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Social Networks of Researchers in Business To Business Marketing:
A Case Study of the IMP Group 1984-1999

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Abstract

Science is a social process that functions through social networks of researchers that form invisible colleges. Analysis of these social networks provides a means for examining the structure of relations among researchers. The Industrial Marketing and Purchasing (IMP) group, "an informal international group of scholars concerned with developing concepts and knowledge in the field of business-to-business marketing and purchasing," is used as a case study of a network of researchers because it has been responsible for considerable research over the last decades in the area of business-to-business marketing, yet its structure remains hidden because of its informal network characteristics. The results of a social network analysis of the IMP group is described based on the pattern of co-authorship at annual IMP conferences. The results reveal a power law distribution of paper co-authorship and a small world network that conforms to the results of studies of other types of social networks. A core network of 57 researchers is identified and its network properties are described, including how it has evolved over time. The study provides the basis for further studies of the social networks of marketing and business researchers.

Introduction

Science emerged as a better way of advancing knowledge through the development of the scientific method (Chalmers, 1999). But science is also a social process involving interaction and collaboration among people as the research of Latour (1987) and Galison (1997) has shown. The social institutions of science include both formally-constituted organisations,

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such as the various academies of science, and specialist organisations, such as the American Marketing Association, European Marketing Academy or Australia-New Zealand Marketing Academy. In addition, there are more informal networks within which researchers communicate, compete and collaborate with each other.

The objective of this paper is to use Social Network Analysis to analyse research collaboration within a specific academic group over time. In particular, we seek to describe the network of relations among members of the Industrial Marketing and Purchasing (IMP) group, which has been responsible for a considerable amount of research in the area of business to business marketing over the last 30 years or so. In this way our research may be seen as a contribution to the sociology of knowledge, concerning the social structure of the scientific process, as it manifests itself in a particular context i.e. the study of business markets. It is thus in the tradition of prior research by Latour (1987) and Galison (1997) who studied the social processes of science in other scientific contexts and more recent studies of social networks of other scientists (Barabási et al., forthcoming; Newman, 2001). It also contributes to a growing literature in areas of science that examines the nature and characteristics of complex adaptive systems in which network structures play a fundamental role (Barabási, 2002; Easton et al., 1997). Lastly, it provides the basis for further studies of networks of researchers in marketing and business areas.

The IMP Group has made a sustained and significant contribution to the development of theory and practice in the areas of business marketing. Their work extends from the original research study (IMP1) of international and domestic supplier-customer relations in Europe, to the later (IMP2) study of connected business relations and networks as well as to a multitude of other research projects on various aspects of business marketing (Wilkinson, 2001). The results of their research have been published in the leading journals in the field (e.g.

Anderson et al 1994; Blankenburg-Holm et al., 1996; Hallen et al., 1991). Many books and articles have been published detailing their work, including the development of their interaction approach and network models of industrial markets (Axelsson and Easton, 1992; Ford, 1990, 1997; Ford et al., 1998; Ford et al., 2002; Hakansson, 1982, 1987, 1989; Hakansson and Snehota, 1995; Turnbull and Valla, 1986). The development of the IMP research group and its philosophy has also been described in various recent papers (e.g. Hakansson and Snehota, 2000; McLoughlin and Horan, 2002; Turnbull et al., 1996; Wilkinson, 2001, Young, 2002).

From the foregoing we may conclude that the IMP Group is a major intellectual force in the study of business markets and has shaped the way many of us view, research and teach business marketing. Therefore it is a worthwhile case study to examine. But the structure and operation of the IMP Group is somewhat of an enigma. The IMP Group describes itself as an informal international group of scholars concerned with developing concepts and knowledge in the field of business-to-business marketing and purchasing. It has no journal, no university home base, until 2002 no website (which is now to be found at www.impgroup.org), and no clear membership criteria. What it does have is a philosophy and an annual conference, held in September, which has been taking place since 1984 and is now arguably the largest international conference in the world focusing on business-to-business marketing. It has also spawned a number of associated conferences, workshops, doctoral consortia and seminars that have been held in various parts of the world and is linked in various ways to other groups of researchers focusing on relationships and networks in marketing and business.

In this paper we analyse the nature and structure of the IMP Group using social network analysis. We adopt this methodology because the IMP Group is itself a network of

interrelated scholars, linked in terms of their ideas, as well as in terms of various types of professional and social relationships and patterns of interaction, including joint research, teaching and publication activities, inter-university visits, IMP and other related conference attendance, as well as various forms of social interaction.

The contributions of the IMP Group have arisen through research collaboration, in just the same way as any intellectual innovation, as a result of research collaboration undertaken by a community of practice (Leonard-Barton, 1995; Turati et al., 1998; Wenger, 1998). The production of knowledge is, as we have already noted, a social process involving interactions among people and organisations with different backgrounds, resources, predispositions and insights. The members of such a community interact and develop and exchange new knowledge and through these processes shape their community over time (Nonaka, 1994; Tushman and Rosenkopf, 1992). This applies to the process of science as much as it does to the development of knowledge in business and elsewhere, as has been noted by many scholars (e.g. Brown and Duguid, 2000; Galison and Stump, 1996; Latour, 1987; Nonaka and Takeuchi, 1995; Wilkinson and Young, 2002). Indeed, one of the contributions of IMP researchers has been to emphasise the role and importance of interactions, relationships and networks in the production and diffusion of knowledge and technology (Hakansson, 1989; Hakansson and Snehota, 1995; Lundgren, 1995).

We view the IMP group as a form of invisible college (Crane, 1972) and our focus is on the communication flows of the community, which comprise a mix of formal and informal mechanisms that enable both face to face and mediated communication, including visiting researchers (exchange of people); interpersonal communication patterns (e-mail and other forms of exchange of papers and methodologies); and collaboration on research and writing

(co-authorship). This invisible college gives momentum to the network, allowing intellectual innovation and refinement of the technology.

Invisible Colleges are usually investigated through 'co-citation analysis', in which the links are established through the way authors refer to each others' research and publications (e.g. Cote and Leong, 1991; Culnan, 1987; Goldman, 1979; Lin, 1995; Robinson and Adier, 1981). Here we adopt a different approach based on Social Network methods. We focus on the people relationships inside the IMP group as expressed through their co-authorship of articles, rather than the development and diffusion of ideas per se. Our conjecture is that this more directly reflects the nature and structure of research communities stemming from various types of links among researchers such as professor-student, common institution, propinquity, research interests and methods used. An account of the development of IMP thinking is contained in the accounts of its development cited already and in an analysis of topics covered in IMP annual conferences (Gemunden, 1997).

Co-authorship (i.e. collaboration in writing an article) is used as the means for defining researcher relationships. Our unit of analysis is therefore the 'article' and the assumption is that each article is a contribution to knowledge and is a part of the process of technology development within the community. More specifically, we define relationships based on co-authorships reported in the proceedings of the annual IMP Conferences. There have been few studies to date that have examined patterns of co-authorship (Barabási et al., forthcoming; Lotka, 1926; Newman, 2001) and these were unknown to us when we began our research. These other studies serve to reinforce our contention that this is a valuable way to investigate the structure and evolution of social networks and also provide some points of comparison for our own results. A further point is that co-authorship links overcome some of the deficiencies of fieldwork studies of social networks, as Newman (2001) has pointed out.

For example, when two or more people co-author a paper we may assume they have had some form of social interaction, whereas field studies of friendship and communication links suffer from the problem of different respondent perceptions and definitions of the language used in questions and answers.

Research Objectives

The research questions we seek answers to are the following:

- To what is extent is research in the IMP group dominated by a few key researchers?

- What is the importance of cross national research collaborations in a research group comprising researchers from many nations in Europe, Asia, Australia and America?

- What is the subgroup structure of the IMP group and the role and importance of particular individuals in these subgroups in linking otherwise disconnected subgroups of researchers?

- How stable is the structure of relations and how vulnerable is it to the departure of key researchers?

Our paper is designed also to stimulate fruitful discussion among IMP and related scholars about the nature and performance of the group, how this has changed over time and the challenges facing the group in the future as some of the founding fathers approach retirement.

The paper is organised in the following way. First, we briefly review related research that underpins our study. We then describe the way the database used as the basis of analysis was developed. The results of our social network analysis are then reported and discussed. The final section considers areas for future development of this type of research.

Related Research

There are two streams of literature that support the ideas of this paper.

The first concerns *research collaboration*. In the last 20 years there has been increasing collaboration in research and it is widely assumed that this should be encouraged and extended in various ways, i.e. international collaboration, across sectors, between university and industry, between science and technology, across scientific disciplines, and at individual and institutional levels (Katz and Martin, 1997). Early studies on research collaboration are more than 30 years old and are generally referred to as the Sociology of Knowledge and Sociology of Science (de Solla Price, 1963; Zuckerman, 1967; Crane, 1972). Researchers use quantitative methods to measure research collaboration through co-citation and co-authored publications. The most cited studies are by Derek Price and Diane Crane, who introduced and developed the concept of Invisible Colleges, the focus of our article. Diane Crane (1972) presented the idea of 'Invisible Colleges' as informal communication networks with some form of social organisation. She highlighted the importance of key individuals in the dissemination of information throughout the field and how these individuals are members of 'a highly elite invisible college.' Invisible Colleges, or networks of the most productive authors, are an important aspect in the social organisation of a research area because they tend to link separate groups of collaborators and promote the development of a field.

