Most people who use information technology (IT) every day use IT in text-centered interactions. In e-mail, we compose and read texts. On the Web, we read (and often compose) texts. And when we create and refer to the appointments and notes in our personal digital assistants, we use texts. Texts are deeply embedded in cultural, cognitive, and material arrangements that go back thousands of years. Information technologies with texts at their core are, by contrast, a relatively recent development. To participate with other information researchers in shaping the evolution of these ITexts, researchers and scholars must build on a knowledge base and articulate issues, a task undertaken in this article. The authors begin by reviewing the existing foundations for a research program in IText and then scope out issues for research over the next five to seven years. They direct particular attention to the evolving character of ITexts and to their impact on society. By undertaking this research, the authors urge the continuing evolution of technologies of text.

IText
Future Directions for Research on the Relationship between Information Technology and Writing

ITEXT WORKING GROUP
Http://www.ItextNext.org
CHERYL GEISLER
Rensselaer Polytechnic Institute
CHARLES BAZERMAN
University of California at Santa Barbara
STEPHEN DOHENY-FARINA
Clarkson University
LAURA GURAK
University of Minnesota
CHRISTINA HAAS
Kent State University
JOHNDAN JOHNSON-EILOLA
Clarkson University
DAVID S. KAUFER
Carnegie Mellon University
ANDREA LUNSFORD
Stanford University
CAROLYN R. MILLER
North Carolina State University

DOROTHY WINSOR
Iowa State University
JOANNE YATES
Massachusetts Institute of Technology

Texts mediated by information technologies are at the core of the information revolution. The vast majority of people who use information technology (IT) every day use IT in text-centered interactions. In e-mail, we compose and read texts—to communicate, to negotiate, to convey. On the Web, we read (and often compose) texts—to advertise, to inform, to persuade. And when we create and refer to the appointments and notes in our personal digital assistants, we use texts—to record, to remember, to organize.

These texts form a new page in the story of the coevolution of humanity, culture, and technology in ways that give them new function and significance. Texts, already technology for communicating at a distance, are deeply embedded in cultural, cognitive, and material arrangements that go back thousands of years. Information technologies with texts at their core—the blend of IT and texts that we call *ITexts*—are, by contrast, a relatively recent development. E-mail began in the early 1970s with the creation of simple software to send and receive messages over the ARPANET, the progenitor of the Internet. The first hypertext editor, WorlDwidEweb, and Web server were released in 1991. The Palm Pilot, the first and still most successful personal digital assistant, hit the market in 1995. In a few short years, however, these ITexts have initiated social and material changes that appear to be altering the very character of texts and the interactions of those who use them.

As researchers and scholars concerned with producing and receiving texts, we stand at the confluence of a variety of research traditions that, taken together, provide the foundation for a systematic research program on IText. We have two reasons for being interested: First, information technologies provide an opportunity to explore fundamental theoretical issues of text in new ways. Second, we want to participate with other information researchers in shaping the evolution of future IText technologies in directions consistent with social values, human needs and capacities, and our best knowledge. This article is a call to those who share our sense of urgency and opportunity.

To accomplish our goals, we must speak with the unified voice of a mature discipline, forge strong alliances with other information disci-

plines, and develop for ourselves coherent research agenda that have the potential to make a contribution. All of this requires that we articulate our issues and our knowledge base, a task we have begun here. In the first section, we review the existing foundations for a research program in IText to introduce it to researchers new to the field and to start the discussion with those outside of the field. In the remaining sections, we scope out issues for IText research over the next five to seven years, directing particular attention to the evolving character of ITexts and their impact on society.

FOUNDATIONS FOR RESEARCH ON ITEXT

In this section, we focus on the frameworks and knowledge on which research on IText can be built. Although we write for those outside of our field as well as those new to the field, we do not have the time to be comprehensive—instead, we are illustrative. Our overall point is that the foundations for research agenda concerned with IText have been laid in the confluence of research activity over the past 25 years concerning the creation and reception of text: in rhetorical theory, in activity theory, in literacy studies, in genre theory, in usability research, and in workplace writing.

Rhetorical Theory

Although an ancient discipline, first developed in ancient Greece as an art for democratic decision making, rhetoric has recently enjoyed a revitalization as philosophers, historians, anthropologists, and others have become interested in the role of persuasive symbols in constructing the human world and managing uncertainty when certainty is not possible. Rhetoric is a design art (Kaufer and Butler, *Rhetoric*), a goal-directed activity similar to engineering and architecture in its regard for practical effects in the future and in its need to be socially responsible and ethical. In particular, rhetorical theory provides the fundamental analytical tools for elucidating how IText is related to traditional forms of communication and for stimulating theoretical advances needed to go beyond those forms.

Central to rhetorical theory is the idea that audience determines the appropriateness and success of communication. The expectations, task needs, immediate situation, values, interests, and presumptions

of readers affect how they understand and respond to a text or message. Research in linguistics, cognitive psychology, reading, and rhetoric has shown that little meaning is literally on a page and that much meaning must be contributed by the reader through the process of common inference and an understanding of convention at many levels. Thus, a message that is unintelligible to someone who has never been in the US Navy can be understood by 350 naval officers in less than 45 seconds. Consequently, the message must be judged clear and effective because it provides information relevant to readers in a form that they find appropriate as well as identifies itself and the readers as part of the relevant community (Suchan and Dulek).

Rhetorical theory also helps us to understand the effects that texts have on readers as arguments—that is, in providing reasons and inducements to believe (van Eemeren, Grootendorst, and Henkemans). Audiences with different backgrounds and needs respond to different sets of reasons and inducements: Different responses of managers and engineers to arguments, for example, contributed to the situations that caused the Three Mile Island nuclear incident and the space shuttle *Challenger* disaster (Herndl, Fennell, and Miller). Analysis of argument patterns helps explain what audiences respond to and why (Toulmin, Rieke, and Janik), including what they find credible, interesting, and familiar.

In an era of information overload, designers of IText can also learn from rhetorical theory ways to engage and manage human attention. Rhetorical theory provides a repertoire of moves and strategies that can be combined to create effective experiences for readers: repetition, emotion, narrative, segmentation, use of visuals and graphics, authority, and patterns of reasoning (Perelman and Olbrechts-Tyteca). These can be adapted to IText to give producers and users the best chance of connecting in productive and meaningful ways.

Finally, rhetorical theory directs us to the rhetorical situations in which writers and readers coexist: the occasions that draw them together, the motives they bring, the tasks they are engaged in, the rules of engagement they operate within, and the communities they affiliate with. Rhetoric is understood both as a mode of conflict within and between communities and as a means of conflict management and of community building. Traditional studies of political oratory must now be supplemented by research on e-government and the nature of virtual communities (Jamieson).

Activity Theory

Activity theory, based on the work of Lev Vygotsky and Alexei Leontiev (see also Wertsch), provides analytic tools for studying how ITexts function within human activity. Activity theory is particularly useful in examining the text-mediated interaction of multiple participants as organized in the patterned social relations of activity systems that vary according to the practices and cultures of social collectivities (Engeström; Hutchins; Russell, "Rethinking," "Writing"). Activity theory also points toward the way technologies facilitate different sets of relations, thoughts, and mediating texts. Although rhetorical persuasion can be seen as gaining acquiescence, alignment, and cooperation to pursue further activities, texts may carry out many other specific functions within systems of activity.

