---

## Online Communities: Focusing on sociability and usability

**Jenny Preece & Diane Maloney-Krichmar**

University of Maryland, Baltimore County

1000 Hilltop Circle, Baltimore, MD 21250

preece@umbc.edu, dkrichmar@erols.com

## *1      Background*

Millions of people meet online to chat, to find like-minded people, to debate topical issues, to play games, to give or ask for information, to find support, to shop, or just to hang-out with others. They go to chat-rooms, bulletin boards, join discussion groups or they create their group using instant messaging software. Short messaging (also known as 'texting') is also gaining popularity in some parts of the world.

These online social gatherings are known by a variety of names including 'online community', a name coined by early pioneers like Howard Rheingold, who describes these online communities as 'cultural aggregations that emerge when enough people bump into each other often enough in cyberspace' (Rheingold, 1994, p. 57).

### 1.1  The scope of this chapter

There is no accepted definition of online community. The term means different things to different people (Preece, 2000) so this chapter starts by examining definitions and descriptions of online community from different disciplines, and briefly traces how the topic has emerged. Section 2 outlines research from social psychology, sociology, communications studies, computer-supported cooperative work (CSCW) and human-computer interaction (HCI) that informs our understanding of why people interact they way they do in online communities. Section 3 brings many of these ideas together in the context of design and evaluation of online communities, outlines a design methodology and proposes a frame work for supporting social interaction (i.e., sociability) and designing usability. Section 4 returns to research and briefly reviews

key techniques that are being used to research online communities and discusses the challenges of doing online communities research. Section 5 provides a brief summary of the chapter and proposes two agendas; one for practitioners wanting to create successful new online communities; the other for researchers looking to break new ground.

Our aim in writing this chapter is to promote better understanding of social interaction online and how this contributes to developing better sociability and usability and to promote research in this new field. Throughout we address the following questions. How do people interact in online communities? What is a successful online community? How can we improve sociability and usability for the millions of people participating in online communities? This chapter therefore focuses on Web-based online communities supported by text and graphical user interfaces, though much of the discussion is also relevant to 3-D computer virtual environments (CVEs), the topic of Chapter x.

**1.2    What is an Online Community?**

In 1996 a multidisciplinary group of academics held a workshop at which they identified the following core characteristics of online communities (Whittaker, Issacs, & O'Day, 1997, p. 137):

- Members have a shared goal, interest, need, or activity that provides the primary reason for belonging to the community.

- Members engage in repeated, active participation and there are often intense interactions, strong emotional ties and shared activities occurring between participants.

- Members have access to shared resources and there are policies for determining access to those resources.

- Reciprocity of information, support and services between members is important.

- There is a shared context of social conventions, language, and protocols.

In addition they also agreed that the following characteristics, though not as essential, could significantly impact interactions online: evidence of people having different roles; people's reputations; awareness of membership boundaries and group identity; initiation criteria for joining the community; history and existence over a period of time; notable events or rituals, shared physical environments; and voluntary membership. Not surprisingly many of these characteristics appear in other definitions too. Several speak of continuing relationships cemented by rituals and history that create a sense of belonging.

Depending on one's perspective and academic discipline, the different characteristics take-on different levels of importance. Hence, there are several views about what an online community is.

Sociology is an obvious discipline to look for a definition but it is worth remembering that for over fifty years sociologists have defined and redefined the concept of community (Wellman, 1982). Finding a suitable definition that everyone can agree with is therefore not an easy task. Furthermore, definitions change over time. Until the advent of telecommunications technology, definitions of community focused on close-knit groups in a single locale. Things such as birth and physical location determined belonging to a community. Social relationships were with a stable and limited set of individuals and interaction was primarily face to face. Since it was difficult to maintain relationships over long distances due to the slowness and cost of communicating, physical separation from the community often reduced not only contact, but also the strength of a person's membership in the community (Gergen, 1997; Jones, 1997; Rheingold, 1993). However, modern transportations, increased personal mobility, and the development of modern telecommunications systems made these concepts less useful for defining communities. Researchers therefore consider the strength and nature of relationships between individuals to be a more useful basis for defining community (Hamman, 1999; Haythornthwaite & Wellman, 1998; Wellman, 1997; Wellman & Gulia, 1999b).

Particularly potent indicators of community that have been adopted by many online community researchers include: the concepts of people with shared interests, experiences and/or needs, engaged in supportive and sociable relations, where they obtain important resources, develop strong interpersonal feelings of belonging and being wanted, and forge a sense of shared identity (Jones, 1997; Rheingold, 1993; Wellman, 2000).

The notion of strong and weak ties is useful in further defining relationships (Granovetter, 1973; Granovetter, 1982). Granovetter's work suggests that the strength of an interpersonal tie can be measured by assessing the amount of time invested in maintaining the tie, the emotional intensity and degree of intimacy of the tie, and the level of reciprocal services that characterize the relationship (Granovetter, 1973). A parent-child relationship is an example of a strong tie. Typically each of us has only a few strong ties, compared with many weak ties. For example, special interest groups and work-related groups with mailing lists (paper or electronic), telephone trees, theater groups, international organizations (e.g., Green

Peace, Amnesty International, ACM, etc.) facilitate hundreds and thousands of weak-tie relationships between members. These weak-tie groups contain people that share some common interests but do not rely on each other for strong emotional support, regular daily or weekly help. While Internet helps to support strong ties, such as those between family members, it is particularly good for weak-tie relationships (Wellman & Gulia, 1999a). Because weak tie relationships are more numerous and diverse than strong tie ones, they provide a larger social network for obtaining and disseminating information and resources than strong tie relationships (Walther & Boyd, Forthcoming). They are important therefore for information exchange, making new contacts and raising awareness about new ideas (Granovetter, 1973; Kling, 1996) Walther & Boyd, Forthcoming; Wellman, 2000). These networks enable people to discuss topics and contact others with whom they would otherwise not communicate. Some of these relationships would probably flounder without their online component because of geographical distance. Furthermore, the longer such relationships last the strong the ties tend to become (Walther, Anderson, & Park, 1994).

In contrast, technology-oriented definitions describe online communities by the software that supports them. It is common to hear talk of chat, bulletin board, listserver, UseNet News, MUDs (Multi-user dungeons), MOOs (Object-oriented MUDs), and web-based communities. Such descriptions are concise and meaningful to those who know about software and while they indicate what conversation protocols are like, they say little about social interaction in the community. For example, two defining characteristics are whether software is synchronous or asynchronous (Ellis, Gibbs, & Rein, 1991). Synchronous technologies require all participants to be available (though not in the same place) at the same time and communication usually involves short comments, as occurs in chats, for example. Asynchronous technologies, such as bulletin boards or email), do not require participants to be available at the same time. Correspondence via asynchronous technologies therefore tends to take longer because it more closely resembles written notes in which one person raises or debates issues and others respond days, weeks or even months later. Because they are geared to different communication tasks, it is becoming increasingly common to find both synchronous and asynchronous technologies together on community sites.

Enthusiasts of gaming and 3-D immersive environments focus on spatial relations in representations in which participants move around in the form of avatars. These environments are based on spatial metaphors that encourage assumptions about participants' behavior and relationships according, at

least partly, to their spatial relationships. For example, can it be assumed avatars that are next to each in the same room are talking to each other whereas avatars in different rooms are not. Perhaps avatars that are frequently seen together represent friends or at least collaborators.

In contrast to issues identified by both sociologists and technologists, e-business entrepreneurs take a pragmatic view of community (Hagel & Armstrong, 1997; McWilliam, 2000; Williams & Cothrel, 2000a). For them any chat, or bulletin board on a web site is a potential community because it can draw customers to the site - a concept known as 'stickiness'. Consequently, before the dot.com crash online communities were spawning everywhere. While this market-driven approach is in keeping with the drive to promote commerce on the Web (Jones, 1999; Hagel & Armstrong, 1997), it pays little attention to the complexity of interaction online and the need to support and guide it. This may explain why many are ghost towns.

Communities for professionals and others who share knowledge and resources are often referred to as 'communities of practice' (Wenger, 1998) to distinguish them from special interest communities and support communities. Their members often have a shared task and well-defined roles (Feenberg, 1993) and they offer professionals emotional support as well as information and discussion (Moon & Sproull, 2000) Sproull & Faraj, 1997; Williams & Cothrel, 2000a).

Another kind of community is physical communities that are supported by an online network, known as community networks to distinguish them from communities that primarily exist online. Early examples include Seattle Community Network (Schuler, 1996) and Blacksburg Electronic Village (Cohill & Kavanaugh, 1997) but there are now hundreds of community networks (Carroll & Rosson, 2001). These community networks usually focus on neighborhood issues, and the online communication supplements face to face meetings. Increasingly, many people are meeting online and physically and the distinction between the two is becoming blurred but there are also people, scattered across the globe who can only interact virtually (Lazar, Tsoa, & Preece, 1999).

Instant messaging and telephone 'texting' communities (particularly in Europe) are also gaining popularity, especially with teenagers who like to keep contact with friends while moving from location to location. Many teenagers switch effortlessly between media, texting, emailing, and chatting. Judging online

activity by what is seen in a single medium is therefore likely to give a distorted picture (Brown et al., 1999).

This variety of definitions and descriptions has led some researchers to seek new terms. For example, 'online social space' avoids the sociologically inaccurate usage of the term 'community' (Farnham, Smith, Preece, Bruckman, & Schuler, 2001). However, because online community is the still the most widely used term, we will use it in this chapter to refer to social activity that involves groups of people interacting online. Such communities may be long or short term, large or small, national or international, and completely or only partially virtual.

**1.3     Emergence of online communities**

The listserver, bulletin board and chat technology that supports many of today's online communities changed comparatively little during the last twenty years, until the Web became widespread in the mid-1990s. Since then there has been a steady flow of new versions and new technologies but the biggest changes are in how the technology is being used, and who is using it.

Increasingly combinations of different types of synchronous and asynchronous technology are embedded in web sites supported with information, links to other sites and search facilities. Linking into online communities via small mobile devices such as telephones and PalmPilots is also becoming popular and no doubt we will see more access via other small devices during the next few years.

Early online communities for education (Hiltz, 1985), networked communities (Hiltz & Turoff, 1993; Rheingold, 1993; Schuler, 1994), and office communities (Sproull & Kiesler, 1991), were developed for known groups of users, whose characteristics, needs and skills were known and who had the same or similar communications software. Since then the number of computer users has increased dramatically. In addition the demographic composition of the user population has also changed to include people of all ages, different cultures, educational backgrounds, experience and technical skills. A recent survey by the Pew Foundation confirms this trend. Pew reports that over one hundred million Americans had Internet access in 2001 (Rainie & Packel, 2001). The range of people participating in various kinds of online communities has also changed. While some communities require members to have particular skills or qualifications, there are millions of 'open' communities in which anyone with Internet and Web access can participate.

Consequently, the majority of users in these open communities and many others are not technical people or skilled office workers. Today's online community participants come from all walks of life.

Early descriptions of online communities were anecdotal and tended to make comparisons with face to face communication, but chatting and sending messages online is becoming a normal part of many people's lives, particularly for young people. Online people do almost everything that people do when they get together, but they do it with words on screens, leaving their bodies behind independent of local time or location (Rheingold, 1994).

Sherry Turkle, an early researcher, reported that those who lack confidence in face to face situations often become more confident online and lose their inhibitions. She documented many cases of this phenomenon and, using her knowledge of psychotherapy, she explained how people explore new personas online in which they act-out facets of their personalities that are problematic in face to face situations (Turkle, 1995). For example, people who are shy and find making relationships hard become bolder online because they do not have to face the person with whom they interact, and if the going gets tough they can switch their computer off.

As well as having advantages for individuals, whole communities can benefit from becoming networked as Rheingold and Schuler have described. Rheingold told the story of life in the WELL (Rheingold, 1993; Rheingold, 1994), one of the first, and most famous networked communities, situated in the San Francisco Bay area. Schuler focused on design and development issues associated with creating the Seattle Community Network (Schuler, 1996). This experience led him to propose a noble set of core values to guide future online community development. These values included: conviviality and culture, education, strong democracy, health and human services, economic equity, opportunity and sustainability, and information and communication.

From the late 1990s, the combination of less expensive computing power, the Web and several successful service providers enticed tens of thousands of people into online communities, which has aroused strong interest among researchers in human-computer interaction (HCI), sociology, anthropology, psychology, linguistics, communications studies and information systems. This multi-disciplinary group is interested in all aspects of social interaction online. The input from this broad range of fields, each with its

own literature, theory and research paradigms, makes studying online communities an intellectually rich research area.

Social scientists seek to answer questions about how the Internet is changing our lives (e.g., Kraut et al., 1998), how communities form and function (e.g., Smith & Kollock, 1999; Wellman & Gulia, 1999b; Wellman et al., 1996) and the policy issues concerned with privacy, security, etc. (Kahin & Keller, 1995). Linguists and psychologists try to understand how conversation, discourse (e.g., Herring, 1999), interaction and social relationship development is different online from off-line. Technology oriented researches address questions about design for sociability and usability (e.g., Erickson et al., 1999), supporting and visualizing interaction online (e.g., Viegas & Donath, 1999; Sack, 2000a; Smith & Fiore, 2001).

During this time period several edited books appeared that document some of this research and made it more widely available (e.g., Jones, 1998; Kiesler, 1997; Smith & Kollock, 1999). Multiple perspectives and different skills provide many benefits but one of the drawbacks is that material is scattered across many journals and conferences, which is a problem for future research that seeks to build on previous studies. Other books cover e-business, which somewhat mistakenly heralded online communities as a panacea for drawing customers to online sites (e.g., Hagel & Armstrong, 1997) and provide guidance for practitioners on how to develop successful online communities for business (e.g, Figallo, 1998; Kim, 2000). Specialist graduate courses have been developed that add to curricula offerings in information systems (e.g., www.umbc.edu/onlinecommunities), computer science (e.g., http://www.cc.gatech.edu/~asb/past-classes.html), and sociology (e.g., http://www.sscnet.ucla.edu/soc/faculty/kollock/classes/cyberspace/index.htm) and texts are appearing that attempt to distill the field for students and practitioners (e.g., Preece, 2000).

There has also been a strong research thrust into 3-D immersive environments, which helps to cast light on interaction, relationship development, identity etc. in such worlds and this is discussed in Chapter x. Other exciting research challenges involve developing GUI communities to support large numbers of people with standard equipment well.

## *2      Social interaction*

The theory and research that informs our understanding of online communities is drawn from a broad range of disciplines as we have just said. Consequently, there is a large body of potentially relevant

research so we have had to be selective and to focus on ideas that we consider most central for understanding the basics of this field. The first part of this section discusses communication between pairs and small groups, while the second part examines research that addresses community issues.

