Knowledge sharing in online communities and its relevance to knowledge management in the e-business era

Christopher Lueg

Department of Information Systems, Faculty of Information Technology, University of Technology Sydney, PO Box 123, Broadway NSW 2007, Australia
E-mail: lueg@it.uts.edu.au

Abstract: Proliferation of network access in the age of the internet has enabled information and knowledge sharing to an extent that was beyond thought a few years ago. In this paper we discuss the impacts of two heavily intertwined trends that have emerged, especially during the past few years. On the one hand, an increasing number of business-to-customer relationships almost requires customers to be online savvy. On the other, the internet has enabled alternative information dissemination channels where information can be published bypassing traditional media control instances. Online communities have shown themselves to be social settings in which effective information and knowledge sharing can be observed. In this paper we illustrate some key aspects of the potential power of online communities and we argue that knowing about relevant online activities is becoming an increasingly important aspect of knowledge management in the e-business era.

Keywords: Online communities; information dissemination; information management; knowledge management; security management.

Reference to this paper should be made as follows: Lueg, C. (2003) 'Knowledge sharing in online communities and its relevance to knowledge management in the e-business era', *Int. J. Electronic Business*, Vol. 1, No. 2, pp.140-151.

Biographical notes: Dr. Christopher Lueg is a Senior Lecturer at the Faculty of Information Technology, University of Technology Sydney (Australia). He has a diploma in Computer Science from the University of Dortmund (Germany) and a doctoral degree from the Faculty of Science, University of Zurich (Switzerland). His interests are trans-disciplinary in the intersection of computer science, information science and cognitive science.

1 Introduction

Proliferation of computers and network access has enabled information and knowledge sharing activities to an extent that was beyond thought prior to the advent of the internet. Early witnesses of the looming revolution expected significant impacts on society. As Rheingold [1] put it in his famous book on virtual communities:

> "Because of the potential impact on so many people's beliefs and perceptions, the future of the Net is connected to the future of community, democracy, education, science, and intellectual life-some of the human institutions people hold most dear, whether or not they know or care about the future of computer technology."

From today's point of view it is interesting to note that business is not included in the list. The reason is probably, that in 1993, the already existing World Wide Web had yet to take off. In 1993, the most important online tools were email, ftp. and gopher which was a kind of ancestor to the web.

In these days, just a few years but almost an epoch later, the internet and especially the web are mainly viewed as enablers of business opportunities, such as conducting business electronically. Apart from enabling electronic business, the internet has established itself as a platform for network-based information sharing activities. In this context, two heavily intertwined trends suggest that the importance of information and knowledge sharing activities is increasing.

On the one hand, internet service providers, such as America Online (AOL) and CompuServe, are bringing more and more people online. The world wide web as an easy-to-use interface has enabled even casual users to make use of some of the internet's enormous resources. Along with the success of the web as a unifying interface, websites enabling business-to-customer relationships have become popular. Prospective customers need to be online savvy in order to interact with such websites. This means customers are also able to 'surf' the rest of the web and to access a variety of other online resources.

On the other hand, the internet has enabled alternative information dissemination and publication channels in the sense that people no longer rely on established publication channels, such as newspapers or books, to make information available to a broad audience. One impact of this information freedom is that more and more (potentially biased) information about companies, their products, their bright sides and their dark spots, are available online, waiting to be accessed by current and prospective customers.

In this paper we discuss the growing importance of information and knowledge sharing activities to electronic business and business in general. In particular, we outline that online communities play an important role in disseminating information and knowledge online. We argue that knowing about relevant activities is an important aspect of knowledge management in the e-business era.

We proceed as follows. First, we introduce online communities as social groupings. Secondly, we discuss the importance of online communities by outlining information dissemination and knowledge sharing activities in two online communities. Thirdly, we relate these observations to knowledge management in the e-commerce era and discuss some highly relevant areas that demand careful consideration from a knowledge management perspective. Finally, we summarise our findings and outline future research directions.

2 Online communities

Roughly, two different notions of online communities (also referred to as virtual communities) can be found in the literature. Rheingold [1] defines virtual communities as:

> "social aggregations that *emerge* from the Net when enough people carry those public discussions long enough, with sufficient human feeling, to form *webs of personal relationships* in cyberspace" (emphasis added).