Often human activities are carried out entirely within the symbolic realm and realized through the production of texts such as accounts, legislation, literary works, and reflexive essays (Freedman and Smart; Geisler, *Academic*). Texts may also become consequential for activities that are less obviously text centered. Legislation and court decisions, for example, have consequences for the activities of police enforcement and incarceration. Accounting texts have consequences for the activities involved in producing, processing, and distributing food crops. Texts may even serve to organize activities, not only through direct regulation (as in the official rules of a sport or of the patent system) but also through the affordances of the text (as in the way the spreadsheet organizes accounting and corporate planning) (Bazerman, "Discursively," "Systems"). Further texts encode the persisting organization of social groupings and their activities, revealing the forms and patterns of communication and work, the tools they use, their enabling beliefs and knowledge, and other aspects of their culture (Berkenkotter and Ravotas; Prior).

Activity theory has some special relevancies for a study of the emergence of IText. People use IText documents as part of larger activities, carrying out meanings with motives and using tools that are built on prior activities and activity systems but transforming them in their new electronic contexts. The tools that support the production, circulation, and use of ITexts have consequences for the kinds of communicative processes that are afforded. Taking advantage of electronic affordances, some users may modify the structure of their

activities, thereby creating problems for those trying to pursue goals in older, familiar ways.

In the long run, this electronic mediation may change the entire system of activity that sustains social organization (Bazerman, "Politically"). Many of the traditional forms of social organization, such as bureaucracies, professions, and sciences, have gained their persisting structure and function through texts (Merton). As these social entities move their communication and information online, their structure and function will necessarily change in response to the new forms of available text and the emergent opportunities of text accessibility, circulation, and use. The history of such institutions has been of constant change, with major consequences for the way we live our lives and the role each of us takes within these institutions. Concern about the collection of personal data in current institutional information systems is one of the ways we all will be caught up in activities ever more reliant on ITexts.

Literacy Studies

Literacy studies examine how reading and writing are used and function in the daily mental and material lives of individuals, in the work and interactions of social groups, and throughout large cultural movements. Complementing rhetorical theory, literacy studies pay particular attention to how reading and writing occur in situ and in real time. Four important findings for discussions of IText come from literacy studies.

First, literacy studies suggest that to be literate does not mean to possess a set of discrete skills but rather refers to a way of doing, a way of functioning within complex communicative situations. Literacy is in fact a complex of abilities and knowledge that enable individuals to function and contribute in specific situations. As information technologies develop and change at a rapid rate, the contexts that literate individuals must understand and use change as well in profound ways. According to theorist and practitioner Paulo Freire, literacy must be accompanied by an awareness of the cultural and political events and conditions that shape literacy and individuals' use of it. Likewise, an individual in a contemporary workplace needs to know not only how to write a memo (using standard conventions of professional language) but also when to write it and under what circumstances. This individual also needs to know what kinds of technologies (paper, e-mail, Web) are appropriate in a specific situation and

which other people need to be involved in or informed about the situation.

Indeed, at a number of important junctures in human history, the intricate relation between technology and literacy has been evident. Scholars of the history and functions of literacy emphasize that literacy entails the ways that technologies of communication—from writing, to printing press, to telegraph, to computers and the Internet—shape interactions between readers and writers. These changes often concern time and space. For instance, the technology of early writing meant that communication between individuals could be removed in space and in time (that is, written artifacts, unlike face-to-face speech, could be transported from place to place and read at points removed in time). The rise of the printing press in the early Renaissance meant that texts could be duplicated easily and thereby gain increased portability and permanence. The advent of electronic communication in the nineteenth century changed the space and time relationship between communicators yet again, as technologies such as the telephone and telegraph meant that individuals could communicate across space and, later, with the advent of the taped radio and television, across time as well. This changed temporal and spatial relationship between readers and writers of IText has been and should continue to be of rich interest to scholars of literacy (Haas, *Writing*).

Second, the course of literacy development is complex and lifelong. Instead of marching along in neat steps, writing develops simultaneously along a number of fronts, including, in the early stages, pattern recognition (Piaget; Vygotsky, *Mind*, *Thought*); comprehension and use of logical structures such as parataxis and hypotaxis (see Goodman); vocabulary development; motor-skill development; and social-cognitive development, to name but a few. Moreover, writing develops not linearly but recursively, in large loops that eventually spiral upward toward more complex ways of signifying meaning (Emig; Flower and Hayes). It involves the interiorization of language tools and systems in various contexts (Vygotsky and Luria).

These literacy skills continue to develop into adulthood. Studies show that an essential part of later literacy development concerns understanding the rhetorical nature of extended written discourse. In college and beyond, many readers come to see texts not just as content or information but also as rhetorically based actions within specific contexts, actions that are deeply implicated in issues of social functioning, cultural learning, and the ongoing negotiation of meaning

(Berkenkotter, Huckin, and Ackerman; Haas, "Learning"; Herrington; Geisler, *Academic*; Geisler, Rogers, and Haller; White). These findings have led scholars interested in writing development to focus on embedding writing instruction into the curriculum throughout a student's educational career, focusing at each educational level on gaining ever-increasing proficiency. One result of this emphasis has been the growing movement referred to as writing across the curriculum (Herrington and Moran; McLeod and Soven), which provides theoretical grounding and practical support for instructors in all fields to incorporate writing instruction and writing activities into their courses.

Third, complex issues are involved in determining who within a culture has the ability and the power to read texts or to write them. For instance, in medieval times, scribes wrote texts but often did so without truly understanding the content or import of those texts. Reading and interpreting the text was the province of the clergy, a much more powerful group. In our own time, although many individuals are able to access information via the Internet, relatively fewer individuals have the skills and resources (i.e., power) necessary to produce or write text online. That means that, in our age at least, an important "digital divide" may separate those who have access to information technology from those who have the power to create or generate information and its technologies.

Fourth, as we enter the twenty-first century, belief in the importance of literacy and the way new technologies shape literate activities is widespread. Americans have long assumed that individuals receive important social and economic benefits from being literate, and, in general, these expectations have held. Not only do those with higher levels of education fare better on the job market, but certain kinds of jobs (e.g., professional, white collar) require and reinforce individuals' literate abilities. Again, however, the relationship between literacy (whether traditional literacy or electronic literacy) and social or economic benefits is not always straightforward. Shirley Brice Heath's work with Appalachian families and Sylvia Scribner's work with blue-collar workers suggest that reading and writing may not always translate into advancement, economic or otherwise. For instance, the 21st Century Workforce Commission's recent report, "A Nation of Opportunity: Strategies for Building America's 21st Century Workforce," emphasizes that the "current and future health of America's 21st Century Economy depends directly on how broadly

and deeply Americans reach a new level of literacy," what the commission calls "21st Century Literacy" (5).