**2.1     Communicating online**

In online textual environments people represent themselves through their words and both syntax and semantics convey meaning. However, when people communicate via narrow bandwidth media such as text  (i.e., text) that do not carry non-verbal information (e.g., body language, facial expression, voice tone) cues that help us to understand each other are missing. Developing shared understanding (i.e., establishing common ground) a sense of social presence, empathy, and trust is therefore usually harder, which in turn makes developing social relationships slower and more difficult.

All technologies have strengths and weaknesses, which developers need to understand. For example, video-conferencing conveys some non-verbal communication but due to limitations of communications bandwidth, screen size and resolution, subtle body language and important contextual information about participants' moods, the context in which they are participating and their environment are lost (Olson & Olson, 2000). The developers' job is to select or develop technology that matches the communication tasks of the community, their social and practical needs. The researchers' job is to elucidate fundamental knowledge that supports that process and the following discussion outlines some of that research.

*Common Ground*

Common ground theory is a linguistic theory that has been applied extensively in computer supported co-operative work research (CSCW) to explain how the properties of different media effect communication, e.g. (Olson & Olson, 1997). Common ground theory provides a framework for understanding how two people or a small group develop shared understanding in a conversation (Clark & Brennan, 1991). For instance, if person 'A' speaks to person 'B' about 'my daughter', the two of them must understand that she is referring to child playing in the living room and not to girls playing in the street three blocks away. The process of acquiring this common understanding is grounding*,* which varies from situation to situation. Grounding takes one form in face to face conversation and other forms in computer mediated communication supported by different types of software, and yet other forms when calling

directory assistance, chatting with a friend or participating in a debate. Grounding is, therefore, influenced both by the communication medium and the communication task.

Grounding occurs through several rounds of checking that a conversation partner has heard and correctly understood what is being said. This sounds cumbersome, but conversations usually follow an identifiable pattern. For example, by noticing how much attention a partner is paying to a comment, the speaker can judge whether there is shared understanding. Utterances, gaze, nodding, and facial expression indicate that the person is paying attention and understands. People generally do this unconsciously with as little effort as possible, checking and then repeating or repairing incomplete comments when in doubt.

The amount and type of effort required for establishing common ground varies between different communication media. Techniques that work in one medium may not work so well in another. For example, a nod works in a face to face conversation, but is useless in a bulletin board or chat discussion. Similarly, an agreed short-hand communication language used by a group of friends for texting in England may not be understood outside the community, so establishing common ground will be difficult. Furthermore, people who are unfamiliar with a particular medium will not have had time to develop their own ways of supporting grounding.

Factors that affect the ease with which common ground is established include:

- sharing the same physical space, i.e., *co-presence*;

- being able to see each other, i.e., *visibility*;

- being able to hear each other and detect voice tone, i.e., *audibility*;

- both partners experiencing the conversation at roughly the same time, i.e., *co-temporality;*

- sending and receiving more of less simultaneously, i.e., *simultaneity;*

- keeping turns in order, i.e., *sequentiality;*

- being able to review messages, i.e., *reviewability;* and

- being able to revise messages; i.e., *revisability.*

Surprisingly, face to face isn't necessarily the best for all types of communication, nor are high-bandwidth synchronous environments, it depends on the communication task. For example, video images do not contribute much in information transfer tasks, voice alone is adequate, although participants may prefer video (Sellen, 1994). Text only environments can be preferable when the content of the conversation

is potentially embarrassing as in a discussion about a rape incident (Newell & Gregor, 1997). Asynchronous textual communication is preferable when having time to reflect is useful or when participants cannot be co-present. In a study of recovering alcoholics communicating via a bulletin board, participants reported that they liked being able to send messages any time of day or night and having time to reflect before replying (King, 1994). People with poor typing skills or those who like to reflect may also prefer asynchronous textual media.

However, because face to face is the default we are used to, it has become the standard for judging other media. There are also times when no matter which media is available face to face communication is preferable because there is no substitute for the commitment of being there, sharing a hug, and getting a broad understanding of the context in which the conversation is occurring (Olson & Olson, 2000).

*Social presence, identity and relationships*

Social presence theory (Short, Williams, & Christie, 1976) speaks about how successfully media convey a sense of participants being physically co-present. Although it focuses on some of the same issues as common ground its origins are in communications studies and social psychology rather than linguistics (Rice, 1987) (Rice, 1993). Consequently, Social presence theory takes a different perspective. It helps to explain how social behavior is affected by characteristics of different media, whereas common ground focuses on conversation. Media richness theory is similar to social presence but it has a media-oriented perspective and was developed ten years later, with, apparently, little knowledge of earlier work on social presence (Daft & Lengel, 1986; Rice, 1993).

Like common ground, social presence depends not only on the words people speak but also on non-verbal cues, body language and information about the speakers' context (Rice & Love, 1987; Rice, 1993). Reduced social cues (i.e., gestures, body language, facial expression, appearance, voice tone, etc.) are caused by not having sufficient bandwidth to carry this information (Culnan & Markus, 1987; Walther, 1993). In textual systems, for example, both task information and social information are carried in the same single verbal/linguistic channel which, though adequate for much task information, does not carry non-verbal information, which may be needed for interaction (Walther, 1994; Walther et al., 1994). Consequently, many clues about the communicators' emotional states are filtered out. Gaze and tonal information, for example, are missing.

When people meet each other for the first time they develop mental models of each other and the content of their discussion (Norman, 1986). Their opinions are influenced partly by such things as age, gender, physical appearance, the context of the meeting etc. Furthermore, they tend to be developed very quickly but can be remarkably powerful and resistant to change, even when evidence suggests they are not completely correct (Wallace, 1999). So another feature of reduced social presence, particularly in low bandwidth environments, is that the way people form impressions of each other is different, which can have both positive and negative affects depending on the situation.

Because people communicate without knowing the circumstances and broader context in which comments are made misunderstandings can occur, especially if the comment was abrupt, poorly explained, out of context and so on. Annoyed, the person receiving the message may respond in an angry tone, possibly escalating the problem and causing an argument. Misunderstandings are particularly common among people who are not used to using the media because they have not had time to get used to it and to develop ways of getting around this problem. People may also make unwarranted, angry attacks, known as flaming encouraged by the fact that they do not have to face the person who they are attacking or take responsibility for their behavior (Hiltz, Johnson, & Turoff, 1986; Sproull & Keisler, 1986), (Spears & Lea, 1992).

Conversely, there are times when not being able to see the person with whom you converse and knowing you may never meet them can be a positive feature of these environments because people are encouraged to disclose more about themselves (Lea, O'Shea, Fung, & Spears, 1992; Spears, Russell, & Lee, 1990; Walther, 1996). This is why remarkably candidate comments are sometimes made online about personal health problems, emotional relationships and feelings. Furthermore, when people discover they have similar problems, opinions or experiences they may feel closer, more trusting and be prepared to reveal even more. When conversations are limited to just a few topics a false sense of feeling similar and shared identify can develop. This has a 'snowball effect' in that the more people discover that they are similar to each other, the more they tend to like each other and the more they will disclose about themselves. This is known as self- disclosure reciprocity and it is powerful online (Wallace, 1999). It works by 'if you tell me something about yourself, I'll tell you something about me.'

Another phenomenon that has been noticed in research on people using low bandwidth systems is that these users tend to send fewer messages during the same time period as those communicating face to face or via video conferencing (Hiltz et al., 1986; Ogan, 1993; Walther, 1993). Some online relationships may, therefore, be slower to develop, but given sufficient time strong relationships can form that are comparable with those formed face to face (Walther, 1993). Furthermore, online relationships may be extremely rich (Spears & Lea, 1992). Encouraging participants to be particularly careful about what they say and how they say it early in relationships can be helpful until they become experienced with the medium and find ways to deal with the lack of visual cues (Rice & Barnett, 1986). For example, phrasing a comment tentatively to avoid appearing aggressive (Wallace, 1999), or prefacing it with IMHO - 'in my humble opinion' can achieve this goal. Emoticons (also known as 'smilies') are also used as softeners (Lehnert, 1998) provides a list). Placing additional personal material (e.g., pictures, personal stories) on Web pages associated with the community can also help people to get to know each other online.

The way people choose to portray themselves online is of considerable research interest. An aspect that has received particular attention is how gender is portrayed and revealed. Whether done intentionally or unintentionally many online participants have discovered that there can be consequences from revealing one's gender online. For example, women may get unwanted attention (Bruckman, 1993; Herring, 1992; Turkle, 1995; Turkle, 1999), so some avoid harassment by switching or disguising their gender. This behavior may fool other participants effectively, but linguists and those sensitive to gendered differences in conversational style can usually detect semantic and syntactic differences between the way women and men express themselves (Herring, 1992; Reid, 1993). For example, women tend to be more self-deprecating, apologetic and to include more adjectives in their speech (Tannen, 1990; Tannen, 1994). Women also tend to avoid criticism by phrasing their questions in defensive ways (Herring, 1992).

What this research says to online community developers is that they need to look for ways of educating participants about how their online behavior may be perceived and help them to find ways of preventing misunderstanding that can damage online relationships. For example, taking the time to check that you have understood what the other person is really saying can be important (Zimmer & Alexander, 1996). Simulating physical presence via avatars is a frequently used technique in graphic environments,

particularly gaming environments and chats, such as ActiveWorlds.com. By representing themselves as an avatar, participants can disguise their real identities and influence how others perceive them.

There is however a cost in screen real estate for using avatars. If too many are present at once the screen becomes cluttered. Another problem is that avatars may move across the screen and out of view very quickly. Small, more abstract graphical representations that avoid this problem but give visual feedback about the number of people present in an environment, what they are doing and who is speaking are being developed to support social presence online and also contribute to representing individuals' identities. One of the first environments to show this idea was 'chat-circles', a chat environment in which participants are represented as small circles (Viegas & Donath, 1999). A variation on this theme is used in Babble, another chat environment (Erickson et al., 1999) that supports a community of practice for IBM researchers. In this application small colored circles represent different participants. The relative position of these circles also indicates who are talking to whom, and who the most active participants are. However, as with any innovation that discloses information, there may be a downside for some people. For examples, people who read but do not send messages (i.e., silent participants, also known as 'lurkers') will also be shown. For people whose intention is not to be seen, such representations therefore pose a threat and may stop them from participating. Whether lurking should be encouraged or not is debatable and opinions vary. In part such judgements need to be related to the community's purpose, and we return to this topic later. (Nonnecke & Preece, 2001).

*Empathy and trust*

Additional support for these ideas comes from research on empathy, which is defined as 'knowing what another person is feeling, feeling what another person is feeling and responding compassionately to another person' (Levenson & Ruef, 1992). Research shows that empathy is strongest between similar people and people who share similar experiences, such as people in the same profession or siblings (Eisenberg & Strayer, 1987; Etchegoyen, 1991; Ickes, 1993; Ickes, 1997). In fact, the more similar people are the easier it is for them to understand each other (Hodges & Wegner, 1997). This phenomenon is particularly noticeable in patient support communities, where participants experience similar problems, discomfort and treatment. Comments such as: 'we're all in this together' are frequently seen (Preece, 1998; Preece, 1999a; Schoch & White, 1997). However, empathy, like common ground and social presence,

depends heavily on non-verbal communication such as gaze and body language (Eisenberg & Strayer, 1987; Etchegoyen, 1991; Lanzetta & Englis, 1989), so it too is influenced by the properties of different communication media (Preece, 2000).

Since trust seems to be similar to empathy, it is likely to be influenced by the properties of the media in a similar way. Trust can be defined as: " the expectation that arises within a community of regular, honest and cooperative behavior, based on commonly shared norms, on the part of the members of the community" (Fukuyama, 1995). Revealing personal information about one's health, agreeing to cooperate on a project, or making a purchase requires trust. The more that is risked the more trust in needed. Considerable research effort is being focused on understanding how trust develops on line stimulated by the needs of e-business. Procedures and mechanisms are being sought to support trust online. These should involve evidence of good past performance and truthful promises and guarantees of similar future behavior (Shneiderman, 2000). Ways of supporting and managing trust in online communities is also acknowledged to be important (Kollock & Smith, 1999).

One example of successful online trust management is E-bay's reputation management system (Kollock, 1999). In this system, ratings of customers' satisfaction of transactions with a particular vender are compiled to provide a history that can be examined by potential customers. Furthermore, knowing that a vendor has a good reputation encourages co-operation when things don't go quite as expected because there is a basis for trusting that the problem will be put right in a timely way. However, it is hard to see how reputation systems could be used more widely in online communities without damaging some participants' confidence to participate.

A related trust issue concerns the persistence of conversations online (Erickson, 1999). Savvy online community participants who understand technology are reluctant to enter into online conversations that involve disclosing personal information because they know that they that it can be retrieved, even after they themselves have deleted the text. They realize that their information could be dredged up, even years later, and they could be damaged. For example, revealing details about a health or personal problem could affect the cost of their health insurance. An unfavorable comment about a manager could prevent them gaining a much-deserved promotion.

Of course, what influences individuals, pairs and small groups also impacts upon the community, but communities also have a character and dynamics of their own.

## 2.2 Group dynamics online

Just as theory from psychology and linguistics has been adapted and applied to understand how people communicate online, theories from social psychology, sociology and other branches of the social sciences are being drawn upon to help explain how communities form and change.

*Social Network Theory*

Social network theory is a branch of sociology that examines the patterns and characteristics of social connections and their relationship to individual's lives and societal organization. This theory is used as a framework to study how people relate to each other through computer mediated networks (Wellman, 1997; Wellman & Frank, 2001; Wellman et al., 1996). Wellman and Frank (2001) believe that a multi-level approach is required to understand the interactive effects of characteristics of computer mediated networks. These characteristics include the composition of networks, the network size, the range of the network, the frequency of contact between people, the density of interpersonal ties, the characteristics of members, the history of the network, and the resource available in the network (Wellman & Frank, 2001).

*Critical mass*

It is well known that if there are too few people contributing to an online discussion it will die because there will be insufficient new messages to hold the interest of existing members. The number of people needed to make an online community viable and to attract others is known as its critical mass (Markus, 1987; Markus, 1990; Morris & Ogan, 1996). However, while critical mass is a useful concept for explaining success and failure (Rice, Grant, Schmitz, & Torobin, 1990) and interactions online (Ackerman & Starr, 1995), it is of limited practical value because it is so hard to quantify. What may be enough people in one community may not be in another because members of different kinds of communities have different expectations. Further research is therefore needed to quantify critical mass for different kinds of communities and situations.

*Reciprocity and social dilemma*

Reciprocity means giving back to the community as well as taking from it. It is a central concept for explaining the success and failure of communities. In communities that function well 'whatever is given

ought to be repaid, if only to ensure that more is available when needed. Repayment of support and social resources might be in the form of exchanges of the same kind of aid, reciprocating in another way or helping a mutual friend in the network' (Wellman & Gulia, 1999b). Even if reciprocity does not happen immediately it can happen months or years later possibly to another person in the community (Constant, Sproull, & Kiesler, 1996; Wellman & Gulia, 1999b). In healthy communities reciprocity is a general and accepted norm among members.

