"We'll discuss that online . . .": A case study of computer-supported collaborative work in a locally-based emerging organization

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The Internet has attracted much popular and academic attention regarding its potential role as a medium for collaborative work. Through transcending many space- and time-based barriers to communication inherent in other media, the Internet represents a relatively cheap, sophisticated and accessible avenue of communication between geographically and temporally dispersed people within an organization.

In a local setting, however, the Internet is but one of many media for effective communication. Telephone (both wireless and standard), 'groupware' software, the facsimile machine and simple face to face meeting are but some of the alternatives locally-based organizations can select. Yet, despite all these other options, the Internet can prove to be an effective tool for co-ordinating organizational activities, due in no small part to its accessibility, asynchronicity, relatively low cost, and ability to create archives of organizational activity automatically.

This paper tracks the use of a communal mailing list and the role it played in the emergence of Resonant Communications, a start-up new media small business spawned from academic roots. The mailing list provided a medium for supplementing discussion on important and tangential issues, developing full and small group meeting agendas, disseminating information culled from external sources, and establishing and maintaining internal cohesion, both in the 'real' and 'virtual' worlds.

Through quantitative analysis of mailing list usage statistics and structured observations gained through participatory action research, the authors aim to contextualize this case in current research in small group computer-mediated communication (CMC) and derive grounded theories of effective communication practice that may inform similar emerging local organizations.

Introduction

Understanding the social implications of technological innovation is an intriguing problem for researchers. The importance of this problem has been amplified recently with the weaving of new information and communication technologies (NICTs) into the social and economic fabric of Western society. While conclusions may differ, many researchers, theorists and futurists view NICTs as playing a central, coordinating role in the transformations which comprise the 'information society'.

This paper charts a particular approach to studying computer-supported collaborative work (CSCW) and in so doing notes gaps in contemporary research, which tends to focus on complex technological systems implemented in established corporations in order to facilitate long distance or remote communication. While this research is valuable, it ignores the social and economic constitution of smaller, emerging organizations with sparse economic, technological and intellectual resources and which tend to be based in a localized, yet often spatially dispersed, setting. Using information gathered through participatory action research (PAR), the authors examine the use of a common Internet mailing list within a locally-based emergent organization and derive conclusions which highlight the role of mailing lists in the development and social cohesion of similar organizations.

Computer-supported collaborative work as a social problem

Distilling a critical understanding of (CSCW) should depart from a theoretical base which adequately explains how technology emerges from and implicates itself into existing economic, political and cultural relations of power. We must also investigate how technological systems structure, constrain and augment specific forms of day-to-day social behaviour in identifiable yet predictable ways (Bush 1983).

Deriving a complex, dynamic relationship between technological systems and society affords researchers the ability to analyze systems in a more holistic fashion, taking into account a multitude of forces emerging from technological design, economic and historical constraints, social patterns of use, and numerous other potential influencing factors. We should aim to transcend the limitations of simple technological, economic or social determinism by weighing all mediating factors relative to one another, understanding at the same time that some factors will appear especially salient given the technology and the particular environment and time of its introduction. Bush's taxonomy of developmental, user, environmental, and cultural contexts offers us an example of such holistic taxonomies of effects (Bush 1983), as does critical feminist analyses (e.g. Wacjman 1991) and efforts which

highlight what occurs when the parameters and boundaries of analysis are changed. (e.g. Balka 1987; Lipsett 1997)

This case study departs from this tradition of complex, multi-variate analyses of technology and society. Our study examines the social relations and communicative patterns witnessed on a collective mailing list of a locally-based emerging commercial organization incubated at Simon Fraser University (SFU). The analysis is grounded within an understanding of the technological limitations of the mailing list as a medium of communication and academic and economic influences which structured both the choice of this technology and its subsequent use. In addition to these factors, we highlight one agent which influenced observed social and communicative practices: organizational structure.