One of her results is that

> '...in each of these areas a sizeable core of individuals were connected with one another.... In each case, one large network of individuals linked directly or indirectly emerged...Analysis of the networks showed that anyone choosing even one of the most productive members of each research area studied by the author could have been in contact with a large network of individuals. In other words, the high proportion of choices directed toward these individuals meant that members of these groups were not so much linked to each other directly but were

linked to each other indirectly through these highly influential members ...' (Crane, 1972, pp. 45)

These ideas have been developed and tested in various later studies. For example, much work has been done on the link between research productivity and research collaboration. It seems that more prolific authors collaborate more frequently and authors at all levels of productivity tend to collaborate more with highly productive authors (Katz and Martin, 1997). Other studies focused on patterns of spatial proximity and scientific interaction at regional and country levels. Structural researchers fostering research collaboration have been investigated, not only in terms of research on the Sociology of Knowledge and Sociology of Science, but also in policy and technology oriented studies (e.g. Hakansson, 1987; Rothwell, 1994; Welch et al., 1998).

A gap in studies of research collaboration stems from the general approach adopted. Usually a macro perspective is adopted rather than a micro one focusing on the roles of individuals in the collaboration network (Melin, 2000). There is a lack of studies adopting a relational approach.

The second stream of research underpinning our research is *Network Theory*. We use methods and tools derived in the cross-disciplinary field of network studies. Network Analysis is a potentially powerful tool that can be used to study a variety of phenomena (Borgatti and Everett, 1999; Burt, 1992; Carley, 1999; Hummon and Carley, 1993; Lundgren, 1995; Morlacchi, 2002; Padgett and Ansell, 1993; Wasserman and Faust, 1994). More recently, there has been increased interest in using this methodology in business to analyse the nature and role of informal relations between people in formal organisations (Cross et al., 2002; Cross and Pusak, 2002) and work examining the co-authorship of scientific papers, as already mentioned (Barabási et al., forthcoming; Newman, 2001).

The study of networks is becoming a focus of attention throughout science as this form of organisation is seen to play an important role in the material, biological and social sciences.

Methodology

Our data set consists of structural and individual attributes of the nodes in our network. The nodes are co-authors and the relations are the number of papers jointly authored (with or without additional authors). The primary *unit of analysis* is 'the article or research paper," which is regarded as the outcome of a process of research collaboration. Hence the type of relation analysed (sometimes referred to as a "tie") is 'co-authorship'.

The *population* of interest comprises all people presenting a joint paper at IMP annual conferences from its beginning in 1984 to 1999, as indicated in the conference proceedings. Altogether, there are 1163 papers, but only 670 of them are by 2 or more authors. Our universe is therefore the 989 authors involved in these 670 joint papers.

The omission of people that tend to publish single authored papers is an obvious weakness of this approach. The ideas of particular sole authors may play an important role in shaping the intellectual directions of the group and their role will tend to be under-represented. For example, two authors who have attended many IMP conferences and yet do not appear in our sample are Keith Blois and Jim Anderson. Both of these have had an important impact on IMP thinking. This limitation suggests the need for additional research looking at co-citation among IMP conference papers and co-authorship and co-citation in other types of publications. It is interesting to note that, as a consequence of an early version of this article being presented at the 2000 IMP conference, one IMP researcher, Malcom Cunningham, one of the "old men" of IMP, was moved to write a rejoinder for the next conference (Cunningham, 2001). In this he bemoaned, somewhat tongue in cheek it has to be said, the relegation to lesser ranks of some IMP researchers because of their non-inclusion in our

database. This seems to us to be yet another indication of the social process of science, as well as of the spirit of the IMP group.

We used the following criterion to select our *sample*: we considered only authors who have attended 3 or more IMP annual conference and who therefore are involved in 3 or more papers. This results in a sample of 171 people, which is summarised in the appendix. The reasons for restricting analysis to these 171 are twofold. First, because we are trying to draw a picture of the IMP community and it is reasonable to focus on more active members, people who regularly attend the annual conference and present papers that contribute to the production of new knowledge in the focal research area of industrial marketing and purchasing. The second is a technical constraint related to the UCINET V software used to implement the analysis.

Results

Frequency Distribution of Co-Authored Papers

One of the surprising results is that the distribution of number of co-authored papers is not a normal or bell shaped distribution with but has a characteristic power law distribution, in which a few authors contribute a large number of co-authored papers and there is a long tail involving many authors contributing a small number of co-authored papers. Thus, there is no characteristic scale in terms of number of co-authored papers as reflected in a mean, which is 5.97. The power law distribution is shown in Figure 1, which shows frequency and the log-log plot of the number of co-authored papers. The log-log plot shows the characteristic straight line pattern with a correlation of 0.98 with a slope close to -1 (Barabási, 2002). The power law distribution conforms to the much earlier results of Lotka (1926) and to the more recent studies carried out by Newman (2001) and Barabási et al. (forthcoming) and is a

hallmark of complex adaptive, self organising systems such as social networks like the IMP group (Barabási, 2002).
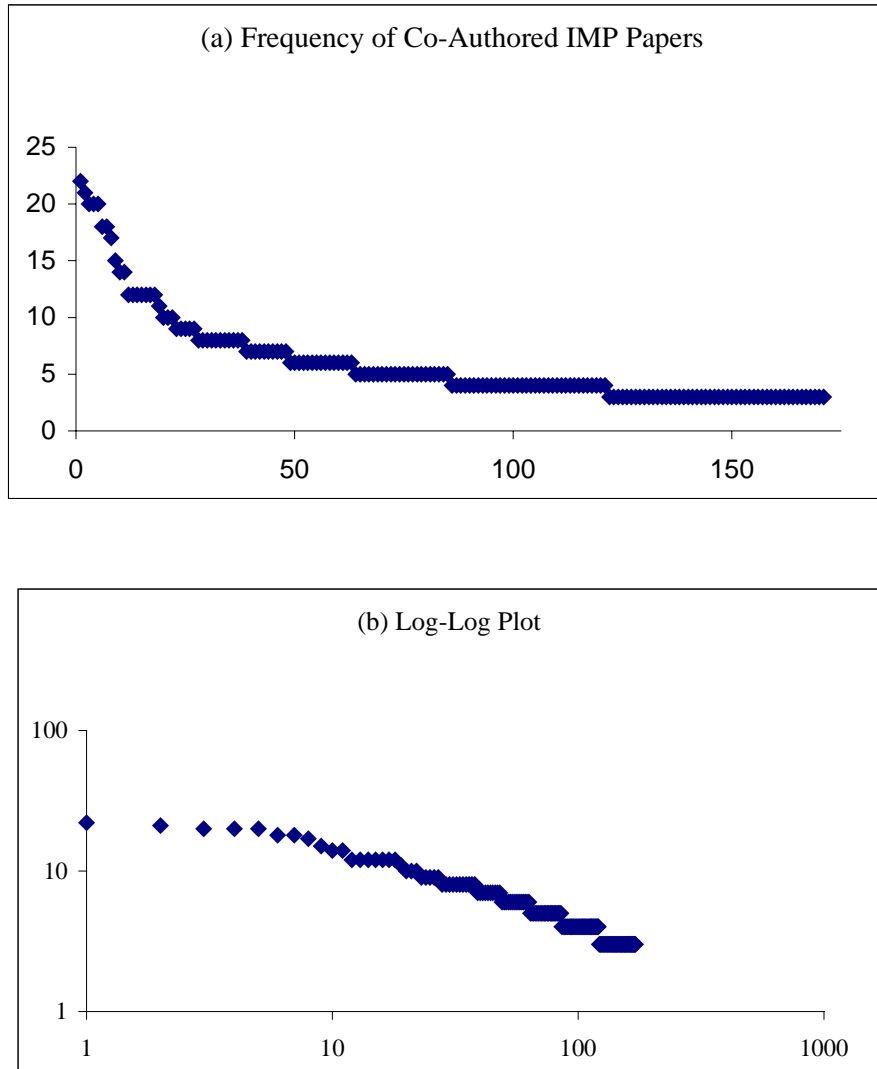
Figures 1a and 1b - Power Law Distribution of Number of Co-authored IMP Conference Papers (N=171 minimum 3 papers)

Figure 2 shows the composition of the sample in terms of country of the author's university. This is based on their affiliation at the time of their first IMP conference paper though some authors have moved institution and country during the period under consideration. This shows the strong dominance of Europe in the make-up of the IMP Group, particularly the

UK, Sweden and Finland. Finland was not part of the IMP1 or IMP2 cross-national business relationship and network studies yet it is well represented in terms of conference participation. This in part reflects the research focus of many Finnish researchers and the number of doctoral students who attend the conference each year, writing papers with senior researchers.
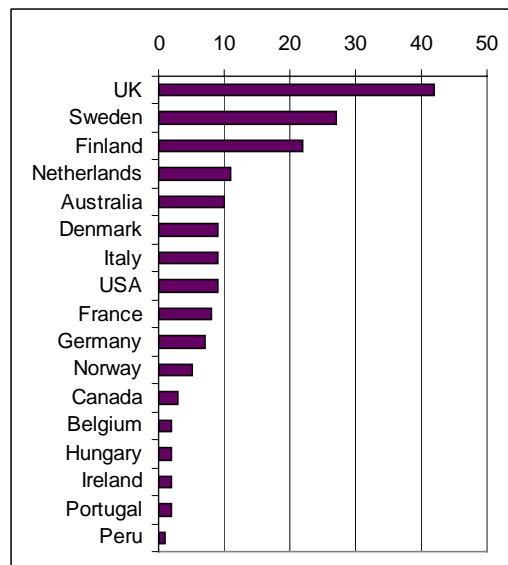
Figure 2 - Number of Co-authored IMP Conference Papers in Sample By Country of Author (N=171)

An analysis of individual researchers' attributes in terms of the number of papers presented, their first year of participation, the number of years of participation, their home country and home institution shows that existence of three main sub-groups:

❑ Highly Productive people: a group of highly productive people in terms of the number of papers presented

❑ Long Serving Participants: a group of people who have participated in many IMP conferences and

❑ Early Starters: a group of people who have attended the conference right from the beginning (i.e. 1984 or 1985).