The problem is that often behavior that benefits an individual can damage the group. Furthermore, in certain situations individuals can gain benefit without it being obvious to the community that they are not contributing and are therefore damaging the community effort. For example, if a community agrees that each of its members should donate a certain amount of money or time to achieve a community goal, and then some people do not contribute, then they benefit, particularly if no one knows about their selfish act, and the community loses. Similarly, if participants in a small community decide to read messages in a topic discussion but not to post because they don't want to spend time contributing, the community as a whole will suffer because there will not be sufficient critical mass for it to be viable. This tension between what is best for an individual and for the group is a social dilemma (Axelrod, 1984; Kollock, 1998) and it is at the heart most social interactions (Kollock & Smith, 1999).

Furthermore, online it may be particularly tempting for people to take and not to give back because the chance of meeting people from the online community in person is likely to be extremely low so there are no serious implications for future interactions (Walther, 1994).

*Roles, rituals, norms, and policies*

Governance covers many issues from registration to moderation to democracy online and is also strongly influenced by the cultural norms of the community. Communities that have a strong cultural basis, such as church groups, environmentalists, alcoholics anonymous, etc. that already have rules and norms in operating in their off-line versions, can import them online. New communities that only exist online, will have to develop their own governance procedures from scratch and gradually develop norms as members get to know each other and start to debate and agree what is acceptable and what is not. Baym's research provides insight into how an online audience community devoted to soap operas start to do this. As fans

discuss the story lines and characters of their favorite soap opera, they share their views and values, learn from the rich network of relationships and develop shared norms (Baym, 2000).

Old issues have to be addressed online. What type of governance should there be? Should it be democratic or not? How democratic should it be? If so what kinds of policies and social procedures are needed? Diversity University, for example, has a sophisticated democratic process for calling votes. Another example concerns freedom of speech. Should freedom of speech be limited if it is racist, obscene, blasphemous or aggressive? A short clearly worded statement saying what is acceptable may be useful. Early in the existence of the WELL, for example, its members decided that complete freedom was important (Rheingold, 1993). Other communities develop guiding policies. For example, the Down Syndrome Online Advocacy Group (http://www.dsoag.com) simply requests: "Do not communicate to someone else that which you would not want communicated to you." (Lazar, Hanst, Buchwater, & Preece, 2000)

Having rules is fine but how should they be enforced? There is no point making rules if they are not enforced. Moderators perform one of the best known roles in online communities, but the extent of their roles may not be so well known. Moderators performed many different tasks (Berge, 1992; Collins & Berge, 1997; Salmon, 2000) including:

- Facilitating so that the group is kept focused and 'on-topic'.
- Managing the list, e.g. archiving, deleting and adding subscribers.
- Filtering messages and deciding which ones to post. Typically this involves removing flames, libelous posts, spam, inappropriate or distracting jokes and generally keeping the ratio of relevant messages high, which is often described as the 'signal/noise ratio.
- Being the expert, which involves answering frequently asked questions (FAQs) or directing people to online FAQs, and understanding the topics of discussion
- Editing text, digests or formatting messages.
- Promoter of questions which generate discussion.
- Marketing the list to others so that they join, which generally involves providing information about it.
- Helping people with general needs.
- Being a fireman by ensuring that flaming and *ad hominem* attacks are done off-line.

Levels of activity vary between moderators, from reading, making judgements and taking action on every single message and updating frequently asked questions (FAQs) regularly to stepping in just occasionally with a remark to deter a future transgression. Most moderators are self-taught or learn by observing others on the job (Feenberg, 1989). Knowing when to push discussions back on topic and when not to can be difficult as the following quote from an experienced moderator illustrates: "Hmmm. How inviolable should the original purpose be? I manage a list that now only rarely touches on [the] topic it was originally supposed to talk about. So? The conversation is shaped by the community's current and compelling interests. The original topic re-emerges when someone needs to talk about it, when it has some kind of immediate relevance to someone's life. Fine with me" (Berge, 1992).

To protect themselves from unwarranted criticism moderators often follow accepted policies, which are made public. Having clearly defined policies is also useful for coordinating two or more moderators. Helping roles, norms and rules get developed is often done by community leaders, or managers who work with the community. Skill is needed to make sure that there is enough structure to protect and guide the community's evolution but not so much that it is stifled.

There are usually two sides to creating rules. The rule can stop unwanted behavior but it can also deter people from joining and inhibit contributions to the community, particularly if there are too many rules and people feel stifled by them. For example, registering deters casual visitors intent on disrupting the community but may discourage others too. Some communities get round this problem by allowing anyone to visit for a limited period with limited privileges. Others have a light registration procedure but newcomers go through a probationary period in which their behavior is observed.

Participants in online communities often carve out roles for themselves just as they do in physical communities. For example, there are protagonists, experts, people who befriend others, people who always try to respond, witty people, sarcastic people, lurkers who watch silently, etc. Roles vary according to the type of the community but can be extremely important in the early days of developing a community (Kim, 2000). Dynamic or charismatic characters help to draw others to the community.

**2.3    Support for social interaction**

How research informs design and management of online communities depends on many factors including the purpose of the community; the needs of participants and the policies that develop. For

example, emotional and health support communities are quite different from scholarly communities. Table 1 summarizes some ways the key concepts just discussed and proposes some ways for supporting social interaction online.

| Support for: | Issues potential solutions |
| --- | --- |
| Grounding | Support communication by encouraging participants to check that they share a common understanding. Different types of software provide different support. For example, turn taking can be a problem in busy chats, whereas turn-taking is clearer in threaded bulletin boards. Helping to make the identify of individuals clear in synchronous environments and providing short-hand versions of common words and phrases can help. Chatters and texters also tend to develop their own short-hand language. Encouraging participants to check for common ground is helpful. Supporting social presence also helps. |
| Social presence | Avatars simulate being there and provide more identity for individuals  Thumb-nail pictures can also be used (Zimmer & Alexander, 1996). Other techniques include links to personal home pages and graphical representations (Donath, Lee, Boyd, & Goler, 2001; Erickson et al., 1999). Participants also need to be aware that it can take longer to develop relationships online (Walther, 1996). |
| Discouraging misunderstanding & aggression | Encourage participants to explain themselves clearly and to check each other's intentions and look for common ground (Zimmer & Alexander, 1996). Appoint moderators to check messages. Keep discussions on topic (Collins & Berge, 1997; Salmon, 2000). |
| Prevent flames | Registration helps to deter *ad hoc* flamers. Support moderators with tools to identify flames and spam (Seabrook, 2001). |
| Relationship formation | Supporting social presence, empathy and trust helps. Pay particular attention to early interactions and encourage long-term communication (Wallace, 1999; Walther, 1993). Moderators and mentors can also help. |
| Encouraging empathy | Support social presence. (Preece, 1999b) Provide a clear statement of the community's purpose (Preece, 2000). Allow participants to explore their similarities |

| | |
|---|---|
| | by facilitating private communication, and providing space to tell stories (Preece, 1999a) |
| Encouraging trust | Support formation of long-term relationships. Provide a record of past behavior (e.g., reputation management) (Kollock, 1999). |
| Encouraging critical mass | Provide clear statement of purpose so people know what to expect and support the purpose, e.g., by keeping discussions on topic etc. (Preece, 2000) Stage events (Kim, 2000) and make sure there is always new content. |
| Discouraging social dilemma | Encourage reciprocity with rewards, e.g., acknowledge helpful responses. Encourage good community norms and values. |

**Table 1 Suggestions for supporting social interaction in online communities**

Knowledge from research can be fed into design, development and management of online communities to inform those processes.

### 3       *Developing and evaluating online communities*

Involving participants in software design helps to ensure their social and political needs are taken into account (Eason, 1988; Mumford, 1983; Greenbaum & Kyng, 1991; Muller, 1992; Schuler, 1994; Schuler & Namioka, 1993). What makes online communities different from most other software development is that communities evolve continuously because community is a process not an entity (Fernback, 1999). The role of community developers and managers is therefore to start this evolution by providing suitably designed software and to help guide the community's social evolution. Schuler, advocates participatory design with a focus on core social values (Schuler, 1994). Cliff Figallo, one of the developers of the WELL, focuses on building relationships, and increasing customer loyalty through online community in order to maintain competitive business edge (Figallo, 1998). Others with an interest in building online communities for e-business promote various business models of community (Hagel & Armstrong, 1997; Williams & Cothrel, 2000b). Kim documents best practices and proposes nine design strategies that are based on three sound principles: design for growth and change; create and maintain feedback loops; empower members over time (Kim, 2000) and Preece advocates a process of *participatory community-centered development (PCCD)* composed of two key components: software design, particularly

designing usability, and guiding social development, that is, supporting sociability (Preece, 2000). PCCD

borrows concepts from user-centered design (Norman, 1986), contextual inquiry (Beyer & Holtzblatt,

1998) and participatory design (Mumford, 1983; Greenbaum & Kyng, 1991; Muller, 1992; Schuler &

Namioka, 1993) and has been deployed successfully in a number of online community development

projects (Lazar & Preece, 1999a; Lazar et al., 1999; Lazar et al., 2000; Preece, 2000).

The first stage of PCCD is the community needs assessment and user task analysis requires, which

involves understanding the community's social needs, individuals communication task needs and any

technical constraints that must be considered. The second stage involves developing a conceptual model of

the community space and then either building or selecting software with suitable usability, and starting to

plan the sociability support that will be needed. The third stage is refining sociability and usability. The

fourth and final stages involve seeding the community with participants, publicizing it and creating events

so others will come, and welcoming, nurturing and guiding the community as it grows until it becomes self-

sufficient. PCCD is iterative and benefits from multi-disciplinary input and extensive participant

involvement in which potential community members review and inform the process through different

evaluation processes. There are significant differences between the various technologies (listserv, bulletin

board, chat, Usenet, 3-D environments, etc.) available for supporting online communities.  Their relative

strengths and weaknesses are described in the following table.

| **Technology** | |
|---|---|
| **Mailing lists/ Listserver** | **Characteristics**<br>Asynchronous, available 24/7, may be moderated or unmoderated<br>Broadcast only (push technology)<br>The list may be hosted by a company/institution or individually purchased and supported<br>Listservers deliver messages in two forms - either they trickle<br>through as they are sent or a moderator collects them into a digest.<br>Visitors have to register |
| | **Advantages**<br>Easy to use/ Good for newbies, No special equipment required beyond email capability<br>Good for sending announcements and newsletters; Good for broadcasting messages<br>and discussions<br>Participants may take time to reflect, compose and edit items posted to the list<br>Visitors have to register – may help to create a feeling of community |

| Mailing lists/<br>Listserver | **Disadvantages**<br>Visitors have to register – may discourage participation<br>Lists with a large number of postings may be overwhelming to readers<br>Everything posted to the list comes to each member<br>Context for responses have to be provided by including parts of previous messages<br>If a digest is sent it can be difficult to respond to a particular message because messages are not threaded or ordered. |
| --- | --- |
| UseNet News newsgroups | **Characteristics**<br>Asynchronous 24/7<br>Collection of discussions on various topics hosted on the Internet, cross posting between UseNet News groups is common and spamming is frequent.<br>Users have to go to UseNet to read messages (pull technology)<br>Open communities, no registration required to post<br>Usually non moderated |
|  | **Advantages**<br>Open communities, no registration required to post – may encourage wider participation<br>No special equipment beyond Internet access<br>A large number of newsgroups exist on the Internet with a wide range of topics. It is easy to find an existing group to match your interests<br>Participants may take time to reflect, compose and edit items posted to the list |
|  | **Disadvantages**<br>Open communities, no registration required to post – may create a sense of anonymity that can lead to inappropriate messages and hostile postings (flaming)<br>Spamming is frequent<br>Need sufficient expertise to run<br>The volume of messages in some groups may be overwhelming |
| Message Boards Bulletin Boards Discussion or Forum | **Characteristics**<br>Asynchronous 24/7<br>Users have to go to a site to read messages (pull technology)<br>May be moderated or non moderated<br>Usually require registration, but may be open<br>Discussions are threaded or linear<br>Many bulletin board services are set up to send an email to signal new<br>Messages, responses, and/or topics of interest |

| | |
|---|---|
| **Message Boards Bulletin Boards Discussion or Forum** | **Advantages**<br>No special equipment beyond Internet access<br>Participants may take time to reflect, compose and edit items posted to the list<br>It is easy to find an existing group to match your interests<br>Discussion threads provide historical context<br>Linear organization provides separate topics for each conversation and is good for in-depth discussion<br>Participants may take time to reflect, compose and edit items posted to the list<br>Many Bulletin boards provide good search facilities that enable participants to search on topics, or people, or messages sent on or between particular dates, etc.<br>Emoticons are also becoming increasingly common so participants can signal the content of their message and their mood |
| | **Disadvantages**<br>Newcomers may find it hard to break into the conversations<br>Following threads may become confusing<br>May be difficult and time consuming to moderate a large board<br>Group norms may develop that stifle new points-of-view and participation |
| **Real-timer, Text-based Chats** | **Characteristics**<br><br>Synchronous, text environments<br>Messages are short and conversation moves on quickly<br>Real-time auditoriums may be structured to accommodate large number of persons in a public chat<br>Instant messaging provides real-time chats for private groups<br>Participants register, pull technology – you have to go to the site |
| | **Advantages**<br>Provides a sense of immediacy<br>Allows people to communicant in real-time<br>Good for teaching classes, holding meetings, conducting interviews and to hang out and relax<br>Newcomers can learn to participate in chats easily<br>Participation is fast paced and entertaining |
| | **Disadvantages**<br>Must be online at a specific time to participate<br>No time to reflect, compose and edit postings.<br>Several conversations may appear at the same time and be confusing for participants<br>Conversations may get inter-twined because messages appear on a first come first displayed basis<br>Some types of real-time chat may require special download and configuration |

| Immersive Graphic Environments | **Characteristics**<br>Synchronous, interactive, navigable environments using graphics, sound, animation and customizable characters (avatars)<br>Highly versatile gaming e-business, learning and entertainment environments.<br>May be moderated or non moderated, open or public<br>Pull technology – you have to go to the site |
|---|---|
| | **Advantage**s<br>Interactive, visual and aural environments allow individuals creative freedom to express themselves<br>Provide highly collaborative Environments<br>May provide a broader experience<br>May generate a stronger sense of presence and engagement |
| | **Disadvantages**<br>Many types of immersive environments require high memory computers with audio ports, headsets, microphone and fast Internet access<br>May require downloading programs or plug-ins that work with specific browsers<br>The space can become crowded with avatars which limits interaction<br>Unclear how much value is added by these environments |

**Table 2  Characteristics, Advantages and Disadvantages of Various Online Community Technologies (Figallo, 1998, Kim, 2000; Preece, 2000)**

The Web makes it possible to integrate synchronous and asynchronous technologies so that users can benefit from both. For example, messages are left on boards or sent via email to coordinate and schedule chat or virtual world sessions. Instant messages are used to signal that a document has been posted for review and so on. These combinations of technologies and the web site on which they reside provide a richer basis for community than any single technology could on its own; they are the community. Furthermore, it is becoming increasingly difficult to distinguish between technologies for example instant messaging systems, chats and virtual worlds share more common more features.  However, technologies choices must ensure that all users will be able to participate with the equipment they own, and that software is intuitive, straightforward, and pleasant to use (Preece, 2000).   There are three design issues that are key to the success of online communities: supporting sociability, designing usability and criteria for evaluating online communities.

