A SOCIAL NETWORK ANALYSIS OF CO-AUTHORSHIP AT THE AUSTRALASIAN CONFERENCE ON INFORMATION SYSTEMS (ACIS) FROM 1990 TO 2016

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1. Introduction

Since 1990 the Australasian Conference on Information Systems (ACIS) is the yearly academic meeting place for the Australasian Information Systems (IS) community, in particular its Australian and New Zealand members. In this report we present the results of an investigation into the history and development of this community and its members' collaborations as articulated and manifested through their networks of co-authorship of their conference publications in the period 1990 to 2016. When the report was commissioned by the Australian Council of Professors and Heads in Information Systems in September 2017 this period comprised the whole conference record. Due to the commission date the report does not include the now available data for the 2017 conference.

When the relationships between individuals and their structures are recognised to hold important implications, social network analysis (SNA) is often applied to study them (Borgatti et al. 2013). The SNA research approach focuses on analysing the relationships and interactions between network actors as the main unit of analysis, which enables investigation into the actors' environment and its impacts on the actors' perceptions and behaviours (Borgatti et al. 2013; Hanneman and Riddle 2005; Otte and Rousseau 2002). The use of SNA in the social sciences is not new (Borgatti and Foster 2003), and researchers in the information science field have employed SNA methods to study structural patterns of research collaboration (Otte and Rousseau 2002).

Understanding why authors choose to collaborate with others produces theoretical and practical insights about important mechanisms of social networks, such as the tendencies to self-organise or create centre-periphery structures (Wagner and Leydesdorff 2005a, 2005b). The consequences of research collaboration between authors can be explored, such as their impacts on the authors' performance or influence in their fields (Abbasi et al. 2011, 2012; Acedo et al. 2006). As a result, practical recommendations in terms of research policies can be made to improve research productivity (Abbasi et al. 2012; Hâncean and Perc 2016; Wagner and Leydesdorff 2005a).

This report is based on research that applies SNA and is an extension of a previous study (Dang-Pham and Kautz 2017) which in line with others (see for example Galliers and Whitely (2002) and Vidgen et al. (2007) for research on the European Conference on Information Systems and Cheong and Corbitt (2009a, 2009b) for the Australasian Conference on Information Systems in the period 1990 to 2006 and the Pacific Asia Conference on Information Systems from 1993 to 2008) investigated the structural patterns of research collaborations at conferences. In our earlier work (Dang-Pham and Kautz 2017) we also investigated collaboration patterns at ACIS at the institutional level, but that work only comprised the period from 2001-2011. Thus the present report is the first to comprise - with the exception of ACIS 2017 - the whole history of the conference.

We here again focus on the structural features of the co-authorship networks with the individual researcher at the heart of the investigation. We evaluated the levels of collaborations and identified key researchers during this period in terms of network size, centrality, and research output. Further avenues for future research are identified and summarised in the conclusion section of this report.

To get a better understanding of the topical development of IS research in our region in the investigated period the report also contains a classification of the research themes and topics of the 2,528 ACIS publications in the period which we derived by applying a text mining method. As stated above we conclude the report with suggestions for further research and based on our findings provide some recommendations for the further development of the ACIS community.

2. Method

In the following we are briefly introducing the two methods we used to identify the co-authorship networks and the themes and topics of the publications in the analysed period of time. The methods are social network analysis (Borgatti et al. 2013; Hanneman and Riddle 2005) and text mining (Blei et al 2003; Antons and Breidbach 2018).

2.1. Social Network Analysis for Identifying and Analysing Co-authorship Networks

To analyse the co-authorship networks and identify the key researchers, we performed a social network analysis (SNA) on a bibliographic database provided by ACPHIS. This database contains information about the researchers' co-authorship on papers, publication years, titles and abstracts of all papers that were accepted at ACIS in 27 years, i.e., from 1990 to 2016 (see Table 1). We converted the information into the format of network data and segmented the data into five periods, i.e., 1990–1995, 1996–2000, 2001–2005, 2006–2010, 2011–2016, which we then analysed separately in detail. The data transformation process was laborious, since we had to manually check for and, if necessary, correct the inconsistent names provided by 2,865 authors in their publications.

SNA puts emphasis on examining the attributes of networks that are comprised of ties, which represent interactions and relationships between nodes, which represent human or non-human entities in a social context. In the context of this report, the nodes characterise the authors who published at ACIS, and the ties represent the co-authorships between them. Each tie records a unique co-authorship relationship between pairs of authors regardless of the number of co-authored papers, i.e., a pair of authors is recorded to have a tie if they have co-authored at least one paper. We also analysed the number of publications for each author, which measures the authors' productivity. This allowed us to identify the key researchers overall and within the six defined periods between 1990 and 2016.

We used the 'visone' (Brandes and Wagner 2004) and 'Gephi' (Bastian et al. 2009) software tools to visualise the co-authorship networks and to calculate the number of ties possessed by the nodes. Nodes that have more ties, i.e., authors that have co-authored papers with many collaborators, are shown as bigger than those with fewer ties in the network visualisations. In SNA terminology, basic network structures include dyads that are made of two connected nodes,

Table 1. List of ACIS conferences (1990–2016) - adapted from Wikipedia[1]

Year	Place	Host	Theme

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[1] https://en.wikipedia.org/wiki/Australasian_Conference_on_Information_Systems

2016	Wollongong, Australia	University of Wollongong	Occupying the Sweet Spot: IS at the Intersection
2015	Adelaide, Australia	University of South Australia	Information Systems in the Age of Big Data
2014	Auckland, New Zealand	Auckland University of Technology	Integral IS: The Embedding of Information Systems in Business, Government and Society
2013	Melbourne, Australia	RMIT University	Information Systems: Transforming the Future
2012	Geelong, Australia	Deakin University	Location, location, location
2011	Sydney, Australia	University of Sydney	Identifying the Information Systems Discipline
2010	Brisbane, Australia	Queensland University of Technology	Information Systems: Defining and Establishing a High Impact Discipline
2009	Melbourne, Australia	Monash University	Evolving Boundaries and New Frontiers: Defining the IS Discipline
2008	Christchurch, New Zealand	University of Canterbury	Creating the Future: Transforming Research into Practice
2007	Toowoomba Queensland	University of Southern Queensland	The 3Rs: Research, Relevance and Rigour - Coming of Age
2006	Adelaide, Australia	University of South Australia	Thought Leadership in IS
2005	Sydney, Australia	University of Technology Sydney	Socialising IT: Thinking About the People
2004	Hobart, Australia	University of Tasmania	Managing New Wave Information Systems: Enterprise, Government and Society
2003	Perth, Australia	Edith Cowan University	Delivering IT and e-Business Value in Networked Environments
2002	Melbourne, Australia	Victoria University	Systems: Enabling Organisations and Society
2001	Coffs Harbour, Australia	Southern Cross University	2001 IS Odyssey: Where are we going in Cyberspace?
2000	Brisbane, Australia	Queensland University of Technology	N/A
1999	Wellington, New Zealand	Victoria University of Wellington	N/A
1998	Sydney, Australia	University of New South Wales	N/A
1997	Adelaide, Australia	University of South Australia	N/A
1996	Hobart, Australia	University of Tasmania	N/A
1995	Perth, Australia	Curtin University of Technology	N/A
1994	Melbourne, Australia	Monash University	N/A
1993	Brisbane, Australia	University of Queensland	N/A
1992	Wollongong, Australia	University of Wollongong	N/A
1991	Sydney, Australia	University of New South Wales	N/A
1990	Melbourne, Australia	Monash University	N/A

and triads that are made of three connected nodes. Densely connected groups of more than three nodes are referred to as clusters of co-authors in this report. Our analysis of co-authorship networks

is provided in the following 6 sections including the results for the 5 intervals we chose for our examination and as well as for the entire period.

2.2 Text Mining for Identifying Research Themes and Topics

The second part of this report includes an analysis of the research topics and themes of the publications at ACIS between 1990 and 2016 based on their titles and abstracts. For this purpose we by and large applied the text mining approach outlined by Antons and Breidbach (2018) : the analysis started with pre-processing the title and abstract of each publication by removing punctuations, numbers, common stop words (e.g., 'a', 'the', 'of', 'he', and 'she') and research terms (e.g., 'research', 'paper', 'study', 'investigate'). Then, we used a stemming technique (Singh and Gupta 2007) to identify the meaningful and important terms. For instance, the terms 'methodologically' and 'methodological' were stemmed to their root 'methodology', or 'proposed' and 'proposes' were stemmed to 'propose'. We followed the 'bag of words' approach for text mining (Goldberg 2017), where each ACIS publication is represented by a collection of terms (see Table 2 for 3 examples).

Table 2. Publications and their representative terms

Publication	Collection of words
Publication #100	strateg plan group support organis reap strateg plan issp perform multidisciplinari group plan difficulti frequent propos group dss gdss technolog overcom issp impedi advantag issp gdss plan particip commit share enhanc support implement review plan specialist support devic decis modul dam
Publication #102	technic writer system develop process develop busi multiskil team ideal team analyst programm interfac specialist repres manag user technic writer technic writer system develop team user advoc show technic writer opportun particip system develop manag recognis involv technic writer softwar develop team inclus technic writer develop process hide cost omiss
Publication #103	healthcar distribut work environ healthcar inform intens activ coordin cooper multipl distribut agent agenc qualiti patient pivot work patient care poor support comput system task depart distribut network heterogen system suffici move paradigm patient focus support care process global propos network system work system creation seamless transpar patient inform independ agent agenc provis intellig capabl coordin support distribut healthcar team member

By representing each publication as a collection of words, we then applied the topic modeling technique called 'Latent Dirichlet Allocation' (LDA) (Blei et al. 2003) to identify the groups of terms that frequently appeared together and collectively represented a topic. Performing LDA requires specifying the number of topics in advance, and the optimal number of topics is determined by assessing quantitative statistics or interpretability of the resultant topics. We performed both quantitative and qualitative assessments of several topic models, each of which specified a different number of topics. We concluded that the 2,528 ACIS publications, which are included in this report, are most appropriately categorized into 84 topics, which were further grouped into 17 themes. The second last section of this report contains the analysis of the identified research topics.

3. Co-authorship Networks during the Period 1990-1995

The year 1990 marks the beginning of the ACIS conference series with the participation of 25 authors and 15 accepted papers. After five years, these numbers had increased to 104 authors and 63 papers, which indicated the active contributions of Australasian and international researchers to ACIS. The collaboration on research papers is highest in 1994 with 81 co-authorship ties with the disparity between the number of authors (102 authors) and the number of accepted papers (56 papers) also being the largest (see Figure 1).

Figure 1 shows the numbers of authors and co-authorship ties which have both increased during this period. The number of authors exceeded the number of co-authorship ties with an approximate 2:1 ratio, indicating that many researchers tended to publish as sole authors rather than co-authoring papers.

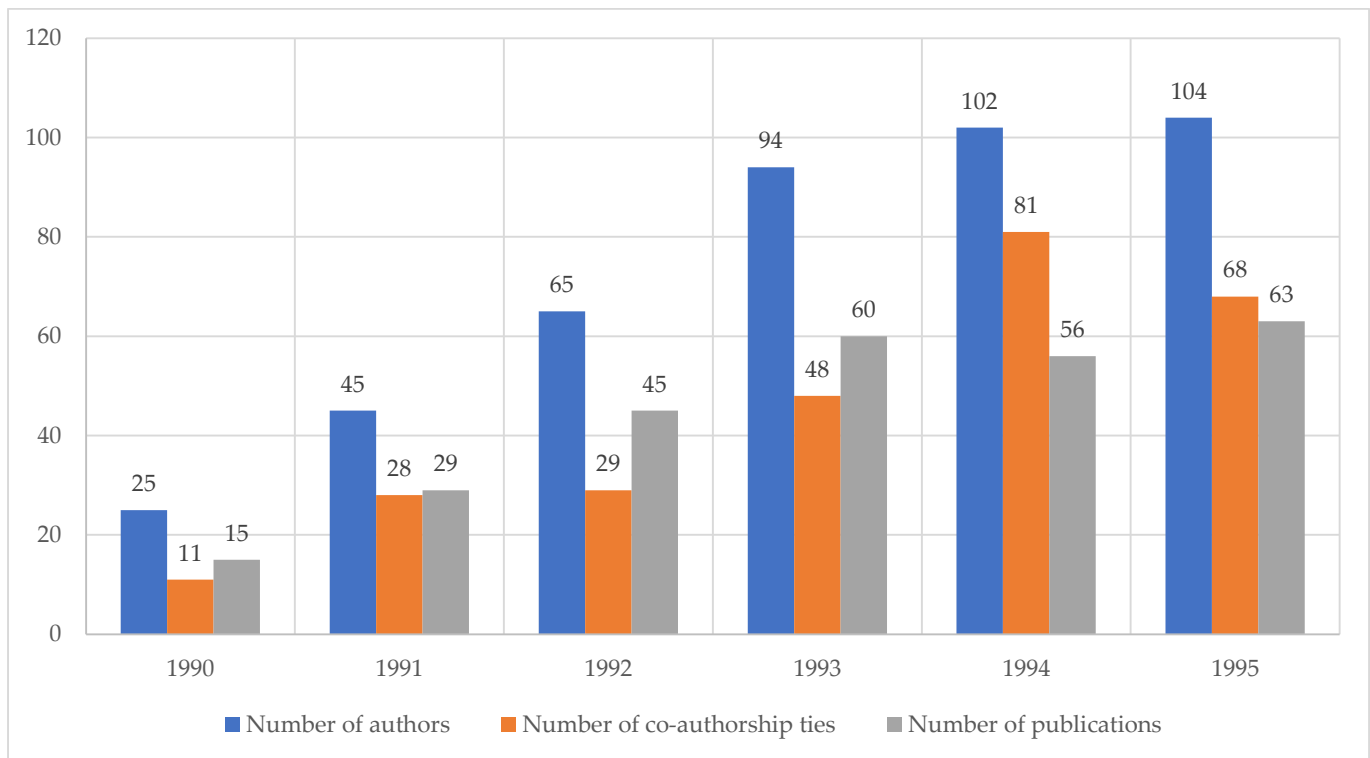
Figure 1. Numbers of authors, co-authorship ties, and publications (1990 to 1995)

Table 3 presents the authors and their number of publications in the 1990–1995 period. The top contributor in this period is Graeme Shanks who published eight papers within six years, followed by Paul A. Swatman and C.N.G. (Kit) Dampney with seven papers, and David Arnott and Dan Eaves with six papers, each.

Table 3. Top five ranked productive researchers (1990 to 1995)

Author	Number of publications							
	1990	1991	1992	1993	1994	1995	Total	Rank
Graeme Shanks	1	1		1	2	3	8	1st
Paul A. Swatman	1	1		1	2	2	7	2nd
C.N.G. (Kit) Dampney	1		2	1	1	2	7	2nd
David Arnott				1	2	3	6	3rd
Dan Eaves	1	1	2		2		6	3rd
Paula M.C. Swatman	1	1		1	2		5	4th
Graham Pervan			1	2	1	1	5	4th
Robert M. Colomb		1	1	1	1		4	5th
Peter O'Donnell	1			1	2		4	5th
Julie James		1	1	1		1	4	5th
20 authors							3	
44 authors							2	
263 authors							1	

Figure 2 presents a network visualisation consisting of all co-authorship ties between 1990 and 1995. A tie between two authors indicates that these authors have co-authored at least once in the said period. The size of the author nodes corresponds to the number of co-authorship ties they have, with larger nodes indicating elevated levels of research collaboration. The average degree of the co-authorship network, or the average number of collaborators per author, is 1.466. One author collaborated with one other author on average.

In this network, Graeme Shanks is the most connected researcher by collaborating with co-authors in five distinct groups. These groups comprise two sole authors, two connected pairs, and one large group of four authors. David Arnott, Peter O'Donnell and C.N.G. (Kit) Dampney are other prominent authors in this network with many connections. Of these three authors, David Arnott collaborated with Peter O'Donnell, and their combined personal networks present the largest cluster of 13 authors in the 1990–1995 period.

Despite co-authoring with only two authors, Alexander Rusli (second row, second cluster from the right) holds a potentially powerful position that connects two separate clusters led by Bernard Glasson and Peter Marshall. By acting as the bridge between the two clusters, Rusli could leverage an advantageous position to reach out to Glasson's and Marshall's co-authors, potentially through their introductions. In the context of research collaboration, gaining relationships with more researchers may result in learning new expertise or developing a track record in a new research area although in the case of Rusli this effect cannot be further traced through our network analysis.

Figure 2. Consolidated co-authorship network (1990 to 1995)

Figures 3 to 8 show the six networks representing each year's co-authorship network. They changed in both size and structure through the period. The co-authorship network grew larger, and the network structures became more sophisticated over time with structures other than dyads and triads. From 1990 to 1993, the common network structures were the sole authors (48), i.e., the isolated nodes at the bottom of each network snapshot and the pairs (48), some triads (21) and a few collaborations between four authors (3).
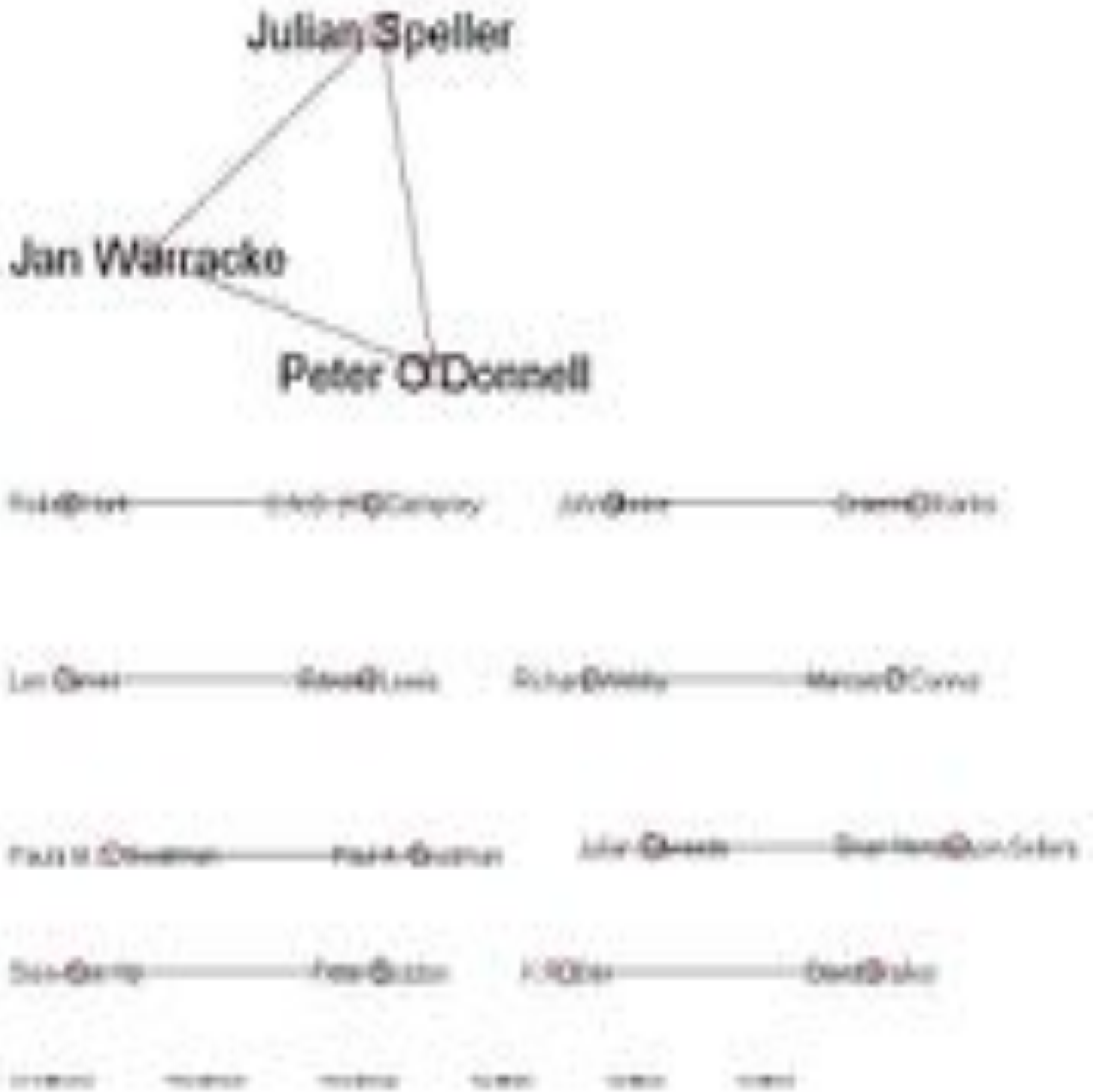
Figure 3. Co-authorship network (1990)
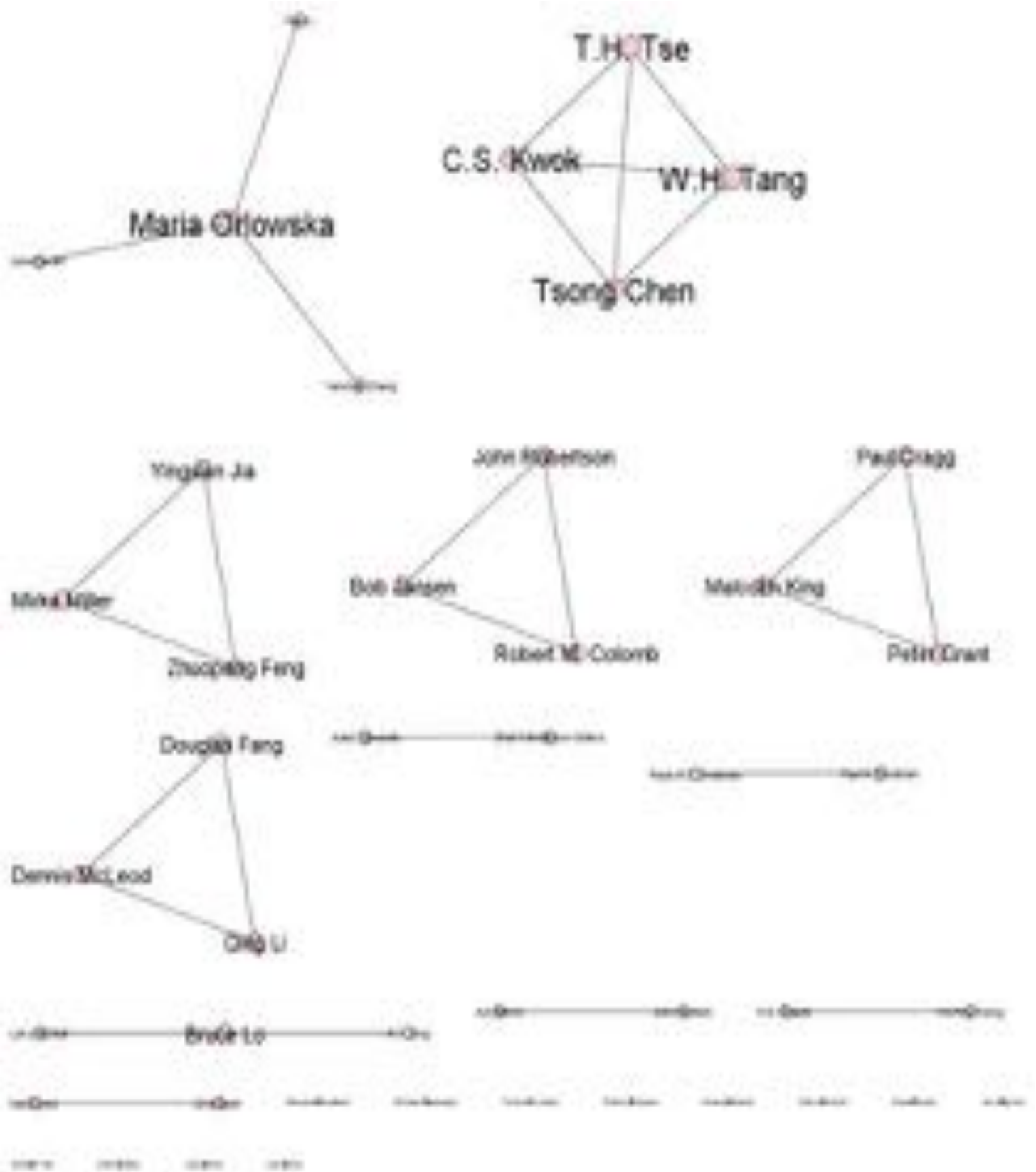
Figure 4. Co-authorship network (1991)
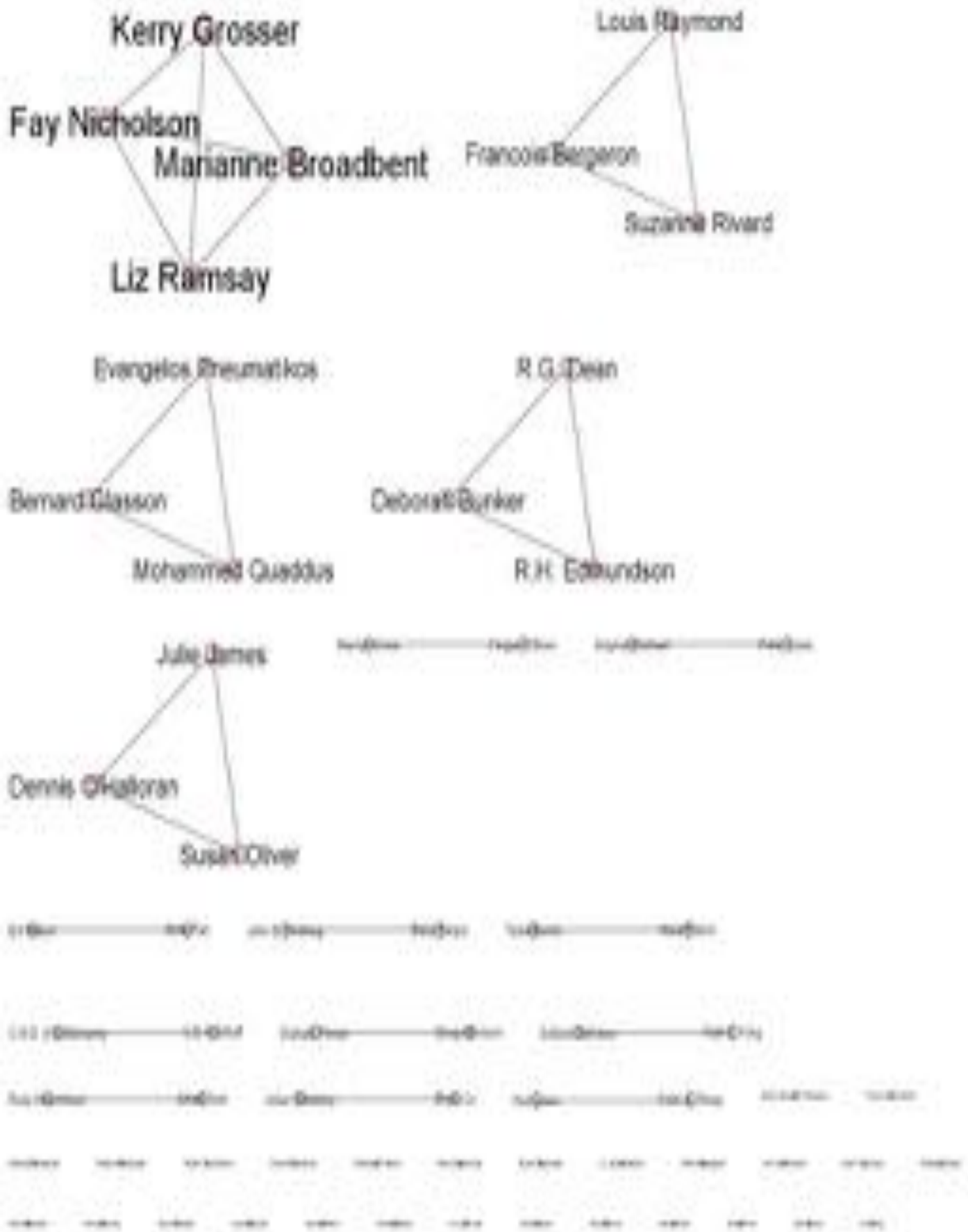
Figure 5. Co-authorship network (1992)

