8 UNDERSTANDING AND SUPPORTING KNOWLEDGE WORK IN SCHOOLS, WORKPLACES, AND PUBLIC LIFE

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In this chapter, we take up the issue of what knowledge (writing) work looks like and what it means for writing researchers and teachers to support this work. Supporting knowledge work across domains is important for technical and professional writing programs in particular, largely because contemporary social and institutional contexts are dependent on high-quality symbolic work. To put the issue differently, the activity of citizenship, as well as the activity of professionals working in organizational settings (including technical writers), is knowledge work that is either supported by writing or embodied as writing.

We are researchers and co-directors (two of three) of the Writing in Digital Environments (WIDE) Research Center at Michigan State University. The Center has taken up the problem of how to study writing given new and changing digital and networked information technology tools and environments. We study how the use of digital technologies changes the processes, products, and contexts for writing—particularly composing processes in organizational contexts. Fundamental to our approach is the development of information and software tools as a deliverable of our research. The development of software tools, in particular, might seem unusual as a research deliverable. Computers and writing researchers, in the early years of that field's development, often made software to support then new computer supported writing processes. We understand WIDE as part of that tradition. But more substantively, we see software as either a way to test developing theories of writing or as useful responses to needs we see emerging from research—and sometimes both. These

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tools and resources, generally speaking, leverage functionality associated with social computing systems, including information visualization and unified content management architectures to enable and support writing. WIDE's goal is to take theories and research methods that have served the community of writing researchers and place them into the hands of writers in a range of contexts (school, workplaces, and public domains). These intellectual tools, embodied in the function as well as the "content" of information systems, will become useful for writers in a variety of contexts who, like students, have a stake in reflecting on and improving writing as an important piece of improving their work overall.

We orient to writing in particular ways as well. We study writing as a verb, which means that we are interested in the activity, not precisely the object. Studying writing as an activity also entails asking how we can best do it and how we can help others to do it better. We understand the activity of writing to be carried by a variable semiotic (e.g., multiple media), and we understand the activity of writing to be epistemologically productive—that is, we situate ourselves within a rhetorical tradition that understands writers as producing new knowledge as part of acts of composing (this becomes thorny and more interesting when the writers in question are not readily understood as "experts"). We are interested, in other words, in what writing does, not in what it means; in the social and organizational functions and impacts of writing, not in the interpretation of the texts themselves. As this perspective concerns "knowledge work," we are interested, simply, in the work that writing (and writers) does. Finally, we tend to be much more interested in how groups write rather than in how individuals write.

Our point in sharing this institutional and conceptual background about the Center and ourselves is to frame the approach we take in this chapter. We provide here an understanding of what we think writing (knowledge) work looks like and why it matters to support it, and we do so by focusing on the digitally mediated activities of groups. We offer for consideration and critique, then, both our focus and approach. We are making an argument for how writing researchers might usefully orient to the study of writing. In what follows, we will first unpack what it means to understand writing and (as integral to) knowledge work. We then move to some visualizations of writing work and their possible interpretations. We conclude by moving toward implications for rhetorical theory.

WRITING AND/AS KNOWLEDGE WORK

Perhaps the most significant idea connecting our work and animating the work of the WIDE Center is the notion of "knowledge work." Knowledge work

is typically understood as "analytical" and thus requiring problem-solving and abstract reasoning, particularly with (and through) advanced information technologies. Johnson-Eilola (2005) notes that knowledge work is also typically concerned with the production of information, as distinct from the production of material goods, and he also usefully points out that increasing numbers of us do not just work with information, we inhabit it because the very environments in which we work are information immersive (his favorite example is the digital sound editing software-studio interactions of musicians). Thus knowledge work, or what Johnson-Eilola calls symbolic production, is the making of largely discursive performances that, quite literally, do work. The concept of knowledge work has tremendous cultural capital right now, and we fully admit to an interest in the language for that reason. But the concept that "knowledge work" glosses is poorly understood in our view. This is a statement that demands qualification. There is a significant amount of work in management studies that seeks to understand knowledge work (e.g., Orlikowski & Yates, 1994; Pentland, 1995). But we are interested in a fine-grained understanding, and we are interested in understanding the activity of knowledge work and in rendering that activity visible to those who are engaged in that activity. When visible, we suspect that knowledge work looks like writing (indeed, is writing) or is substantively supported by writing. Writing is how knowledge work carries value in organizations.

