

# The Emergence and Diffusion of the Concept of Knowledge Work

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**Abstract:** The past decades have witnessed the proliferation of research on knowledge work. Knowledge work has mostly been used as an antonym to manual work, to refer to specific occupations characterized by an emphasis on specialized skills and the use of theoretical knowledge. The efforts to encompass all the different contexts where knowledge plays a relevant role in work tasks has resulted in various and ambiguous definitions of what knowledge work actually is.

In order to shed light on the elusive concept of knowledge work, we studied how it has appeared in the scientific discussion, and diffused from one scientific community to another. As the circulation of new ideas and concepts in scientific discussion is apparent through academic literature, we examined the emergence and diffusion of the concept of knowledge work through a citation analysis on articles from the Social Sciences Citation Index. The data set consists of 273 articles with 7,057 cited references for the 1974 to 2003 period, and we used a dense sub-network grouping algorithm on the co-citation network to distinguish highly cited groups of references.

We distinguish three periods of diffusion of the concept of knowledge work. The results show that Drucker's *In the age of discontinuity* (1969) and Bell's *The coming of post-industrial society* (1968) were the main influencers when the concept emerged in the scientific discussion from 1974 to 1992. After this period, we can distinguish a slow diffusion period from 1993 to 2003, when the concept started to gain attention, and a fast diffusion period from 1999 to 2003, when the research proliferated.

The discussion dispersed outside the management domain already in the emergence period, but the management domain has stayed the main domain of discussion also later on. However, from 1992 to 2003 the discussion inside the management domain dispersed into different groups. One of the main influences to a new group of research that appeared at this time was Zuboff's *In the age of the smart machine* (1984). This group, drawing on research conducted on knowledge-intensive firms, has recently produced highly cited articles such as Blackler's 'Knowledge, knowledge work and organizations' in *Organization Studies* (1995). As the current discussion on knowledge work is dispersed in different groups, there is a need to engage in a common conceptual discussion and define what is actually meant by knowledge work.

**Keywords:** scientific discourse, knowledge work, bibliometric analysis, citation analysis

## 1. Introduction

The past decades have witnessed proliferation of research on knowledge work, building on the belief that economic success of post-industrial societies increasingly depends on the ability to wisely use knowledge (Drucker 1994, Shariq 1997). A significant proportion of work in developed economies involves the activities of acquisition, processing, refining, packaging, and transfer of knowledge, activities that primarily constitute knowledge work (e.g. Davenport et al. 1996). Recently, knowledge workers have been referred to as the "most valuable asset" of modern organizations, and likened to the production equipment of modern organizations, given the difference that they own the means of production (Drucker 1999). With the perceived increasing importance of knowledge work, also knowledge-work productivity (Drucker 1969, 1999, Davenport et al. 2002) and managing knowledge work (Scarbrough 1999, Zack 2003, Pearce 2004) have gained substantial attention in academic journals.

Despite the clear significance of knowledge work to modern societies, there is consensus among academics that as even the concept of knowledge is ambiguous the same applies to knowledge work (Alvesson 2001, Pyöriä 2005). Knowledge work encompasses professions that have traditionally been referred to as professional work (accountancy, legal professions or scientific work) as well as the more contemporary types of work of consultancy, software development, or public relations (Newell et al. 2002). However, instead of classifying specific knowledge-work occupations, recent studies of knowledge work define it through different descriptive characteristics, such as processing of large amounts of information (Davenport et al. 1996), use of information and communication technologies (Blom et al. 2001), problem-solving capabilities (Tsoukas and Vladimirov 2001), non-routine work (Järvenpää and Eloranta 2001), increased autonomy over work (Robertson and Swan 2003), or collaboration (Kogan and Muller 2006). These characteristics often seem to

distinguish work that is “comparatively complex, analytic, and even abstract, because it makes use of tools that generate symbolic representations of physical phenomena” (Barley and Orr 1997: 5).

Based on the variety of existing definitions, it is clear that there is a lack of shared understanding on the essential nature of knowledge work. Going back in literature we often find that Peter F. Drucker has been referred to as the first who “coined the phrase” knowledge work (e.g., Kelloway and Barling 2000, Lindgren et al. 2003). After the concept was introduced in the late 1960’s, it was often used as synonym to white collar work and antonym to manual work (Mandt 1978), referring to specific occupations characterized by and emphasizing on specialized skills and the use of theoretical knowledge. However, as knowledge work denotes the changes in the nature of work which cut across existing occupational categories, it has later on been shown to be lacking in occupational identity (REF). As a result, knowledge work can not be defined based on occupational identity, and new bases of definition have to be found.

In this paper, we examine how the concept of knowledge work has come to be under increasing attention, as an attempt to narrow down the relevant body of knowledge. Finding the concept of knowledge work elusive and ambiguous, we aim to elaborate how it has appeared in scientific discussion, and diffused from one scientific community to another. The following we first describe our approach to the literature. Second we present the results of our analysis on the origins and the diffusion of the concept of knowledge work, discussed as presented. Finally we conclude our results and outline future research possibilities.

## **2. Methodology**

The circulation of new ideas and concepts in scientific discussion is apparent through academic literature, in other words publications in scholarly books and journals. Based on this notion, we have used citation analysis, a major bibliometric approach (Osareh 1996), to study the discussion that has evolved around the concept of knowledge work.

