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# WHICH WAY RECORDS MANAGEMENT RESEARCH? A CLUSTER ANALYSIS OF THE KEYWORDS IN RECORDS MANAGEMENT LITERATURE USING SCOPUS DATA, 1971-2018

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## Abstract

This paper evaluates the keywords and subject areas in records management (RM) publications, as indexed in the Scopus database, with a view to mapping RM research from 1971 to 2018 so as to determine the direction of research in the field. A total of 4 762 documents were obtained from the Scopus database using the term records management and searching within the title, abstract and keywords fields. The data was analysed using VOSviewer software. The findings reveal that interest in RM research has grown as the volume of publications has continued to increase. Whereas there was no dominant area of research in the 1980s, as far as RM research is concerned, the main focus in the 2010s was the management of electronic health records, thereby signalling a shift in RM research from being just an information management exercise to being used for the management of records in the medical and health sector. Other popular research areas in the 2010s were health care, electronic medical record/s, information management, medical computing, information systems, and electronic document exchange. A classification of the RM publications according to Scopus's broad subject fields revealed that RM research is mainly conducted in computer science, engineering, medicine, and the social sciences. The study predicts a slow growth in the number of RM publications in the next ten years (2019-2028), greater focus on RM in the health sector, and continued dominance of computer-based systems and electronic records as topics of RM research.

**Key words**: records management; cluster analysis; content analysis; electronic records research publications

## Introduction and background to the study

Records management (RM) is a relatively new occupation, having been identified as such in the early 19th century (Webster 1999), and it is younger than the related fields of information management, librarianship and information science (Yusof & Chell 1998). Nonetheless, it has since gradually grown to become one of the core research areas and courses in the library and information science (LIS) field. Webster (1999) says that RM has transformed from being a profession into its position as a scholarly discipline. In fact, many LIS schools in the world have initiated departments specifically for the purpose of conducting RM courses and research (e.g. DePaul University, Chicago, USA; University of Miami, USA; Moi University, Kenya; Florida Gulf University, USA; University of Barcelona, Spain; National University of Science and Technology, Zimbabwe, among others). The courses on RM are often conducted in conjunction with archival courses, hence the name *archives and records management* as a discipline, field or course, or even as the name of a department teaching courses in this field or subject domain.

The future of records management (RM) has preoccupied a number of scholars and professionals in the past, among which are Newton and Unuigbe (Newton 1996; Newton 1989; Unuigbe 1990) and, in recent times, Bailey (2007), Lee (2009), Warland (2010), Brudno (2012) and Fripp (2017). The renewed debate about the future of RM has been attributed to David Bearman and Margaret Hedstrom who penned an article titled *Reinventing archives for electronic records: alternative service delivery options*, published in 1993 (Bearman & Hedstrom 1993). However, it was J. Michael Pemberton who, a few years earlier, asked, "Does records management have a future?" (Pemberton 1991). At the time, Pemberton raised the following further questions in an attempt to answer his initial questions: "What are our roles?", "Who cares about records management?", "Who's in charge?", "What's in a name?", "What is a records manager?", "Whither records management education?", "Theory and research: who cares?", "Is certification enough?" and "Whither perspectives?" Yusof and Chell noted in 1998 that RM was emerging as a component of information management (Yusof & Chell 1998:25). There are those who believe that RM will change due to the change of focus from records to data, particularly in the fourth industrial revolution (Talbot 2013). This prediction was made in 1996 by Newton who, in his piece in the *Records Management Journal*, said that records managers would become more concerned with business objectives, risk management and data management (Newton 1996).

Evidently, most debates have revolved around the future of RM as a profession, as well as the possible neglect of its future as a research field or academic/scholarly discipline. However, a few of the publications on the future of RM as a profession have attempted to address the implications for RM education and training (Warland 2010). Therefore, there is a dearth of literature as far as the auditing of RM as a research field is concerned. Yet, it is widely acknowledged that research in any given field will most often inform teaching (Hu, Van der Rijst, Van Veen & Verloop 2015) and practice (Sargent & Cohen 1983; Ratcliffe et al. 2004). Practitioners are also increasingly engaging themselves in the conduct of research, thereby shaping the current and future direction of research in different fields, including RM. The symbiotic relationship between the RM profession and the RM academic discipline has led some scholars to conclude that RM is no longer just a profession but is today, without doubt, a scholarly discipline, as predicted by Webster in 1999 (McLeod & Hare 2010). The unanswered questions, which also constitute the key points of investigation in this study, are: "Whither RM research?", "How has RM research fared thus far?", "On which aspects is RM research focused?" and "What factors, if any, have shaped and would perhaps shape the future of RM research?"

## A brief review of the related studies

Limited attempts have been made thus far to assess RM research in general, and its future, in particular. The few studies undertaken have focused on diverse bibliometrics indicators to investigate some aspects of RM research, such as to evaluate journals that publish RM research (Lee 2015; Kim & Kang 2018), to explore the subject content of RM literature (Onyancha 2016; Onyancha & Mokwatlo 2012; Joseph & Hartel 2017), to examine electronic records management research (Hsu et al 2014; Chigariro & Khumalo 2018), to determine research collaboration patterns and trends in RM research (Ngoepe, Maluleka & Onyancha, 2014), and to analyse references and citations behaviour in RM literature (Onyancha, Mokwatlo, Mnkeni-Saurombe 2013; No & Chang 2013). A review of these studies identifies only a handful that have addressed some aspects investigated in the current study. For example, Kim & Kang (2018) conducted an analysis of the *Journal of Korean Society of Archives and Records Management* in order to identify the most frequently researched topics in the journal, the most influencing topics and the widely intervening research topics. Electronic records appeared in the three categories, implying its popularity among researchers

as well as its importance in the current information age. For their part, Hsu et al. (2014) identify clusters of articles and terms that best described the focus of RM research. In terms of articles, the study identified seven clusters, namely: digital preservation, digital repository, critical projects, archiving, electronic records management, metadata and information technology applications. The co-word analysis of the RM literature produced eight clusters – digital preservation, digital repository, digital collections, internet applications, archiving in digital library and government, cases of electronic records and metadata, and standard. Hsu et al.'s (2014) study was not meant to assess the evolution of the RM research and therefore may not assist the scholarly community to understand the progression of RM research.

The study conducted by Onyancha and Mokwatlo (2012) is perhaps the closest to the current study in that it examined, among other things, the shifts in subject heading occurrences in the RM literature published between 1971 and 2009, with a view to determining the emerging topics of RM research. Basing their study on the data retrieved from the Library, Information Science and Technology Abstracts (LISTA), the authors observed that there had been shifts in research focus in RM from 1971 to 2009. RM research had shifted from computers and automation in 1971-1980 to focus on electronic documents, information services, archives, information science, information technology, documentation, websites, electronic information resources and management in 2001-2009. They further identified seven clusters of subject terms that described (a) functions and/or activities in RM, (b) tools or enablers of RM, (c) people involved in RM, (c) institutions involved in RM or in which RM is conducted/researched, (d) information resources that are managed under the umbrella of RM, (e) processes involved in RM and (f) disciplines in which RM is practiced and/or researched. Finally, the authors noted that the most common subject terms in RM literature were "information resources management" (which the database uses to index "information management" literature), electronic records and archives. Onyancha and Mokwatlo's (2012) paper focused on the broad subject headings and title words.

