

The Promise and Perils of a Participatory Approach to Developing an Open Source Community Learning Network

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ABSTRACT

This paper describes and analyses the early developmental stages of a community learning network based in an urban community and social service agency. With government funding, the community organization contracted with a small software firm to design and implement participatively a web-based 'community portal' using open source software and techniques. While adopting these progressive development ideals has brought notable benefits, they have also posed significant challenges for the parties involved. In particular, mis-matched expectations, budget squeezes, and slipped schedules have been attributed to the approach being too participatory and too open. We examine these claims and offer insights into community-oriented, participatory, open source development projects.

GENERAL TERMS

Performance, Design, Economics, Experimentation, Human Factors, Theory.

KEYWORDS

Community Informatics; Community Learning Networks, Participatory Design; Social Services; Open Source

1. INTRODUCTION

This paper describes a history of the participatory process of designing a Community Learning Network (CLN). CLNs are a government-funded program designed to ameliorate digital divides by "preparing citizens for learning and working in the digital era."¹

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Proceedings Participatory Design Conference 2004, Toronto, Canada.
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¹ See: http://olt-bta.hrdc-drhc.gc.ca/ourprogram/cln_e.html

The authors of this paper represent three distinct yet interwoven perspectives that are involved in the construction of a CLN, as well as in community networking more broadly. The CLN itself is being designed for St. Christopher House (SCH) led by Terada. The actual software development and programming is being done by The Working Group (TWG: Bortolussi, Booth, Brooks, and Christ). Rounding out the triptych are researchers from the University of Toronto (Clement, Luke). This document reflects a retrospective and somewhat opportunistic analysis of the process to date. It is opportunistic in the sense that the researchers (Clement and Luke) were on the scene working with SCH and TWG on the CLN project, but more as observers of rather than contributors to the CLN project.² There was at the time of the paper's inception a breakdown in communication between SCH and TWG, and the discussions about the nature of participation that ensued were amenable to the timing of the upcoming PDC 2004. The conference opened an opportunity to engage with everyone concerned and to reflect on the participatory process that had been a staple of the CLN design method.

The research agenda of Clement and Luke concerns investigating the conditions and consequences of the community organizations that provide public access facilities and help people use networking resources for local economic, civic and domestic purposes. Clement and Luke are interested in Participatory Design (PD) and bridging between academic institutions involved in studying policy for public access and information and communication technology (ICT) use and organizations that are directly involved in the practical, day-to-day implementation of these issues. We see PD playing an important role in facilitating the vital mutual learning among all parties engaged in the research and development of community networking initiatives. This paper is an example of this sort of mutual learning.

² The express purpose of the researcher involvement was to assist in the development of an evaluation framework for Community Learning Networks.

Participatory processes fit the social service sector well. Social service provision benefits from overt and strong community-based participation because of the social nature of the services and because the agencies are generally not resource-rich. Chronic underfunding of social services leads to involvement by people committed to ideals of social inclusion, social justice, and meaningful engagement of the general population. Participation within program development and delivery is a crucial way to mobilize volunteer forces around common causes, and to generate consensus among disparate groups bound by common social goals.

The development of the CLN web portal as described in this paper was undertaken using open source programming as a method of software engineering. Open source was seen by SCH as a viable model for development because it fit the model of community-driven design and development and the public service nature of community social service in general. However, the ideals of participation and open source have contrasted with the realities of designing a CLN amidst conflicting views of participation, budgetary constraints, and expectations surrounding the design and development of new technologies that seek to engage community members and program staff in new forms of work and lifelong learning. There has been shared idealism but some disappointment with the results to date. This paper is a discussion of the events leading up to the initial release of the Alpha version of the CLN software, and, as an example of participatory action research, forms part of the reflective practice of the design process itself.

As we will show, the participatory intent of the CLN project was not informed directly by Participatory Design (PD) research and practice. While the University researchers (most notably Clement) were familiar with the PD methodologies and literature, the others were not. This led to some difficulties (not the least of which presented themselves during the writing of this paper) in coming to a shared and common understanding of how to gauge the relative success or failure of the participative processes used in the CLN design. It is thus important to make a distinction between the participatory processes used in the design of the CLN, and PD itself as a grouping of methods to ensure participation within these sorts of design projects. The PD literature offers us a useful analytical tool with which to critically appraise the process of designing and developing the CLN at SCH, and it is useful and instructive to see where PD would have informed a more advantageous project development lifecycle.

