# Computer Mediated Communication: Disseminating Information

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## Abstract

Social science and humanities view computermediated communication (CMC) as a hub for information dissemination. The development and diffusion of CMC can be divided into three phases: pre-Internet CMC (beginning in the 1980), Internet-focused CMC (roughly 1994 to date) and social-software-supported CMC (beginning around 2002). Email, online collaborative learning, and blogs (representing, respectively, pre-Internet, Internet-focused, and socialsoftware- supported CMC) are three modes frequently studied in assessing asynchronous CMC. The current stage of CMC (social-software supported CMC) provides opportunities for research to investigate artifacts in newer domains such as YouTube, Facebook, and Flickr.

*Index terms*— computer mediated communication, artifacts, information dissemination, externalization of knowledge.

# 1 Introduction

omputer mediated communication (CMC) is a cross-disciplinary research area. Researchers from the sciences, the social sciences, and the humanities have investigated different aspects of CMC. Social science and humanities researchers have examined the CMC environment as an information space (Walker, 2006) and have studied specific technologies that enable this form of communications (e.g., Schrecker, 2007). CMC is understood as a means for information dissemination ??Porta & Diani, 1999), through which people seek and exchange information (Westerman, 2008) and influence opinions (Blasio & Milani, 2008; ??o, 2008). It is also a means by which we get work done, conduct business, and entertain ourselves. Through such applications as email, recorded online collaborative learning/education, blogs, podcasts, and YouTube-all of which are means of asynchronous communication-people post textual and sometimes audiovisual information that is accessible by others who have an Internet connection. Artifacts or texts that remain online in asynchronous CMC represent stored information; such artifacts can be used for empirical investigation to understand how people seek, construct, disseminate, and exchange information.

The objective of this paper is to discuss CMC as it supports information dissemination. ??uggan and Banwell (2003) used this term in describing the transfer of information from the provider to the recipient. Information dissemination occurs by virtue of communication, which is "the process of transferring information from place to place or from one transaction to another" (Uno, 1981, p. 165). ??ärvelin's (2003, p. 293) view of an information retrieval system emphasizes the tasks of storage and transfer involved in information dissemination. The specific domain of interest of this paper is in studying the artifacts that people leave behind in asynchronous computer mediated communication as these provide evidence of information dissemination. Improved understanding of how asynchronous CMC is used for information dissemination connects with ICS's longstanding interest in the processing and flow of information (e.g., ??orko, 1968).

# 2 II.

# 3 Artifacts and Information Dissemination

In developing an anthropology of information technology, Sinding-Larsen ??1987, 1988a) explained how artifacts-linguistics and semiotic-store knowledge that people can share across space and time. He contended that action or

performance recorded on an external device is an externalization of knowledge. For example, a clock is an external device that stores our knowledge about time. Sinding-Larsen showed how humans, by means of the linguistic and semiotic process of externalization, develop tools and artifactslanguage, numbers, printing technology, radio, TV, computers-that they can use to express themselves over socially shared platforms.

Sinding-Larsen argued that through externalization, i.e., by creating and using artifacts, we have developed processes for disseminating information and sharing knowledge. He elaborated on how language, as an artifact, helps us externalize ourselves: "It [language] is a way of living in the world. We try to make our world intelligible through making it readable. In fact, we transform our environment more and more according to our linguistic vision of the world, so most of our living becomes a reading of our own texts" (Sinding-Larsen, 1987, p. 130). Sinding-Larsen (1988b) used the example of western musical notation to support his concept of the externalization of knowledge. A series of musical notes, for example the Fifth Symphony of Mozart, is an externalization of a particular development of music stored by a set of artifacts called musical notation. These artifacts help people across space, time, location, and societies in( D D D D D D D )

learning to play that particular symphony. The musical score also provides information for an interested knower about the genre or milieu of music that was practiced in 18 th century Europe. Berger and Luckmann (1967), taking a social construction of reality perspective, hold that information and knowledge transfer is possible because linguistic and semiotic artifacts constitute objectification of social meaning. They state that, "it is through externalization that society is a human product. It is through objectification that the society becomes a reality sui generis. It is through internalization that man is a product of society" (p. 4). Mead's (1934) idea of language as significant symbol provides the ground for the notion of objectification. Symbols-linguistic and semiotic-are objectified as the social corpus of meaning, which is shared by people who, in the process of socialization, internalize those meanings that reside in the artifacts.

The use of language and the ways people describe their experiences provide an observable corpus to investigate how people disseminate information (Keeney, 1983). Buckland (1991) deals with a similar idea in his notion of "information as thing," which proposed a distinction and relation between intangible (knowledge and information-as-knowledge) and tangible (information-as-thing) aspects of information. Although Buckland does not use the term artifact, he argues that knowledge can be represented and "any such representation is necessarily in tangible form (sign, signal, data, text, film, etc.), so representations of knowledge (and of events) are necessarily "information-as-thing" (p. 352). This supports the contention that a tangible form of information, i.e., the artifact, is necessary for information dissemination and knowledge transfer.