This paper builds on Onyancha and Mokwatlo's (2012) study which targeted RM publications indexed in EBSCO-hosted LISTA database and analysed subject terms in a bid to establish the shifts of research foci in the subject domain. Their use of subject terms revealed the trend and pattern of research in the broad subject areas in RM. Whereas Onyancha & Mokwatlo's (2012) study targeted the controlled vocabulary (i.e. the indexing subject terms), the current study focuses on keywords drawn from the title and abstracts, as well as the author-supplied keywords of RM publications indexed in the Scopus database, in order to identify specific areas of RM research so as to map the trend and patterns of RM research from 1971 to 2018. The mapping of keywords to visualise the patterns of research in a field or subject domain is well documented (Khan & Wood 2015; Liu et al. 2015; Chen, Xiao, Hu & Zhao 2015; Yang, Han, Wolfram & Zhao 2016; Onyancha 2020).

This study (a) tracks the growth of literature on the concept "records management" from 1971 to 2018, (b) maps the keywords describing RM research, and (c) examines the broad Scopus subject fields within which RM research is conducted. In addition, the data forecasting the research trends (figure 2) and the funding institutions (Appendix A) are presented and discussed as a way of explaining the general direction of RM research for the next 10 years after 2018.

## Research methodology

The study obtained its data from the Scopus database. Scopus is the largest bibliographic and citation database and tends to index a variety of journals in social sciences and humanities (Schotten et al. 2018; Pinto, Escalona-Fernández & Pulgarìn 2013; Majid et al. 2015). A search within the *title, abstract* and *keywords* fields using the search phrase "records

management" yielded a total of 5 314 documents published between 1949 and 2019, all years inclusive. We noted, however, that the years between 1949 and 1970 yielded zero to four records each and these were therefore excluded from the study as the number of publications were to be analysed using the computer. The documents published in 2019 (382) and 2020 (8) were excluded as the study was conducted in September 2019 and the 400 records were, therefore, not representative of the publications of 2019 and 2020. These limitations resulted in 4 886 documents meeting the search query requirements. The search was then refined by isolating journal articles, reviews, book chapters, books and conference papers for analysis as these document types are often representative of research outputs and were, therefore, deemed representative of research output in RM. The bibliographic and citation data of 4 762 documents, consisting of 2 309 (49%) conference papers, 2 009 (42%) journal articles, 303 (6%) reviews, 113 (2%) book chapters and 28 (1%) books, as shown in figure 1, were obtained for analysis. The illustration demonstrates the distribution of the documents by type but does not form part of the findings as the study did not seek to examine the RM research's publication formats.

A cluster analysis approach was adopted to conduct data analysis, while cluster networks were used to present the findings. Cluster analysis involves grouping of similar "objects" (points in the attribute space), where the objects can be words, concepts, or names. As Berka (2015: 211) explains, the similarity between and among the objects can be "based on distance (points within short distances from each other form a cluster), or density (dense regions form a cluster)". In this study, concepts or keywords formed clusters based on their co-occurrence in a document. The co-occurrence of keywords was selected as the mode of analysis in VOSviewer, a software tool, the purpose of which is "creating maps based on network data and for visualising and exploring these maps" (Van Eck & Waltman 2019). The clusters were normalised using association strengths. Finally, the study allowed overlapping of clusters in cases where several variations of a keyword existed and were linked to different keywords, therefore belonging to more than one cluster.

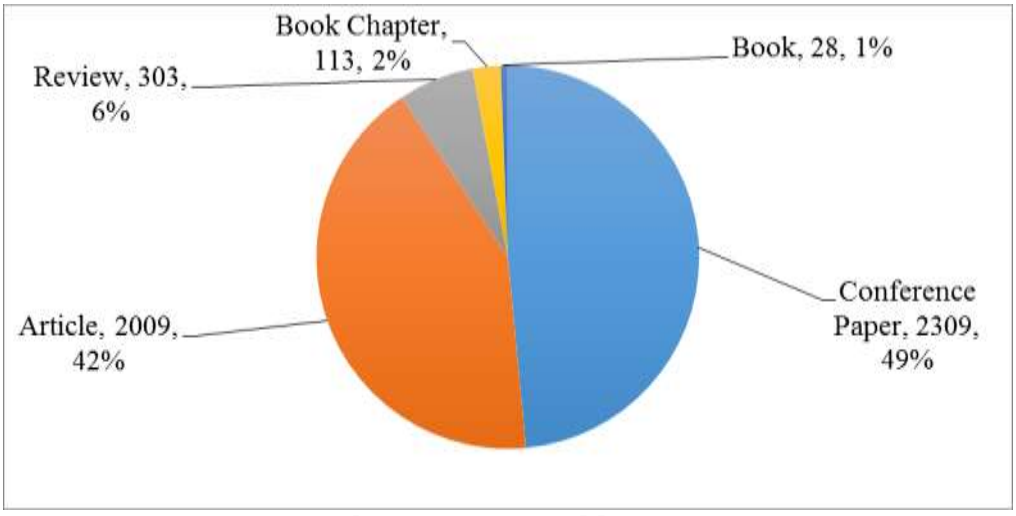


**Figure 1: RM research, 1971-2018: publication types (N = 4762)**

## Results and Discussion

### Trend of RM research publication

The trend of RM research from 1971 to 2018 is depicted in the publications trend over the period in table 1. The table shows that the number of publications on RM has continued to grow over time, from just two in 1971 to 359 in 2018. Furthermore, a comparison of the average number of publications in the five decades of RM research under investigation in the current study revealed that RM research has been on the rise from just 5.3 to 313.5 publications per year in 1971-1980 and 2011-2018, respectively. The other decades posted publication numbers as follows: 1981-1990 (17), 1991-2000 (46.5), and 2001-2010 (156.6). The percentage change in publications growth between years of publication, however, shows a mixture of patterns whereby there are positive and negative figures, signalling upward (increment) and downward (decline) movement in the number of publications respectively. The deepest dip in the number of publications was witnessed in 1973, followed by 1975, 1986 and 1995. The highest positive percentage changes in the number of publications were recorded in the first decade of investigation (1971-1980). Generally, there have been more upward trends in the number of publications than there have been downward trends.