He explains cyberspace as:

> "the name some people use for the conceptual space where words, human relationships, data, wealth, and power are manifested by people using CMC [computer-mediated communications] technology".

Sociology views sharing beliefs or a feeling of 'belonging together' as essential for viewing a social grouping as a community. Online social groupings have been found to be capable of forming communities in the sociological sense (e.g., [2]).

Along with the increasing commercialisation of the Net, a different and more business-oriented usage of the term community came up. Williams and Cothrel [3], for example, define an online community as groups of people engaging in many-to-many interactions and the motivation for the engagement is the shared interest in certain products. The idea behind such business-related online communities is to adapt businesses to the culture of the internet by providing consumers with the ability to interact with one another in addition to the company [4]. It is not required that members of such 'communities' share beliefs or a feeling of belonging together. Membership is more a matter of subscribing to a mailing list or 'signing in' to a website than being accepted by other community members. Contrary to real communities, business communities can be 'created' and 'owned' by companies because it is a matter of providing appropriate infrastructures, such as websites, where consumers may interact. Whether real communities emerge out of the interactions around such websites, however, is beyond corporate spheres of influence.

Apart from these two poles within the community spectrum, a variety of other types of communities are described in the literature. Armstrong and Hagel III [4], for example, distinguish communities of transaction, communities of interest, communities of fantasy, and communities of relationship. They go on to outline that these four sorts of community are not mutually exclusive and argue that community builders would miss business opportunities if they do not cover all of them. Carotenuto *et al*. [5] distinguish communities of interest, communities of practice, communities of purpose, and communities of passion.

Business communities or 'communities of commerce' [6] are widely considered as a business opportunity as they are expected to be a key element in gaining and sustaining customer loyalty in the age of the internet [4,6]. Typical examples of such online communities are the social interactions that occur in the context of the virtual bookstore Amazon [7] and the virtual market place eBay [8]. Amazon encourage their prospective customers to provide ratings for books and to write reviews. If customers select a book for closer inspection they are provided with information about which other books were bought by customers who bought this particular book already. eBay informs prospective buyers about sellers by listing feedback provided by persons who have already bought from the respective sellers. Creating a sense of 'stickiness' is considered a way to cope with 'empowered fruit flies', which is a term used to denote "low-attention-span creatures with big wallets [...] move swiftly from one sweet fruit to the next in search of the best pricing, highest convenience, and quickest satisfaction" [9].

In this paper, we are especially interested in online communities as social groupings in which information is disseminated at the speed of light. Communities may be

business-friendly which means that information disseminated convey, a rather positive image of companies and their products, but information may also be detrimental when contributing to creating a negative (or more realistic) image. Almost classical examples for the latter are the websites maintained by the Living Wages project [10] and by the McSpotlight community [11]. The former illustrates a particular understanding of a multi-national sports equipment giant while McSpotlight informs about the practices of a globally operating fast food company.

3 Information and knowledge sharing in online communities

In what follows, we discuss two particular online communities that are situated in the global conferencing system Usenet news. Usenet-based online communities have frequently been described in the literature [2,12]. Such online communities are virtual communities in the sense of Rheingold [1] and as such distinct from artificially created business communities. Members of Usenet-based online communities typically share certain attitudes, such as expecting posters to behave according to the Usenet 'netiquette' and its rules of good conduct. Moreover, community members often maintain shared artifacts, such as lists of answers to Frequently Asked Questions (FAQ) or websites which are used as central repositories for information relevant to the communities. Information artifacts created by online communities are important when considering the scope of even small online communities (see below).

Usenet is a text-based conferencing system that is used by tens of thousands of users every day who contribute hundreds of thousands of messages *per day*. As in the case of the web, collecting precise data is difficult as most user interactions with Usenet remain invisible; messages posted to newsgroups are 'visible' but the much more frequent activity of reading messages remains invisible [13]. Traditionally, passive participation or 'lurking' was assumed to be less valuable than active participation but a recent study of lurking behaviour in mailing-lists suggests that lurking is a frequent and important part of online communication [14]. Lurking can even be understood as a kind of 'legitimate peripheral participation' in online communities [15]. Legitimate peripheral participation is one of the constituents of communities of practice which have been shown to be places of effective learning and knowledge sharing [16].