Our claims about knowledge work, value, and writing demand some justification. To make visible these claims about writing and knowledge work, we turn to vignettes drawn from a series of small studies conducted with organizations that we understood to have knowledge work problems. We will then propose a model for group writing that is descriptive of some of the dynamics that emerge from the vignettes. We will close with a discussion of a fourth project that illuminates opportunities in the model for supporting writing as knowledge work.

Career Services and Placement

Michigan State's office of career services and placement came to us with a common problem: we need a new Web site. At first we did not fold this project into the workflow of the Center. Instead, Jeff taught a year long independent study class with five students who planned and completed a research and development project that eventually led to a new Web site (http://www.csp.msu.edu).

What became quickly apparent to Jeff and his students was that the key problem for Career Services and Placement (CSP) was a writing problem. With their previous way of working, many people within the organization wrote their Web site—sometimes as individuals, sometimes as part of small teams. They

did so without a clearly marked workflow, and they did so within a basic html architecture: no style sheets controlling design; no content management system supporting the writing. As a result, when writers within the organization updated the Web site, they often broke it. Given the lack of standardization, the site evolved into a tangled web of links, cul-de-sacs, and inconsistent and sometimes conflicting content.

The CSP project was one of the first in which we posed two simple but powerful questions to that organization: who are you (together); and who writes? The first question is designed to help people figure out how they cohere in terms of their identities, organization, and work (what is their groupness). And the second question is designed to help them to see that what they do with and through their Web site is write together, and, therefore, to ask themselves who should be doing that writing. This realization is by no means obvious or without controversy. None of the individuals who literally wrote the CSP Web site understood themselves as "writers." The eventual solution was the use of a content management system, in this case Plone, to support the writing of three people within the organization charged with coordinating CSP's work with and through their Web site. Adapting a content management system to become a writing environ-

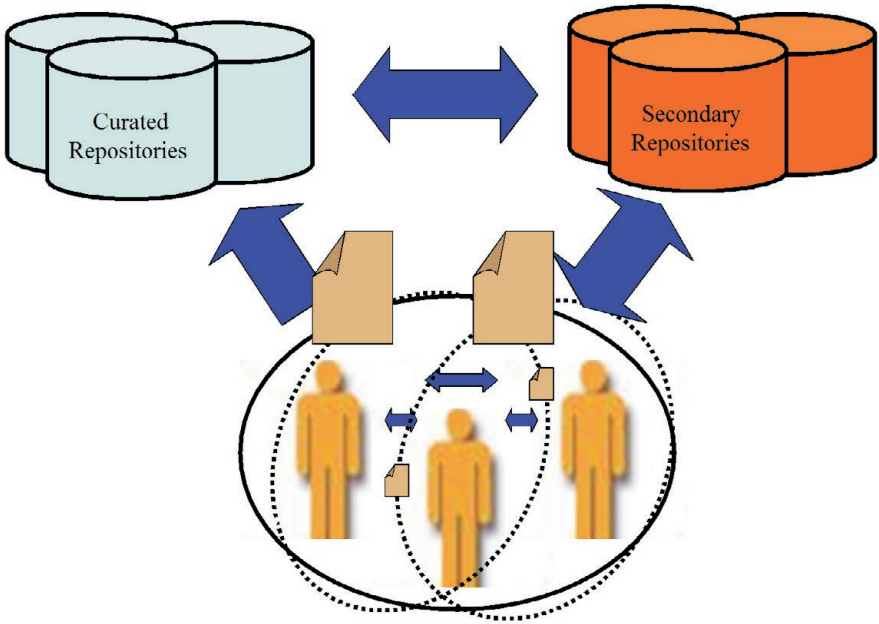

Figure 1. A macroscopic view of writing activity in social groups.

