/a	n/a
	Albert Meijer, Utrecht University, The Netherlands	18	16	30	890
	Gregoris Mentzas, National Technical University of Athens, Greece	18	25	51	1960
	Rodrigo Sandoval-Almazan, State Autonomous University of Mexico Toluca, Mexico	18	7	3	161
	Eric W. Welch, Arizona State University, Phoenix, USA (as of 1/26/2014)	18	19	27	1678

**Table 4 Top 51 EGR Contributors (29f to 45) Continued from Table 3**

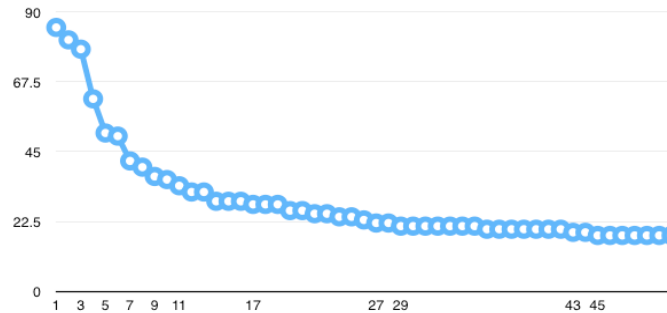
For 31 of the top-51 EGR scholars the information was found and recorded. Also, for 9 of the top-10 EGR contributors this information was publicly available, which provides a sound foundation for assessment of this particular subgroup. The inspection of the citation indices revealed that several authors had relatively high citation indices, while they had relatively low numbers of EGR publications. Upon inspecting the citation counts of these individual authors, one extreme case was found (Becker/Münster/Germany-see Table 3), where the EGR-related citations were low, while the overall citation count (7284) overwhelmingly corresponded to work produced in other fields of study. For preventing undue skewness of EGR-related results, this case was disregarded when calculating the descriptive statistics.

As Table 5 and Figure 2 reveal, with 67 the range in number of publications for the top 51 EGR scholars is quite significant, and the top-10 scholars in EGR make a relatively large overall contribution to the domain in terms of output. However, also in terms of impact, these scholars make a difference: With two exceptions the 10 most

prolific EGR scholars have higher numbers of citations than the mean (1229) and the median (1213); they also have higher h-indices than the mean (16.8) and the median (16.5) as well as higher i10-indices than the mean (29.9) and the median (29.5) in the sample—see Table 5.

Descriptive Statistics	# of Entries in EGRL v 9.5 (March 2014)	h-index (April 15, 2014)	i10-index (April 15, 2014)	# of Google Scholar Citations (April 15, 2014)
Min	18	3	3	45
Max	85	27	72	2570
Range	67	24	69	2525
Mean	29.4	16.8	29.9	1229.0
Median	23	16.5	29.5	1213
Mode	21	20	38	n/a
Std Dev	16.1197	6.2279	17.4884	734.5843

**Table 5** Descriptive Statistics of Top 50 EGR Contributors' Publication Entries and Citation Indices (One Case Intentionally Omitted)



**Figure 2** Distribution of Number of Publications of Top 51 EGR Contributors

In the aforementioned earlier study [9], the geographic provenance of the most prolific EGR contributors based on the location of their academic affiliations was also analyzed. When comparing the numbers of the two samples in the earlier study and in this study, some noteworthy changes have occurred, while other relationships have remained stable. As Table 6 shows, the vast majority of most prolific EGR contributors (90.2%) still comes from either Europe or North America; other geographic areas are either minimally represented. No scholar from South America appeared among the top scholars anymore, while at least one scholar from Africa was still represented in the top group. While no scholar located in Asia made it into the top group in the earlier study, in this study three scholars were found in this group.

However, the most striking change occurred in the ratio between contributors from Europe and North America; while the two groups were of almost equal size in 2008

(Europe= 27; North America=26), the European contingent has grown to 31, while at the same times the North American subgroup of most prolific scholars shrank by 9 to a mere 15, which is less than half the size of its European counterpart (see Table 6).