**Table 1: Publication trends in RM research, 1971-2018**

| Year | Publications | % | % Change | Year | Publications | % | % Change |
|---|---|---|---|---|---|---|---|
| 1971 | 2 | 0.03 | | 1995 | 47 | 0.70 | -30.88 |
| 1972 | 3 | 0.04 | 50.00 | 1996 | 59 | 0.88 | 25.53 |
| 1973 | 1 | 0.01 | -66.67 | 1997 | 58 | 0.86 | -1.69 |
| 1974 | 2 | 0.03 | 100.00 | 1998 | 48 | 0.71 | -17.24 |
| 1975 | 1 | 0.01 | -50.00 | 1999 | 48 | 0.71 | 0.00 |
| 1976 | 4 | 0.06 | 300.00 | 2000 | 46 | 0.68 | -4.17 |
| 1977 | 10 | 0.15 | 150.00 | 2001 | 68 | 1.01 | 47.83 |
| 1978 | 11 | 0.16 | 10.00 | 2002 | 80 | 1.19 | 17.65 |
| 1979 | 10 | 0.15 | -9.09 | 2003 | 85 | 1.26 | 6.25 |
| 1980 | 9 | 0.13 | -10.00 | 2004 | 110 | 1.63 | 29.41 |
| 1981 | 11 | 0.16 | 22.22 | 2005 | 157 | 2.33 | 42.73 |
| 1982 | 14 | 0.21 | 27.27 | 2006 | 140 | 2.08 | -10.83 |
| 1983 | 22 | 0.33 | 57.14 | 2007 | 127 | 1.88 | -9.29 |
| 1984 | 19 | 0.28 | -13.64 | 2008 | 184 | 2.73 | 44.88 |
| 1985 | 19 | 0.28 | 0.00 | 2009 | 295 | 4.38 | 60.33 |
| 1986 | 13 | 0.19 | -31.58 | 2010 | 320 | 4.75 | 8.47 |
| 1987 | 12 | 0.18 | -7.69 | 2011 | 307 | 4.55 | -4.06 |
| 1988 | 16 | 0.24 | 33.33 | 2012 | 258 | 3.83 | -15.96 |
| 1989 | 22 | 0.33 | 37.50 | 2013 | 285 | 4.23 | 10.47 |
| 1990 | 22 | 0.33 | 0.00 | 2014 | 295 | 4.38 | 3.51 |
| 1991 | 22 | 0.33 | 0.00 | 2015 | 320 | 4.75 | 8.47 |
| 1992 | 24 | 0.36 | 9.09 | 2016 | 341 | 5.06 | 6.56 |
| 1993 | 45 | 0.67 | 87.50 | 2017 | 343 | 5.09 | 0.59 |
| 1994 | 68 | 1.01 | 51.11 | 2018 | 359 | 5.32 | 4.66 |

Figure 2 predicts that RM research will continue to grow, albeit slowly, over the next ten years. When projected for the next ten years, based on the last five years' performance, the number of publications is likely to increase to about 513 by 2028. The projected number of publications based on the last ten years' performance will be 553 publications by the same

year. The number of publications would have therefore increased by a maximum of 54 per cent from the current 359 publications that were published in 2018. Increased research activities in RM will depend on several factors, including individual attributes such as persistence, resource adequacy, access to literature, initiative, intelligence, creativity, learning capability, stimulative leadership, concern for advancement, external orientation, and professional commitment (Babu & Singh 1998) and organisational attributes such as size of programme and faculty, control of private sector, amount of university revenue, availability of technology and computing facilities, number of books and journals, workload policies, availability of leaves, travel and institutional funds for research, and availability of nongovernmental research funds (Dundar & Lewis 1998).

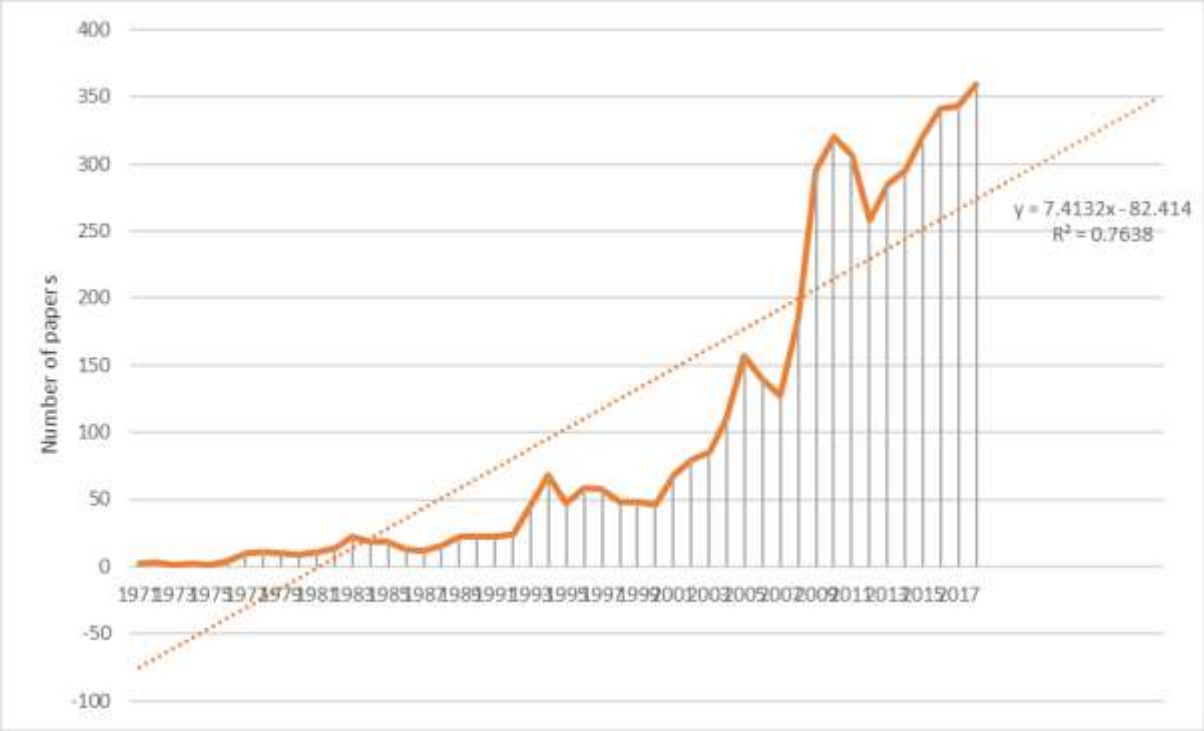


**Figure 2: Projected growth of the number of RM publications, 2019-2028**

## Mapping RM research topics from 1971 to 2018

The mapping of author-supplied keywords and index keywords provided a glimpse of the topics or subjects of RM research between 1971 and 2018. Figure 3 provides a network map consisting of 23 clusters with 239 keywords, 1 420 links and 1 488 total link strengths. There were few keywords that appeared in more than one publication. These were: medical record, that appeared in nine publications, followed by information processing (6), information retrieval systems (6), computers (5), record keeping (5), information systems (5), computer analysis (4), computers (3), forms and records control (3), management (3), records (3), information dissemination – microforms (3) and record-keeping systems (3), just to name those that appeared three or more times. A critical review of the clusters reveals that the prominent keywords revolved around the following themes: processing systems, computers and computer systems, management information systems, and formats of records. The emphasis on computerised records and computer-based records management systems in RM occupied researchers in the 1970s, as reflected in studies such as those by Butler and Nicholson (1979) and LaRue (1979). Control and access were also key focus areas in RM.

The 1981-1990 period witnessed an increased activity in RM research, which resulted in a total of 179 publications, an increase of 237.7% over the 53 publications in 1971-1980. The number of author-supplied keywords and index keywords also increased from 19 to 40 and 285 to 655, respectively.