### 3.1 Supporting sociability & designing usability

Sociability is concerned with planning and developing social policies and supporting social interaction. Usability has been defined by many authors and operationalized over the last twenty years (e.g., (Bennett, 1984; Shackel, 1990; Shneiderman, 1986; Dumas & Redish, 1999; Nielsen, 1993; Nielsen & Mack, 1994; Preece, Rogers, & Sharp, 2002). Sociability is a newer concept that still needs to be operationalized (Preece, 2000). Because online communities are evolving continuously, developers must accommodate changes by regularly revisiting sociability and usability decisions. Developers of traditional systems office systems, record systems, air traffic control, do not need to deal with this type of continuous evolutionary change. This is a challenge for many software developers who are not used to working on a continuously moving target.

Key components of usability, often described as principles, guidelines or heuristics depending on the role in design and evaluation (Preece et al., 2002) are by now well understood and can be used as a framework to guide development. But accepted frameworks for sociability have not yet been established because sociability is a new concept with many components as the discussion in the previous section testifies. Despite there being gaps in our fundamental knowledge of social interaction in online communities, a framework is needed to guide designers' thinking and to help them focus on key issues so that they do not become bogged down in details. Preece's pillars of participatory community-centered development aims to provide such a framework (Preece, 2001 in press). The key components of sociability in this framework are the community's purpose, its people and the policies that help to guide online behavior. The key components of usability are dialog and social support, information design, navigation and access. Applying this framework and showing how the components that make it up are related is step towards systematically incorporating sociability and usability into design and development of online communities (Preece, 2000). The components of sociability – purpose, people and policies, will now be described briefly.

Purpose - defining the community's purpose is important so that potential participants can immediately find out about the communities goals (Kim, 1998; Preece, 1999c; Preece, 2000). Giving the community a meaningful name, and providing a clear, readable definition of its purpose helps to discourage people from joining who are not committed and encourages empathy by bringing like-minded people

together. This in turn may encourage common ground to be established more easily, mitigates any effects of pour social presence online and may foster trust. These effects can discourage off-topic discussions and can help to reduce frustration.

People - the sociability and usability needs of participants are central in community development. As in other kinds of software development individual differences must be taken seriously but so must the collective needs of the community. Communities for children will have different characteristics from those for adults. Support communities are different from religious, ethnic and political discussion groups. Knowing who the members of the community will be enables developers to cater for their needs. Some communities deliberately try to restrict access in order to make achieving this purpose easier; others achieve the same thing by defining themselves narrowly. If the community is intended for a wide range of users different versions of the interface may be needed. For example, basic information such as 'help' and governance policies could be provided in different languages. There could be different versions for people with disabilities, limited experience, children, and seniors?

Policies – supporting development of governance is often better than letting serendipity take its course. Every community will have its own culture and as it develops agreed sets of values, norms and other governance procedures will develop. Deciding which policies are needed, particularly early in a community's life and working with participants to develop them, and then making sure they are enforced is an important task. Policies must be strong enough to guide community behavior but flexible enough to change as the community evolves.

The basic requirements for the usability are similar to those for other software. Software should be consistent (e.g., have a consistent look and feel); users should be in control of what the software does, not controlled by it; and the way the software responds should be predictable (Shneiderman, 1998). Other definitions state, for example, that software should be: effective to use, efficient to use, sage to use, have good utility, be easy to learn, and easy to remember how to use (Preece et al., 2002). While different aspects of usability for online community software is discussed (e.g., Erickson et al., 1999) coherent usability guidelines are not available. The components of usability – dialog and social support, information display, navigation and access, will now be described briefly.

Dialog and social support – these usability issues include how long it takes to learn the dialog protocol, how difficult it is to send or read messages, or perform other actions. Users should also be satisfied with the nature off the dialog and social support, make few errors and be able to remember what to do when they return to community on future occasions. Increasingly textual systems are appearing on the market with more advanced features including ability to include in messages, and ways of signally message content and participants moods.

Information display - these usability issues include how easy it is to find information (e.g., Help) and to perform tasks with information-oriented goals with few or no errors. Whether users are satisfied with and like the information design and how it is structured.

Navigation – navigation is a key usability issue for any web application including online communities; particularly communities of practice which involve a large amount of information exchange. Key issues include the length of time it takes to learn to navigate through the community and its associated information resources, the time and ease with which particular information can be found or a part of the community can be reached. How memorable and intuitive the navigation system is depends on a number of things including the metaphor it is based on, the breadth versus depth of the menu system, how intuitive the icons and menu names are, etc. The number of errors or dead-ends that users go down and their satisfaction with the navigation system or also key considerations. Threading and improved search facilities are making it easier to navigate many systems.

Access - an increasingly important usability feature for online communities. Developers have to ask themselves whether users can access the community with the equipment that they have available and whether they can read and send messages and whether response times are reasonable. If software has to be downloaded, users must be able to do this with comparative ease and in a timely manner. While research on 3-D, graphical user interfaces may suggest how to solve problems associated with low social presence in textual environments, these systems require high bandwidth communications technology in order to use them satisfactorily. The majority of the world's users will not have access to such systems for many years, so attention to access is important for bringing greater equality to the Internet and ensuring that those from poorer regions of the world can participate. Alternatives may also be found that may include wireless telephone and other hand-held devices.

### 3.2 Relating sociability with usability

Sociability and usability are closely related and often influence each other. (In many respects sociability is a new component of usability.) Consider for example, taking a decision on whether community members should register to join a community. The decision to have registration, what the policy says, what information is requested from registrants, what promises are made about privacy and security, etc. involves sociability issues. The mechanics of registering has to be designed in the software and involves usability decisions. The registration form (if a form is used) should have a clear, consistent design that reduces frustrating errors. The way terms are used should be consistent and meaningful and so should the typography. The form should also be engineered to reduce the possibility of users making frustrating errors. Table 1 contains nine questions that online community participants frequently ask and discusses some of the possible solutions (Preece, 2001) for improving sociability and usability. It informs online community development by providing the users' perspective.

| Users' questions | Sociability implications | Usability solutions |
|---|---|---|
| **1 Why should I join this community?** *(purpose)* | Consider what the title and content should communicate about the community's purpose. What information is needed and how should it be presented? | Provide a clear title and statement of purpose that is concise and consistent. Graphics should not detract from the main message. |
| **2 How do I join or leave?** *(policy)* | Should the community be open or closed? This will depend on the sensitivity of topics discussed and whether participation needs to be controlled, etc. | Consider requiring registration. If there is registration, provide clear instructions, make the procedure short and give reassurance that personal details are private and will not be revealed to third parties. |
| **3 What are the rules?** *(policy)* | What kind of policies will support the community's purpose? Is a moderator needed to enforce rules or arbitrate in disputes? Are disclaimers, copyright regulations, etc. needed? | Provide clearly, concisely worded policies and appropriately position them. If moderation is needed provide tools and policies to support the moderators. |

| | | |
|---|---|---|
| *4 How do I communicate with others in the community?* *(policy)* | Consider what newcomers will need to enable them to feel part of the community and communicate with others. What do the old-timers need? How might participants' needs change over time? Is private communication important? | Determine what kind of usability support is needed for different groups in the community. Consider providing templates, emoticons, FAQs, single messages or digests for listservers, search facilities, ability to send private messages (i.e., back channel), etc. |
| *5 Can I do what I want easily and get what I want?* *(purpose)* | Consider the social needs of the community. What's the community's purpose and who is it for? For example, is broadcast, private communication, long-term information, synchronous and asynchronous communication needed? | Decide how to support different communication tasks, e.g., synchronous and asynchronous media, FAQs, enable users to express content and feelings and search, provide help at the right level, allow private communication etc. |
| *6 If I give will I get back?* | How can reciprocity be encouraged? | Acknowledge responses to questions, offers of help & support. |
| *7 Is the community safe?* *(policy)* | Consider whether a moderator and stronger rules are needed to ensure appropriate behavior and support the community's purpose. Is confidentiality, security, & privacy important? How will trust be encouraged? . | Find ways to: protect personal information; secure transaction processing; support private discussion; protect people from aggression, support trust by providing evidence of past behavior. |
| *8 Can I express myself as I wish?* *(purpose)* | Determine the kind of communication a community with this purpose wants. How should it be supported? | Provide emoticons, content icons, consider whether avatars, personal pages, seamless links to private email, etc., are needed. |
| *9 Why should I come back?* *(purpose & policy)* | Decide how to keep people interested and entice them to keep coming back. The question being asked is what's in it for me? | Provide changing content: e.g., news broadcasts, real-time discussions, encourage provocateurs and leaders to stimulate social interaction, focus on purpose, etc. |

**Table 3 Nine questions that users' ask, some sociability implications and usability solutions (adapted from Preece, 2000).**

### 3.3 Determinants of success

Excellent evaluations are published in accounts of novel systems. For example, Lili Cheng and her colleagues discuss a series of tests to evaluate prototypes of HutchWorld, a 3-D graphical chat environment for cancer patients. As well as finding ways of improving and fine tuning their design, these researchers learned that patients wanted asynchronous communication so that they could plan to meet online to chat synchronously (Cheng, Stone, Farnham, Clark, & Zaner-Godsey, 2000). Erickson, and his colleagues evaluated IBM's Babble system, to test the efficacy of a graphical representation of users online behavior and to ascertain how well it was liked (Erickson & Kellog, 2000). But despite an increasing interest in online community design there has been little attempt to identify criteria that indicate whether a particular community is successful or even what these criteria might be and how could they be assessed and measured?

Roxanne Hiltz discusses possible determinants of success for educational online communities (Hiltz, 1994) and a recent paper by Preece provides a more general initial set of possible determinants for sociability and usability. Some indicators of good sociability could include: the number of participants in the community (high in successful communities); the number of lurkers (the ideal number depends on critical mass of the community) (Nonnecke, 2000; Nonnecke & Preece, 2000); the number of messages (high in successful communities); the number of messages per participant (high); how much reciprocity there is as indicated by, for example, the number of responses per participant (high); the amount of on-topic discussion (high); how empathic the interaction is (high in support groups but it would vary according to the type of community); the level of trust (high); participants' satisfaction with social interaction in the community (high); the number and type of incidents that produce uncivil behavior (low in successful communities); average duration of membership (high); and the percentage of people who are still members after a certain period of time (high); etc. (Preece, 2001 in press).

Some determinants of good usability might be: speed of learning to use the interface (should be high in successful communities); retention, i.e., how much a user remembers about the mechanics of interacting with the online community software (should be high in successful communities); productivity,

i.e., how long it takes to do standard tasks such as reading or sending, searching, etc. (should be high); the number of errors that occur when doing communication tasks (should be low); and users' satisfaction using the software (should be high); etc. (Preece, 2001 in press).

Table 3 provides a summary of some possible determinants of success for online communities and relates them to the sociability and usability framework. In most cases the determinants do not directly speak about purpose and policy but they provide evidence that is indirectly indicative. To gain an overall impression of the success of the community several measures of sociability and usability are needed. Furthermore, evidence from interviews and ethnographic studies will also be useful. (See section 5 for more about these methods.)

| Framework | Design criteria | Examples of determinants of success |
|---|---|---|
| Sociability | Purpose | How many and what kinds of messages or comments (or comments per member) are being sent? How on-topic is the discussion? How much interactivity is occurring? How much and what kind of reciprocity occurs? What is the quality of the peoples' contributions and interactions? |
| | People | How many and what kinds of people are participating in the community? What do they do and what roles are they taking? How experienced are they? What are their ages, gender and special needs, etc.? |
| | Policy | What policies are in place? For example, registration and moderation policies to deter uncivil behavior. How effective are the policies? How is relationship development being encouraged? For example, what kinds of policies encourage trustworthiness and how effective are these policies? |
| Usability | Dialog & social support | How long does it takes to learn about dialog and social support? How long does it actually take to send or read a |

| | | message, or perform some other action, etc.? Are users satisfied? How much do users remember about dialog and social support, and how many errors do they make? |
|---|---|---|
| | Information design | How long it takes to learn to find information (e.g., Help)? How long does it takes to achieve a particular information-oriented goal? How satisfied are users? How much do users remember after using the system? Can users access the information they need without errors? |
| | Navigation | How long does it take to learn to navigate through the communication software and web site or to find something? Can users get where they want to go in a reasonable time? How much do users remember about navigation? How satisfied are they? How many and what kinds of errors do they make. |
| | Access | Can users get access to all the software components that they need? Can they down load them and run them in reasonable time? Are response times reasonable? What problems do they encounter when trying to download and run software? |

**Table 4 Some examples of determinants of success for sociability and usability of online communities (adapted from Preece, 2001).**

## *4        Different types of communities*

The use of the Internet to link individuals with others sharing common interests provides the scaffolding for building communities that offer support, solidarity, information and social capital (Wellman & Frank, 2001).'The human need for affiliation is at least as strong as the need for information' (Kahin & Keller, 1995). Even though the Internet provides exposure to diverse groups and ideas, people are most strongly drawn to online groups that share their interests and concerns (Preece, 2000; Wellman, 2000; Wellman & Frank, 2001).

Online communities of interest or practice have developed to support all kinds of interests. For example, there are communities for expatriates, gardeners, genealogists, hobbyists, professionals, gamers and also senior citizens, who have become one of the largest demographic groups on the Internet (Rainie & Packel, 2001). Spiritual groups create online communities to promote their beliefs, and there are interfaith health groups and bible study groups. Communities of practice create new products, processes, and services online. The darker side of the Internet is also represented by groups of Neo-Nazis, child pornographers and the Klu Klux Klan who have establish online communities to recruit new members and support their organizations (Breeze, 1997; Church, 1996; Furlong, 1996; Gunderson, 1997; Moon & Sproull, 2000; Wenger & Snyder, 2000)

Technology user communities include the customers of corporations. Microsoft, for example, has a gateway to information and services that invites their users to join Microsoft Communities http://communities.microsoft.com/: "…. launching pad for communicating online with others about Microsoft products, technologies, and services.  Converse with peers and experts in open forums." One of the best-known online technology user groups is the Linux developers. They are creating a collaborative open-source, PC-based operating system (Moon & Sproull, 2000) and the community is an informally bound group of people who share their expertise and passion for this joint project. This vigorous community comprises more than 3,000 developers, living in over 90 countries on five continents.  Through their interactions the community has developed their own ways interacting and norms for behaving (Baym, 2000; Wenger & Snyder, 2000).