ment is no small task. We continue to work on this problem. But the point we want to make with this example is simple: the key moment in this project was when the people of CSP were able to see themselves as writing together when they were "doing" their Web site. Once CSP understood itself as an organization that writes—and individuals and groups within that organization began to see themselves in this way—then the project shifted dramatically from one focused on helping the organization "get" a new Web site to one focused on developing effective and explicit writing processes (imagine a writing center tutorial with an organization rather than an individual). A new Web site happened, but it was a product of writing research, or a writing process (change), and of a shift in organizational culture.

Teachers for a New Era

"Teachers for a New Era" (TNE) (2004) is the title of a multi-year initiative undertaken by the School of Education at Michigan State University with support from the Carnegie Foundation of New York. The aim of the TNE project is to create and disseminate teacher knowledge standards that would guide the education and professional development of future teachers. When the TNE team approached us in September 2005, we agreed to conduct a study to determine how the "Teacher Knowledge Standards" (TKS) developed by the TNE project team could best be delivered to its intended users—that is, "MSU students preparing for teaching careers, all faculty involved in their disciplinary and pedagogical preparation, K-12 teachers and administrators, and public officials responsible for educational policy" ("Teacher Knowledge Standards," November 2004, p. 1).

In Fall 2005, the WIDE team conducted its study. We adapted an interviewing method known as contextual inquiry (see Beyer & Holtzblatt, 1997) with the aim of discovering, in a practical and detailed way, how teachers and teacher educators reported using the standards and integrating them into their work practices. Participants were interviewed about the use of standards information in their day-to-day work as teachers and/or teacher educators. We asked to meet the participants in the places where they actually worked so that we could see as much of their working environment as possible. In many cases, meeting them in their office or with their computer nearby meant that we could ask them to show us how they performed certain types of routine tasks such as preparing lesson plans or evaluating student work. By prompting participants to show us examples of work routines, we were better able to discover tacit uses of standards in the participants' practice by noting where and when they accessed, referenced, or made direct use of standards language in their own work products.

We contacted approximately seventy potential participants from the Teacher Education literacy team and interviewed twenty-two teachers and teacher educators who volunteered for the study. Eleven of the interviewees represented the elementary grades, and 13 represented the middle and secondary grades. A variety of roles were represented in the participant group as well, including four undergraduate TE students and teacher interns, three mentor teachers, six subject area leaders, eight field instructors, 12 content-area instructors (some participants, as the role totals indicate, served in more than one role).

Each interview lasted approximately 60 to 90 minutes. We took field notes as our primary method of data gathering. We also audio recorded the interviews as a backup. We did not make full transcripts of the audio recordings, but we did listen to them to flesh out the notes for each interview. We also gathered sample artifacts—documents representing typical work product or guidelines for work—from the participants when possible.

We analyzed the interviews in an effort to construct comparable accounts of teachers' use of standards information, paying particular attention to the combinations of information (texts), technologies, and strategies used. We did this by constructing lists in response to questions such as "what kinds of terms did people use to refer to 'standards'?" or "what uses for standards information were mentioned?" We then identified individual cases that tended to be typical or atypical, using these as the basis for more detailed questions about motives and rationales for the use of standards.

