Managing technology use and learning in nonprofit community organizations: Methodological challenges and opportunities

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ABSTRACT

We are investigating how to empower nonprofit community organizations to develop the information technology management practices required to carry out their civic goals. We highlight our methodology of working with nonprofit organizations through three case examples from the field. These examples illustrate that nonprofit organizations are able to and can indeed sustain their IT management practices through various methodological techniques. These techniques—such as scenario development, technology inventory assessment, and volunteer management practices—emphasize the importance of long-term critical planning and design skills. Based on our fieldwork, we enumerate lessons that may be valuable for community stakeholders, designers, researchers, and practitioners.

Categories and Subject Descriptors

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous

Keywords

Community computing, participatory design, cooperative design, information technology management.

1. INTRODUCTION

Technology is increasingly becoming more complex and management of technology is becoming a serious bottleneck to personal and organizational productivity. We have observed this tension in our work with nonprofit organizations. Nonprofit organizations often have a vision for how technology might help them achieve their communitarian goals. However, they often face problems achieving their technology goals because technology planning is often not an explicit part of their organizational practice. Because of the perceived and real complexity of technology, nonprofit organizations can get "stuck." They focus on the obstacles of IT rather than on their considerable assets with respect to situational and domain knowledge that can be leveraged to achieve their technology goals. Paradoxically, developing such

technology planning practices may help such organizations achieve their organizational goals and manage their scarce resources more effectively.

For nonprofit organizations, technology management involves working with organizations to develop their socio-technical infrastructure and capacity to support change. Because they often have scarce resources, this often requires nonprofits to effectively identify and leverage local resources such as volunteer efforts, small grants, and community-oriented initiatives to achieve their goals. These types of constraints are typically not considered in workplace studies that focus on technology projects in organizational settings with dedicated staff members to complete a technology project and at least a minimal infrastructure to support technology change. While we are specifically concerned with nonprofit organizations in this paper, the need to develop technology management practices is an issue that faces all organizations.

A central question that our work addresses is how to empower nonprofit organizations to develop the management practices required to carry out their IT goals. Such management practices will also enable organizations to ensure that technology innovations fit with their work practices, values, and culture. In this paper, we describe our methodology for working with nonprofit community organizations in ways that promote their ability to manage technology use, learning, and innovation. We report on our work in the Civic Nexus project: a three-year participatory design initiative with the goal of working with nonprofit community organizations to facilitate their ability to envision and direct technology projects. We begin by describing the methodological commitments that underlie our work and the strategies we use in working with nonprofit community organizations to promote sustainability. We describe our work with three nonprofit organizations. Finally, we present some methodological lessons learned from working with nonprofit organizations with the goal of encouraging long-term shifts in organizational practice related to technology management.

2. THE NONPROFIT CONTEXT

Nonprofit community organizations are an integral part of most communities, making their study especially relevant. In the United States, alone, almost six percent of all organizations are in the nonprofit sector comprising over 1.6 million organizations and 9.3 percent of all paid employees [25]. The Johns Hopkins Comparative Nonprofit Sector project estimates that in the late 1990's, in the 35 countries worldwide participating in their study, this sector had aggregate expenditures of $1.3 trillion (US) dollars

and employed 39.5 million full-time equivalent workers when factoring in religious congregations.

Technology plays an important role in nonprofit organizations, enabling them to advertise services, communicate their mission, and recruit volunteers. Despite this potential, there is evidence that nonprofits often do not have a comprehensive strategy for incorporating technologies such as email or a website into their organization. Burt and Taylor [7], for example, in a study of nonprofits in the UK, found that nonprofits did not use their websites for more strategic purposes such as expanding their business scope or offering service using different delivery mediums. Instead, they used the Internet in more conventional ways to address administrative and operational issues. Similarly, Gilbert [14] found that nonprofits often do not use email more strategically by engaging in activities such as collecting email addresses on their website or distributing electronic newsletters.

At a very basic level, lack of technology planning is due to real resource limitations that such organizations face [2, 3, 19, 30]. They typically have few staff members, limited (or non-existent) technology budgets, and often do not have an in-house technology staff to address immediate problems or provide ongoing training and support. Technology purchases tend to be made in a piecemeal fashion based on a grant that includes a technology component. Their infrastructure is often composed of a mishmash of older equipment, making support and maintenance difficult. Technology solutions tend to be "created on the fly," designed to address an immediate organizational need (e.g. a crashed hard drive). Staff members and volunteers often have varying levels of IT literacy, constraining the technical systems that can be implemented. Because of its complexity, technology can also be perceived as being outside of their regular practice, better off left to the experts. Nonprofits may see conflicts between addressing their civic goals, such as serving clients, and technology goals, such as spending the time and money to address IT concerns. They may fail to realize how technology is strongly tied to their mission [20].

In our research, we are trying to find ways to encourage nonprofit community organizations to make technology planning a more explicit part of their practice. We work with nonprofit organizations to identify the management practices necessary to enact their technology vision, identify and address potential bottlenecks, and address organizational change and learning.