There are many different kinds of online communities, as we have said, and we cannot describe them all, so in this section we discuss patient support, education, and e-business communities. Although each community is unique and has its own characteristics, communities that share a common purpose generally share some characteristics.

**4.1     Patient support**

We are witnessing doctor-patient relationships being transformed by the Internet (Rice, 2001). Patients are learning about their own problems and going to doctors empowered to discuss them on a more equal basis. Some doctors embrace this change, other feel that their expertise is challenged (Kahin & Keller, 1995). Patients who come online want to learn about their diseases; find information; get support;

help fellow-suffers; and be less afraid. They can get information from web sites, but online communities are more personal. Talking to other patients can be comforting and reassuring in ways that talking to even the most skillful and communicative physician may not be. Furthermore, getting enough face to face interaction with doctors is a problem everywhere in the world and attending face to face support groups may not be convenient. Online communities enable patients to share experiences and relate to each other's problems (Davidson, Dickerson, & Dickerson, 2000). Other patients have been there (Preece, 1998) and can respond empathetically (Ickes, 1997) which may encourage strong relationships to develop making these communities some of the most important on the Internet. The benefits that an online health community can provide for its members are especially valuable for people who lack mobility, or are socially or geographically isolated (Cummings, Sproull, & Kiesler, 2001; Davidson et al., 2000; Sproull & Keisler, 1986).

People access online health communities through the Web pages, bulletin boards, listservs, and chat sites in which they create a sort of group narrative that is also typical of face to face self-help groups (Rappaport, 1996). Typically an individual starts a thread by posting a question or comment to which others reply; all the threads can be read by anyone on the site. Many online health communities also provide opportunities for members to communicate privately by sending private e-mail or having side conversations (e.g., whispering in a chat room) (Cummings et al., 2001; Preece, 1998; Preece, 1999a; Preece, 2000; Preece & Ghozati, 2000). It is well documented that many people choose not to post messages but do spend a lot of time reading the conversational threads – i.e., lurking. In a study of lurking behavior in 77 listserver patient support communities 45% of the members did not post during the three-month period of the study (Nonnecke & Preece, 2000). Lurking in the 21 technical support groups that were also studied was much higher, at around 82%, which suggests that different categories of communities may indeed exhibit different characteristics.

According to the Pew Internet & American Life: Online Life Report, 2000, Fifty-two million American adults, or 55% of those with Internet access have researched a disease or medical condition on the Internet and the number continues to grow (Rainie & Packel, 2001). A large proportion of those researching a disease or medical condition online go to bulletin board, UseNet News or listserver communities (Rice, 2001). Forty-eight percent of those who sought health information online reported that

the advice they found improved the way they take care of themselves and 55% said that access to the Internet improved the way they get medical and health information (Rainie & Packel, 2001). A recent edited volume by Ron Rice and James Katz is crammed full of facts and figures (Rice & Katz, 2001).

Online health communities also have a dark side. Physicians are rightly concerned about patients getting incorrect information. A University of Michigan 1999 survey of 400 health related sites found that 6% provided incorrect information and the Federal Trade Commission estimates that only about half of the content on health and medical Web sites is reviewed by doctors (Rainie & Packel, 2001). An increasing number of online communities now support question and answer sessions with real doctors (e.g., drkoop.com, drweil.com) but some doctors do not like this practice either, because online doctors do not see patients or know their backgrounds. These are real dangers and patients need encouragement to become discerning consumers of medical information. The American Medical Association has launched a campaign to inform consumers that they must check the quality of health information they get online (Rainie & Packel, 2001). In addition, members of online health communities may experience negative, hostile or malicious exchanges that come about in the online environment because people have a lack of fear of social sanctions and feelings of depersonalization (Fox, 1996; Fox & Rainie, 2000; Sproull & Keisler, 1986).

Privacy is also a big concern for those people accessing health sites on the Internet (Katz & Aspden, 2001). Eighty-nine percent (89%) of those who use the Internet to get health information express concern about a health site selling or giving away information about their online activity. Eighty-five percent (85%) fear that their insurance company might raise their rates or deny them coverage if they find out what health sites they visit, and 52% express concern that their employer could find out what online health sites they had visited (Rainie & Packel, 2001).

Supporting people coping with illness who may lack both physical and emotional stamina also requires special features. For example, as we mentioned, the developers of the HutchWorld 3-D synchronous chat environment for cancer patients discovered that they needed to include asynchronous communication so that patients did not have to be present at a particular time. Treatment regimes, days when patients felt unwell and doctors' visits frequently prohibited their involvement in synchronous chats which was frustrating. Also, they liked being able to leave messages when they felt like it and the ability to organize synchronous chats with other patients, family, friends and care-givers (Cheng et al., 2000).

Ninety-three percent (93%) of those people who got health information online say that being able to access help and information 24 hours a day is very important (Pew, 2001). A recent study of an online self-help community for hearing impaired people brings new evidence that participants reported above average benefits when family and friends also participated in the online support group (Cummings et al., 2001). The study's findings also supported previous research that people who lack social support are more likely to actively participate online. So, apart form privacy and security, key sociability and usability concerns involve supporting communication and personal relationship development among people whose disease may limit their access.

**4.2     Education**

Distance education in which students learn from materials on the Web is becoming widespread. Consequently, some students may not interact with class-mates face to face which is a concern because learning is an intrinsically social process (Hiltz, 1998; Vygotsky, 1978; Vygotsky, 1986). Online communities, therefore, have a role in bringing social interaction to learning and supporting the learning process. Used creatively they help to prevent 'digital diploma mills' from developing (Noble, 1998), in which the students' learning experiences are limited to reading and absorbing facts from the Web (Winner, 1995). Technology can be used to create learning communities that foster collaborative learning so that students can learn together and benefit from sharing ideas and resources supported by skillful moderators and mentors (Hiltz, 1998; Salmon, 2000). Supported by both physical and virtual communities students are succeeding with ambitious projects that they could not have done without the Internet (Lazar & Preece, 1999b; Lazar et al., 1999). They can communicate with others in the same region, country or across the globe, and find state of the art research on the Web that their professors do not know about. This adds a new dimension to learning that can be threatening for professors. More and more professors are having to accept that their role is to guide students to meaningful learning activities in a learner-centered process rather than to be the teacher in a traditional teacher-centered one (Berge & Collins, 1995; Hiltz, 1998). .

Amy Bruckman describes two types of online educational communities: knowledge-building communities and Technological Samba School (Bruckman, 1999). Knowledge-based educational communities focus on knowledge sharing and collaborative learning through projects where, for example, children from around the world collect and share data to build an understanding of environmental issues

(See the TERC/National Geographic Acid Rain project at http://globalab.terc.edu/.) Projects such as the Jason project, (www.jasonproject.org/), allow students to participate in scientific research through interactive video-conferencing and remote control of instruments provide rich collaborative learning environments. Seymour Papert introduced a term 'Technological Samba Schools', to describe a process whereby a community of people of all ages engage in a creative project using computers (Papert, 1980). He got the idea from watching a community of Brazilians – children to grandparents - learning to samba; everyone was teaching and learning. The MOOSE Crossing project,(www.cc.gatech.edu/elc/moose-crossing), is an example of a technological samba school. A MUD, it provides children with programming languages that are easy to learn so they can build virtual places and objects. As they work, they are learning creative writing and computer programming in a peer-supported environment (Bruckman, 1999).

Online professional groups that serve educators have also evolved into communities with large numbers of people seeking information and support. For example, WMST-L, a listserv created in 1991 provides a forum for women from around the world to share women studies teaching materials and ideas, network and provide emotional, social and professional support (Korenman, 1999). MediaMOO, a MUD, (www.cc.gatech.edu/~asb/MediaMoo), for media researchers, functions like an 'endless reception for a conference on media studies' (Bruckman, 1999, p. 13).

Sociability and usability considerations for educational applications depend on the purpose of the community and whether it is a closed class-based community or an open community. Small class-based communities have a small number of participants so critical mass can be a problem unless there are goals to motivate student involvement. Some professors therefore set tasks to be graded, but intrinsic motivation for participation is obviously more desirable. Support for discussion, collaborative project work and access to resources (i.e., information, tools, etc.) are needed and sufficient moderation to protect students against inappropriate behavior and guide discussion. Better tools to support moderators would also be welcomed by educators. Privacy is another concern, both to protect students' grades and also comments made in discussions.

**4.3    E-business**

Driven by surveys such as the Pew Internet Project: Internet Tracking report: More online, doing more (Pew, 2001), reports that 52% of the 104 million American adults who have Internet access have

bought a product online. E-business companies view building online 'brand' communities as a marketing strategy. These companies seek to build a new kind of relationship with their customers through online communities (Hagel & Armstrong, 1997). Many companies began using the Internet by developing web sites that provided product information, direct sales, and customer service but increasingly they are hosting interactive consumer-to-consumer (C2C) online community sites organized around their brand, products and services to create reinforcing, competitively distinctive and long-lasting relationships with consumers (McWilliams, 2000). Tightly interwoven with sales details and product information, companies use 'stickiness technologies' like e-mail, chat rooms, affinity groups and bulletin boards to encourage customers to stay at the site longer interacting with each other, the company and buying products and services (de Figueiredo, 2000; Preece, 2000). For example, the REI site, (www.rei.com), reinforces the company's image as a high quality retailer of outdoor gear that cares about their customers by embedding online communities in its Web site. These communities encourage consumers to communicate with each other about interesting hiking, biking, boating and skiing, locations and even helps them match up with each other for trips and activities. The Kodak Company's web site, www.kodak.com, also has an embedded discussion board that serves as a gathering place for discussion of photography and visual storytelling. Companies like these hope to gain marketing edge and build product loyalty by fostering genuine relationships with and between their customers (McWilliams, 2000). Service providers, such as Yahoo and MicroSoft, host large numbers of online communities to encourage traffic to their sites where they carry advertisements.

E-business companies want to expand their markets by reaching customers worldwide via the Internet; market their products directly to the consumer and accumulate detailed customer profiles for target marketing new and existing products and services. In addition, communications between consumers at these sites provide the companies with valuable feedback about the needs, likes and dislikes of their consumers (de Figueiredo, 2000; Hagel & Armstrong, 1997; McWilliams, 2000; Preece, 2000) (Venkatraman, 2000). Companies use customer communities to test new product ideas, involve customers in product development, to monitor customers' purchase patterns, and to gauge early demand for products. This type of information is used to make their brick and mortar stores, as well as their e-business sites, more responsive and efficient (Tedeschi, 2001; Venkatraman, 2000). The online arm of Toys'R'Us,

ToysRUs.com noticed customers' preference for indigo game consoles and certain game titles through advanced promotion, sweepstakes promotions and advanced sales at their online site of Nintendo's Game Boy Advance handheld console and the software that went with it. The company had not planned to carry the most popular title sold online, Hot Potato, in their retail stores and the manufacturer of the consoles had produced consoles in equal quantities of three colors. However, as a result of the information gained from their online site, the company changed their in-store marketing plans and worked with the manufacturer to produce more indigo consoles in future production runs (Tedeschi, 2001).

People who buy from web-based retailers want value for money, their personal details to be secure and private, and to receive goods and services in a timely manner. Trust and privacy are key issues for customers. In a recent study at Brigham Young University that surveyed 4000 adult Internet users, researchers discovered that 'credit card fear' is the single most important factor that distinguished people who shop online from those who do not. Non-shoppers are afraid that their credit card will be stolen and that merchandise will not be delivered (Stellin, 2001). E-Bay's reputation system and Amazon review process help to alleviate some of these fears. The infrastructure for e-business sites must be designed to make it easy for customers to use the site without 'sacrificing their trust about reliability, security and privacy (Venkatraman, 2000).

Designers of e-business communities must also consider the companies' business model and brand strategy and realize that online markets may be better served by focusing on customers rather than on products (Hagel & Armstrong, 1997; McWilliams, 2000; Tedeschi, 2001). In Four Smart Ways to Run Online Communities, (Williams & Cothrel, 2000b), point out that member development, asset management and community relations involve issues related to technological choices, social policies and practices. Designs have to be both socially and technically feasible (Figallo, 1998; Preece et al., 2002) and Kim stresses practices for actively growing online communities, including staging events and ensuring that there is always fresh content (Kim, 2000).

## 5 Research techniques

There is a large catalog of research techniques can be drawn on from the social science, psychology, HCI and CSCW. Which are actually chosen at any time depends on the question(s) to be addressed and the training and skills of those doing the research. However, there are some special

challenges associated with researching into online communities. Intervening in how a community functions changes the fundamental nature of the community and would also be unethical. Conducting surveys can also be tricky because a community's population may change from day to day or be unknown, which makes unbiased sampling impossible.

At a workshop in the early 1990s Stu Card characterized the growth of new disciplines in four stages (Card, 1991; Olson & Olson, 1997). At the time he was considering HCI but his model is widely applicable and can be used to analyze the emergence of interest in online communities. The first stage in the model involves starting to build, observe and evaluate communities, which continues to intensify during the second stage. In the third stage dimensions of success are identified which lead to the development of theories and laws in the fourth stage, which characterize a mature discipline.

When applied to online communities this model helps to explain how this new field of research is developing. There are examples of case studies, rich ethnographic descriptions and anecdotes about experiences in online communities. Surveys, interviews and data logging are also starting to be widely used. Models and theory from other fields are imported to support and help explain the phenomena observed. Some of these may have particular techniques associated with them as in social network theory that uses sociograms to show social relationships.

In this section we briefly review the most commonly used research techniques and explain why and when they are used.

## 5.1        Ethnography and associated techniques

Ethnography is a popular approach for understanding the dynamics of online communities, particularly early in the study of a community. This research tool, borrowed from anthropology and sociology, is a qualitative research method for understanding how technology is used *in situ.* The purpose of ethnographic research is to build a rich understanding of a group or situation from the point of view of its members/participants (Fetterman, 1998). Ethnographic research is becoming an increasingly popular method for studying the Internet because of the unique way it contributes to understanding technology, and 'the culture that enables it and is enabled by it' (Hine, 2000). Ethnography is especially useful for studying online communities because it causes little disturbance to the community. It is also useful because research questions are refined throughout the study as valuable details become known.

A variety of data collection techniques are used in ethnographic research including participant observation in which researchers participate in the community. This involves observing what is happening, doing in-depth interviews, taking notes, collecting artifacts and participating in the activities of the community in order to gain a better understanding about how the community functions (Preece et al., 2002; Walcott, 1999).