Structure of the organization studied

As mentioned above, the organization in question has an organizational history and structure which distinguishes it from much research in CSCW. Many studies of computer-mediated communication emerge from established corporate or educational environments. While the organization studied here shares many of the same needs, its structure and history differ substantially from the focus of most CSCW research. The organization's defining characteristics include: a local base and orientation, a lack of a common meeting place over time, a low budget, organizational goals and objectives determined 'on-the-fly', and its link with academic requirements and schedules. These particularities offer distinctive challenges and constraints which deserve attention.

CSCW research often notes the enabling effect of computer networks to transcend spatial barriers, citing examples of cooperative efforts with remote and/or international partners (e.g. Field 1996; Harasim 1993). In an organization with a local base, however, this potential benefit of CSCW systems becomes at first glance less pronounced. The organization studied here is local; all list members were situated within the Greater Vancouver area and within a fifty-kilometre radius of the university. While some space-transcending benefits of this communication medium did emerge when members temporarily left this geographic area, most communication evident on the list was locally generated.

The organization's local base suggests an interesting interface between the mailing list and other communication technologies and practices. While there may exist particular productivity, efficiency and cost-saving imperatives which support CSCW over long distances, these imperatives become less central when the medium is forced to share space other forms of technologically-mediated and 'real-world' communication. For example, one message thread in the group's initial orientation involved collecting and disseminating phone, pager, facsimile and cellular phone

numbers, as well as determining schedules, work responsibilities and locations of group members to facilitate face-to-face meetings. These alternative means of communication were frequently used by group members and were often critical in maintaining group organization and cohesion. The resulting synergies between our CSCW system and other forms of communication influenced the group's use of, and dependency on, the central mailing list.

While there is evidence of organizational forms whose 'real' existence is transitory and or not located in any formal location in space and time (e.g. Bracco 1996; Center and Thompson 1996), most studies of CSCW involve established institutions with stable (although perhaps disparate) locations and practices. The organization highlighted here, however, enjoyed only sporadic and unstable access to SFU's infrastructure, and as such often had to coordinate face-to-face meetings in a contingent fashion. As we will see, the mailing list played a central coordinating role in maintaining the group's cohesion.

As an academic project group, this organization was equally strapped for cash. While there were some available funds for photocopies, books and honorariums, the 'low-end' $40,000-$60,000 CSCW systems mentioned in the literature (Field 1996) were well beyond our budget for outside consulting and capital expenditures, which was essentially zero. Computer-mediated communications solutions required the generosity of the university, the use of personal funds and capital for hardware, software and training, and a lot of do-it-yourself solutions derived from on-the-fly problem solving. This was a primary determining factor in the group's choice of electronic mail (a low-cost solution, pending the availability of personal or public lab computers) as a CSCW medium.

Some CSCW research does address the particular needs and objectives inherent in defined-term, project related work. (Moody 1995; Manasco 1995) However, in most cases, the end goals of the short-term project are clearly defined and fit within a larger organizational infrastructure and reward system. This organization, on the other hand, was centered around loosely defined goals and objectives which were to be determined in greater detail over the course of the project. The open-ended nature of the project led to numerous discussions and conflicts surrounding direction which will become more evident in the data presented below. The emergent nature of the organization equally created an environment where most of our human and intellectual resources were dedicated to establishing and fulfilling our week-to-week goals and objectives, and not 'larger' goals such as technical infrastructure and group policy.

Like similar educational efforts in computer-supported co-operative learning, this project group was bounded, however, by academic time pressures. As this project involved a group of eight undergraduate students, one graduate student and

one faculty member, time constraints resulting from grading deadlines, term start and end dates, individual and group assignments, and competing demands from other courses taken concurrently affected the distribution and nature of communication seen on the list. Differential expectations and roles of the faculty and graduate student members (the authors of this paper) also posed a potential threat to group cohesion and communication that had to be pro-actively addressed, as outlined in the methodological section below.