3. METHODOLOGICAL OVERVIEW

Civic Nexus is a three-year participatory design project with the goal of working with nonprofit community organizations to develop their capacity to implement technology projects and to develop strategies to manage technical expertise in their organization [20, 21]. Our project builds on previous work that blends ethnographic methods with long-term participatory design to develop information systems that address local needs [9]. We begin with ethnographic fieldwork to understand how technology is used in a nonprofit organization and how it fits with their values and work practices. We then select a project that we will work together with them on over the course of a year. Our goal is for the participants in the nonprofit organization to take control of the project in terms of directing what should be done, managing the resulting technology infrastructure, and incorporating the learning that is produced as knowledge management practices within their organization.

In our work with nonprofit organizations, we are influenced by cooperative approaches to participatory design that seek to break down barriers between users and designers, and that make inquiry into the nature of the collaboration a part of the work process [5, 17, 28]. This approach has ties to Scandinavian studies in which organizational change is driven by workers rather than management [5] and studies that encourage active user engagement in the design process [15, 26]. These approaches emphasize the importance of articulation work to notice and address some of the boundary shifting inherent to the process [29]. Beyond noticing boundaries, cooperative approaches also emphasize the need for systematic ways of bridging these differences and to scaffold participation and collaboration [6].

In this section, we unpack some of the commitments that underlie our methodological approach. These commitments include: (a) understanding the context of use for community organizations, (b) scaffolding problem solving, and (c) encouraging long-term changes in technology management practices.

3.1 Understanding community context and leveraging community resources

Nonprofits do not operate in isolation; the nature of their work is fundamentally social [10, 27]. They need to be adept at managing the social and technical resources within their organization. Leaders in nonprofits often have an important role in maintaining and developing human resources in areas such as recruiting board members, seeking funding opportunities, forming partnerships with other organizations, and communicating their organization's mission to stakeholders [16]. On an operational level, this often takes the form of recruiting people to a board of directors who devote their time and expertise to advancing organizational goals drawing on their expertise to set policy, provide financial oversight, and develop specific areas of an organization such as creating a publicity or fund-raising plan [4].

It is especially important for community organizations to recruit a stable network of technical expertise into their organizations [10, 12]. Volunteers can provide a great service to nonprofits by using their technical expertise to carry out technology projects such as developing or maintaining an organizational website. At the same time, the use of volunteers must be carefully managed. Volunteers may not have the required skill set to carry out a technical project or may be more interested in working on the social mission of the organization. Another danger is that a volunteer may design a system that is idiosyncratic, matching his or her own skill set rather than selecting a technical solution that may be best suited for an organization in the long run [4]. A typical scenario for nonprofit organizations is that a volunteer will come into the organization, do a technology project, and leave. As a result, organizations can be left with a system that is difficult to manage, change, or repair when breakdowns occur.

Understanding the context of use is especially relevant to our project because we work collaboratively with community organizations to define the scope of our project. Instead of merely observing community organizations' activities, we dedicate our major effort in working with the organization together to identify the various types of expertise that exists in the organization and how it can be leveraged to achieve the organization's goals. Understanding context also requires a thorough understanding of the factors that influence technology use and planning. Such factors include the role of the board in setting policy, the way that

technology is used to achieve an organization's mission, and the way that technology is embedded within people's work practice.

3.2 Scaffolding problem solving

In our collaboration with nonprofit organizations, we encourage user control over the design process and technology learning by working on projects that are tied to real world activities and concerns in the organization. We define technology broadly to include technological products (e.g., website), strategies to manage and sustain technology use (e.g. organizational documentation for volunteers), interactive processes that contribute to design (e.g. use of scenarios), and changes in practice that supports technology adoption (e.g. ways of better using volunteers or governing boards). The work on these projects involves goal-setting and assessing the scope of the project, the resources needed, and the results of our collaboration.

In our collaboration with nonprofit organizations, we want to find ways of doing participatory design in which designers contribute to projects that are directed and controlled by end users [8]. Our goal is not to be content by situating community organizations as mere end users. Nonprofit organizations can do more than providing design insights and technological requirements. They can take an active role by learning about information technology itself and by leveraging that knowledge to sustain their organizational goals. In terms of promoting sustainability, we must see nonprofit organizations as owners of technology projects. Nonprofit organizations share their projects with designers.

In working with the nonprofit organizations, we try to resist solving problems or taking over the process of work on a technology project, and instead, rely on minimalist strategies to promote learning [24]. It is tempting to jump in and solve problems for nonprofit organizations but this strategy does not help an organization develop the long-term capacity to address technology concerns. Instead, we try to use techniques that encourage nonprofit organizations to reflect on problems that they encounter and suggest tools to help them make and enact their technology decisions. Some of these techniques include discussing tradeoffs for various technology solutions, pointing organizations to relevant documentation when they encounter problems, and encouraging organizations to leverage expertise in their organization (or to develop new areas of expertise) to address technology needs.