Provenance of Top 51 EGR Contributors	2009 to 2013		Before 2009	
	Number of Contributors	Percentage	Number of Contributors	Percentage
Europe	31	60.8%	27	49.1%
North America	15	29.4%	26	47.3%
Asia	3	5.9%	0	0.0%
Africa	1	2.0%	1	1.8%
South America	0	0.0%	1	1.8%
Oceania	1	2.0%	0	0.0%
<b>Totals</b>	<b>51</b>	<b>1</b>	<b>55</b>	<b>1</b>

**Table 6 Geographic Provenance of Top EGR Contributors**

### Topics of Focus/Interest in 2009 through 2013 (RQ #3)

As pointed out in the methods section, the manuscript keywords and manuscript titles were used to obtain clues about the topical directions and scholarly interests in the study domain. The keywords were seen as most significant indicators, since they give authors an opportunity to pinpoint their work within a topical range, while manuscripts titles were seen as only ancillary indicators, since titles provide authors with high degrees of freedom and a range of options with regard to exactly specifying or not specifying at all the respective topics.

The keyword cluster of *electronic and transformational government* was by far most frequently counted (532) followed by *information and communication technologies* (160), *e-democracy/e-voting* (112), *e-participation* (90), *government information* (81), *public administration* (77), *digital divide* (65), *services* (58), *technology adoption* (51), and *technology acceptance* (49)-see table 7. When comparing the frequencies of the keyword cluster list with that of the manuscript title term list, the following cluster rankings emerged: again, *electronic government* (1414) was found on top followed again by *information and communication technologies* (509), the term *public* (394), *services* (382), *information & knowledge* (346), *local government* (316), *case/cases* (264), *participation* (257), *development* (242), and *policies/strategies* (242).

The top-two clusters in both keyword and title lists were the same, also in their ranking, while *services*, *information*, *public*, and *participation* appeared in both lists albeit at different ranks. In other words, six keyword clusters were also found among the top topical clusters in the manuscript titles, which indicates a relatively high degree of correspondence between the two. It is also noteworthy that nine of the top-ten topical keyword clusters show trend lines with a positive slope (see the mini-charts

embedded in Table 7). When compared with the findings of the 2013 survey-based study [12], it appears that *transformational government* (including open government), *participation*, *services*, *information and communication technologies* (in terms of *cloud services*, *institutional architecture*, and *interoperability* as a proxy) and *digital divide* form the intersection of topical foci in the respective top-ten focal areas in either study. However, topics such as social media and open/big data, which ranked prominently in the survey-based results, do neither appear in the top rankings of the keyword cluster list nor those of the title cluster list.

	<b>Keyword/Cluster</b>	Frequency 2009	Frequency 2010	Frequency 2011	Frequency 2012	Frequency 2013	Frequency 2009 to 2013	Frequency Charts 2009 to 2013
1	e-government, electronic government, internet in public administration, transformational government	67	42	132	145	146	532	
2	information & communication technologies	5	21	43	43	48	160	
3	democracy, digital democracy, e-democracy, e-voting, internet voting	13	2	42	30	25	112	
4	participation, e-participation, political participation, civic engagement, citizen engagement	5	3	34	28	20	90	
5	information, government information, electronic-government information, public-sector information	12	9	21	27	12	81	
6	government, public administration	3	6	17	13	38	77	
7	access to information, accessibility, digital divide	3	7	17	19	19	65	
8	services, information services, web services, public services, service delivery	2	9	14	20	13	58	
9	adoption, technology adoption, diffusion	2	4	13	16	16	51	
10	acceptance, user acceptance, technology acceptance model	2	3	21	14	9	49	

**Table 7 Most Frequent Topical Clusters based on Keywords (2009 to 2014)**

In summary, the topical directions of EGR in the period of 2009 to 2013 have mainly focused on *electronic and transformational government*, *information and communication technologies* in all its vices, *participation*, *services*, and the *digital divide*. Newer topics such as social media use in and in contact with government, open/big data, and smart government have not made it into the top list of topics.

## **Discussion, Future Research, and Concluding Remarks**

The study's object has been to update and in part triangulate previous studies on the state of play in EGR. This includes the study of the overall numbers of publications in EGR and of the type of publication outlets used (e.g., conferences and journals). Furthermore, individual scholarly output was investigated, the geographic provenance of the most prolific scholars was analyzed, and moreover, this study presented for the first time findings on scholarly impact in terms of citations and citation indices. Finally, the major topical directions in EGR in the period of 2009 through 2013 were analyzed. The three perspectives incorporated in this study help provide a detailed profile of the EGR study domain and its current state of play. Along with the recent study on "Forums for Electronic Government Scholars" [13], this study complements the findings on preferred outlets for presenting EGR and the relative academic weight of these outlets.