Figure 6. Co-authorship network (1993)

The network structures started to become more sophisticated in 1994 and 1995, which reflected the strategic collaboration between authors, who, despite sharing the same collaborators, did not know or work with each other before. For instance, Paula M.C. Swatman and Paul A. Swatman collaborated with the group consisting of Evalyn N. Wafula and Craig Parker, as well as with Danielle Fowler in 1994.

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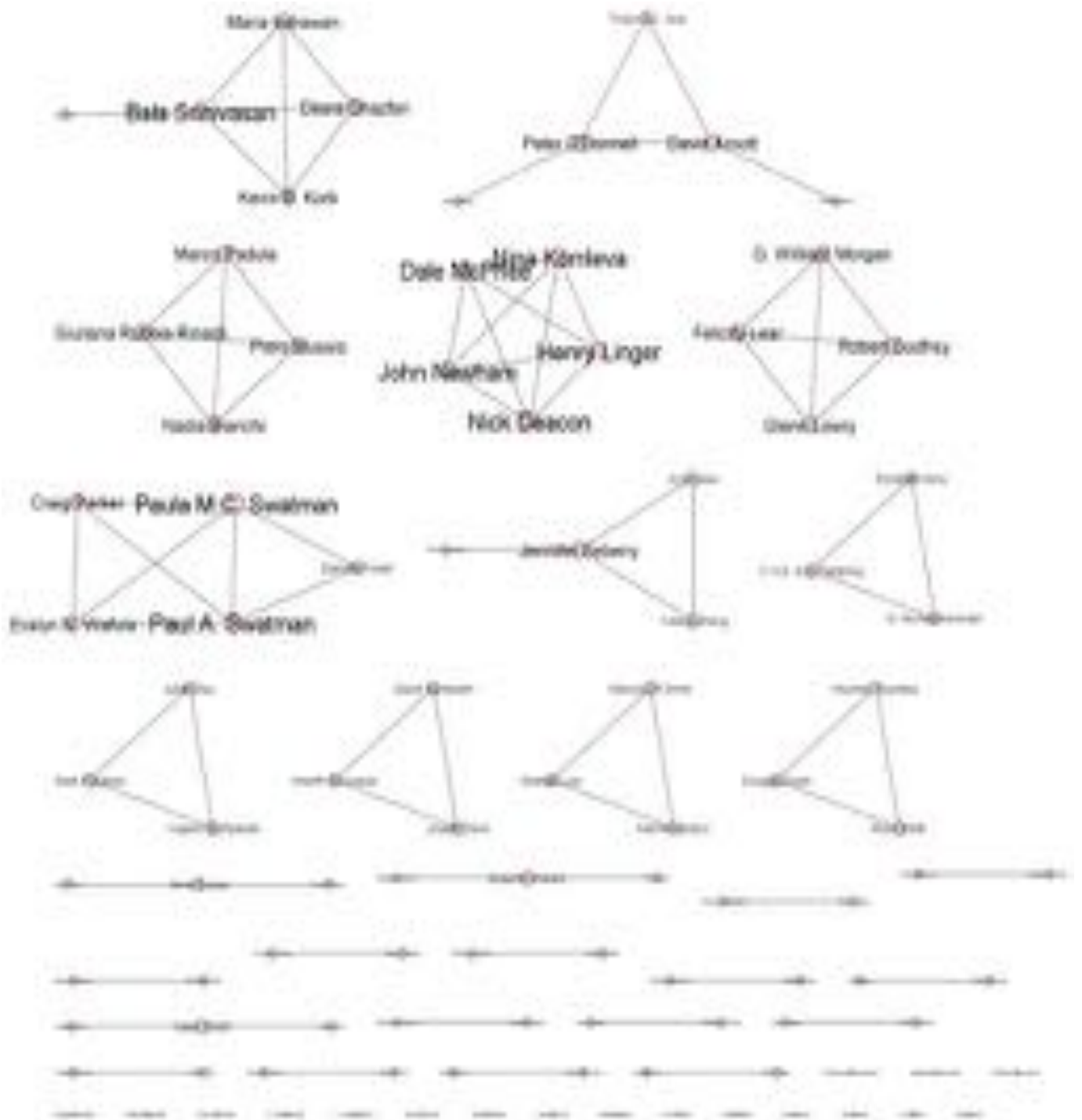
Figure 7. Co-authorship network (1994)

For the first time a collaboration of five authors occurred in 1995 between Graeme Shanks, Graeme Simsion, John Venable, Nancy Olsen, and Daniel Moody. Additionally, Graeme Shanks collaborated with Peta Darke and Brett Hodgson, which made him the most connected author in 1995, followed by David Arnott. Since Shanks collaborated with two groups of co-authors, i.e., the one involving Simsion, Olsen, Venable and Moody, and another involving Darke and Hodgson, it can be argued that Shanks held a strategic position in the co-authorship network that granted him access to more unique resources and expertise.
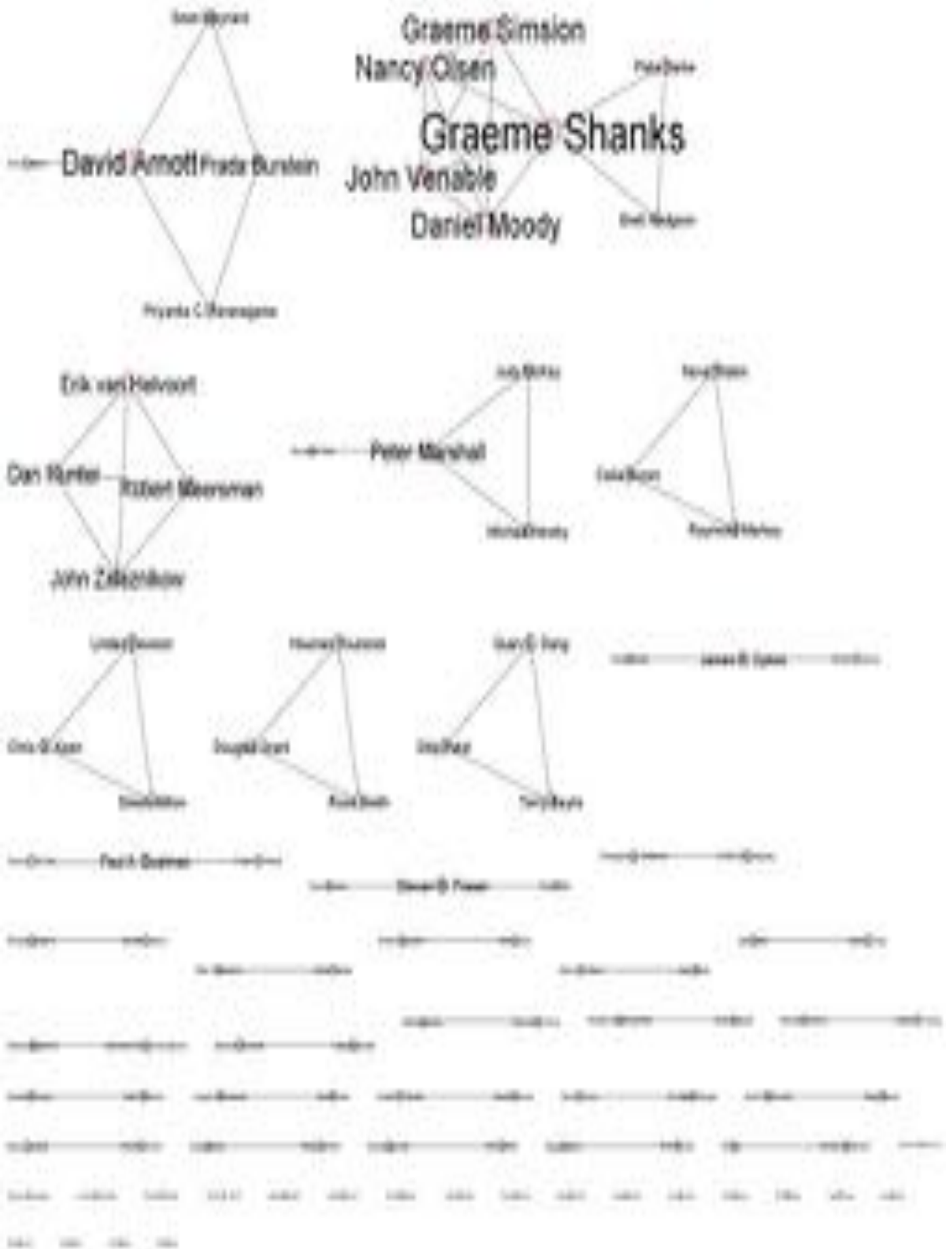
Figure 8. Co-authorship network (1995)

4. Co-authorship Networks during the Period 1996-2000

The ACIS conferences between 1996 and 2001 had fluctuating numbers of authors and publications. These numbers continued to increase compared to the previous period, to 119 authors and 72 publications in 1996. However, the numbers of authors and publications decreased between 1996 and 1998. There was a significant increase in the numbers of authors and publications again in 1999, with the number of authors further increasing in 2000, while the number of publications dropped that year (see Figure 9).

Figure 9 also shows that research collaborations in this period were most prominent in 2000, for that year we detected 178 co-authorship ties. The number of co-authorship ties was almost equivalent to the number of authors, indicating that not many researchers contributed to ACIS 2000 as sole authors, while a total of 361 authors were sole authors in this period in which 389 papers were authored for ACIS by 694 authors.
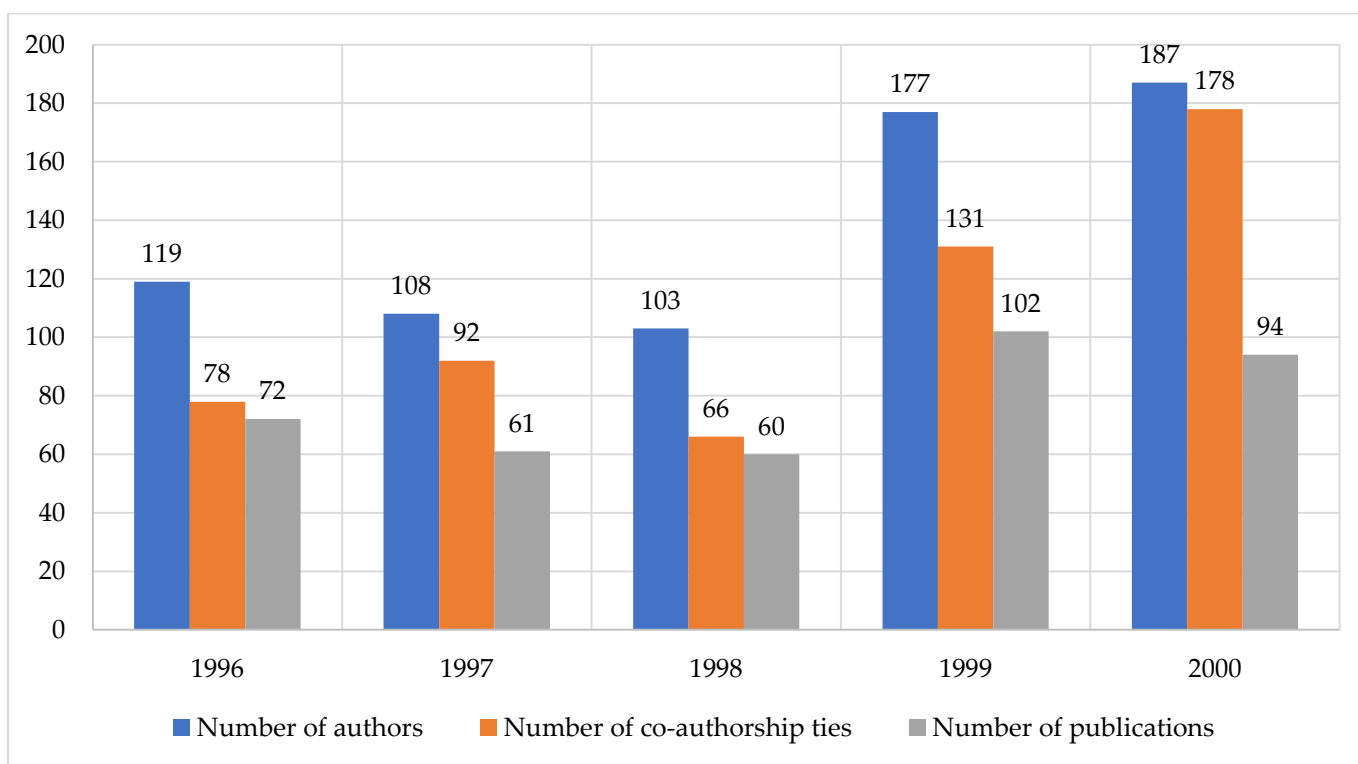
Figure 9. Numbers of authors, co-authorship ties, and publications (1996 to 2000)

Table 4 provides the list of authors and their number of publications between 1996 and 2001. Graeme Shanks remained the most productive researcher within ACIS also in this period with 11 publications, followed by Peta Darke, Graham Pervan and Angele Cavaye with seven publications each. Most of the very productive researchers published at least one paper every year, with some researchers such as Shanks, Darke, and Cavage publishing two to three papers in at least three of the years of that period, while Mike Metcalfe produced 4 papers in one year, the year 2000.

While the 1990–1995 period only had one author with five publications, this period from 1996 to 2000 had nine authors who published that amount of papers and 7 authors publishing more than 5 papers in those 5 years. Together with the increasing numbers of authors and papers shown in

Figure 9, these statistics indicate that the ACIS conference authorship quickly expanded over those years.

Table 4. Top five ranked productive researchers (1996 to 2000)

Author	Number of publications					Total	Rank
	1996	1997	1998	1999	2000		
Graeme Shanks	2	3	3	3		11	1st
Peta Darke	1	2	2	2		7	2nd
Graham Pervan	1	2	1	1	2	7	2nd
Angele Cavaye		2	2	2	1	7	2nd
Glenn Lowry	1	2		3		6	3rd
Guy G. Gable	2		2	1	1	6	3rd
Jennie Carroll		2	3		1	6	3rd
Mike Metcalfe				1	4	5	4th
Judy McKay		1	1	1	2	5	4th
Glenn Stewart	1	1	1	1	1	5	4th
Julie Fisher		1	1	1	2	5	4th
Celia Romm	1	1		1	2	5	4th
Donald Falconer	1		1	3		5	4th
Daniel Moody	2		1	2		5	4th
Peter Marshall		1	1	1	2	5	4th
Trevor Wood-Harper		1		2	2	5	4th
Ross Smith			2	1	1	4	5th
Paul A. Swatman		1	2	1		4	5th
Mariam Fergusson	1	1	1	1		4	5th
Dubravka Cecez-Kecmanovic	1			1	2	4	5th
Peter Seddon	1		1	2		4	5th
Gail Ridley	1	1	1	1		4	5th
Christian Bauer			1	1	2	4	5th
Gavin Finnie	1	1		1	1	4	5th
Michael Lane			1	1	2	4	5th
Gerhard Wittig	1	1		1	1	4	5th
David Arnott		2	2			4	5th
Beverley Hope	1			2	1	4	5th
R. Alan Hodgett	1		1	2		4	5th
Alan Underwood	1		2	1		4	5th
Chris D. Keen	1	1	2			4	5th
Craig Standing			1	1	2	4	5th
33 authors						3	
77 authors						2	
361 authors						1	
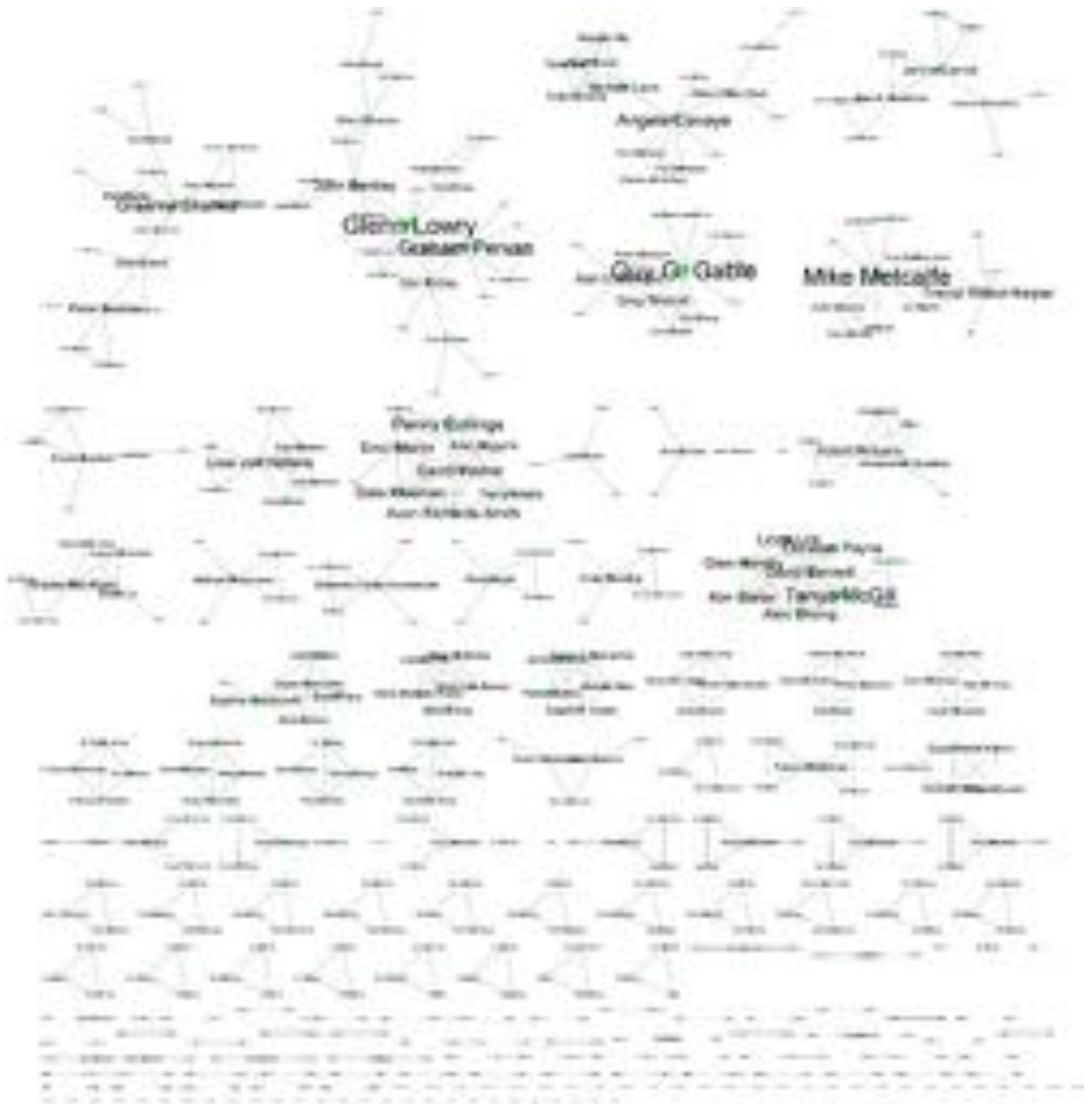
Figure 10. Consolidated co-authorship network (1996 to 2000)

Figure 10 presents the consolidated o-authorship network between 1996 and 2000 which becomes more complex and larger than that of the 1990–1995 period. There were 500 unique co-authorship ties in total, and each author collaborated with two co-authors on average i.e., an average collaboration degree of 1.984. The largest collaboration cluster is made of two clusters led by Graeme Shanks and co-led by Glenn Lowry and Graham Pervan respectively. David Arnott, Julie Fisher, and John Bentley co-authored with each other and subsequently bound these two clusters together. We also found that other researchers established their own clusters of unique collaborators, such as Angele Cavaye, Guy G. Gable, Mike Melcalfe, Jennie Carroll and Liisa von Hellens.