Researchers with the goal of connecting design to learning have considered a number of roles to achieve this goal. Trigg and Bodker [31] describe the "handyman's role" that they played in helping users with technical problems that they encounter in their work. They also describe the role of a "sparring partner" in which a member of the research team talked with a local developer about possibilities and constraints for technical innovation. Mogensen and Shapiro [22] describe how they took on a variety of roles in their work including expert, facilitator, and goad. In our own work, we have explored new roles in working with nonprofit community organizations, roles that we have characterized informally as lurkers, facilitators, consultants, and bards. The role that we have articulated the most is that of a bard [8]. A bard is someone who stands outside of the organization who celebrates a organization's accomplishments, encourages reflection on their current practices, and provokes a organization to consider how potential technology changes might fit with their existing values and goals.

These roles emphasize the less directive stance that we wish to take in the project and emphasize the organization's control over the design process. This requires a great deal of articulation work because it goes against more traditional roles for designers and the typical ways that nonprofit organizations incorporate outsiders, especially those with technical expertise. In our work, the nonprofit organizations define the technology projects and control the work activity. In such cases, where technology is being pushed back to us, we continuously strive to emphasize the need for nonprofit organizations to make decisions and to direct the design process themselves.

3.3 Encouraging long-term shifts in technology management practices

Our participatory design approach is driven by our core agenda of encouraging sustainability in nonprofit organizations as a process and as an end result. We are interested in finding ways to encourage our community partners to incorporate long-term strategies in their work that give them greater control over technology use in their organization. In a broad sense, this means working with the organizations to help them envision how technology can be used to achieve their mission. In a more concrete sense, this requires working with organizations to develop the expertise in their organization to make these visions a reality. This includes skills such as an organization's ability to assess their technology infrastructure, scope out a project, recruit technical resources and expertise into their organization, learn problem solving strategies when they experience breakdowns, and understand some of the long-term costs of technology projects. In the long term, organizations also need to develop strategies to manage volunteers and technical knowledge within their organization.

Based on the realities of nonprofit life, a number of strategies have been suggested to effectively carry out participatory design projects in the nonprofit sector. Kyng [18] suggested: (a) sharing stories and conducting work place visits to demonstrate how technology might be used in an organization, (b) finding models for local work, (c) using future workshops to help people envision and plan for potential changes in work practice, and (d) using mock-ups that make design decisions more concrete. These strategies are exemplified by a number of studies within computer supported cooperative work (CSCW) that describe technology projects with nonprofits. Trigg [30], for example, created a database that served as an in-house "sandbox" to try out design ideas for a nonprofit. Robertson [23] served in an advisory capacity helping an organization think through some of the "shopping" decisions involved in choosing a new technical system. Mogensen and Shapiro [22] worked with organizations to expand their technology thinking by presenting alternatives to solve problems that organizational members encountered in their everyday work. McPhail et al. [19] used a future's workshop and demos to elicit user participation.

In our research, we seek to blur the line between end user and designer by finding ways of encouraging the development of design and technology planning/management expertise into the work practices of nonprofit organizations. In working with nonprofit organizations over a year, we hope that the organizations gain practical skills and knowledge that can be used to manage future technology projects. Our vision of sustainability is closely aligned with cooperative design methods in which the

goal is to facilitate a process by which people can actively promote their own interests and are better able to use their competencies to address future use situations [5].

In terms of our own agenda, we are interested in abstracting the lessons learned through our work so that designers can find more effective ways of working with nonprofit organizations and so that other community organizations can benefit from the lessons learned. In the next section, we describe the data collection methods that helped us to abstract these lessons.

4. DATA COLLECTION

For the past three years, we have conducted fieldwork to understand the overall mission of our community partners, their activities in the community, and the role of technology in their organization. In the data collection process, we take on both active roles such as facilitators and consultants and more passive roles such as meeting observers and email lurkers. We conduct both semi-structured and open-ended interviews covering a broad range of topics related to the technology issues in the organizations. This included issues such as their current technology infrastructure, technology success stories and challenges, existing technology strategies in the organization, and the way technology both supports their mission and is embedded in their work. We focused on interviewing the primary stakeholders in the nonprofit organizations, as they are usually the only non-volunteer members who have more comprehensive knowledge about the organization.

Relying on the primary stakeholders' perception alone is not sufficient to understand the complex context of a community organization. We collected data through participant observation as well as sitting in board meetings, attending community events, and participating in technology meetings. In working with a school organization, we also produced a questionnaire that was administered to students to capture their learning experience during the project.

We also collected secondary sources of data, such as work documents (e.g. community brochure or newsletter, meeting agendas, and meeting minutes), archival records (e.g. video of an organization's presentation, emails and websites), and physical artifacts (e.g. design mock-ups and scenarios).

The analysis of the data collected was performed using the general analytic strategy of developing a case description [32]. Although the objective of the study was not a descriptive one, a descriptive approach was followed to help identify the complex stages of our participatory design approach. Our perspective on participatory design guided our analysis of the data, reflecting important socio-technical elements of designing and managing technology. However, the data were also used to inform the participatory design approach itself, in that the design approach emerged as an iterative process taking place throughout the data collection and analysis phases.