Genre Theory

Texts link readers and writers by using typified generic forms, or genres, that signal texts' function and meaning. These genres are now the subject of extensive literature incorporating perspectives from literary studies (Beebee; Cohen; Hernadi; Todorov), speech communication (Campbell and Jamieson, *Deeds*, *Form*; Simons and Aghazarian), writing (Bazerman, "Life," "Letters," *Shaping*; Coe, Lingard, and Teslenko; Freedman and Medway, *Genre*, *Learning*), applied linguistics (Bhatia; Cope and Kalantzis; Halliday and Martin; Swales), and linguistic anthropology (Duranti; Hanks, "Discourse," *Language*). A specific literature is also emerging to address the emergent genres of IText.

In rhetorical terms, genres are typified responses to typified situations, providing typified motives and forms of realization (Miller, "Genre"). Genres help give shape to situations and people's actions, helping orient writers to their communicative needs and opportunities and providing audiences with means of making sense of the texts they receive (Bazerman, *Shaping*; Berkenkotter and Huckin). In sociological terms, genre could be said to be a key device for processes of social typification (Bergmann and Luckmann; Schutz and Luckmann), the formation and enactment of habitus (Bourdieu), and structurational reproduction (Giddens). However, the complexity of each new situation; the different locations, conflicts, ambivalences, and motives of participants; and the multiple frames available to participants suggest how each invocation of a genre is a novel event and genres keep changing. Genre studies now analyze many of the genres of professional and public life. Through the system of genres by which research contracts are negotiated and completed, for example, one can study (as Van Nostrand has) the entire cycle of knowledge production between the Department of Defense and its various vendors.

Understanding of genre is crucial to moving activities and social networks into electronic environments. The use of prior forms for early recognizability needs to be balanced with innovation that restructures communicative forms, social relations, and activity (Agre; Bolter and Grusin; Gurak; Yates). The design of IText tools for

the production, access, circulation, and use of information needs to accommodate both continuities and change in genre.

Genre is also an important device for locating and organizing forms of information in indexing and accessing archives. Genre defines the forms in which information enters into people's communicative activity and understanding of the sociosymbolic world. Without the orientation genre provides, people would not know where to look for information or what that information might mean. Archival indexing systems have been aware to some degree of the importance of genre, but the increasing demands on electronic archiving require a deeper look at this issue.

Usability Research

Working with IText requires us to reevaluate and rearticulate our understanding of textuality. Although all texts, strictly speaking, are technological artifacts, ITexts lie on the far end of the technological spectrum—the bleeding edge, where the two ends of the terms *technology* and *communication* overlap each other in critical and exciting ways. ITexts therefore dwell in the realm of usability research and practice. By their nature, they are interactive, as early hypertext theory and practice discovered—with theorists such as George Landow and Richard Lanham rubbing elbows with technology theorists such as Ben Shneiderman and Lucy Suchman. Our working with IText, then, can benefit from usability research and practice.

At its heart, usability research focuses on the relationship between technology and users. Strands of usability theory include usability studies and usability engineering (Card, Moran, and Newell; Nielsen; Norman; Schriver) and socially situated theories such as participatory design and ethnography (Ehn; Mirel; Suchman). Both areas provide important perspectives to understanding (using and designing) IText. Jakob Nielsen's work, for example, focuses on a range of low-level usability issues, including subjective ratings of user patience levels with progress bars in dialogue boxes on computer screens. Pelle Ehn's work in participatory design involves issues such as the politics of automation and the inclusion of end users into the design process. In research on participatory design practices in a Scandinavian printing factory, for example, Ehn found that technology designers worked closely with printing professionals, embracing the complex-

ity of the professionals' processes as their starting point, improving work without inappropriately simplifying the context.

To separate ITexts from our current static notion of text, we need to understand users as active and, perhaps more fundamentally, ITexts as interactive, designed in accordance with the notion that a text is an ongoing, negotiated process, a use rather than a reception. Although technologies traditionally have been considered neutral artifacts, usability theory increasingly approaches technological development and use as a political activity, one in which users, developers, and technologies are linked together in positions of unequal power (Gurak; Haas, "Relationship"; Johnson-Eilola, *Nostalgic*; Mirel). IText as a concept and practice builds on this work in usability by increasing the visibility of text operating as a social and political technology.

Workplace Writing

In the workplace, texts are stereotypically treated simply as one of the means by which communication occurs. Although communication is an important function of texts, careful field studies show that it is not the only function. Current research on workplace writing views texts as a technology that effects a wide range of social actions. These varied functions need to be understood by developers of IText so that systems are developed that facilitate rather than limit the effectiveness of textual activity in the workplace.

Texts are able to fulfill important functions in the workplace because, once published, they are relatively permanent and easily shared. Thus, texts provide shared visions around which joint work can be organized. In this role, texts serve to stabilize knowledge, a function that is important, for instance, in establishing intellectual property (Geisler and Lewis; Medway; Smart). As part of stabilizing knowledge, texts also serve as organizational memory, a task that is not always straightforward. What is recorded in such documents as minutes becomes the official understanding of what has happened or what will happen so that texts are used to shape members' understanding of the organization and its past and future activities (Cross; Doheny-Farina, *Rhetoric*; Rogers and Swales; Winsor, "Genre"; Yates). Texts such as minutes, agenda, work plans, and mission statements can also serve a disciplinary function in organizations because they make public the tasks people are supposed to perform so that they can

be held accountable (Barabas; Haas, "Relationship"; Geisler and Munger; Geisler, "Accounting"; Winsor, "Genre," "Ordering").

Almost as much as the texts themselves, the process by which texts are created also helps to shape organizations, which is one reason much labor is sometimes exerted in writing texts that no one reads (Geisler and Munger). Texts in organizations are frequently collaborative efforts with several people contributing to them either directly or through the document review process (Lunsford and Ede; Paradis, Dobrin, and Miller). Through the interaction it requires, the creation of texts often serves as an occasion for negotiation about future actions (Doheny-Farina, *Rhetoric*), for education of newcomers about organizational culture (Katz; MacKinnon; Winsor, *Writing*), and for multiple disciplines to represent and negotiate their particular issues and expertise (Geisler, Rogers, and Haller; Geisler, Rogers, and Tobin).

THE CHARACTER OF ITEXT

The ubiquity of ITexts in the information technology revolution requires that, above all, such texts be useful. Yet, as the confluence of foundational work outlined in the previous section makes clear, usefulness is not a simple concept. In this section, we turn from these foundational understandings of texts in general to considering specific issues that we see arising when texts move from print to online. Such issues include making electronic text effective, managing the interplay of visual and verbal, establishing credibility online, controlling information overload, developing new techniques for information retrieval, and understanding texts as intellectual property.

Effective IText

ITexts—in their newly emerging genres, publishing and circulation patterns, and occasions and situations of use—will develop according to the situations, relationships, and activities within which they will be accessed and comprehended. ITexts move across space and time as writers make meaning in and from texts in local circumstances. Writers must then make the texts interpretable by readers located in other circumstances and activities. Many of the complex clues that allow us to orient to printed texts are deeply embedded in our cultural knowledge and our schooling. We are not aware of just

how much we do tell books by their covers—and publishers, circulation patterns, typical readers, and the ordinary practices that determine how, when, and for what purposes we are likely to access texts.