Bibliometric analysis is based on the idea that citations can be used as indicators of present and past activities of scientific work (Small 1973). Citations play an important role in the social system of science, as researchers follow the academic habit of crediting sources by citing references they used related to their research (Summers 1984). This principle is crystallized in the normative theory of citation which maintains that bibliographies are lists of “influences that authors cite in order to give credit where credit is due” (MacRoberts and MacRoberts 1989). Authors have various reasons for using citations, from support and acknowledgement to illustration<sup>1</sup>, but it is argued that only a relatively small percentage of citations are self-serving or frivolous (Summers 1984). So, citation analysis allows us to trace the path of ideas through the evidence and documentation left by the network of references and citations (Hoffman and Holbrook 1993).

Co-citation analysis, a particular form of citation analysis, uses these “paths of ideas” to represent the structure of scientific literature (Small and Griffith 1974). When two documents cite the same piece of literature, a document-to-document similarity measure called co-citation can be calculated to represent the association between these two documents. As every author could cite a vast number of sources from the totality of related literature, but includes only a small amount of crucial references<sup>2</sup>, it can be assumed that co-citing works share a common view on the scientific literature in question. The groupings of co-citing works can be called invisible colleges or scientific communities, in which authors interact and draw on each others’ works (Crane 1972). The scientific structure of a number of disciplines has already been mapped with co-citation analysis, either as a snapshot at a given point in time, or as the development over a specified time period (see White and Griffith 1982). However, to our knowledge, co-citation analysis has not been used to analyze the emergence and diffusion of scientific concepts.

### **2.1 Data**

Based on the bibliometric principle that knowledge of disciplines is concentrated in only a small proportion of important journals, we retrieved citation data from Social Sciences Citation Index (SSCI) of ISIWeb of Science. SSCI indexes 1750 journals over 50 social science disciplines, adding approximately 60,000 new cited references per week. We searched for all articles with the words “knowledge work\*”, “knowledge-intensive work\*”, “knowledge intensive work\*”, and “knowledge worker\*” published during the 1956 to 2003 period. The time-frame was chosen to start in 1956 to cover all early publications and to end in 2003 to allow

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<sup>1</sup> The Encyclopedia of Library and Information Science lists 15 specific reasons why authors cite the work of others ranging from giving credit for related work to identifying an eponymic concept or term (Weinstock 1971).

<sup>2</sup> The amount of crucial references included is estimated around 11 items in average for social sciences (Price 1980).

sufficient time for article citing. By restricting the search in the title, abstract, and keywords we ensured that the resulting articles intentionally discuss the concept of knowledge work, not just use it in passing. The search resulted in a data set of 281 articles, of which 8 were discarded, as they did not discuss knowledge work<sup>3</sup>. The final data set consisted of 273 articles with references to over 7,000 sources.

## 2.2 Methodology

In typical bibliometric analysis, the relationship between two sources is based on the co-occurrence of references within articles. It is assumed that if two articles are cited in the same paper, they are closely related to each other either because they belong to the same topic area or because their topic areas are closely connected (Small 1973, Garfield 1983). Although many co-citations may be quite unrelated in each individual article, a sufficiently large sample of cited articles enables one to attenuate random “noise” created by articles focusing on diverse topics.

The network, extracted through linking similar references, is called a co-citation network. Given that the 273 selected articles for analysis had over 7,000 cited references, it was impossible to include all of them in the analysis. As literature does not give a concise view on how to select a particular threshold level, we selected the citation frequency threshold by investigating citer-cited networks with different thresholds. After testing a series of networks, we analyzed only articles with at least 3 references to disregard e.g. book reviews and editorial pieces with a limited scope.

In our analysis, we constructed a co-citation network using the so called Jaccard index as a normalized co-citation strength measure (S) in order to emphasize proximate relations between similar references that are not cited as often as the most common references (Gmur 2003).

$$S = N_{AB} / (N_A + N_B - N_{AB}),$$

where  $N_{AB}$  = the number of common citations to articles A and B,

$N_A$  = the number of citations to A, and

$N_B$  = the number of citations to B.

A dense sub-network grouping algorithm, yielding a number of independent densely connected groups and a list of disconnected nodes (Schildt and Mattsson 2006), was used to distinguish highly cited groups of references. It is assumed that these groups represent the different intellectual bases that participate in the discussion evolving around the concept of knowledge work. The dense sub-network grouping analysis is implemented in the bibliometric software tool Sitkis (Schildt 2002) that was used to produce the co-citation network data. Other network analyses were conducted using Ucinet (Borgatti et al. 2002).