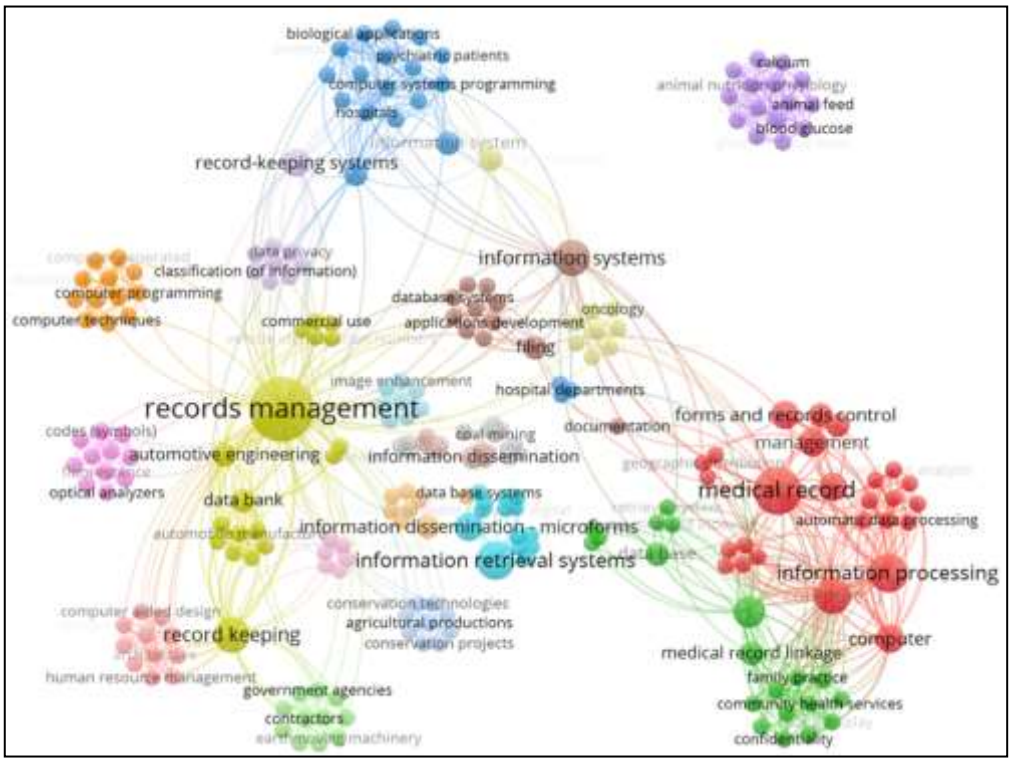


**Figure 3: Network map of keywords in RM research publications, 1971-1980**

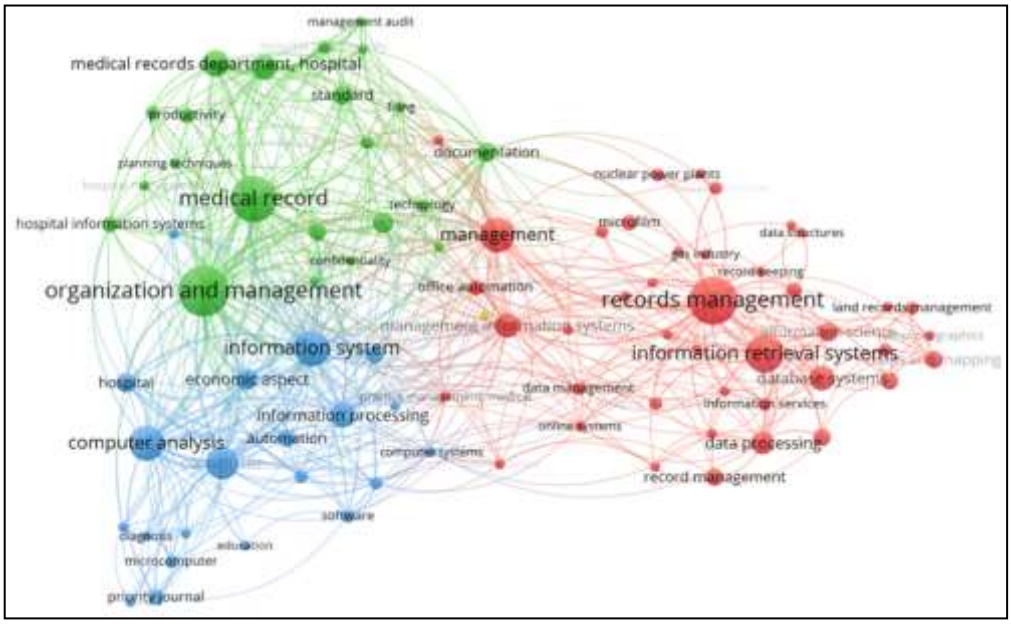


**Figure 4: Network map of keywords in RM research publications, 1981-1990**

Figure 4 visualises a total of 86 keywords that occurred in two or more publications in three large clusters. The number of keywords that appeared in one publication each was 596. Cluster one in figure 4 consisted of 42 keywords, while clusters two and three comprised 22 keywords each. The most common keywords in the publications, as illustrated in figure 4,

included *organization and management*, which appeared in 30 publications. In the second position was *medical record* (26), while *information retrieval systems* (18) came third followed by *information system/s* (17), *management* (16), *computer analysis* (16), *computer/s* (14), *and hospital medical records department* (10). The keywords in the three clusters reflected in figure 4 coalesced around (a) *information processing* and *retrieval systems*, (b) *computers* and *information technology* and (c) *organisation* and *management*. The shift from the preceding time period (1971-1980) to the current period was not so much about the topics of research but the intensity of research on the same areas of focus. The only exception is the emphasis on data management which was largely reflected in such keywords as *data management, data processing, data processing – government, digital data storage, optical data storage, data structures, database management,* and *database systems*. However, this topic on data management should not be construed to refer to big data analytics which has become a core area of research in library and information science (LIS) in recent times. Its presence in RM research in the 1980s is closely linked to automation of RM systems.