The new forms and functions of ITexts present new challenges to meaning-making (Charney). Texts can be chunked and linked or atomized into bits of information. They permit rapid movement between different texts by different authors; quick and extensive indexed searches of heterogeneous documents; rapid, nonsequential movement between parts of texts; scroll skimming; and various other practices. To design rhetorically effective documents and systems for their production, access, support, and distribution, we need to understand how people make sense of these new forms and practices. What aspects of design can promote both efficient meaning-making for the purposes at hand and the deep understanding required for reflection and thought?

In addition, the design and use of ITexts increasingly work from the assumption (explicit or implied) that texts are no longer simply discrete objects to be accumulated and moved around but also spaces to be connected to each other and moved within (Johnson-Eilola, "Accumulation"). Information architecture and the related strand of graphic design and interface design (among others) offer the beginnings of a new sort of textuality—text as space—that are crucial to IText. In general, information architecture investigates methods for making information spaces understandable to particular audiences, particularly in information-dense situations (Benedikt; Laurel; Tufte, *Envisioning*, *Visual*; Wurman). Richard Wurman, for example, points out the ways that typical texts rely heavily on unexamined, default genres that do not translate well to new communication technologies. Rather than limiting ITexts to narrative, temporal, or alphabetical orders (the three most common structures for our conventional understanding of texts), we must investigate the design and use of new structures: spatial, dynamic, multimedia.

We are still exploring the ways people make sense of these new kinds of texts. Typified genres and activity systems provide some stability in the situation and meaning-making in varied circumstances (Bazerman, *Constructing*), but we know little about the typification and attendant complex clues that make ITexts effective. The more the design of electronic texts recognizes the situationality and complexity of meaning-making, the more effective the texts will be in evoking sufficiently congruent meanings from their appropriate readers. Although the possible meanings people might draw from ITexts have

engendered much speculation and visionary thought, we need more concrete studies and careful analyses of meaning-making, meaning-making practices, and the situated use of meaning in ITexts (Haas, *Writing*; Gurak; Johnson-Eilola, "Living"; Nardi) to address such issues as these:

- *Creating effective work flow.* Although new technologies allow decentralized and unstructured work spaces, in practice, workers frequently reassert old work methods (Brown and Duguid; Johnson-Eilola, *Nostalgic*). How might we design institutional situations, specific workplaces, and technologies that are more amenable to fluid work flow? Under what circumstance should we preserve old patterns?
- *Connecting virtual and face-to-face situations*. Our current approaches to text frequently maintain separate categories for text outside the computer and text inside the computer. What methods most effectively connect virtual and real worlds? How are ITexts used across virtual and face-to-face situations? What tools can we provide users for reusing texts in new social situations?
- *Developing virtual spaces*. Even though classical rhetoricians often conceived of texts as spaces (Yates), ITexts often radically intensify the notion of text as space (Benedikt; Haynes and Holmevik). How can applied theories from architecture or urban planning assist us in developing virtual spaces? Are there aspects of virtual space that contradict our experiences of real space?
- *Reducing fragmentation*. The tendency toward fragmentation in IText has been both celebrated (Baudrillard) and decried (Bierkerts). What forms of IText combine the fluidity of IText with the ability for reflective thought? Does fragmentation differentially affect different groups of users (by race, class, gender, etc.)? Do generational gaps exist in understanding and using ITexts (Johnson-Eilola, "Surfacing")?

The Interplay of Visual and Verbal

The word *text* is inadequate when discussing documents created for and about information technology. Today's interactive, hypertextual documents—many of which reside on the Internet—use color, sound, images, video, words, and icons to express their messages. According to William Horton, "we all think visually" (16). Visual communication is a basic form of human communication, dating back before written language. Before the invention of alphabets or symbols for numbers, humans communicated visually. More than 15,000 years ago, humans created cave paintings of animals, hunting expeditions, and other activities. Today, we are surrounded by information that is a blend of textual and visual.

Walter Ong suggests that we are living in a time that could be characterized as "secondary orality" (136): a time when our communication is not only written in words but also involves characteristics of earlier oral cultures. The words, pictures, sounds, colors, icons, and video images in today's communication have created the need for what Kathleen Welch calls "electric rhetoric": a systematic study of writing and communication that expands beyond traditional humanities training and includes insights from human-computer interaction, cognitive psychology, computer science, art, and other fields. Several topics need to be studied:

- *Typography and understanding*. In a classic work on typography, Paterson and Tinker describe how people read various typefaces in different fashions. Serif faces, for example, seem to speed the eye from letter to letter. In addition, we know that typeface, type size, line length, interline spacing, and other features of type affect how we read and interpret electronic texts. And on the screen, these features can be shaped and reshaped by the browser, software, screen type, and so on. How should we teach and study writing with these features in mind?
- *Print and screen differences*. Studies have noted that people interact with ITexts differently than with print ones (see Haas, *Writing*, for a review). How do we teach reading and writing with these differences in mind?
- *Visuals and readability*. Too many visuals, or visuals that are crowded with too much information, create visual noise. People have an easy time processing visuals but not if the chart, graph, or other visual is so crowded or disorderly that it cannot be understood. One expert refers to this visual noise as "chartjunk" (Tufte, *Envisioning* 34); another author suggests that the new language of the electronic age is a visual one (Horn). What mixture of verbal and visual information is appropriate in ITexts?
- *Ethics and visual information*. Visuals can manipulate as well as inform. When bar charts use pictures, not just bars, for example, the relative size of the bar and type of picture might convey a particular bias (Kostelnick and Roberts 292). How do we teach students to create ITexts that are ethical?

Credibility in ITexts

As citizens, students, consumers, and researchers depend increasingly on electronic media for information and exchange, understanding the sources of credibility and the motives for trust will become increasingly important for the successful development and maintenance of communication through ITexts. For example, in e-commerce, trust has also become a key issue, without traditional forms of face-to-

face credibility and institutional reputation to undergird commercial relationships (Fukuyama). However, neither trust nor credibility is well understood in sociopsychological terms, and research in other domains where trust and credibility have proven to be critical (such as risk communication) has failed to produce predictive models (Leiss; Peters, Covello, and McCallum).

Rhetorical theory decomposes credibility (or ethos) into three components: knowledge and intelligence, moral character, and goodwill or cooperativeness (Johnson; Baumlin). This conceptualization has helped articulate the operation of scientific discourse (Gross), risk analysis (Miller, "Presumptions"), and academic disciplines (Sullivan), for example. These studies all presume traditional print text, however, and little theoretical or empirical work explores how IText might be different.

That trust and credibility might be important in IText were shown early on by Joseph Weizenbaum's experiments with the first interactive conversational computer program. What he discovered is now called the "ELIZA effect" (Hofstadter 4), that is, the strong tendency of those who interact with such a program to attribute intelligence and personality to it. More recently, work on software "agents" created through artificial intelligence research has confirmed that trust is a vital element of their success (Foner; Haase; Miller, "Writing"). Also suggestive is a study of audiotaped versus typed peer review feedback, which found some evidence that the modality of feedback influenced the perceived credibility of the reviewer (Neuwirth et al.). The following issues represent areas for future research on credibility in ITexts:

- *Comparisons with other synchronous and asynchronous media*. To what extent are the mechanisms by which asynchronous IText can earn credibility and gain trust similar to those of other asynchronous communication media, such as print text? To what extent are the mechanisms of synchronous ITexts and digitized oral communication similar to those of face-to-face communication, telephone conversations, and teleconferencing?
- *Components of credibility*. Can we distinguish components of credibility and trust that operate in different ways in different electronic situations? Such components might include not only the general qualities recognized by rhetorical theory (knowledge and intelligence, moral character, and goodwill) but also other factors such as authority, empathy, interactivity, gender markers, autonomy, and affiliation.
- *Cues to credibility*. If making appropriate attributions of credibility is considered a critical literacy skill, what cues do readers or users of IText rely

on in making such attributions, and how do they learn to use new cues? Such cues may include domain names, authentication procedures, frequent and attributed updates, privacy notices, and corporate trademarks and identifiers. Do different groups of readers/users use and respond to such cues differently?