A comparison of these groups reveals a limited degree of overlap as shown in Figure 3. Groups have been defined by taking as fixed the dimension of the 1984-1985 group of 32 authors and selecting those ranked among the top in the other two sub-groups.

Long Servings

Early Starters

MT SI

BF, CN, HL, PS, RES,
TG, LGA TM, VJP,
HUS, LU, MV, BS,
FR, RP, SM

**AL, BN, CM, EG, GLE, FD,
HH, JJ, JW, MLG, SR, SD,
TP, WI**

*AH, CB, FLR, FP,
DA, GHG GP, HV,,
NP, PJ, SA, SPR,
TJA, WK, YL*

DS, HS, HEP, KDJ,
MP, PAC, RS

*Highly
Productive*
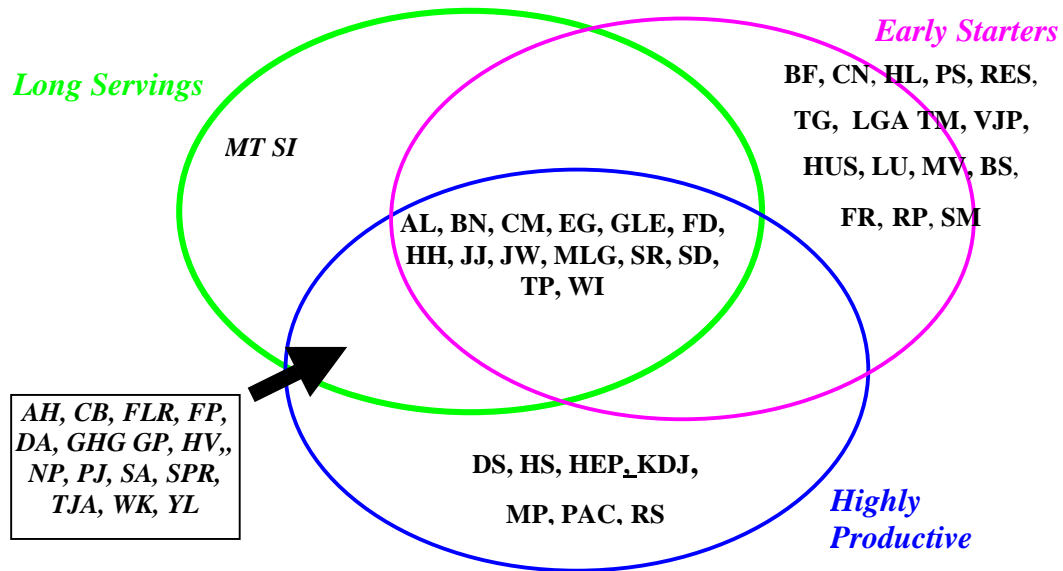
Figure 3 - Major IMP Subgroups Based on Individual Attributes

The overall pattern of researcher-to-researcher connections is shown in Figure 4. A line linking two researchers means they have co-authored at least one IMP conference paper, the number of such co-authorships is not used as part of this or subsequent analysis. The figure shows the existence of a large or giant component of the network comprising a set of interconnected researchers covering a large part of the network (Newman 2001). It also shows the existence of isolated individuals and subgroups. Some of the isolates may be indirectly connected to the main component of the network through co-authorship links they have with people not included. This is because our sample includes only those researchers who have been to 3 or more conferences and therefore published 3 or more papers. Therefore, some isolates may have co-authored papers with researchers not included in the

sample, through whom they may be connected to the main component. But Figure 4 describes the dominant structure of the network and is used as the basis for further analysis.
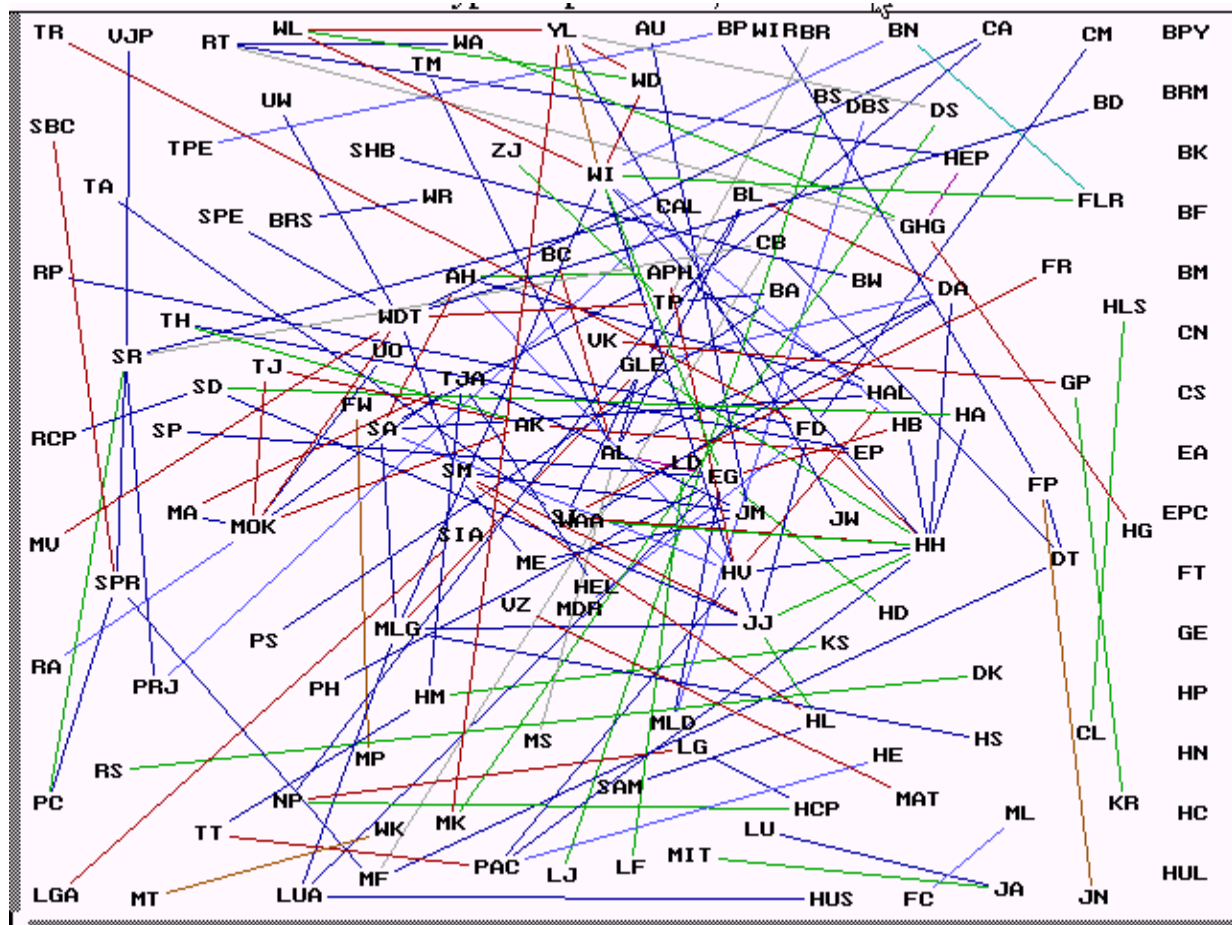
Figure 4 - Connectivity of 171 IMP Co-authors

Ego Networks

Table 1 summarises some of the main characteristics of the ego networks[1] of the 171 researchers included in our sample. *Size,* is the number of other researchers (alters) with whom a researcher (node) has co-authored an IMP conference paper. *Ties,* is the total number of co-authorship links among the researchers with whom a focal researcher has co-authored papers, excluding the focal researcher. *Pairs,* is the total number of potential ties among researchers with whom a focal researcher has co-authored a paper. For example, if a

researcher has co-authored papers with 4 others in the sample, the *size* of their ego network is 4. Some of these 4 other researchers may have co-authored papers with each other, which is the number of *ties*. Lastly, among *n* people there are *n*(*n*-1)/2 potential ties, which for 4 people is 6 and is termed the number of *pairs*.

The ratio of ties to pairs measures the extent to which a researcher links together other researchers in a non-redundant manner. This has been referred to as the clustering coefficient by Watts and Strogatz (1998) and shows how close-knit the co-authors are. The less close-knit a researcher's co-authors are, the more a researcher connects researchers that are not otherwise connected, which is the concept of structural wholes proposed by Burt (1992). Researchers occupying structural wholes, or non-redundant connections, play a potentially important role in connecting different parts of the network and in stimulating knowledge sharing and development through their role in bringing together researchers that would otherwise not be linked.

