The Processes of Adopting Multimedia and Interactivity in Three Online Newsrooms

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This article examines the material culture of newsroom practices by focusing on the dynamics of the processes through which news workers adopt new technologies. More specifically, it looks at some key factors that shape the adoption of multimedia and interactive technologies in online newspapers. Through ethnographic case studies of innovations in 3 online newsrooms, I show that variations in organizational structures, work practices, and representations of the users are related to different ways in which members of the newsroom appropriate these technologies. I draw from this analysis to reflect on issues related to the technological dimension of editorial work and the dynamics of media convergence.

Field studies of newsroom dynamics have shed light on the interpersonal, institutional, and political dimensions of editorial work (Epstein, 1973; Gans, 1980; Gitlin, 1980; Kaniss, 1991; Tuchman, 1978). Despite these valuable contributions, research in this area has mostly neglected the newsroom's technological dimension. According to Sumpter (2000), "Media sociologies . . . have lagged the technical . . . evolution of the news worker's milieu" (p. 335). This lag is particular salient to make sense of contemporary American media firms, given the extent to which their newsrooms have been computerized since the 1970s. To Hansen, Ward, Conners, and Neuzil (1994), "The now classic newsmaking studies require reexamination in the light of information technology adoption in the newspaper industry" (p. 561). In a review of research on news work, Schudson (2000) concluded, "There has been little academic attention to the concrete consequences of the technological transformation of news production" (p. 182).

This article helps close this gap between newsroom phenomena and our accounts of them by looking at the process of adopting multimedia and interactive
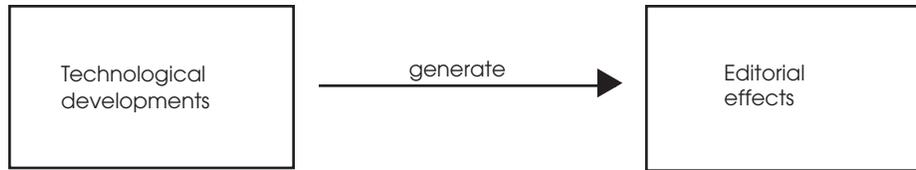
Figure 1. Dominant focus espoused in most studies of newsroom computerization.

technologies in online newsrooms. Through ethnographic case studies of innovations in three online newspapers, I will show that variations in organizational structures, work practices, and representations of the users are related to different ways in which newsroom workers adopt these technologies. Then I will draw from these findings to reflect on the broader implications of this analysis to understanding the technological dimension of editorial work and the dynamics of media convergence.

Conceptual Framework

The computerization of newsrooms has been one of the most pervasive transformations in American media organizations since the 1970s (Marvin, 1980; Picard & Brody, 1997; Smith, 1980; Weaver & Wilhoit, 1986). This phenomenon has triggered research on issues such as information search and retrieval (Garrison, 2001; Jacobsen & Ullmann, 1989; Ward, Hansen, & McLeod, 1988), skill acquisition and distribution (Bromley, 1997; Cottle, 1999; MacGregor, 1997; Pilling, 1997), work patterns and division of labor (Dunaway, 2000; Esser, 1998; Heath & Luff, 2000; Ursell, 2001), and news content and format (Aronson, Sylvie, & Todd, 1996; Russial, 1994; Sylvie & Witherspoon, 2002). This research has made an important contribution by beginning to move technology issues to the foreground of newsroom studies.

Despite the differences among these and other relevant studies, most of them have shared a focus on the effects of technological innovation in editorial dynamics and products. This focus has also surfaced in general claims about technological and social change in media firms. For instance, McNair (1998) has suggested that "the form and content of journalism is crucially determined by the available technology of newsgathering, production and dissemination" (p. 125). Pavlik (2000) opened his essay, "The Impact of Technology on Journalism," by saying that "journalism has always been shaped by technology" (p. 299). Sylvie and Witherspoon (2002) argued that "the telegraph, telephone, and computer . . . have changed the way people work" in the newspaper industry (p. 35). Explicitly or by omission, this focus on technology's effects has espoused the notion that technological developments generate editorial effects (see Figure 1).