In the context of this paper, online communities are important for several reasons. First, online communities are social groupings in which information may be disseminated at the speed of light. Second, communities are settings in which not only information is disseminated but in which effective knowledge sharing may happen. There is some evidence suggesting that knowledge sharing benefits from a sense of 'belonging together', as people appear to be more willing to spend their valuable time to inform others [17]. Members of online communities do not only get to know new information but they also learn about how and where to find further information and how to make use of this information. In a business context, this means that members may acquire in-depth knowledge about companies, their products, and their business practices. Last but not least, members of online communities who have benefited from their communities often feed back information into the communities after having applied their new knowledge to real world situations.

In what follows we discuss two particular examples which nicely illustrate these important aspects of online communities.

3.1 A virtual fast food community

The topic of the first community to be discussed is 'fast food', which is a generic name for food like hamburgers, French fries, pizzas and sandwiches. Although not directly relevant to e-business, the community is well-suited to illustrate information and knowledge sharing activities in online communities as well as the feedback loop in which community members feed back (real world) experiences to the community.

Members of the fast food community discuss their personal experiences with fast food restaurants. Typical examples for information being shared quality of food consumed and service enjoyed in particular restaurants (e.g., food temperature, speed of service, friendliness of employees, responsiveness to questions and critiques) as well as regional differences in what restaurants operated by the same fast food company offer. In general, community members are fast food friendly (in fact this is a so-called fan newsgroup) but this does not prevent members from reporting most embarrassing observations as well. For example, one newsgroup member reported how he or she observed the (strictly forbidden) re-use of food products that were returned by an unsatisfied customer.

Internal quality control systems used by certain fast food companies are a frequent topic. Fast food companies in general seem to face the problem that their freshly made products should be consumed within short periods of time to ensure product quality. Depending on the actual product, products may be stored in the warmer for a few minutes but, after this time, products should be discarded according to internal quality standards. One of the most popular burger companies uses a number-based indicator system to identify until when products may be kept in the warmer. Details of the quality control systems and the meaning of the indicators used are not communicated to customers. Customers ultimately have to trust the companies that only freshly made food is served and that overdue food is indeed discarded. Some members of the newsgroup community knew about the quality control systems used and shared this knowledge with other community members. Now most of the newsgroup members are able to assess how fresh products really are when they are served. According to observations reported in the newsgroup, overdue food products were not always discarded as demanded by internal company policies. Contrary to this it seems that quite often indicators are manipulated in order to pretend a later production time. As a result, food served may not be as fresh as demanded by company policies. Some restaurants seem to avoid using the indicator system at all, which means that it is impossible even for employees to assess the freshness of products they serve to customers. Incidents reported in the newsgroup were mostly observed in Germany but similar incidents were observed in Australia as well.

Discussions in the newsgroup suggest that people not only 'consume' the information that there seems to be some flaw with the quality control system but also people reportedly used the information to find out whether it happens in their local restaurant as well. Moreover, they often feed their observations back to the newsgroup. Also, the importance of the 'quality problem' discussed should not be underestimated, as discussion statements indicate that some of the newsgroup members understand the quality problem in such a way that they question the company's attitude towards its own

quality standards in general. This is important as the company serves their products to a significant part of the population that is most active in online communities.

Through their online interactions, newsgroup members create information artifacts that are to stay. Knowledge about the quality control system, how it is intended to be used and how it may be abused, has become part of the community's 'organisational memory' and is described in the newsgroup's FAQ. The newsgroup's FAQ is available on a website that is maintained by some of the newsgroup members. New participants in the newsgroup are pointed towards the website when information related to topics covered by the FAQ are being requested.

3.2 A virtual bodyart community

The second example is a community of consumers who share an interest in 'bodyart' topics, ranging from the design of tattoos to determining appropriate jewellery for particular piercings and to taking care of fresh piercings. The online community is directly relevant to e-business as more and more manufacturers of bodyart jewellery offer their products online. Moreover, the community can be used to illustrate how members of online communities may disseminate targeted information to business websites with the effect that the respective businesses may be disrupted.