The participatory process of the design and development of the CLN is here contrasted with the prominent precepts of Participatory Design as an approach to design. In many respects the differentiation between what is a participatory process and PD reflect issues addressed by Kensing and Bloomberg [13] that deal with aspects of user involvement and the mechanisms for obtaining this. In describing the CLN design process from a PD perspective, we present a history of collaboration and participation that illustrates some of the difficulties and tensions associated with practitioner/researcher collaborative projects. In so doing we present a model for engaging researchers and practitioners in constructive dialogue around collaborative, participatory processes. This discussion is particularly germane to the emergent community technology area that is increasingly using open source technologies and design parameters.

2. PARTICIPATORY DESIGN AND COMMUNITY INFORMATICS

The issues highlighted in this paper are relevant well beyond the immediate site - to a PD audience as well as Community Informatics. The emergence of a 'community technology' sector has seen more attention paid to developing ICT applications in the Non-Governmental Organization (NGO), civil society sector [8; 9]. The experiences of our team are of wider concern to those working in the NGO/ICT field, and those who are generally interested in the development of ICT-enabled applications for citizen engagement and participation.

With new opportunities to serve the public with new technologies, mirroring the application of new technologies in other areas of governance, education and economic development, social service agencies in Canada have seized upon government sponsorship and funding programs as a way to leverage development resources for their communities. But this is not without new pressures. Government funding regimes have presented their own problems, as we shall see, and the general ICT-saturated environment has created expectations among the public that is often at odds with what is possible within budgetary constraints. In addition, perceptions of just what constitutes "e-learning" often cloud policy formation and directives for its establishment on the one hand, and how it is operationalized as a consequence.

Key unresolved issues raised by the relatively novel configuration of ICT and community organizations include how the various parties come together and what expectations and preconceptions govern their relationship, and how these are played out within the scope of the CLN development. The particular challenges raised by the varying perspectives working on this CLN project lead to useful conclusions on aspects of a PD approach that are salient and some that are problematic. These lessons are especially valuable to the growing interest in Community Informatics and the use of open source programming as an enabler of community capacity development. We are led to question how the growing commitment to open source fits with community oriented PD development.

Participatory Design is an approach to the "assessment, design, and development of technological and organizational systems that places a premium on the active involvement of workplace practitioners (usually potential or current users of the system) in design and decision-making processes."³ PD practice and theory is still emerging and being applied to a widening range of settings so diverse there can be no single definition of PD. However, several key tenets are shared by most PD practitioners and advocates:

Respect the users of technology. View every participant in a PD project as an expert in what they do, as a stakeholder whose voice needs to be heard.

Recognize that workers are a prime source of innovation, that design ideas arise in collaboration with participants from diverse backgrounds, and that technology is but one option in addressing emergent problems.

View a "system" as more than a collection of software encased in hardware boxes, but rather as networks of people, practices, and technology embedded in particular organizational contexts.

³ See: <http://www.cpsr.org/program/workplace/PD.html>

Understand the organization and the relevant activities on its own terms, in its own settings.

Find concrete ways to improve the working lives of co-participants

Be conscious of one's own role in PD processes; try to be a "reflective practitioner."

With its roots in Scandinavian industrial democracy experiments of the 1970's, PD has tended to emphasize workplace applications rather than community oriented ones. However, there is growing recognition of the suitability of PD approaches in civil society, non-profit organizations [2; 18; 26]. This is especially the case for community organizations, such as St Christopher House, which can pay their staff only modestly and depend on volunteers for much of their effectiveness.

SCH strives to be a transparent organization - promoting openness, community involvement and focus. Many non-profit organizations are resource weak, and have to be opportunistic and take advantage of skills that they value and may not be in a position to pay for. Thus relying on volunteer effort means that these organizations are open to other peoples' contributions, which in turn is particularly amenable to participatory design processes. In this case, the volunteer sector functions as a community talent pool helping to build community capacity of the organization. SCH explicitly seeks to promote an open and inclusive development process in building its community service CLN portal.