This dominant focus has made a valuable contribution by stressing the significance of technology's potential effects, but it has also limited our understanding
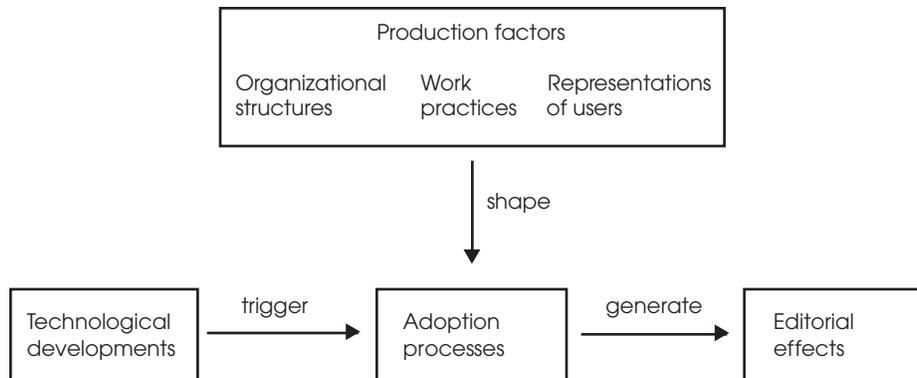
Figure 2. Alternative approach utilized in this article.

of these complex phenomena by making less visible the adoption processes that shape whether and how these effects may arise in the various sites where the technologies are used. As work in social studies of technical change has shown, the consequences of incorporating computerized artifacts in work settings is largely dependent on local dynamics that affect how these artifacts are actually used (DeSanctis & Poole, 1994; Fulk, 1993; Orlikowski, 2000; Suchman, 1987). To help counter the limitation of this dominant focus, I will concentrate on the role of some critical factors that shape the processes of adopting multimedia and interactivity in the newsrooms of three online newspapers (see Figure 2). Online papers provide a suitable context to examine these processes because they have been sites of intense technological activity, and of research about the results of this activity, in the past few years (see Boczkowski, 2002, for a review of this research).

I will focus on multimedia and interactivity because they are two of the most salient capabilities of new media. By multimedia I mean the combination of text, still and moving images, audio, and computer animation in the production of editorial content. By interactivity I refer to the use of many-to-many and one-to-one communication spaces such as forums, chat rooms, and user-authored sites, in addition to the one-to-many mode of traditional media. I will examine production factors having to do with organizational structures, work practices, and representations of the user. I have chosen these factors because they have been identified as relevant to the development of online papers in scholarly analyses or in practitioners' accounts published during the second half of the 1990s, when research for this paper was undertaken.

In the case of issues of organizational structure, scholarship about online papers has emphasized the centrality of the relationship between print and online newsrooms and the complex character of this relationship (Endres, 1998; Huxford & Duda, 2000; Martin & Hanson, 2000). Of direct relevance to this paper, Huxford and Duda (2000) have argued that a "clash of cultures" (p. 2) between the two

newsrooms has hindered the creation of original online content, but their study did not analyze how this relationship affected adoption of multimedia and interactivity technologies when original online content is created. I will examine whether the presence or absence of the print newsroom in the routines of its online counterpart has any influence in the adoption of multimedia and interactive technologies during content creation by the latter.

Concerning work practices, scholars have suggested that a distributed and networked information infrastructure such as the Web challenges the need for traditional gatekeeping roles because every node can be a sender and receiver of news (Bardoel, 1996; Kawamoto, 1998; Newhagen, 1998; Singer, 1998). According to Williams (1998), "In a world where everyone can be a publisher, journalists are vulnerable to losing their franchise as gatekeepers of news" (p. 34). In this article I will examine this argument by turning it upside down: Instead of seeing the end of gatekeeping as an editorial effect of technological change, I will look at whether the configuration of work practices around either gatekeeping tasks or alternatives to it shape how multimedia and interactive capabilities are adopted in the newsrooms under study.

Regarding representations of the user, throughout the first 5 years of online papers on the Web, the population of their potential users was heterogeneous in their technical capabilities and their interest in being consumers of news or also contributing to their production. First, users connected to the Web at different speeds, from diverse platforms, and by employing various browsers, and they had different degrees of technical expertise and even wider interests in becoming more proficient. Stories in trade publications showed that online newsroom personnel were aware of this phenomenon and documented different strategies they enacted to deal with it. For example, when Associated Press planned its online wire service in 1996, it designed the interface "mostly for 28.8 [kilobytes per second] modems. However . . . a 'cyber-lite' version will probably be created for those users who don't have the latest technology" (Cohen, 1996, pp. 14, 46). Along these lines, I will look at whether conceiving the users as technically savvy or limited affected the adoption of multimedia and interactive tools by newsroom personnel.

