

Special Section

**Collaboration, Integration, and
Transformation: Directions for Research
on Communication and Information
Technologies**

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In today's world, with so much of people's everyday interaction dependent on technology and its functions, learning how to use technology to communicate, research, and interact effectively with others is now, more than ever, at a premium. We may safely assume that future technological reliance will not decrease or diminish anytime soon. As such, it is to the benefit of all communication and information technology scholars to understand how to use communication and information technologies (CITs). Additionally, we must help foster and promote collaboration, recognize the implications of the increasing integration of CITs in regards to communication, as well as how to use CITs to alter the execution of communication research. This essay will do just that—offer three primary CIT challenges and provide suggestions and/or solutions of how to optimally achieve each challenge.

Challenge One: Can communication technologies really promote collaboration?

Collaboration has become a buzzword in society in general and particularly in the world of CIT. However, collaboration seems to have been reduced to the lowest common denominator, teamwork, in most current conceptions. Teamwork is important, but it is not exactly the Watson-Crick type of creative, potentially innovative collaboration that is implicitly promised by “new collaboration technologies.” How can we facilitate more creative, effective collaborations? Many of the Web 2.0 technologies introduce possibilities for collaboration that were unheard of until recently. Wikis, for instance, have been perhaps the best-known new collaboration tool and projects such as Wikipedia are touted as brave new collaborations. The Wikipedia site has

impressive lists of collaborations, guidelines for collaboration, and examples of collaborations. However, the value of the Wikipedia project has been questioned and the openness of the collaboration afforded by Wikis has been challenged.

While technologies such as Wikis can promote collaboration, they do not guarantee it. The human side of the equation is particularly important to whether technologies are used collaboratively or not. Some human tendencies break down collaboration and a key question is whether CIT can be designed to counteract these tendencies. And if they are successful in counteracting these tendencies, just as group decision support systems (GDSS) were at counteracting counterproductive tendencies in group communication, what is to keep them from going the same route as GDSSs, which have had problems with adoption and effective use?

One interesting irony is also suggested by 2 decades of GDSS research (Poole & Ahmed, in press). Studies showed that providing support for communication only (level 1 support), such as tools for listing and rating ideas or for chatting, worked well until conflict occurred or groups had to tackle difficult tasks. When this occurred, systems with level 1 support tended to decrease the effectiveness of groups and increased the amount of conflict and negative interaction, as well as decreasing member satisfaction. Group processes were improved and conflict managed more effectively when members used more complex tools such as multicriteria decision analysis or problem formulation routines (level 2 support), which “walked them through” a process of conflict management. In view of this finding it is interesting to note that most tools used for collaboration on the Internet, such as blogs, wikis, IM, or e-mail, offer communication support only. They may thus foment negative interactions when conflicts or problems arise. Developing tools that provide higher levels of support may be important to fostering collaboration via the Internet.

Challenge Two: Determining the implications for communication of the rapidly increasing integration of CITs

Integration and convergence are two main themes of the development of CITs over the past 20 years. Ongoing development in middleware, web services, multimodal search engines and other integration technologies has led to the ability to connect different types of data in unprecedented ways. Until recently, this integration was hindered by the fact that massive amounts of data were not easily manageable, but advances in datamining, textmining, terabyte data storage, crawlers, bots, and other technologies have made finding data and associations among them far easier. To some this raises the spectre of the panopticon, with the FBI combing phone calls and using textmining to surveil the populace. To others it raises opportunities to learn about consumer preferences or the public's interests and to build stronger communities by connecting people unaware of common interests or causes. Communicative aspects of integrative technologies have not been explored much. What are the implications for communication of being able to integrate multiple media? Of being able to capture shards of public opinion from text bases? Of combining MySpace and EverQuest

blogs? Of other people being able to put embarrassing pictures of someone up on YouTube and then having these images linked to the other entries on the person, and then pulled into integrative applications? Has the originator lost control over the process (you bet) and what are the implications of this for how we conceive of communication? Will human relationships change now that everyone's life is an open book? And, finally, what is the potential of these integrative technologies for communication research?

Challenge Three: Using CITs to transform the conduct of communication research

Advances in communication and information technologies offer unprecedented opportunities to advance our research agendas. Consider just one example. A multidisciplinary group of scholars from the University of Illinois, University of Minnesota, Northwestern, and University of Southern California have worked with SONY to get access to five months of complete data from the massive multiplayer online game (MMOG) EverQuest2 (Williams, Contractor, Poole, Srivastva, & Cai, 2008). This data includes complete information on all activity within the game, including quests (group actions), bartering and economic activity, and communication. It is anonymized since the only identifiers and player's account numbers and hence does not intrude on players. Players are not aware that their behaviors are being analyzed (part of their agreement in signing up for the game is that SONY can observe and analyze their game behavior) so there are no observer effects—players become so involved in the game that they lose themselves. In effect, the research team is replicating activities SONY would engage in already—measuring activity levels, monitoring players, using data from the game to design new challenges and environments—but with scholarly ends in mind.