There are important ethical considerations. How much and how often should inform the community about their study and how much information should be revealed about the data sources (Herring, 1996). Brief descriptions of two examples help to illustrate how ethnography is used to understand online communities and how the researchers dealt with the ethical issues.

The first is a longitudinal study by Nancy Baym in which she joined an online community interested in soap operas as a participant observer for over a year in order to understand how the community functions (Baym, 1997; Baym, 2000). Baym comments: 'As a longtime fan of soap operas, I was thrilled to discover this group. It was only after I had been reading daily and participating regularly for a year that I began to write about it. As the work evolved, I have shared its progress with the group members and found them exceedingly supportive and helpful.' (Baym, 1997; Baym, 1997) By adopting this honest approach she gained the trust of the community, who offered support and helpful comments. Because the researcher's presence can be hidden so easily and people's privacy abused sensitivity to these ethical issues is needed (Markham, 1998). As Dr. Baym participated she learned who the key characters were, how people interacted, their values, the types of discussions in which they engaged. She also adapted interviewing and survey techniques to support her observations and to enrich her account of the community (Baym, 2000).

In a study lasting several years David Silver observed and compared the day to day activities in two networked communities, the Blacksburg Electronic Village (BEV) and the Seattle Community Network (SCN) (Silver, 1999). These participant observations set the stage for face to face and online interviews that led to a deeper understanding of the differences between the two communities. He realized that the more market-driven nature of BEV, which was originally set-up with funding from commercial organizations (Cohill & Kavanaugh, 1997) compared with grass-roots development of SCN by community reactivists (Schuler, 1994) had far-reaching consequences for the character of the two communities. Silver

asked the communities' permission to study them and frequently shared his findings with them. This also enabled him to check that he had understood particular events from the community's and participants' perspective. On some occasions Silver also did face to face interviews.

Techniques that are frequently used with ethnography for data analysis include content analysis, discourse analysis and various types of linguistic analysis. For example, content analysis was used to examine how much of the communication in a patient support community was empathic and how much was factual (Preece, 1999a) and to compare the type of communication that occurred in different kinds of communities (Preece & Ghozati, 1998; Preece & Ghozati, 2000).

In discourse and other types linguistic analysis the researchers focus more strongly on the intentions of the communicators. For example, Susan Herring did a study in which she investigated why textual computer-mediated communication is so popular despite the inherent incoherence caused by repetition of messages, fragmented discussions, and breaks in turn-taking, etc. Herring suggests that a possible explanation is 'the ability of users to adapt to the medium, and to except incoherence in exchange for greater interactivity' and communication (Herring, 1999). In other words, if users get enough from the technology they will put up with problems or find creative ways to work around them – a concept that has been called 'adaptive structuration' by some researchers (DeSanctis & Gallupe, 1987; Hiltz & Turoff, 1993).

(Erickson, 1997) proposes using the concept of 'genre' to analyze on-line discourse. He believes that analysis of the purpose of the communication, it regularity of form and substance, and the institutional [for those that are institutionally based], social and technological forces that affect communication is more important to understanding on-line communication than the relationships between community members (p. 2). This method may also be useful when looking at online communities like The Palace™, which are supported by a graphical environment for meeting and chatting, where participants do not form lasting relationships, share few values and do not count on each other for help or provide information.

Not only does ethnography fit well within Card's model of how early studies are conducted in new disciplines, it is also a fundamental approach for understanding community, having developed from anthropology. The technique causes minimal disruption to the community and provides rich descriptions laced with persuasive anecdotes. Although quantitative comparisons are sometimes made (Fetterman,

1998) (e.g., using content or other analysis techniques), they are often missing, which is seen as a limitation of this approach by some researchers.

## 5.2     Data logging

Data logging can be used to examine mass interaction without disturbing the community. Examples include studies of the demography of UseNet News (Smith, 1999), and lurking in listserver communities (Nonnecke & Preece, 2000). Smith's (1999) research mapping the social structure of the Usenet provides a general topology that shows the amount of activity and relationships within this huge and geographically diverse network. The study looked at the technical and social components of the Usenet examining variation across the whole system in hierarchies, newsgroups, posts, posters and cross posting (Smith & Kollock, 1999).

Nonecke and Preece conducted a demographic study of lurking (those who read but do not post) on email-discussion lists in health and software-support groups (Nonnecke & Preece, 2000). Lurkers are of interest to researchers because estimates generally assume that lurkers make up over 90% of the population of online communities. However, as mentioned earlier, the results of this study showed that there were considerably fewer in these communities. Different communities, supported by different kinds of software are likely to vary on this as on most other characteristics.

Visualization tools are starting to be used by online community researchers to explore trends in large data sets. The MIT Media lab's Sociable Media research group http://smg.media.mit.edu , engages in research projects to develop intuitive visual representations of social information that provide a vivid sense of the abstract space in online groups (Donath et al., 2001; Xiong & Donath, 1999).

A paper by Mark Smith and Andrew Fiore provides a review of some of these techniques (Smith & Fiore, 2001) and an example of the application of the treemap visualization technique (Shneiderman, 1992) for analyzing UseNet News groups. It also discusses a tool for visualizing discourse in very large conversations (Sack, 2000b).

Together data logging and ethnography provide a broad picture of online community activity in which both qualitative and quantitative aspects are represented.

**5.3     Questionnaires**

Questionnaires are useful for collecting demographic information and have the advantage that they can be distributed by hand to local participants, or posted via email or on the Web (Harper, Slaughter, & Norman, 1997; Lazar & Preece, 1999a). In a study to identify the defining characteristics of online community, Terry Roberts emailed questionnaires to a selection of UseNet News Groups (Roberts, 1998). Three dimensions were used to select the groups: topic area, traffic and the gender balance in the groups. Using analysis of variance primarily Roberts identified six dimensions that 'add up to a factor that one might call community'. Another study used online questionnaires to assess the resistance of different demographic groups to participating in an online community for career changers (Andrews, Preece, & Turoff, 2001). This study emphasizes the importance of developing a thorough understanding of a demographic group's distinctive characteristic in order to build sustainable online communities for the target audience.

While the Internet is a powerful and inexpensive distribution mechanism for, there are major sampling problems because Internet populations are often unknown as we said already. For this reason national census records are being used to obtain unbiased samples. (See webuse.umd.edu).

**5.4     Experiments and quasi-experiments**

Laboratory studies are valuable for testing the usability of the interface and users' reactions to new user interface features. For example, trust is a key factor for developing relationships in e-business, which can be investigated using laboratory experiments (Bos, Gergle, Olson, & Olson, 2001), (Zheng, Bos, Olson, & Olson, 2001) to examine the effect of providing customers with different information about trust policies. However, it cannot usually be assumed that the results apply directly to online communities in the wild. However, some researchers are working to develop quasi-experimental techniques with better ecological validity. For example, B. J. Fogg and his colleagues worked with two companies on an experiment in which they intervened to change banner ads in order to study users' perception of the reputability of the web (Fogg et al., 2001). Such approaches could conceivably be used to investigate the impact of change in software design on online communities. Roxanne Hiltz has also developed powerful quasi-experimental approaches for comparing performance of students learning online with similar groups learning in classrooms (Hiltz et al., 1986; Hiltz, Turoff, & Johnson, 1989).

As with many new areas of research, researching online communities poses new challenges. Gradually as this field matures we can expect to see other techniques imported from other disciplines and adapted to provide both qualitative and quantitative information about life online.

## 6   Brief summary and agenda for future work

In this chapter we pointed out that there is no single definition of online community; different researchers focus on different issues (Section 1). In Section 2 we reviewed research that has contributed to our understanding of online community, starting with research about communication between pairs and small groups. Then we discussed group dynamics and interaction. Many of these concepts were then drawn together in Section 3, which focused on how knowledge of sociability and usability can be used in online community development. The participatory community-centered development method, and a framework for sociability and usability were proposed.

Section 4 examined three groups of online communities: patient support communities, education communities and e-business communities. Many other groups could have been discussed, such as religious, sports, and entertainment communities, which each have particular needs and characteristics, but because space limitations we focused on these three popular groups.

In Section 5 we returned to the issue of research and discussed key techniques used to research online communities. Currently ethnography tends to dominate but data logging is becoming increasingly popular. Because these methods do not attract attention, it is important for researchers to be cognizant of participants' rights to privacy and other ethical concerns.

The previous sections of this chapter now set the scene for proposing an agenda for future work for researchers and practitioners.

### 6.1    Researchers

Detailed agendas for future interdisciplinary research online been proposed (Brown, 1999b; Brown, 1999a; Brown et al., 1999). There are many topics that could be mentioned; some that are specifically relevant to this chapter include:

- Application of fundamental community concepts from the social sciences to understand online communities, e.g., social dilemma, reciprocity, weak and strong ties etc. and development of new theories that explain social interaction online.

- Techniques for showing and supporting social interaction

- Comparative studies of communities that look for similarities and differences.

- Case studies of the relationship between physical-virtual relationships, particularly the roles that online communities play in people's lives.

- Scalability, which includes taking account of universal usability and sociability in large communities of tens of thousands or millions of people.

- Development methods, frameworks to support sociability and usability in online community development, and techniques and measures for assessing the success of online communities.

**6.2    Practitioners**

Similarly, there are many topics for practitioners. Some of the most important ones include:

- Creating development processes that take account of sociability and usability. Every community is different so it is essential to pay attention to the details of its purpose and the needs of the members.

- Focusing on designing for universal sociability and usability when appropriate. Versions for low bandwidth are particularly important.

- Pay attention to different stages of development of online communities and be sure to provide moderator support early in the community's life. Support moderators and managers well so that they can support the community.

- Provide access from PCs, mobiles, web-tops, phones, handheld machines and wearables with well designed interfaces and interaction.

- Continue to find ways to integrate asynchronous and synchronous software so that users are not shocked by a new interface.

- Develop ways of scaling online communities to support large numbers of people from different cultures, with different kinds of experience using a variety of equipment for a variety of purposes (e.g., political communities, health communities, cultural communities, etc.).

- Develop ways of evaluate and measuring success that go beyond membership and participation metrics to reveal how well the sociability support and usability design supports the community.

Future research and development must focus on better understanding and developing theories to explain social interaction in textual and graphical communities accessed via a range of devices. Already existing usability methods need to be adapted for online communities. Most important, researchers and practitioners must pay attention to universal sociability and usability so that the millions of people who do not have state of the art broadband communications, and who do not speak English can participate. To do achieve this will also require the cooperation of hardware and software manufacturers, telecoms and service providers.

## *Acknowledgement*

## *References*

Ackerman, M. S., & Starr, B. (1995). *Social activity indicators: Interface components for CSCW systems*. Paper presented at the ACM Symposium on User Interface: Interface components for CSCW systems.

Andrews, D., Preece, J., & Turoff, M. (2001, 3-6 January, 2001). *A conceptual framework for demographic groups resistant to online community interaction*. Paper presented at the IEEE Hawaiian International Conference on System Science (HICSS).

Axelrod, R. (1984). *The evolution of cooperation*. New York: Basic Books.

Baym, N. (1997). Interpreting soap operas and creating community: Inside an electronic fan culture. In S. Kiesler (Ed.), *Culture of the Internet* (pp. 103-119). Mahwah, NJ: Lawrence Erlbaum Associates.

Baym, N. K. (2000). *Tune in, log on: Soaps, fandom, and online community*. Thousand Oaks: CA: Sage Publications.

Bennett, J. (1984). Managing to meet usability requirements. In J. Bennett, D. Case, J. Sandelin, & M.

    Smith (Eds.), *Visual display terminals: Usability issues and health concerns* . Englewood Cliffs:

    NJ: Prentice-Hall.

Berge, Z. L. (1992). *The role of the moderator in a Scholarly Discussion Group (SDG)*. Available:

    http://star.ucc.nau.edu/

star.ucc.nau.edu/~mauri/moderate/zlbmod.html.

Berge, Z. L., & Collins, M. P. (1995). Computer-mediated communication and the online classroom:

    Overview and Perspectives. In Z. Berge & M. Collins (Eds.), *Computer meidated communication*

    *and the online classroom* (Vol. I, pp. 1-10). Cresskill, NJ: Hampton Press, Inc.

Beyer, H., & Holtzblatt, K. (1998). *Contextual Design. Defining Customer-Centered Systems*. San

    Francisco: CA: Morgan Kaufmann Publishers, Inc.

Bos, N., Gergle, D., Olson, J. S., & Olson, G. M. (2001). *Being there versus seing there: Trust via video.*

    Paper presented at the CHI 2001, Seattle, WA.

Breeze, M.-A. (1997, ). Quake-ing in my boots: <Examining> clan: Community<construction in an online

    gamer population. *Cybersociology Magazine,* 1-5.

Brown, J., van Dam, A., Earnshaw, R.,  Encarnacao, J., Guedj, R., Preece, J., Shneiderman, B. & Vince, J.

    (1999b). Human-centered computing, online communities and virtual environments. *IEEE*

    *Computer Graphics, 19*(6), 70-74.

Brown, J., van Dam, A., Earnshaw, R.,  Encarnacao, J., Guedj, R., Preece, J., Shneiderman, B. & Vince, J.

    (1999a). Human-centered computing, online communities and virtual environments. *ACM*

    *SIGCHI Interactions, 6*(5), 9-16.

Brown, J., van Dam, A., Earnshaw, R., Encarnacao, J., G., R., Preece, J., Shneiderman, B., & Vince, J.

    (1999). Special report on human-centered computing, online communities and virtual

    environments. *ACM SIGGRAPH Computer Graphics, 33*(3), 42-62.

Bruckman, A. (1993). *Gender swapping on the internet.* Paper presented at the The Internet Society (INET

    '93) Conference, San Fransisco, CA.

Bruckman, A. (1999). *The day after Net day: Approaches to educational use of the Internet*. Available:

    asb@cc.gatech.edu.

Card, S. (1991). *Presentation on the theories of HCI at the NSF workshop on human computer interaction* . Washington DC, USA: National Science Foundation.

Carroll, J. M., & Rosson, M. B. (2001). *Better home shopping of new democracy? Evaluating community network outcomes.* Paper presented at the CHI 2001, Seattle, WA.

Cheng, L., Stone, L., Farnham, S., Clark, A. M., & Zaner-Godsey, M. (2000). *Hutchworld: Lessons learned. A collaborative project: Fred Hutchsinson*

*Cancer Research Center & Microsoft Research.* Paper presented at the Virtual Worlds Conference 2000, Paris, France.

Church, S. (1996, August 1996). Expatriate keeps in touch via the Web. *CMC Magazine,* 1-3.

Clark, H. H., & Brennan, S. E. (1991). Grounding the communication. In L. Resnick, J. M. Levine, & S. D. Teasley (Eds.), *Perspectives on Socially Shared Cognition* (pp. 127-149). Washington, DC: APA.