4.1 Selection criteria for organizations

Over the three years of the Civic Nexus project, we worked with three to four nonprofit community partners each year. Our goal was to work intensively with a set of community partners for one year and then to maintain the contact but to work with them less intensively in subsequent years (a process we call *fading*). One of the advantages to this approach is that we are able to observe the

organizations' learning and their ability to maintain the achievements produced over the course of our work together.

In recruiting organizations for the study, our criteria included: (a) a desire to find organizations that were working on social and communitarian goals tied to our geographic region (Centre Country, PA, USA). (b) We were looking for some evidence that the organizations were engaged with technology in their organization. The heuristic that we used to assess engagement was whether or not an organization had an existing web presence. (c) We wanted to find organizations with a desire to work in a cooperative way on a technology project. (d) We wanted to work with organizations that had control over technology decisions in their organization. For example, if we worked with a subsidiary of a large nation-wide nonprofit, then this organization may have less discretion over technology decisions. (e) We did not want to work with government organizations whose funding structure would be very different from other nonprofits organizations. (f) We wanted to include organizations that differed from each other in terms of interest and that represented typical organizations that might be found in most community settings.

Once we identified potential organizations, we held a workshop to provide more details about the project and to learn more about the organizations. Thereafter, we contacted the organizations that expressed an interest in working with us and had a technology project in mind (even if it was only roughly conceived).

4.2 Establishing trustworthiness

Rigor is a challenge for any qualitative study [11]. In our work, we use multiple sources of data collection as a form of data triangulation to help ensure the trustworthiness of our results. Field researchers also meet biweekly with the rest of the research team to report on field observation, research issues, and data collection efforts. The research team reflects on the collected data for a better understanding of the process and to address individual researcher subjective bias. Member checking is used to account for potential biases in interpreting our data. We typically ask our community partners to read our research reports to get feedback on and alternate readings of our interpretations.

5. PROMOTING SUSTAINABLE TECHNOLOGY PRACTICES

Under the Civic Nexus project, we have worked with eleven distinct nonprofit community organizations. In this section, we describe our work with three such nonprofit community organizations to illustrate the methodological commitments highlighted in Section 3. We use these three cases to characterize and exemplify our participatory design methodology.

5.1 Food Bank: Identifying community assets

The State College Food Bank (Food Bank) is a nonprofit organization that provides emergency food and clothing to those in need within State College. They also provide support to other food pantries within the county. The organization has two paid staff members and a steady base of volunteers that serve the organization. They have a board of directors that is active in providing oversight for the organization. Our work with this organization highlights the importance of working with an organization to assess their current technology capacity and the way that nonprofits can identify and draw upon social resources in their organization to complete technology projects.

One major concern for the Food Bank when we began to work with them was shortcomings in their technology infrastructure. The staff members wanted to be able to access the Internet at the office and they wanted more control over their organizational website. The organization did not have Internet access so staff members had to do work at home that required email or web access. The management of web resources, including their web site, was another major concern. They had relied on a volunteer to update their website. This strategy worked well until the volunteer left the organization. As a result, they needed to find a new way of getting their web page updated regularly. They also needed to find a different web host for their web site because their Internet Service Provider (ISP) did not offer email accounts as part of their service package. As a result, staff members were using their personal email accounts to conduct organizational business.

One strategy we used to identify and analyze Food Bank's technology infrastructure was to collaboratively develop a community technology assessment report. This report documented potential technology projects as well as their current practices of using technology and how they operate on a daily basis. We developed this report by shadowing key members of the organization, asking questions about their infrastructure, attending board meetings, and observing how technology was used on a day-to-day basis by staff members.

As we developed the technology assessment report, we noticed that the Food Bank was relying on volunteer effort in the form of their board to address their technology infrastructure issues. A member of the board recommended that they utilize the services of a technology consultant who was a personal acquaintance to evaluate the organization's current technology capacity and to make recommendations for technology upgrades. This example illustrates the importance of a nonprofit's board both in terms of recruiting expertise into the organization and their ability to set policy for the organization. In this case, having a board member that was actively engaged in the technology issue was critical in recruiting the technology consultant and in pushing forward the technology agenda for the organization.

Our focus toward a more ethnographic style of work during the early stages of working with organizations, as opposed to directly jumping into a technology project, allowed us to explore organizational practices in more depth. For example, we noted the articulation work that must be done both with people inside and outside the organization to carry out technology projects. The Food Bank needed to be able to describe their technology needs to an outside consultant. The staff at the Food Bank also needed to find ways of making sure that the board was aware of the technology problems that they were having and to find ways to engage them in working on this task. Articulation work goes beyond coordination of people—it involves achieving common ground between multiple participants (committee, board, etc) and focused deliberation.

Finally, the technology assessment report facilitated the identification of a technology project. We used the report as a means to provoke inquiry with the Food Bank. We asked them to give us feedback on the report, revise content, and to help us better understand the role of technology in the organization. This was the first step towards developing a technology plan because we asked the Food Bank to prioritize the various potential technology projects that we could work together during that year. We worked with the organization to scope out a potential project and to reflect on the process involved and resources required.

One of the major issues that the Food Bank experienced, emerging from the technology assessment report, was how to keep their website up-to-date. The technology assessment helped them identify areas of expertise they needed to keep their website running. It also helped them identify the resources that they currently possessed and the need for recruiting technically skilled volunteers.