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[1]An ego-network '…consists of a focal actor, termed *ego*, a set of alters who have ties to ego, and measurements on the ties among these alters…' (Wasserman and Faust, 1994, pp. 42).

Table 1- IMP Group Co-authorship Ego-Network Measures (N=171)

Size		
	Mean	1.82
	StDev	2.08
	Min	0
	Max	11 (HH)
	M+3σ	8.06
	People outside range (M+3σ)	EG, HH, HV, WI, WDT
Ties		
	Mean	1.43
	StDev	3.14
	Min	0
	Max	18 (HV)
	M+3σ	10.87
	People outside range (M+3σ)	DA, GLE, HH, HAL, HV, SA, WI
Pairs		
	Mean	5.8
	St Dev	14.96
	Min	0
	Max	110

The results indicate that the network of researchers shows many of the small world properties of social networks discovered in previous research. The network is highly clustered, rather than a random set of connections, and some researchers have extensive collaboration networks and play a key hub role in linking different parts of the network. Once again, a power law distribution of ego-network scores is evident with some researchers, the hubs in the network, having scores more than three standard deviations above the mean, i.e. HH, HV, WI, SA, HAL, DA, WDT, GLE, EG. Comparison of these results with the studies of physicists (Newman, 2001) mathematicians and neuro-scientists are not meaningful because they cover a greater range of types of publications and time periods.

A commonly used measure describing the connectivity of a network is the minimum distance linking two researchers, which is the length of the shortest path between them (Barabási, 2002). A distance of 1 means that two authors have co-authored a paper with each other and a distance of 2 between researcher A and B means that A has co-authored a paper with

someone who has co-authored a paper with B. This type of measure has been used in various situations to provide an index of how closely two researchers, actors or people are connected (Barabási, 2002). Similar indices could be conducted in terms of distance from particular IMP researchers, such as one or more of the founders, but we have not computed that here. Instead, in the following section we examine the role of particular researchers and the pattern of co-authorship links they have. It should be noted that not all researchers will have distance scores to all other researchers in the network because some are isolates and hence not connected to other parts of the network. Because of this, an average distance score for a network such as that shown in Figure 4 cannot be calculated.

The Core Network

The pattern of network connections shown in Figure 4 suggests the presence of a 'core/periphery structure'. Furthermore, *cluster analysis* confirms this type of structure exists. We used an n-cliques analysis to detect the presence of isolated nodes and sub-groups and this provided clear evidence of the existence of a core network. This core-periphery structure of a network has been discussed by Borgatti and Everett (1999) and Everett and Borgatti (1999) and we used their models of networks to identify a core group of 57 members or a cohesive subset. Hereafter, we will call this network the '57Core Net' and it is depicted in Figure 5.
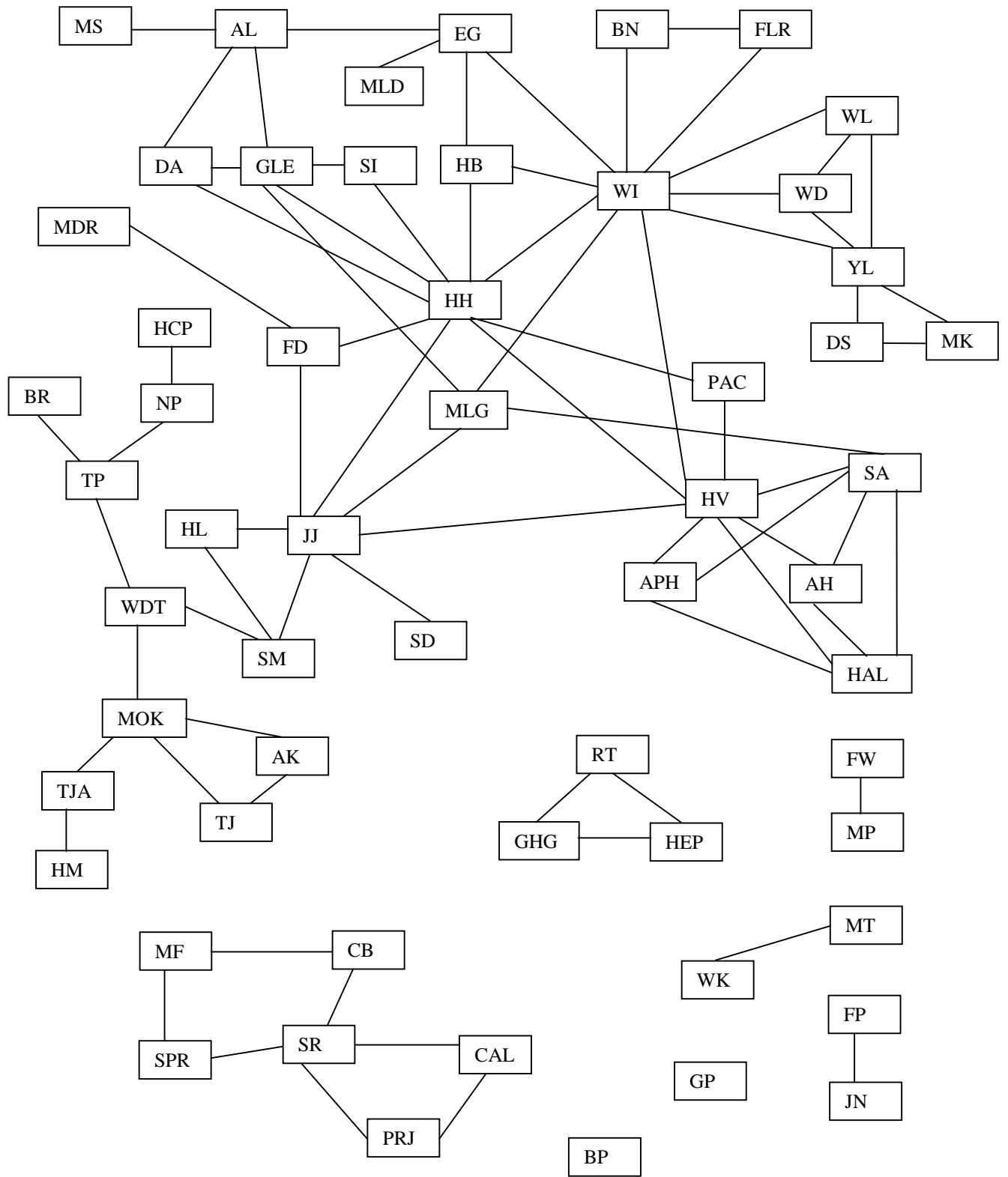
Figure 5 - The Core Network of 57 Researchers

Within this core network there is a large sub-net composed of 40 researchers together with other smaller structures i.e. dyads, triads and small groups. The large sub-net is structured around some key researchers and quite different roles can be detected. Table 2 (in Appendix 1) shows several key ego network measures for this core group. Size and pairs have been defined already. Two-step reach is percentage of other researchers in the core network linked directly, i.e. having a distance score of 1, or at a distance of 2 to a focal researcher. "Structural Holeness" is measured in terms of the effective size of a researcher's co-authorship group, i.e. the number of co-authors minus the average number of links between them, not counting ties to the focal researcher (Burt, 1992). It indicates how important a researcher's role is in linking together researchers of the network. This measure is analogous to the concept of a clustering coefficient used by Watts and Strogatz (1998). See Table 3 in Appendix 2.