3. COMMUNITY LEARNING NETWORKS (CLNS)

In the mid-1990s, with the rapid rise in prominence of the internet, many of the leading industrialized nations developed policies and funding programs to promote public access to the internet and ameliorate the emerging 'digital divides' that threatened to undermine social solidarity, impede the adoption of information and communication technologies (ICTs), and hamper the emergence of the 'new economy' [10; 11; 16].⁴ In Canada one of the more prominent of the federal government initiatives in this area is the Community Learning Networks (CLN) program. CLNs are usefully defined as "community-controlled structures and systems aimed at furthering community development and enhancing the lives of their constituencies by supporting and encouraging lifelong learning." Key CLN components include:

the use of ICTs as tools to support and enable learning and networking;

a strong community participation or community control at the local level; and

the promotion of individual and community development⁵.

Human Resource Development Canada launched its Community Learning Networks Initiative in late 1998 and since then has supported hundreds of pilot projects, in partnership with community organizations that can "offer multi-point access to a variety of learning resources within and across communities." Community Learning Networks aim beyond the relatively simple internet connectivity provided by the Community Access Program (CAP)⁶ to fulfill an important learning function. They are physical, social and electronic public spaces that foster community values and technological literacy as well as offering a supportive learning environment, especially for those without computer access at home, to develop new skills enabling active participation in a knowledge-based economy/society.

4. ST CHRISTOPHER HOUSE: THE CLN DEVELOPMENT SITE

St Christopher House is a non-profit community organization in Toronto. SCH offers various services to the community, including immigration, settlement, and learning programs, and family support for low-income people. SCH administration recognized the need to position their organization to take advantage of the growing availability of ICT, and the CLN project was seen as a key step towards realizing this goal. The administration realized that their community was rapidly growing and there was an emergent and expanding demand for digital services of all kinds. The funding made available under the CLN program was seen as a key step towards ensuring their community would not be subjects of digital divides.

The Project goals of the SCH CLN portal are to fashion "a meeting and virtual learning/teaching facility that will test and push the horizon of the Internet's capacity to provide relevant online content for a diverse client population with a multiplicity of needs."⁷ SCH is determined to use the CLN as a conduit for staff and program participants from the community to learn about using ICT, specifically the internet, for locating resources, communication and accessing SCH and other program or governmental services that may be available online. The CLN portal is intended to function as a community enabler – offering links to services offered online by SCH and other agencies relevant to the communities served by SCH, as well as linking community members and staff across the organization itself.

It is important to recognize that SCH is not a monolithic organization. It is made up of a diverse array of people, a complex collection of actors, each with their own distinctive yet at times overlapping roles and perspectives. SCH is unified in its desire to promote their services for the benefit for the wider community, yet there can be many competing and complementary voices that need to be accounted for in the development of programs such as the CLN. SCH adopts a participatory and consensus driven model of governance as a way to leverage their resources and to forge

⁴ In Canada this was pursued most visibly through the federal 'Connecting Canadians' agenda. With the goal of making Canada the most 'connected nation on earth' and led by Industry Canada, it consisted of the School Net, Community Access Program (CAP, Urban CAP), VolNet, and LibraryNet programs. More recent federal and provincial programs have pursued related goals (e.g. Community Learning Networks in the Office of Learning Technologies, HRDC) While these programs have complex and sometimes contradictory objectives, they all declare the aim of promoting economic development while bringing Canadians closer together in some fashion. Altogether several hundred million dollars have been spent in these programs in support of some 10,000 community ICT initiatives.

⁵ From: Survival to Sustainability workshop <http://www.ecommons.net/sustain/main.phtml?show=aboutus#Three>

⁶ See: <http://www.connect.gc.ca/en/240-e.htm>

⁷ SCH CLN application.

effective policies that accord with their overall mandate to serve their communities. The key internal stakeholder roles that are relevant to the CLN development narrative include the following from SCH:

Terada, project lead and interlocutor

Senior program staff/managers – four people largely responsible for setting the direction of SCH

Staff – program staff who will eventually use the CLN

Volunteers

Community constituents – those people who access SCH services and are interested in playing an active role in the institution

Advisory Board – made up of approximately a dozen volunteers from the SCH staff and community

The Community of Practice Understudy (CPU) – a group of volunteers from the community who are technically proficient and will eventually assume responsibility for the CLN once it is completed by TWG.