Milestone events and dates of the project group are listed below in order to offer the reader a better understanding of the timing and academic constraints which shaped interpersonal communication throughout the course:

Course start date:	May 1, 1996
Course end date:	August 15, 1996
'Retreat' weekend	July 12-15, 1996
Final presentation	August 13, 1996
Number of initial group members	9
Members at completion	8
Date of member withdrawal	July 10, 1996
Start of mailing list	April 17, 1996
Range covered in this report	May 1, 1996 - August 14, 1996
Full group meetings:	Once weekly, self-administered among students
Sub-project meetings and presentations:	Occasionally before and after full group meetings; occasional meetings as work demanded over the weekend and outside of school hours.
	Three three-week phases of sub-groups, starting in week three
	• Sub-group presentations to the full group at the end of each phase.
	Three groups of three members per phase.
	• Rotating membership in small groups.
	Small groups addressed Administration, Research (Environmental Scanning) and Evaluation.
Individual evaluation	Weekly journal entries covering process, administrative and academic issues.
	• Contributions to collective knowledge base on Web site.
Group evaluation	Quality of work presented at final presentation to faculty member, research sponsor.

Method

As noted above, the project group was primarily composed of undergraduate students. A core group of students proposed the project to the faculty member, who agreed to sponsor it on the condition that enough students were recruited to meet the minimum course limit.

Members of the core group approached the graduate student group member to see if he would be interested in pursuing this project over the summer term. Upon discussion with group members and the faculty member, it was agreed that this would be acceptable, provided that the graduate student member acted as a participatory action researcher.

Participatory action research (PAR), like other forms of micro-sociological research, aims to explain the dynamics of social situations and divine common threads of truth which may be applicable outside of the case studied. Participatory research is particularly appropriate in situations such as this project group, where an understanding of relatively undefined and emerging phenomena need to be studied from multiple perspectives with an understanding of the specific context of events (Yin1989).

This method of social research seems particularly salient with regard to organizational change and dynamics. Organizations, even those as small as our project group, emerge from and are constituted from a wide array of structural, political, interpersonal, individual and economic mores and relationships. Understanding the intersection between the multitude of contexts which exist within organizations is not information readily gained by 'empirical' means such as surveys or even transcript analysis of a mailing list. Perhaps this is why studies such as Fred Moody's *I Sing the Body Electronic* (1995), Tom Juravich's *Chaos on the Shop Floor* (1985) and Pace and Argona's Quality of Working Life (QWL) studies (e.g. Pace and Argona 1989) seem so authentic and offer as many insights as they do into actual work life, and why taxonomies generated from case studies can seem a little more plausible (e.g. Watson 1994).

All group members were made aware of the research goals of this project and gave permission for the study of communication over the 'public' mailing list. The research agenda was placed clearly on the table for discussion and debate in order to avoid political struggles regarding the intended use and perceived abuse of online transcripts for research purposes. As such, the researchers felt it imperative that all members would enjoy full disclosure regarding the nature of the research. To our knowledge, this approach had the intended consequence of ensuring a reasonable degree of free and open communication without fear of retribution or exploitation by academic "superiors".

The quantitative data found below was assembled from a manually maintained archive of electronic mail sent to the graduate researcher. Messages were then filtered to determine their origin (off the central mailing list, or from individual members), and to discern the time, date, and length of posting.

Classifying message topics occurred through an iterative categorization process which yielded an initial taxonomy of fifty-eight distinct categories of messages.

Like categories were combined until the final list (found below) emerged. The tally does not add up to the total number of messages as some messages with dual or multiple purposes were classified under multiple categories. This categorization is meant to serve as a glimpse into mail-list communication. We believe the data to be an accurate reflection of activity; however, as it was done by a singular coder, the validity of the classification process cannot be fully guaranteed.

Quantitative analysis and discussion of mailing list data
Use of the group mailing list was quite extensive, yielding 807 individual messages in a three and a half month period.