Additionally, there were clusters of co-authors where the co-authorship ties were evenly distributed, i.e., each author co-authored with almost every member of the same cluster, such as the cluster comprising Penny Collings, Errol Martin and David Walker (third row, third cluster from the left) and the cluster of Tanya McGill, Linda Lim and Alex Chong (fourth row, first cluster from the right). The ACIS community began to take its first shape with noticeably expansive clusters 11 years after the conference's debut in 1990.

Figures 11 to 15 show the 5 networks representing each year's co-authorship network. The conferences in 1996, 1997, and 1998 contain basic network structures, including sole authors, pairs and triads. Researchers in advantageous positions were those who collaborated with diverse groups of co-authors such as Errol Martin and Guy G. Gable, and those who served as the sole bridges that linked clusters of authors together such as Jennie Carroll and Mike O'Connor. By collaborating with distinct groups of people, these researchers had access to more unique resources such as expertise and indirect connections of their collaborators' contacts.
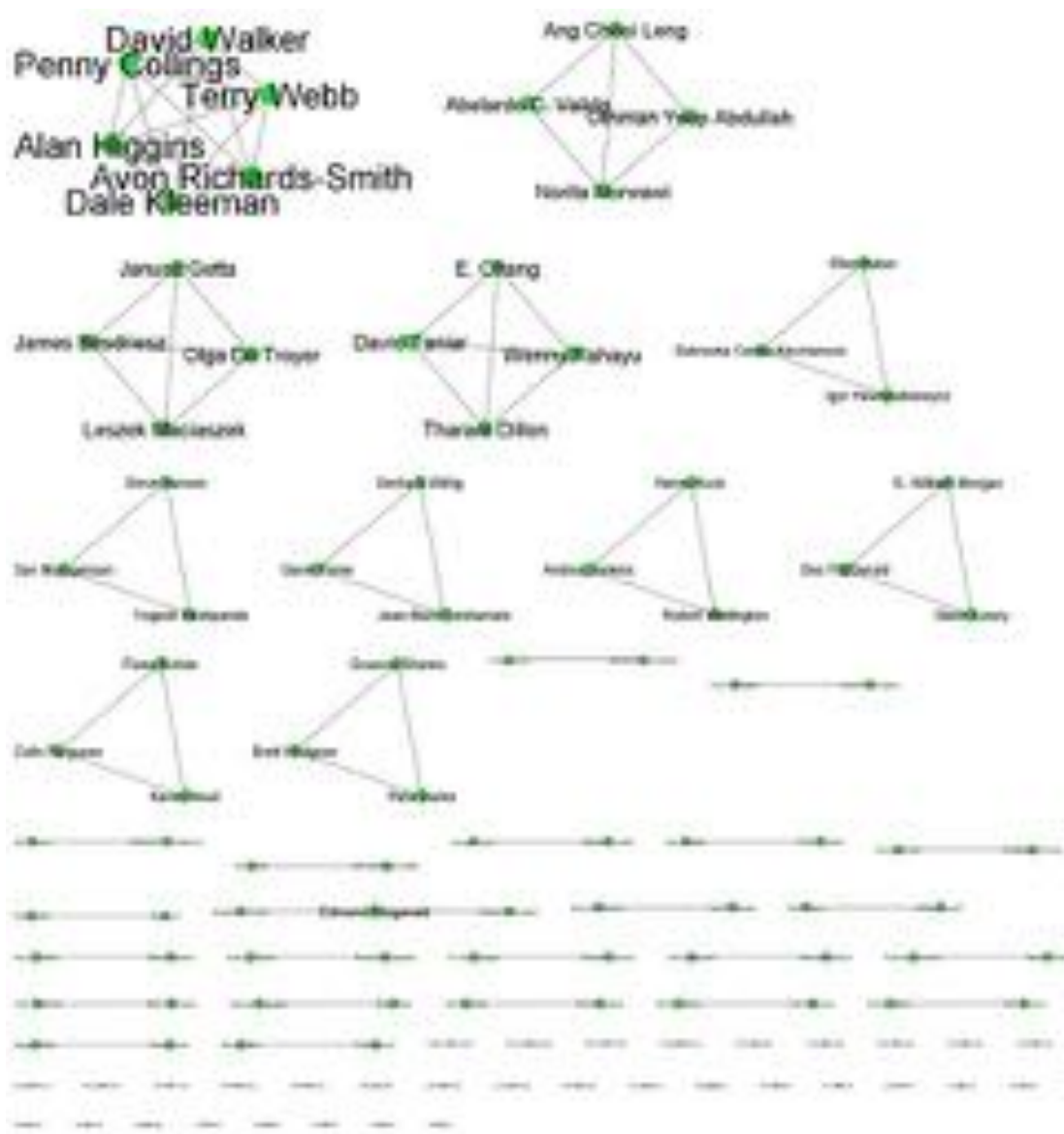
Figure 11. Co-authorship network (1996)
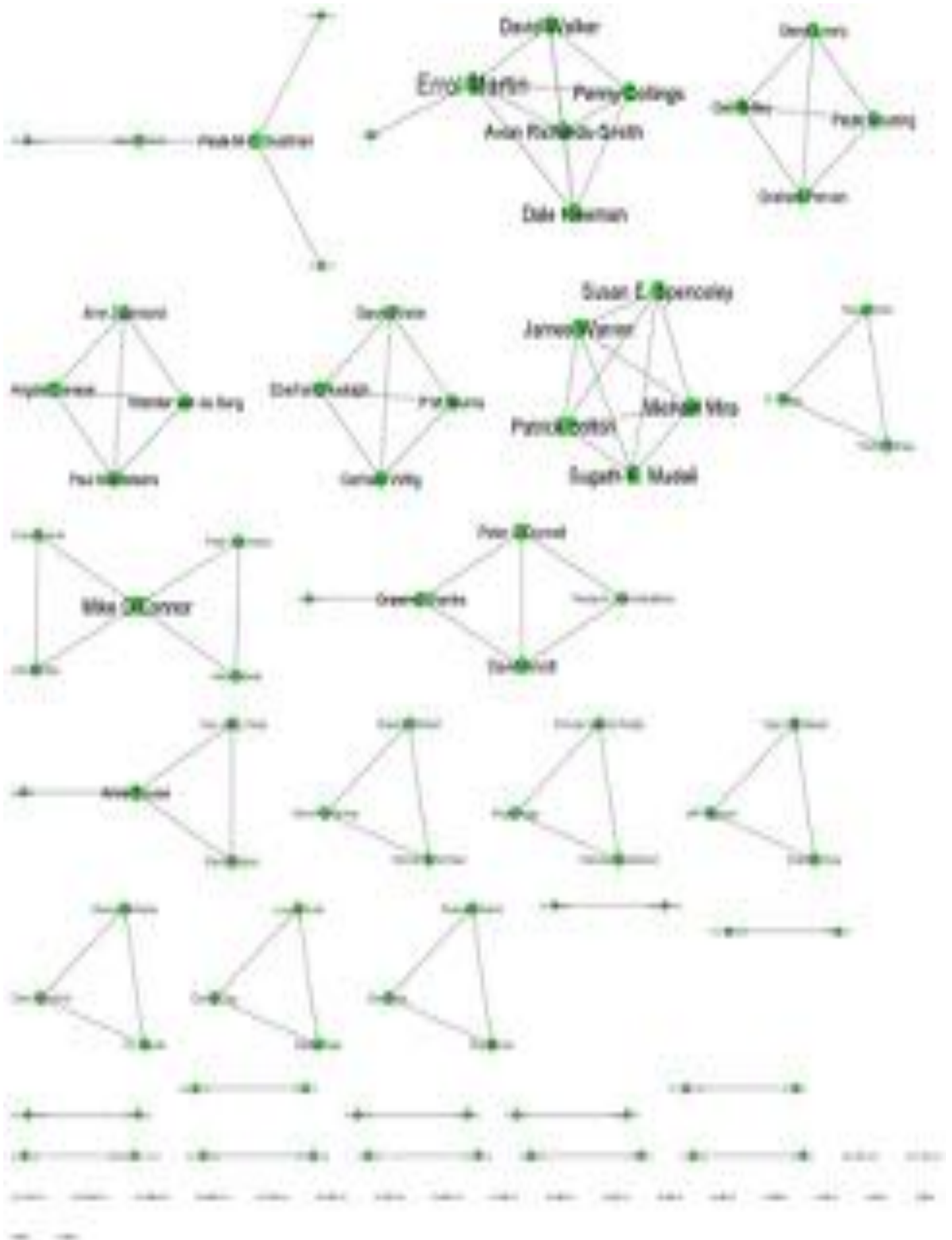
Figure 12. Co-authorship network (1997)
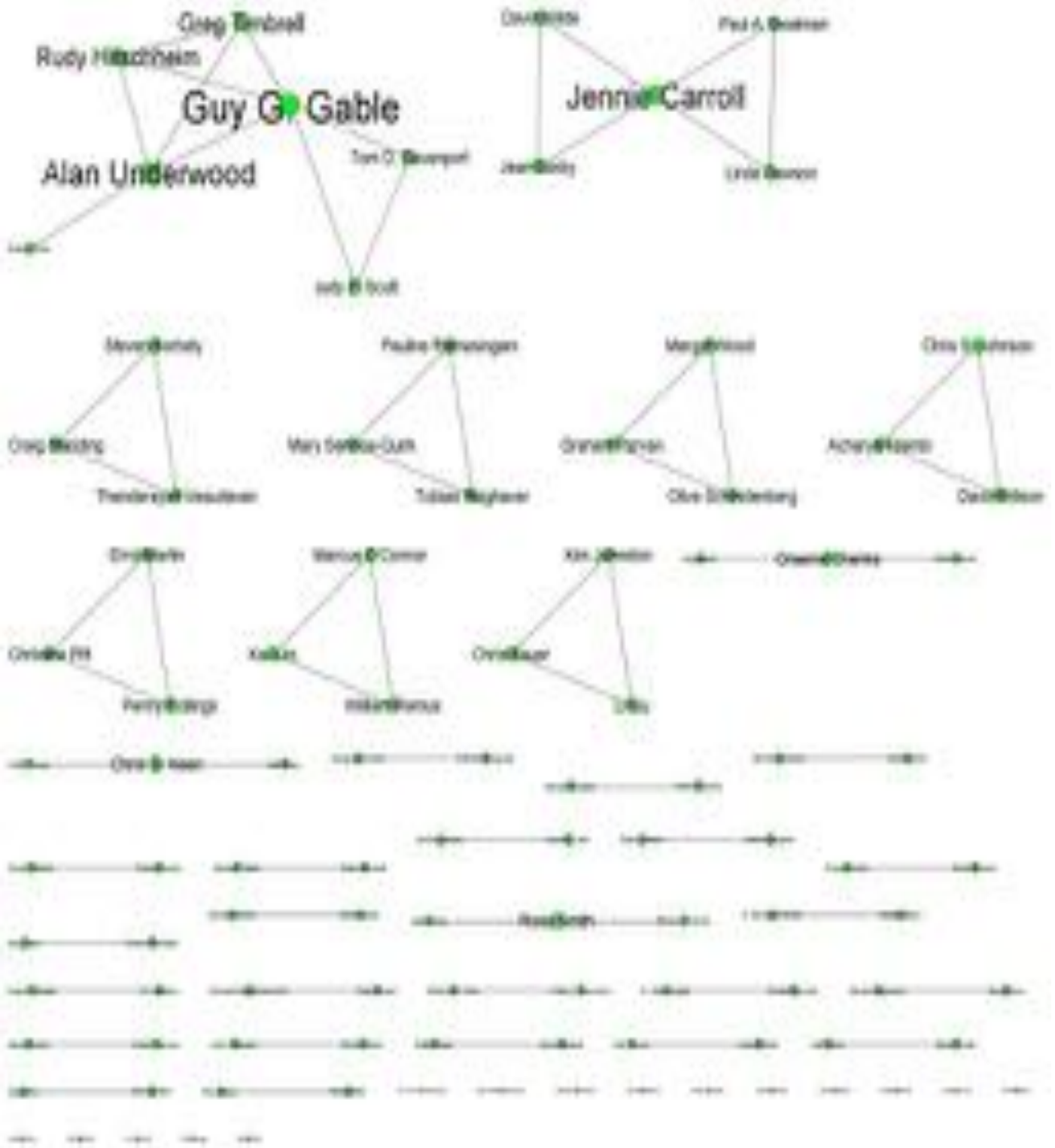
Figure 13. Co-authorship network (1998)

For the first time, prominent authors in the ACIS community formed a large cluster in 1999 (figure 14). Specifically, Brian Corbitt collaborated with Peter Seddon and Graeme Shanks, and in doing so Corbitt connected the two groups involving Seddon and Shanks. By acting as the bridge between these two groups, Corbitt could reach the immediate co-authors of Seddon and Shanks, potentially through their referrals, to expand his network. Mike Metcalfe and Tanya McGill were researchers, who also held similar advantageous positions in the co-authorship network in 2000.

Figure 14. Co-authorship network (1999)
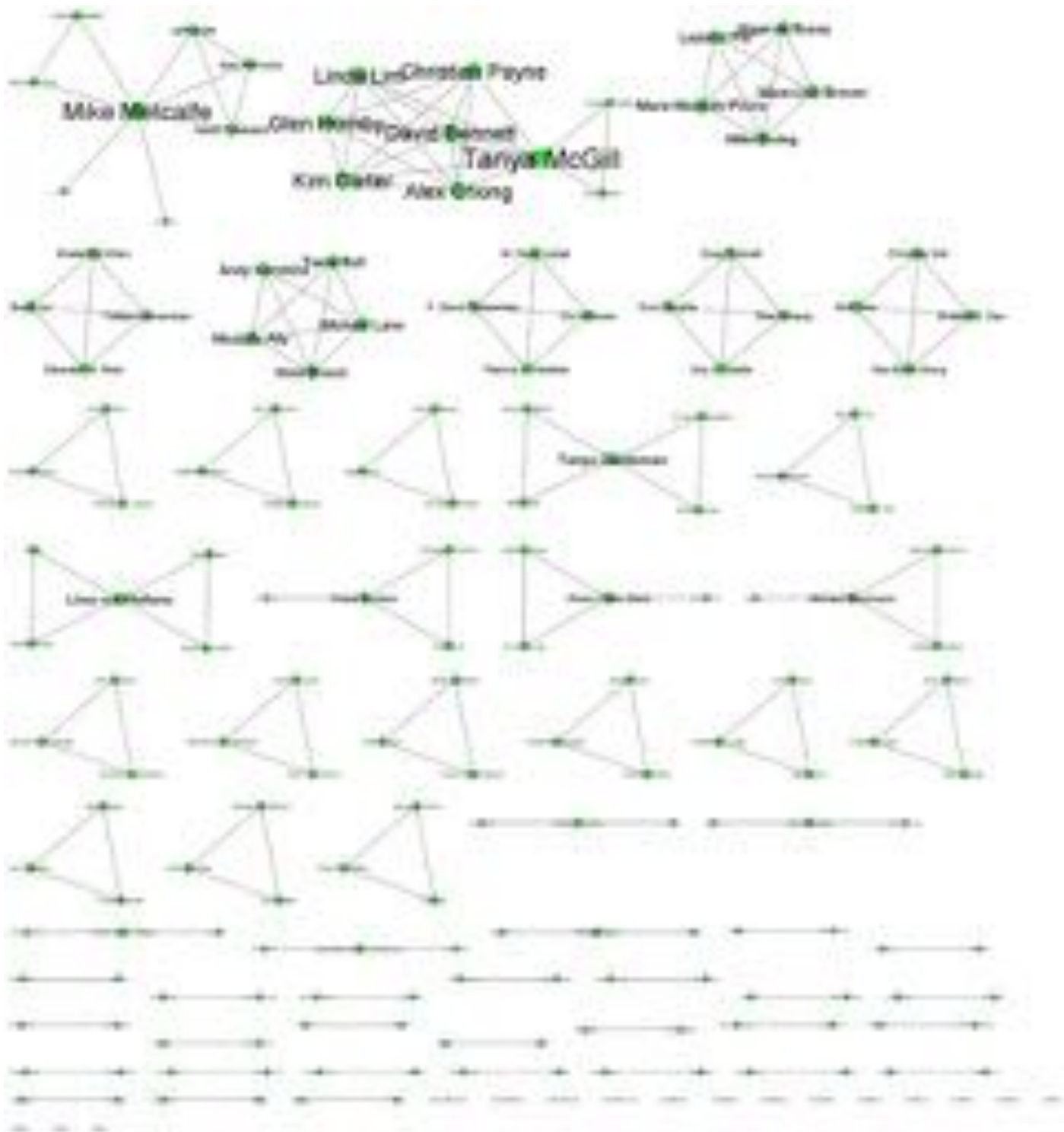
Figure 15. Co-authorship network (2000)

5. Co-authorship Networks during the Period 2001-2005

After two years with sharp increases in the numbers of authors and publications in 1999 and 2000, the numbers decreased to 136 authors and 84 publications in 2001, then increased again from 2001 to 2003 where the numbers peaked at 273 authors and 146 publications (see Figure 16). After 2003, the number of publications dropped to 120 papers in 2004 and 112 in 2005, while the number of authors dropped to 235 (2004) and 200 (2005). Overall, the ACIS community continued to extend its size and attracted more authors and publications compared to the previous periods.

The 2001–2005 period also witnessed an increased level of research collaboration, as the number of co-authorship ties in the latter three years nearly equalled the number of authors in each conference. This change in the number of co-authorship ties suggests that the authors changed their publishing strategy. They favoured co-authoring papers over being sole authors. This might have been enabled by growing possibilities of collaborations within institutions among colleagues at different stages of their careers and a growing number of PhD students.
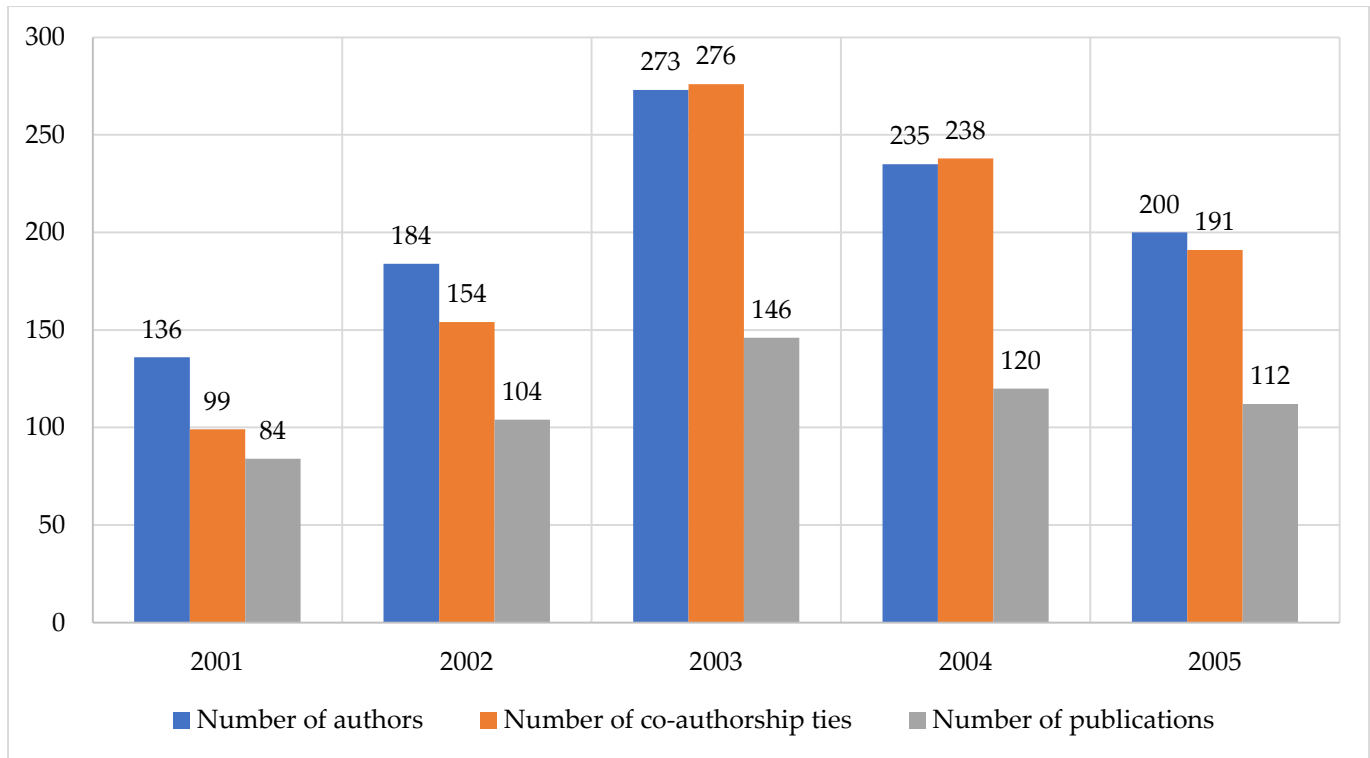
Figure 16. Numbers of authors, co-authorship ties, and publications (2001 to 2005)

In the 2001–2005 period, Michael Rosemann was the most contributing ACIS researcher with a total of 15 publications, followed by Craig Standing, Graeme Shanks, Dubravka Cecez-Kecmanovic and Jennie Carroll (see Table 5). Notably, Rosemann published four papers in ACIS 2001 and another six papers in ACIS 2005. A prominent author with many co-authorship ties from the previous periods, Jennie Carroll, ranked third in this list with 11 publications. Another well-connected researcher of the previous period, Graham Pervan, ranked fifth with eight publications. Brian Corbitt, Rodger Jamieson, Paul Turner, and Peter Love came fourth with nine publications each. The latter two did not publish in any ACIS conference before 2000.

Figure 17 shows the consolidated network of research collaborations from 2001 to 2005. This network has 719 authors and 814 co-authorship ties, and each author has 2.264 ties on average. In the previous section, we commented that the ACIS community began to take shape as we observed the emergence of several clusters at the end of the last period. In this period, three major clusters can be distinctively recognised due to their large sizes.

Some of the most productive researchers, Michael Rosemann, Graeme Shanks, Jennie Carroll and Brian Corbitt, together with their personal networks formed one of the three largest clusters with

Graeme Shanks as the cluster's core. The formation of this largest cluster was achieved due to network brokers or 'bridges' such as Jennie Carroll, Ron Weber, Peter Seddon, Elizabeth Tansley, Konrad Peszynski and Ross Smith, who brought the smaller clusters together by collaborating with the mentioned most productive researchers. The second large cluster includes members such as Dubravka Cecez-Kecmanovic, Graham Pervan and Peter Love, and the third one involves Julie Fisher and Frada Burstein.