## 3. Results

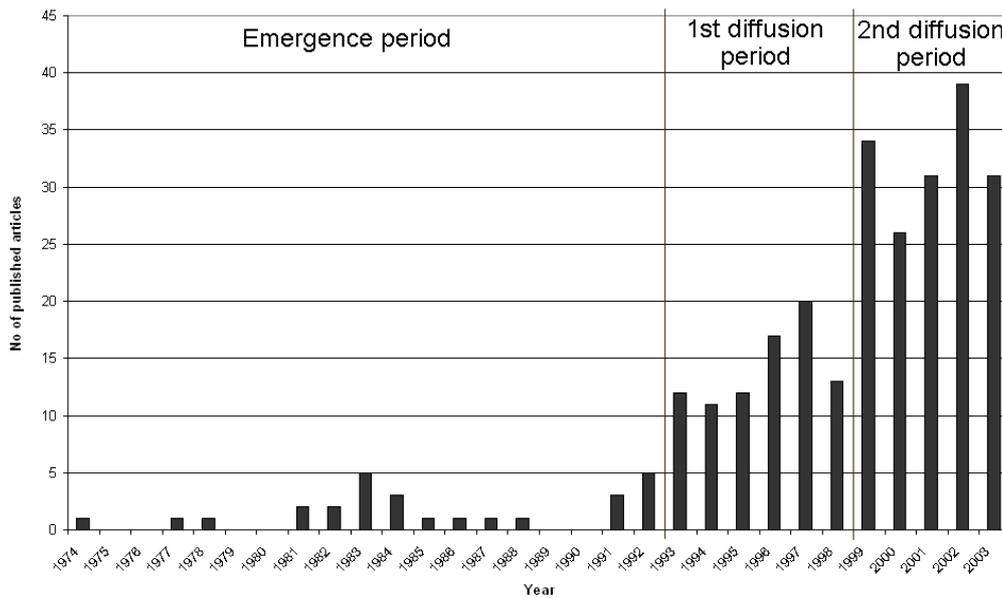
We found a total of 273 articles on knowledge work with 7,057 references for the time period 1974-2003. In the following the 273 articles discussing knowledge work are called ‘citing articles’ and their references are called ‘cited articles’. These groups are partly overlapping.

### 3.1 Periods of evolution

Figure 1 shows the distribution of the citing articles over the considered period. The 1974 to 2003 period can be divided into three main periods: the emergence period and two diffusion periods.

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<sup>3</sup> The 8 articles had the words “knowledge” and “work” in a row, but did not use them as an individual concept “knowledge work”. For example, one article discussed “job knowledge, work sample performance, and supervisory ratings” (Schmidt et al. 1986).



**Figure 1:** The yearly distribution of the citing articles over the 1974 to 2003 period.

At first, the appearance of citing articles is sporadic. Until 1992, no more than 5 articles were published per year, so we consider the concept of knowledge work entered the scientific discussion during the ‘Emergence period’ from 1974 to 1992. After the Emergence period, the concept of knowledge work started to gain more attention in various scientific communities. The 1993 to 2003 period can roughly be divided in the early diffusion period from 1993 to 1998 (‘1st diffusion period’), when no more than 20 articles on the concept of knowledge work were published annually, and the proliferation period from 1999 to 2003 (‘2nd diffusion period’).

### 3.2 Influential articles

The citing articles and how much they are cited reveal us what articles are the most influential in the discourse evolving around knowledge work. Of the 273 citing articles, only 133 have received 3 or more citations in SSCI. The articles received 8.6 citations in average, the median being only 2.0. We can therefore assume that only a limited number of citing articles have considerably affected the scientific discourse on knowledge work.

Table 1 presents the 20 most cited citing articles. The most influential article by far has been Blackler’s 1995 article on knowledge and knowledge work, one of the few articles to date that truly discusses the definition and meaning of knowledge work. Blackler is also the most influential author currently writing on knowledge work, with a total of 199 citations on his 2 articles (Blackler 1993, 1995). Another influential author is Alvesson, who has a total of 103 citations on his 3 articles on knowledge work (Alvesson 1993, 2000, 2001).

**Table 1:** The 20 most cited citing articles published during the 1974 to 2003 period.

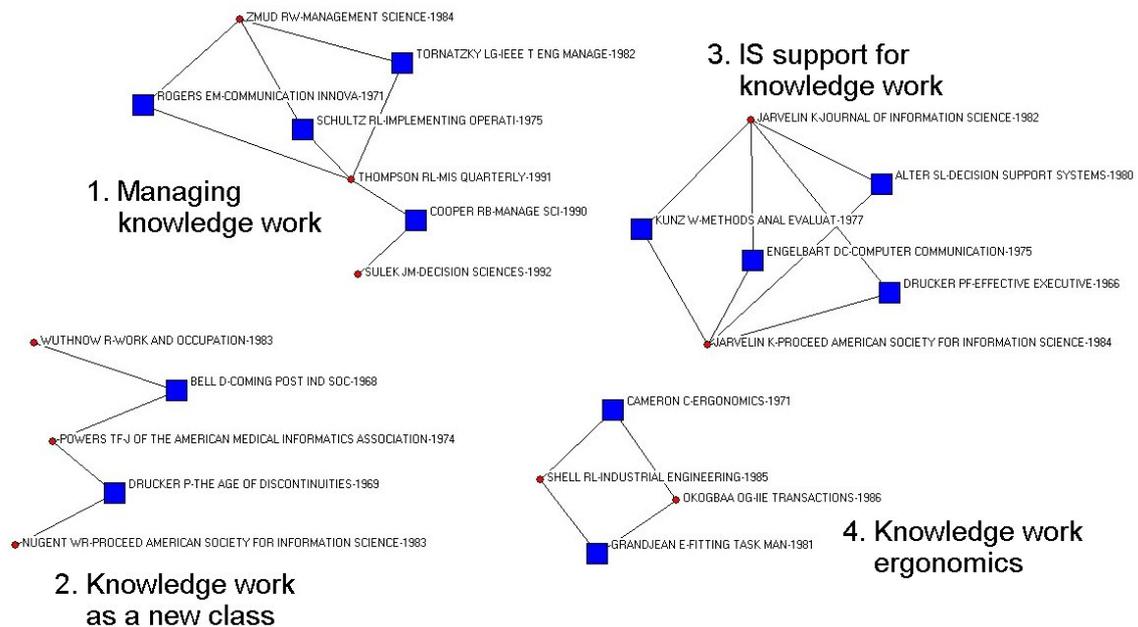
	1st author	Year	Journal	Article title	Times cited
1	Blackler	1995	Organization Studies	Knowledge, knowledge work and organizations: An overview and interpretation	162
2	Thompson	1991	MIS Quarterly	Personal computing: Toward a conceptual-model of utilization	128
3	Gefen	1997	MIS Quarterly	Gender differences in the perception and use of e-mail: An extension to the technology acceptance model	116
4	Zmud	1984	Management Science	An examination of push-pull theory applied to process innovation in knowledge work	108
5	Cook	1999	Organization Science	Bridging epistemologies: The generative dance between organizational knowledge and organizational knowing	100
6	Orlikowski	1994	Administrative Science Quarterly	Genre repertoire: The structuring of communicative practices in organizations	90