The second issue concerning user representation is related to research on interactivity that has suggested that users in online environments may want to express their opinions, read those of their peers, and engage in dialogue about issues of their interest as much as they want to consume content generated by journalists, and this research has also speculated about the potential effects of this transformation for the media landscape (Friedland, 1996; Jankowski & van Selm, 2000; McAdams, 1995; Schultz, 2000). As I did with scholarship about gatekeeping, I will turn this argument upside down: Instead of seeing user-authored content as an effect of technological change, I will ask whether news workers' vision of their audience as either consumers or also coproducers shapes the adoption of multimedia and interactivity in online newsrooms.

To summarize, I will examine the role of organizational structures, work practices, and representations of the user that shape how multimedia and interactive tools are adopted in three online newsrooms. This approach aims to overcome the limitations of the dominant focus on technology effects by making more vis-

ible the processes whereby these effects are, or are not, created. This alternative approach does not replace but complements a concern with the effects of newsroom computerization. That is, it is precisely because these effects are potentially so significant that we need to have a better understanding of the processes that generate them.

Research Design

I draw from ethnographic case studies of innovations in the newsrooms of three online papers: *The New York Times on the Web*'s "Technology Section," *HoustonChronicle.com*'s "Virtual Voyager," and *New Jersey Online*'s "Community Connection." I followed a "maximum variation sampling" strategy to choose these cases: a small number of cases that expressed significant diversity across multimedia and interactivity to elicit "important shared patterns that cut across cases and derive their significance from having emerged out of heterogeneity" (Patton, 1990, p. 172). The Technology Section showed limited adoption of either technical capability, Virtual Voyager featured extensive tinkering with multimedia, and Community Connection exploited interactivity to a significant extent. These cases also were chosen partly for some key features they shared: They involved the creation of original content, on a regular basis, and trying to take advantage of some of the Web's unique technical capabilities. These shared features facilitated the analysis of adopting multimedia and interactive capabilities in a way that would not have been feasible had I looked at sections of online papers that primarily reproduced content created for their print counterparts.

In January 1996, *The Times* launched "CyberTimes," a new daily section that aggregated the technology stories published in various sections of the *Times* and added a regular stream of stories, columns, and other features authored originally for the Web. The section soon became a success, accounted for a significant proportion of the site's traffic, and increased its visibility at a time when most online papers had only material taken from their print counterparts. I conducted fieldwork between May and August of 1998. By then CyberTimes had been renamed the "Technology" section of the online paper, but the desk had kept the original name and was staffed with an editor, a deputy editor, an assistant deputy editor, a producer, and a staff writer. Freelancers did most of the reporting because the print *Times* did not want to commit additional fixed resources to an effort seen as commercially uncertain. During my study I saw little use of multimedia and interactivity by the desk. Its members produced content that often shared key features of print journalism: The content was conveyed by textual means, the stories' length was roughly similar to those in print, the publication cycle was daily, and there was a "we-publish-you-read" mindset, with user feedback and forum exchanges separated from editorial products.

HoustonChronicle.com launched Virtual Voyager in April 1995. It was a multimedia magazine with storytelling that combined text, still images, audio, video, 360-degree photography, and computer animation to create "vicarious experiences" among users: "Virtual Voyager takes a viewer as close to being on scene as

possible without actually being there," wrote content supervisor Glen Golightly in a memo to his colleagues in the online newspaper (1996, p. 1). For instance, in a month-long car trip along Route 66, two voyagers installed a camera in the car's back seat, which webcast pictures every 30 minutes, thus allowing the audience to see what the journalists were seeing in almost real time, instead of providing a text description or a video clip for ulterior broadcasting. In the early days of online newspapers on the Web, Virtual Voyager's originality and creativity brought to the online paper the first Newspaper Association of America's Digital Media Award for Best Interactive Feature in 1996. When I conducted most of the research of this case in early 1998, Voyager was a separate unit within the online newsroom staffed with four employees with prior print experience. By contrast to the extensive adoption of multimedia tools, Virtual Voyager personnel took limited advantage of interactive spaces such as forums, chat rooms, and user-authored sites.