Table 1: Number of messages by date	
May 1-15	37
May 16-31	115
June 1-15	66
June 16-30	119
July 1-15	144
July 16-31	184
August 1-15	92

As shown in Table 1, mail list activity varied quite extensively between fifteen-day periods. Again, this interfaces well with the organizational structure of this emerging organization. The first month involved getting accustomed to self-governability, establishing and negotiating a new set of group dynamics, determining our intended final goals, and engaging in background research. In short, it was a 'warm-up' period in which many messages dealt with banal topics such as meeting times and places.

The beginning of June brought forth a combination of 'mid-term stress' for those still in full-time academic studies as well as a period of stagnation and concern about direction, which will be mentioned in greater detail below. The novelty of the process had worn off, and the level of energy and enthusiasm had dissipated slightly.

As the group began to coalesce and our direction and final product began to take shape, traffic regarding sub-project and full group events and discussion began to accelerate. The period between June 16 and July 31 accounts for 55% of total messages.

The 50% decline between the July 16-31 period and the August 1-15 period did not represent a decline in 'work done', but rather the opposite. As a spatially disparate group, the mailing list became a good place to mediate group discussions and exchange common information. As the final presentation deadline approached

and an increasing amount of effort was necessary to produce the presentation script, our promotional materials, and a demonstrable version of an auditing software package, the group held numerous face to face meetings in early August, thus decreasing our dependency on the mailing list.

Table 2: Number of messages by members

UG1	142
UG2	41
UG3	86
UG4	42
UG5	39
UG6	177
UG7	50
UG8 (w/d)	26
MA1	96
FAC1	100
Others	8

As seen above, there were marked differences in participation rates on the central mailing list, with one member (UG6) contributing four and a half times more often than the least participating member. Why the wide distribution?

Technical skill was not a mediating factor in this distribution. All group members had been exposed to electronic mail previously, had approximately one year of previous experience with the system, and were regular (at least once weekly) users of the medium.

Differences in the ubiquity of the technology was certainly a factor. As noted previously, all technological resources used in the course of the project were supplied by members; if they did not have or could not afford both a personal computer and an active account with SFU's Internet service, their level of potential access was significantly reduced. Both non-undergraduate members and UG1, 3, 4, and 6 had this infrastructure at home; this group accounts for the top five message posters. UG5 and 7 did have facilities in the home, but did not have exclusive access and use privileges, sharing the computer with family members. UG2 did not have this level of technology during the course of the project.

Work-related use equally was a mediating factor. Some members worked in an academic, research, or workplace environment which afforded and often demanded an active and consistent use of electronic mail. Both non-graduate members fall under this category, as do UG1 and UG3, who were research assistants for the faculty member and thus had access to both computer hardware and a quick, stable and constant Internet connection in the workplace.

General usage patterns and comfort level with the technology equally contributed to differences in usage. UG6, in particular, an avid user of the World Wide Web for gathering information for both personal and professional use, sent a wide variety of articles and Web sites to the list for the group to check out, and was a prime advocate of moving more discussion and debate online. Other members, while able and willing to engage in CSCW, preferred face-to-face discussions and meetings and used the list as one of many potential tools of communication.

Table 3: Number of messages by time of posting

Midnight - 7:59 AM	114
8:00 AM - 11:59 AM	158
12:00 PM - 5:59 PM	277
6:00 PM - 11:59 PM	258

The data above show how the mailing list afforded a degree of independence from time constraints. As most group members were forced to balance competing personal, professional and academic demands on their time, much communication was pushed out of the span of 'normal business hours'. The 8 a.m. to 6 p.m. bloc accounted for only 54% of communication; messages in the late evening/early morning hours (10 p.m.to 3 a.m.) were quite common, especially among those with computer facilities in the home.