The results help clarify the key hub role of certain researchers and this may be illustrated by examining parts of the 57CoreNet network centred around key researchers. For example, Figure 6 shows a portion of the network including researchers positioned 2 steps from one of the founders of the IMP Group, Hakan Hakansson (HH). This figure shows how the network appears from the perspective of one key researcher and the kinds of researchers influencing and being influenced by this researcher.
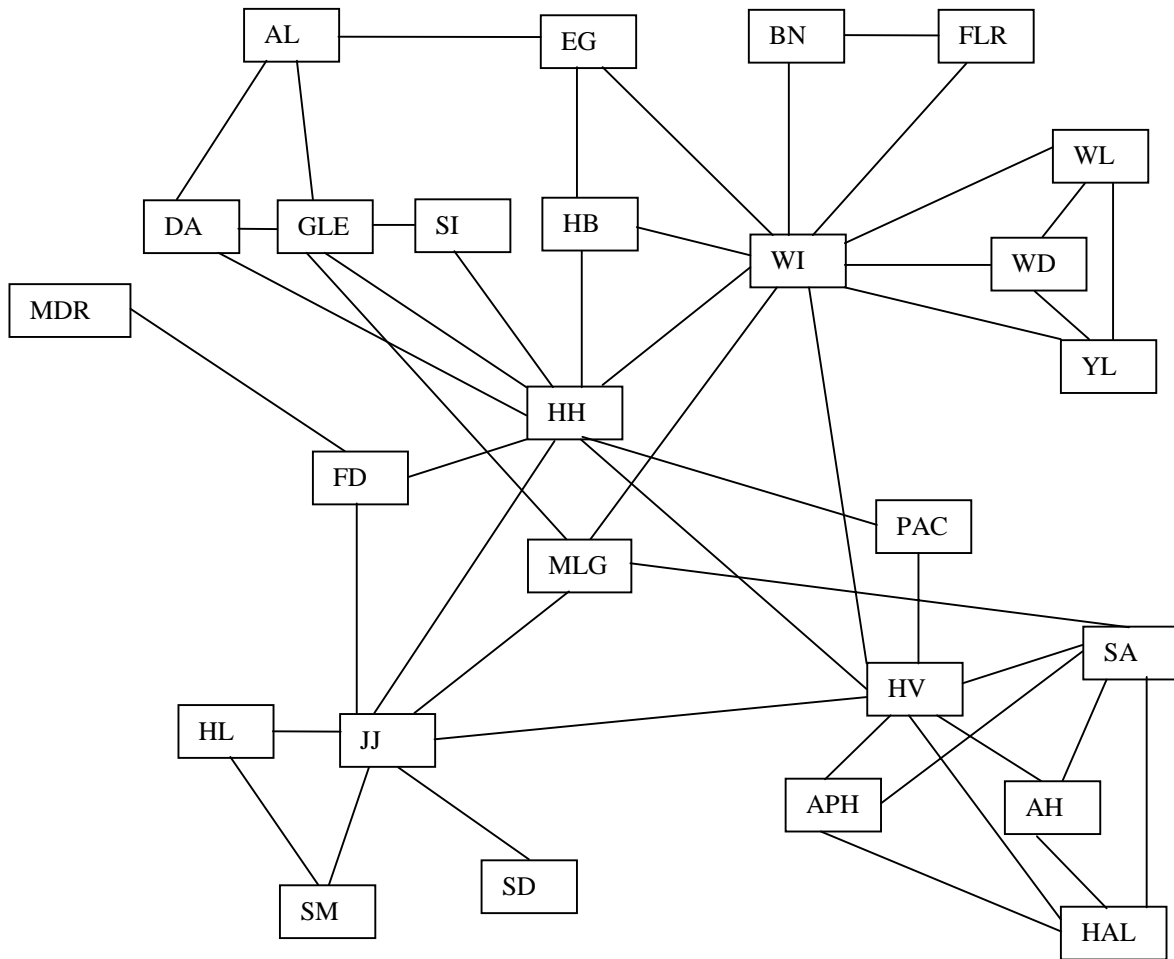
Figure 6 - Researchers With a Hakan Hakansson Index of 1 or 2

shows the important hub role Jan Johanson plays in the network, as a gatekeeper or broker situated in a structural hole (Burt, 1992). DWT also appears to play a critical role in linking various researchers into the inner core and WI links various Australian based researchers into the core. These researchers occupy structural holes in the network, as their high score on this ego network measure indicates.
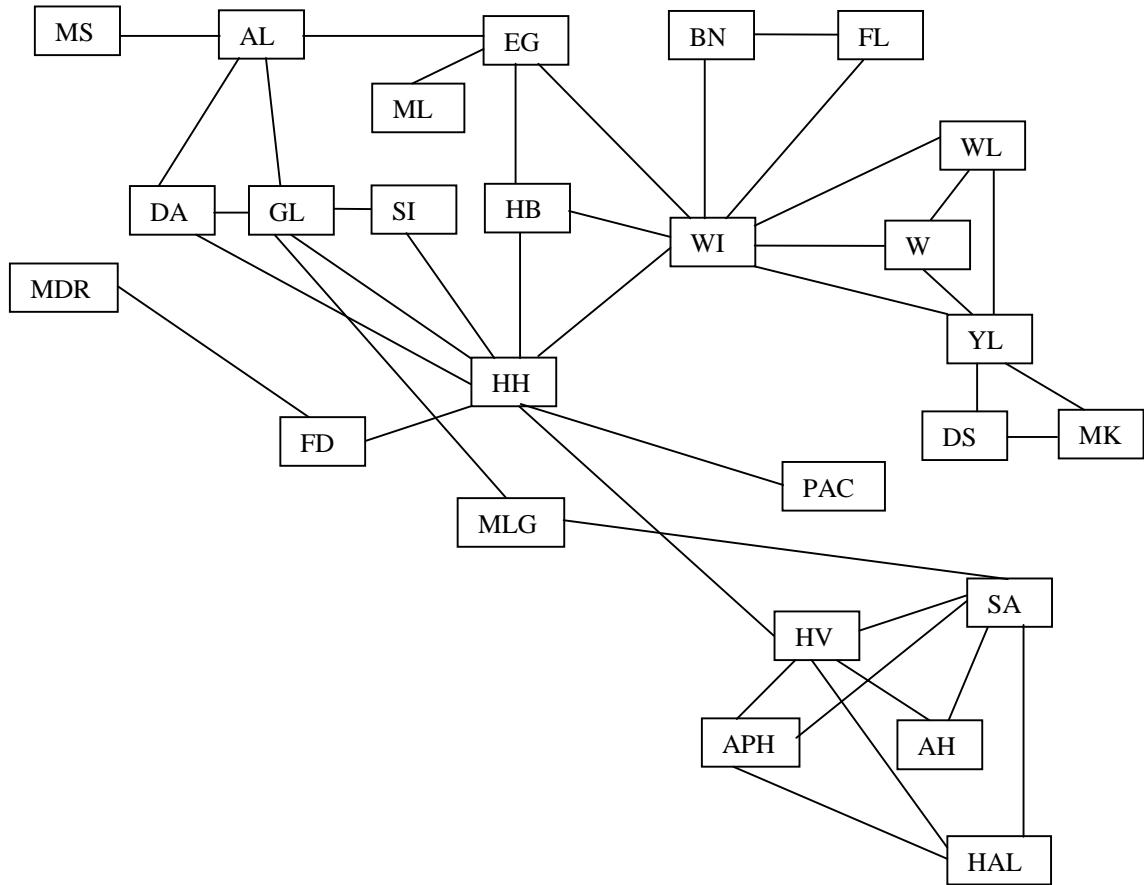
Figure 7 - The Core Network in the Absence of Jan Johansson

The network also reveals some geographic groupings of researchers. For example, there is a group of French and Portuguese researchers that tend to write papers with each other, as indicated by the disconnected group in the bottom left of the figure, as well as a tight group of three German researchers (RT, GHG and HEP).

Figure 8 summarises the core network in terms of researchers grouped by country. Researchers are grouped together if they are directly or indirectly connected to each other and if they are from the same country. Thus some countries have more than one grouping. The number of researchers in each group (N) and the number of researchers in that group who connect their country to other countries (C) are shown. This shows the important role of Swedish researchers in the network, linking researchers from many other countries.
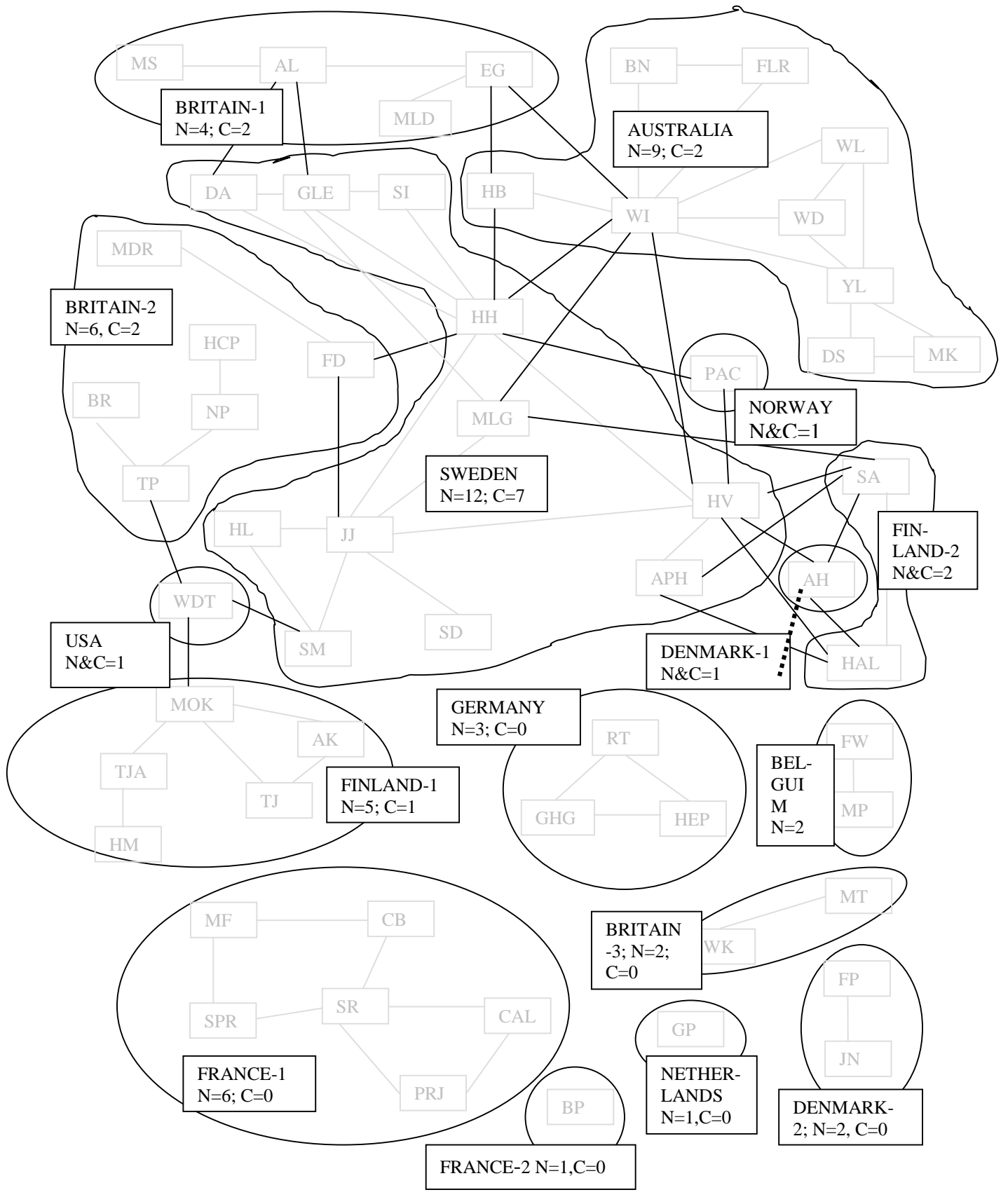
Figure 8 - Core network in terms of researchers grouped by country

This includes linking groups of researchers from the same country, such as the two groups of UK based researchers that are indirectly linked through Swedes. This is not unexpected given the central role that Swedish researchers have played in the development of the IMP group and serves to show the importance of third parties in linking together researchers that are otherwise not connected. In other words the Swedes as a whole occupy an important structural hole in the network.