Contracted by SCH to build the CLN is The Working Group (TWG), a quartet of web programmers who successfully bid on the CLN Request for Proposals. They are comprised of two programmers (Booth, Christ) and two process and interface designers (Bortolussi, Brooks). Christ brings expertise in open source software and a history of involvement in the open source community. Booth, also an open source expert, has a background in instructional design and computer-based training. Brooks and Bortolussi draw on participatory and collaborative facilitation skills and methodologies working in the Accelerated Solutions Environment (described in detail below). TWG aims to deliver affordable open source internet solutions to the non-profit and voluntary sector. A key component of their offering is a commitment to participatory approaches to the design of technology.

The University of Toronto researchers (Clement, Luke) became involved with the CLN project a few months after it had been initiated. One of the researchers (Clement) had already worked with SCH on another internet study,⁸ and since June of 2002 we have been assisting SCH in developing a participatory evaluation framework for CLNs that will be used more widely in a large research alliance.⁹ One of the university researchers (Luke) also serves on the CLN Advisory Board, offering advice on issues relating to effective e-learning design and the introduction of ICT more generally. With the opportunity to reflect on the participative nature of the CLN development process, the researchers have been engaging with all stakeholders as observers and “honest brokers” to help reflect on the process so far and offer insights that may help in the future stages. This paper was written by engaging all authors in constructive dialogue about the CLN design process to date. Interviews were conducted with SCH and TWG members,

⁸ Everyday Experiences of Network Services, a project of the Information Policy Research Program (IPRP), funded as a standard research grant by SSHRC, 2001-2004
<http://www.fis.utoronto.ca/research/iprp/ee>

⁹ The Canadian Research Alliance for Community Innovation and Networking (CRACIN); see <http://www.cracin.ca>.

and from these notes the initial paper was drafted. This was then circulated for comments. Additional conversations and drafts followed.

5. BUILDING TO THE ALPHA LAUNCH - DEVELOPING THE COMMUNITY PORTAL, PHASE I

The initial development process was intended to be participatory, and involved a series of recorded and documented interviews and focus groups conducted by TWG as part of the needs assessment for developing the CLN. Wide participation by SCH staff and community members was seen by SCH as key in enabling buy-in among the constituents that would eventually use the CLN. It would also form an important part of the education and outreach that would encourage participation in the finished product. The consensus-driven model favoured by SCH also made a participatory design of the CLN an attractive way to proceed. There was also precedent at SCH in developing community-driven websites and resources that are created by community members and staff. The CLN itself, envisioned as an extension of the open and collaborative nature of SCH, would continue this participatory approach once built. Engaging those who would eventually use the CLN in the design stages was a natural step for SCH to take. Including stakeholders in iterative design processes is an effective change management strategy for the introduction of new technology [13; 23].

The Working Group was awarded the CLN contract in November 2002. In January 2003 the needs assessments were conducted with multiple staff and community groups and stakeholders at SCH. These focus groups have involved every program area at SCH, as well as four groups of community participants (members of the public who access SCH services). In February 2003, a design event was held, called an Accelerated Solutions Environment (ASE) coordinated by the Working Group. The ASE is a facility and a process specially designed to facilitate large groups working collaboratively. The ASE facility is an open and creative workspace that allows teams to quickly storyboard and prototype ideas, and the process is designed to facilitate “decision by design”—to keep teams focused on their goals, ensure open participation, and achieve consensus without forcing it prematurely. The purpose of the ASE in the CLN development process was to collaboratively create a plan to use the internet for St Christopher House to expand and enhance services to the community. Supporting objectives of the ASE included:

1. Gain a common understanding of how SCH currently uses information and knowledge
2. Create a common language for the CLN
3. Develop an understanding of the functionality and value of Internet Tools
4. Finalize the overall CLN goals, guiding principles, and model
5. Determine how the new system should enable SCH processes
6. Identify a prioritized list of tools for SCH stakeholders that TWG would implement starting April 1, 2003

The ASE was deemed a success. However, for TWG objectives 1 – 3 proved extremely challenging and time-consuming, and the team

was only able to partially complete objectives 4 – 6. As a result, the two organizations emerged with a well-aligned but less than fully detailed view of the problems to be solved and the best avenues to pursue in developing the CLN. There was a common understanding of the kinds of tools that were needed, but less understanding on how best to implement them. This incongruence would later be a factor in the subsequent discussions among the two parties.