### **Some Key Observations**

*Ranking of Publication Outlet Types.* Quite a few disciplines rank order publication outlet types in terms of the outlet type's relative weight and appreciation, when considering the value of the contributions. In some fields, conference contributions are more highly valued than journal contributions (for example, in computer science), or vice versa (for example, in public administration or MIS), or the discipline values books the highest (for example, in philosophy). In EGR journal and conference contributions appear to be on a par in weight. This is not surprising given the multidisciplinary nature of the study domain. As an indicator, with regard to conference and journal publications also the numbers of these two outlet types are on a par in EGR. The low republishing counts consistently found in the EGRL (that is, for example, same or similar author lists, similar title and keywords, same or consecutive years of publication), when searching for duplicates or near-duplicates in EGRL maintenance, are another indicator that the two types overwhelmingly account for original work. As other research [13] found the top-rated conferences were the HICSS e-Government Track, the IFIP EGOV conference, and the dg.o conference whereas the top-rated journals in EGR were Government Information Quarterly (GIQ), Information Polity (IP), Journal of Information Technology and Politics (JITP), Transforming Government (TGPPP), and the International Journal of Electronic Government Research (IJEGR). These outlets appear to attract the lion's share of EGR publications.

*Core EGR Community.* The most prolific contributors have also been referred to as the core community of EGR. While 8 contributions qualified for a spot in the list of 55 top EGR contributors in 2008, the same number was counted for a total of 179 EGR contributors in this study; and with respect to the extended core community, that is, scholars with at least 5 contribution (by the end of 2008), when using the same criterion in this study a list of 396 EGR contributors was produced. In other words, not only has the inner core group significantly increased in size but also the extended core group: when applying the same criteria as in the previous study [9], then the inner group grew by 225%, and the extended core group increased by 76% in the

period of 2009 to 2013. These numbers also explain the overall growth in the number of publications in EGR.

However, the decreased number of scholars from North America in the EGR domain's inner core group presents a serious concern; as seen in the findings section, while the number of scholars in this core group located in Europe and Asia went up during the same period, the number of scholars from North America went down by 42.3%. When scanning the names of North American colleagues who are no longer listed among the most prolific EGR scholars, two circumstances can help explain their absences, that is, (1) lack of EGR-related funding (in the cases of about 8 US scholars), and (b) retirement, either from academia or from work life (in the cases of at least 2 US scholars). Paradoxically, while the Obama Administration has successfully introduced numerous technology-based innovations in government, it also displayed a serious lack of interest in research on the subject. Digital Government as an area of focused research funding by the National Science Foundation was abandoned in 2010 altogether. As a consequence, unlike Europe and other world areas, in which EGR remained to be well funded serving as a driver for continued administrative innovation, the lack of funding of EGR, particularly in the USA, appears to have stifled the scholarly production as well as the academically supported progress of e-government practice in this part of the world. This may over time also impact the attractiveness of conference venues in this geographic area, since local contributions as the backbone of conference attendance may remain relatively low, and it needs to be seen, how well contributions from other parts of the world can make up for the gap. However, the numbers may indicate a shift in the centers of gravity in EGR, which appears to become less North America-oriented and more Europe-based.

*Topical Directions.* It was most surprising that in the topical analysis of both keywords and manuscript titles the terms "social media," "cloud computing," "open/big/linked data," and even "open government" were relatively infrequently found. In the list of keywords, the term "social media" did not make it into the top 20, while in the list of title terms it appeared at rank #15, although with a steep positive slope in its trend line. A future inquiry might find the more recent topical areas of focus more prominently ranked.

### **The Way Ahead in EGR**

In summary, the multi-disciplinary domain of EGR has grown significantly in recent years, and its core scholarship is strong and stable. The study domain has attracted a high number of new contributors from all over the world. As an academically pluralist and global undertaking, EGR may see shifting centers of gravity in its scholarship in the years to come despite the fact that many of its premier outlets for publication remain located in North America.

With a now strong and well-recognized cluster of EGR publication forums [13] tenure and promotion should increasingly become attainable to EGR scholars also in disciplines and institutions, in which EGR is seen as a specialty or niche domain of study. While the acceptance of multidisciplinary research undertakings appears to have grown over recent decades, even making it a necessity for the effective investigation of many phenomena in both natural and social sciences, the evaluation of

scholarly performance might still be influenced more by discipline-internal criteria than criteria reflective of cross-disciplinary achievements. Therefore, for future research it might be interesting to analyze how the career paths of some 400 scholars who represent the EGR core community have actually unfolded over the years. It appears appropriate to reproduce and extend this study in another five years' time.

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