As the group began to coalesce, patterns of use began to stabilize over twenty-four hour periods. As often occurs in working and personal relationships bonded by a common spatial location, group members came to be implicitly aware of each other's circadian rhythms. As noted above, students UG1 and UG3 were employed by the faculty member and as such were commonly available, both by phone and electronic mail, during normal weekday business hours. Similarly, the graduate student showed a consistent pattern of late evening and early morning participation. As group members came to 'know each other's clocks', mailing list use developed a certain synchronicity in which 'bursts' of traffic, resulting from a simultaneous yet detached 'co-presence', became evident. These synchronous patterns of online use helped the group establish a quasi-dialogical communicative space through the inherently asynchronous medium of electronic mail.

Table 4: Number of messages by kilobytes (KB)

1 KB	95
2 KB	398
3 KB	130
4 KB	75
5-9 KB	76
10-14 KB	24
15+ KB	9

Online communicators suggest that a good rule of thumb is to keep messages short and to the point and that, in the end, messages will over time become shorter as people realize that long messages are hard to read on a computer screen (Harasim 1995). This seems to be supported by the group list data. The majority of messages (61%) sent were 2 kilobytes (2,048 bytes, or characters) or smaller. As this size measurement included message header information, the actual number of 'lines' of text in a one or two kilobyte message varies from one to about ten.

Most larger messages (5KB+) were comprised of text downloaded off the Internet or copies or shared group documents such as answers to self-evaluation questionnaires and draft versions of our emerging business plan. These documents were often disseminated in a 'for-your-information' manner, and were not designed to jump start any larger conversations.

Very few large messages involved group discussion, save one thread of messages which revolved around conflicting goals and direction of group activities. At the following weekly meeting, where the issue was placed on the agenda, all members had brought printed versions of the e-mail chain which had been extensively highlighted and marked up, suggesting that most of their reading and analysis of the discussion occurred on paper.

Main topics

Table 5: Number of messages on administration of information systems

Mailing list and real life group coordination	25
Web site design/administration issues	31

As previously mentioned, much of the first half month was spent deriving a common list of our e-mail addresses and phone, fax, pager and cellular phone numbers, where applicable. Mailing list coordination was largely completed early in the project, revisited slightly upon the withdrawal of one group member.

The group Web site (http://edie.cprost.sfu.ca/~know/), however, was an emergent process which crystallized near the end of May largely due to the efforts

of one student. While much of the framework and design was decided by this student, the site's content was group-authored; especially the summaries section in which synopses of research were posted. Group authorship of a Web site requires a moderate level of co-ordination in order to ensure that members conform with the original design and do not overwrite or remove pages or links when changes are made. The student who acted as site administrator and designer coordinated the site's updating and actively ensured that other members followed the 'rules' of this collaborative space.

Table 6: Number of messages on establishing an information base

References to external articles	32
References to Web sites/internet sources	76
Terse summaries of articles (http://edie.cprost.sfu.ca/~know/ts)	23
Information requests and answers	35

References to external articles and Web sites were distributed quite freely over the span of the project. As noted in Table 6, Web site and Internet sources were much more prevalent than 'traditional' sources of information. This is partially indicative of the research habits of some group members (UG6, as noted previously, was an avid Web surfer and thus was more likely to come across online information sources than others), differential access to information (both non-undergraduate members, as well as avid e-mail users such as UG1, 3 and 6, subscribed to various electronic mail lists which distributed numerous messages daily), as well as the consonance between the use of the Internet as a research medium and as an information dissemination medium; i.e. it is more efficient to 'cut and paste' Internet research findings onto the mailing list than to retype notes taken at the library or at home from a paper-based publication.

Table 7: Primary online discussion topics

Online discussion of emerging issues	87
Discussion of group direction / resolution of internal conflict	37
Deciding on a name and logo	19
Support for academic requirements of the project	15
Discussion of projects outside the scope of the project group	33

The mailing list proved to be an active space for discussion of issues pertaining to the accumulated information base. Online and 'real-life' articles, especially those well summarized by initial posters, were discussed in great detail, as were the results of many sub-group projects.