Table 5. Top five ranked productive researchers (2001 to 2005)

Author	Number of publications						
	2001	2002	2003	2004	2005	Total	
Michael Rosemann	4	2		3	6	15	1st
Craig Standing	2	1	3	4	2	12	2nd
Graeme Shanks	3	4	3	2		12	2nd
Dubravka Cecez-Kecmanovic	3	3	3	1	2	12	2nd
Jennie Carroll	1	2	2	2	4	11	3rd
Paul Turner	2	5	2			9	4th
Peter Love			4	3	2	9	4th
Rodger Jamieson		1	7	1		9	4th
Brian Corbitt		2	3	1	3	9	4th
Graham Pervan	4		1	2	1	8	5th
John Campbell	1	2	1	2	2	8	5th
Deborah Richards	2	2	1		3	8	5th
3 authors						7	
5 authors						6	
17 authors						5	
19 authors						4	
54 authors						3	
129 authors						2	
480 authors						1	

It is worth mentioning that top performers did not form clusters exclusively with those who were ranked next to them. For example, Cecez-Kecmanovic was ranked second in terms of publications, and she was found to co-author and form a cluster with Pervan (5th rank) and Love (4th rank). Similarly, Rosemann (1st rank) and Shanks (2nd rank) formed a cluster with Corbitt (4th rank). However, Burstein (7th rank with seven publications) and Fisher (8th rank with five publications) also formed a cluster with diverse connections. Overall, we can observe that researchers had started to form 'strategic' relationships that subsequently established larger clusters with more complicated structures, compared to those of the previous periods. At this point we can only speculate what brought about these clusters (see previous section).
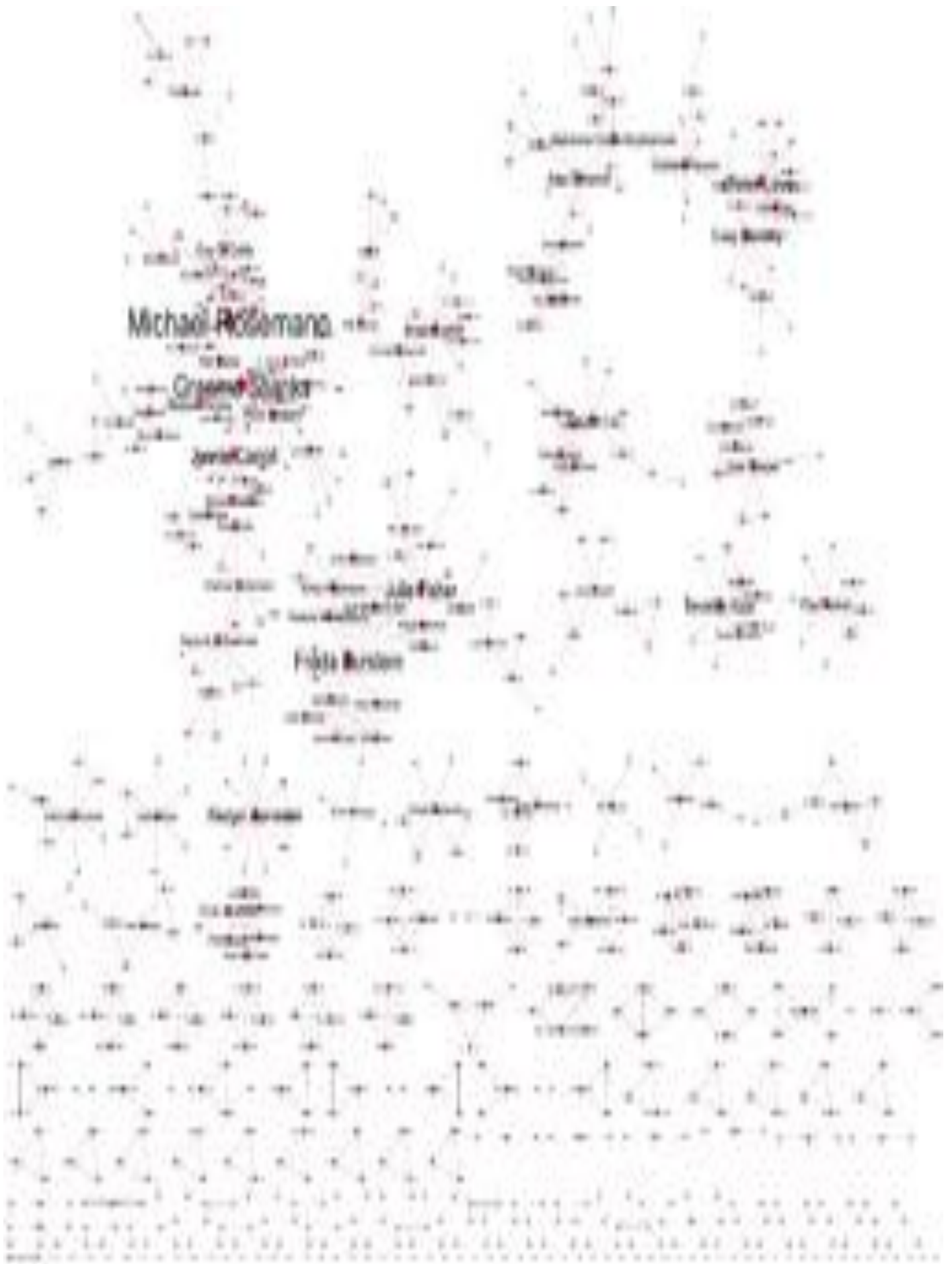
Figure 17. Consolidated co-authorship network (2001 to 2005)

Figures 18 to 22 show the 5 networks representing each year's co-authorship network. Consistent with the network snapshots of the previous periods, the common network structures in these five years consisted of pairs and triads of three co-authors. The four-author structure became also popular, especially in the 2004 co-authorship network.
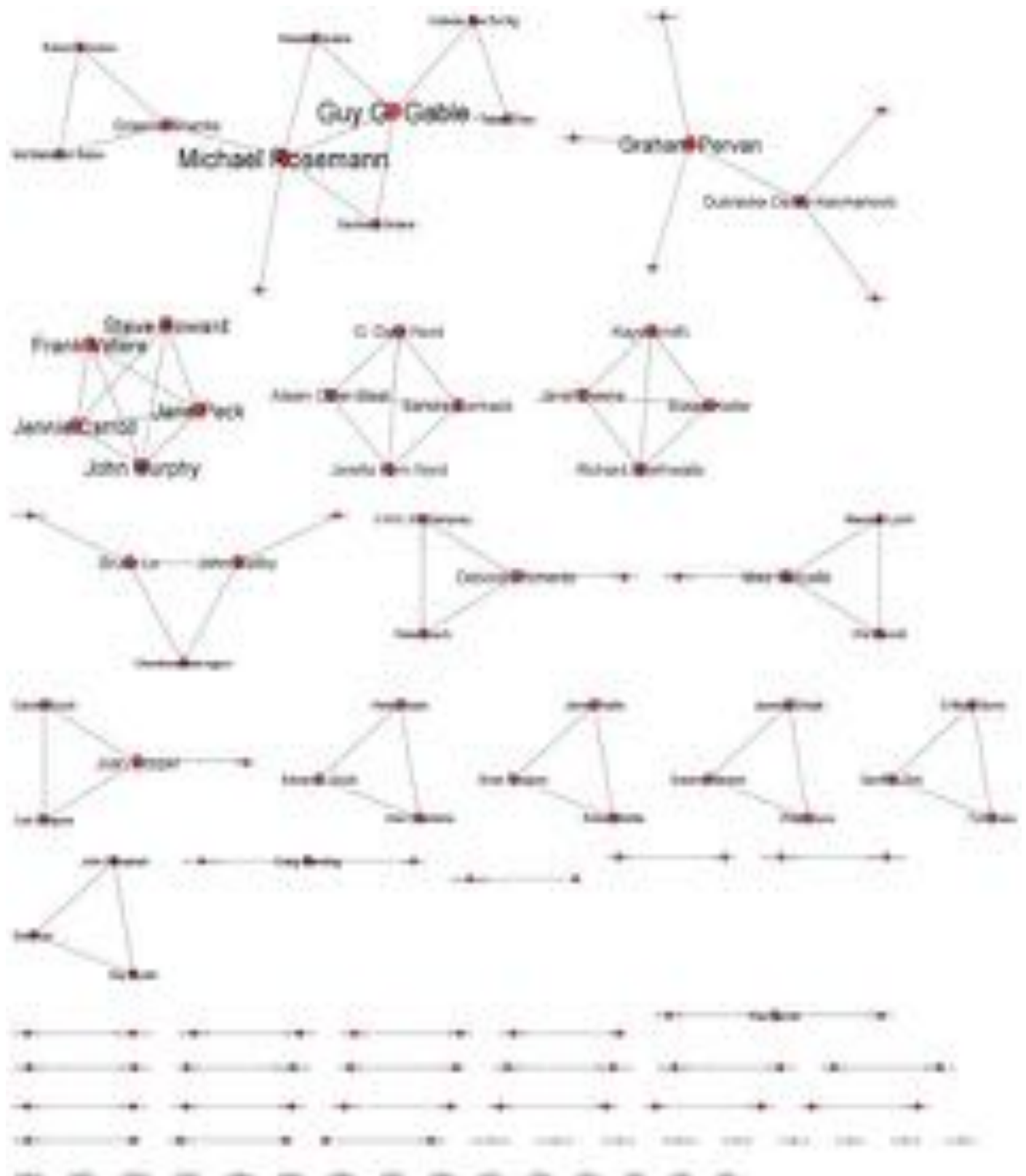
Figure 18. Co-authorship network (2001)

There were several clusters of authors that became visible throughout this period; including the one involving Kirsty Williamson, Frada Burstein and Julie Fisher that appeared in 2002 and 2003, and the cluster surrounding Michael Rosemann that appeared in 2005. Graeme Shanks, Brian Corbitt, Sim Kim Lau and Mark Toleman also held central positions in clusters in one of these six years.

Figure 19. Co-authorship network (2002)
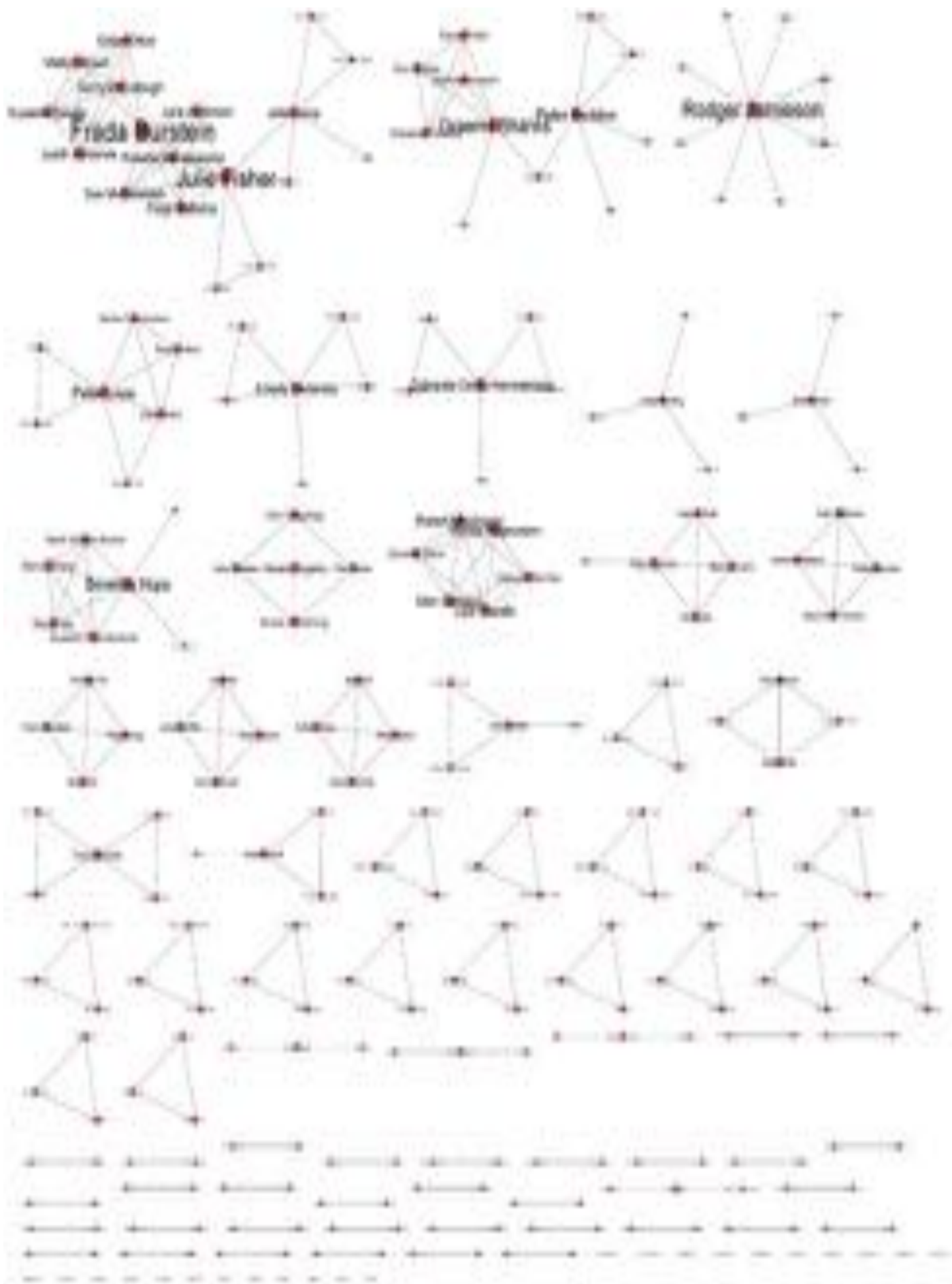
Figure 20. Co-authorship network (2003)
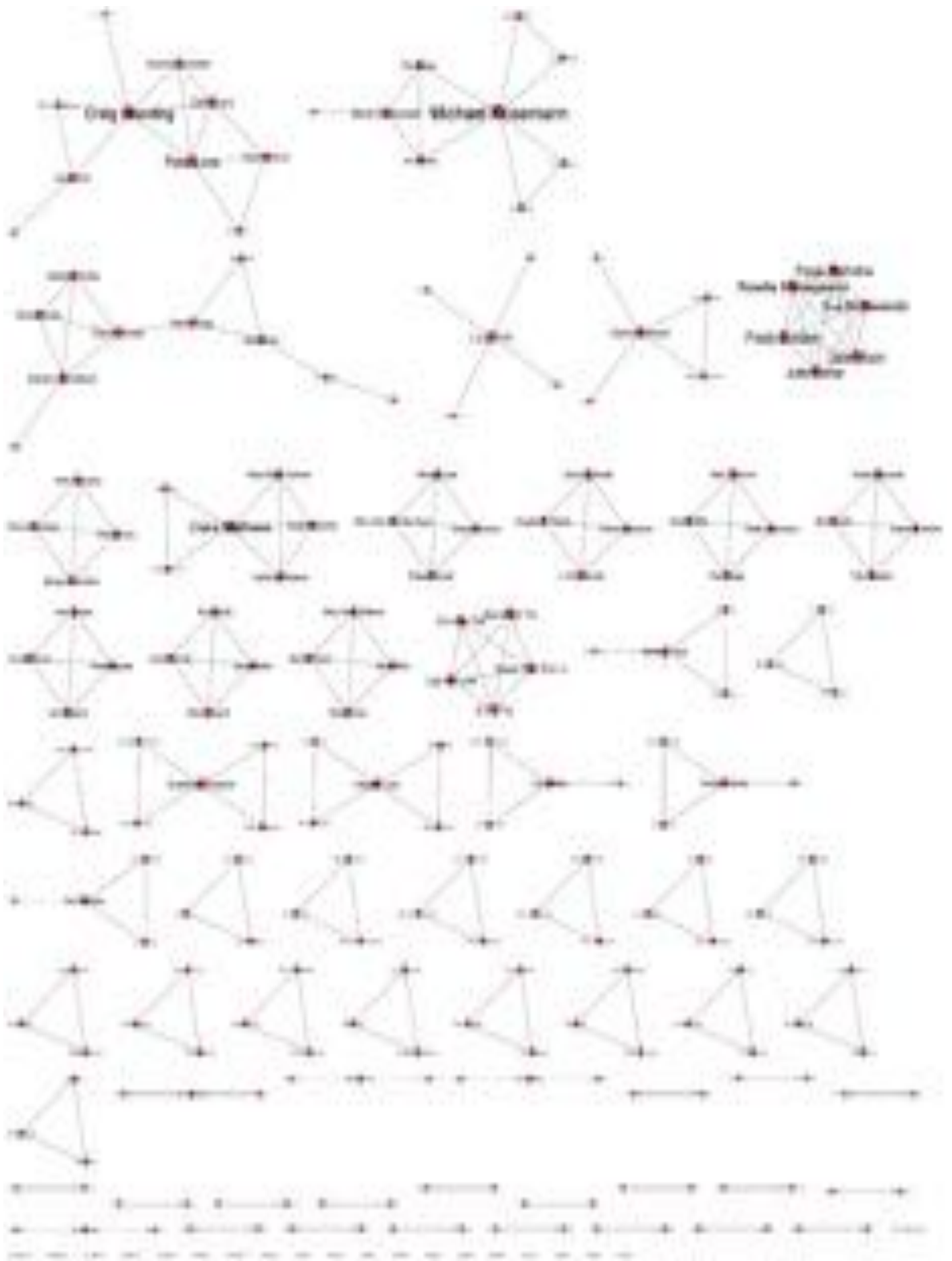
Figure 21. Co-authorship network (2004)
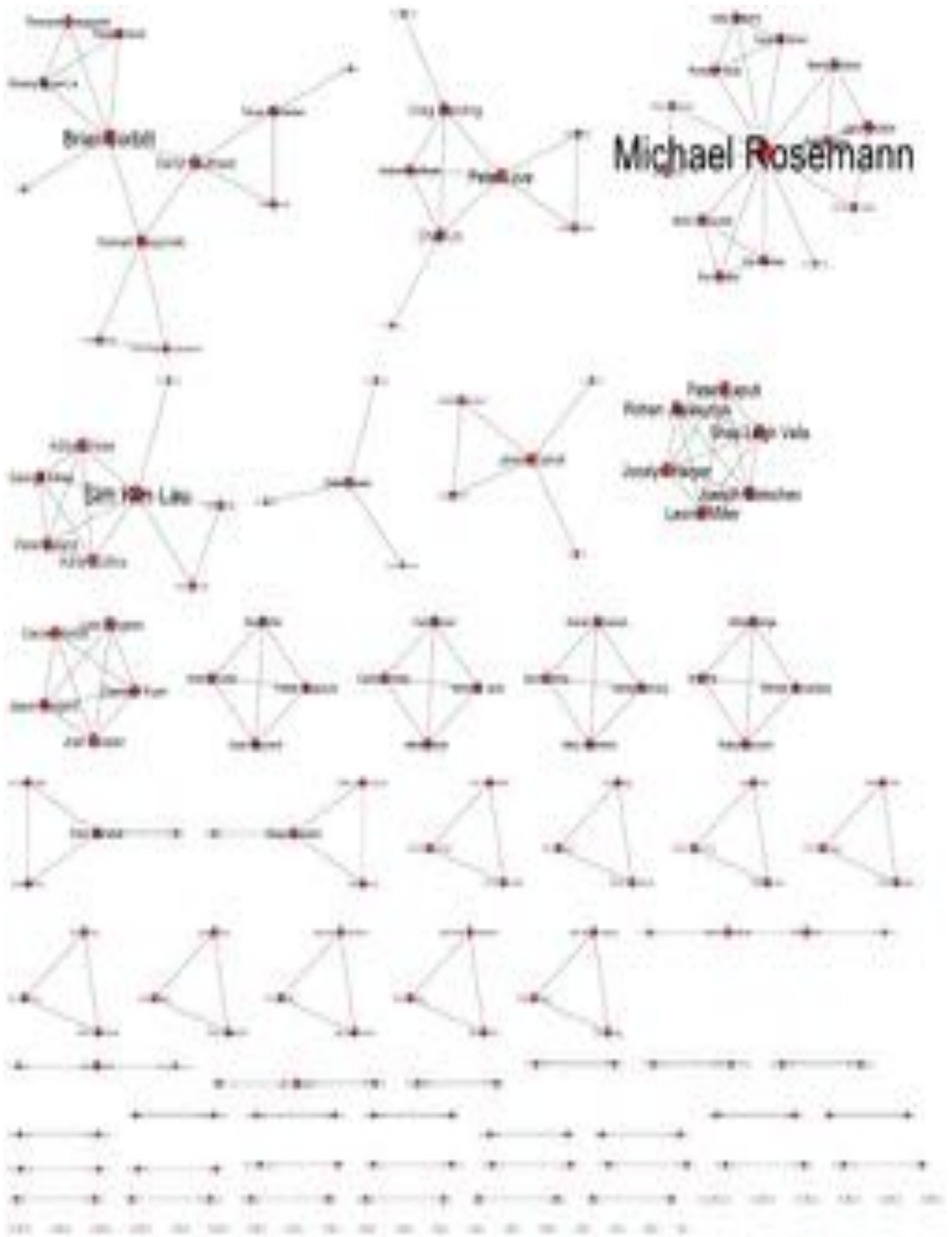
Figure 22. Co-authorship network (2005)

Although the two mentioned clusters surrounding Rosemann and Birsteinn appear equally large, the number of publications shown in Table 5 indicates that Rosemann's cluster contributed more to his productivity. A closer examination of these clusters shows that Rosemann had more unique collaborators than Burstein did, and each of these unique collaborators co-authored a different publication with Rosemann. In contrast, although Burstein had a similar number of collaborators, they all co-authored the same papers, which indicates a rather closed network of collaborators.

Figure 31 compares the clusters surrounding Rosemann and Burstein. The colours indicate distinct groups of co-authors who collaborated with each of them. Rosemann collaborated with six different groups of 13 co-authors, which resulted in six papers in 2005. Burstein collaborated with 10 co-authors, who belonged to only two groups and resulted in (just) two papers in 2003. Based on this observation we conclude that the size of a researcher's personal co-authorship network is less important for their productivity than the composition of the network.
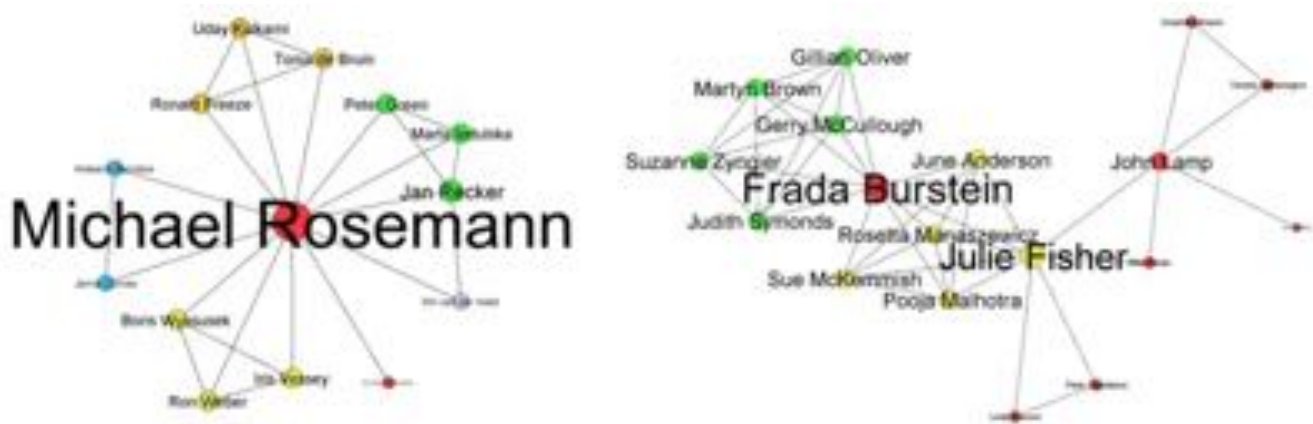
Figure 23. Personal networks of Rosemann (2005) and Burstein (2003)

6. Co-authorship Networks during the Period 2006-2010

Consistent with the previous period's trend, the 2006–2010 period had a fluctuating number of authors, whereas the number of accepted papers was relatively stable between 104 and 116 per conference (see Figure 24). This can be interpreted as that the ACIS community continued to attract a large number contributors (between 211 and 260 published contributors in this period) while paying attention to controlling for the quality of the submissions.