- *Balance between credibility and gullibility.* What are the situations in which readers/users may invest too much credence in a Web site or other form of IText? Can electronic genres provide new forms of stabilization that will promote trust? How can the design of technologies promote the best balance between gullibility and cynicism?
- *Applications in artificial-intelligence agents.* What is the contribution of the trust/credibility dynamic to the performance of software agents in practical Internet applications? How are these applications relevant to the electronic interactions of human agents?

Information Overload

One of the most pressing problems regarding ITexts relates to the sheer mass of information people find themselves facing on a daily basis. ITexts such as Web sites and e-mail proliferate at an exponential rate. Because many users are trained primarily in the structures and practices of print text (or, at best, print text practices carried over, imperfectly, to online environments), information overload becomes a persistent problem.

Conventional responses to information overload, drawn from early usability and interface-design research, apply a transparency model to the problem: If an interface contains more information than a user can process, remove information from the text until it is easily understandable. Technologies, in other words, should be as transparent as possible. Although this approach is an important strategy for achieving usability, it is ultimately limiting for complex ITexts because it tends to oversimplify them. Information overload should not be replaced by information poverty.

A better approach to the problem of information overload requires understanding the evolution of IText as a reciprocal activity in which technologies adapt to users and users adapt to technologies. We need to begin by developing a richer, more complex approach to designing the usability of IText technologies. Contemporary ITexts are often considered artifacts to be viewed (e.g., Web pages). Future technologies will require that users not only receive but also work with—and within—ITexts. That is, communication increasingly involves not the creation of original text but selecting, arranging, filtering, and recombining preexisting information, what labor theorist Robert Reich has

termed "symbolic-analytic work" (178; but see also Lyotard; Jameson; Drucker; Hammer; Hall; Grossberg). Several information overload issues need to be addressed with research:

- *Information design for complexity.* How can we extend participatory design practices to assist writers in designing ITexts that support rather than reduce information complexity?
- *Active reading strategies.* As users are called on to work interactively with large masses of information, can we develop strategies through which they can overcome (or even benefit from) information overload?
- *Educational strategies.* Even as we adapt IText to the needs of users, we must also develop new forms of education that allow users to adapt to the evolving character of IText. How can we best educate readers not just to survive but to take advantage of this wealth of new information?

Information Retrieval

The passport to the most highly valued information in our culture—the information used for strategic decision making at every level of an organization—is finding or commissioning a good text. Although texts are important carriers of information, the importance of what they do cannot be understood unless we develop ways of studying information within their naturally occurring textual organizations. In the information revolution, paradoxically, texts have been typically denigrated as unstructured artifacts. The ruling idea is that to deal seriously with information, one must structure information outside of natural text organizations. Although seldom explicitly defined, *information* in texts is often implicitly associated with the low-frequency, highly abstract or key words and phrases that most effectively discriminate one IText from an archive of others. These key words and phrases are heavily weighted toward noun strings and phrases and are further associated with the chief content of the IText.

Although this keyword approach has been somewhat successful in discriminating ITexts in an archive for relevance, it depends on the indexer's labeling a text in a way that will address the user's information need. This approach proves to be limited when a full-text keyword search results in a large number of texts, all of which contain keywords that suggest that the texts address, in one way or another, the user's need for information. For example, a content search on the Civil War, with restrictors such as *Gettysburg* and *Meade*, could bring

up a variety of results pertaining to the battle and the Union general. In such a case, the user must resort to serial reading (or scanning) to determine both whether and the extent to which each text meets the user's needs. We need to develop more effective solutions for information retrieval in large IText archives by supplementing content searches with searches based on rhetorical criteria. The positive result readers seek will no doubt have to embody the content that guides the reader's formal query. Yet, obtaining a positive result involves much more because when a reader seeks information from a text, the reader is actually seeking out reading experiences. Does the text lecture the reader? Does the text provide a guide that leads the reader? Does the text present information from a subjective perspective (e.g., "I feel that") or as an objective description (e.g., "Congress passed the bill")? A rhetorical search, sensitive to the ways texts differ in shaping the reading experience, might discriminate between the texts on Meade on the basis of their autobiographical or biographical or scenic or narrative elements (Kaufer and Butler, *Designing*).

Characterizing a document by the reading experience it provides is an approach considered by some researchers in the areas of library science and linguistics. It is theoretically related to genre-based approaches to text description (e.g., Karlgren and Cutting; Karlgren and Straszheim; Kessler, Nunberg, and Schutze; Murphy). One such promising approach may be to build on a theory characterizing texts as representational experiences (Kaufer and Butler, *Designing*, *Rhetoric*; Kaufer et al.). Taking this research to the next stage will require further study in three areas:

- *Rhetorical features for retrieval*. What is the connection between rhetorical features of texts and features currently used for information retrieval? How can these two sets of features work in tandem to simplify or enrich the retrieval process?
- *Rhetorical features and reader attention*. Can we provide empirical validation that rhetorical features play an important role in directing the reader's attention to texts? Are they features that matter? How do they matter?
- *Rhetorically based search*. Can we show that rhetorically based searches are practical and relevant for document retrieval in electronic environments? Can such searches improve the management and use of large document archives?

IText as Intellectual Property

The history of intellectual property in the United States is intimately tied to copyright, which the Constitution inscribes as necessary to balance the right of the public to information with the need for creators to control their work for profit for a limited number of years (originally only seven). For better or worse, the protection of creators has been extended again and again in the twentieth century, as a late capitalist society has moved toward ever-greater protectionism (Jaszi). Moreover, legal precedent has all too often appropriated the concept of *author* that was developed as part of the literacy practices in early eighteenth-century England (following the 1710 Act of Anne, the first copyright law), stretching that concept to apply to a growing and diverse number of kinds of works (Woodmansee; Woodmansee and Jaszi).

In recent years, scholars of writing and rhetoric have joined a large group of academics and academic organizations in protesting the constant expansion of copyright and the concomitant limitation of public access to information (Digital Future Coalition). These efforts have increased as it has become obvious that powerful corporate and entertainment groups are attempting to further appropriate the outdated concepts of author and works to apply to ITexts of all kinds. Recent litigation surrounding Napster software is a current example of this struggle between the right of creators to hold exclusive copyright to information and that of the public to have common access to that information. These issues are especially important to educators in general and to researchers and teachers of texts in particular (LeFevre; Lunsford; Porter). Students today depend on access to information on the Internet to carry out course work and projects throughout their education. Thus, the first principle of intellectual property and ITexts, for students and teachers, must remain access (Gurak).