To some extent Scandinavia could be considered as a single grouping unit. For example there is considerable intra-regional linkage on the right-hand section of the Swedish group – in particular through HV – to other Scandinavians who are not Swedish. Also, dense patterns of connections are observed within but not between other countries.

Table 4 summarises the pattern of inter-country connections depicted in Figure 8. If Sweden, Norway, Denmark and Finland are considered together, they represent more than half of the researchers in the main component of the network. The inter-group connectivity also changes when Scandinavia is considered as one group. 52% of Swedish collaborations are with other Swedes, and intra-Scandinavian co-authorships account for 76% of total Scandinavian co-authorships – due mainly to the inclusion of the Finns.

Table 4 - Connectedness of Core Network by Country and Region

Country or Region	Number of Authors	Total External Links	External Links Per Author	Total Internal Links	Total Links	Percent of Internal Links	Total Links Per Author
Finland-1	5	1	0.20	5	6	83%	1.2
Sweden	12	7	0.58	14	27	52%	2.25
Scandinavia	23	7	0.30	29	38	76%	1.65
Britain-1+2	10	4	0.40	7	14	50%	1.40
Australia	9	2	0.22	12	18	67%	2.00
USA	1	1	1.00	0	3	0	3.00
Total	43	14	0.33	48	73	0.66	1.70

It is Britain rather than Scandinavia that has the highest proportion of inter-region connections with 40% of those in the main UK clusters (i.e. excluding Britain-3) connected to researchers in another country. Both Britain and Australia have higher average numbers of inter-regional co-authorships per researcher than does Scandinavia.

Evolution of the Network

Using the first year of publication of each researcher in the network, we mapped the development of the 171 sample and of 57CoreNet. Four periods may be distinguished, i.e. I: 1984-1985; II: 1986-1990; III: 1991-1993; IV: after 1993, and people may be characterised in terms of their first year of publication as shown in Table 5. No data exists for the final two years as researchers first publishing in those years would have been excluded from our sample as having less than three years conference attendance.

Table 5 - Development of the IMP Network Over Time

	1984	1985	1986	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
57 Core	10	15	15	19	21	25	32	36	39	46	52	57	-	-	-
171	21	32	36	51	60	71	83	104	117	133	147	161	171		

Table 6 shows that people like MOK, HV and YL joined the IMP Group later on. However, the previous analysis shows that they are part of the core network. This suggests interesting issues to follow up in order to understand how such people were able to enter the network at a later stage and to quickly become core researchers. Some of the obvious reasons are the entry of significant researchers later in the evolution of the IMP group. These people brought with them connected others, had links with one or more of the core group and formed a

distinct subpart of the network. For example, IW had a paper at the first IMP conference but did not publish another until 1991. But since then he has co-authored many papers with newer researchers, as well as with established members of the core group. Moreover, some of these newer researchers subsequently co-authored papers with members of the earlier core group and, in this way, the core group has grown.

Table 6 - Researchers grouped by year of first publication at IMP

I: 1984-1985	II: 1986-1990	III: 1991-1993	IV: after 1993
AL	CB	AH	AK
BN	GHG	DA	APH
EG	HAL	FLR	BP
FD	HEP	FP	BR
GLE	MF	GP	CAL
HH	MOK	HV	DS
HL	NP	HB	FW
JJ	SA	HCP	JN
MLG	SPR	MT	MDR
SR	TJA	SI	MLD
SM		WL	MK
SD		WK	MS
TP		YL	PAC
WI			PRJ
WDT			RT
			TJ
			WD

Another issue is the departure of researchers from the network. Is this due to retirement, to change in research direction or could it be an inability to form productive research ties with established IMP researchers? More generally, models of network evolution based on co-authorship data are only beginning to be developed (Barabási et al., forthcoming) and suggest interesting possibilities for further research using the IMP co-authorship network as well as other data bases of marketing and business publications, which we are currently examining.

Discussion and Conclusions

The paper paints a picture of a social network of researchers and reveals some dimensions of the social process of science. In particular, our case study analysis has shown that there is an invisible college inside the IMP Group. Beyond expected national and institutional cooperation on research, there is an informal network of collaboration that connects different subgroups located in many parts of the world.

An interesting finding is that the pattern of co-authorship corresponds to a power law distribution, which conforms to the results of studies of co-authorship in other discipline areas. This supports the view that the IMP group is a kind of living complex adaptive system - a self-organising social organism of interacting researchers – that exhibits the same characteristics as other complex adaptive systems.

To summarise our results we return to the research questions described above.

To what is extent is research in the IMP group dominated by a few key researchers?

The collaboration network based on co-authorship is quite centralised and based on key researchers who play important bridging or hub roles. The role and importance of the founding fathers (and they are all men) is obvious from the results. As of 1999, they were still very active researchers with a wide range of research collaborators located around the world. There is also an indication of a second generation of IMP researchers, who joined and became active later and brought with them particular research collaborators who also joined the group. In this way groups of researchers from different regions, such as Australia, came to play a significant role and became part of the core network.

What is the importance of cross-national research collaborations in a research group comprising researchers from many nations in Europe, Asia, Australasia and America?

There is considerable international collaboration among IMP researchers but distinctive groups based on country or region of origin also exist. Within the Scandinavian countries there is much cross-national collaboration, in part due to established traditions of research cooperation and associated regional research forums. This result also reflects the strong influence of Swedish researchers in the founding of the IMP group and in taking the lead (if that is possible in IMP!) in some of the key collaborative empirical studies carried out by the IMP group.

What is the subgroup structure of the IMP group and the role and importance of particular individuals in these subgroups in linking otherwise disconnected subgroups of researchers?

Much of this is covered in the answer to the foregoing questions. Some individuals do seem to play an important bridging or hub role, linking researchers from different parts of the world and perhaps different research traditions, to the core group. However, there are also more isolated subgroups that publish with each other but not with other IMP researchers. The Finns and the French, and to some extent the Germans, seem to be more isolated subgroups, which may be in part due to language barriers or to different research and publication traditions in these countries.

How stable is the structure of relations and how vulnerable is it to the departure of key researchers?

The retirement of key researchers such as HH, JJ, DW or IW, who act as important bridges connecting different parts of the network, could have significant impact on the functioning of the IMP group. The issues of its future direction and problems of transition beyond the

original founders have been discussed at IMP conferences, most recently in a plenary session at the 2002 conference. There appears to be some hope for the future because, as Young (2002) describes in her review of the discussion that took place at this session, a new generation of younger researchers is emerging, who are not as closely linked to the original "old men," and who sometimes are not even aware of who they are! This, as she says, bodes well for the future as this new generation makes their mark on research directions and conferences.

There are obviously limitations to our analysis. First of all, we consider only one aspect of research collaboration, i.e. co-authorship, and a simple indicator of this. We make no attempt to examine the importance of the co-authored papers, to categorise them by subject area or to include co-authorships outside of the conference proceedings. Second, as already noted, single-authored papers are not included in our database and this will tend to undervalue the role of some researchers who have contributed important papers to IMP conferences. Third, we do not consider the significance to individual researchers of their IMP-related co-authored papers. For some researchers, particularly those from North America, their main research agenda is outside the domain of the IMP group, yet they play an important role at conferences in interacting and sharing ideas with other IMP researchers and in collaborating on other, but related, research projects. Fourth, we do not consider co-authorship of non-IMP conference papers in the form of journal articles and books. The latter in particular have been an important means of joint publication of IMP ideas. Despite these limitations, we believe the broad patterns reported are representative of the structure of the IMP group and how it has changed over time. Most researchers tend to trial a paper at the conference before later journal publication and the conference is the main meeting place for IMP researchers. A further limitation is the time frame analysed. Although our data spans 1984-1999, we effectively only consider data up to 1996 because of the way we selected our sample i.e.

people attending the conference for 3 or more years. We believe that history matters, but in network terms the history of our community is quite short.

There are many opportunities to further develop the type of research described here, including extending it to non-IMP contexts. First, the analysis can be extended to include papers from additional conferences, such as specialist IMP and related conferences in addition to the main annual IMP conference. For example, several conferences and workshops have taken place in Scandinavia, Australia and Asia. Business network tracks also form part of other business and marketing conferences. Consideration of these would allow us to see how far the IMP group of researchers interacts with other researchers in the area of business markets.