However as the number of co-authorship ties consistently exceeded the number of authors during this period, it appears to us that publishing as a sole author in an ACIS conference had become less common, and researchers now consistently formed more teams as co-authors. It also suggests that current members of the ACIS community successfully attracted new contributors, what remains unclear at this point is whether these were national or international peers or this was due to a further growing number of, probably mostly international, PhD students.
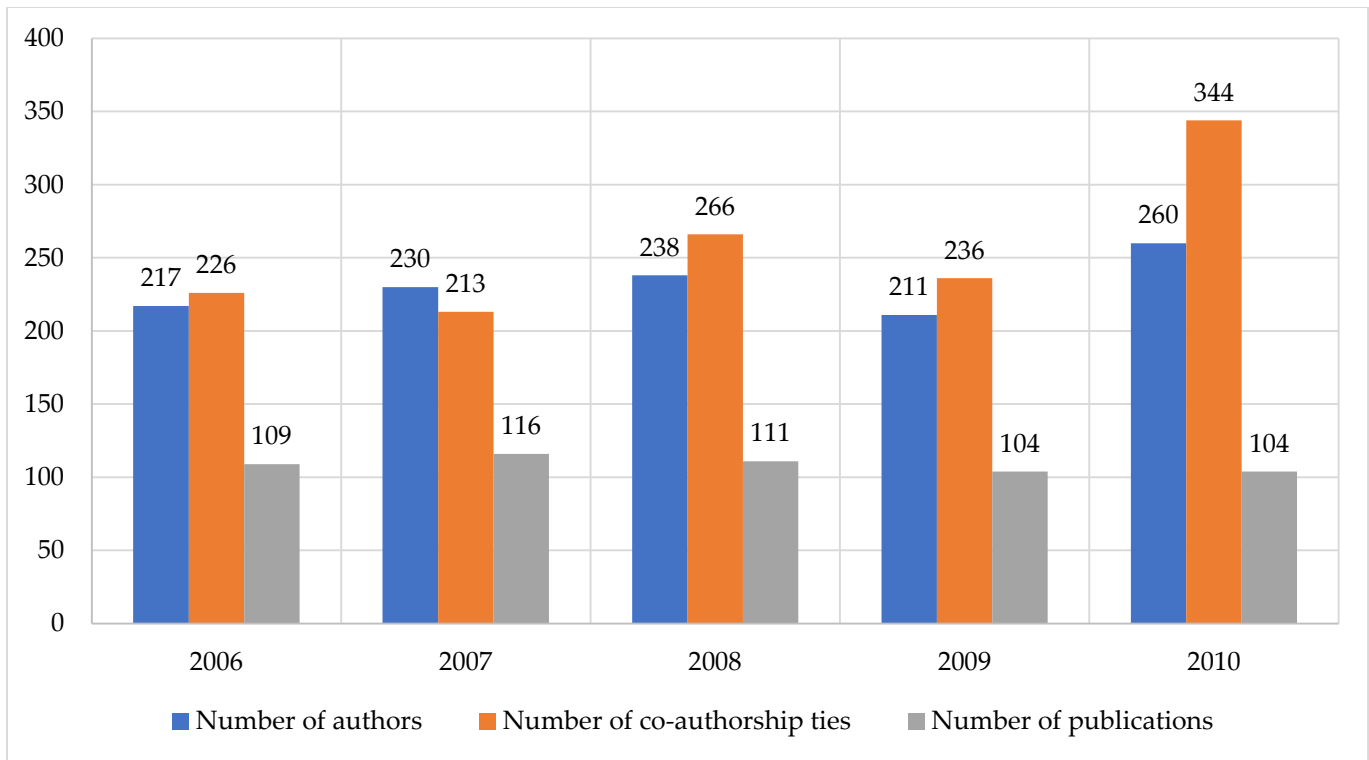
Figure 24. Numbers of authors, co-authorship ties and publications (2006 to 2010)

The top contributors to ACIS in this period were Michael Rosemann (11 publications), Brian Corbitt (10 publications), Sherah Kurnia, Jennie Carroll, Judy McKay and Alemayehu Molla with nine publications each (see Table 6). Of these top performers, Rosemann and Carroll maintained their top ranks, which they had reached in the previous period; Corbitt further climbed in the rankings, while Kurnia, McKay and Molla were researchers, who appeared in the most productive researcher list for the first time. These statistics indicate that the ACIS community and the co-authorship networks underwent noticeable changes after 2005. We can speculate whether these changes have to do with the before mentioned assumed growing number of PhD students, and/or with any changes of academics' affiliations based on an increased mobility where existing co-authorship relations are maintained and new ones are created. They might also be grounded in academic leadership of some sort in certain institutions with regard to the importance of conference publications and the accompanying conference participation as a cornerstone of developing scholarship through exposing ones ideas to peers.

The consolidated co-authorship network of the 2006–2010 period, as shown in Figure 25, also indicates several changes compared to the previous period. The average number of collaborators in the network is 2.733, which means that on average an author more regularly now had three co-authors. It will be interesting to research in detail who, respectively what, the characteristics of these co-authors are. We could speculate that at elast in many three author teams the team members are from the same institution, representing a PhD student and their two supervisors.

Following Graeme Shanks' disappearance as a bridge in one of the co-authorship network of the previous period, Michael Rosemann and Brian Corbitt were not members in the same cluster anymore. Both Rosemann and Corbitt grew their own personal networks of collaborators, where they collaborated with new and well-connected researchers such as Sherah Kurnia, Alemayehu Molla, Shanton Chang, Wasana Bandara and Jan Recker. The co-authorship network of this period has a reduced number of clusters from three to the mentioned two.

Table 6. Top five ranked productive researchers (2006 to 2010)

Author	Number of publications					Total	Rank
	2006	2007	2008	2009	2010		
Michael Rosemann	5	3		7		15	1st
Brian Corbitt	2	1	6		1	10	2nd
Sherah Kurnia	1		2	1	5	9	3rd
Jennie Carroll	2	1	1	4	1	9	3rd
Judy McKay	2	2	1	2	2	9	3rd
Alemayehu Molla		1	4	2	2	9	3rd
Sharman Lichtenstein	3	2	1	1	1	8	4th
Peter Marshall	1	1		3	3	8	4th
Mark Toleman	3	4		1		8	4th
Jan Recker	2	2		4		8	4th
Aileen Cater-Steel	3	3		2		8	4th
Graeme Shanks	1	1	1	2	3	8	4th
Vanessa Chang	1	2	2	2		7	5th
Hepu Deng			3	1	3	7	5th
Alexei Tretiakov			3	3	1	7	5th
10 authors						6	
11 authors						5	
22 authors						4	
50 authors						3	
130 authors						2	
613 authors						1	

Figure 25. Consolidated co-authorship network (2006 to 2010)

The structures of the co-authorship networks in this period resemble those of the previous period, where there was at least one large cluster of authors in a year (see the networks for each year from 2006–2010 in Figures 26 to 30). Michael Rosemann continued to collaborate with multiple distinctive groups of co-authors, resulting in seven publications in 2009. Brian Corbitt as a key author of this period joined the largest cluster of co-authors in 2008 and published six papers in the same year. Moreover, Corbitt's collaboration brought Hepu Deng and Alemoyahu Molla to the list of most productive contributors.
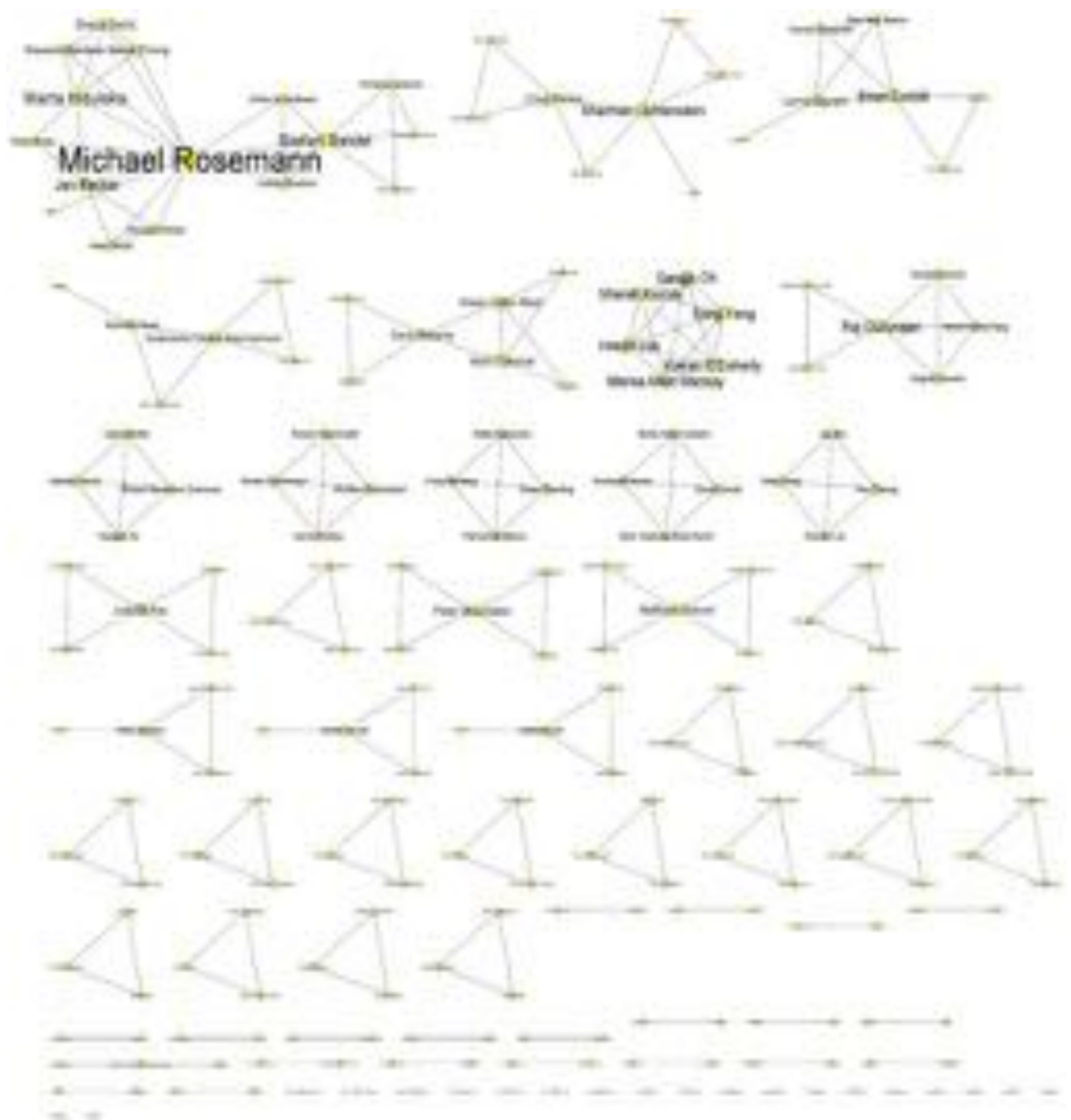
Figure 26. Co-authorship network (2006)
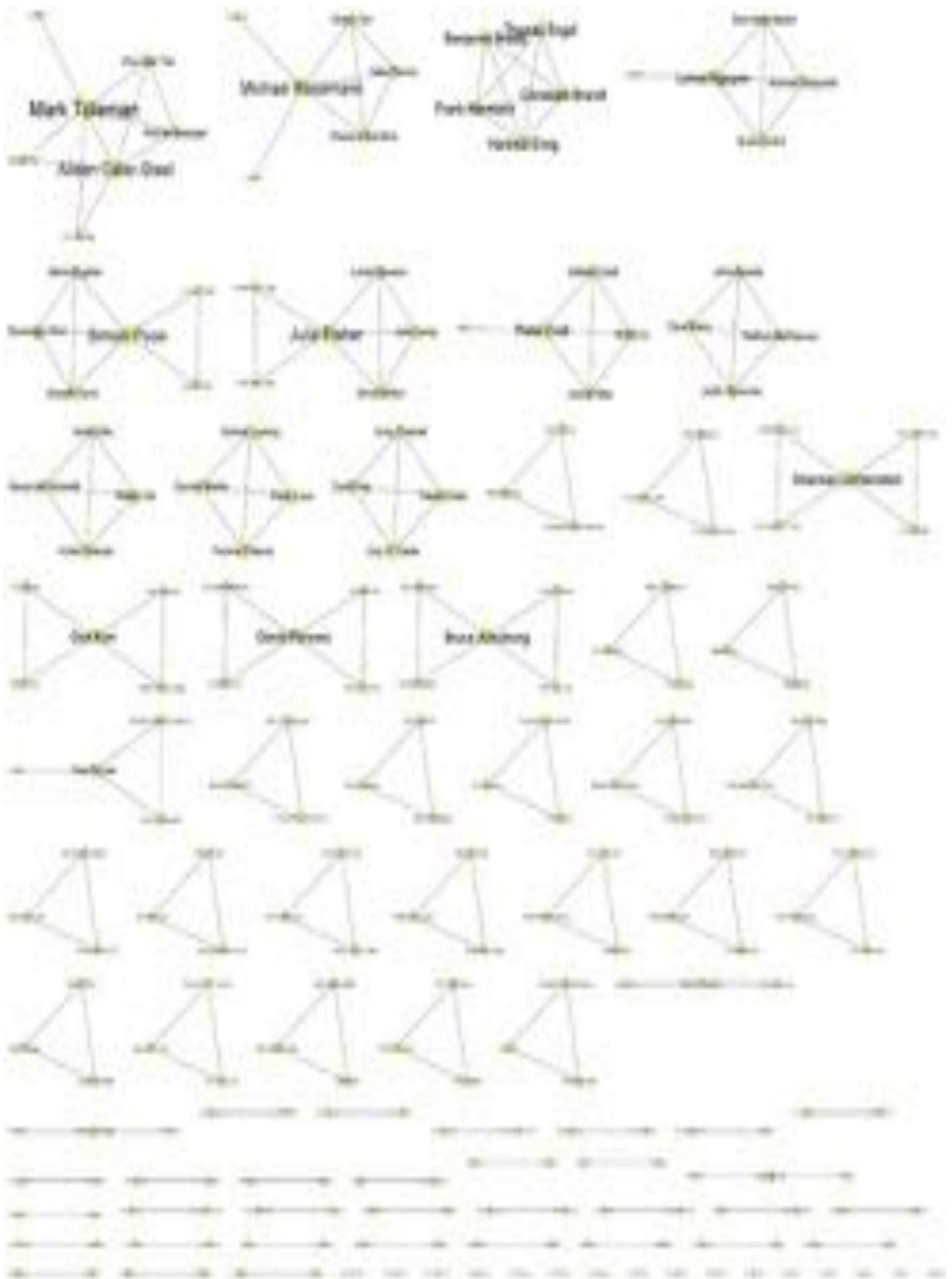
Figure 27. Co-authorship network (2007)

Figure 28. Co-authorship network (2008)

Figure 29. Co-authorship network (2009)
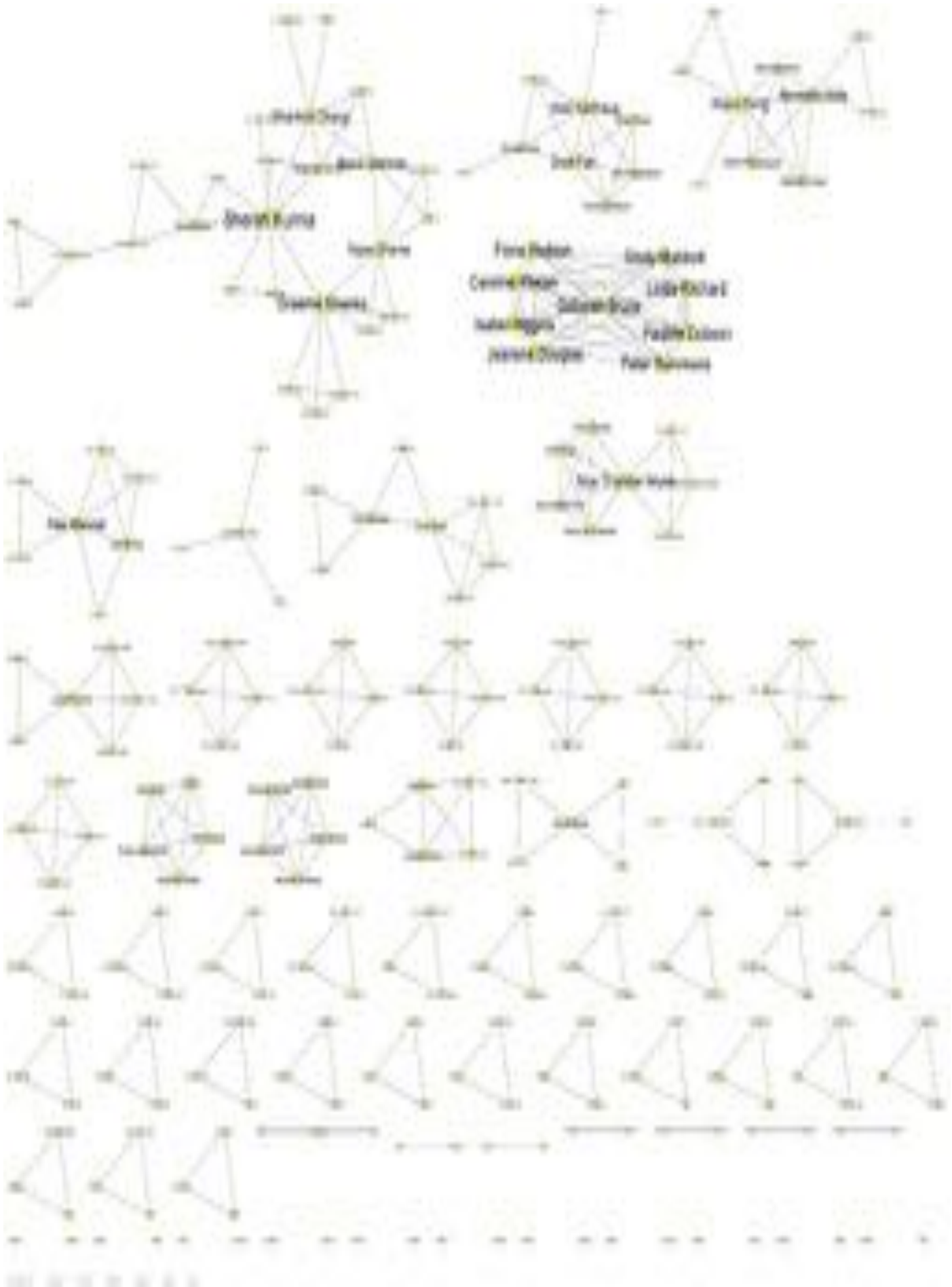
Figure 30. Co-authorship network (2010)

7. Co-authorship Networks during the Period 2011-2016

From only 25 authors and 15 publications in 1990, the numbers of authors and publications peaked at 424 authors and 179 papers in 2014, then were lower again in 2015 and 2016. One plausible reason for the large numbers of authors and publications in 2014 may be that ACIS 2014 took place in conjunction with the International Conference on Information Systems (ICIS 2014) in New Zealand. Many, both local and international researchers may have decided to submit papers to and attend both of these two conferences in 2014. The numbers are however only insignificantly higher than in 2013 when the conference was in Melbourne, possibly indicating that location is another factor for authors' interest in submitting a paper to the conference; a further factor could be that in this period conference participation was recognised by institutions and their leaders as a vital part of building up a strong individual researcher career and thus funding for this purpose was made available. The number of submitted papers and accepted submissions might also provide some insight in the numbers of authors, co-authorship ties, and publications.

Researchers continued to favour co-authoring papers in this period, as shown in Figure 31 where the number of co-authorship ties exceeded the number of authors every year. Collaborations have been a trend in the ACIS community since 2008. In fact, the year 2013 observed the largest number of co-authorship ties (556 ties) in the entire period between 1990 and 2016.
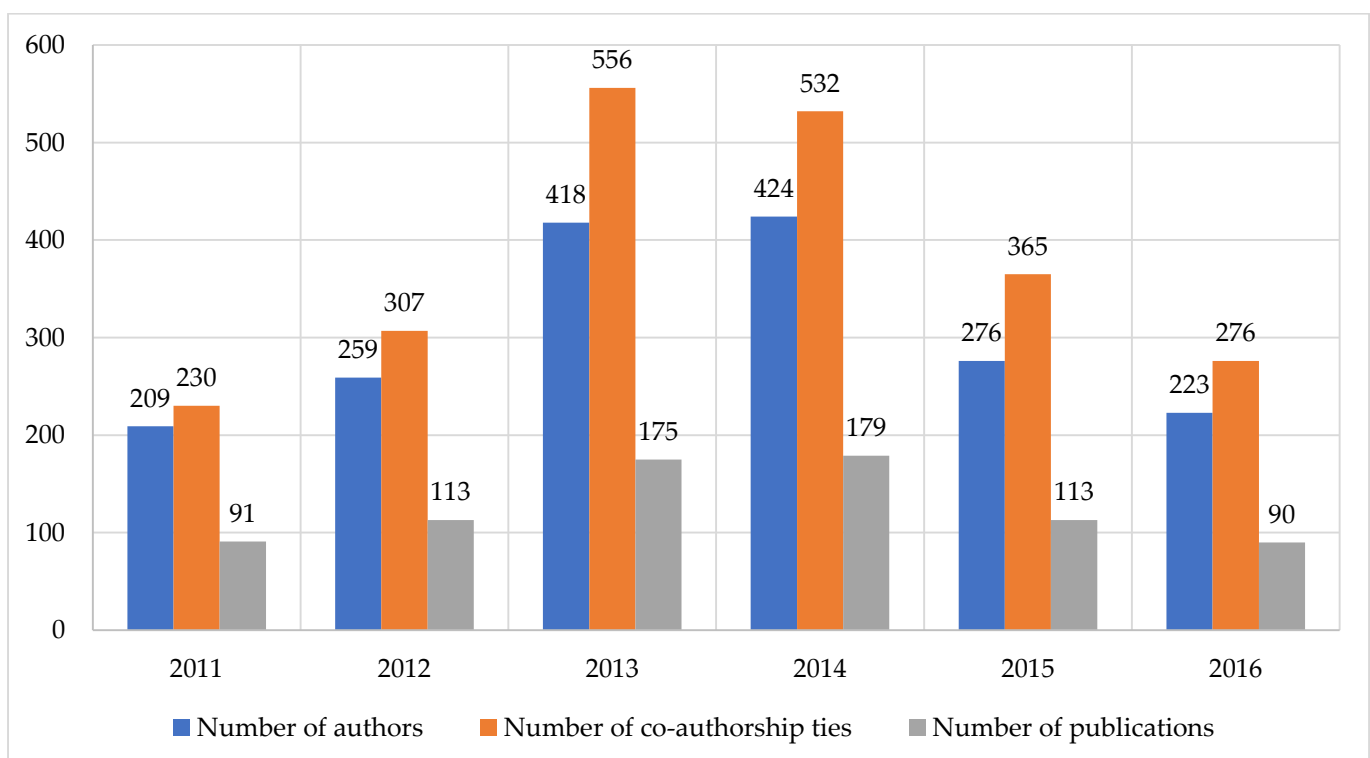
Figure 31. Numbers of authors, co-authorship ties and publications (2011 to 2016)

Table 7 shows the most productive researchers of the period between 2011 and 2016, consisting of researchers who have not appeared in the previous lists. Sean Maynard, Rachelle Bosua, Atif

Ahmad, all from the University of Melbourne, and John Campbell were the most productive authors in this period with 12 publications, followed by Sherah Kurnia and Helena Scheepers who produced 11 publications each. Erwin Fielt, Karlheinz Kautz, and Kai Riemer, all recent arrivals from Europe, ranked third in the top performer list with 10 publications.

Again we can speculate about institutional reasons along the lines stated above for this development if we would take the authors' affiliations into account. The actuality, raise and fall, of certain topics might also play a role. It also raises the interesting question about the wider influence of overseas recruits and addition to the ACIS community and the formation of co-authorship clusters spearheaded by the likes of Professors Rosemann, Burstein, Cecez-Kecmanovic and previous, possibly international, PhD students such as A/prof Sherah Kurnia. This might warrant a more detailed look at how researchers who relocated to Australia and New Zealand contributed to publications at ACIS. The co-authorship network of the 2011–2016 period, as shown in Figure 28, displays a new collaboration structure established by the emerging authors in this period. The average degree of this network is 3.073, confirming the trend found in the previous period that each researcher had three co-authors on average.