In March/Early April, TWG reviewed and organized the output of the ASE Collaborative Workshop, and based on the initial proposal as well as what was gathered from the ASE, TWG began drafting the CLN Blueprint. This included rough schematics of functionality (Content Management System, permission management, workflow, communication). The Blueprint specifically addressed needs and concerns raised by the SCH community during and prior to the ASE process. Functionality was placed in the context of its proposed use and benefit to the SCH community. Continuing in April 2003 SCH comments on the Blueprint draft, with answers by TWG, as an implementation and development plan was created. TWG presented the final Blueprint to the CLN Advisory Board for approval in May 2003.

Following the Blueprint approval, TWG researched the best methods for developing the CLN system, and decided that a custom software solution was the best way forward. The CLN is to be used as an online learning tool, and the Blueprint included applications standard to e-learning practices such as interactive chat boards, asynchronous threaded discussions, personal portfolios or “lockers,” bookmark utilities, and interactive programming layout tools. In order to make this system work within the parameters desired by SCH (as an organic and additive community-based archive) TWG had determined that SCH needed a complex permissions management system. This would enable multiple people from across the SCH organization (staff and community) to be able to add and edit varying levels of content (from individual blocks of content, to pages, to multiple pages) to the CLN portal. This was compounded by a need to enable an administrative function for editing permission groups as well as publishing final content on the public site.

TWG started coding in early August 2003. Successive prototypes of the CLN system were scheduled for release in October and November of 2003. However, the releases of these beta versions of the CLN were delayed. An initial release was issued in December, but without some aspects of the core functionality. This version contained the basics of the complex permissions system that would enable SCH to have their community create pages and aspects of pages as part of the CLN portal site. The December release was in some respects a disappointment to SCH as it was not fully functional. There were problems faced by TWG in establishing the core functionality of the permissions system that undergirded the entire program. There was concern at SCH that there was a large delay over this release, given that a version was expected in October. SCH felt that their input into the process was lacking, and were keen to show staff and early adopters what the CLN was and could do as a means of perception management and in keeping people interested in the ongoing development and eventual use of the CLN. These concerns were shared by TWG, who were feeling pressure at having a more difficult task than anticipated of getting aspects of the core functionality stable enough to build the rest of the CLN infrastructure.

The final Alpha release came on 9 February 2004. This version was a more complete version of the CLN software that had a fully functional permissions system, page layout tools, and simple HTML/page editors. A session was held with the CLN advisory group, where they were stepped through the system and how to use it. There was general feedback coming from this session that the Alpha version was not very usable – it was complex and cumbersome, and not very intuitive to use. SCH, already facing internal pressure at the time overruns, was now concerned that the program was late and unusable. Part of this perception stemmed from a lack of input into the design of the first version itself; for many of SCH staff and the CLN advisory, this was their first look at the CLN after eight months of coding. The perception at SCH was that things were very participatory until TWG went away to code, a development acknowledged as problematic by TWG.

6. ISSUES

The timeline just sketched is important to this story as it relates to the expectations that were set in motion from the initial participatory process. Prior to the commencement of the actual coding, SCH staff and community members were engaged within the design process. However, when coding began, there was a participatory hiatus, a duration during which there was limited input by the SCH community at large in the development process. Herein lies the first difficulty in measuring this project against the PD literature. PD calls for iterative prototyping and the involvement of the end-user in the design as contextualized within real life practice [3; 4; 6; 7; 12]. However, there was a general feeling within TWG that this was not feasible. It was very hard for TWG to figure out how to involve, in a “participatory” sense, the general SCH users while what they were working on were core technical issues (coding, etc). Compounding this is the general feeling that the Alpha version of the product is a first cut and unfinished prototype. The Alpha version was meant to be an initial iteration, and it and the feedback on it were meant to be a continuation of the participatory process. That the Alpha was not well received was a failure of expectations management in not setting this context clearly enough. The difficulties encountered with the Alpha release were largely seen by TWG as being a result of non-technical people reviewing a very technical environment, and being asked to imagine its potential. The identification of the issues was an important part of the process; what was missing was the recognition that these things could be solved in an iterative fashion, and were not cause for concern. There were people on the CLN Advisory Group who were technically proficient, and who could grasp this purpose of the Alpha version. These individuals were able to speak to the “imagined future” of the CLN Alpha version.