5.2 SCWC: Scaffolding problem solving via scenarios and artifact co-construction

The Spring Creek Watershed Community (SCWC) is a community organization in Centre County, Pennsylvania that works to show how regional environmental and economic planning by watershed is more effective than planning by municipality. Through outreach activities such as their website and newsletters, SCWC hopes to shape public policy by informing decisions makers and stakeholders about local watershed issues. For about 18 months, we have worked with the organization on revamping their existing website. The work on this redesign project has lead to shifts in the organization's existing practices for managing technology decisions and learning in their organization. Our work with this organization highlights the role a researcher can play to scaffold problem solving and technology learning in an organization.

Before our involvement with the organization, SCWC hired a third party commercial vendor to design their website. They were unhappy with the final product that was produced because they felt that the website did not accurately reflect their organizational mission. While the goal of SCWC was to show the importance of watersheds to the local community, SCWC perceived that the website depicted them as a generic "tree hugger" environmental organization with an interest in watersheds. As a result of their dissatisfaction with this experience, SCWC made a decision to redesign the website and to direct the design process themselves.

The first step of this process involved gaining control over their web content that was in the hands of the third-party vendor. It was at this point that researchers in the Civic Nexus project started to work with this organization. The lead coordinator of SCWC decided to write an email to the vendor requesting release of their website. This coordinator utilized the expertise in the organization to draft this email including the help of a technical volunteer and researchers in the Civic Nexus project. Eventually, the organization was able to retrieve their website content after some provocative email exchanges with the vendor.

The second step of this process involved the actual redesign of the website. SCWC created a website committee made up of technically proficient volunteers that were charged with revamping the web site. One of the major topics of conversation in these meetings was how to organize the main page of the website so that it reflected the local nature of the organization's interest in watersheds. The organization created several different organizational patterns for the site and had explicit discussions about what it meant to design a website and about the tradeoffs involved in the various patterns they considered.

In working with the organizations, our strategies involved finding ways to help the organizations make better-informed technology decisions. From day one, we deemphasized our role as technology solution providers. We explicitly wanted to avoid being seen as the creators of their new website or directors of the design process. In this negotiation process, we spoke about our role with

caution, always qualifying our involvement as facilitators rather than as design experts who would direct the process. At first, we took more of an observational role in the meetings as we learned more about the issues that were important to the organization. As the design process continued, we took on a slightly more active role suggesting some design techniques that they could use to address concerns raised in the meeting.

One specific example of a technique that we used was introducing the concept of scenario-based design as a way to resolve design conflicts such as the layout of the website front page [13]. In applying this to web design, the goal of the technique is to create a story that describes why a user might visit a website, the information that this hypothetical user is looking for, and how he/she might interact with the website. This proved to be an evocative technique because it provided scaffolding to help the organization to think more about who might be using the site and provided less technical members of the organization with a way to talk about factors important in the design process. Through this technique, the organization identified an audience for their website that they had not previously considered. The lead coordinator of the organization, who was less technically proficient than some of the volunteers, developed a scenario to demonstrate his/her stake in the design process and to articulate his/her vision about how the organization should be represented on the front page. We found that scenarios were a facilitating technique that encouraged technology learning and control over the design process. Scenarios are not only evocative but they also relate to typical, everyday uses of technology.

SCWC experienced a conflict that opened up the possibility for shifts in roles, responsibilities, and practices in their organization. Before the incident with the vendor, there was hardly any practice within the organization to capture their intangible and tacit knowledge. After the incident, SCWC significantly changed its practice by focusing on knowledge management and attributing value to the self-management of technology. Through their experience of working on this project, they learned about some of the dangers involved in relying on outsiders to manage their technology infrastructure. They decided they should maintain control of the organization's technology while being minimally technically proficient in using this technology and proactive in directing the process.

5.3 CCHS: Organizational readiness and achieving long-term technology change

A third organization that we worked with was the Centre County Historical Society (CCHS). This organization demonstrates some of the challenges involved in working with an organization to change their existing practices. Our work with this organization also raises the importance of an organization's readiness to address technology change and the way that a commitment to an organization's existing practices can inhibit change.

Founded in 1904, the Centre County Historical Society (CCHS) works to collect and preserve materials related to local history. CCHS also works to educate local residents about local history through activities such as publishing and promoting interest in historically significant publications, hosting tours of the museum, and producing educational materials for teachers. The organization has a website that reflects their mission and a newsletter to keep the public updated on the organization's activities.

Our early meetings involved discussion of potential projects that we might work on together. To facilitate the process, CCHS introduced a list of possible areas of collaboration that included projects such as putting exhibits online, developing the educational portion of their website, and using interactive maps in local history education. Our assumption entering this research setting was that CCHS would choose a project to work on and we would take a consultant role as they directed and organized the project. Their assumption was that we would select a project from the list that they provided and we would begin implementing the project. To some extent, this difference in assumptions about our roles in the project was expected. We found in working with other organizations that it often took time to communicate the less directive role that we wanted to play. After several months of weekly meetings, CCHS decided that they wanted to work on developing the educational section of their website. As we began discussing the "doing" of this project, they changed their minds, switching the potential focus of the project several times.