In contrast to our previous observation about the network's reduced number of clusters, the current network expanded again into several clusters formed by new researchers such as Md Mahbubur Rahim, Stephen Smith and Mary Tate, as well as prominent researchers of the recent periods such as Sherah Kurnia, John Campbell and Frada Burstein.

Brian Corbitt, who was part of the major cluster with Kurnia, left the cluster and the co-authorship network. Following this, Kurnia was tied to well-connected researchers such as Rahim, Smith, Bosua and Maynard. Michael Rosemann remained in the central position of his network; however, his network's size of ACIS contributions decreased. These findings reinforce the fact that the co-authorship network has evolved with new contributors entering and with established contributors possibly publishing at other conference and more through other, probably journal outlets.

Table 7. Top five ranked productive researchers (2011 to 2016)

Author	Number of publications						Total	Rank
	2011	2012	2013	2014	2015	2016		
Sean Maynard		1	1	1	5	4	12	1st
Rachelle Bosua	1		3	1	4	3	12	1st
John Campbell	1	1	5	3	2		12	1st
Atif Ahmad	2		1	1	4	4	12	1st
Sherah Kurnia		1	4	2	4		11	2nd
Helana Scheepers	2	2	3	3	1		11	2nd
Karlheinz Kautz		2	4	1	3		10	3rd
Kai Riemer	1	3	1	2	2	1	10	3rd
Erwin Fielt	4		4			2	10	3rd
Michael Lane			2	2	4	1	9	4th
Jan Recker	1	3	1	3		1	9	4th
Deborah Richards	1	4	2	2			9	4th
Frada Burstein		1	2	2	2	2	9	4th
Anuradha Mathrani	2			2	4	1	9	4th
Aileen Cater-Steel		2	1	3	2	1	9	4th
Olivera Marjanovic		2	2	1	2	1	8	5th
Michael Rosemann	4		4				8	5th
Rosemary Stockdale	3	2	2	1			8	5th
Mark B. Freeman	1	1	2	3		1	8	5th
Md Mahbubur Rahim	1		6		1		8	5th
Mary Tate		1		2	4	1	8	5th
Byron Keating			2	2	2	2	8	5th
Darshana Sedera			2	5	1		8	5th
6 authors							7	
9 authors							6	
24 authors							5	
38 authors							4	
84 authors							3	
205 authors							2	
900 authors							1	

Figure 32. Consolidated co-authorship network (2011 to 2016)

Figures 33 to 38 show the six co-authorship networks from 2011 to 2016. There were no major clusters in 2011 and 2012. In 2013, Michael Rosemann and Md Mahbubur Rahim were the most connected authors in the network. However, the personal co-authorship network of Rahim was more diverse than that of Rosemann, resulting in Rahim becoming one of the top contributors in this period with eight publications in total. It is also worth mentioning that ACIS 2013 was the last conference where Rosemann appeared as a key contributor. After 2013, we do not see the appearance of former top ACIS contributors such as Michael Rosemann, Brian Corbitt, and Graeme Shanks in the ACIS conferences anymore. There might be various reasons for this such as strategic choice of other outlets of research results, careers change, or retirement.
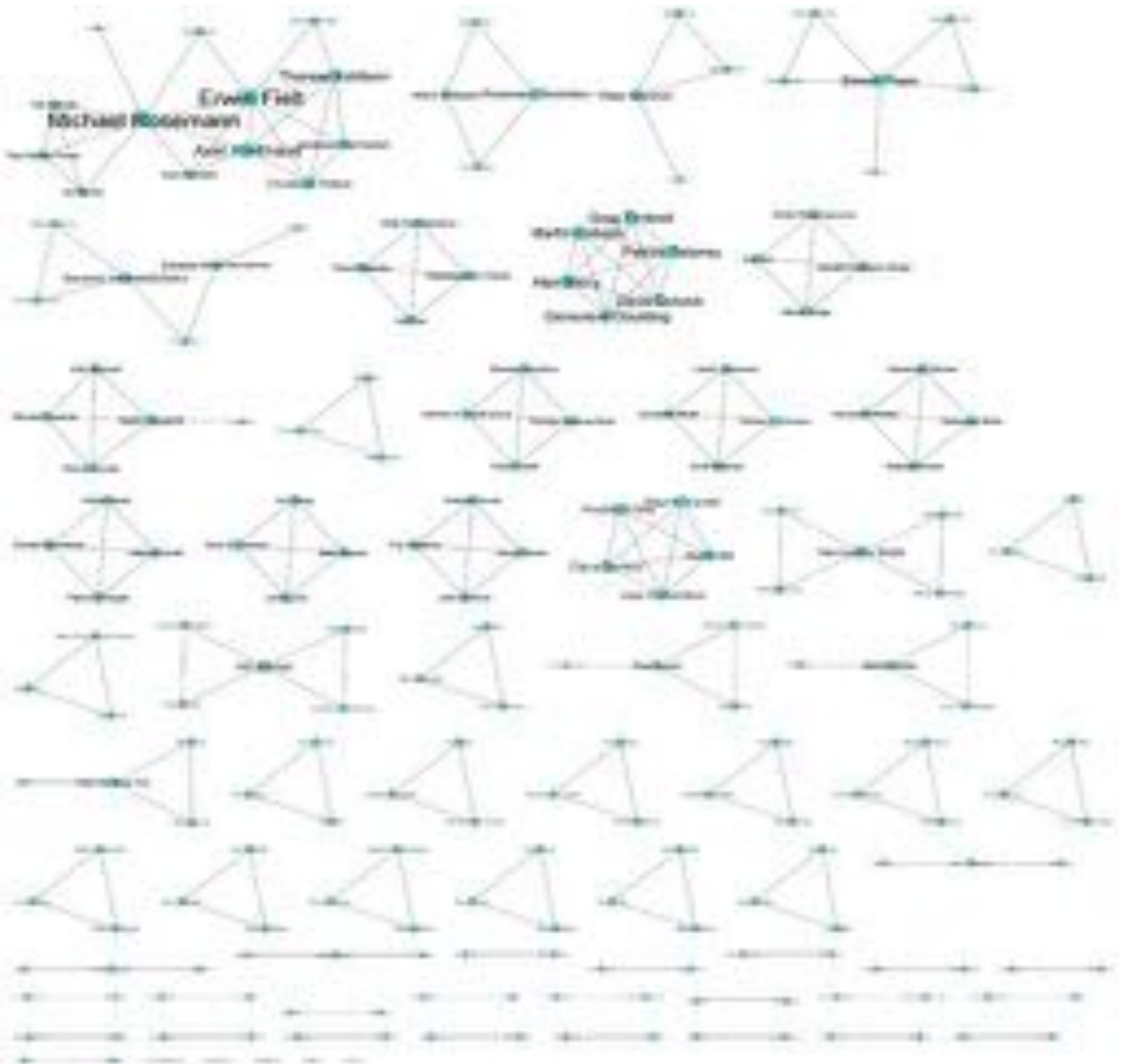
Figure 33. Co-authorship network (2011)
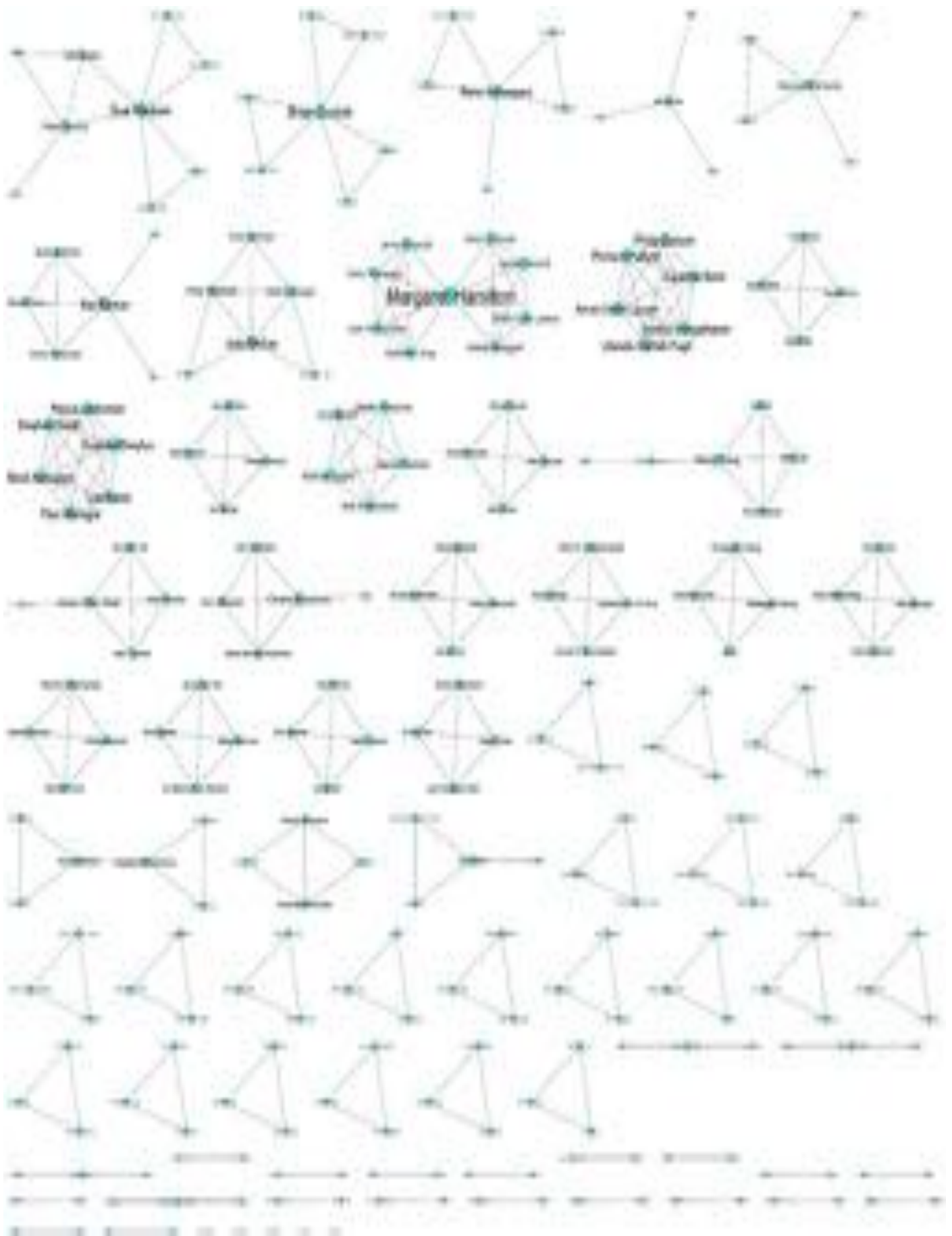
Figure 34. Co-authorship network (2012)
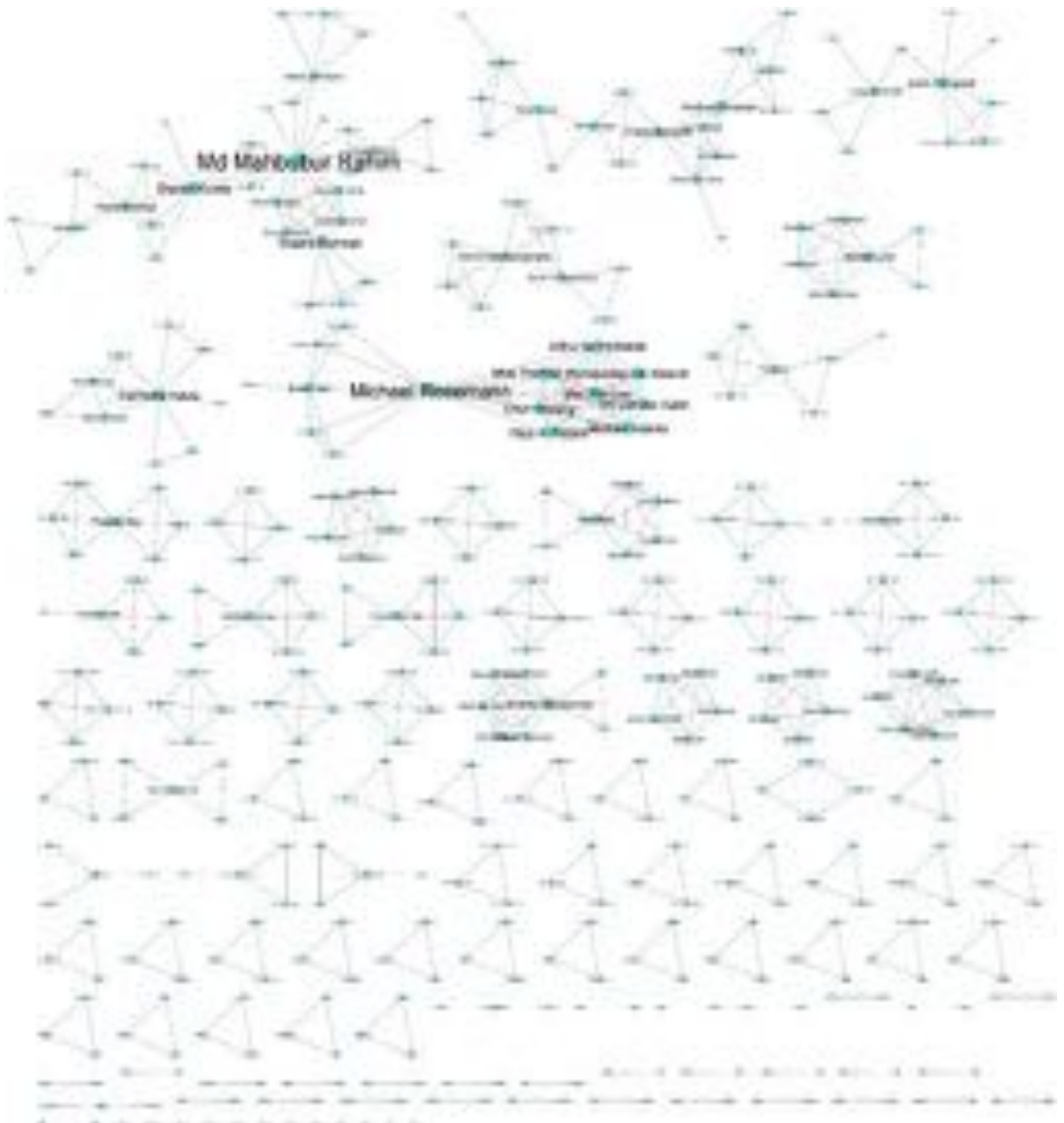
Figure 35. Co-authorship network (2013)

Large clusters of researchers such as those of Mary Tate, Sherah Kurnia, Rachelle Bosua and Frada Burstein appeared after 2013. Similar to how Brian Corbitt, Alemayehu Molla and Hepu Deng, all from RMIT, emerged together as most productive ACIS contributors in the 2008–2012 period, Sean Maynard, Rachelle Bosua and Sherah Kurnia, all from University of Melbourne collaborated with each other and became the new most productive ACIS contributors of the 2011–2016 period. This might be explained with the fact that these author teams shared the same affiliations, an issue which deserves further research.
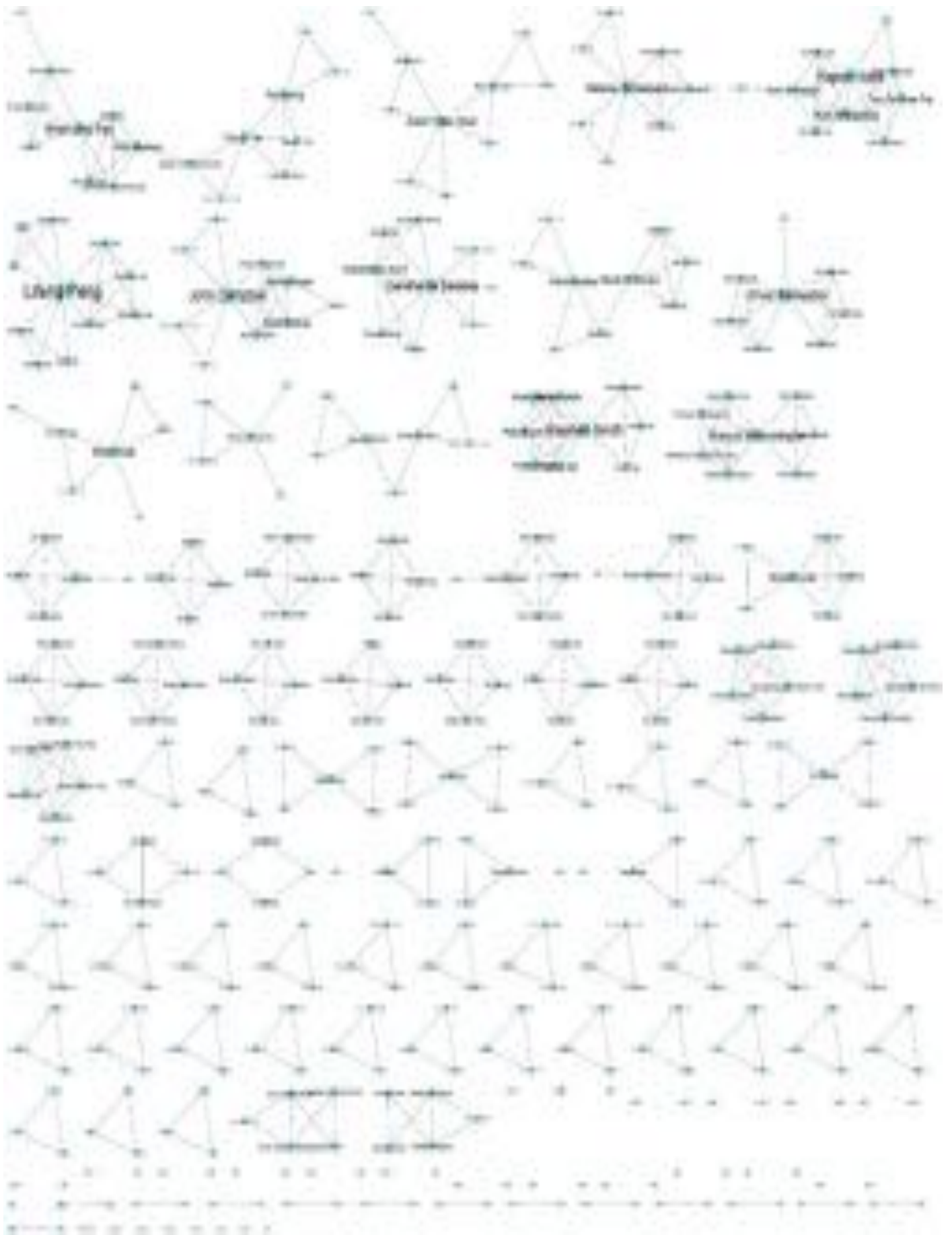
Figure 36. Co-authorship network (2014)
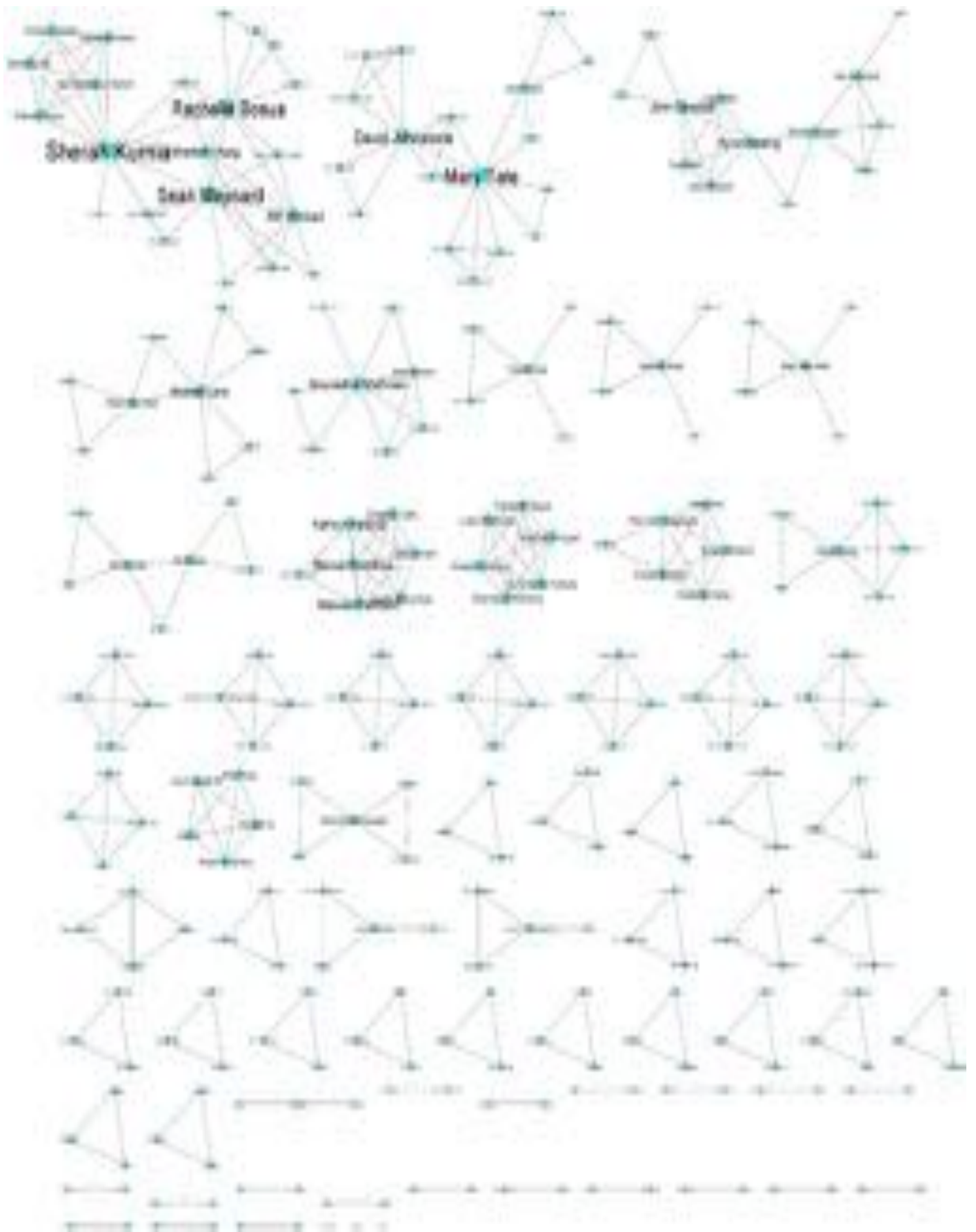
Figure 37. Co-authorship network (2015)
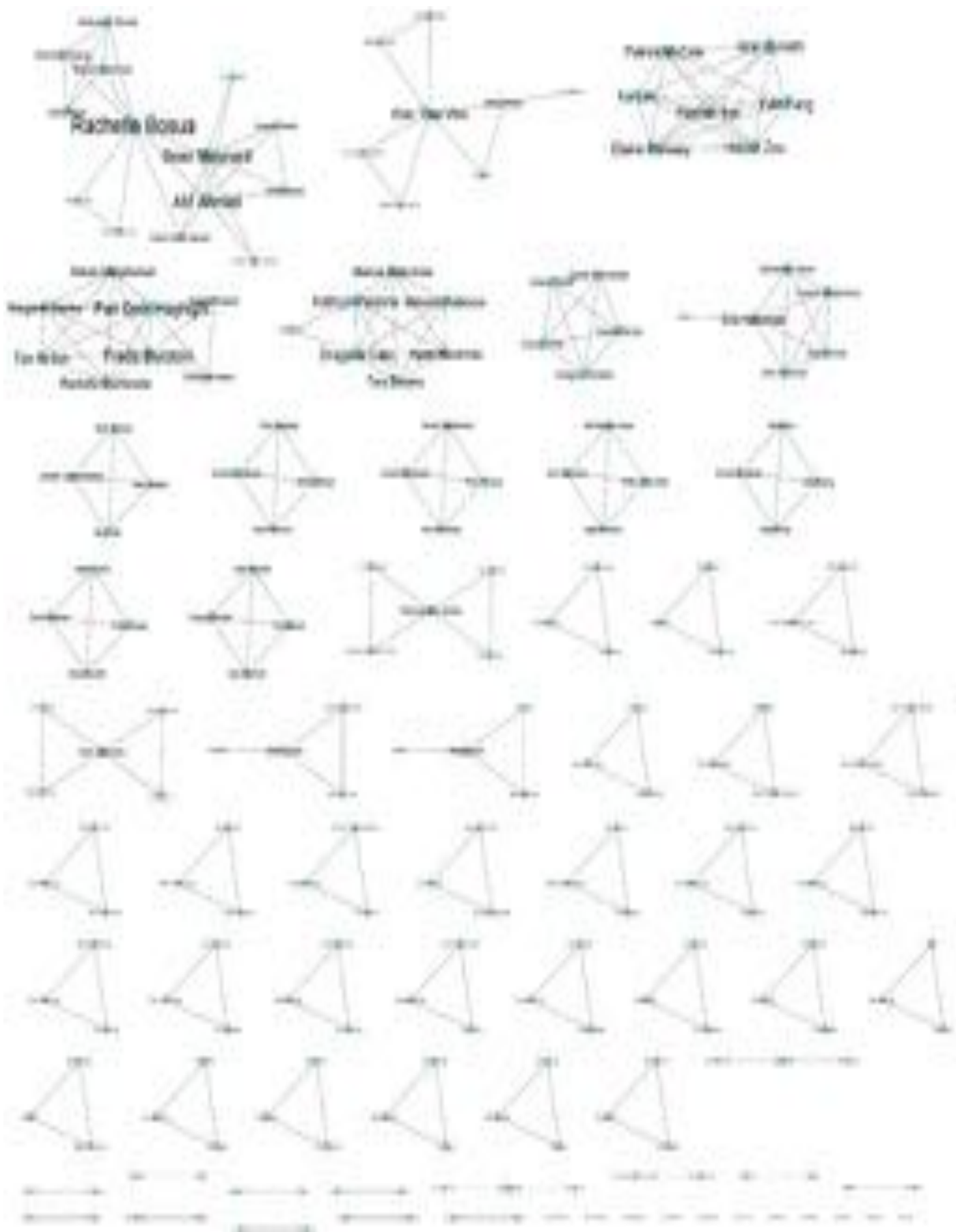
Figure 38. Co-authorship network (2016)