In reporting on how they used standards, teachers and teacher educators revealed that they would re-appropriate the standards for their own purposes. One example from our final report focused on a mentor teacher acting in the role of department chair. When describing how she used standards, the mentor teacher talked about her experience as a department chair working with her colleagues. More precisely, each department in her high school was charged with collaboratively creating a unit that ties back to the district standards. This teacher used the standards and a shared document called the "Understanding by Design" planning model to "coordinate [their] work together by talking through it all." Once her department decided on a text to use, they took the following steps:

- Considered outcomes
- Identified appropriate assessments
- Created classroom activities
- Identified all the possible standards associated with this task
- Decided which standards to foreground

The teacher reported that she did not view the standards as a starting point, but rather as something to help her refine her outcomes, assessments, and activities. While she believed student standards helped her to "focus and justify the

things I want to do," she also feared that standards may be used to show how students are failing, rather than how they are succeeding. Thus, this teacher seemed to use standards as a way to talk with her colleagues, to aid in her planning process, and to address the concerns of other stakeholders, such as parents, policy makers, and administrators. In other words, the standards were reappropriated to do a kind of work that is important for a department chair to do: build consensus among her colleagues and other stakeholders. But this is delicate work, not least because the same standards might get used in ways that the teacher is not willing to support.

Based on patterns of reappropriation illustrated in the previous example, we recommended to the TNE team that standards be presented as a means for empowering users—teachers and teacher educators—and helping them to do their work, rather than as another set of mandates foisted upon them. Our detailed recommendation took the form of a new software tool that eventually came to be called the Literacy Resource Exchange (http://tne.wide.msu.edu). The system allows teachers and teacher educators to share commonly-used materials such as lesson plans, syllabi, rubrics, and other "working genres" in an environment where links between these materials and teacher knowledge standards can be made explicit. In other words, the system supports the kind of writing that teachers need to do in both formal and informal social collectives (e.g., as members of departments, as members of affinity groups). Much of the day-to-day practice of teaching is made up of writing that requires teachers to adapt materials drawn from other sources in the service of knowledge-work tasks such as creating lessons, documenting curricular decision-making, and evaluating students.

Capital Area Community Information

The Capital Area Community Information (CACI) project is an attempt to design with "users" (citizens) information communication technologies that will support their knowledge work in communities. The claim that the work of citizenship is knowledge work is more fully developed in Grabill (2007), but the claim itself rests on the observation that when groups of people are working for community change of any kind, the work that they must do—and the first part of this argument is to understand citizenship as work—is a form of rhetorical labor that requires the use of advanced information technologies (searching; use of databases; making databases) and a great deal of writing (letters; proposals; reports; Web sites; iMovies; flyers; and on and on). All of this work is focused on assembling participants around issues (i.e., organizing), keeping projects focused and on-target (i.e., management), and achieving change (persuasion).

The CACI project is a study of an existing initiative called CACVoices (http://www.cacvoices.org), a public Web site that hosts databases and public information related to public health, crime, parks and recreation, including as

well Web sites for small community and neighborhood organizations. While the CACVoices resource is valued by community-based organizations in the Capital Area, there were usability problems with interfaces and database tools. Web sites like CACVoices exist in communities all over the world, particularly in the developed world. Originally they were the byproduct of digital government initiatives or attempts to close digital divides and even urban and regional planning efforts. In most instances, the narrative supporting the development of Web sites such as CACVoices tells a story of increased community activity, enhanced information technology capacity, and a more robust and informed citizenry. In the communities served by CACVoices, there is little evidence that the information tools have enabled citizen productivity or that they have led to the social transformation expected by both sponsors and users.

Like many data-rich tools, CACVoices provides an array of options and languages for non-expert users to navigate the Web site, access databases, and create Web sites by using built-in development tools. Once users find and access specific database tools, they are confronted with interfaces and language that demand expert users. For instance, to access crime data for one's neighborhood, a user without any training or documentation must use a Geographic Information Systems (GIS) tool developed for professional geographers. In our usability evaluation of this tool, users often did not even recognize the default map of their community (represented visually in terms of a network of roads, rivers, and county lines) as their community. The problems suggested by these interfaces are substantial, both at the interface and in terms of their implications for what users can do with the information. That is, the usability problems associated with this site, such as failures to navigate to critical information and databases that were opaque to users (problems that have since addressed), are problems only because they prevent the ability of people in communities to engaged in the knowledge work that is necessary. Bad interfaces and tools that do not support complex work are disabling technologies. But even here usability as an approach is inadequate, because usability only allows us to see and solve problems at the surface layer of interfaces; writing and other complex activities are "deeper" both in terms of the intellectual activities required of users and the system interactions required to support users. Citizens writing to change communities need to do much more than navigate clearly and cleanly. They must have sophisticated interpretive skills, both for text and visuals and data displays. They must also be able to produce complex documents—reports, letters, issue summaries, digital video. Very few individuals have these literacies. But groups of people do, and they can be highly effective if they have tools smart enough to support how they write together.