Community members share information about bodyart (different jewellery types, prices for getting bodyart, etc.) as well as personal experiences with bodyart studios and their particular bodyart practices. Newsgroup members may learn how to assess the quality of studios and their work. Good studios are being recommended, whereas other studios are discussed rather critically. Members have developed a particular 'derb attitude' (derb is both an acronym describing the newsgroup's name and a German language pun); knowing about specific aspects of the newsgroup's development appears to be an important aspect of being a 'full' member of the newsgroup. An example is knowing the anecdote that pierced and inked persons were discriminated against as being 'sozialethisch desorientiert' (disoriented in terms of social ethics) by German government representatives. A similar notion of belonging together can be observed in the American bodyart newsgroup 'rab' (again an acronym based on the newsgroup's name) where full members call themselves 'rabbits'.

The bodyart newsgroup generates information artifacts and, although founded only a couple of years ago, the community has already become a widely recognised bodyart information resource on the internet. Information about bodyart experiences, recommended bodyart studios and manufacturers of jewellery, and the nature of bio-tattoos, have become part of the community's 'organisational memory'. Community members have set up a website and new participants in the newsgroup are referred to the website when information related to topics covered by the website are being requested.

Bodyart is typically associated with customers visiting studios where they get their bodyart done. However, there is also a trend for people with an interest in bodyart to start exploring their bodyart interests by collecting information online prior to visiting bodyart studios. Moreover, a number of manufacturers of bodyart jewellery have set up websites and have started to sell directly to customers. As these companies require their customers to be online savvy (which means that these customers are able to access other resources as well), sharing experiences with particular jewellery in online communities can be expected to have direct impacts on sales.

Another relevant aspect is the treatment of so-called bio-tattoos by newsgroup members. Bio-tattoos are body modifications similar to tattoos except that bio-tattoos are advertised as being only temporary modifications; regular tattoos are known to be permanent modifications. The whole bio-tattoo business is based on the claim that bio-tattoos would disappear after a few years. Discussions in the newsgroup, however, suggest that bio-tattoos rarely hold to what is being promised as they may not disappear completely. Based on information provided by community members who are involved in medical research, newsgroup members may learn about the biological characteristics of the human skin and why these characteristics often contradict what is claimed by bio-tattoo studios.

In the context of this paper, the interesting thing about bio-tattoos is that newsgroup members contribute their knowledge about bio-tattoos to websites set up by bio-tattoo studios. For example, newsgroup members reportedly engaged in online discussion forums set up by bio-tattoo studios to advertise their services. Given the growing interest in interactive e-business websites, where customers are encouraged to exchange information to the benefit of the business, such specific forms of well targeted information dissemination could be disturbing.

3.3 The scope of online communities

Information artifacts created by online communities, such as newsgroup discussions or FAQs, can easily be found when using regular search engines, such as Google [18]. Such search engines preserve information for years and have empowered even casual users to find information that was published somewhere on the internet. Using such tools, users have access to billions of web pages and messages that were published in the global conferencing system Usenet news over the past few years.

Community members may also use other online communication channels, such as email, mailing lists, chats, instant messengers and other newsgroups, to disseminate information they received in a community. Furthermore, members of online communities are real persons who meet family members at home, friends at the movies and colleagues at the workplace, which means that rumours can be expected to be disseminated in the real world as well.

Dissemination of rumours and false accusations in online communities can threaten companies [19]. An almost classical example is the designer Tommy Hilfiger being the victim of a threatening urban legend [20]. The legend was circulated mainly in Usenet newsgroups and states that Hilfiger appeared on the Oprah Winfrey Show and made racist comments about several groups, after which he was tossed off the set by Winfrey. In fact, Hilfiger never appeared on or taped an episode of Winfrey's show but the legend spread so rapidly and generated so much controversy among customers and potential customers that the company was forced to respond on the net.

There are many other examples of potentially threatening activities, such as hoaxes or 'joe jobs' [21]. Hoaxes are false email messages whose only purpose is to spread to as many people as possible, promising gifts from companies if they forward the letter to a number of people. A joe job denotes spam sent under the name of another person's domain, or web pages. The effect is that lots of people complain to the Internet Service Provider (ISP) hosting the domain or the web page advertised in the spam, as they mistakenly assume they know the source of the spam.