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8. The Consolidated Co-authorship Network of the Period 1990-2016

The ACIS community has rapidly expanded in both numbers of authors and publications over the past 27 years. The first conference took place in 1990 with 25 authors and 15 papers, and after 25 years these numbers peaked in 2014 at 424 authors and 179 publications (see Figure 27). Over the years a change in the patterns of collaboration among authors occurred. As shown in Figure 35, it took more than 10 years, i.e., from 1990 to 2003, for the ACIS participants to develop a clear preference for co-authoring papers. After 2003, co-authoring papers has become a prevalent trend in the ACIS community, resulting in the number of co-authorship ties nearly consistently exceeding the number of authors.
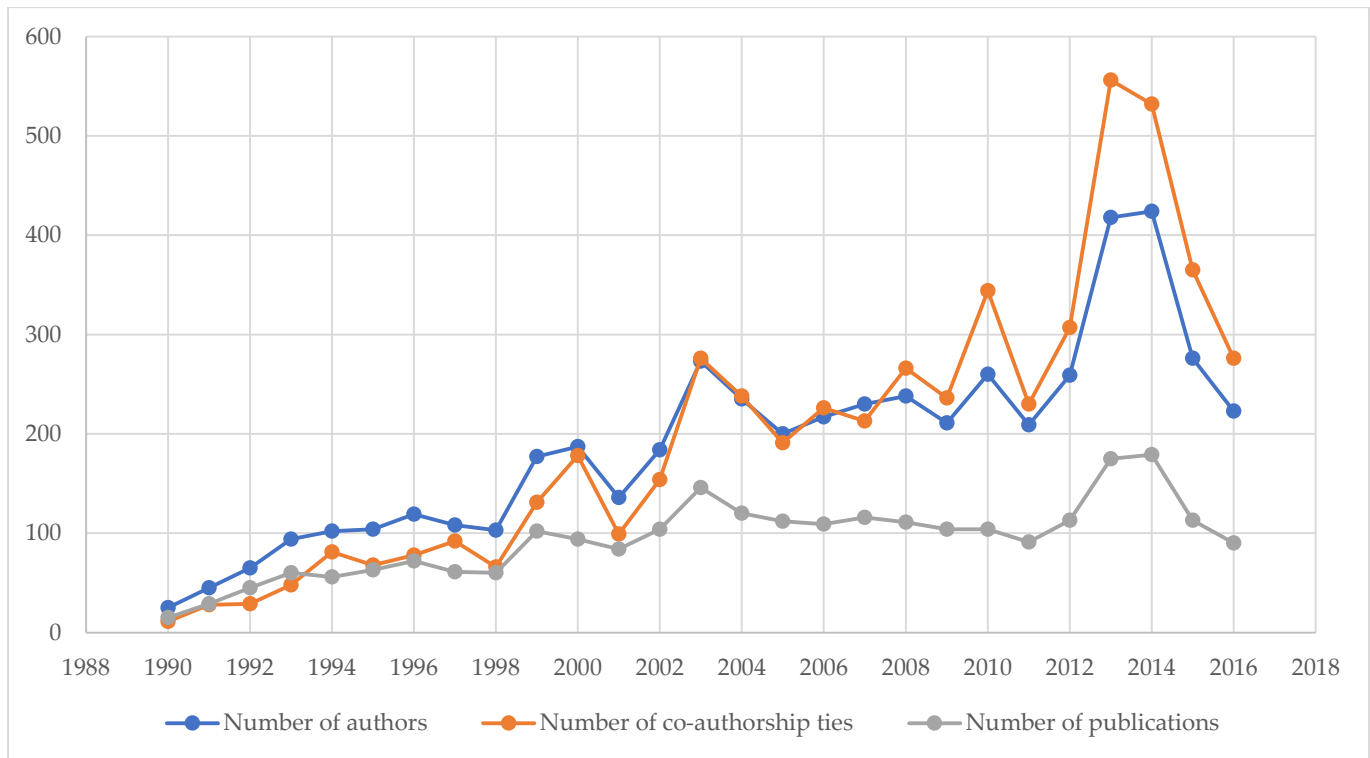
Figure 39. Numbers of authors, co-author ties, and publications (1990 to 2016)

In terms of number of contributions, Graeme Shanks and Michael Rosemann were the most active contributors in the ACIS conferences with an accumulated number of 45 and 41 publications respectively. Their numbers of publications are almost twice as large as that of the third-ranked contributors, Jennie Carroll and Dubravka Cecez-Kecmanovic, who each had 28 publications. There are 78 authors, who have published at least ten papers, and 2,787 authors who have published fewer than ten papers (see Table 8). The list of the 20 most contributing researchers shows an equal gender distribution with 10 male and 10 female academics. Gender distribution, also with regard to academic position, is however another issue, which deserves further investigation. An interesting aspect of co-authorship is the number of publications for which an academic appears as lead author since being lead author usually indicates the main contributor to the research (see table 9). Dubravka Cecez-Kecmanovic has the highest number of lead authorships (16 times), exceeding the two prime contributors of the entire investigated time period, Graeme Shanks (14 times) and Michael

Rosemann (8 times). Thus also in this respect Cecez-Kecmanovic can be considered as a very influential researcher.

Table 8. The most contributing researchers (1990 to 2016)

Author	Number of publications	Author	Number of publications
Graeme Shanks	45	Paula M.C. Swatman	17
Michael Rosemann	41	Mark Toleman	17
Jennie Carroll	28	Karlheinz Kautz	17
Dubravka Cecez-Kecmanovic	28	Craig Standing	17
Peter Marshall	25	6 authors	16
John Campbell	25	8 authors	15
Brian Corbitt	25	4 authors	14
Julie Fisher	24	7 authors	13
Deborah Richards	24	7 authors	12
Judy McKay	23	12 authors	11
Graham Pervan	23	10 authors	10
Peter Seddon	22	18 authors	9
Frada Burstein	22	23 authors	8
Sherah Kurnia	21	25 authors	7
Aileen Cater-Steel	21	50 authors	6
Rosemary Stockdale	19	56 authors	5
Michael Lane	19	86 authors	4
Jan Recker	19	169 authors	3
Guy G. Gable	19	428 authors	2
Rachelle Bosua	18	1932 authors	1

Many of the top lead authors can be identified as senior scholars at some point of the researched time period; their portion of lead authored works varies between 25% (Rosemann) and more than 55% (Cecez-Kecmanovic) of their total authorship. This raises a number of interesting questions, which would warrant further analysis: Are there any patterns in terms of point in time in career and lead authorship, in terms of lead authorship seniority and co-author seniority, and in terms of number of co-authors; and, returning to the issue of gender, as 7 of the listed lead authors are male and 6 are female, are these pattern different for male and female academics?

In this report for an initial analysis, we however first focussed on the researchers' total number of co-authors (see table 10). Michael Rosemann has co-authored papers with a total of 53 researchers over 27 years, who have contributed to his considerable number of publications and show his influential role on IS research published at ACIS. Patters in terms of co-authors, peak number of contribution compared to stage of career are two further possible avenues for future research. Other authors such as Frada Burstein, Sherah Kurnia and Julie Fisher were also well-connected, but they did not produce as many publications as some of those, who had fewer co-authors; e.g., Dubravka Cecez-Kecmanovic, Jennie Carroll and John Campbell. It would be interesting to investigate and analyse some of the possible and multiple reasons for this fact, again in terms of f.ex. affiliation and gender.

Table 9. Researchers' total number as lead author (1990 to 2016)

Author	Number of publications as lead author	Author	Number of publications as lead author
Dubravka Cecez-Kecmanovic	16	Peter Busch	8
Graeme Shanks	14	Michael Rosemann	8
Jennie Carroll	13	9 authors	7
Deborah Richards	12	12 authors	6
Daniel Moody	11	25 authors	5
Julie Fisher	10	49 authors	4
John Campbell	10	97 authors	3
Helen Hasan	9	256 authors	2
Glenn Stewart	9	1132 authors	1
Michael Lane	9	1272 authors	0
Judy McKay	8		

Table 10. Researchers' total number of co-authors (1990 to 2016)

Author	Number of co-authors	Author	Number of co-authors
Michael Rosemann	53	Shirley Gregor	20
Graeme Shanks	44	Wasana Bandara	20
Frada Burstein	44	Erwin Fielt	20
Sherah Kurnia	36	4 authors	19
Julie Fisher	28	3 authors	18
John Campbell	27	4 authors	17
Guy G. Gable	27	9 authors	16
Brian Corbitt	27	7 authors	15
Stephen Smith	26	10 authors	14
Mary Tate	25	7 authors	13
Md Mahbubur Rahim	25	21 authors	12
Peter Seddon	24	19 authors	11
Aileen Cater-Steel	23	20 authors	10
Jennie Carroll	22	23 authors	9
Dubravka Cecez-Kecmanovic	21	49 authors	8
Graham Pervan	21	56 authors	7
Rachelle Bosua	21	62 authors	6
Shanton Chang	21	142 authors	5
Michael Lane	20	240 authors	4
Jan Recker	20	517 authors	3
Alemayehu Molla	20	833 authors	2
Karlheinz Kautz	20	664 authors	1
Sean Maynard	20	149 authors	0 (sole author)

Figure 40. The consolidated network of co-authorship ties across 27 years of ACIS (1990-2016)

Figure 40 provides the network visualisation of the co-authorship ties consolidated from all networks throughout the 1990–2016 period. The visualisation only displays the largest component of the network, which comprises the most number of connected nodes. Smaller clusters and isolated nodes are not displayed in this figure. The colours of the nodes indicate their cluster membership, which is automatically identified by the using the modularity algorithm provided by the software.

At the first glance, the consolidated co-authorship network appears to have a core–periphery structure, where a few central members are densely clustered around the network's core, while most other members hold peripheral positions, and are tied to only the central members, but not to each other. However, a closer examination indicates that the network is not completely core–periphery since some of the core, highly connected members, e.g., Michael Rosemann, Graeme Shanks, Frada Burstein are also not directly tied to each other.

The consolidated co-authorship network has an average degree of 3.114, which indicates that a researcher collaborated with three co-authors on average between 1990 and 2016. Network density, which is the ratio between the existing ties and all possible ties in total, is at a low 0.001. The low density reflects the thin and sparse nature of the co-authorship network. Degree centralisation, or the variation in the nodes' number of ties, also has a low value of 0.017. This indicates that most researchers in the network have a similar low amount of ties and that the network is not centralised.

9. Analysis of Research Themes and Topics during the Period 1990-2016

To understand what kind of topics were researched and subsequently published at ACIS we analysed the themes of the published ACIS papers. Our topic modelling (see section 2.2) suggested that the publications can be summarised into 84 topics, based on their titles and abstracts. We assigned labels to these topics by examining their representative terms, and we further grouped them into 16 large themes.

For the theme 'IS management' we identified topics related to the organisational and managerial aspects of IS, such as 'Finance', 'Decision support', 'Enterprise resource planning', 'Strategy' and 'Culture'. The theme 'Database management' involved topics containing keyword terms about databases (e.g., relational, query, schema), data quality (e.g., metadata, tag, data quality) and data model (e.g., entity, relationship, and diagram). The theme 'Public IS' referred to terms about web applications and online services that are primarily used by public audiences, such as e-government, disaster management platforms, social media and online communities. The 84 topics, their top 15 most representative terms, and the 16 themes are listed in table 11.

Based on the composition of terms of each publication's title and abstract, the used analysis algorithm predicts the probabilities of a publication belonging to one of 16 themes including one theme labelled 'Other' for papers, which could be categorised in any of the defined themes. We considered themes with the highest probability as the prevalent theme of a publication, whereas publications, for which two themes with equally high probabilities were identified, were classified as having a 'Mixed' theme. Figure 37 presents the frequency of occurrence of the 16 prevalent and

the mixed themes from 1990 to 2016. Most of the papers were categorised as focusing on the 'IS management' theme (513 papers), followed by the 'Mixed' (278 papers) and the 'Technology' themes (233 papers). The theme 'Public IS' was ranked fourth in this list with 202 papers. The themes with the least number of papers were 'Sustainability' (39 papers). At this point in time we did not make an in-depth assessment of which pair of themes determined the 'Mixed' theme and which papers made up the theme 'Other'.
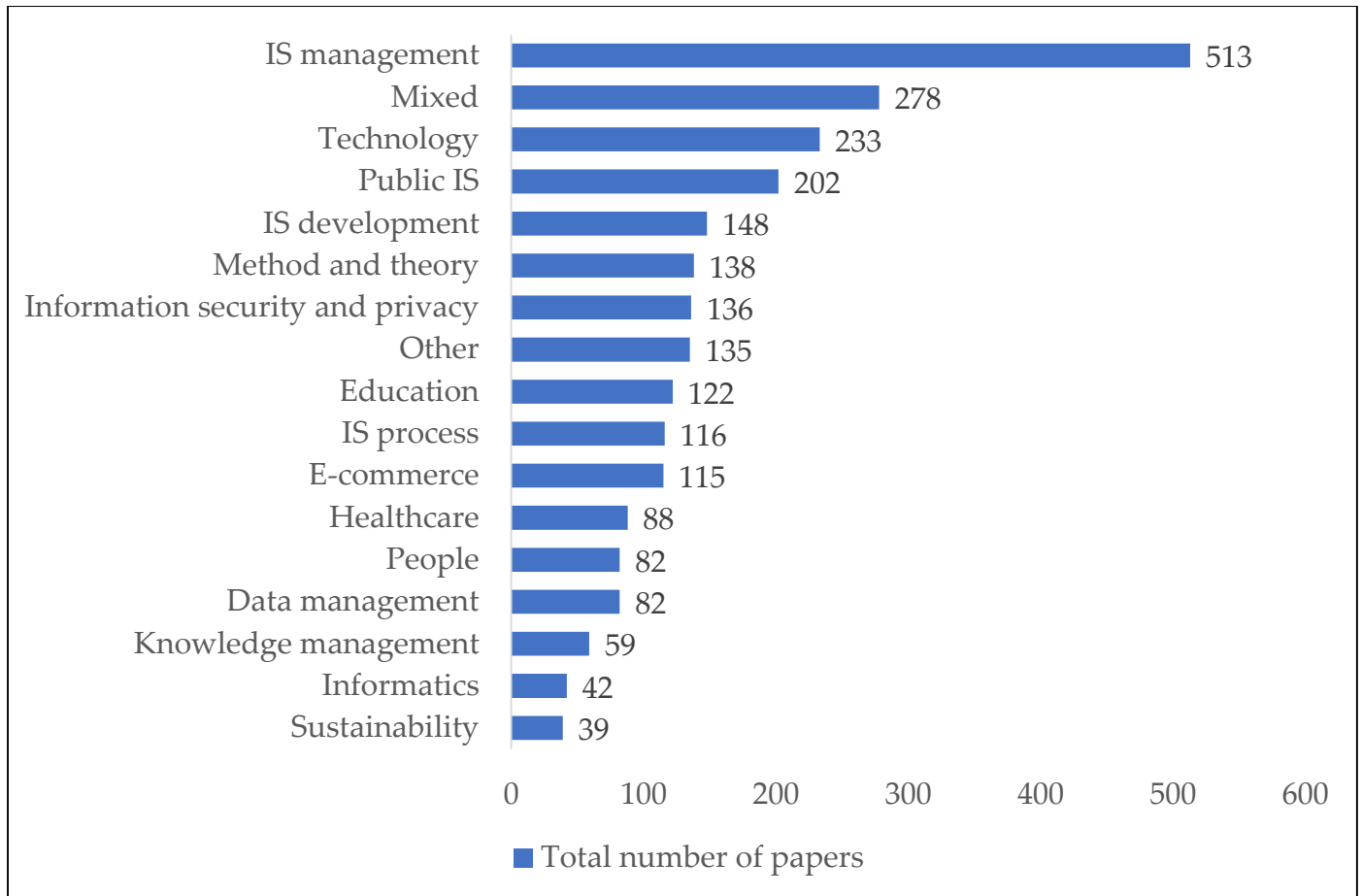
Figure 41. Frequency of occurrence of prevalent themes (from 1990 to 2016)

A co-authorship analysis per se cannot provide any reason for the change of themes and topics, however correlating the temporal development of themes and topics, including IS fads and fashions, in terms of time and period of uptake through individual researchers and their co-authors could also provide further insight about the co-authorship networks of the ACIS community. As a first step we produced a heat map based on the calculation of the percentage of the papers belonging to a theme in each ACIS conference (see figure 38). The red cells in this heat map indicate the specific years or ACIS conferences where the theme was prevalent, i.e., receiving a large amount of contributions from the researchers.

Table 11. Research themes, topics, and top 15 representative terms

Topic number	Top 15 representative terms	Topic	Theme
6	database, query, relational, constraint, schema, novice, statistical, conceptual schema, protocol, relational database, compromise, algorithm, integrity, commit, dbms	Database	Data management
32	datum quality, warehouse, datum warehouse, metadata, tag, dq, quality datum, corporate datum, datum management, quality dimension, focus research, quality issue, decision performance, semiotic, cognitive process	Data quality	
57	datum model, procurement, entity, diagram, entity relationship, system success, delone, mclean, delone mclean, mclean model, develop application, variance, relationship model, procurement process, relationship diagram	Data model	
74	consumer, channel, purchase, food, retailer, upgrade, loyalty, brand, retail, behavioral, perceive risk, safety, information product, multi channel, brick	Consumer	E-commerce
38	commerce, electronic commerce, ec, ecommerce, bc, commerce adoption, social commerce, tasmanian, commerce activity, commerce business, relative advantage, adoption commerce, commerce paper, internet commerce, readiness	E-commerce	
50	investment, marketplace, auction, buyer, intermediary, realisation, bb, seller, online auction, benefit realisation, technology investment, buy, expenditure, era, sell	E-marketplace	
16	bank, develop country, heuristic, transition, usable, bank sector, european, transcription, workshop, bank service, internet bank, autonomous, disorder, execution, greatly	Bank	
18	student, school, curriculum, class, classroom, base learn, group work, learn environment, tertiary, lecture, teacher, learn experience, pedagogy, university student, instructor	Education	Education
24	skill, graduate, analyst, password, curriculum, employer, newspaper, recruitment, system analyst, business analyst, composition, technical skill, password composition, technology skill, shortage	Skill	
10	record, code, clinical, nurse, handover, format, chart, physician, information share, hospital, medicine, edrms, machine, extraction, share problem	Carer	Healthcare
42	health, healthcare, patient, care, age, health information, hospital, health care, cancer, age care, carer, mhealth, record, chronic, family	Healthcare	
29	search, presentation, www, multimedia, informatics, gp, hypertext, seminar, graphic, information search, www base, hypermedium, tour, health informatics, south	Informatics	Informatics
51	smes, flow, workflow, sme, information flow, ecosystem, adoption smes, datum flow, item, logical, owner, knowledge source, control flow, enable information, workflow system	Information flow	
26	security, information security, policy, compliance, threat, byod, security policy, system security, security risk, security compliance, security behaviour, leakage, information asset, cyber, computer security	Information security	Information security and privacy
53	identity, crime, structuration theory, structuration, research agendum, fraud, consensus, technology fit, situational, forensic, problem solve, identity crime, identity fraud, differentiate, task technology	Crime	
59	risk, project management, project success, risk management, project manager, management project, risk analysis, risk compliance, zone, factor study, project risk, finnish, regulatory, governance risk, manage project	Risk management	
71	trust, privacy, location, protection, app, information privacy, privacy concern, personal information, legislation, source project, affective, security privacy, leader, location base, disclosure	Privacy and trust	
35	object, space, object orient, orientation, analysis design, semantic, cyberspace, class, orient analysis, cscw, object orientation, web information, placement, foom, layer	Programming	IS development