GROUPS BEING GROUPS: WRITING AND SOCIAL COLLECTIVES

What emerges from these three projects is a model of writing as central to group activity. And despite the differences among the groups represented in each project, we can identify some common features of this group model of writing. Whether formally or informally, explicitly or tacitly, the work of groups writing together involves the crucial interplay of communication with others in the group, with curated repositories of information, and with secondary repositories of information. As our two previous examples help to illustrate, this dynamic is increasingly a pattern for living, working, and participating in day-to-day activity in the context of an emerging global knowledge society (Castells, 1999; Zuboff & Maxmin, 2004).

Curated repositories are those that have a community of editors, reviewers, and possibly merchants looking out for the quality of materials, providing a standard for organizing these (e.g., metadata standards, search tools), and providing means to access the materials. These could be free (as in a library) or fee-based, as in a proprietary collection of bioinformatics research data. Secondary repositories are user-driven schemes that add value to content in curated repositories by providing a bottom-up set of materials that sit alongside the curated content and help users access, understand, and use it. Reviews and comments are two familiar genres in secondary repositories, which can also include "derivative works" that build on materials in a curated repository. Secondary reposito-

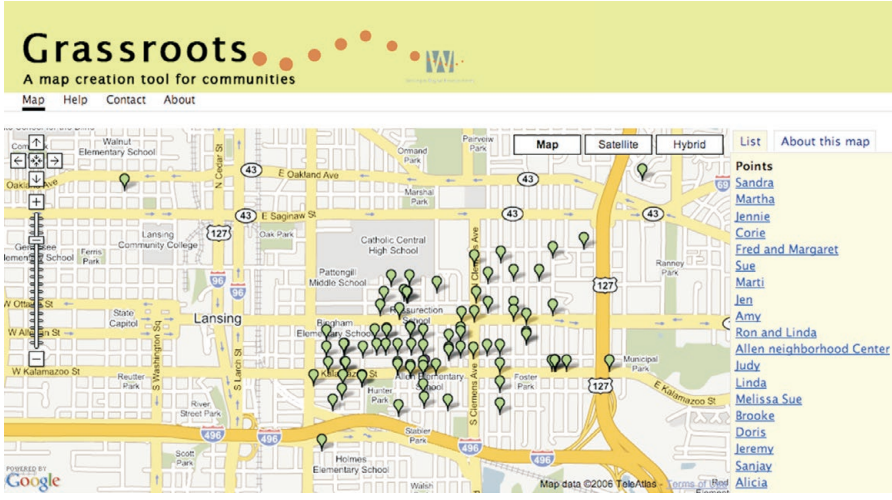

Figure 2. Distribution of Farmer's Market yard signs.

ries may also have robust metadata schemes, search tools, and other resources, though there is no centralized top-down control of these (because when there is, they become curated repositories). Secondary repositories are often a function of user activity, and much of that activity is what we might usefully understand as writing. User-created product reviews on sites like Amazon.com, for example, are created by users for other users. Their status as secondary repositories, then, is a function of the fact that they are user activity that is not curated—so imagine the conversation Amazon.com representatives had to have with their retail partners about this fairly radical concept: "the only reviews of your product on the site might be negative ones ... we just can't say for sure ... because we will not edit what users write."