Beyond access, however, a whole host of issues concerning definitions of intellectual property arises. Rhetorical scholar Rebecca Howard has studied the history of Western and school concepts of *plagiarism* extensively, demonstrating the inadequacy of this term for present-day students and writers. After all, what is plagiarism in a world in which downloading and cutting and pasting are common acts enabled and encouraged by the very design of the Web? In addi-

tion, a number of writing researchers have called attention to the inadequacy if not falsity of current notions of authorship in the face of the clear collaborative nature of most textual production (Faigley; Lunsford and Ede). In a world where all text, in the end, is a link to other people's ideas, how can this traditional notion of the singular, solitary author hold?

Based on the work reviewed here, scholars of writing and rhetoric are poised to set a rigorous agenda for research aimed at further exploring these questions and, more important, identifying a theory and a model capable of accounting for shared production and use of ITexts. The key to a robust theory and model will be identifying a substitute for the powerful root metaphor *property*, with its etymological connections to *propriety* as well as to what is proper to a person (i.e., in British legal tradition, land that can be owned, leased, traded, given right of way to, etc.). The property metaphor is not adequate for the age of ITexts because knowledge is not a commodity that is depleted if it is shared; rather, it is reconstituted, reformed, and resituated. Beginning work toward a new model is being carried out on several fronts—by rhetorical scholars (Gurak; Howard; Porter; Woodmansee), by legal race theorists (Guinier; Williams), and by legal theorists (Boyle; Coombe; Jaszi). These fairly small, and so far unconnected, research efforts need to be drawn together as the basis for a much more extensive research effort aimed at identifying and describing the features of a new model of intellectual property for ITexts and tracing its implications for copyright law.

THE IMPACT OF ITEXT

The research agenda outlined in the previous section surveyed the issues associated with the changing character of IText in electronic environments. Such research promises to play an important role in shaping the quickly evolving nature of IText. In this section, we consider questions concerned with the impact that these ITexts may have on the digital divide, organizational life, changing social norms, educational curricula, and everyday life. Information technologies not only promise to bring ever-increasing numbers of ITexts to users but also require from users increasing levels of interaction and change. What will be the consequences?

IText and the Digital Divide

The emergence of IText technologies as central tools of the information age means that IText is used and disseminated by nonspecialists who have a much closer relationship with IText technologies than they do with, say, nuclear power plants or robotics. According to the US Department of Labor, almost 50% of all the jobs in the country require the use of information (Johnson and Packer). At the same time, however, the US Commerce Department points out that "a digital divide remains or has expanded slightly in some cases, even while Internet access and computer ownership are rising rapidly" (xvi).

A research agenda that explores the relationships between IT and the digital divide must push investigators to look deeper into the digital divide by studying the potential prosocial and antisocial impacts that interactive media can have on geophysical communities. What will access do for or to the individuals and groups who have it? The concept of *social capital* developed by Robert Putnam can help to describe the ways in which social ties make lives more productive. Putnam identifies "bonding" and "bridging" social capital. Bonding ties reinforce "exclusive identities and homogenous groups" (22). Bridging "networks are outward looking and encompass people across diverse social cleavages" (22). Information technologies can enable both types of networking; for example, online interest groups might bring diverse people together over the one facet of their lives that can unite them, or, conversely, associations of homogeneous groups can use information technologies to further circumscribe the group and its interests. Under what circumstances do IText technologies operate to enhance bonding or bridging or some sort of hybrid of both?

Although many organizations currently seek to fund projects to overcome the digital divide (for a list, see Digital Divide Network), very little basic research has been done to examine the consequent community impact. Considerable work has been done on community networks (Cohill and Kavanaugh; Doheny-Farina, *Wired*), and research has been initiated to examine their impact (Kavanaugh). For most people across the nation, however, access to communication networks is gained not through local, public means but through individual, commercial Internet service providers—entities that may or may not have ties to any one locality. Two notable studies—undertaken through Internet-based research centers at Carnegie Mellon (Kraut et al.) and Stanford (Nie and Erbring)—have indicated that users' online

behaviors decrease their connections to their localities, leaving users disaffected and isolated. Such investigations are valuable but highly limited. Further research must address the following issues:

- *The intersection of individual with community behaviors*. How do interactive media affect levels of local interactions across a variety of demographic and psychological variables (e.g., gender, ethnicity, education, income, rural, urban, suburban, and the whole complex of psychological typologies)?
- *User behavior and media mix*. How does user behavior vary across an ever-developing mix of communication and networking technologies and delivery systems from traditional ISP services to cable, wireless, and beyond?
- *Public and private means of access*. How do public and private access compare, from commercial household services, to commercial networks such as newly built residential communities that include private neighborhood networks (Holmes), to large-scale public community networks that attempt to provide universal access to a locality?

ITexts in Organizations

As activity theory would predict, ITexts appear to be continuing the long tradition of documenting work in the organization, serving as visible, stable representations of policy or knowledge around which members of the organization can orient their joint activity. However, as texts move online, both their visibility and the stability change with consequences for organizations that we do not yet understand. Previous research testing the usability of ITexts under laboratory conditions, often using students as participants, is of limited value in assessing how workplace professionals create and use ITexts within specific rhetorical situations (Bordia).

Historically, print documents have been able to anchor organizational life partly because their production has been controlled, and the texts have carried many markers of their official status. A variety of conventions for publication—signatures, cover pages, publication dates, printing, binding, and distribution—indicate to readers that a document is done as well as structure work and set organizational directions. In composing ITexts, however, writers tend to produce and circulate multiple drafts, with multiple authors frequently being able to alter them. This instability of text changes workflow and is one of the factors that makes difficult the assessment of IText's credibility and hence its organizational usefulness.

In the workplace (and perhaps out of it), the most common electronic text is undoubtedly e-mail. Researchers such as Lee Sproull and Sara Kiesler have looked at these texts, but increasingly widespread use, changing software, and greater user proficiency mean that the workplace conditions under which e-mail is used are constantly changing, and thus research becomes quickly outdated. In the workplace, changing or clashing software also makes difficult our predictions about ways that ITexts other than e-mail circulate. For instance, writers send their ITexts as attachments to e-mail. If receivers cannot open an attachment (a distressingly frequent occurrence), the consequences can go beyond a delay in transmitting a document. Strong social sanctions are often aimed at the writers or readers, who are then left out of an information loop in which they would otherwise be included. Thus, practical problems are treated as moral ones, and upgrading becomes a moral obligation.

Although lack of accessibility can be a problem within organizations, greater accessibility can be a problem outside them. Because ITexts may be available on the Web, they can be circulated to a global audience. As various researchers argue (DeJong and Van Der Geest; Sienot), testing of Web texts should go beyond technical testing to see whether all the links work to examine the responses of actual viewers. At present, we are not even clear on the best way to conduct this testing, much less the results it might produce (Sienot).