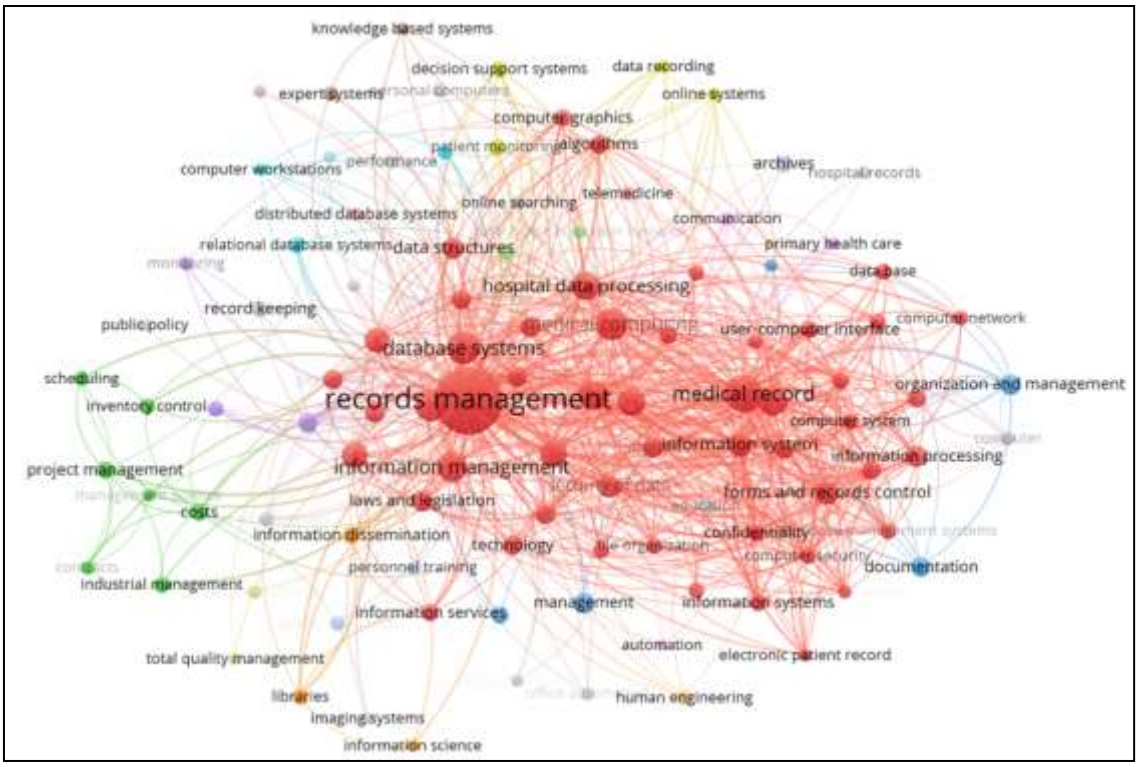


**Figure 5: Network map of keywords in RM research publications, 1991-2000**

Figure 5 is made up of 106 keywords that appeared in six or more publications, 31 clusters, 2 184 links, and 5 807 total link strength. Eighteen clusters consisted of one keyword each, while six clusters comprised two keywords each. The largest cluster (shown in red) consisted of 51 keywords, while the second largest cluster consisted of seven keywords. The other 11 clusters posted between three and five keywords each. The implication is that the RM research was increasingly becoming more focused on specific interrelated themes than in the preceding years. The following keywords registered the most appearances in the RM publications, thereby signalling the most researched themes in 1991-2000: *medical record* (67), *database systems* (50), *medical computing* (45), *information retrieval systems* (43), *information management* (42), *computerised medical records systems* (39), *health care* (38), *hospital data processing* (35), *information retrieval* (35), and *management information systems* (31). Others were: *information technology* (29), *computer software* (27), *information system* (24), *forms and records control* (23), *security of data* (22) and *data structures* (20). It is demonstrable that the current period has witnessed some intensity, as well as a shift in the

focus of some aspects of RM research. Of particular interest is the emergence of *information management* to rank among the top keywords mentioned in the RM publications. The concept of information management is closely linked to RM (Onyancha & Mokwatlo 2012). The two concepts of records management and information management are sometimes discussed together under the banner *records and information management* (Franks 2013; Okello-Obura 2012). *Information technology* and *systems* still occupy a prominent space in RM research. It should be noted that automation of records management has been a long-term discourse among RM researchers and practitioners and the emphasis on medical records places RM research largely within the health and medical sector.

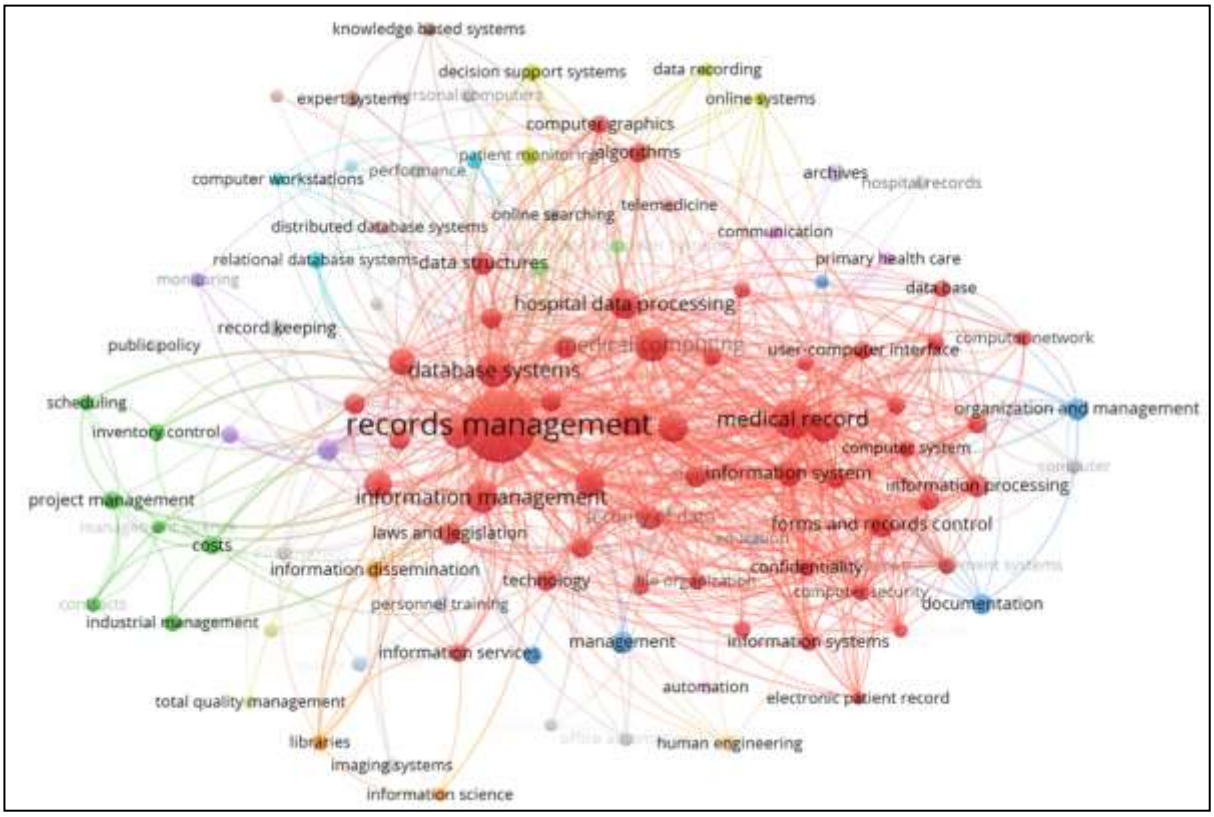


**Figure 6: Network map of keywords in RM research publications, 2001-2010**

There were a total of 2 783 and 8 299 author and index keywords, respectively, describing the focus areas of the 1 566 publications that were published on RM in 2001-2010. Of these, figure 6 maps 101 keywords that occurred 23 or more times in the RM publications. The network map is made up of 11 clusters, 3 500 links, and 20 005 total link strength. The limitation of the number of keywords to 101 was based on the endeavour to make the keywords clearly visible. The 2001-2010 decade witnessed the following keywords appearing the most in the RM publications: *electronic health record/s* (393), *health* 275), *health care* (246), medical record/s (179), *computerised medical records systems* (168), *information management* (162), *information systems* (135), and *medical computing* (132). The keywords that appeared in more than 70 but fewer than 130 publications included *electronic medical record* (123), *information technology* (101), *database system/s* (80), *hospitals* (80), *ehealth* (78), *semantics* (74), and *knowledge management* (72). It was noted that RM research is gradually shifting in terms of its focus from *automation* and *retrieval* issues to the *management* of records and, to some extent, *data*, *information* and *knowledge*. The *data*-associated terms that featured prominently in the RM literature in the 2001-2010 period include *database systems*, *security of data*, *hospital data processing*, *metadata*, *data acquisition*, *government data processing*, *data privacy*, *data processing*, *medical data* and *database management systems*. The presence of such terms as management information