As we worked more with the organization, we realized that there was a deeper mismatch between their normal practice for getting technology projects done and our vision of playing a less directive role in the process. Like many nonprofit organizations, CCHS has limited resources so they often rely on volunteers or contractors to take on technology projects. Typically, an individual or organization with an interest in technology (and often an interest in history) will approach the organization offering to do a project for them such as adding a new exhibit to their website. In these cases, the staff members of CCHS typically act as domain experts providing information about local history and they have limited involvement in carrying out a design project. Technology projects become a module that is handed over from one independent contractor or volunteer to another.

The mismatch in perspectives led us to try to find new strategies for working with the organizations to promote learning that fit more with their existing structure for managing technology projects. Later in the project, we started working with a technical volunteer, a local high school student, who contacted the CCHS because he wanted to work on a community-oriented technology project for school credit. This volunteer had basic web design skills but did not have a specific interest in local history or knowledge about how CCHS operates. As a result, he did not know what needed to be updated on the website or how his work fit within the larger context of the organization. As we worked with this volunteer, we learned more about the issues that he saw with the website and articulated some of these ideas to staff members. We also provided some informal technical support working with him to understand and solve some technical problems that he encountered.

We continued to work with CCHS to identify a potential technology project and tried additional techniques to encourage reflection about the current state of technology in their organization. For example, we did an analysis of their current website's usage statistics so CCHS could get a sense of who was using their site. We also demonstrated prototypes of various technologies that could be used to achieve some of the organization's goals. We worked with a staff member to create an online photo gallery that could be used to teach people about flowers that were abundant during the early 20th century. The goal was to create a photo gallery that a volunteer could use to add content to the system. This project was eventually abandoned because the volunteer who was responsible for adding content and

photos to the photo gallery did not know HTML (Hypertext Markup Language) so he/she could not use the system.

Our experience with CCHS highlights the difficulties involved in changing established practices and the importance of considering an organization's readiness for such a change. In the case of CCHS, they were able to identify ways that technology could benefit their organization. Yet, there seemed to be conflicting perceptions about the changes that should be made, the readiness of people in the organization to handle changes, and the resources that could be devoted to such change. In terms of management issues, nonprofits need to make careful decisions about what innovations to bring into their organization, how those innovations should be implemented, and how innovation fits with their culture and value structure. They also must manage the conflicts, role changes, and resistance to change that inevitably will be produced.

6. LESSONS LEARNED

In the Civic Nexus project, we used an ethnographically-inspired participatory design approach to encourage long-term changes in technology practices and management in community organizations. We worked with nonprofit organizations intensively for a one-year period on a technology project of their choosing. We took a more peripheral role in the design process, acting as consultants while the nonprofit organizations control and direct the work process. We encouraged the organizations to reflect on their current uses of technology and ways that they might like to use technology in the future. We helped them assess their current socio-technical infrastructure and helped them plan for changes to make their future visions a reality. Designers need not just provide technological solutions, but can empower community organizations in their day-to-day decision making processes and practices by inducing knowledge about information technology.

In our work, we utilized a number of strategies in working with nonprofit organizations. To a large extent, the strategies that we used in working with these organizations are standard for any participatory design project. What made our work different is the end result that we were trying to produce. We were not using the techniques to solicit better or more accurate design requirements so that we could build a better system. Rather, we introduced techniques that the nonprofit organizations could use themselves to gain control over technology in their organization. Some of these techniques included scenarios, requirements analysis, and lightweight prototypes. We encouraged the organization to think about their priorities and work practices to find technical solutions that would meet their needs. Finally, we tried to help the organizations "learn how to learn" about technology as they encountered problems in carrying out technology projects by pointing them to relevant documentation and resources.

We also developed new strategies that we believe might have more widespread use in participatory design. In working with the Food Bank, we introduced the use of a community technology assessment and the development of a technology plan to facilitate our collaboration. We co-constructed an online document over a period of a few weeks, identified possible projects that would be of interest to the community organizations, and finally the organization prioritized these projects according to their immediate needs. The result of this process was a technology assessment report, which not only captured the project to be done but also how contextual factors, like board decisions and availability of volunteers, could affect the implementation of the various technology projects. Having an outcome, such as a technology assessment report, also stimulated the community organizations to participate in helping us understand how they operate. Producing this document helped the organization reflect on their current technology infrastructure and to articulate their technology goals and priorities.

In this section, we reflect further on the methodological lessons learned as a result of our work on the Civic Nexus project. These lessons reflect some of the tensions involved in trying to invoke changes in technology practices within community organizations. These lessons are applicable to those interested in carrying out community-oriented technology projects.

6.1 What is learning; what is success?

One of the issues that all researchers in participatory design projects need to address is how to define and measure "success" when working together on a technology project. In our project, because we were concerned with sustainability, success was closely aligned with assessments of learning and evidence that the organizations took "control" over the management process of working on a technology project. We were specifically looking to avoid situations in which we either overtly directed a technology project (e.g., redesigning a website) or provided a technical solution to an organization that they could not maintain after the project was completed. We found that our understanding of these terms changed and broadened as we worked more with our community partners.