The disjuncture between what had transpired in leading up to the design of the Blueprint, and the gap in wider community participation and communication when coding began, led to “perception management” problems from both SCH and TWG perspectives. On the SCH side, there were questions as to why there was a delay in the production of the Beta and Alpha versions of the CLN. This in turn affected TWG and their relationship with SCH. The relative lack of participation during the coding period led to uncertainty on the part of SCH as to what was happening, reinforcing the “black box” notion of programming that was at odds with the initial participatory involvement in the design and needs assessment stages. (It should be noted that the public open source site SourceForge was used to display the code as it was being written – this is explored in more detail below). The

Working Group, on the other hand, was seeking to find a way to manage its relationship with SCH while delving into a coding job that was more complex than originally thought.

These issues are commonly reported in PD literature (See, for example, [5; 20; 26]). However it is too easy to read the breakdowns in communication and overt participation as a failure to apply good PD practice. Taking into account the local knowledge ecologies and the development of the SCH CLN, these issues form excellent bases on which to judge the relevance of PD to these kinds of design projects, and to accord with what the PD literature says about PD processes such as iterative prototyping and the involvement of stakeholders in complex design processes. There are numerous other issues that bear commenting as they emerged from this process, and that came to light during the writing of this paper.

6.1. Mis-Matched Expectations

Key issues that emerged during the overall process, particularly those that came to head around the alpha launch, highlight the differing views within, but mainly between SCH and TWG. These include the expectation management as outlined above in terms of the relationship between SCH and TWG. SCH had to manage the internal expectations as well, in terms of what the initial experiences had instilled within the staff. The ASE process was particularly successful at getting staff buy-in to the CLN project as a whole. However, it may have set expectations too high, insofar as it related to the Blueprint that was eventually produced. This Blueprint was a result of the ASE and the focus groups leading up to it. But there were differing opinions between SCH and TWG as to how much of the Blueprint could be implemented within the scope of the budget.

TWG viewed the Blueprint as a general development plan, and not a software development plan *per se*, a crucial distinction that was not shared with SCH. Some members of SCH did view the Blueprint as a hard and fast rule of what would be built, reflecting internal tensions and inconsistencies with the perception of the Blueprint itself, and how its content were communicated across the organization. Compounding the differences in understanding over what the Blueprint was, there was no discussion of budget at the ASE, from which the Blueprint emerged. Thus there was a perception (at SCH, and by TWG) that, although the ASE was successful in getting SCH input from wide variety of actors, there was no understanding of what it would cost to implement the entire wish list that emerged from the ASE. The blueprint was built as part of a general participatory process, but then TWG went away to program and there was little communication during this time. Both parties feel that more rapid prototyping and iterative design-sharing would have aided the process, but this is retrospection. However, besides the complexity issues mentioned above, TWG experience has typically been to go out and program something and come back and show it as a complete thing. In fact, there is the perception that to do otherwise would be to mismanage client expectations by showing systems that were not fully developed and so lead to potential disappointment. It was difficult for TWG to involve (especially non-technical) people in feedback processes, particularly when time lags lead to costly delays. At this point in the development process, stopping development to go to SCH for feedback was seen as perhaps desirable, but would unnecessarily delay the entire process and lead to further cost overruns.

6.2. Budget Pressures

The budget is an issue that raises interesting points for discussion. SCH had a limited budget for software development, relative to how these systems are established in commercial arenas. Compounding this was the fact that SCH had to also work within the confines of the government funding regimes that often required the expenditure of monies at certain times. This is not an insignificant point that led to a rush in some aspects of the design and development not only of the CLN itself, but of the RFP that led to the contracting of a programming group to actually build the CLN. These kinds of funding regimes can unnecessarily constrain design processes artificially. With a limited budget and a desire to engage in participation, it became clear that certain compromises were going to have to be made in order to ensure that programming was done on time.