These problems suggest the following issues that can only be addressed by either naturalistic or experimental research within work sites:

- *Unending authorship*. Unending authorship leaves readers in some doubt as to which version is the final one or whether everyone has the same version. This difficulty is particularly acute when people who write and use these documents live in different physical locations. How do individuals and organizations manage unending authorship and the consequences it entails?
- *Document management*. Document management systems are designed to help people keep track of versions, changes, and modifications, thus providing a clear electronic paper trail. However, we do not know how people use these systems, nor do we know how to teach students to use them. How do working professionals actually use document management systems?
- *Document interoperability*. As documents are circulated electronically, we know little about the social norms attending their interoperability, the ability to be open and read across systems. What are the social consequences of a lack of interoperability of texts? What are practical means

for coping with mismatched software and organizational means for defusing social conflict over the issue?

- *Extraorganizational reading.* Once documents circulate electronically, they easily move beyond their intended readership. How are Web texts and e-mail attachments read and used outside of their organizational contexts by people with a wide range of interests and abilities?

IText Genres and Changing Social Norms

Studies of genre, genre systems, and related constructs have enormous potential to contribute to our understanding of how ITexts and communities are evolving in conjunction with technology. As we have seen, genres reflect the social norms in communities that draw on them. Traditionally, genres have emerged and been modified only slowly. Today, however, communities are using a changing array of new technologies, from e-mail to groupware to the Web. In so doing, these communities are structuring their communication over time in ways that reflect both the capabilities of the technology and the evolving norms for communicative purposes and forms.

A few studies have looked at the phenomenon empirically (e.g., Bazerman, "Politically"; Orlikowski and Yates; Yates, Orlikowski, and Okamura), but much work remains to be done. Since the initial emergence of e-mail, we have seen that genre norms are a moving target, requiring ongoing study as the changes triggered by evolving new technology continue. Indeed, some of the earliest research on electronic, text-based communication, which looked at the use of such new technologies statically and in the lab (e.g., Sproull and Kiesler), saw new media as causing phenomena such as flaming. More recently, however, IT researchers have noted that social context and social relationships over time play a powerful role in how real users use such technology (DeSanctis and Poole; Orlikowski).

The emergence of new genres of communication, especially around the World Wide Web, has received some superficial attention from IT researchers already (e.g., Crowston and Williams; Erickson), but researchers coming from the rhetorical tradition are just beginning to dig deeper into such genre emergence and change (e.g., several chapters in Coe, Lingard, and Teslenko). Because the virtual communities linked by ITexts often differ from traditional communities (e.g., geographically dispersed special interest groups, support groups around medical conditions, etc.), genres may emerge differently in them and take different and more rapidly changing forms.

Moreover, as new technologies such as Web-based discussion groups support new uses, these new uses in turn lead users to develop new norms.

Much study is needed to understand the nature of the interactions between technologies, user communities, and changing genre norms. This research needs to address two major issues:

- *IText genres in existing communities*. Existing communities that adopt new technologies develop new norms. How does this influence existing patterns of communication?
- *IText genres in new communities*. New communities that form around new technologies develop norms. Who participates in such new IText-mediated communities? How do communication norms affect participation (gender and other dimensions of diversity may play a role here)? How do newly formed communities without previous norms develop norms? To what extent and how do founders of such communities influence the genre norms that evolve and with what consequences for the corresponding communities?

Studies that illuminate such issues can inform the developers of information technology. For example, the observation that genre change occasioned by technology adoption is a moving target has important implications for designers and users: that technology can better support such ongoing change if it allows users to tailor the technology and that users may benefit from being more explicit about genre norms in the context of new technology (Yates, Orlikowski, and Rennecker). Future research from this genre perspective will undoubtedly add to such recommendations.

IText and Education

The growing use and importance of ITexts at work and in school have increased the need for knowledge workers who are effective writers. At the boundary joining users and technologies, writing instruction should provide the perfect educational site for teaching the symbolic-analytic skills required for IText. Writing education should help students learn symbolic-analytic methods for dealing with ITexts composed of large quantities of disorganized information (Johnson-Eilola, *Nostalgic*). Writing education should also teach students to produce ITexts for others. Both of these tasks are necessary for effective workplace understanding and production of ITexts.

In addition, IText technologies themselves are developing in ways that have the potential to foster the development and use of strong writing abilities. More specifically, some technologies allow for a kind of visible thinking through software programs that analyze, sort, and synthesize information. In a similar way, technologies that allow for multisourcing allow users to create writing that merges image, text, and sound—perhaps the most important form of discourse for the twenty-first century. Further work is needed, however, to address the following issues:

- *IText and the development of writing abilities*. ITexts have altered the demands placed on students throughout the educational curricula and into the workplace. How are IText technologies affecting student writers' navigation through education and beyond?
- *IText and the writing curriculum*. Writing practices have been reshaped by the emergence of IText. How should IText technologies be incorporated into current writing instruction?
- *IText for writing development*. Writing instruction is hard work; learning to write is a challenging task. How should IText technologies be developed to promote effective writing practices, both in school and on the job?

We are well positioned to study these issues and to contribute to a robust theory of electronic communication. In fact, several major studies of the relationship between writing development and IText already exist (Gurak; Hawisher and Selfe; Selfe), and others are in progress, including some by graduate students working in programs at the University of Illinois, Rensselaer Polytechnic University, Carnegie Mellon University, and Michigan Technological University. In addition, the first large-scale longitudinal study of college-student writing, with a special focus on its relationship to various technologies, is being launched at Stanford University. Such studies take more time and resources than are usually available, but unless such studies are undertaken within the next few years, much important information regarding the relationship between school-based writing development and technology may be lost.

IText and Everyday Life

Many emerging IText technologies invite fundamental alterations in the distribution of personal time, space, and identity. Mobile tech-

nologies, in particular, have the potential for penetrating and connecting corners of daily activity that have been relatively stable and discrete in the modern era. Techniques for management of time, space, and identity that have relied on tacit divisions between the domains of work, play, home, and school are now being challenged by new IText technologies for naming, linking, accessing, and communicating personal information.

The impact of personal digital assistants on everyday life is the front of a wave of effects we can expect to see cascade with the advent of ever more ubiquitous mobile technologies just over the horizon. The International Data Corporation predicts that more than one billion people worldwide will use mobile devices by 2003, and Dataquest predicts that the US wireless data market will increase from 3 million subscribers in 1999 to 36 million by 2003 (Greengard). By 1999, Palm, Inc., maker of the most popular personal digital assistant (PDA), shipped more than five million Palm organizers (Kirchner).

Although not widely recognized as IText technologies, PDAs are, at their core, technologies of text. Drawing together multiple lines of technological development that include the daily planner, rolodex, handheld calculator, and personal computer, PDAs have core functionality directly related to creating and consulting texts. Calendars, phone lists, to-do lists, and notepads are designed to encourage users to write goal-related tasks across the hours of a day and through the days of a week, month, and year. In addition, users may link these ITexts to one another across functions. Finally, these ITexts may be categorized according to categories that are either provided or self-defined. For example, a user planning for a meeting may write the appointment on the calendar, link it to contact information for those who will attend and to a note containing e-mail about the issues to be discussed, and categorize the appointment as one related to, say, the Johnson case.