Second, our analysis can be extended to examine more fully the associations between a researcher's personal characteristics and the characteristics of their ego networks, such as the number and type of their co-authors, the subgroups they belong to, and their degree of connectivity. Third, alternative measures of links between researchers can be used, such as co-citation, surveys of communication links and grant applications, in order to see how the network picture differs.

Fourth, and important is the extension of this research approach to other parts of the marketing and business disciplines. The same kind of analysis can be used to examine co-authorship networks in other areas of marketing and business research, including conferences such as the American Marketing Association Summer and Winter Educator conferences, or the European Marketing Academy conferences and the Australia-New Zealand Marketing Academy conferences.

Lastly, the study of the evolution of social networks, including co-authorship networks, is an area of increasing interest and importance (Barabási et al., forthcoming). Not only are

existing patterns of collaboration relevant but also how they have developed over time. More generally, the study of complex adaptive systems, of which social networks are but one example, has led to the development of methodologies that enable us to improve our understanding of the way in which our social networks and knowledge evolve (e.g. Easton et al., 1997; Kauffman, 1995). These developments present many opportunities for future research that are only beginning to be exploited.

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Appendix 1: Table 2 - Ego Network Measures of Individuals in the Core Group (N=57)

		Size	Pairs	2 Step	Reach	Struct.	Holes
1	WI	10	90	HH	44.640	WI	8.600
2	HH	9	72	WI	42.860	HH	7.444
3	HV	8	56	HV	41.070	JJ	6.143
4	JJ	7	42	MLG	41.070	HV	5.750
5	YL	5	20	JJ	33.930	MLG	4.000
6	GLE	5	20	HB	32.140	GLE	3.800
7	SA	5	20	EG	26.790	EG	3.500
8	APH	4	12	GLE	25.000	MOK	3.500
9	AH	4	12	FD	25.000	AL	3.500
10	HAL	4	12	DA	23.210	SR	3.500
11	MOK	4	12	PAC	23.210	YL	3.400
12	MLG	4	12	YL	21.430	WDT	3.000
13	EG	4	12	WD	21.430	TP	3.000
14	AL	4	12	WL	21.430	SA	2.600
15	SR	4	12	APH	16.070	FD	2.333
16	WD	3	6	AH	16.070	SM	2.333
17	WL	3	6	HAL	16.070	NP	2.000
18	SM	3	6	HL	14.290	MF	2.000
19	WDT	3	6	MOK	12.500	CB	2.000
20	TP	3	6	SD	12.500	SPR	2.000
21	FD	3	6	AK	7.140	TJA	2.000
22	DA	3	6	TJ	7.140	HB	1.667
23	HB	3	6	CAL	7.140	DA	1.667
24	CB	2	2	PRJ	7.140	PAC	1.000
25	SPR	2	2	NP	7.140	WD	1.000
26	MF	2	2	MLD	7.140	WL	1.000
27	HL	2	2	MS	7.140	APH	1.000
28	PAC	2	2	MF	5.360	AH	1.000
29	SI	2	2	MDR	5.360	HAL	1.000
30	BN	2	2	BR	5.360	HL	1.000
31	FLR	2	2	GHG	3.570	SD	1.000
32	DS	2	2	HEP	3.570	AK	1.000
33	MK	2	2	RT	3.570	TJ	1.000
34	AK	2	2	HM	3.570	CAL	1.000
35	TJ	2	2	HCP	3.570	PRJ	1.000
36	CAL	2	2	SI	0.836	MLD	1.000
37	PRJ	2	2	SA	0.768	MS	1.000
38	GHG	2	2	SM	0.768	MDR	1.000
39	HEP	2	2	WDT	0.768	BR	1.000
40	RT	2	2	BN	0.768	GHG	1.000
41	TJA	2	2	FLR	0.768	HEP	1.000
42	NP	2	2	AL	0.760	RT	1.000
43	SD	1	0	TP	0.465	HM	1.000
44	MDR	1	0	SR	0.397	HCP	1.000

		Size	Pairs	2 Step	Reach	Struct.	Holes
45	MLD	1	0	CB	0.397	SI	1.000
46	MS	1	0	SPR	0.397	BN	1.000
47	BR	1	0	DS	0.397	FLR	1.000
48	HM	1	0	MK	0.397	DS	1.000
49	HCP	1	0	TJA	0.397	MK	1.000
50	FW	1	0	FW	0.096	FW	1.000
51	FP	1	0	FP	0.096	FP	1.000
52	JN	1	0	JN	0.096	JN	1.000
53	MP	1	0	MP	0.096	MP	1.000
54	MT	1	0	MT	0.096	MT	1.000
55	WK	1	0	WK	0.096	WK	1.000
56	BP	0	0	BP	0.000	BP	0.000
57	GP	0	0	GP	0.000	GP	0.000

Appendix 2: Table 3 - Attributes of 171 Samples

	Name	Code	Total	First	Total	Country	Institution
1	Alajoutsijarvi, Kimmo	AK	3	1995	7	Finland	Oulu Uni
2	Andersen, Poul	APH	4	1994	5	Denmark	Aalborg
3	Anderson, Helen	AH	8	1991	10	Sweden	Linkoping
4	Anderson, Ulf	AU	3	1992	3	Sweden	Uppsala
5	Araujo, Luis	AL	14	1984	18	UK	Lancaster
6	Bangens, Lennart	BL	4	1992	5	Sweden	Chalmers
7	Barrett, Nigel J.	BN	9	1984	9	Australia	UTS
8	Barreyre, Pierre	BPY	3	1990	3	France	Grenoble
9	Beije, Paul R.	BP	3	1996	4	The Netherlands	Rotterdam
10	Benson-Rea, Maureen	BRM	4	1995	4	New Zealand	Auckland
11	Biemans, Wim G.	BW	5	1988	6	The Netherlands	Eindhoven
12	Blois, Keith J.	BK	3	1995	3	UK	Oxford
13	Bonaccorsi, Andrea	BA	3	1989	4	Italy	Pisa
14	Bradley, M. Frank.	BF	4	1984	4	Ireland	Dublin
15	Brand, Maryse J.	BM	4	1989	4	Netherlands	Groningen
16	Brege, Steffan	BS	5	1985	7	Sweden	Linkoping
17	Brennan, Ross	BR	5	1995	6	UK	Manchester
18	Bridgewater, Susan	BRS	3	1994	3	UK	Warwick
19	Brito, Carlos	BC	4	1992	4	UK	Lancaster
20	Burt, David N.	BD	3	1990	4	USA	San Diego
21	Campbell, Alexandra	CA	5	1992	5	Canada	York
22	Campbell, Nigel C. G.	CN	5	1984	5	UK	Manchester
23	Canning, Louise E.	CL	3	1996	3	UK	UWE
24	Castro, Luis M	CAL	4	1994	4	Portugal	Oporto
25	Connor, Sandra	CS	3	1992	3	UK	Paisley
26	Cova, Bernard	CB	10	1988	12	France	Paris
27	Cunningham, Malcolm	CM	7	1984	8	UK	Manchester
28	Damgaard, Torben	DT	3	1992	3	Denmark	Southern DK
29	de Burca, Sean	DBS	6	1994	8	Ireland	Dublin
30	Deans, Kenneth R.	DK	3	1989	3	New Zealand	Otago
31	Denize, Sara	DS	5	1994	6	Australia	UTS
32	Dubois, Anna	DA	8	1992	10	Sweden	Gothenburg
33	Easton, Geoff	EG	14	1985	22	UK	Lancaster
34	Eggert, Andreas	EA	3	1997	3	Germany	Kauserlautern
35	Elfferich, P. C.	EPC	3	1991	3	The Netherlands	
36	Eriksson, Paivi	EP	3	1997	3	Finland	Tampere
37	Faes, Wouter	FW	3	1996	6	Belgium	Limburg
38	Fang, Tony	FT	3	1995	3	Sweden	Linkoping
39	Fiocca, Renato	FR	3	1985	3	Italy	Bocconi
40	Fletcher, Richard	FLR	8	1992	8	Australia	UTS
41	Ford, David	FD	13	1985	18	UK	Bath
42	Frear, Carl R.	FC	4	1988	4	USA	Thunderbird
43	Freytag, Per V	FP	8	1992	9	Denmark	Southern DK
44	Gadde, Lars-Erik	GLE	10	1984	12	Sweden	Gothenburg
45	Gemünden, Hans Georg	GHG	10	1988	20	Germany	Karlsruhe
46	Ghauri, Pervez N.	GP	8	1991	8	The Netherlands	Groningen
47	Gressetvold, Espen	GE	3	1997	3	Norway	Trondheim
48	Hadjikhani, Amjad	HA	5	1992	5	Sweden	Uppsala
49	Hakansson, Hakan	HH	14	1984	21	Sweden	Uppsala
50	Halinen, Aino	HAL	4	1989	5	Finland	Turku
51	Hallén, Lars	HL	6	1984	6	Sweden	Uppsala
52	Hanmer-Lloyd Stuart	HLS	5	1993	5	UK	UWE
53	Harris, Phil	HP	4	1993	5	UK	Manchester M
54	Harrison, Debbie	HD	3	1997	3	UK	Lancaster
55	Havila, Virpi	HV	9	1991	11	Sweden	Uppsala
56	Hedaa, Laurids	HEL	4	1992	5	Denmark	Copenhagen
57	Helfert, Gabi	HG	3	1996	4	Germany	Karlsruhe
58	Hertz, Susanne	HS	6	1989	8	Sweden	Stockholm
59	Heydebreck, Peter	HEP	6	1990	8	Germany	Karlsruhe
	Hibbert, Brynn	HB	3	1991	4	Australia	UNSW
61	Holden, Nigel J.	HN	5	1988	5	UK	Manchester
62	Holland, Christopher P.	HCP	6	1991	7	UK	Manchester
63	Holmen, Elsebeth	HE	4	1994	6	Denmark	Southern DK
64	Holmlund, Maria	HM	5	1993	7	Finland	Helsinki
65	Homburg, Christian	HC	4	1993	5	Germany	Koblenz
66	Huemer, Lars	HUL	3	1994	3	Sweden	Umea
67	Hultén, Staffan	HUS	3	1985	3	Sweden	Stockholm
68	Järvelin, Anne-Mari	JA	4	1995	4	Finland	Tampere
69	Johanson, Jan	JJ	7	1984	12	Sweden	Uppsala
70	Johanson, Martin	JM	4	1992	5	Sweden	Uppsala
71	Johnston, Wesley J.	JW	9	1984	12	USA	Georgia State
72	Jorgensen, Niels	JN	6	1994	6	Denmark	Southern DK
73	Kamann, Dirk-Jan F.	KDJ	5	1993	8	The Netherlands	Groningen
74	Kavanagh, Donnacha	KD	3	1992	3	Ireland	Cork
75	Kemp, Ron G.M.	KR	4	1994	4	The Netherlands	Groningen
76	Kempeners, Marion A.	KM	3	1995	3	The Netherlands	Eindhoven