	1st author	Year	Journal	Article title	Times cited
7	Campion	1996	Personnel Psychology	Relations between work team characteristics and effectiveness: A replication and extension	88
8	Star	1996	Information Systems Research	Steps toward an ecology of infrastructure: Design and access for large information spaces	69
9	Straub	1994	Information Systems Research	The effect of culture on IT diffusion: E-mail and fax in Japan and the U.S.	66
10	Alvesson	1993	Journal of Management Studies	Organizations as rhetoric: Knowledge-intensive firms and the struggle with ambiguity	64
11	Warkentin	1997	Decision Sciences	Virtual teams versus face-to-face teams: An exploratory study of a Web-based conference system	55
12	Janz	1997	Personnel Psychology	Knowledge worker team effectiveness: The role of autonomy, interdependence, team development, and contextual support variables	46
13	Snell	1994	Academy of Management Journal	Strategic compensation for integrated manufacturing: The moderating effects of jobs and organizational inertia	45
14	Davenport	1996	Sloan Management Review	Improving knowledge work processes	44
15	Blackler	1993	Journal of Management Studies	Knowledge and the theory of organizations: Organizations as activity systems and the reframing of management	37
16	Knights	1993	Journal of Management Studies	Networking as knowledge work: A study of strategic interorganizational development in the financial services industry	34
17	Bernhardt	1995	Applied linguistics	Interpreting relationships between L1 and L2 reading: Consolidating the linguistic threshold and the linguistic interdependence hypotheses	34
18	Perlow	1998	Administrative Science Quarterly	Boundary control: The social ordering of work and family time in a high-tech corporation	34
19	Thelwall	2002	Journal of Documentation	Evidence for the existence of geographic trends in university Web site interlinking	29
20	Drucker	1999	California Management Review	Knowledge-worker productivity: The biggest challenge	25

The most highly cited citing articles are mainly published in recent years. Only 2 articles have been published before 1993 (Table 1): Thompson and Higgins (1991) on personal computing and Zmud (1984) on process innovations in knowledge work. Most of the highly cited citing articles have also been published in management journals. There are, however, some articles from other domains such as IS (8, 9), psychology (7, 12), linguistics (17), and information sciences (19). The discussion evolving around the concept of knowledge work has thus diffused outside the management community.

### 3.3 Origins of the concept of knowledge work

The concept of knowledge work emerged in the scientific community during the Emergence period of 1974 to 1992. Only 27 citing articles appeared during these years. The first citing article is Powers (1974) on paraprofessionals as knowledge workers. He draws on the earlier work of Drucker (1969) and Bell (1968), two books on the new post-modern society that seem to have laid the foundation for the development and further diffusion of the knowledge work concept. Powers's work was followed by more articles in the beginning of the 1980's that saw knowledge work as a new class, and studied e.g. structural and ideological convergence among various knowledge workers (Wuthonow and Shrum 1983). This group of articles is one of the 4 highly cited groups found using the dense sub-network grouping algorithm for this period, called the 'Knowledge work as a new class' (Figure 2).



**Figure 2:** The four highly cited groups over the 1974 to 1992 period with the corresponding citing articles. The cited references are marked with blue squares, and the citing articles with red dots.

After this early work, the most influential work on knowledge work was conducted by the highly cited ‘Managing knowledge work’ group in Figure 2. Researchers in this group were not that interested about the concept of knowledge work, but debated how to *improve* knowledge work. The citing articles of the late 1970’s dealt with the quality of working life, productivity of knowledge workers, and the management challenges of white collar workers. Later citing articles discussed various organizational, management, and educational issues.