But what drives sales on Amazon.com is exactly what drives the system represented in Figure 1: the activity of users interacting with one another, doing their own work on their own terms. Much of this work relies upon and results in texts of various kinds, and so while we would understand it as "writing," users may not experience their work in this way. This "disconnect" between user experience and activity is a key theme in our shared work. Just as lawyers rarely see themselves as expert professional writers, teachers in the TNE project did not see the work of teaching as thoroughly discursive, and the people we worked with on the CACI project rarely saw the writing that they did. Therefore, the participants in the projects described above, for example, were more focused on delivering placement services to undergraduate students, working for change in their communities, or preparing course materials. Failures in workflow—in the ability to work effectively and successfully—are, in our view, just as likely to be failures in shared writing processes as anything else. What our model attempts to make clear is that all of these interactions derive from, and frequently result in, information objects that users create: documents, forms, learning objects. That is, users are makers, not consumers. When they access information, they do so to create, adapt, remix, and reuse it ... not merely to read, digest, or consume it. Groups write.

UNDERSTANDING AND SUPPORTING RHETORICAL ACTIVITY

One purpose of the examples we have presented in this chapter is to build toward a claim regarding the meaning of writing, the functions of professional communicators, and the role of writing research. If writing is a distributed activity at the very core of knowledge work in a broad array of domains and organizations, then a key function for professional communicators (and writing research-

ers) is to support the writing work of others. This does not mean, of course, that professional communicators are done writing themselves—quite the opposite, in fact—but our claim does mean that we have some work to do to understand writing work differently than we have in the past in an effort to support this work more effectively.

To flesh out this argument, we will utilize relatively recent work from Latour (2005) and another example from the work of the Center. To begin, it is first important to move one step beyond our assertion that groups write and focus somewhat differently on who and what constitutes a group. In other words, to focus on what is required to get writing work done. In this regard, we understand writing as a collective social activity, and when we treat writing in this way, we understand

- that writing requires infrastructure
- that the texts and technologies (and other elements of practice and standards) that comprise infrastructure are participants—they are part of the collective

We would go on further to claim

- that the purpose of rhetoric is to serve as a type of connection between participants
- that we ought to be engaged in making—and facilitating the making—of those connections

There are a number of important issues embedded in this list. The concept of "infrastructure" we take from Starr and Ruhleder (1996), who write that "infrastructure is something that emerges for people in practice, connected to activities and structures" (p. 112). The commonplace notion of infrastructure as largely material and foundational is certainly part of what Starr and Ruhleder mean by the concept, but their notion of infrastructure is at once broader and more social and cultural. They write, "Computers, people, and tasks together make or break a functioning infrastructure," underlining the contingent meanings that can be attached to a concept (infrastructure) that is material, institutional, cultural, and social at the same time. In other words, just as a tool is not an artifact with "pre-given attributes frozen in time" but rather given meaning as a tool by specific users working on particular problems in specific situations, so too does the meaning and value of an infrastructure emerge. An infrastructure's meaning and use are not stable. They are a product of ongoing processes of use.

The value of a concept like infrastructure is that it gives us a heuristic for seeing the required elements of a productive writing infrastructure. Infrastructure, after all, is notoriously difficult to see, particularly when it works well. We are also better able to name its participants. So, in the case of this bit of writing work, we can name "Bill" and "Jeff" as participants, but we also need to be able to name

"computer" and "network" and "time" and "shared office space" and "smart, supportive editor" as a few of the other participants enrolled in the work at hand. Given this, what distinguishes those collectives that are highly effective at knowledge work from those that are not? This is an essential question, of course, and one we might very well spend a few years examining. But here is where we see a role for rhetorical theory and practice because certain forms of rhetorical theory might enable us to see collectives in particular ways (or at all), understand how best to assemble them, and how best to support them. Our sense of rhetoric, then—and therefore our sense of the core activities of writing and writers—is that it serves as a particular type of connection between things that are not rhetorical and that good writers create and maintain those connections. We close this chapter by attempting to explain this last sentence in two ways.