systems, information management and knowledge management as well as *data processing* and *organization* reflects such a shift. Similarly, noticeable is the research focus on electronic formats of records, reflected in the following terms: *electronic health records, electronic medical records,* and *electronic health records systems*.

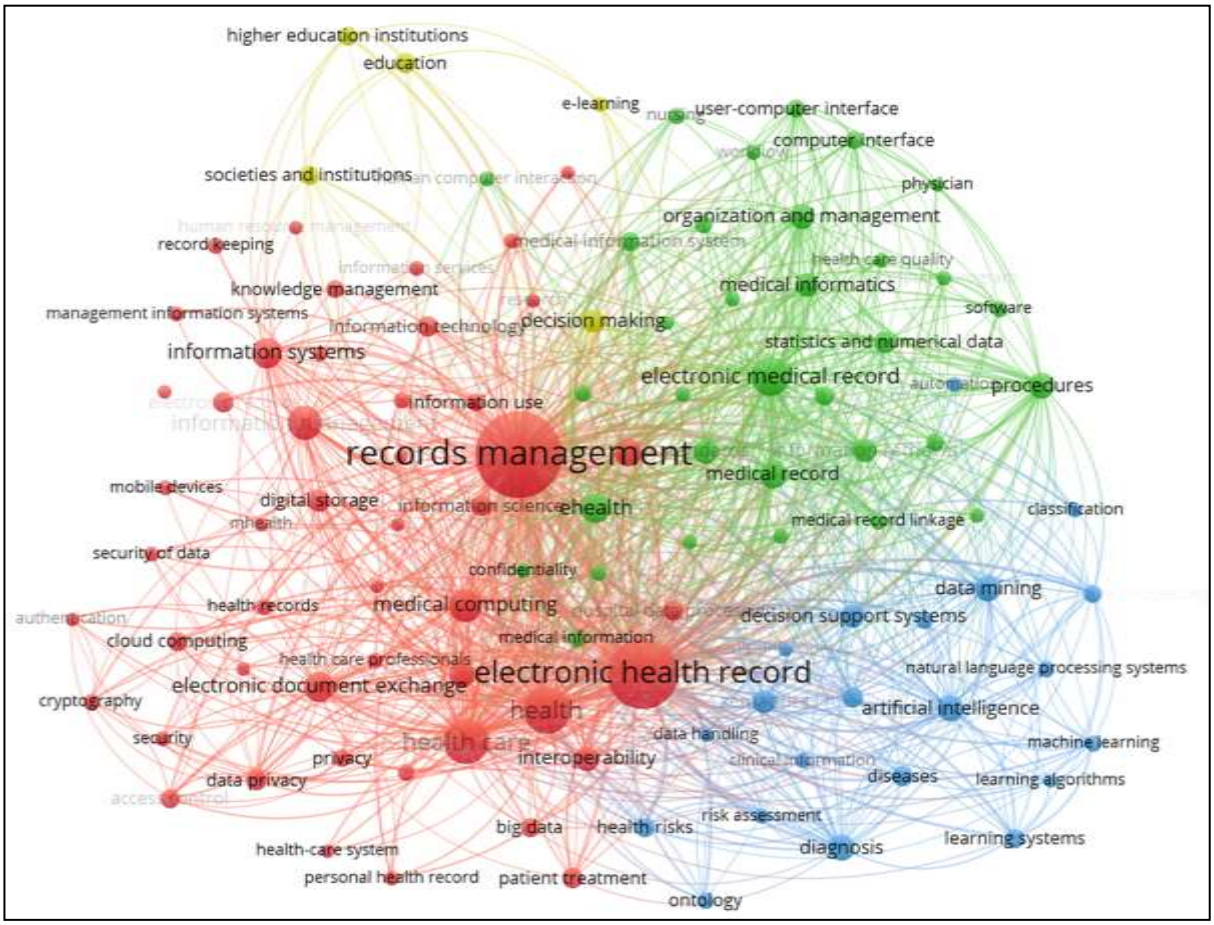


**Figure 7: Network map of keywords in RM research publications, 2011-2018**

The current decade (2011-2020) has so far witnessed increased activity in RM research as reflected in the trend of RM publications in table 1, as well as the total number of publications produced between 2011 and 2018, when compared to the preceding decades. The 2 508 publications published from 2011 to 2018 yielded 5 686 author-supplied keywords and 11 051 index terms. Figure 7 consists of four clusters of 108 keywords, with 4 731 links and 49 984 total links strength. The clusters of keywords in the period 2011-2018 follow the patterns reflected in the network map of keywords in the previous decade whereby the most common keywords, in descending order of the number of publications in which they appeared, were: *electronic health record/s* (1296), *health,* (537), *health care* (520), *electronic medical record/s* (367), *information management* (296), *medical computing* (256), *information systems* (222), and *electronic document exchange* (214). The keyword *knowledge management* which seemed to be gaining popularity among RM researchers had disappeared from the top 10 keywords in 2001-2018 to rank 54$^{th}$ in 2011-2018. However, *information management* continues to strengthen its extent of occurrence in RM publications as it ranked 6$^{th}$ in 2011-2018, up from 7$^{th}$ position in 2001-2010. *Big data* has emerged as one of the key areas of RM research in 2011-2018. The concept, with its associated keywords (e.g. *data mining, data privacy, hospital data processing, security of data, metadata,* and *data handling*) was popular among RM researchers in 2011-2018 period. The focus of RM in terms of the format of records was not different from the previous decade as electronic medical or health records again took centre stage in 2011-2018. The management of

electronic records has become a major focus of RM research since 2001. Similar observations were noted in Kim and Kang's (2018) study of the *Journal of the Korean Society of Archives and Records Management,* 2001-2017. The authors noted that *electronic records* was one of the keywords that was the most frequently researched topic, most influential topic and most widely intervening research topic in the journal.

The emphasis of RM for the last two decades seems to have been on *health care,* a concept that featured prominently in the last two decades. Another observation to be made based on the findings in figure 7 is the emphasis on computer-based systems whose keywords have consistently appeared since the 1990s. The analysis of the publications according to subject areas in the next section further points to the prominence of keywords associated with computers and information systems.