	Name	Code	Total	First	Total	Country	Institution
77	Kock, Soren	KS	6	1993	6	Finland	Vasa
78	Komppula, Raija	KR	3	1997	3	Finland	Tampere
79	Kristensen, Tore	KT	3	1993	3	Denmark	Copenhagen
80	Laing, Angus W.	LA	5	1993	5	UK	Aberdeen
81	Lancaster, Geoffrey A.	LGA	3	1984	3	UK	Durham
82	Lehtinen, Uolevi	LU	3	1985	3	Finland	Tampere
83	Lemaire, Jean-Paul	LJP	3	1987	3	France	Paris
84	Leminen, Seppo	LS	3	1997	4	Finland	Helsinki
85	Lesevic, Pablo A.	LP	3	1990	3	Peru	San Ignacio
86	Leverick, Fiona	LF	3	1991	3	UK	Manchester
87	Lilliecreutz, Johan	LJ	3	1991	4	Sweden	Linkoping
88	Littler, Dale	LD	3	1988	6	UK	Manchester
89	Lockett, Geoff	LG	3	1990	3	UK	Manchester
90	Lundgren, Anders	LUA	5	1986	6	Sweden	Stockholm
91	Mandjak, Tibor	MAT	4	1996	4	Hungary	Budapest
92	Marcati, Alberto	MAR	5	1989	5	Italy	Bologna
93	Matthyssens, Paul	MP	5	1995	8	Belgium	Limburg
94	Mattsson Lars-Gunnar	MLG	9	1985	14	Sweden	Stockholm
95	Mazet, Florence	MF	5	1990	6	France	Lyon
96	McDowell, Raymond	MDR	3	1996	4	UK	UWE
97	McLoughlin, Damien	MLD	5	1995	7	Ireland	Dublin
98	Metcalf, Lynn E.	ML	4	1992	4	USA	Philips
99	Miettilä, Aino	MA	4	1990	4	Finland	Turku
100	Miller, Kenneth E.	MK	3	1996	3	Australia	Sidney, Tech
101	Millman, Tony	MT	7	1993	7	UK	BuckinghamU
102	Mittilä, Tuula	MIT	3	1996	3	Finland	Tampere
103	Möller, K.E. Kristian	MOK	10	1988	15	Finland	Helsinki
104	Mols, Niels Peter	MN	3	1995	4	Denmark	Aarhus
105	Monami, Eric	ME	3	1992	3	Sweden	Uppsala
106	Mouzas, Stefanos	MS	5	1994	5	UK	Lancaster
107	Mummalaneni,	MV	4	1985	4	USA	Penn State
108	Naude, Pete	NP	8	1990	12	UK	Bath
109	Nummela, Niina	NN	3	1996	3	Finland	Turku
110	Paliwoda, Stanley J.	PS	4	1984	4	UK	Manchester
111	Pardo, Catherine	PC	5	1993	6	France	Lyon
112	Pederson, Ann-Charlotte	PAC	6	1994	9	Norway	Trondheim
113	Pels, Jacqueline	PJ	7	1989	8	Italy	Bocconi
114	Perks, Helen	PH	3	1997	4	UK	Salford
115	Proenca, Joao	PRJ	4	1994	4	Portugal	Oporto
116	Raffa, Mario	RM	3	1992	3	Italy	Napoli
117	Rajagopal, Shan	RS	6	1989	8	UK	Strathclyde
118	Rajala, Arto	RA	4	1994	4	Finland	Helsinki
119	Rao, C.P.	RCP	3	1986	3	USA	Arkansas
120	Rautkylä, Ritva	RR	3	1988	3	Finland	Helsinki
121	Reid, Stan	RES	3	1984	3	Canada	New Brunswick
122	Ritter, Thomas	RT	5	1995	7	UK	Bath
123	Rosenbröijer, Carl-Johan	RCJ	4	1993	4	Finland	Helsinki
124	Rosson, Philip	RP	6	1985	6	Canada	Dalhousie U
125	Rundh, Bo	RB	3	1996	3	Sweden	Karlstad
126	Salle, Robert	SR	9	1984	12	France	Lyon
127	Salmi, Asta	SA	8	1989	9	Finland	Helsinki
128	Sandström, Madelene	SAM	3	1988	3	Sweden	Uppsala
129	Schlegelmilch, Bodo B.	SB	3	1988	3	UK	Wales
130	Seyed Mohamed, N.	SM	5	1985	5	Sweden	Uppsala
131	Sharma, D. Deo	SD	7	1985	9	Sweden	Uppsala
132	Shaw, Brian	SHB	4	1988	4	UK	Oxford
133	Simintrias, Antonis C.	SIA	6	1991	7	UK	Open Univ
134	Smith, Phil	SP	4	1986	5		
135	Snehota, Ivan	SI	7	1992	7	Sweden	Stockholm
136	Söderlund, Magnus	SOM	4	1988	4	Sweden	Stockholm
137	Solberg, Carl Arthur	SCA	4	1992	5	Norway	Oslo
138	Sollner, Albrecht	SOA	4	1995	4	Germany	Berlin
139	Spekman, Robert E.	SPE	3	1990	4	USA	Virginia
140	Spencer, Robert	SPR	8	1990	12	France	Lyon
141	Sutton-Brady Catherine	SBC	3	1996	3	Australia	UWS
142	Tahtinen, Jaana	TJ	4	1996	4	Finland	Oulu
143	Ten Pierick, Eric	TPE	3	1996	4	The Netherlands	Rotterdam
144	Tesar, George	TG	5	1984	5	USA	Wisconsin
145	Thomas, Michael J.	TM	3	1984	3	UK	Strathclyde
146	Thomas, Richard	TR	3	1992	3	UK	Bath
147	Tikkanen, Henrikki	TH	4	1996	5	Finland	Oulu
148	Tornroos, Jan-Ake	TJA	10	1988	10	Finland	Helsinki
149	Torvartn, Tim	TT	6	1994	6	Norway	Trondheim
150	Tunisini, Annalisa	TA	4	1992	4	Italy	Urbino
151	Turnbull, Peter W.	TP	11	1984	20	UK	ManchesterU
152	Tyler, Katherine	TK	3	1995	3	UK	Westmister
153	Ulaga, Wolfang	UW	3	1997	3	France	Lille
154	Uusitalo, Olavi	UO	5	1994	6	Finland	Jyvaskyla
155	Valla, Jean-Paul	VJP	5	1984	5	France	Lyon
156	van der Meer, Robert	VMR	3	1990	3	UK	Strathclyde

Name	Code	Total	First	Total	Country	Institution
157 Venetis, Karin A.	VK	3	1994	3	The Netherlands	Maastricht
158 Veres, Zoltan	VZ	3	1997	3	Hungary	Budapest
159 Walter, Achim	WA	4	1992	4	Germany	Karlsruhe
160 Waluszewski, Alexandra	WAA	4	1986	4	Sweden	Uppsala
161 Welch, Denice E.	WD	3	1991	3	Australia	Monash
162 Welch, Lawrence S.	WL	3	1991	5	Australia	Monash
163 Wensley, Robin	WR	3	1988	3	UK	Warrick
164 Wilke, Ricky	WIR	3	1993	4	Denmark	Copenhagen
165 Wilkinson, Ian F.	WI	9	1984	20	Australia	UNSW
166 Wilson, David T.	WDT	13	1984	17	USA	PennState
167 Wilson, Kevin	WK	7	1993	8	UK	Southampton
168 Yorke, David A.	YD	7	1984	7	UK	ManchesterU
169 Young, Louise C.	YL	8	1991	14	Australia	UTS
170 Zolkiewski, Judy M	ZJ	3	1995	3	UK	Manchester
171 Zollo, Giuseppe	ZG	3	1992	3	Italy	Napoli

Note: Country and affiliation is based on earliest conference paper