Given the increasing importance of online gaming, one set of important questions centers on the impact of these games on the players, their families, and societies. Beyond this, study of game activity can help to shed light on real world phenomena. These games are much like small societies and will allow scholars to study interpersonal and group processes, economics, communication networks, diffusion of information, innovation, learning, and many other important subjects. Initial analyses suggest that there is verisimilitude between game behavior in economic and social interactions and behavior of people in "real life," though it seems obvious that there are likely to be some limits to generalization.

While they are small societies, these MMOGs enable the drawing of *huge* samples of individuals, groups, networks, etc. compared to "manual" social scientific research. The EQ2 dataset tracks over 100,000 characters over 5 months and runs to 1.5 terabytes of data, which would support drawing samples of thousands of groups and tens of thousands of individuals. Since the MMOG capture complete data, it enables us to avoid the difficulties associated with missing data that plague both longitudinal and network research.

The EverQuest2 project is just one example of how CITs will enable scholars to gather data unprecedented in type and scale. Scholars are using online environments such as Second Life to run experiments, web crawlers to gather data on organizations and their interconnection from their websites, and sites like Facebook and YouTube for the study of interpersonal relationships. Advances in commercial computer interfaces like Wii will enable the capture of data on nonverbal communication at relatively low cost. Due out in December is a headset that captures brainwave data and uses it to enable the user to control a computer by thinking! (Conrad, 2004) While crude at their present stage of development, the history of CIT suggests these and other novel interface devices will mature in the next few years, opening up unprecedented capabilities for data capture and handling.

CITs also have the potential to “supercharge” data analytics. It goes without saying that social science has advanced considerably in the sophistication of statistical, network, and modeling tools that support quantitative analysis, and future advances are in the offing. For example, high performance computing will enable social scientists to develop large-scale agent-based models of groups, organizations, and societies. And while agent-based models typically emphasize simple rules governing agent activity, peta-scale computing may enable the development of more complex agents that reflect human proclivities more accurately.

As the EverQuest2 example suggests, the real challenge for computing in the future is more likely to be handling large datasets than increasing processing speed. Our ability to take advantage of CITs hinges on what may seem rather prosaic methods for storage, retrieval, managing databases, cleaning large datasets, and related tasks.

What may be less evident than the advances in quantitative social science are the advances CITs are bringing to intensive interaction analysis and to qualitative research. For instance, the Digital Replay System (DRS), developed at University of Nottingham, enables researchers to consolidate and synchronize multiple video and audio recordings, other audio data such as pitch and intensity, sensor data, transcripts, and codings and qualitative annotations (Greenhalgh, French, Tennent, Humble, 2008). The DRS greatly reduces the time and effort involved in analyzing multiple data streams and, more important, enables teams of researchers to overlay different analyses of the same data.

At the National Center for Supercomputing Applications at the University of Illinois, a team of social scientists and computer scientists are using middleware developed at the NCSA, CyberIntegrator, to link the DRS to numerous other data capture and analytic tools, including a tool that extracts social network data from videorecordings, a tool for acoustic analysis of human speech, automated voice recognition tools, automated video analysis tools, network analysis packages, and statistical packages to create GroupScope, an analytic “mashup” that will provide much more rapid and thorough interaction analysis of dyadic and group interaction (Poole et al., 2008). The goal is to automate many of the initial steps in interaction analysis and bring in human coders and analysts later in the process to correct and enhance automated “first drafts” of the data. For instance, initial automated analysis

might identify potentially high value segments of the interaction and send them to the human analyst for further work, thus greatly reducing the time the human must spend finding key segments. The ultimate goal is to develop a system to enable direct, detailed observational analysis of large groups, such as emergency response teams (that can number in the hundreds) and classrooms, something beyond the pale of current methods. I believe research mashups such as GroupScope are going to become more feasible in coming years.

These are only a few examples of how CITs have the capacity to change how we conduct research. But perhaps even more important are the possibilities CITs offer to develop research environments for extended, multischolar research projects. The typical practice in communication research has been for single scholars or relatively small groups of scholars to gather their own proprietary datasets which they generally analyze in isolation, perhaps allowing a few other scholars access. What if, instead, we followed the example of astronomers and created datasets that were posted in Virtual Research Environments (VRE) and accessible to a large number of scholars from many institutions? The VRE would have cyberinfrastructure such as a portal, analytical tools, datasets, and community-building tools such as blogs to encourage collaborative research across disciplines and fields. One can imagine, for instance, a set of data on group interaction consisting of videos, transcriptions, and acoustic and other nonverbal data, along with questionnaire data gathered from group members on a number of common variables. Scholars could apply their own analytical techniques to this data and their analyses—codings, qualitative observations, statistical results, network data—would be added back into the VRE. Over time layers of second-order analytic data would accumulate, enabling new discoveries by cross-referencing multiple scholarly lines of work.

Current developments in CITs make this vision realizable. To make it work will require a different mindset on the part of communication scholars, a transition from lone wolf (or lone wolfpack) scholars to members of a larger scholarly enterprise. I believe this type of transition is vital if we are to move communication scholarship to the next level. We are wont to say that communication research is different from astronomy because we study human beings, societies, and culture. I would venture a bold hypothesis that it is NOT that different and that we have been limited by our technologies for research and by our aspirations. That no longer needs to be the case.

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