To sum up, the scope of information disseminated in online communities exceeds the particular communities and their virtual habitats by far; communities and their respective websites have the potential to become widely recognised information resources on the internet and it is reasonable to assume that customers of related businesses will retrieve (potentially biased) information from these information sources.

4 Issues for knowledge management in the e-business era

In what follows we outline a few areas that demand careful consideration from a knowledge management point of view. The term knowledge management is used to describe "any process or practice of creating, acquiring, capturing, sharing, and using knowledge, wherever it resides, to enhance learning and performance in organisations" [22]. Typically, knowledge management focuses on 'managing' what companies know. This perspective was nicely described by Hewlett-Packard CEO Lew Platt echoing a former head of HP Labs: "If HP knew what HP knows, we would be three times as profitable" [23]. In fact, Davenport and Prusak [23] state the perspective even in the title of their popular book '*Working Knowledge: How Organizations Manage What They Know'*.

Apart from 'managing' what companies *do* know, companies need to understand what they *should* know in the age of the internet. In a sense, this exceeds what is traditionally considered as knowledge management. We feel, however, that managing intellectual and technical resources in such a way that corporate awareness of online activities is enhanced qualifies as a knowledge management topic.

4.1 Recognising the soft power of online communities

As already outlined above, it is likely that online savvy customers harvest online resources for information about their prospective business partners. Moreover, they may become members of online communities, which means that they have more direct access to information and knowledge shared in online communities. Companies should be aware of these developments and they should consider business-friendly online communities as opportunities rather than as challenges [24]. So far, many companies focus on setting up websites to create and nurture their own business 'communities' but have not yet realised the potential of *existing* online communities. Communication with these communities may be beneficial in terms of gaining new customers and protecting the business (as community members may step in to clarify false accusations).

Some ways to support communication with such communities have been outlined in [24]. In the case of a community similar to the fast food company described in this paper, the communication goal would be to prevent (further) deterioration of the fast food company's reputation and to improve that reputation through transparency. The communication strategy should be based on interaction with community members and the provision of appropriate feedback. The overall 'message' would be that, despite bad experiences, the company still is a trustworthy company offering quality products; the company does not try to hide grievances and will investigate and resolve incidents as soon as possible after they are reported.

Quite the opposite of this strategy could be observed in the bodyart newsgroup a few months ago. An employee of a well-known bodyart jewellery vendor selling jewellery online contributed to ongoing discussions about the quality of the company's products and services. Roughly, the employee claimed (using an email address of the company's internet domain) that the experiences reported by some newsgroup members were basically wrong. Publishing transaction details without permission, he in fact supported those community members already questioning the company as a reliable business partner. Moreover, like all other information posted to the newsgroup, the employee's statements have become part of the information artifacts created by the newsgroup. The employee could not do worse.

The incident is a nice example of the claim that maintaining additional communication channels, such as channels for communication with online communities, involves certain risks. As outlined in [24] appropriate communication requires considerable expertise (domain knowledge, legal knowledge, PR knowledge, etc.) and still communication may fail if the company's reaction to incidents does not meet what is expected. A recent example of a lack of communication (and a wrong situation assessment) is one of the world's largest media corporations, AOL Time Warner, being forced to back pedal when confronted by online communities. AOL Time Warner is the parent company of Warner Bros., which is shooting the hyped Harry Potter film. According to Riley [25], the company tried to shut down Harry Potter fan websites when launching its own Harry Potter promotional website. However, one of the youngsters has teamed with other Harry Potter website creators in Britain to form the 'Defense Against the Dark Arts' project, which is threatening a world-wide merchandise boycott. AOL Time Warner has issued a contrite statement, admitting that it may have been over-zealous with its letters and offered to talk to Harry Potter fans about their sites [25].

Last but not least, new communication channels introduce security risks as such channels may be abused to bring malicious code, such as viruses, into corporate networks. Moreover, communication channels can be abused for launching information-level denial-of-service attacks (see [21] for examples). Sending faked inquiries to service accounts (e.g., feedback channels for online communities) to eat up corporate resources would be an example of such an attack.