Community Connection debuted on *New Jersey Online*, the joint website of *The Newark Star-Ledger*, *The Trenton Times*, *The Jersey Journal*, and *News12 New Jersey*, in September 1998. The section enabled New Jersey nonprofits to create sites within the online paper where they could post information relevant to their organizations. *New Jersey Online* did not charge nonprofits for this, nor compensate them financially for providing content and drawing traffic, to its site. The main goal of this initiative was, according to *New Jersey Online*'s editorial director Sara Glines, "to make our site sticky. We want people to come and use it and have a reason to stay and come back tomorrow, and when they are here we want them to feel tied to our site" (personal communication, March 4, 1999). *New Jersey Online* created two new positions in its editorial unit to handle all aspects of the initiative, from users' technical support to outreach efforts. I conducted fieldwork between October 1998 and March 1999, at which point the project had more than 3,000 sites with text and still images—they had no audio, video, or computer animation content. Among other accolades, Community Connection received the 1999 *Editor & Publisher*'s EPpy Award for Best Community Publishing Effort in a Newspaper Online Service.

I spent between 4 and 5 months per case and employed three main data collection methods: open-ended interviews, observation of work practices, and analysis of documents. First, I conducted 142 interviews with relevant actors, including the members of the teams in charge of these innovations and other relevant actors to whom they advised me to talk in a snowballing sampling fashion. I interviewed people from the key occupations often present in online papers—editorial, design, systems, advertising, and marketing—and holding positions in all the hierarchical levels of full-time employees in their organizations. I assumed an overt stance, explaining to my interviewees the nature of the project and the types of outlets where I expected to publish its results and asking them how they preferred to be identified should I quote any of their statements. Second, I undertook about 700 hours of nonparticipant observation of the work practices most directly related to the daily production of three innovations under study. Because these innovations were seen primarily as editorial endeavors, they were located within the newsrooms of their respective organizations. Although I focused my observa-

tions on these units, I also paid attention to exchanges between newsroom workers and their colleagues in advertising, design, marketing, and technical units. Third, I analyzed relevant documents, from memos and business plans to advertisements and the sites produced by the three innovations.

The research process was characterized by a movement from theorizing to data collection to analysis and back to theorizing. Initial exposure to secondary literature and practitioners' accounts in trade publications led me to focus on the process of adopting new technologies rather than on their effects and to pay attention to issues of organizational structures, work practices, and representations of the user. The first stages of data collection proceeded by observation, informal conversations with key informants, and review of documents. As a result of analyzing these data, I developed an initial grounded theory (Strauss & Corbin, 1990) of how these factors mattered in each of the sites, which I then probed systematically in interviews and further observations. I then undertook a new round of data analysis, which resulted in further theorizing that I put in writing and shared with key informants in a way I describe in the next paragraph.

I pursued two main strategies to test the grounded theory that emerged from this process: member checks and triangulations. I conducted member checks at two critical junctures in the research process. First, immediately after finishing data collection for each case, I wrote a paper with preliminary findings and sent it to key members of the online paper. Then, after writing of findings from the larger research project within which these cases were originally included (Boczkowski, 2001), I sent either the whole text or the relevant chapters to key members of each organization. In both cases, sharing these documents often led to follow-up conversations in which I probed my interpretation of events and learned about alternative interpretations and factual errors. I also employed two kinds of triangulation procedures: methodological and by data source (Denzin, 1979). Methodological triangulation was possible by contrasting material gathered from interviews, observations, and document analyses. In addition, interviewing actors from various units, occupations, and hierarchical levels, and observing an array tasks undertaken in different days and times of each day, enabled me to triangulate across multiple sources of data.

Organizational Structures

Print papers began publishing on the Web circa 1994, and by 1999 the vast majority of American dailies had such editions (Dotinga, 1999). During these early years, newspapers structured the relationships between print and online newsrooms in various fashions, from integrated to autonomous. The three case studies also featured variations in this dimension, and this was related to differences in the adoption of multimedia and interactivity. On the one hand, the CyberTimes desk was somewhat closely tied to relevant counterparts in the print newsroom such as Business, Technology, and Circuits. These ties had an asymmetric character: Personnel in the online newsroom made more effort to coordinate with, and

adapt to, their print colleagues, than vice versa. The implications for multimedia and interactivity were that work undertaken by online personnel to align their processes and products with those of their print counterparts was associated with a reproduction of print's ways of doing things in the online newsroom.