Nevertheless, measured in numbers of publications, the discussion around knowledge work at this time was not the playground of management researchers, but that of computer scientists and human-computer interface researchers: almost half (13) of the citing articles in this period were published in IS journals. These researchers participated either in the ‘IS support for knowledge work’ group studying IT tools, or the ‘Knowledge work ergonomics’ group that studied knowledge work ergonomics. Except for a few references to Drucker, these groups were influenced by previous research in the IS domain.

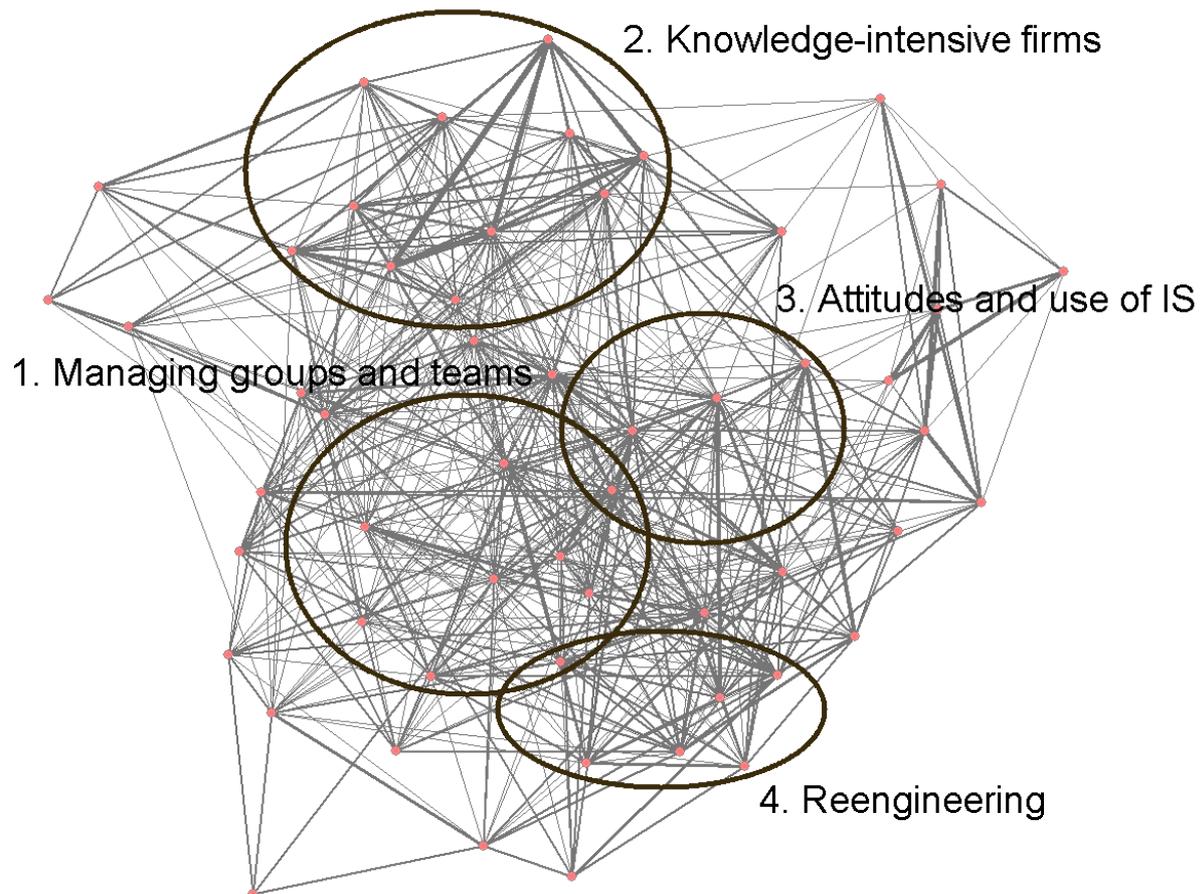
It seems that Drucker was indeed one of the main influencers in bringing the concept of knowledge work in the scientific discussion, even if different groups draw their inspiration on different articles (Drucker 1966, 1969). We should, however, also acknowledge the influence of Bell (1968). Measured by the amount of citations in this period, he was as influential as Drucker in opening the discussion. Still, neither Drucker nor Bell really defined the concept of knowledge work. It seems that Drucker used the term knowledge worker to “embrace all whose work requires a high degree of specialized training and education and a mental, rather than physical effort” (Mandt 1978), but a clear definition of the phrase was still lacking.

### 3.4 Diffusion of the concept of knowledge work

Even if the early discussion was dispersed in different domains, the management domain was clearly the originating domain of discussion on knowledge work. Therefore, it is no surprise that by 1993 it was the management domain that started a serious discourse and actually defined what was meant by knowledge work through a special issue on knowledge work published by the *Journal of Management Studies* in 1993 (see Blackler et al. 1993).