Our early notions of learning were tied to more conventional skill-based views of literacy. Learning would take place if we saw evidence that community members developed new skills or refined older skills such as the ability to code a webpage or design a web form. We were looking for a more traditional learning progression where a person might, for example, move from basic to more advanced HTML skills. We quickly realized that this did not capture all of the kinds of learning that we were observing with the nonprofit organizations. For example, a member of a nonprofit organization might not learn a specific skill but they may learn the meaning of technical terms and have a greater appreciation for how a technology might be used in their organization. We had to question what it meant for the organizations to be on a learning progression. Nonprofit organizations are not going through a standard curriculum, rather they are learning in the context of doing activities central to their work and mission. We also noticed that many of the organizations managed others, especially volunteers, to get technology projects done. We started to note that the ability to strategize about technology decisions was also a form of learning.

The experience with our community partners made us aware that we needed to be more systematic in our understanding of how people were learning about technology and what they were learning. It may not be appropriate for everyone in an organization to learn concrete technology skills like coding a web page. For example, a leader may need to learn to better budget for long-term computer maintenance expenses, the type of expertise required to carry out a project, and a sense of the long-term costs involved in implementing a technology project. Volunteers or staff members may need to learn discrete skills, to articulate their needs, and to better document their work. At the organizational level, a technology committee may learn about the current state of the technology infrastructure in the organization and the

organization's technology needs. Learning might involve understanding how technology supports the mission of the organization and making sure that technology is used in such a way that it supports the value structure of the organization.

Our definition of technology and technical change also broadened, and we learned to think more about the costs involved in learning new technology skills. We started out with the idea that we would work with organizations to develop their websites. As we worked with the organizations more, we learned about the range of technologies that they used (websites, newsletters, databases, forms, etc) and how these technologies were connected to their work practice. We also started to define technology more broadly to include procedures, plans, committee decision-making, and ad hoc problem solving strategies. We also had to acknowledge cases where technology made people's jobs more difficult or did not match their practice. This emphasizes the value of our approach in combining ethnography with participatory design.

6.2 How context affects evaluation of organizational outcomes

By virtue of our project goals, our ethnographically-inspired participatory design process is complex because we are not just collaboratively designing technology but simultaneously trying to understand the socio-technical dynamics and subtleties that exist in community organizations. Our work consists of "doing" design and "understanding" the underlying fabric of community organizations, how they make decisions, why they choose a particular technology over another, and so forth.

Nonprofit organizations are driven by both internal external factors that influence IT use and adoption. For example, social capital (both weak and strong ties) is an opportunistic resource for community organizations in managing both short- and long-term goals. Nonprofit organizations, by virtue of resource limitations, must be adept at leveraging and developing their social network to develop technical expertise in their organization. This includes finding technically competent volunteers, soliciting advice from friends or family members on technology-related issues, leveraging professional contacts to raise funds, and so on.

In our first year, we underestimated the impact of community context (people, technology, practices, values) on technology use and adoption. It is not the case that we were unaware of how technology use is embedded within the larger socio-technical system of the organization. Being new to this research space, we did not have the experience to know, for example, how big a role a board or leadership style can play in an organization. Because we were trying to facilitate the organization's work on a technology project rather than doing the design ourselves, we also felt a tension between getting involved immediately in a design project and learning more about the factors that impact technology use in community settings. The two are inseparable but it took us time and experience working with organizations to identify these factors.

Our experience from year 1 re-oriented our approach in year 2. Before diving into technology projects, we spent a considerable amount of time, on the order of three to four months, to understand how nonprofit organizations operate. This involved, for example, shadowing key stakeholders in the community organizations during their daily activities. We also attended many public meetings, such as those of boards and committees, which we perceived as possibly useful to guide participatory design.

Another major change from year 1 to year 2 was our action to do early goal-setting with the community organizations. In addition to an ethnographic style of work to understand context, another and perhaps a more productive way is to involve community organizations in meaningful activities that have a bearing on their goals. Because we were interested in doing a technology project, we collaboratively worked with community organizations to define and plan goals for achieving this.

Understanding how context affects organizational outcomes in nonprofits is critical. This is a valuable lesson for the CSCW community because it often happens that technologists or designers have a narrow view of technology, and do not fully appreciate the socio-technical gap [1]. We believe that the socio-technical gap—the gap between social requirements and what we can support technically—is by default a larger one in nonprofit community organizations versus for-profit, workplace environments because the underlying organizational structure is often invisible in the former. Thus, designers should make an extra effort to understand and appreciate the social culture of nonprofit community organizations in order to design more usable and effective systems.