A significant portion of the daily routines of editors at the CyberTimes desk consisted of finding out what the relevant desks in the print newsroom were working on and aligning online processes accordingly. For instance, CyberTimes personnel attended meetings of the relevant print desks to work on possible changes in the online presentation of material authored for print publication. The following statement by James Gorman, editor of Circuits, the weekly consumer/ information technology section, illustrates both the presence of a relationship and its asymmetric character: "Mostly we concentrate on the print [paper] and leave the website to [the CyberTimes desk]. However, [they] come to our meetings and when we talk about stories, sometimes we talk about how they'll be extended for the Web" (personal communication, September 18, 1998).

Each desk in the print newsroom put together a list of the stories that it was working on. CyberTimes' editors scanned these lists in the paper's database system many times per day to see the unfolding of technology stories coming up in the paper and to avoid duplication of efforts. In addition, they sent their own list to print editors and telephoned and emailed them to negotiate over stories that could be written by reporters from either newsroom. Thus, online stories were assigned partly due to the CyberTimes desk's own preferences and partly as a result of alignment with the print paper. This was also related to the fact that the print newsroom increasingly published original CyberTimes stories and used the desk's writers. As Jeri Clausing, CyberTimes Washington reporter, told me, "The paper calls me and asks me to do stories for the paper; and the paper picks up what I've done for the website. And I coordinate now more often with the paper's reporters" (personal communication, June 18, 1998).

The Virtual Voyager and Community Connection cases illustrate a different situation: Weak or null presence of the print newsroom in the routines of its online counterpart was associated with extensive appropriation of either multimedia or interactive technologies by personnel of the latter. In the Voyager case, there was no formal connection with potentially relevant units in the print *Chronicle* newsroom such as the Features desk. This lack of formal structural relationship was enacted in the work routines of Voyager personnel, even though three of the four members of the Voyager team had worked in the print newsrooms of either the *Chronicle* or other Hearst-owned newspapers. I observed a similar pattern of little connection with the print newsroom in the case of other units of the online operation. According to Jim Townsend, who headed the online newsroom: "The way our newsrooms are set up, they're pretty much autonomous" (personal communication, February 19, 1997).

Likewise, there was little relationship between Community Connection personnel and the newsrooms of the print newspapers affiliated with *New Jersey Online*. According to an executive of Advance Internet, *New Jersey Online*'s corporate parent, this started with a strategic decision to separate print and online operations: "There's no geographic or common employee crossover [between print and

online] . . . Our companies are conceived as separate . . . [because] the owners and the management group . . . thought of [online] as a new entity. . . . and that would take different people to run it than to append it to the newspaper operation" (personal communication, March 11, 1999). Community Connection personnel enacted this decision in their routines, which featured minimal ties to the print newsrooms of *New Jersey Online*'s affiliated newspapers.

Representations of the Users

Members of online newsrooms have a vision of what kind of users they would like to reach, and this vision shapes their adoption of new technical capabilities. Two dimensions of this matter appear as relevant in the present cases: users' technical expertise and their role as either consumers or producers of content. There was a wide variation of technical expertise among the population of potential users during the first 5 years of online papers on the Web. Envisioning the intended users of an online paper often entailed taking into consideration this heterogeneity of technical expertise. One way in which this issue played out in the three cases is that building technically sophisticated products meant targeting primarily the "lead user/early adopter" public. Conversely, a low degree of technical sophistication was seen as key to continuing to reach print papers' broad consumer base. Thus, on the one hand, there was a relationship between seeing users as technically savvy and experimenting with multimedia storytelling. Virtual Voyager provides a good example of this option. The complex mix of text, audio, video, and computer animation related to a representation of the user as technically adept. As content producer Mark Evangelista put it, "A user of a newspaper, a reader, has to pick up a newspaper and read it . . . [but] our users have to be Internet savvy, computer savvy, updated on operating systems and plug-ins" (personal communication, April 3, 1998). Virtual Voyager had a "resources" page with links to technology sites to help users get the latest version of tools needed to access the material.