Cohill, A. M., & Kavanaugh, A. L. (1997). *Community networks: Lessons from Blacksberg, Virginia.* Norwood, MA: Artech House.

Collins, M. P., & Berge, Z. L. (1997, March 24-28.). *Moderating online electronic discussion groups.* Paper presented at the 1997 American Educational Research Association (AREA) Meeting., Chicago, IL.

Constant, D., Sproull, L., & Kiesler, S. (1996). The kindness of strangers: The usefulness of electronic wak ties for technical advice. *Organization Science, 7*(2), 119-135.

Culnan, M. J., & Markus, M. L. (1987). Information Technologies. In F. M. Jablin, L. L. Putnam, K. H. Roberts, & L. W. Porter (Eds.), *Handbook of Organizational Communication: An Interdisciplinary Perspective* (pp. 420-443). Newbury Park: CA: Sage.

Cummings, J., Sproull, L., & Kiesler, S. B. (2001). Beyond hearing: Where real world and online support meet. *forthcoming in*.

Daft, R. L., & Lengel, R. H. (1986). Organizational information requirement s, media richness and structural design. *Management Science, 32*, 554-571.

Davidson, K., Dickerson, J., & Dickerson, S. (2000). Who Talks: The social psychology of illness support groups. <u>*American Psychologists,*</u>  <u>*55*</u>(<u>2</u>), <u>205-217</u>.

de Figueiredo, J. M. (2000). Finding sustainable profitability in electronic commerce. *Sloan Management Review, 41*(4), 41-52.

DeSanctis, G., & Gallupe, R. B. (1987). A foundation for the study of group decisions support systems. *Management Science, 33*(5), 589-609.

Donath, J., Lee, H.-Y., boyd, d., & Goler, J. (2001). *Loom2-intuitively visualizing Usenet*. Available: http://smg.media.mit.edu/projects/loom2/ [2001, 6/10].

Dumas, J. S., & Redish, J. C. (1999). *A Practical Guide to Usability Testing (Revised Edition)*. Exeter: England: Intellect.

Eason, K. D. (1988). *Information Technology and Organisational Change*. London: Taylor Francis.

Eisenberg, N., & Strayer, J. (1987). Critical issues in the study of empathy. In N. Eisenberg & J. Strayer (Eds.), *Empathy and its development* (pp. 3-13). Cambridge: Cambridge University Press.

Ellis, C. A., Gibbs, S. J., & Rein, G. L. (1991). Groupware: Some issues and experiences. *Communications of the ACM, 34*(1), 38-58.

Erickson, T. (1997, January 6-10,1997). *Social interaction on the the net: Virtual community as participatory genre.* Paper presented at the Thirtieth Hawaii International Conference on System Sciences, Maui, Hawaii.

Erickson, T. (1999). *Persistent Conversation: Discourse as Document* . Paper presented at the  Thirtieth Hawaii International Conference on Systems Science, Maui, Hawaii.

Erickson, T., & Kellog, W. A. (2000). Social translucence: an approach to designing systems that support social processes. *ACM Transactions on Computer-Human Interaction, 7*(1), 59-83.

Erickson, T., Smith, D. N., Kellog, W. A., Laff, M., Richards, J. T., & Bradner, E. (1999). *Socially translucent systems: Social proxies, persistent conversation, and the design of Babble.* Paper presented at the CHI 99 Human Factors in Computing Systems, Philadelphia.

Etchegoyen, R. H. (1991). *The Fundamentals of Psychoanalytic Technique*. New York: Karnac Books.

Farnham, S., Smith, M. A., Preece, J., Bruckman, A., & Schuler, D. (2001, 31 March - 5 April). *Integrating diverse research and development. Approaches to the construction of social cyberspaces.* Paper presented at the Chi 2001, Seattle,.

Feenberg, A. (1989). The written word: On the theory and practice of computer conferencing. In R. Mason & A. Kaye (Eds.), *Mindweave: Communication, Computers and Distance Education* . New York: Pergamon Press.

Feenberg, A. (1993). Building a Global Network: The WBSI Experience. In L. M. Harrisim (Ed.), *Global Networks: Computers and International Communication* (pp. 185-220). Cambridge: MA: MIT Press.

Fernback, J. (1999). There is a There There. Notes Toward a Definition of Cybercommunity. In S. Jones (Ed.), *Doing Internet Resarch. Critical Issues and Methods for Examining the Net* (pp. 203-220). Thousand Oaks: SAGE Publications.

Fetterman, D. M. (1998). *Ethnography: Step by step (2nd. edition)*. (Vol. 17). Thousand Oaks, CA: SAGE Publications.

Figallo, C. (1998). *Hosting Web Communities*. New York: John Wiley & Sons, Inc.

Fogg, B. J., Marshall, J., Kameda, T., Solomon, J., Rangnekar, A., Boyd, J., & Brown, B. (2001). *Web credibility research: A method for online experiments and early study results.* Paper presented at the CHI 2001, Seattle, WA.

Fox, S. (1996). *Listserv as a virtual community: A preliminary analysis of disability-related electronic listservs.* Paper presented at the Speech Communication Association, San Diego: CA.

Fox, S., & Rainie, L. (2000). *The online health care revolution: How the Web helps Americans take better care of themselves* . Washington, DC: The Pew Internet & American Life project.

Fukuyama, F. (1995). *Trust*. New York: Free Press Paperbacks, Simon and Schuster.

Furlong, M. (1996). *Transcript of Mary Furlong Interview*. Web Networks, Inc. Available: www.transmitmedia.com/svr/vault/furlong/maryf_transcript.html [2001, July 12, 2001].

Gergen, K. (1997). Social saturation and the populated self. In G. E. H. C. L. Selfe (Ed.), *Literacy, technology, and society: Confronting the issues* (pp. pp. 12-36). Upper Saddle River: NJ: Prentice Hall.

Granovetter, M. (1973). The strength of weak ties. American Journal of Sociology. *American Journal of Sociology, 78*, 1360-1380.

Granovetter, M. (1982). The strength of weak ties: A network theory revisited. In P. M. N. Lin (Ed.), *Social Structure and Network Analysis.* (pp. 105-130). Beverley Hills: CA: Sage.

Greenbaum, J., & Kyng, M. e. (1991). *Design at Work: Cooperative Design of Computer Systems.* Hillsdale: NJ: Lawrence Earlbaum Associates.

Gunderson, G. (1997, Fall 1997). Spirituality, community, and technology: An interfaith health program goes online. *Generations, 21,* 42-45.

Hagel, J. I., & Armstrong, A. G. (1997). *NetGain: Expanding markets through virtual communities.* Boston: MA: Harvard Business School Press.

Hamman, R. B. (1999). *Computer networks linking network communities:Effects of AOL use upon pre-existing communities.* Available: http://www.socio.demon.co.uk/cybersociety/.

Harper, B., Slaughter, L., & Norman, K. (1997). *Questionnaire administration via the WWW: A validation and reliability study for a user satisfaction questionnaire.* Paper presented at the Proceedings of WebNet 97: International Conference on the WWW, Internet and Intranet.

Haythornthwaite, C., & Wellman, B. (1998). Work, friendship, and media use for information exchange in a networked organization. *Journal of the American Society for Information Science., 49*(12), 1101-1114.

Herring, S. (1992). *Gender and participation in computer-mediated linguistic discourse.* : ERIC Clearinghouse on Languages and linguistics (October).

Herring, S. (1999). *Interactional Coherence in CMC.* Paper presented at the Thirty-Second Annual Hawaii International Conference on Systems Sciences, Maui, Hawaii.

Herring, S. C. (Ed.). (1996). *Computer-mediated communication: Linguistic, social and cross-cultural perspectives.* Philadelphia:PA: John Benjamins Publishing Company.

Hiltz, S. R. (1985). *Online Communities: A Case Study of the Office of the Future.* Norwood: NJ: Ablex Publishing Corp.

Hiltz, S. R. (1994). *The Virtual Classroom: Learning Without Limits via Computer Networks.* Norwood, New Jersey: Ablex Publishing Corporation.

Hiltz, S. R. (1998). *Collaborative learning in asynchronous learning networks: Building learning communities.* Paper presented at the WEB98, Orlando, FL.

Hiltz, S. R., Johnson, K., & Turoff, M. (1986). Experiments in group decision making; Communication process and outcome in face to face versus computerized conferencing. *Human Communication Research, 13*, 225-252.

Hiltz, S. R., & Turoff, M. (1993). *The Network Nation: Human Communication via Computer  (Revised Edition)*. Cambridge: MA: MIT Press.

Hiltz, S. R., Turoff, M., & Johnson, K. (1989). Experiments in group decision making, 3, Disinhibition, deindividuation, and group process in pen name and real name computer conferences. *Decision Support Systems, 5*(217-232).

Hine, C. (2000). *Virtual ethnography*. Thousand Oaks: CA: Sage Publications.

Hodges, S. D., & Wegner, D. M. (1997). Automatic and controlled empathy. In W. Ickes (Ed.), *Empathic Accuracy* (pp. 311-339). New York: The Guilford Press.

Ickes, W. (1993). Empathic Accuracy. *Journal of Personality, 61*(587-610).

Ickes, W. (1997). *Empathic Accuracy*. New York: The Guilford Press.

Jones, Q. (1997). Virtual-communities, virtual-settlements and cyber-archaeology: A theoretical outline. *Journal of Computer Mediated Communication, 3*(3).

Jones, S. (1999). Studying the Net: Intricacies and Issues. In S. Jones (Ed.), *Doing Internet Research. Critical issues and methods for examining the net.* (pp. 1- 27). Thousand Oaks: SAGE Publications.

Jones, S. E. (1998). *Virtual Culture: Identity & communication in cybersociety*. London: Sage.

Kahin, B., & Keller, J. (1995). *Public access to the internet*. Cambridge: MA: MIT Press.

Katz, J. E., & Aspden, P. (2001). Networked Communication Practices and Security and Privacy of Electronic Health Care Records. In R. E. Rice & J. E. Katz (Eds.), *The Internet and Health Communication* (pp. 393-415). Thousand Oaks, CA: Sage Publications.

Kiesler, S. E. (1997). *Culture of the Internet*. Mahwah: NJ: Lawrence Earlbaum Associates.

Kim, A. J. (1998). *Secrets of successful web communities*. Amy Jo Kim [1999, 1/8/99].

Kim, A. J. (2000). *Community building on the Web: Secret strategies for successful online communities*. Berkeley, CA: Peachpit Press.

King, S. (1994). Analysis of Electronic Support Groups for Recovering Addicts. *Interpersonal Computing and Technology: An Electronic Journal for the 21st Century (IPCT), 2*(3), 47-56.

Kling, R. (1996). Social Relationships in Electronic Forums: Hangouts, Salons, Workplaces and Communities. In R. Kling (Ed.), *Computerization and Controversy: Value Conflicts and Social Choices (Second Edition)* . San Diego: CA: Academic Press.

Kollock, P. (1998). The economies of online cooperation: Gifts and public goods in cyberspace. In M. Smith & P. Kollock (Eds.), *Communities in Cyberspace* (pp. 220-239). London: Routledge.

Kollock, P. (1999). The Production of Trust in Online Markets. In E. J. Lawlwer, M. Macy, S. Thyne, & H. A. Walker (Eds.), *Advances in Group Processes* (Vol. 16, ). Greenwich: CT: JAI Press.

Kollock, P., & Smith, M. (1999). Chapter 1. Communities in Cyberspace. In M. A. S. P. Kollock (Ed.), *Communities in Cyberspace* (pp. 3-25). London: Routledge.

Korenman, J. (1999). Email Forums and Women's Studies: The Example of WMST-L. In B. Pattanaik (Ed.), *CyberFeminism* (pp. 80-97). Melbounre, Australia: Spinifex Press.

Kraut, R., Patterson, M., Lundmark, V., Kiesler, S., Mukopadhyay, T., & Scherdis, W. (1998). Internet paradox: A social technology that reduces social involvement and psychological well-being? *American Psychologist, 53*(9), 1017-1031.

Lanzetta, J. T., & Englis, B. G. (1989). Expectations of cooperation and competition and their effects on observer's vicarious emotional responses. *Journal of Personality and Social Psychology, 56*, 543-544.

Lazar, J., Hanst, E., Buchwater, J., & Preece, J. (2000). Collecting user requirements in a virtual population: A case study. *WebNet Journal: Internet Technologies, Applications and Issues (under review)*.

Lazar, J., & Preece, J. (1999a). Designing and implementing web-based surveys. *Journal of Computer Information Systems, xxxix*(4), 63-67.

Lazar, J., & Preece, J. (1999b). *Implementing Service Learning in an Online Communities Course.* Paper presented at the Proceedings of the 1999 Conference of the International Association for Information Management.

Lazar, J., Tsoa, R., & Preece, J. (1999). One foot in Cyberspace and the other on the ground: A case study

of analysis and design issues in a hybrid virtual and physical community. *WebNet Journal:*

*Internet Technologies, Applications and Issues., 1*(3), 49-57.

Lea, M., O'Shea, T., Fung, P., & Spears, R. (1992). 'Flamming' in computer-mediated communication:

Observations, explanations, and implications. In M. Lea (Ed.), *Contexts of Computer Mediated*

*Communication* . London: Harvester-Wheatsheaf.

Lehnert, W. G. (1998). *Internet 101. A Beginners Guide to the Internet and the World Wide Web*. Reading:

MA: Addison-Wesley Longman Inc.

Levenson, R. W., & Ruef, A. M. (1992). Empathy: A physiological substrate. *Journal of Personality and*

*Social Psychology, 63*, 234-246.

Markham, A. N. (1998). *Life Online: Researching Real Experience in Virtual Space*. Walnut Creek: CA:

Altamira.

Markus, M. L. (1987). Toward a critical mass theory of interactive media: Universal access,

interdependence and diffusion. *Communication Research, 14*, 491-511.

Markus, M. L. (1990). Toward a critical mass theory of interactive media: Universal access,

interdependence and diffusion. In J. Funk & C. Steinfield (Eds.), *Organizations and*

*communication technology* (pp. 194-218). Newbury Park: CA: Sage.

McWilliam, G. (2000). Building stronger brands though online communities. *Sloan Management Review,*

*Spring*, 43-54.

McWilliams, G. (2000). Building stronger brands through online communities. *Sloan Management Review,*

*41*(3), 43-54.

Moon, J. Y., & Sproull, L. (2000). Essence of distributed work: The case of the Linus kernal. *firstmonday,*

*5*(11).

Morris, M., & Ogan, C. (1996). The internet as mass medium. *Journal of Communication, 46*(1).

Muller, M. J. (1992). *Retrospective on a year of participatory design using the PICTIVE technique.* Paper

presented at the Proc. CHI'92 Human Factors in Computing Systems.