58	developer, software development, productivity, development methodology, certification, software engineer, case tool, user developer, global software, software developer, reusability, software project, system developer, profession, application development	Development	
64	agile, usability, software development, dependency, agile software, oss, source software, agile development, user experience, teamwork, agile method, specialist, usability engineer, asd, xp	Development process	
80	prototype, interface, creativity, visual, user interface, creative, computer system, impression, architect, argument, check, persuasive, score, approach system, system prototype	User interface	
84	specification, viewpoint, reuse, requirement engineer, elicitation, information requirement, determination, requirement determination, user requirement, requirement specification, requirement definition, regulation, analysis model, system requirement, view point	Requirements	
48	executive, eis, executive information, management issue, system management, ceos, key issue, sector organisation, adoption usage, senior executive, school information, execute, eis development, human resource, ceo	Executive IS	IS management
21	intranet, stock, price, ad, hoc, ad hoc, investor, dynamically, aggregation, unrealistic, stock market, forum, readiness, accordance, inspire	Finance	
61	conflict, worker, workplace, flexibility, telework, knowledge worker, process design, office, distribution, hour, surveillance, teleworking, enable organizational, impediment, epistemology	IS worker	
83	team, maturity, maturity model, virtual team, delphi, development team, research article, capability maturity, decision management, project team, quality management, key issue, social factor, delphi study, manage information	IS maturity	
22	decision support, dss, knowledge base, isd, adaptive, gdss, group decision, tablet, adaptive system, distinction, cas, constituency, design environment, dss development, evaluation framework	Decision support	
36	sisp, system methodology, strategic information, iso, audit, ssm, iec, sisp success, system plan, cobit, office, control objective, iso iec, iec standard, methodology ssm	Strategic IS	
39	es, enterprise system, empowerment, manufacture, system implementation, es implementation, behavioural, orientation, hide, system success, csfs, ship, es datum, process orientation, disclose	Enterprise system	
47	erp, erp system, erp implementation, post implementation, modification, sap, change management, organisational change, business information, system implementation, business benefit, global business, erp project, implementation review, intangible	Enterprise resource planning	
55	ea, soa, enterprise architecture, web service, description, business service, lifecycle, ab, soa governance, business information, genre, business system, lifecycle management, arch, ea framework	Enterprise architecture	
63	end user, strategic plan, resistance, sign, habit, plan success, user train, allocation, issp, system strategic, user compute, specialist, measure strategic, eap, control system	Enterprise end user	
66	transformation, capital, social capital, business transformation, crm, wave, organisational structure, business network, md, model transformation, trigger, management service, essentially, worthwhile, capital theory	Business transformation	
70	alignment, business alignment, strategic alignment, causal, alignment process, multidimensional, grid, loop, policy, repertory, exercise, uncertain, repertory grid, strategy business, strategy information	Strategy	
73	governance, site, web site, top management, itg, assimilation, datum governance, absorptive, absorptive capacity, datum set, effective governance, nation, governance model, project governance, governance framework	Governance	
76	culture, criterion, organisational culture, national culture, hierarchy, organizational culture, formative, pl, system quality, business	Culture	

	relationship, culture information, quality management, social influence, auditor, location		
11	outsource, contract, arrangement, offshore, partnership, client, outsource arrangement, ito, offshore outsource, relationship management, outsource relationship, bpo, process outsource, business architecture, application service	Outsourcing	
25	satisfaction, commitment, job, user satisfaction, information quality, tne, continuance, psychological, kong, hong kong, job satisfaction, hong, dissatisfaction, turnover, quality user	User satisfaction	
31	metric, production, informal, incident, human resource, irm, estimate, resource management, estimation, management information, function point, format, design theory, informal learn, model software	Resource management	
2	logic, itil, negotiation, itsm, service management, realization, enable service, infrastructure library, dispute, resolution, argument, contradiction, innovativeness, service process, hit	Service management	
14	instrument, centre, service quality, sem, servqual, instrument measure, call centre, ucd, user centre, pl, survey instrument, measure service, instrument develop, continuity, item	Service quality	
75	ict, career, ethical, bpr, woman, intervention, gender, school, cluster, reengineer, icts, age, overview, profession, ict industry	Business process reengineering	IS process
8	process improvement, software process, organisational learn, groupware, ist, csfs, system technology, asynchronous, spi, qualitative research, division, technology ist, enterprise customer, announcement, criterion	Process improvement	
12	process model, representation, model technique, notation, system model, graph, model language, development method, model notation, bpmn, enterprise model, research process, template, ontological analysis, visual	Process modelling	
17	expert, bpm, expert system, lie, prediction, bpm capability, bpms, criticism, interactivity, operator, bpm organisation, process improvement, classification, decline, diagnosis	Business process modelling	
5	knowledge share, motivation, inter organizational, motivational, organizational knowledge, extrinsic, joint, workspace, tension, intrinsic motivation, system field, reconcile, venture, aggregate, intervention	Knowledge sharing	Knowledge management
40	knowledge management, km, datum information, information knowledge, km strategy, study knowledge, sensemaking, knowledge process, management strategy, strategic orientation, disability, exploitation, management activity, adoption diffusion, arabian smes	Knowledge management	
37	artefact, design science, institutional, portal, design research, exemplar, dsr, adr, institutional theory, research paradigm, institutionalisation, action design, content management, accuracy, institutional pressure	Design science	Method and theory
81	action research, crowdsourcing, programme, profit, adaptation, justification, coordination, profit organisation, interpretivist, interpretivist research, reflection, design system, fee, quality management, set criterion	Action research	
20	ontology, ontological, meta, semantic, bww, grammar, meta model, ontology development, decomposition, formalism, formulation, realism, critical realism, representational, robustness	Ontology	
3	relevance, journal, conference, publication, rigour, share service, reflection, desk, rigour relevance, acis, index, outlet, citation, mis, rigor	IS research	
27	actor, actor network, translation, ant, translate, ecms, assignment, organizational business, standardisation, standardize, translate information, scholarly, dyadic, standardization, tail	Action network and collaboration	
15	taxonomy, error, classification, scheme, spreadsheet, user perspective, execution, print, classification scheme, index, approach development, reuse, semiotic, concrete, conflict	Taxonomy	
56	discourse, frame, metaphor, text, communicative, ethic, hci, narrative, philosophy, image, discourse analysis, habermas, social interaction, rationality, communicative action	Discourse analysis	
28	tam, belief, user acceptance, contingency, cop, postgraduate, enjoyment, voluntary, smartphone, utaut, workshop, supervision, belief attitude, acceptance information, cultural factor	IS adoption	People

54	style, learner, leadership, personality, reward, visualization, elearning, learn style, user involvement, information share, contingent, efficacy, trait, transformational, leadership style	Leadership	
77	competency, cio, board, reference model, configuration, typology, core competency, bundle, cio role, director, cios, board director, legitimacy, achieve strategic, role cio	Competency	
7	ios, gss, ios adoption, inter organisational, motivation, meeting, group support, support group, group work, facilitator, progression, system ios, interorganisational, facilitation, ethic	Group work	
23	website, local, local government, council, victorian, information service, victorian local, electronic service, government website, transition, disadvantage, strategic decision, municipal, reform, fruit	Government	Public IS
82	government, agency, citizen, service delivery, government service, government information, government organisation, online service, advisory, evaluate government, egovernment, channel, civil, government sector, quality service	E-government	
33	disaster, twitter, crisis, emergency, repository, tweet, disaster management, emotion, agency, dm, emergency service, event, warn, crowd, resilience	Disaster management	
49	internet, regional, internet base, pacific, tourism, internet technology, south, law, politic, sponsor, asia pacific, copyright, adoption internet, inhibitor, base electronic	Internet	
65	social medium, facebook, page, audience, medium tool, affordance, role social, disclosure, presence, facebook page, prevention, medium policy, visible, research set, civic	Social media	
68	social network, site, sns, network analysis, network site, online social, esn, enterprise social, preference, osn, knowledge transfer, cbr, network service, professional service, project base	Social network	
79	community, virtual, music, online community, virtual community, indigenous, file, community practice, file share, forum, community base, community information, virtual organisation, thread, viability	Community	
52	telecommunication, formation, vision, emission, wine, climate, nation, carbon, ghg, transport, ghg emission, south, information society, activity base, increase pressure	Sustainability	Sustainability
34	environmental, sustainability, maintenance, energy, software maintenance, environmental sustainability, consumption, greening, trigger, sustainable development, support sustainability, sustainability initiative, residential, model social, role ict	Sustainability	
4	mobile, phone, mobile device, mobile phone, payment, mobile service, mobile technology, farmer, mobile datum, literacy, mobile learn, datum service, mobile payment, load, add service	Mobile technology	Technology
9	digital, platform, edi, divide, disruption, digital divide, interchange, digital technology, datum interchange, digital disruption, electronic datum, currency, gateway, digital platform, disruptive	Digital strategy and EDI	
30	analytics, business analytics, firm performance, alliance, synergy, ba, middle, datum drive, management information, middle manager, process orient, version, collaborative network, learn design, feral	Analytics	
41	innovation, bi, intelligence, business intelligence, disruptive, bi system, disruptive innovation, innovation theory, csf, discovery, ip, innovation process, competitor, efficacy, understand innovation	Business intelligence and innovation	
44	client, server, consultant, authentication, client server, problem solve, abstraction, actionable, disconnect, replicate, manager plan, cmc, discrepancy, mismatch, protection	Client-server technology	
60	broadband, wireless, remote, connectivity, story, family, handheld, speed, technology healthcare, broadband internet, survival, handheld device, wireless technology, pdas, sociomaterial	Communication technology	
69	cloud, cloud compute, legacy, benchmark, cloud base, cloud service, compute adoption, compute service, service provision, threaten, cloud cloud, legacy system, step approach, system cloud, emotional	Cloud computing	

78	email, message, mail, winery, phishing, writer, im, sms, genuine, specialist, authority, electronic communication, phishing email, cue, electronic mail	Communication technology	
62	chain, supply, rule, supply chain, business rule, agility, rfid, chain management, scm, food, sc, information process, radio, home, agility information	Supply chain technology	
43	participation, package, user participation, youth, neural, spectrum, neural network, package software, software package, culturally, recursive, linear, conditional, case method, software architecture	Other	Other
1	unit, construction, appropriation, logistic, reputation, exception, technology appropriation, bias, month, construction industry, prioritisation, model technology, system construction, ameliorate, climate	Other	
13	game, attack, side, micro, social software, ebusiness, vulnerability, iss, gamification, knowledge creation, system strategy, macro, player, detect, management information	Other	
19	program, acquisition, event, base software, reactive, wil, pair, shelf, tailor, acquisition integration, event drive, integrate learn, acquirer, introductory, system education	Other	
45	business model, home, assumption, intellectual, retrieval, information retrieval, oral, correlation, electronic business, generic attribute, graduate, attribute graduate, core business, success business, location	Other	
46	behavioural, portfolio, simulation, portfolio management, childhood, mathematical, touch, touch screen, parent, screen, teach case, video, simulation model, authentic, lie	Other	
67	agent, travel, web technology, presence, software agent, mine, child, stable, disintermediation, video, module, optimisation, player, artefact, datum mine	Other	
72	profile, similarity, distance, disciplinary, refinement, establishment, de, tree, philosophical, price, accuracy, execute, escalation, net, control mechanism	Other	

In the first ACIS conference in 1990, the 'IS management', 'Mixed', 'IS development' and 'Sustainability' themes were prevalent. It is worth noting that several papers in this year used the term 'sustainability' to describe the resilience or continuity of IS and organisations, rather than the recent 'green' practices that focus on the environmental impacts of IS. These topics, along with other topics such as 'Other' and 'IS process', remained prevalent until the year 2000, where the 'E-commerce' and 'Education' themes started to emerge as new prevalent themes.

'Technology' emerged once as a prevalent theme in 1997 then again in 2006. From 2011 onwards, the theme 'Technology' consistently gained significant prevalence, with about 15 per cent of the papers in a conference focused on this theme. In contrast, the 'Knowledge management' theme emerged only once as a prevalent theme in 2009, but received less attention after that year. We also checked the proceeding of the recent ACIS 2016 conference, where there was only one paper that explicitly used the term 'knowledge management' in the abstract. This paper, which was entitled 'The influence of personal knowledge management on individual decision making in health care medical treatment', was classified by our software's algorithm as belonging to the 'Healthcare' theme.

The theme 'Public IS', which includes topics such as social media, e-government and virtual communities, became prevalent for the first time in 2011 and remained important between 2011 and

2016. Similarly, 'Healthcare' emerged as a prevalent theme from 2011 onwards, and together with 'Information security and privacy', these two themes attracted a total of 24 per cent of papers in ACIS 2016.

The emergence of prevalent research themes was consistent with the trends outside academia in the public sector and in industry. For example, the theme 'E-commerce' emerged in 2000 and 2001, where online shopping became prominent. Similarly, 'Public IS' research focusing on social media and e-government became important in 2011, where social media platforms such as Facebook and Twitter were popularised.

Moreover, the heatmap suggests also under-researched and potential areas that deserve, and probably will receive, future contributions. We anticipate the research themes 'Technology', 'Public IS', 'Information security and privacy' and 'Healthcare' will maintain their prevalence in the coming years. The research themes 'Data management' and 'IS development', which focus on data- and programming-related research, were prevalent between 1991 and 1998, and may become important again due to the emergence of big data technology. We also observed the research theme 'Sustainability' to gradually grow in prevalence from 2008 onwards, and it may become even more important in the future. Interestingly, the topic method and theory only attracted few contributions each year, indicating a pragmatic and practice-oriented approach of the ACIS community. With the changing landscape of IS research and its most prominent role with an emerging focus on digitalisation of all aspects of human life and a need for reliable research results, this topic however also deserves more attention. Finally, topics that had an ambiguous combination of terms were labelled as 'Other', the prevalence of this 'research theme' suggests the potential emergence of novel research themes or topics in the future, which were yet not recognisable at the time of writing this report.

Figure 42. Prevalence of themes measured by percentage of papers in a conference

10. Conclusion

In this report we identified and described the patterns of research collaboration and co-authorship between participants of the ACIS conferences from 1990 to 2016 solely based on the names of the authors. We also identified key authors and research clusters over the years. This task was not without challenges as quite a number of authors published under different variations of their names, which made the pre-processing of the bibliometric data a demanding task. The AAIS as the organisation now responsible for the ACIS conference series may consider adopting a reviewing and library system, which includes a database of contributors and allows researchers to select their pre-recorded names and identification based on our cleaned dataset from the database instead of manually inputting their names. Such a function could minimise the risk of using inconsistent names.

We also identified the research themes and topics that were prevalent in the ACIS research community and uncovered changes of themes and topics during the time period under investigation. This was also a challenging task. Although the applied topic modelling method can automatically discern research topics of publications based on their composition of terms, it is not necessarily able to accurately detect the 'true' topic of a publication; as an example we discussed in this report a publication, which uses many keywords about 'knowledge management', but focuses on the 'healthcare' context. In such a case, it can be debated whether to classify this publication in the 'knowledge management' or 'healthcare' theme or both.

The development of a more formal classification framework for research topics based on a continuous analysis of the discipline and/or determined by the Executive responsible for ACIS in collaboration with ACPHIS might be a step to resolving this issue; such a framework can be embedded in the ACIS submission system and let the contributing authors assign topics to their submissions. Work on such a classification framework can help to reveal emerging research trends and themes within the ACIS community. Conference committees can use these insights to design calls for papers and special tracks that are trending, while providing equal opportunities for research on all topics to be published.

Regarding the patterns of co-authorship we found that the co-authorship networks were overly sparse and thin. The consolidated network for the whole period from 1990 to 2016 comprises a number of changing, disconnected core members who each are connected to many peripheral members. This might have various reasons mainly related to the seniority of these members and deserves further research. It took about 10 years from the inception of the conference for authors to form a first large cluster around some core members within the co-authorship networks and another 10 years before the emergence of new core members. We have briefly discussed the reasons for this, speculating about core members' retirements, their changed choice of preferred research outcome outlets, junior members developing into senior roles, and the influx of overseas academics at a relative senior stage of their career as the ACIS conference series has successfully attracted many new authors over the years. Accordingly, we also see a trend of the list of the most productive

contributors changing in 10 years intervals. A change in the structure of the co-authorship network, as well as the emergence of new core members, can be expected to take place in a couple of years. The current core members, who are mostly senior researchers, who are capable of changing the current co-authorship network, presumably will contribute to the ACIS community for about 10 years while mentoring the next generation. The emergence of the next generation of researchers to become the next core members depends on the mentorship of these senior researchers, which facilitates the junior researchers' co-authorship ties.

The numbers of authors, co-authorship ties, and papers have generally increased over the 27-year period, with some variations and remarkable peaks and dips with the number of accepted papers reaching the 100 paper bar at 1999 and peaking with 179 papers in 2013, the number of co-authorship ties reaching the 100 bar in 1999 and peaking in 2013 with 556 ties, and the number of author reaching 100 in 1994, 200 in 2003, and a peak of 424 in 2014. We can only speculate whether there are particular reasons, such as the conference location for this result. What we however know is that the most active contributor over the 27 years, Graeme Shanks, has a large co-authorship network, which is comprised of a large number of unique authors, both senior and junior. Researchers may consider employing this strategy to co-author papers with unique collaborators, who do not know each other to possibly increase their numbers of publications and co-authorship ties. As co-authoring papers is a clear trend within the ACIS community, community members, in particular those, who work alone and isolated, may want to develop co-authorship ties across clusters to both increase their number of contributions, but also their access to new and exciting research areas and knowledge. To decentralise co-authorship networks peripheral members within and across clusters should be encouraged and take the initiative to co-author papers with each other more; this would also move them from the periphery. This will also require core members to collaborate more with each other to connect their clusters together. This might not always be possible due to differing interests in research topics and due to preferred, mutually exclusive research approaches.

While this report comprises the results of our analysis of 27 years of research collaboration and co-authorship as presented at the ACIS conference series in the period 1990–2016 and while it provides some interesting insights into the ACIS community as well as some recommendations embedded in the above discussion, this work also identified and raised a number of further questions and avenues for future research, which we included in the above sections. These questions concern - beyond the grounding of our investigation in the authors' names - the impact of elements such as an author's gender, her affiliation, seniority, and mobility on the formation of the identified co-authorship networks. Some of this work has been documented on a subset of the here presented data by the authors in Dang-Pham and Kautz (2017), but more detailed work is needed.

In summary, this report describes the delivered outcomes of the agreed tasks as defined in the project brief, which is attached in the appendix. The authors of this report now expect advice from the ACPHIS Executive board about where to place the cleaned dataset and the digital information

systems, which provide the functionality to allow the identification and visualisations of the networks based on different variables and parameters.

References

Abbasi, A., Altmann, J., Hossain, L. 2011. "Identifying the effects of co-authorship networks on the performance of scholars: A correlation and regression analysis of performance measures and social network analysis measures," *Journal of Informetrics*, (5:4), Elsevier Ltd, pp. 594–607 (doi: 10.1016/j.joi.2011.05.007).

Abbasi, A., Chung, K. S. K., Hossain, L. 2012. "Egocentric analysis of co-authorship network structure, position and performance," *Information Processing and Management*, (48:4), Elsevier Ltd, pp. 671–679 (doi: 10.1016/j.ipm.2011.09.001).

Acedo, F. J., Barroso, C., Casanueva, C., Galán, J. L. 2006. "Co-authorship in management and organizational studies: An empirical and network analysis," *Journal of Management Studies*, (43:5), pp. 957–983 (doi: 10.1111/j.1467-6486.2006.00625.x).

Antons, D., Breidbach C.F. 2018. Big Data, Big Insights? Advancing Service Innovation and Design with Machine Learning, Journal of Service Research (21:1), pp. 17-39.

Bastian, M., Heymann, S., Jacomy, M. 2009. Gephi: An open source software for exploring and manipulating networks. In Proceedings of the Third AAAI International Conference on Weblogs and Social Media, ICWSM 2009, San Jose, California, USA, May 17-20, 2009, DOI: 10.13140/2.1.1341.1520.

Blei, D.M., Ng, A. Y., Jordan, M. I. 2003. "Latent Dirichlet Allocation". Journal of Machine Learning Research. *3 (4–5):* pp. 993–1022.

Borgatti, S. P., Everett, M. G., Johnson, J. C. 2013. Analyzing Social Networks, Sage Publications Ltd.

Borgatti, S. P., Foster, P. 2003. "The network paradigm in organizational research: A review and typology," *Journal of management*, (29:6), pp. 991–1013.

Brandes, U., Wagner D. 2004. Analysis and Visualization of Social Networks, in Jünger M., Mutzel P. (eds, Graph Drawing Software. Mathematics and Visualization. Springer, Berlin, Heidelberg.

Cheong, F., Corbitt, B. J. 2009a. "A Social Network Analysis of the Co-Authorship Network of the Australasian Conference on Information Systems From 1990 To 2006," in *Proceeding of 17th European Conference on Information System (ECIS 2009)*, p. 23 (doi: 10.1016/j.respol.2013.06.012).

Cheong, F., Corbitt, B.J. 2009b. "A Social Network Analysis of the Co-Authorship Network of the Pacific Asia Conference on Information Systems from 1993 to 2008," *Proceedings of Pacific Asia Conference on Information Systems* (PACIS 2009), Hyderabad, India, July 10 -12, 2009.

Dang-Pham, D., Kautz K. 2017. "Exploring the ACIS Community through the Analysis of Co-authorship across Institutions, " in Proceedings of the 28th Australasian Conference on Information Systems, Hobart, TAS, Australia, Dec 3rd – 6th Dec, 2017.

Galliers, R. D., Whitley, E. A. 2002. "An anatomy of European information systems research, ECIS 1993 - ECIS 2002: some initial findings, " in 10th European Conference on Information Systems, 6 - 8 June 2002, Gdansk, Poland.

Goldberg, Y. 2017. Neural Network Methods in Natural Language Processing, Morgan & Claypool Publisher, CA, USA.

Hâncean, M.-G., Perc, M. 2016. "Homophily in coauthorship networks of East European sociologists," *Scientific Reports*, (6:August), Nature Publishing Group, p. 36152 (doi: 10.1038/srep36152).

Hanneman, R. A., Riddle, M. 2005. Introduction to social network methods, Riverside, CA: University of California, Riverside.

Otte, E., Rousseau, R. 2002. "Social network analysis: a powerful strategy, also for the information sciences," *Journal of Information Science*, (28:6), pp. 441–453 (doi: 10.1177/016555150202800601).

Singh, J., Gupta, V. 2017. "A systematic review of text stemming techniques, " *Artificial Intelligence Review*, 48:2, pp 157–217.

Vidgen, R., Henneberg, S., Naudé, P. 2007. "What sort of community is the European Conference on Information Systems? A social network analysis 1993-2005," *European Journal of Information Systems*, (16:S1), pp. 5–19 (doi: 10.1057/palgrave.ejis.3000661).

Wagner, C. S., Leydesdorff, L. 2005a. "Network structure, self-organization, and the growth of international collaboration in science," *Research Policy*, (34:10), pp. 1608–1618 (doi: 10.1016/j.respol.2005.08.002).

Wagner, C. S., Leydesdorff, L. 2005b. "Mapping the network of global science: comparing international co-authorships from 1990 to 2000," *International Journal of Technology and Globalisation*, (1:2), p. 185 (doi: 10.1504/IJTG.2005.007050).

Appendix: Project brief as approved by the ACPHIS executive

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Melbourne, September 14, 2017

ACPHIS project proposal

By Karlheinz Kautz

Project description:

The proposed project aims at investigating the evolution of research collaboration between participants of the ACIS conferences from 1990 to 2016 with social network analysis (SNA) methods. Understanding why authors choose to collaborate with others produces theoretical implications about critical behaviours of social networks, such as the networks' tendencies to self-organise or create a centre-periphery structure (Wagner & Leydesdorff 2005b; Wagner & Leydesdorff 2005a; Cheong & Corbitt 2009). Practical recommendations in terms of research policies can be made to improve research productivity and research collaboration (see e.g., Hâncean & Perc 2016; Abbasi et al. 2012; Wagner & Leydesdorff 2005b; Vidgen et al. 2007).

The proposed project has two objectives. First, we will explore the structural patterns of research collaboration to identify the key authors and clusters of research collaborators, as well as how the authors' key roles and clusters changed over time. Such analysis will allow us to evaluate the sustainability and maturity of the ACIS community of researchers. Second, we will perform topical analysis on the manuscripts' abstracts, and we will explore how the ACIS community progressed in changing research topics over the years.

Expected outcomes:
- An ACPHIS report which
  - Describes the patterns of research collaboration between participants of ACIS conferences from 1990 to 2016
  - Identifies the key authors and research clusters over the years
  - Identifies the changes of research topics in ACIS conferences
  - Provides recommendations to improve research collaboration between academics in Australasia
- A clean dataset about co-authorship among participants of ACIS conferences from 1990 to 2016, which will be made available to ACPHIS' members to perform further analyses
- Potential publications in the following outlets:
  - ICIS/ACIS 2018
  - Australasian Journal of Information Systems (A-ranked journal)
  - Information and Management (A*-ranked journal)
  - European Journal of Information Systems (A*-ranked journal)

Budget

I intend to perform the project with the support of one research assistant who will perform the following tasks and activities:

Activity	Hour	Day
Data Collection and Cleaning	56	7
Perform analysis and online visualisation	40	5
Preparation for presentations	8	1
Total time	**104**	**13**
RMIT hourly rate[1]	**AUD 44.03**	

Total budget   **AUD 4,579.12**

[1] Section 5.10.1, Casual / Sessional academic staff – hourly rates (RMIT University): http://www1.rmit.edu.au/browse/Staff%2FWorkplace%20essentials%2FPolicies%20and%20processes%2FHuman%2 0resources%2FEmployment%20conditions%2FAcademic%20and%20professional%20agreement%2FSchedule%201 %2F5.%20Casual%20%20%20Sessional%20academic%20staff%20%E2%80%93%20hourly%20rates/