On the other hand, there was a connection between representing the user as technically limited and taking limited advantage of the Web's multimedia capabilities. In the case of the Technology section, for instance, a frequent contributor sometimes raised the possibility of adding computer animation or video material to the text of her articles and was told that "'we could do that but it would take forever for the page to load for the reader,' or 'readers who have older browsers might not be able to get this'" (personal communication, June 6, 1998). As Rich Meislin, the editor-in-chief of *The New York Times* Electronic Media Company, said about the online paper's low use of audio and video: "A substantial part of our audience doesn't have the bandwidth to really enjoy a multimedia presentation" (personal communication, August 10, 1998). Community Connection personnel made a similar association between users' limited technical skills and little multimedia utilization when they commented on their decision to limit the media nonprofits could use to build their sites to text and still images. According to Carla Alford, community producer, "We wanted anybody, regardless their computer

level, to be able to go in and build a website. [They] don't need to know anything, just point, type and click." To which she added: "If you make it too complicated you'll be knocking out a whole population of people who can't access it" (personal communication, March 4, 1999).

The other relevant dimension of representing the user revolves around issues of information flows. Print newspapers have long conceived their readers as consumers of content and constructed an artifact that reflects this notion by leaving little space for readers to voice their opinions alongside those of reporters and editors. This is partly because it is more affordable to centralize rather than distribute the production and circulation of print goods. These economic constraints are somewhat relaxed in a digital and networked communication environment such as the Web. Thus, although online newspapers have had most of their content continue with this "we-publish-you-read" mode, they have also featured more spaces for user participation such as forums, chat rooms, reviews, and self-publishing sites. Concerning the research reported here, whether users were seen as information consumers or producers was associated with the adoption of interactivity by online personnel as follows. On the one hand, seeing users as information producers was tied to enacting multiple information flows. This was the case of Community Connection, which was created with the idea that user-authored content was a key difference between traditional and new media. According to David Farrell, editor-in-chief of *Michigan Live*, Advance Internet's online operation in Michigan, which also featured Community Connection: "Our audience wants to participate online more than just passively reading text, or listening to audio files online. They want a chance to express their opinions, to self-publish whatever it is that they find important" (personal communication, March 11, 1999).

On the other hand, seeing users as consumers of information was tied to reproducing print's "we-publish-you-read" mode. Virtual Voyager and the Technology section illustrate this option. The Virtual Voyager team authored most of the content of their voyages. Users were seen as technically adept consumers, but not content producers. There were forums available for users to post their views about voyages, but they were used sparingly. Content supervisor Glen Golightly attributed the low exploitation of interactive spaces to the belief that "people want to contribute to a certain point, they want to be entertained, not work" (personal communication, April 7, 1998). Similarly, reporters and editors affiliated with the Technology section saw the production of their own stories as the core of their journalistic enterprise. The section featured topically relevant forums, some of which generated high levels of participation among users. However, there was no member of the CyberTimes desk in charge of these forums, and neither editors nor reporters paid much attention to them. On the contrary, they were seen as a communication space for users and separated from their editorial activities.

Work Practices

Issues of information flows relate to the character of newsroom practices. All occupations and professions have certain traits that make them stand apart as a

distinctive domain of activity. For modern journalism, one such trait is the notion of gatekeeping. The idea that newsroom practices are about mediating between events and consumers is transmitted everywhere from journalism school to on-the-job socialization and has influenced print's disregard for reader-authored content. Hence, it is not surprising to find that it has played an important role in the three cases analyzed here. On the one hand, configuring the editorial function around gatekeeping tasks was associated with the reproduction of print's one-to-many message flows. The CyberTimes desk recreation of traditional journalism routines illustrates this option. For example, reporters told me that their jobs did not differ much from what they did when they worked for print papers. As one of them put it, "I get on the phone and talk to people, or I meet them in person," and "try to make sure that I'm spelling their names right, and that I have a faithful record of what they told me." Then, "when I come back I try to cobble together a story that's accurate. So that's the most important part of what I do" (personal communication, June 27, 1998). Editors' practices such as story assignment and copyediting also reproduced the gatekeeping character of those of their print counterparts. The tasks of the Voyager personnel had a strong gatekeeping connotation as well—illustrated by the fact that they were in charge of going into the field, collecting information, and processing and disseminating it.