As stated above, the actual core programming leading up to the Alpha release went several months over schedule owing, according to TWG, to the complexity of the system under development. This system complexity was seen by TWG as a direct result of the participatory process that led to the high expectations of the SCH staff. The design and development stage that sought and obtained input from SCH led to the ASE and the Blueprint that was in retrospect much too ambitious given the scope of the budget. It may be that the conditions were not created appropriately for participants to assess effectively what they actually wanted and what they were prepared to pay for.

The budgetary restrictions were viewed as preventing further participation when the coding was proceeding. When it was clear that it was going to go over schedule, then any considerations for SCH input had to be balanced against the need to continue programming, acknowledging that engaging in further engagement would lead to further (perhaps excessive) delays, and thus cost more money. There was thus a perception on behalf of TWG that, at a certain point at least, participation was necessarily curtailed in order to avoid excessive cost overruns. Ironically, this in turn led to the perception at SCH that there was little work being done. In retrospect, iterative prototyping may have circumvented this, but this alone would not have ameliorated the kinds of problems faced at this time. However, TWG felt that it would be better to show SCH a more polished product so as not to disappoint expectations that were already running very high, expectations that were proving increasingly difficult to manage internally at SCH.

6.3. Organizational Dissimilarities

It is too simplistic to say that iterative prototyping may have saved the developmental delays. These two groups represent differing cultures – the social service, volunteer and consensus-oriented SCH, and the traditional software/programming methodologies of TWG. While TWG engaged the project with a participatory process themselves as part of their needs assessment, it was not until the ASE that they realized the true scope of SCH as an organization. TWG realized that in order for the CLN to be successful, they would need to assume responsibility for designing, building, and implementing a system that could facilitate that complexity using internet technology, as opposed to simply delivering a version of a garden variety web solution. For SCH, there came at the time of the Alpha release the realization that they may have asked for too much complexity

Participatory approaches share with community service organizations the ideal that the quality of contributions is enhanced

when people see the direct results of their own initiative and effort. Participants develop a stronger commitment to the decisions and the further work that this entails. Technologies must be considered as being part of a complex array of social and technical forces [1; 11; 14; 15; 25]. This is an important consideration when looking at how ICTs are to be integrated within community networks and non-profit organizations, particularly those that are seeking to enable citizens to make use of new technologies. The relative level of technological literacy among SCH staff and community members was another key organizational/cultural difference that affected the overall development process of the CLN. TWG soon realized that they were part of a much larger educational campaign at SCH that went far beyond just software development. TWG had not realized until the ASE that there would be as part of the job a certain amount of *social* as well as *technical* systems design. Their job extended beyond the computer terminal to include the overall processes at work at SCH in terms of educating their community about the potential that an online learning network could have.

6.4. Open Source Software Development using Source Forge

One key aspect of development concerns the use of open source, and the development of a larger community around the CLN programming. This involved the CPU—the Community of Practice Understudy group of technically proficient volunteers who will assume responsibility for the CLN once TWG completes its contract. In addition to the SCH CPU group, the online open source software site Source Forge was used to post updates, releases, bug reports and fixes on the CLN development. Source Forge is an open source programming community space or “software development site with the largest repository of open source code and applications available on the Internet. SourceForge.net provides free services to open source developers.”¹⁰ It is a public resource where developers can post and share code, coding tips and practices, and work together to build better open source projects. Taken together, the CPU and SourceForge users are two distinct yet interconnected communities that played an important role in the overall participatory development of the CLN.