4.2 Managing what we should know but do not know (yet)

Specific internet surveillance tools, such as IntelliSeek [26], CyberAlert [27] and eWatch [28] have been developed to find out what is 'being said about [a] company and its products', and to provide 'a way to identify potentially damaging rumours' [29] and some companies are already monitoring ongoing discussions.

However, allocating specific resources for surveillance activities may be a problem, especially for small and medium enterprises. Warren and Hutchinson [30] report that even allocating resources required for undertaking (basic) security reviews may be a problem for small and medium enterprises, monitoring online activities would demand further resources. Similarly, hiring external specialists for monitoring internet activities may only be an option for large companies. Batten [31] expects that outsourcing security to professional businesses will become common but financial and other resources still have to be allocated.

Moreover, the strengths and weaknesses of surveillance tools are largely unknown and there is some evidence that technology is limited *in principle* when applied to

information management and knowledge management tasks. Furthermore, specific characteristics of online dissemination channels may even prevent the very application of technology [21]. Ebbinghouse [32] discusses ways to handle threatening situations once they have been recognised but ways to limit damage are rather limited as it is not possible to completely 'remove' information once the information was spread.

The problems involved in getting to know what is happening online suggests we need to explore ways beyond the application of search technology. Internet 'surveillance' activities should be incorporated into existing business processes in order to generally increase corporate awareness of online activities.

5 Conclusions and future research directions

In this paper, we have argued that information dissemination and knowledge sharing in online communities is becoming increasingly important to companies conducting business electronically. We have described two online communities where such activities can be observed and we discussed the scope and the relevance of these activities to companies.

The soft power of online communities should not be underestimated. The discussion in this paper highlights the fact that online savvy consumers (and B2C partners are online savvy *by definition*) may retrieve information about their business partners from information sources that are not necessarily business-friendly. The fast food example, although not directly related to e-business, suggests that even business-friendly online communities may share knowledge companies would probably prefer not to be shared in public. Moreover, the discussion of the bio-tattoo example clearly shows that members of online communities may bring (potentially biased) information to consumers. As a consequence, (prospective) customers may be confronted by specific information about their business partners even without having searched for such information.

Clearly, companies need to be aware of relevant online activities. Increasing corporate awareness of online activities qualifies as a knowledge management topic. In the age of the internet, knowledge management is not limited to managing what companies know but is increasingly required to include what companies need to know (but do not know yet).

Future research topics should be in particular investigations of the strengths and limitations of internet surveillance tools and the incorporation of processes that increase corporate awareness of online activities into existing business processes. Last but not least, we are interested in the extent to which corporate 'cybersleuthing' [33] may violate privacy and freedom of speech.

References and Notes

1 Rheingold, H. (1993) *The Virtual Community: Finding Connection in a Computerized World,* Addison Wesley Longman, Inc. Citations from the Minerva Paperback published by Mandarin Paperbacks in 1995.

2 Wellman, B. and Gulia, M. (1999) 'Virtual communities as communities', in M.A. Smith and P. Kollock (Eds.), *Communities in Cyberspace,* Routledge, London, pp.167–194.

3 Williams, R.L. and Cothrel, J. (2000) 'Four smart ways to run online communities', *Sloan Management Review*, Vol. 41, No. 4, pp.81–91.

4 Armstrong, A. and Hagel III, J (1996) 'The real value of on-line communities', *Harvard Business Review*, May-June, pp.134–141.

5 Carotenuto, L., Etienne, W., Fontaine, M., Friedman, J., Newberg, H., Muller, M., Simpson, M., Slusher, J. and Stevenson, K. (1999) 'CommunitySpace: toward flexible support for voluntary knowledge communities', in *Proceedings of the Workshop 'Changing Places'*, London.

6 Bressler, S. and Grantham, C.E. (2000) *Communities of Commerce: Building Internet Business Communities to Accelerate Growth, Minimize Risk, and Increase Customer Loyalty*. McGraw-Hill.

7 URL http://www.amazon.com

8 URL http://www.ebay.com

9 Colony, G.F. (2000) 'My view: empowered fruit flies', *Forrester Research*, June, p.2.

10 URL http://www.nikewages.org

11 URL http://www.mcspotlight.org

12 Roberts, T.L. (1998) 'Are newsgroups virtual communities?', in *Proceedings of the Annual ACM SIGCHI Conference on Human Factors in Computing Systems (CHI'98)*, ACM Press, Los Angeles, CA, pp.360–367.