In contrast, configuring newsroom tasks around alternatives to gatekeeping was associated with the enactment of a multiplicity of information flows. Community Connection's adoption of user authorship was tied to newsroom practices, such as site screening, database maintenance, technical support, and community outreach, that centered on facilitating and managing multiple information flows. These alternative practices expressed a view of the Web that Jeff Jarvis, executive vice president of Advance Internet, summarized as follows: "We don't own this medium, the audience does. In all other media it is about us publishing to the audience. . . . We're the gatekeepers. In this medium this is not at all true." He added that "what we are really doing is enabling the audience to do what they really want to do. . . . We create the gathering place for that to happen. It's a very different model for publishing than any previous model" (personal communication, March 15, 1999). In a sense, the factors concerning the character of newsroom practices and the representation of users as producers or consumers were the two sides of the interactivity coin, one focusing on the work routines and the other on the beneficiaries of its products.

Discussion

Most scholarship on newsroom computerization has, explicitly or by omission, espoused the view that technological developments generate editorial effects. Cottle (1999) went so far as to say that "for researchers sensitised to processes of social construction and how these inform news manufacture and shape output, discussion of technology can perhaps all too easily slide into simplistic ideas of *technological determinism*" (p. 24, emphasis in the original). By contrast, the analysis presented in this article shows that actors who shared a general awareness of, and

Table 1. Factors That Shaped Adoption Processes in the Three Case Studies

| Cases | Dynamics of the adoption processes | | | Editorial effects: Technology use in content creation |
	Organizational structures	Representations of the users	Work practices	
Technology Section	Extensive presence of print newsroom in online newsroom routines	Technically limited consumer	Newsroom tasks configured around gatekeeping function	Multimedia: low Interactivity: low
Virtual Voyager	Limited presence of print newsroom in online newsroom routines	Technically savvy consumer	Newsroom tasks configured around gatekeeping function	Multimedia: high Interactivity: low
Community Connection	Almost null presence of print newsroom in online newsroom routines	Technically limited producer	Newsroom tasks configured around alternative to gatekeeping	Multimedia: low Interactivity: high

basic access to, the multimedia and interactive capabilities of Web technologies took advantage of them differently. These differences have been, at least partially, shaped by variations in the dynamics of technology adoption processes. In addition, these variations have been associated with production factors having to do with organizational structures, work practices, and representations of the users (see Table 1). Thus, this analysis has underscored the limitations of a focus on the effects of new technologies by shedding light on the processes whereby these effects are, and are not, generated. This does not deny the significance of these effects. On the contrary, it provides a better understanding of their emergence by stressing that they cannot be solely attributed to the properties of new technologies but also to the production processes that mediate actors' adoption of these artifacts.

Beyond newsroom computerization, this article also makes more general contributions to mass communication and new media scholarship. Concerning mass communication work, my analysis builds upon what Schudson (2000) called the social-organizational perspective on news production. The constructionist, ethnomethodological, bureaucratic, and occupational variants of this perspective have posited that the news is, at least partly, a contextual outcome. As I mentioned in my introduction, however, studies of news making have largely neglected the technological dimension of newsroom dynamics. Focusing on the processes of technology adoption enables my analysis to make two contributions

to the social-organizational perspective. First, it broadens the issues that researchers are encouraged to address by showing how editorial practices may not be fully understood without also considering their technological dimension. The findings presented above show that technical considerations were inextricably tied to editorial issues such as who gets to tell the stories, how they are told, and to what public they are addressed. For example, the enactment of work practices alternative to gatekeeping in Community Connection was associated with the actors' populist view of the Web; the technically unsophisticated storytelling produced by the CyberTimes desk was linked to a decision about how to deal with the technological heterogeneity of their potential readers; and the intense adoption of multimedia by Virtual Voyager partially resulted from viewing their users as technically savvy. Although materiality may not always critically matter in every traditional and new media setting, the centrality of technical considerations in the present cases at least implies that a priori overlooking the technological dimension of editorial work in studies of news making may run the risk of either missing important dynamics or misunderstanding their causes and implications.