The first way that we find it useful to explain rhetoric as a type of connection between things that are not rhetorical, is to refer to a commonplace of technical and professional writing that we have discussed in various ways previously in this chapter: the difference between professional writers and professionals who write. We know that professionals (knowledge workers) write all the time—it is a key competency and activity in their jobs. However, as the examples above illustrate, few if any of these professionals understand their activity as writing. They understand themselves to be accounting or lawyering or managing. All non-rhetorical things (when an economist is analyzing data, she is doing economics, not rhetoric). But to do the work of an economist, eventually that economist must assemble what Latour (2005) would call participants (what we have characterized as elements of infrastructure). These acts of assembly and connectivity and the redeployment of these participants toward new ends are rhetorical and require a tremendous amount of writing. For instance, our economist is certainly analyzing data for some purpose and in response to some exigency. However, that exigency may not be shared, or it may not be shared as widely as is necessary to achieve some end—to act on the analysis in particular ways. What our economist must do in the lexicon of Latour, therefore, is assemble participants around a matter of concern, an issue that brings people together precisely because it divides them. This is rhetorical work saturated by concrete acts of writing, and it is basic to effective knowledge work. Our economist must propose, persuade, enroll, analyze, build relationships and assemble all of the elements of infrastructure required to act effectively. She is no longer a discrete economist but a participant in a larger association doing economics.

Similarly, the job of the professional writer is to become an expert in assembling participants to achieve rhetorical goals, and then to care for these assemblies over time (it might be the particular expertise of writers to care for assemblies). To write effectively, to recall an earlier example, CSP needed both

to understand itself differently as an organization and assign specific individuals to assemble the organization around the goal of communicating. In addition, CSP was required to change the culture of the organization—and reconfigure its infrastructure—to care for this new assembly (of texts, people, machines, and so on) that was "doing" its new Web site.

The second way we like to explain rhetoric as a type of connection is to talk about Grassroots, an asset mapping tool that we helped to assemble as part of the Capital Area Community Information project. Through that project, one of the most common forms of writing we observed concerned the making of maps and the use of maps in making other sorts of arguments and documents. Currently in our community, there are lots of GIS tools that allow people to make maps of data. But none of these tools allow people to map data that they create or that is of interest to them. Instead, maps can be made based on databases typically collected by government agencies, which focus on problems in the community. Grassroots is intended to enable communities to name, locate, and thereby create maps of their communities using variables of their choosing. This impulse is supported by a large body of literature that is generally known as an asset-based approach to community development (e.g., Kretzmann & McKnight, 1993). Because the use of mapping tools is a fundamental inventional activity for many community-based organizations, Grassroots is both writing software and an important participant in the rhetorical activity of a number of organizations. Grassroots is also a prime example of what is happening to "writing" as powerful digital tools become more deeply immersed in knowledge work. "Writing" involves much more than tools (participants) capable of making black marks on white screens and paper.

Figure 2 represents a typical use of Grassroots. What is represented in the map is the location of yard signs advertising a farmer's market sponsored by a neighborhood-based organization. We like this map not because it is meant for display to the public on a Web site or in a report or brochure. We like this map—this use of Grassroots—because this map is not meant for a public audience or for wide distribution. Rather, this map is a working document within the organization that enables it to track where its signs are and to tell itself a set of stories about the distribution of signs in a given area. This map supports other forms of activity; this type of mundane writing is important to the organization in ways that would be rendered invisible if we were only studying texts as artifacts or writing as separate from other forms of activity. As digital writing, however, this simple map is even more powerful. This is an organization that regularly uses maps. Some are electronic, but others are paper maps hanging on walls. The existing electronic tools that they have will not permit them to create the sorts of maps shown in Figure 2. And the paper maps are not editable and reusable in other electronic documents.