6.3 Community organizations need to be engaged at different levels

Another issue we faced in the Civic Nexus project was how to engage a community organization in the research process and what it means to work with a nonprofit organization. In our project, we worked with nonprofit organizations to understand the existing socio-technical landscape of these organizations. We then used this knowledge to engage an organization to select a technology project that we would work on collaboratively. This raises the question of what it means to work with a nonprofit community organization that is made up of a number of different constituencies that may or may not support IT adoption in an organization. Methodologically, we needed to make decisions about whom to talk with in trying to understand how technology is enacted throughout an organization and more broadly how to engage the organization in a process of change.

Early in the project, we worked to identify key staff members, often a person in a leadership role, to learn more about the organization and to identify a technology project. This was a reasonable strategy because we were studying small nonprofits with relatively flat management structures and very few paid staff members. We assumed that these staff members would primarily be responsible for technology decisions and implementation in the organization. As we worked with the nonprofit organizations more, we gained a greater appreciation for the way that organizational structure influences IT adoption. This included further understanding some of the key internal players that impacted technology decisions such as volunteers, board members, stakeholders, leaders, staff members, and the community-at-large. We learned in year 2 how to use the connection with key staff members to engage the rest of the organization into our research. For example, we used our connection with a nonprofit leader to gain entry into a board meeting or to gain access to others in the organization who influenced IT decisions.

Given our new understanding of all the constituents that make up community organizations, we had to make decisions about where the bounds of a nonprofit organization ended. As the project progressed, we began to broaden the scope of our data collection

effort to include observations of activities such as board meetings, the work of volunteers and interns in the organization, and activities in which nonprofit organizations used the technology themselves. This was useful because we understood in a broader way how technology was enacted in the organization. At the same time, we had to make decisions about whether or not it was relevant to interview potential users of an organization's website to see how they might be impacted by a technical change.

Tied to the broader understanding of the stakeholders involved in community organizations, we also had to be clearer in defining at which level change was happening in nonprofit organizations (individual, organization, inter-organizational, geographic community). This led us to consider how technology learning was achieved by individuals and how more broadly technology learning took place in the organization. From this perspective, a researcher can tease out an individual's technological literacy and the way that expertise is distributed throughout an organization.

6.4 Fading is a successful technique to manage a long-term participatory project

In the Civic Nexus project, we use the concept of *fading* to refer to the process of disengaging with our community partners. We work intensively with a nonprofit organization for one year on a technology project and then occupy a more distant position checking on their progress and providing minimal technical support during the rest of the project period. We used several strategies to fade. Email is a major contact method in our collaboration with the community members, which makes it less obtrusive when we send emails asking for updates after we disengage. Most of the nonprofit organizations also have us on their mailing list, which allows us to behave as a lurker observing their progress without interrupting the dynamics of their work process. Because many of our technology projects involved website development and maintenance, checking for updates to their websites also helps us monitor the progression of their work. We also use this information to provoke discussions with community members, noting changes and asking the community members to reflect on changes in their work practices, socio-technical infrastructure, roles, and learning.

The strategy of fading is important because it can take time for a nonprofit organization to work through the process of making a technology decision and implementing a technology plan. Taking on a technology project in a nonprofit organization means more than just coding a web page. It involves reflecting on organizational values, presenting the project to a governing board for approval, garnering grant money to pay for the project, recruiting resources such as volunteers to do the coding, developing committees to provide feedback about the site, and developing long-term resources to maintain the site. These processes often stretch beyond the one-year time frame in which we work more intensively with the nonprofit organizations.

It can also take time to evaluate the long-term effects of a technology project on an organization. Technologies create affordances that can have intended and unintended consequences that may extend beyond the course of the project. For example, if a nonprofit community organization decided to introduce a technology committee to take on the work of a technology project, this may require more coordination work and management overhead than they might have experienced when contracting with a technical consultant. This is also true in the sense that it may take time for community members to learn new skills, for work

practices to change, and to see the long-term impacts of all of these shifts.

Disengaging from nonprofit organizations is not an easy process. In doing participatory design in community computing contexts, we hold dual roles as researchers and as citizens in a geographic region. After a one-year commitment working with the organization, we have established a relationship with the organizational members that goes beyond a more typical customer and designer's relationship. Through our work together, we gain a greater understanding of the real contributions that the organizations make to the community and an appreciation for their successes and struggles to use technology to support their mission. It is hard for us to "just disappear" after being involved, even at the periphery, in their community activities as researchers, as neighbors, and as citizens concerned about the community.

7. CONCLUSION

Managing IT in nonprofit community organizations is a challenge, given their varying resources and needs along with ill-structured IT management practices. In this paper, we have highlighted our methodology of an ethnographically-inspired participatory design approach to work with nonprofit organizations in order for them to enhance their IT management skills, including technology adoption, technology use, and technology learning. We have shown that nonprofit organizations are able to and can indeed sustain their IT management practices through various methodological techniques. These techniques—such as scenario development, technology inventory assessment, and volunteer management practices—emphasize the importance of long-term critical planning and design skills. Our methodological approach illustrated by three case examples would be of interest to community stakeholders, researchers, practitioners, and designers alike to understand the challenges of managing IT in context of nonprofit organizations. Our research can further their understanding of how to work with nonprofits to address these challenges and the potential consequences of such work not just for the organization itself but also for the larger community.

8. ACKNOWLEDGEMENTS

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