Our conversations often mention physical objects or things as we talk about ideas and symbols. In other words, the representation and transformation of things and ideas take place in conversation ??Bly, 2003, p. 181) and are assisted by the externalization of knowledge and objectification of meaning through shared symbols or artifacts. In mediated communication, such as email, these artifacts are clues for meaningful information dissemination (Churchill & Erickson, 2003).

In discussing the idea of external scaffolding, Clark (1997) considered language to be the first genuine cognitive artifact. Viewing language as a cognitive artifact entails a distributed cognitive understanding of language. In the distributed cognitive view, an organization's memory consists of people and artifacts (Ackerman & Halverson, 1998). According to ??hittaker (2003, p. 164) "Distributed cognition describes various aspects of how artifacts are used in work settings, as shared representations that coordinate activities between coworkers, as methods to offload memory into the environment, and as devices to restructure tasks." People interact with artifacts in order to share information and transfer knowledge, without which tasks cannot be accomplished. This means that artifacts have both communicative and functional aspects. Artifacts assist people by enabling them to communicate; and through communication, organizational and social actions and tasks are performed.

CMC has been described as a digital writing space ??Bolter, 2001), the latest in Lester's (2003) sequence of development phases: pre-Gutenberg (before 1456), Gutenberg (1456-1760), industrial (1761-1890), artistic ??1981) ??1982) ??1983), and digital (1984-present). ??olter (1984, p. 140), commenting on the change in the structure of language as a result of printing, states, "Only when the printed word freed itself completely from sound did it become natural to regard words as arbitrary signs of the ideas they called to mind. In the centuries following the invention of the printing press, interest in the power of all kinds grew remarkably." Now that computerization allows humans to produce artifacts that can be constituted out of combinations of language, signs, sounds, and images and created hyperlinked structures, an interesting and important research problem is to investigate how information is disseminated by artifacts in CMC.

Communication and information scholars have investigated information artifacts unraveling various aspects of information dissemination. For example, Alexandersson and Limberg (2003) described an empirical study of how students construct meaning through the artifacts-books, digital information, and pictures-offered via the school library. Pierce and Shaw (2005) examined how the Reader's Guide to Periodical Literature evolved to support readers seeking information on sexual and reproductive health. Jeng (1991) studied the knowledge that is represented by the visual image of a title page. Herring's (1994) work on politeness in computer culture is an example of how to explore values, in this case politeness, using the artifact left from an online chat session. Analysis of artifacts in CMC is an expansion of ICS's core concern of understanding information dissemination.

# 4 III.

# 5 Computer Mediated Communication (CMC)

Literature about computer-mediated communication (CMC) in social science shows three phases in the development of information and communication technologies and their diffusion. The first phase traces back to the 1980s, as discussed by Steinfield (1986); we may call it the pre-Internet CMC era. Herring (2003) reviewed CMC as it took shape with the diffusion of the Internet. One may call this the Internet-focused CMC era (beginning roughly 1994 and continuing to date). Recently CMC has been extended greatly with the diffusion of social software. We can call this the era of social-software-supported CMC. Farkas's (2007) book Social Software in Libraries exemplifies the interests and concerns prevalent in this phase.

In the 1980s scholars offered prophetic statements about the changes that might take place as a consequence of the development of computer technology and its merger with telecommunication. Hiltz and Turoff (1978), **??**artin (1978), and Toffler (1984) were among the many whose writings influenced how scholars thought about CMC. From this context Stein field (1986) wrote about CMC in the Annual Review of Information Science and Technology. Computer-Based Message systems (CBMS)-mainly electronic mail, conferencing systems, and bulletin boards-were the primary areas of discussion. Steinfield defined CMC as the use of computers in human communication. He noted that: "various forms of CMC systems are available, each having unique attributes and applied in diverse contexts. All, however, are fundamentally similar in that they use computers to facilitate human communication" (p. 169).

Steinfield's understanding of CMC as a system was similar to the scholarly perspective adopted in the field of telecommunications. Notable contributions include Meyer's (1980) article on a CBMS taxonomy and Miller and Vallee's work (1980) on defining a formal representation of electronic message systems. These articles reflected the ongoing work in telecommunications examining the possibility of CBMS replacing traditional telegraph and postal systems. Miller and Vallee identified four packet-switched networks based on the ARPANET: communicating word processors, message switching, computer and network mail, and computer conferencing. Their theoretical attention was focused on how these new communication systems executed information transfer over three nodesinformation source (input node), relay point (transmission node), and information destination (output node)-and how these nodes were used in human communication networks. For Miller and Vallee (p. 84), "human communication networks are purposive systems; i.e., there are goals, objectives, and constraints that must be met in any group communication."