The second contribution to the social-organizational perspective is to offer some initial building blocks of grounded theorizing on the processes of technological adoption in newsroom settings that could be developed further by future research looking at similar and other technologies in multiple sites. Two caveats are in order with regards to this grounded theorizing. First, although issues of organizational structures, work practices, and representations of the user are common enough that it is likely that they could be relevant in other settings, the specific ways in which they played out in the case studies should not be automatically assumed in other sites. Also, this does not preclude other production and consumption factors, such as interests of advertisers and actions of users, from being relevant in other cases. Second, this theorizing has been sufficient to account for some of the variation observed in the three cases in particular and to underscore the limitations of a focus on technology effects in general, but it has painted a relatively static picture of phenomena influenced by past events and evolving on an ongoing basis—a limitation of special relevance in light of work on the mutual shaping of technological and social change (Bijker & Bijsterveld, 2000; Boczkowski, 1999; Kline, 2000; Pinch & Trocco, 2002). Further research should probe the role of multiple factors that shape technology adoption in various settings and in a way that captures the dynamics of evolving processes.

Regarding new media scholarship, this analysis invites us to rethink how we look at "media convergence" (Baldwin, McVoy, & Steinfield, 1996; Manovich, 2001; Pool, 1983; Poster, 2001). This notion has been usually employed to refer to the delivery of content and services previously provided by multiple technologies such as print, television, telephony, and computers, to a single artifact, often a networked computer. A common approach has been to focus on convergence as a product driven by the technological logic of digitization. As Negroponte (1996) put it, "When all media is digital . . . bits commingle effortlessly" (p. 18). Also, by concentrating on the equalizing role of digital infrastructures, this approach has often yielded accounts that stress uniformity across convergent media products. To Owen (1999), "The prophecy of convergence is this: Television sets, tele-

phones, and computers (and the networks that bind them) are or will become the same" (p. 16). My analysis questions this common approach. First, the findings from the case studies suggest that, inverting Negroponte's assertion, bits commingle effortfully: It is the actions of specific people, enabled and constrained by the resources available in local settings, industrial communities, and historical periods, that generates convergent products out of digitized infrastructures. Second, highlighting the power of technology has led analysts to overlook variations in convergent media products and in the diverging paths that their production may follow in different settings, communities, and periods. On the contrary, this article suggests that we should view media convergence as a contingent process in which actors may follow diverging paths as a result of various combinations of technological, local, and environmental factors. This is not to say that these media may not be increasingly integrated in the future, but that the character of this process would be best captured by a lens that emphasizes actors' agency as much as technology's capabilities.

This article's findings should be seen in the context of the period in which the field research was conducted. For example, in this period there was an asymmetry in the resources of print and online newsrooms that tied to how the presence of the former in the routines of the latter affected technology use, but this may change as online news becomes more central in the media scene. More generally, if the history of print and broadcast media gives any guidance about the future (Barnhurst & Nerone, 2001; Douglas, 1987; Schudson, 1978; Smulyan, 1994), it is likely that the wide variation examined here may become less common as some new media practices and artifacts acquire dominant status. Space limitations prevent me from addressing how this process may have already begun since data for this paper were collected. However, in light of media history it is also likely that there may be more than one way of implementing dominant choices as well as multiple exceptions to them, in both cases resulting from the kind of variations in the interplay of technological, local, and environmental factors studied here. Furthermore, and perhaps more importantly, a focus on process dynamics could help make more visible the contingency in the emergence of these dominant choices and the agency involved in their reproduction, both of which tend to become less visible once these choices get institutionalized.

As a way of bringing together these contributions to mass communication and new media theorizing, I would like to conclude by going back to a key turn in newspaper history when, borrowing from Marvin (1988), "old technologies were new":

> The modern mass-circulation newspaper would be unimaginable without the technical developments of early nineteenth century. They obviously facilitated the rise of the penny press. But they do not explain it. Technological change was not autonomous and itself begs explanation. And while it made mass circulation newspapers possible, it did not make them necessary or inevitable. (Schudson, 1978, p. 35)

It is still too soon to tell whether the advent of online newspapers will be to

news making in the 21st century what the mass circulation daily was to news making in the 19th century. Schudson's words, however, provide a valuable reminder that by paying attention to both technological developments and newsroom adoption processes we will be well positioned to understand the complex dynamics of the current transformation and its multiple outcomes.

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