13 Lueg, C. (2000) 'Supporting social navigation in Usenet newsgroups', in *Proceedings of the Workshop 'Social Navigation-A Design Approach?'* at the *Annual ACM SIGCHI Conference on Computer-Human Interaction* (CHI 2000), The Hague, The Netherlands. Paper available at URL http://www-staff.it.uts.edu.au/~lueg/research/.

14 Nonnecke, B. and Preece, J. (2000) 'Lurker demographics: counting the silent', in *Proceedings of the Annual ACM SIGCHI Conference on Human Factors in Computing Systems (CHI 2000)*, ACM Press, The Hague, The Netherlands, pp.73–80.

15 Lueg, C. (2000) 'Where is the action in virtual communities of practice?', Presentation at the *Workshop Communication and Cooperation in Knowledge Communities,* at the German Computer-Supported Cooperative Work Conference (D-CSCW), Munich, Germany. Paper available at URL http://www-staff.it.uts.edu.au/~lueg/research/.

16 Wenger, E. (1998) *Communities of Practice: Learning, Meaning, and Identity,* Cambridge University Press, Cambridge, UK, First Paperback Edition 1999.

17 For a discussion of related issues in the context of distance learning see: Haythornthwaite, C., Kazmer, M.M., Robins, J. and Shoemaker, S. (2000) 'Community development among distance learners: temporal and technological dimensions', *Journal of Computer-Mediated* Communication, Vol. 6, No. 1.

18 URL http://www.google.com

19 Denning, D. (1998) *Information Warfare and Security,* Addison-Wesley.

20 Ulfelder, S. (1997) 'Lies, damn lies and the internet', *Computerworld*, article available at URL http://www.computerworld.com/cwi/story/0,1199,NAV47_STO6800,00.html (last visit 18/7/2001)

21 Lueg, C. (2001) 'Towards a framework for analyzing information-level online activities', *Proceedings of the 2nd Australian Information Warfare and Security Conference,* November 2001, Perth, WA.

22 Swan, J., Scarbrough, H. and Preston, J. (1999) 'Knowledge management – the next fad to forget people?', *Proceedings of the 7th European Conference on Information Systems (ECIS'99)*, Copenhagen, Denmark, pp.668–678.

23 Cited in: Davenport, T. and Prusak, L. (1998) *Working Knowledge: How Organizations Manage What They Know*, Harvard Business School Press. Paperback version published in 2000, page xxi.

24 Lueg, C. (2001) 'Virtual communities as challenges to real companies', in *Proceedings of the Pacific Asia Conference on Information Systems (PACIS 2001)*, Seoul.

25 Riley, M. (2001) 'Harry Potter magics a fortune from the marketing wizards', *Sydney Morning Herald*, 24 February, p.3.

26 URL http://www.intelliseek.com

27 URL http://www.cyberalert.com

28 URL http://www.ewatch.com

29 Manktelow, N. (2001) 'Net chatter is a data goldmine', *IT News from The Age and the Sydney Morning Herald.* Article available at URL http://www.it.fairfax.com.au/e-commerce/20010227/A25453-2001Feb27.html (last visit 18/7/2001)

30 Warren, M. and Hutchinson W. (2000) 'On-line attacks against small and medium sized enterprises', in *Proceedings of the 1st Australian Information Security Management Workshop,* Proceedings available at URL http://www.cm.deakin.edu.au/mwarren/secman/ (last visit 18/7/2001)

31 Batten, L.M. (2000) 'Security for future computing environments', in *Proceedings of the 1st Australian Information Security Management Workshop.* Proceedings available at URL http://www.cm.deakin.edu.au/mwarren/secman/ (last visit 18/7/2001).

32 Ebbinghouse, C. (2001) 'You have been misinformed-now what?: attacking dangerous data', *Searcher*, Vol. 9, No. 4.

33 Kumar, A. (2001) 'Concern about new web monitors', *Wired,* article available at URL http://www.wired.com/news/business/0,1367,41931,00.html (last visit 18/7/2001).