While the use shown in Figure 2 is a simple example, we like it because it shows clearly how a tool like Grassroots can support more complex rhetorical work by groups. Grassroots as a writing tool represents an attempt to make the construction of a complex genre more accessible for ordinary citizens. In addition, perhaps the most exciting feature of Grassroots is how it enables the sharing of maps within and across groups, teams, or communities. Drawing on the value of reuse, every map created by a Grassroots user can be the basis for another map. Therefore, groups of users can collectively create and edit maps by giving others the ability to add or change things about the map's contents or its features (e.g., zoom level). In this way, for example, a group might choose to use a map to augment other information they already publish and maintain, thereby turning a map into a database. Furthermore, in order to make maps easy to find once they have been created, users can add descriptive "tags" using a system called a "folksonomy" that depends on aggregation and variation among descriptive keywords to create an alternative to a controlled-vocabulary taxonomy. A folksonomic structure allows users to apply highly-idiosyncratic, even personal terms to characterize maps for the sake of making the map findable to their specific group. A group might tag a map with their organization's name, for example, or with an acronym. At the same time, other users can tag the same map with more general keywords like "pizza." Aggregation of tags allows the common descriptors to influence factors such as the placement of a map in search results lists. The use of metadata in this way provides a rich source of descriptive information to enable the searching and grouping of maps. Each of these features and functionalities enables group writing, collective intelligence, and the rhetorical practices of organizations. In the language that we have been using in this last section of the chapter, Grassroots enables writers to make connections between other participants (data, geocodes, images, people, audiences) in a rhetorical situation. But just as importantly from our point of view, Grassroots itself is a connection. Grassroots connects us (and our Center) with other participants, and these participants are then connected to others. With Grassroots we have assembled participants and enabled the assembly of others. Sometimes rhetoric produces more than texts, speeches, and other well-known performances. Sometimes rhetoric makes software.

We began this chapter by saying that we were interested in what knowledge (writing) work looks like so that we might help imagine effective ways to support this work. As we hope to have demonstrated in this chapter, visualizing writing in this way can be complex, and the implications of these visualizations have been—for us at least—challenging to how we have typically understood writing, writers, and our own roles as teachers and researchers. We have turned increasingly to a Latourian understanding of writing and knowledge work in an

effort to theorize what we have observed in ways that are conceptually coherent yet dynamic. We find ourselves, therefore, starting to build rhetorical theory that begins with the understanding that writing as knowledge work is done to make, remake, and unmake associations. Written artifacts and writing-as-action are both concrete tracings of associations. Digital environments are especially exciting to us because in these environments actions leave traces that are ephemeral in offline settings. Life is textualized in digital environments.

The conceptual approach we have sketched in this chapter is not without problems, of course. One that continues to concern us is that despite the efforts of many writing researchers to render visible writing in the making of associations, matters of concern, and in work of many kinds, writing itself (as artifact or action) only occasionally rises to the level of visible infrastructure. We wonder if the approach that is emerging from the work of the WIDE Center will have better luck. Still, it is up to us as writing researchers to a) pay attention to, and b) leverage both the relatively well-known tracings of associations available in texts and the newly-afforded opportunities to trace association building in writing-as-action in online spaces for the sake of supporting knowledge work. It turns out that when we do this, we do not limit ourselves to describing or prescribing support in a textual account (e.g. an article or book); rather, we can also build our findings into the very environments that users inhabit in order to mediate their work directly. The act of making Grassroots is a statement about how we might best express, test, and verify our theories about writing and knowledge work. More generally, we hope this chapter makes clear why we see writing as fundamental to understanding knowledge work and why we see knowledge work as a useful descriptor for the group activities we see in all sorts of contemporary organizations. The problem is that writing is perhaps the paradigm case of invisible work. Like most elements of infrastructure, we only notice it when it breaks. We suggest, then, that a key political as well as intellectual act of writing research is to make writing visible, particularly to those doing the writing. Only then can we develop notions of rhetorical work that correspond to the complexity of that work and build better infrastructures for supporting this essential work in schools, in workplaces, and in the diverse knowledge work contexts of everyday life.

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