It was equally an effective medium for resolving some questions regarding group direction and deciding on an organizational structure, name, and logo for the

incorporated organization which emerged from this project group (Resonant Communications; http://www.iamot.org/resonant/). While most 'final' decisions inevitably took place at weekly and sub-group face-to-face meetings, they were supported quite extensively by conclusions emerging from online discussions. The mailing list allowed for members to continue debates which did not neatly fit within the boundaries of weekly meetings, and served to streamline the discussion that took place in our sparse face-to-face interaction time.

The mailing list was also effective in achieving a mutual understanding among group members of projects which were tangential to the group's mission but were, at times, absorbing the intellectual and human resources of particular group members. This common understanding helped support group cohesion by integrating individual priorities and goals into a common context.

Table 8: Routine administration and co-ordination

Weekly meeting	*Agenda issues*	25
	Time/space coordination	60
	Meeting minutes	12
Sub-group discussion	*Time/space coordination*	24
	Sub-project content	55
Retreat	*Agenda coordination*	5
	Time/space coordination	15
Presentation	*Agenda/content coordination*	30
	Time/space coordination	23
Messages from outside local area		9
Dealing with withdrawal of member		11

Much activity involved attempting to coordinate schedules and spaces for group meetings and activities. Many messages dealing with time-space coordination vis-à-vis group meetings involved questions and responses concerning whether members would be able to attend a particular meeting at a particular time. This pattern was especially evident in the early months when the organizational structure was in the process of solidifying.

The co-ordination role was especially central for larger events such as the 'retreat' (a working 'holiday' away from the university campus) and the final presentation. Final dates for both events had to fit into the schedules of all nine student members, which proved to be a daunting task for those taking classes or working part-time outside school.

Special challenges to routine administration equally factored into mailing list traffic. The occasional absence of members (two periods of absence for the faculty member, and one each for the graduate student and UG3, 5, and 7) led to a more 'traditional' use of CSCW in coordinating communication over long distances.

This coordination was frustrated, however, by different, unfamiliar or non-existent technological configurations in the remote locations. The faculty member's e-mail communication from China was described as difficult and likely expensive; the graduate student noted on the list that interfacing with university computers from Toronto was slow and unreliable, whereas the three undergraduate students, vacationing in New York and in the interior of British Columbia, simply did not have any reliable form of access and thus did not participate. This highlights an important caveat to the 'space-transcending' technical capabilities of CSCW; it can only do so when an appropriate, functioning infrastructure is in place.

The withdrawal of a group member two days before the group retreat equally caused a blip in routine communication. While the withdrawal was handled quite efficiently overall, remaining members were still forced to acknowledge the loss of a member and absorb the withdrawing members' roles and responsibilities.

Table 9: Number of messages on social support and netiquette

Social gathering co-ordination	11
Statements of support	31
Conversation/bantering	37
Humour/jokes	28
Apologies for mistaken postings	18
Disappearance of mutual friend	18

Most CSCW research highlights the role of the system in facilitating goal-directed behaviour. While informative, such instrumental studies ignore or devalue less 'rational' but entirely necessary elements of communication such as boosting group morale, applauding work well done, humour, circulating gossip, and supporting group cohesion during trying times.

The main list was used effectively by group members to maintain a collegial, familiar environment which bolstered both online and face-to-face community cohesion. Jokes, cordial conversation, and good-natured barbs helped maintain a cordial atmosphere and made the list a supportive and accepting place to interact with colleagues.

The list equally helped us deal with trying times. In the week before the retreat weekend, a mutual friend of many group members was reported missing. The list instantly became a medium for dealing with the shock of this sudden event and for coordinating poster campaigns, missing persons Web pages and search parties with other mutual friends (who account for the majority of 'other' participants in Table 2.) After our friend was found alive and well, the list continued to provide support to group members and allowed our outside friends to offer thanks for the collective effort. While this effort probably would have occurred at some level without the

list, the common information base and the widespread information dissemination which the list afforded certainly aided in the coordination of the effort, and also provided an outlet for individual concerns, hopes, and fears.