People's responses to PDA technologies are extreme: extreme love or extreme hate. They may sense that the technology will reconfigure their everyday lives, by naming and categorizing their activities in a database that links together things that used to be compartmentalized, pushing them toward greater multitasking and higher accountability. Functions for distributing, linking, and naming activities, coupled with the mobility that is a hallmark of PDA technology, may encourage the dynamic segmentation of everyday life into more complex patterns than has traditionally been managed through the simple distribution of work-family tasks over the separate spheres of

home, work, and play. Rhetorical theory provides concepts to describe the impact of naming. Research on literacy has looked at changes in time and space wrought by words. However, private texts—that is, texts written for oneself rather than an external audience (Geisler, "Accounting")—have received little attention. Research is needed to identify the ways in which these increasingly common yet private ITexts may function to reshape everyday life. Several issues need to be addressed:

- *Mobile use*. How are mobile technologies such as the PDA actually used? What kinds of functionalities are taken advantage of most frequently? What kinds of ITexts are created? How are they linked? Under what categories (if any) are they stored? How does their use vary by race, class, and gender?
- *Mobile impact*. What is the impact of the use of mobile technologies such as the PDA on the distribution of activities over space and time? How does the use of these ITexts affect specific areas such as work-family coordination? How do they affect identity—personal, professional, or otherwise?
- *Mobile guidelines*. What guidelines should we develop for mobile technologies? How can we ensure that they are responsive to a broad range of interests and needs (that they are, e.g., gender neutral and family friendly)? How can we develop social norms to regulate their use so that they are less intrusive, so that work-related frameworks do not dominate, so that complexity does not become overwhelming?

CONCLUDING REMARKS

Meeting the challenges posed by the IT revolution requires that research and scholarship concerned with text-making activity be included in the national effort to develop and improve these technologies and the policies that will govern them. Building on skills and concepts derived from a rhetorical tradition that is design oriented, research on IText must—through investigations into the character and impact of IText such as those outlined in this article—work to understand and direct IT development in a way that acknowledges the complexity of the meaning-making process, the historical forces that shape interactions with text, and the powerful impact literate interactions in these new electronic environments are having on society.

As members of the IText Working Group, we invite others concerned with text-making activity to join in meeting this IT challenge

by developing a public presence for an IText perspective on the information revolution. We need to make clear who affects and will be affected by IText, who the appropriate stakeholders are, and what the issues and goals of IText development should be. We also need to partner with those in the public and private sectors who share our determination that the IT revolution should be enriched and extended through a sufficiently complex understanding of meaning-making and through a sufficiently ethical approach to social and technical innovation. Through such work, we can play our part in turning to a new page in the evolution of technologies of text.

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Cheryl Geisler, geiscl@rpi.edu, is a joint professor of rhetoric and composition and information technology at Rensselaer Polytechnic Institute, where she conducts research on writing in professional contexts, ranging from academic to workplace. She has published extensively on the relationship between literacy and practice, including Academic Literacy and the Nature of Expertise *(Lawrence Erlbaum, 1994). Her recent work can be found at http://www.rpi.edu/~geislc/.*

Charles Bazerman, bazerman@education.ucsb.edu, professor and chair of education at the University of California at Santa Barbara, has interests in the rhetoric of science and technology, writing across the curriculum, rhetorical theory, and the history of literacy. His most recent book, The Languages of Edison's Light *(MIT Press, 1999), examines the rhetorical and representational work that made Edison's incandescent light a social reality.*

Stephen Doheny-Farina, sdf@clarkson.edu, professor of technical communications at Clarkson University, is author of The Grid and the Village *(Yale University Press, 2001),* The Wired Neighborhood *(Yale University Press, 1996), and* Rhetoric, Innovation, Technology *(MIT Press, 1992). His commentary on new media communication has appeared frequently in newspapers, magazines, radio, and Web sites.*

Laura Gurak, gurakl@tc.umn.edu, teaches in the doctoral program in rhetoric and scientific and technical communication at the University of Minnesota and does research in the areas of computer-mediated communication, social aspects of computing, and intellectual property and electronic texts. She is the author of Persuasion and Privacy in Cyberspace: The Online Protests over Lotus MarketPlace and the Clipper Chip *(Yale University Press, 1997) and* Cyberliteracy: Navigating the Online World with Presence *(Yale University Press, forthcoming). She is also a regular commentator on Minnesota Public Radio.*

Christina Haas, chaas@kent.edu, is an associate professor of English at Kent State University, where she teaches in the graduate program in literacy, rhetoric, and social practice and is an associate of the Center for Research on Workplace Literacy. Her research focuses on situated literacies, information technology, and methodologies in the study of writing. Her article "Writing as an Embodied Practice: The Case of Engineering Standards," with Stephen Witte, will appear in JBTC *15.4 (Oct. 2001). Contact her via http://www.personal.kent.edu/~chaas/.*

Johndan Johnson-Eilola, johndan@clarkson.edu, works as director of the Eastman Kodak Center for Excellence in Communication and is an associate professor of technical communications at Clarkson University. His published work has been awarded the Computers and Writing Best Article Award (1996) and the Technical Communication Quarterly Best Article Award (1997). He is also the author of Nostalgic Angels: Rearticulating Hypertext Writing *(Ablex/JAI Press, 1997) and the forthcoming* Designing Effective Websites *(Houghton Mifflin). See http://www.clarkson.edu/~johndan for additional information.*

David S. Kaufer, kaufer@andrew.cmu.edu, is a professor and head of English at Carnegie Mellon University. His research and teaching are in the areas of rhetorical theory, composition, and text analysis.

Andrea Lunsford, lunsfor1@leland.stanford.edu, is a professor of English and director of the Program in Writing and Rhetoric at Stanford University. She has published numerous articles and books on issues relating to rhetorical theory and practice, women's writing practices, collaboration, and intellectual property.

Carolyn R. Miller, crmiller@ncsu.edu, is a professor of English at North Carolina State University, where she teaches rhetorical theory and criticism as well as technical and scientific writing. Her primary research interest is in the rhetoric of science and technology, and she is currently working on issues of trust, authority, and ethos. Her work has been published in Argumentation, College English, Journal of Business and Technical Communication, Quarterly Journal of Speech, Rhetorica, *and the* Rhetoric Society Quarterly, *in addition to numerous essay collections.*

*Dorothy Winsor, dwinsor@iastate.edu, teaches in the rhetoric and professional commu-nication program at Iowa State University. Recent publications include "Ordering Work: Blue Collar Literacy and the Political Nature of Genre" (*Written Communica-tion *17.2, April 2000), "Genre and Activity Systems: The Role of Documentation in Maintaining and Changing Engineering Activity Systems" (*Written Communica-tion *16.2, April 1999), and* Writing Like an Engineer *(Lawrence Erlbaum, 1996). She has won four NCTE awards for outstanding publications on scientific and technical communication.*

JoAnne Yates, jyates@mit.edu, Sloan Distinguished Professor of Management at MIT's Sloan School of Management, studies communication and information systems as they shape and are shaped by technologies, ideologies, and work practices over time, using both historical and rhetorical/social scientific methods. She is author of Control through Communication *(Johns Hopkins University Press, 1989, 1993), which focuses on communication in American firms from 1850 to 1920. She also collaborates with Wanda Orlikowski on studies of communication and work practices around elec-tronic media in contemporary organizations, focusing on genres and temporal patterns of communication.*