**Table 2: Subject fields in which RM publications are indexed in Scopus, 1971-2018**

| | 1971-1980 (N=53) | | 1981-1990 (N=170) | | 1991-2000 (N=465) | | 2001-2010 (N=1566) | | 2011-2018 (N=2508) | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FIELD | N | % | N | % | N | % | N | % | N | % | N | % |
| Computer Science | 10 | 18.9 | 21 | 12.4 | 116 | 24.9 | 609 | 38.9 | 1268 | 50.6 | 2024 | 42.5 |
| Engineering | 22 | 41.5 | 68 | 40.0 | 146 | 31.4 | 466 | 29.8 | 696 | 27.8 | 1398 | 29.4 |
| Medicine | 16 | 30.2 | 37 | 21.8 | 99 | 21.3 | 391 | 25.0 | 774 | 30.9 | 1317 | 27.7 |
| Social Sciences | 8 | 15.1 | 43 | 25.3 | 167 | 35.9 | 444 | 28.4 | 528 | 21.1 | 1190 | 25.0 |
| Business. Management and Accounting | 2 | 3.8 | 13 | 7.6 | 102 | 21.9 | 257 | 16.4 | 244 | 9.7 | 618 | 13.0 |
| Health Professions | 0 | 0.0 | 5 | 2.9 | 15 | 3.2 | 226 | 14.4 | 329 | 13.1 | 575 | 12.1 |
| Mathematics | 4 | 7.5 | 4 | 2.4 | 17 | 3.7 | 82 | 5.2 | 211 | 8.4 | 318 | 6.7 |
| Decision Sciences | 1 | 1.9 | 3 | 1.8 | 18 | 3.9 | 55 | 3.5 | 142 | 5.7 | 219 | 4.6 |
| Arts and Humanities | 8 | 15.1 | 14 | 8.2 | 20 | 4.3 | 55 | 3.5 | 106 | 4.2 | 203 | 4.3 |
| Environmental Science | 5 | 9.4 | 7 | 4.1 | 10 | 2.2 | 41 | 2.6 | 33 | 1.3 | 96 | 2.0 |
| Materials Science | 3 | 5.7 | 4 | 2.4 | 16 | 3.4 | 18 | 1.1 | 43 | 1.7 | 84 | 1.8 |
| Agricultural and Biological Sciences | 0 | 0.0 | 1 | 0.6 | 7 | 1.5 | 30 | 1.9 | 41 | 1.6 | 79 | 1.7 |
| Biochemistry. Genetics and Molecular Biology | 0 | 0.0 | 1 | 0.6 | 4 | 0.9 | 30 | 1.9 | 40 | 1.6 | 75 | 1.6 |
| Chemical Engineering | 0 | 0.0 | 1 | 0.6 | 7 | 1.5 | 38 | 2.4 | 28 | 1.1 | 74 | 1.6 |
| Physics and Astronomy | 3 | 5.7 | 4 | 2.4 | 16 | 3.4 | 16 | 1.0 | 33 | 1.3 | 72 | 1.5 |
| Energy | 1 | 1.9 | 2 | 1.2 | 12 | 2.6 | 17 | 1.1 | 35 | 1.4 | 67 | 1.4 |
| Earth and Planetary Sciences | 0 | 0.0 | 0 | 0.0 | 8 | 1.7 | 29 | 1.9 | 24 | 1.0 | 61 | 1.3 |
| Economics. | 0 | 0.0 | 2 | 1.2 | 1 | 0.2 | 13 | 0.8 | 23 | 0.9 | 39 | 0.8 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Econometrics and Finance | | | | | | | | | | | | |
| Chemistry | 1 | 1.9 | 1 | 0.6 | 5 | 1.1 | 13 | 0.8 | 17 | 0.7 | 37 | 0.8 |
| Psychology | 1 | 1.9 | 1 | 0.6 | 4 | 0.9 | 6 | 0.4 | 12 | 0.5 | 24 | 0.5 |
| Nursing | 0 | 0.0 | 7 | 4.1 | 3 | 0.6 | 9 | 0.6 | 4 | 0.2 | 23 | 0.5 |
| Pharmacology. Toxicology and Pharmaceutics | 0 | 0.0 | 0 | 0.0 | 3 | 0.6 | 7 | 0.4 | 9 | 0.4 | 19 | 0.4 |
| Multidisciplinary | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 5 | 0.3 | 7 | 0.3 | 12 | 0.3 |
| Dentistry | 0 | 0.0 | 7 | 4.1 | 0 | 0.0 | 0 | 0.0 | 4 | 0.2 | 11 | 0.2 |
| Veterinary | 0 | 0.0 | 1 | 0.6 | 1 | 0.2 | 4 | 0.3 | 3 | 0.1 | 9 | 0.2 |
| Neuroscience | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 2 | 0.1 | 4 | 0.2 | 6 | 0.1 |
| Undefined | 0 | 0.0 | 1 | 0.6 | 3 | 0.6 | 0 | 0.0 | 1 | 0.0 | 5 | 0.1 |
| Immunology and Microbiology | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 1 | 0.1 | 0 | 0.0 | 1 | 0.0 |

## Broad Scopus subject fields within which RM research is conducted

The dominance of keywords associated with computers and information systems, including the electronic formats of records, explains the presence of *computer science* at the top of table 2. The field yielded a total of 2024 publications, which accounted for 42.5 per cent of the RM publications published between 1996 and 2018. In the second position was *engineering* which posted 1 398 (29.4%), followed by *medicine* (1 317: 27.7%), *social sciences* (1 190: 25.0%), *business, management and accounting* (618: 13.0%) and *health professions* (575: 12.1%).

The prominence of *computer science* may be attributed to the introduction of computers and other information and communication technologies (ICTs) in RM practice. Onyancha and Mokwatlo (2012) made similar observations whereby the term *computer/s* was a constant occurrence in their analysis of subject terms that most occurred in RM literature in EBSCO-hosted databases. It is not clear why the second largest number of RM publications is classified under *engineering*. In its description of the fields under which publications are indexed, Scopus breaks down the field of *engineering* into sixteen subject areas. One of the *engineering* subject areas that may be associated with RM publications is *media technology* and perhaps *biomedical engineering*. The fields of *medicine, social science* and *business, management and accounting* as well as *health professions* have significantly contributed many publications in the subject domain. A large number of keywords that topped the lists of keywords illustrated in figures 6 and 7 fall within *medicine* and *health professions*, hence the strong performance of these two fields in table 3.