The pre-Internet CMC era, during which CMC was defined as a computer-based message system and human communication networks, had an organizational aspect as well. **??**ice (1987, p. 65) discussed the organizational perspective: "computer-mediated communication systems not only process information about innovation but are also an innovation that organizations must process, a circumstance that provides organizations with opportunities and challenges for enabling their resourcefulness and responsiveness." Rice (Rice, 1987; Rice & Gattiker, 2001) subsequently advanced his idea about CMC's influence on organization and developed the concept of computer-mediated communication and information systems (CIS). His fundamental argument is that CMC is an information system that influences both individuals and organizations. This has similarities with Detlor's (2003) contention that CMC should be viewed as an information system. Deltor specifically mentioned the use of Internet in organizations in processing information.

As evident in Steinfield's (1986) discussion, the literature of the pre-Internet CMC era focused on messaging systems, information load, group processes and decision making, productivity and media substitution, and organizational structure. Over the next decade or so Information scientists directed their attention to such topics as electronic publishing (Hjerppe, 1986), computer supported cooperative work (Twidale, 1998), policy for the Internet (Braman, 1995), and the use of the Internet to access information (Lynch & Preston, 1990).

With the diffusion of the Internet well under way, Herring conducted empirical research on naturally occurring online communication in non-institutional and non-organizational contexts. She suggested that (2002, p. 110), "Such communication arguably best reflects the organic potential of the Internet itself, as a large, geographically dispersed, interconnected, and relatively unstructured medium to shape human interaction." Herring's (p. 111) work represents a new perspective: Internet-focused CMC: "The general phenomena of interest within this perspective includes the effects of the Internet on language and communication, on interpersonal relations, and on group dynamics, as well as the emergence of social structures and norms, and macro-societal impacts of Internet communication." **??**erring (2002, p. 112) developed the notion of modes of CMC; a mode being "a genre of CMC that combines messaging protocols and the social and cultural practices that have evolved around their use." A CMC mode thus offers a cultural context through which researchers can interpret observations about online communication. Embedded in a cultural context, Internet-focused CMC-email, listserv discussions, Usenet newsgroups, IRC (Internet Relay Chat), websites-facilitates information exchange as well as interpersonal communication.

With the emergence of Internet-focused CMC, researchers identified two forms of communication: synchronous and asynchronous. According to Olarian (2006, p. 211) "Synchronous CMC consists of the real time or simultaneous use of electronic-mediated communication technologies (e.g., IMs [instant messages], chat, computer conferencing) to facilitate interaction. In other words, a key requirement of synchronous CMC is the need for all participants or users to be present during interaction regardless of physical location". On the other hand, real time

communication is not required in asynchronous CMC such as email. **??**erry (2006, p. 359) views asynchronous CMC as an archived memory that can be retrieved later: "computer-mediated communication creates and allows a review of an exact and permanent archived record, and this record is an important difference when comparing CMAC [computer-mediated asynchronous communication] and the traditional synchronous faceto-face meeting" (although there are techniques for capturing transcripts of some forms of synchronous CMC). The recorded artifact in asynchronous CMC has many uses, among which are to promote online learning (Zeiss & Isabelli-Garcia, 2005), accelerate information seeking (Westerman, 2008), and assist in case studies **??**Paulus & Phipps, 2008).

Recently, the Internet and CMC have undergone significant changes. This transformation is largely due to the development of social software (Farkas, 2007)-webbased software programs that allow users to interact and share data. Examples of social software include Webblog, Wiki, MySpace and Facebook, media sites such as Flickr and YouTube. These applications are also known as collaborative software because they allow people to work together and interact on digital platforms that include text, sound, and images (Payne and Forum, 2007). This is the latest phase, which one may call social-software-supported CMC. Farkas claims that this type of CMC helps people capitalize on the wisdom of crowds as more and more users connect via easy-touse networks. She strongly advocates using this kind of CMC in an information center or library, noting, "Social software can provide libraries with a human face beyond their walls. It can provide them with ways to communicate, collaborate, educate, and market services to their patrons and other community members." The same view is found in the reviews of Farkas's work by McNicol (2008) and Fitz-Gerald (2008). Webb (2007) finds YouTube to be an excellent means of disseminating library information to remote clients. Chudnov (2007) advances a similar opinion about social software's importance in a library context. **??**asan and Pfaff (2006) hold that social software technologies, which they term emergent conversational technology, are democratizing information systems in organizations.

# 6   IV.

# 7   Conclusion

CMC is the hub for information dissemination that has evolved from merely information storage to a global social network of information exchange. It is hoped that in near future researchers will focus their scholarly attention to understand the implications of rapidly diffusing social-software-focused CMC. Work is needed on applications such as YouTube, Podcast, Flickr, and del.icio.us. YouTube presents information in various formats: moving image, sound, and text.

Increasingly, YouTube users post a video response to a previously posted video together with text response. This provides excellent opportunities to examine how information is constructed in mixed media. Investigation of reviews posted on Amazon.com may help reveal what opinions people hold, or in other words what information they construct, about books they read or films they watch. This kind of study will involve two layers of information: information in the primary object (a book, for example) and a reader's information about that book. Understanding people's view in this way is an example of reader-response analysis. The history, variety, ubiquity, and rapid evolution of CMC underscore the importance and timeliness of examining how it is used for information dissemination. [1] [2]

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