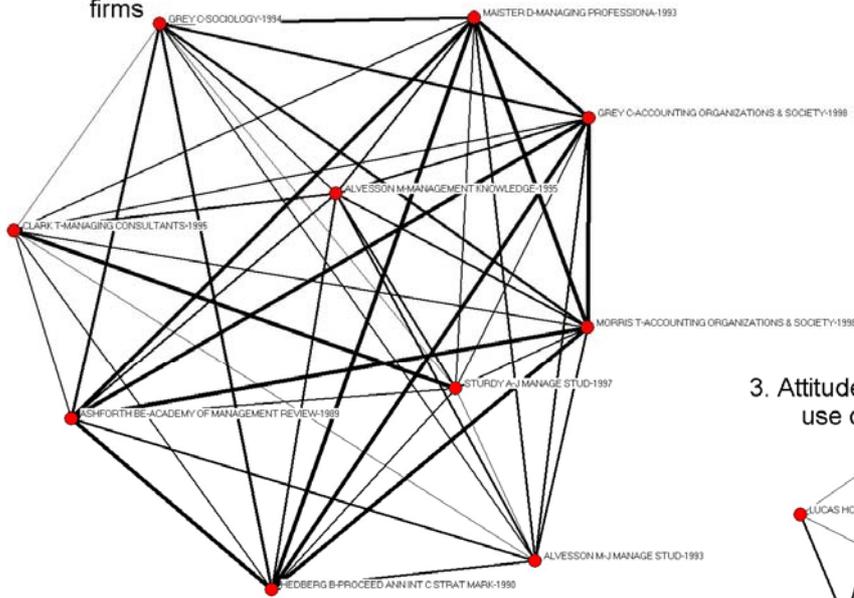
This research built mainly on the work of ‘Managing knowledge work’ group of the Emergence period (Figure 2). This group was much influenced by research on cooperation and group behavior from e.g. the psychology domain (Campion et al. 1993). This group, called ‘Managing groups and teams’, is one of the 14 highly cited groups found using the dense sub-network grouping algorithm for the whole 1974 to 2003 period. Due to severe space limitations, we present here only 4 of the 14 groups, outlined in the co-citation network in Figure 3, and presented in more detail in Figure 4. The 4 groups are from the management domain (groups 1 and 2) and in the IS domain (groups 3 and 4). The other 10 groups do show that the

concept of knowledge work has also sporadically diffused in other research domains such as nursing, library research, linguistics, operations research, sociology, economy, or even urban and regional studies, but that the research in these groups has not influenced other groups of research later on.