Mumford, E. (1983). *Designing Participatively* . Manchester: UK.: Manchester Business School.

Newell, A. F., & Gregor, P. (1997). Human Computer Interaction for People with Disabilities (Chapter 35).

      In M. G. Helander, T. K. Landauer, & P. V. Prabhu (Eds.), *Handbook of Human Computer*

      *Interaction* (pp. 813-824). Amsterdam: Holland: Elsevier.

Nielsen, J. (1993). *Usability Engineering*. Boston: AP Professional.

Nielsen, J., & Mack, R. L. (1994). *Usability Inspection Methods*. New York: John Wiley & Sons, Inc.

Noble, D. (1998). Digital diploma mills: The automation of higher education. *Educom Review, 33*(3).

Nonnecke, B. (2000). *Why people lurk online.* , South Bank University, London.

Nonnecke, B., & Preece, J. (2000). *Lurker demographics: Counting the silent.* Paper presented at the CHI

      2000 Conference on Human Factors in Computing Systems, The Hague, The Netherlands.

Nonnecke, B., & Preece, J. (2001). *Why lurkers lurk.* Paper presented at the AMCIS Conference, Boston.

Norman, D. A. (1986). Cognitive engineering. In D. Norman & S. Draper (Eds.), *User-Centered Systems*

      *Design* . Hillsdale, NJ: Lawrence Erlbaum Associates.

Ogan, C. (1993). Listserver communication during the Gulf War: What kind of medium is the electronic

      bulletin board. *Journal of Broadcasting and Electronic Media, Spring*, 177-195.

Olson, G. M., & Olson, J. S. (1997). Research on Computer Supported Cooperative Work (Chapter 59). In

      M. Helander, T. K. Landauer, & P. Prabhu (Eds.), *Handbook of Human Computer Interaction*

      *(2nd Edition)* (pp. 1433-1456). Amsterdam: Elsevier.

Olson, G. M., & Olson, J. S. (2000). Distance Matters. *TOCHI (in press)*.

Papert, S. (1980). Computer-based microworlds as incubators for powerful ideas. In R. P. Taylor (Ed.), *The*

      *Computer in the School: Tutor, Tool, Tutee* . New York: Teacher College Press.

Preece, J. (1998). Empathic Communities: Reaching out across the Web. *Interactions Magazine, 2*(2), 32-

      43.

Preece, J. (1999a). Empathic communities: Balancing emotional and factual communication. *Interacting*

      *with Computers, 12*, 63-77.

Preece, J. (1999b). Empathy Online. *Virtual Reality, 4*, 1-11.

Preece, J. (1999c, ). What happens after you get online? Usability and Sociability. *Information Impacts*

      *Magazine, December*.

Preece, J. (2000). *Online Communities: Designing Usability, Supporting Sociability*. Chichester, England: John Wiley & Sons.

Preece, J. (2001). *Designing usability, supporting sociability: Questions participants ask about online communities.* Paper presented at the Human-Computer Interaction INTERACT'01, Tokyo.

Preece, J. (2001 in press). Sociability and usability in online communities: Determining and measuring success. Behaviour & Information Technology. *Behaviour & Information Technology.*

Preece, J., & Ghozati, K. (1998). *In search of empathy online: A review of 100 online communities.* Paper presented at the Proceedings of the 1998 Association for Information Systems Americas Conference, Baltimore, USA.

Preece, J., & Ghozati, K. (2000). Experiencing empathy online. In R. E. R. a. J. E. Katz (Ed.), *The Internet and Health Communication: Experience and Expectations* . Thousand Oaks: Sage.

Preece, J., Rogers, Y., & Sharp, H. (2002). *Interaction Design: Beyond Human-Computer Interaction*. New York, NY: John Wiley & Sons.

Rainie, L., & Packel, D. (2001). *More online, doing more* . Washington, DC: Pew Internet & American Life Project.

Rappaport, S. H. (1996). *Supporting the 'Clinic without Walls' with an event-directed messaging system integrated into an electronic medical record.* Paper presented at the Proceedings of the American Medical Informatics Association.

Reid, E. (1993). Electronic Chat: Social Issues on Internet Relay Chat. *Media Information Australia, 67*, 62-70.

Rheingold, H. (1993). *The Virtual Community. Homesteading on the Electronic Frontier.* Reading, MA: Addison-Wesley Publishing.

Rheingold, H. (1994). A Slice of Life in My Virtual Community. In L. M. Harasim (Ed.), *Global Networks: Computers and International Communication* (pp. 57-80). Cambridge: MA: MIT Press.

Rice, R., & Love, G. (1987). Electronic emotion: Socioemotional content in a computer-mediated communication network. *Communication Research, 14*(1), 85-108.

Rice, R. E. (1987). Computer mediated communication and organizational innovations. *Journal of Communication, 37*, 85-108.

Rice, R. E. (1993). Media appropriateness. Using social presence theory to compare traditional and new organizational media. *Human Communication Research, 19*(4), 451-484.

Rice, R. E. (2001). The Internet and Health Communication: A Framework of Experiences. In R. E. Rice & J. E. Katz (Eds.), *The Internet and Health Communication: Experiences and Expectations* (pp. 5-46). Thousand Oaks, CA: Sage Publications.

Rice, R. E., & Barnett, G. (1986). Group Communication Networks in Electronic Space: Applying Metric Multidimensional Scaling. In M. McLaughlin (Ed.), *Communication Yearbook 9* (pp. 315-326). Newbury Park: CA: Sage.

Rice, R. E., Grant, A. E., Schmitz, J., & Torobin, J. (1990). Individual and network influences on the adoption and perceived outcomes of electronic messaging. *Social networks, 12*, 17-55.

Rice, R. E., & Katz, J. E. (2001). *The Internet and Health Communication: Experience and Expectations*. Thousand Oaks, CA: Sage Publications.

Roberts, T. L. (1998). *Are newsgroups virtual communities?* Paper presented at the CHI 98 Human Factors in Computing Systems, Los Angeles.

Sack, W. (2000a). *Conversation Map: A content-based UseNet Newsgroup browser.* Paper presented at the International Conference on Intelligent User Interfaces, New Orleans.

Sack, W. (2000b). *Discourse diagrams: Interface design for very large-scale conversations.* Paper presented at the 33rd Annual Hawaii International Conference on System Sciences, Maui.

Salmon, G. (2000). *E-moderating: The Key to Teaching and Learning Online*. London: Kogan-Page.

Schoch, N. A., & White, M. D. (1997). *A study of the communication patterns of particpants in consumer health electronic discussion groups.* Paper presented at the Proceedings of the 60th ASIS Annual Meeting, Washington, DC.

Schuler, D. (1994). Community networks: Building a new participatory medium. *CACM, 37*(1), 39-51.

Schuler, D. (1996). *New Community Networks: Wired for Change*. Reading, MA: ACM Press & Addison-Wesley Publishing Co.

Schuler, D., & Namioka, A. E. (1993). *Participatory Design: Principles and Practices*: Lawrence Erlbaum & Associates.

Seabrook, R. (2001). *Electronic discussion group moderators' experiences with flame messages and implications for the desig of a multi-modal adaptive content-sensitive filtering too.* Paper presented at the CHI'2001, Seattle, WA.

Sellen, A. (1994). Remote conversations: The effects of mediating talk with technology. *Human-Computer Interaction, 10*(4), 401-444.

Shackel, B. (1990). Human factors and usability. In J. Preece & L. Keller (Eds.), *Human-Computer Interaction: Selected readings* (pp. 27-41). Hemel Hempstead: UK: Prentice-Hall.

Shneiderman, B. (1986). *Designing the User Interface: Strategies for effective human-computer interaction (First Edition)*. Reading, MA: Addison-Wesley.

Shneiderman, B. (1992). Tree visualization with treemaps: a 2-d space filling approach. *ACM Transactions on Graphics, 11*(1), 92-99.

Shneiderman, B. (1998). *Designing the User Interface: Strategies for Effective Human-Computer Interaction (Third Edition)*. Reading, M.A.: Addison-Wesley.

Shneiderman, B. (2000). Designing trust into online experiences. *Communications of the ACM, 43*(12), 57-59.

Short, J., Williams, E., & Christie, B. (1976). *The social psychology of telecommunications*. London: John Wiley and Sons.

Silver, D. (1999). Localizing the Global Village: Lessons from the Blacksburg

Electronic Village. In R. B. Browne & M. W. Fishwick (Eds.), *The Global Village: Dead or Alive?* (pp. 79-92). Bowling Green, OH: Popular Press.

Smith, M., A., & Fiore, A. T. (2001). *Visualization Components for Persistent Conversations.* Paper presented at the CHI 2001, Seattle, WA.

Smith, M. A. (1999). Invisible crowds in cyberspace: mapping the social structure of the internet. In M. A. Smith & P. Kollock (Eds.), *Communities in Cyberspace* (pp. 195-219). London: Routledge.

Smith, M. A., & Kollock, P. (1999). *Communities in Cyberspace*. London: Routledge.

Spears, M., Russell, L., & Lee, S. (1990). De-individuation and group polarization in computer-mediated communication. *British Journal of Social Psychology, 29*, 121-134.

Spears, R., & Lea, M. (1992). Social Influence and the Influence of 'Social' in Computer Mediated
Communication. In M. Lea (Ed.), *Contexts of Computer Mediated Communication* . Hemel
Hempstead: UK: Harvest Wheatsheaf.

Sproull, L. & Faraj, S. (1997). The Network as social technology. In S. Keisleer (Ed). *Culture of the
Internet* (pp.35-51). Mahwah, NJ: Lawrence Earlbaum.

Sproull, L., & Keisler, S. (1986). Reducing social context cues; Electronic mail in organizational
communication. *Management Science, 32*, 1492-1512.

Sproull, L., & Kiesler, S. (1991). *Connections: New Ways of Working in the Networked Organization*.
Cambridge, MA: MIT Press.

Stellin, S. (2001, July 9, 2001). Painting some pictures of the online shipper. *The New York Times,* pp. C4.

Tannen, D. (1990). *You Just Don't Understand. Men and Women in Conversation*. New York: William
Morrow and Co. Ltd.

Tannen, D. (1994). *Talking from 9 to 5*. New York: William Morrow and Company, Inc.

Tedeschi, B. (2001, July 9, 2001). E-Commerce report. *The New York Times,* pp. C7.

Turkle, S. (1995). *Life on the Screen. Identify in the Age of the Internet.* New York: Simon & Schuster.

Turkle, S. (1999, Winter 1999/2000). Tinysex and Gender Trouble. *IEEE Technology and Society
Magazine, 4,* 8-20.

Venkatraman, N. (2000). Five steps to a dot-com strategy: How to find your footing on the Web. *Sloan
Management Review, 41*(3), 15-27.

Viegas, F. B., & Donath, J. S. (1999). *Chat Circles.* Paper presented at the CHI 99 Human Factors in
Computing Systems, Pittsburgh.

Vygotsky, L. (1978). *Mind in Society*. Cambridge, MA: Cambridge University Press.

Vygotsky, L. (1986). Thought and Language . Cambridge, MA: MIT Press.

Walcott, H. F. (1999). *Ethnography: A way of seeing.* Walnut Creek, CA: AltaMira Press.

Wallace, P. (1999). *The Psychology of the Internet*. Cambridge: Cambridge University Press.

Walther, J. B. (1993). Impression development in computer-mediated interaction. *Western Journal of
Communications, 57*, 381-398.

Walther, J. B. (1994). Anticipated ongoing interaction versus channel effects on relational communication in computer -mediated interaction. *Human Communication Research, 20*(4), 473-501.

Walther, J. B. (1996). Computer-mediated communication: Impersonal, interpersonal, and hyperpersonal interaction. *Communications Research, 23*(1), 3-43.

Walther, J. B., Anderson, J. F., & Park, D. W. (1994). Interpersonal effects in computer-mediated interaction: A meta-analysis of social and antisocial communication. *Communication Research, 21*(460-487).

Walther, J. B., & Boyd, S. (Eds.). (Forthcoming). *Attraction to computer-mediated social support*. Neww York: Hampton Press.

Wellman, B. (1982). Studying personal communities. In P. M. N. Lin (Ed.), *Social Structure and Network Analysis* . Beverly Hills: CA: Sage.

Wellman, B. (1997). An Electronic Group is Virtually a Social Network. In S. Kiesler (Ed.), *Culture of the Internet* (pp. 179-205). Mahwah, N.J.: Lawrence Erlbaum Associates.

Wellman, B. (2000). Changing connectivity: A future history of Y2.03K'. *Sociological Research Online, vol. 4*(no. 4).

Wellman, B., & Frank, K. (2001). Getting support from personal  comunities. In N. Lin, R. Burt, & K. Cook (Eds.), *Social capital: Theory and research* . Chicago, IL: Aldine De Gruytere.

Wellman, B., & Gulia, M. (1999a). Net Surfers Don't  Ride Alone. In B. Wellman (Ed.), *Networks in the Global Village* (pp. 331-366). Boulder: CO: Westview Press.

Wellman, B., & Gulia, M. (1999b). Virtual Communities as Communities: Net Surfers Don't Ride Alone. In P. Kollock & M. Smith (Eds.), *Communities in Cyberspace* . Berkeley, CA: Routledge.

Wellman, B., Salaff, J., Dimitrova, D., Garton, L., Gulia, M., & Haythornthwaite, C. (1996). Computer networks as social networks: Collaborative work, telework and virtual community. *Annual Review of Sociology, 22*, 213-238.

Wenger, E. (1998). *Communities of practice*. Cambridge, UK: Cambrige University Press.

Wenger, E. C., & Snyder, W. M. (2000). Communities of practice: The organizational frontier. *Harvard Business Review, 78*(1).

Whittaker, S., Issacs, E., & O'Day, V. (1997). Widening the net. Workshop report on the theory and practice of physical and network communities. *SIGCHI Bulletin, 29*(3), 27-30.

Williams, R. L., & Cothrel, J. (2000a). Four smart wasys to run online communities. *Sloan Management Review, Spring*, 81-91.

Williams, R. L., & Cothrel, J. (2000b). Four smart ways to run online communities. *Sloan Management Review, 41*(4), 81-91.

Winner, L. (1995). Peter Pan in cyberspace. *Educom Review, 30*(3).

Xiong, R., & Donath, J. (1999). *PeopleGarden: Creating data portraits for users*. Available: http://graphics. lcs.mit.edu/~becca/papers/pgarden [2001, 6/12].

Zheng, J., Bos, N., Olson, J. S., & Olson, G. M. (2001). *Trust without touch: Jump-start trust with social chat*. Paper presented at the CHI 2001, Seattle, WA.

Zimmer, B., & Alexander, G. (1996). The Rogerian Interface: For open, warm empathy in computer-mediated collaborative learning. *Innovations in Education and Training International, 33*(1), 13--21.