**Table 3: Percentage change in the number of publications indexed in each Scopus field, 1971-2018**

| FIELD | 1971-1980 | 1981-1990 | 1991-2000 | 2001-2010 | 2011-2018 |
|---|---|---|---|---|---|
| Computer Science | 18.9 | 110.0 | 452.4 | 425.0 | 108.2 |
| Engineering | 41.5 | 209.1 | 114.7 | 219.2 | 49.4 |
| Medicine | 30.2 | 131.3 | 167.6 | 294.9 | 98.0 |
| Social Sciences | 15.1 | 437.5 | 288.4 | 165.9 | 18.9 |
| Business, Management and Accounting | 3.8 | 550.0 | 684.6 | 152.0 | -5.1 |
| Health Professions | 0.0 | - | 200.0 | 1406.7 | 45.6 |
| Mathematics | 7.5 | 0.0 | 325.0 | 382.4 | 157.3 |
| Decision Sciences | 1.9 | 200.0 | 500.0 | 205.6 | 158.2 |
| Arts and Humanities | 15.1 | 75.0 | 42.9 | 175.0 | 92.7 |
| Environmental Science | 9.4 | 40.0 | 42.9 | 310.0 | -19.5 |
| Materials Science | 5.7 | 33.3 | 300.0 | 12.5 | 138.9 |
| Agricultural and Biological Sciences | 0.0 | - | 600.0 | 328.6 | 36.7 |
| Biochemistry, Genetics and Molecular Biology | 0.0 | - | 300.0 | 650.0 | 33.3 |
| Chemical Engineering | 0.0 | - | 600.0 | 442.9 | -26.3 |
| Physics and Astronomy | 5.7 | 33.3 | 300.0 | 0.0 | 106.3 |
| Energy | 1.9 | 100.0 | 500.0 | 41.7 | 105.9 |
| Earth and Planetary Sciences | 0.0 | - | - | 262.5 | -17.2 |
| Economics, Econometrics and Finance | 0.0 | - | -50.0 | 1200.0 | 76.9 |
| Chemistry | 1.9 | 0.0 | 400.0 | 160.0 | 30.8 |
| Psychology | 1.9 | 0.0 | 300.0 | 50.0 | 100.0 |
| Nursing | 0.0 | - | -57.1 | 200.0 | -55.6 |
| Pharmacology, Toxicology and Pharmaceutics | 0.0 | - | - | 133.3 | 28.6 |
| Multidisciplinary | 0.0 | - | - | - | 40.0 |
| Dentistry | 0.0 | - | -100.0 | - | - |
| Veterinary | 0.0 | - | 0.0 | 300.0 | -25.0 |
| Neuroscience | 0.0 | - | - | - | 100.0 |
| Undefined | 0.0 | - | 200.0 | -100.0 | - |
| Immunology and Microbiology | 0.0 | - | - | - | -100.0 |
| TOTAL | 100.0 | 220.8 | 173.5 | 236.8 | 60.2 |

An examination of the growth of publications over time, using the percentage change in the number of publications as expressed in table 3, shows mixed patterns. Although the number of RM publications has continued to increase, the percentage change reveals that the growth has not been consistent or constant. For example, RM research in the *social sciences* rose from just 15 per cent in 1971-1980 to 438 per cent in 1981-1990 and dropped heavily to 288 per cent before settling at 166 per cent and 19 per cent in 2001-2010 and 2011-2018, respectively. As a result, it can be said that RM research is increasingly drifting from being social science focused, despite the field showing a growing interest in RM research. The dispersion of some of the publications in different fields, rather than those at the top of table 3, may imply the multidisciplinary nature of records management research in recent years. Explaining the multidisciplinary of RM, Ries (2007) argues thus: "records management is multidisciplinary – involving management, business process and information technology considerations in addition to legal issues". Indeed, RM publications were scattered across all the Scopus subject fields, as shown in table 3.

## Conclusion

So, whither RM research? The trend and pattern of RM publication of research outputs as illustrated in figures 3 to 7 and table 3 do not provide a clear direction regarding the future of RM research. Firstly, although the number of publications has continued to increase, the growth of publications has been rugged when the percentage growth is considered. There is therefore no clear pattern that can lead to a concrete conclusion of the future growth of RM research in terms of the quantity of publications. Secondly, there are slight changes in the topics of research from one period to another, as reflected in figures 3 to 7 and tables 2 and 3. Thirdly, RM research is concentrated in a few subject fields throughout the study period, which was 1971 to 2018. Nevertheless, there are some shifts in RM research which might help us to predict, albeit vaguely, the future direction of RM research. In terms of the volume of research, the forecast in figure 2 predicts a continued upward movement in the number of RM publications post-2018.

Currently, the focus of RM research is on the management of electronic health and medical records for effective management of hospitals and medical centres, as well as service delivery. The role of RM in the delivery of effective health care services is a great concern for stakeholders, which include hospitals, governments and their agencies, private sectors, higher education institutions, and international organisations such as the World Health Organization (WHO), among others. The increased attention to matters touching on health and medicine that RM research has thus far received, and which can be attributed to funding which largely emanates from health-based institutions and organisations (see Appendix A which provides a list of funding institutions for RM research from 1971 to 2018), is likely to continue to receive interest from researchers. If the current trend is anything to go by, the focus on RM research in the health sector is likely to persist in the foreseeable future. Finally, we believe that the world's attention on the Sustainable Development Goals (SDGs) and the Fourth Industrial Revolution (4IR) may also have a role to play in shaping the future direction of RM research. The themes in the SDGs and 4IR will form part of the topics in RM research, particularly as research funds are channelled into the realisation of the SDGs and the 4IR throughout the world.

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## Appendix A: Institutions funding RM research, 1971-2018

| Funding Body | Papers | Percentage |
|---|---|---|
| National Institutes of Health | 65 | 1.36 |
| National Science Foundation | 48 | 1.01 |
| National Natural Science Foundation of China | 38 | 0.80 |
| U.S. National Library of Medicine | 33 | 0.69 |
| National Center for Advancing Translational Sciences | 22 | 0.46 |
| Agency for Healthcare Research and Quality | 20 | 0.42 |
| National Center for Research Resources | 11 | 0.23 |
| European Commission | 10 | 0.21 |
| Fundamental Research Funds for the Central Universities | 10 | 0.21 |
| National Institute of General Medical Sciences | 9 | 0.19 |
| Arts and Humanities Research Council | 8 | 0.17 |
| Australian Research Council | 8 | 0.17 |
| National Heart, Lung, and Blood Institute | 8 | 0.17 |
| National Human Genome Research Institute | 7 | 0.15 |
| Vanderbilt University | 7 | 0.15 |
| Foundation for the National Institutes of Health | 6 | 0.13 |
| National Aerospace Science Foundation of China | 6 | 0.13 |
| U.S. Department of Veterans Affairs | 6 | 0.13 |
| Conselho Nacional de Desenvolvimento Científico e Tecnológico | 5 | 0.10 |
| Engineering and Physical Sciences Research Council | 5 | 0.10 |
| Fundação para a Ciência e a Tecnologia | 5 | 0.10 |
| Ministerio de Ciencia e Innovación | 5 | 0.10 |
| National Research Foundation of Korea | 5 | 0.10 |
| National Sleep Foundation | 5 | 0.10 |
| Natural Sciences and Engineering Research Council of Canada | 5 | 0.10 |
| Office of the National Coordinator for Health Information Technology | 5 | 0.10 |
| Stiftelsen för Strategisk Forskning | 5 | 0.10 |
| U.S. Department of Health and Human Services | 5 | 0.10 |
| Universiti Kebangsaan Malaysia | 5 | 0.10 |
| Bundesministerium für Bildung und Forschung | 4 | 0.08 |