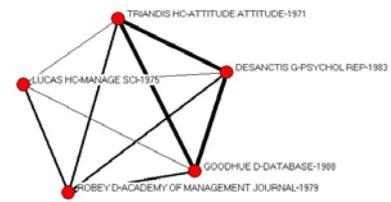


**Figure 3:** The four highly cited groups over the 1974 to 2003 period outlined in the co-citation network.

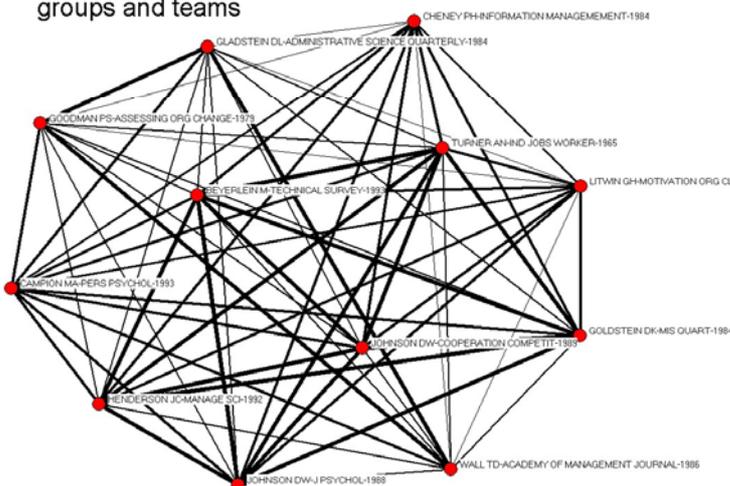
2. Knowledge-intensive firms



3. Attitudes and use of IS



1. Managing groups and teams

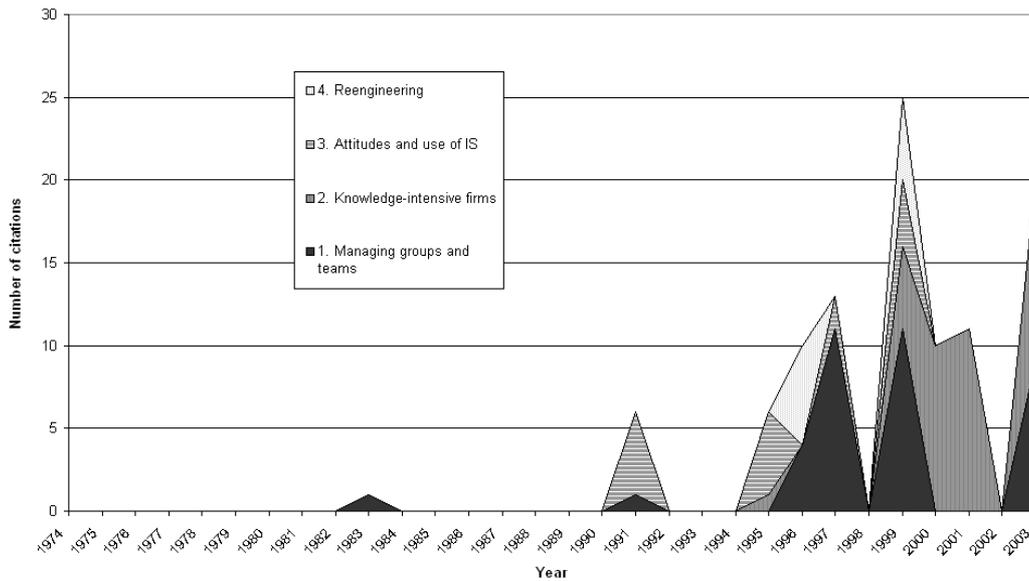


4. Reengineering



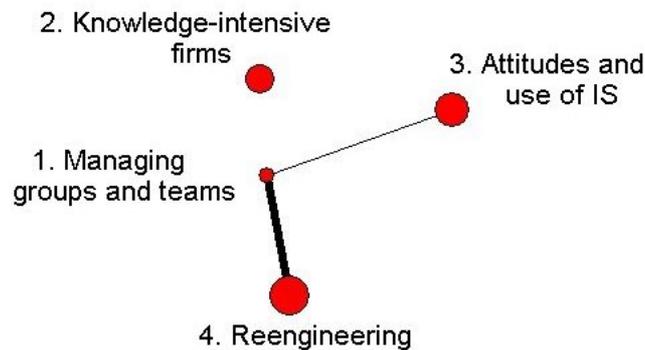
Figure 4: The four highly cited groups over the 1974 to 2003 period.

Like the 'Managing groups and teams' group, also the 'Attitudes and use of IS' group built mainly on previous work, continuing the work of 'IS support for knowledge work' group of the Emergence period. Besides research on user attitudes, the group was influenced by psychological theories explaining learning and use of IS. However, the 'Attitudes and use of IS' group started to decline after the outburst of research in the beginning of the Diffusion period as can be seen in Figure 5. The citing articles in this group (Figure 4) consist of cited articles that have been written in the 1970's and 1980's, suggesting that the outstanding research later on was done somewhere else.



**Figure 5:** The yearly citations of the 4 most cited groups over the 1974 to 2003 period.

In the 1st diffusion period of 1993 to 1998, also another group emerged in the IS domain: the ‘Reengineering’ group. This group was interested in improving the processes of knowledge work, and drew on the business process engineering approach (Hammer and Champy 1993, Davenport 1995). This group was highly influenced by research of the ‘Managing groups and teams’ group: the existing strong links between the different groups can be seen in Figure 6. The main influence on the concept of knowledge work for this group seems to be Drucker (1969).



**Figure 6:** Relationships between the 4 most cited groups over the 1974 to 2003 period. The size of the dot represents the amount of received citations by the group.

The ‘Reengineering’ group was quite influential during the 1st diffusion period, and received huge attention in the form of citations (Figure 6). However, the peak of the group was quite short-lived (Figure 5). In fact, the 2 groups in the IS domain have not received any citations since the beginning of the 21st century. According to our analysis, the original work on the concept of knowledge work, is conducted in the management domain, influencing later on other domains like IS and nursing.

At this period, the ‘Managing groups and teams’ group in the management domain started to decline as well. Even if the group still receives citations in recent years (Figure 5), it has not produced any new articles since 1993. However, the 1st diffusion period saw the emergence of a new group in the management domain, the ‘Knowledge-intensive firms’ group. In the 2nd diffusion period, this group is already the most influential group writing about knowledge work, and is the source of the proliferation of the research in recent years. Also the most influential citing articles like Blackler (1995) (Table 1) and authors such as Blackler and Alvesson are from this group. The influence of the ‘Knowledge-intensive firms’ group is evident when regarding the list of most cited articles (Table 2), as the only recent citing articles to have made the top 20 are from this group.

**Table 2:** The 20 most cited articles (excluding methodological sources). Articles that are also citing articles are highlighted.

	1 <sup>st</sup> author	Year	Journal	Book or article title	Times cited
1	Nonaka	1995		The knowledge-creating company: How Japanese companies create the dynamics of innovation	21
2	Nonaka	1994	Organization Science	A dynamic theory of organizational knowledge creation	16
3	Senge	1990		Fifth discipline: The art and practice of the learning organization	15
4	Zuboff	1984		In the age of the smart machine: The future of work and power	15
5	Bell	1968		The coming of post-industrial society: A venture in social forecasting	13
6	Lave	1991		Situated learning: Legitimate peripheral participation	12
7	Drucker	1969		The age of discontinuities: Guidelines to our changing society	12
8	Nonaka	1991	Harvard Business Review	The knowledge-creating company	11
9	Davenport	1998		Working knowledge: How organizations manage what they know	14
10	Brown	1991	Organization Science	Organizational learning and communities-of-practice: Toward a unified view of working, learning, and innovating	10
11	Stewart	1997		Intellectual capital: The new wealth of organizations	9
12	Kunda	1992		Engineering culture: Control and commitment a high-tech corporation	9
13	Mintzberg	1973		Nature of managerial work	9
14	Kogut	1992	Organization Science	Knowledge of the firm, combinative capabilities, and the replication of technology	8
15	Blackler	1995	Organization Studies	Knowledge, knowledge work and organizations: An overview and interpretation	8
16	Alvesson	1993	Journal of Management Studies	Organizations as rhetoric: Knowledge-intensive firms and the struggle with ambiguity	8
17	Prahalad	1990	Harvard Business Review	The core competence of the corporation	8
18	Levitt	1988	Annual Review of Sociology	Organizational learning	8
19	Drucker	1988	Harvard Business Review	Management and the world's work	8
20	Davenport	1998	Sloan Management Review	Two cheers for the virtual office	7