What is not evident from the mailing list data
As noted previously, many researchers viewing patterns of communication on the group mailing list would be more likely to reach erroneous conclusions due to lack of awareness of particular contexts and histories not evident in the data set.

One such omission would be the existence of a 'secondary' group list formulated after the withdrawal of group member UG8. As there was some lag time between this group members' official removal from the group mailing list and perceived concerns about this group member's future participation in and knowledge of group activities, some 'public' e-mail was addressed to all group members individually, save UG8. Such data was not included in the study, yet was, for the most part, 'group' communication.

Other missing data involves the coordination of subgroup meetings. The authors have in their personal archives messages related to meetings and developments which it was not necessary to divulge to the full group. As we did not have access to members' private e-mail, data regarding sub-group activities were not integrated into the study. However, the archive collected by the graduate researcher contains nearly 300 messages which were not forwarded to the central list: most involved administrative and content-oriented messages relevant to sub-group activities.

There is a noted omission from the above discussion on social networking: the pervasive and unstoppable existence of 'gossip' or private communications regarding group members. Researchers did not have access to personal electronic mail archives as requiring such access would have constituted a clear violation of personal privacy. However, such gossip is essential in maintaining sub-group cohesion by providing a private, secure space for raising and solving potential interpersonal disagreements. Requiring members to archive and surrender all personal messages to the authors would have engendered an atmosphere of mistrust and guaranteed that any negative comments regarding our roles and actions would have been safely conducted through other media. Private gossip poses particular challenges to CSCW research as a result. To pretend that such 'virtual water-cooler' gossip did not exist between group members would be delusional; however, reliably charting such communicative patterns would likely be an impossible task in both this and similar surveys of communication practice.

The local base of this group equally suggests that much necessary communication was conducted in non-recorded face-to-face interactions, telephone

calls and facsimile transmissions. As in the case of sub-group communication and gossip, the authors can extrapolate from personal experience that such communication did take place beyond the 'public' eye, but cannot effectively comment on the nature of interactions outside their presence. It is important to note this blind spot of PAR so that alternative research support mechanisms can be identified and implemented to recoup some of the 'missing' data.

Recommendations for further research
This combined overview of CSCW research and case study findings highlights particular directions for further research which we feel are neglected by contemporary CSCW research.

Investigations of 'blind spots'
While PAR uncovers valuable insights into group dynamics, its necessary condition of implicating researchers in the group process may serve to encourage other group members to remove from view or selectively report certain activities and discussions. Dismissing 'missing' data as peripheral to analysis necessarily creates an incomplete understanding of actual group dynamics. Integrating other methods of analysis or relying on both PAR results and outside analysis might prove fruitful in future studies.

Encouraging more complex organizational studies
Transcending the inherent barriers of technological, economic, and social determinism can provide the research community with a more holistic and accurate portrayal of how CSCW systems are used and appropriated by communicators, the effect of particular mediating influences on usage patterns and the historical, technological, and economic constraints of the systems' implementation and administration. Such a complex relationship should be encouraged in future study.

Understanding the particular challenges of emerging organizations
Newly-formed emerging organizations often do not have a stable or ample supply of financial, technological, or intellectual resources to be able to construct elaborate CSCW systems. Further investigation of cheap, 'do-it-yourself' CSCW solutions and their role within smaller, emerging groups will shed light on a level of CSCW outside the scope of studies of established academic and private institutions.

Analyzing how CSCW systems share space with other communication technologies
Most organizations have a wide and expanding variety of communications solutions to choose from. This is especially true in locally-based organizations where many

communicative practices (i.e. face-to-face communication, regular and wireless telephone and facsimile transmission) are especially cost-effective and simple to administer and conduct. Conceptualizing CSCW systems as one of many available tools for communication will better ground computer-mediated communication in actual practice and hone a more complex and multifaceted understanding of CSCW systems as environments of effective communication.

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