The 'Knowledge-intensive firms' group was not influenced by the work done by the group 'Managing groups and teams', but has drawn mainly on the early work of Bell (1968) and especially Zuboff's *In the age of the smart machine* (1984). Bell (1968) and Zuboff (1984) are also quite high on the most cited list, higher than Drucker (1969). So, while Drucker and Bell are early influencers on the discussion evolving around knowledge work, we should not underestimate the work of Zuboff who was an inspiration to later new streams of thought. If we look at Figure 7, we see that Zuboff (1984) was not 'discovered' in the scientific discussion before 1993, when the 'Knowledge-intensive firms' group started using his work. Nonaka, who is the most cited individual author (48 citations in total), was clearly not noticed at this time. He was recognized in the scientific discussion only after his *The knowledge-creating company* (1995), even if he had written on the topic in *Harvard Business Review* already in 1991. It seems that sources such as Nonaka and Takeuchi (1995) and Senge (1990) might be cited more as general sources.

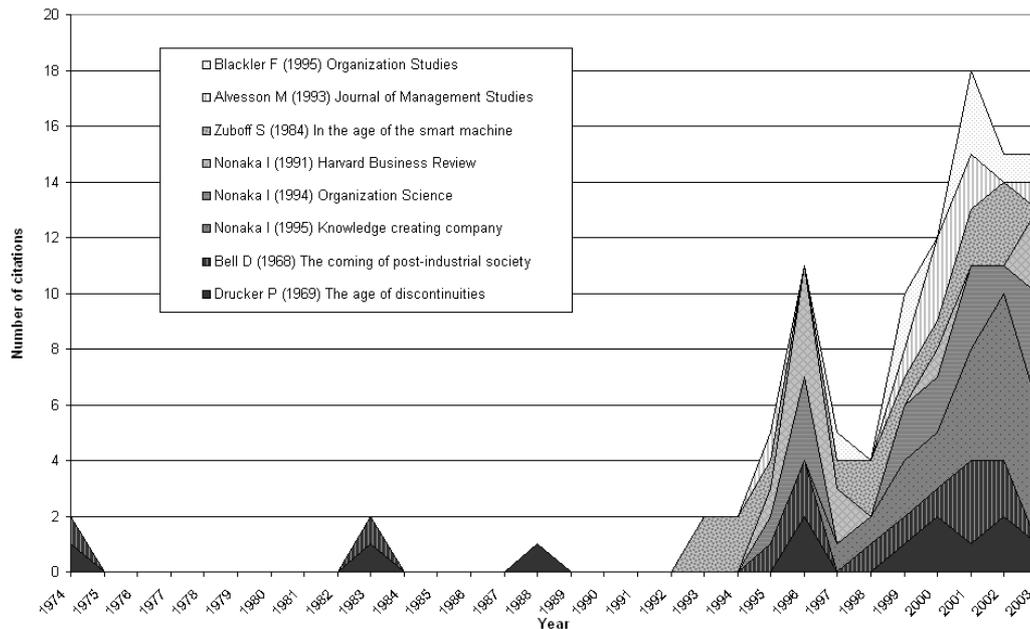


Figure 7: The yearly citations of the most cited references that are discussed in the text.

#### 4. Discussion and conclusions

It is evident that the current discussion around the concept of knowledge work is somewhat dispersed in different scientific domains. However, the main discussion takes place inside the management domain. This discussion is also divided into at least two main groups that focus more either on ways that knowledge work is performed and managed as teams and project groups, or on the actual implications and meaning of knowledge work in organizations. These groups do have some common cited articles like Nonaka and Takeuchi (1995), but they draw on somewhat different articles in their ideas on knowledge work *per se*. We feel that as the research area has matured in recent years and has witnessed proliferation of publications on the topic, there should be enough empirical material and insights to engage in a conceptual discourse.

This paper has contributed to current literature in two ways. First, we have narrowed down the relevant body of research on knowledge work in order to make the structure of the scientific discussion visible. We feel that there is a need to open a discussion between the different groups that have been identified in the analysis. This should be done in order to adopt a common definition of knowledge work and to gain a more profound understanding about the nature and meaning of knowledge work by combining the insights and results of different groups. As the scope of this paper has limited the discussion of the particular viewpoints on knowledge work adopted by different groups, future work should engage in more analytical work to show the similarities and differences between them. It is clear that the discussion on knowledge work is very much linked to the knowledge management domain, and we feel that the knowledge management community should be the starting point of this discussion. We hope that this paper could serve as a starting point to more conceptually-oriented discussions and more detailed research, e.g. content analysis, aiming toward a common definition of knowledge work.

Second, our analysis on the emergence and diffusion of the concept of knowledge work is a new way to use co-citation analysis to investigate how individual concepts are found and used in scientific discussion. We have shown that there are indeed various invisible colleges that influence how concepts emerge and diffuse in the scientific literature. Future work is needed to test the usability of this approach in different settings, and to combine this analysis with an analysis of the informal influences not shown in bibliographic analyses but affecting the adoption and diffusion of scientific concepts.

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