There were some tensions associated with having the CPU group eagerly waiting for the CLN releases so that they could review and test it. These were also associated with the posting of the CLN releases on Source Forge, which had a double effect on the programming. On the one hand, the use of Source Forge and a commitment to the ideals of Open Source promoted a form of “Open Source Learning” [17; 19; 21] and “conspicuous contribution” [22] that fostered a wider community involvement and engagement such as with the CPU. Posting the code on Source Forge also had the effect of instilling in TWG the desire to make sure that their code was solid and error-free, given that it would be posted on a public website for public scrutiny by the larger open source community. Thus TWG was more careful with their code since it was being released to the wider programming community, and as such felt they would come under intense scrutiny. For SCH, Source Forge was a mechanism for tracking the progress of the coding activities, which may have further exacerbated any anxieties TWG may have felt about the public display of their work in progress. The propensity for error and the tolerance for bearing it, is perhaps more intense in such a working

environment. The idea of “making work visible” [24] is a desirable but problematic goal for PD in general, but in this case may have added extra, and perhaps at times unwanted, pressure on the overall programming, particularly given the missed deadlines.

Open source presents differing business models relevant to PD as well. Conventional software design has code constructed, then signed off and delivered. But with an open source project such as the CLN, the programmers were more partners in its development, with a greater stake in its success, given its application as an open source environment. Just as the use of Source Forge encouraged greater reflection on the coding process and product(s), there was also a greater emphasis put on a more sustainable product that TWG would want to have a longer term investment in. When TWG realized the scope of the CLN they opted for “the theoretically better route rather than the theoretically cheaper route,” precisely because the overall participatory process encouraged by open source development led to them taking the decision to make their company around the CLN software. TWG looks upon the CLN as a mechanism for their own company to continue to work on as part of the open source aspect of its continued development. TWG see themselves as having a long term stake in its success, and thus is a long term investment for both TWG and SCH. The open source ethos has led to the idea of future participation in the open source development of the CLN application. There is a general sense that TWG feels they will stand by the CLN as a product long after they would normally do so on a typical computing project where they were simply paid for their services to deliver a finished product. With an open source project, a product *per se* is not developed so much as an operating principle that is then an “open document” and model for future development. Both SCH and TWG have a stake in the success of the CLN development within the larger, perhaps overly public open source environment encouraged by Source Forge.

7. CONCLUSIONS

This experiment in adopting a broadly participatory approach to developing open source tools for a community learning project offers some interesting lessons for the areas of participatory design as well as community-oriented ICT development. In spite of a promising start, the project has experienced difficulties that are being linked by some participants directly to the pursuit of its ideals of participation and openness.

In many important respects, the conditions for project success were highly favourable: The primary client organization, St Christopher House, is a well established agency, experienced in dealing with government funding programs and developing innovative public internet access facilities. It was well disposed in principle and in practice to active client participation in its affairs. While it had less experience with the Open Source/Free Software model for application development and ownership, this too is very compatible with the non-profit, public service, voluntary nature of the organization. The government grant provided an unusually large fund (unusual for a community non-profit organization at least) for developing its new community portal application. It was further fortunate in contracting with a small firm of experienced web developers in The Working Group that shared many of its values around openness and participation.

Development work got off to a good start, with a variety of opportunities ranging from small focus groups to a two day, organization-wide brainstorming retreat (the ASE event), for the

¹⁰ <http://sourceforge.net/>

full range of SCH constituents to learn about and contribute to the project Blueprint. This document underwent several revisions before achieving a general agreement that it represented the main design specifications for the community learning portal. But then the project began to run into trouble. High expectations among SCH staff and volunteers about the pace of development and the functionalities provided turned to disappointment and tensions as the release of promised prototypes dragged on months overdue. These frustrations came to a head with the presentation of the long anticipated Alpha version to a meeting of the Advisory Committee, which they found less ‘friendly’ and less capable than they had been hoping for.

Such delays and frustrations are commonplace, even endemic to software development projects of this scale, but in this case they appear tied to the very principles aimed at avoiding such drawbacks in the first place. Has the development to date been too ‘participatory’ or not enough? Too open, or not sufficiently so?

Certainly expectations were heightened, and perhaps excessively so, by the success of the early episodes of group brainstorming. However, the aggregated demands resulting from this were not tempered by a realistic assessment of the cost and time to develop them until much later, after a long communication hiatus while TWG attempted to custom code the backend system for managing complicated access permissions. Underestimating the complexity of programming tasks is not unusual, but in this case appears to have been exacerbated by an adherence to the conventional systems development life cycle model, which sees the programming only coming after a specification document has been stabilized. From the point of view of the PD literature (see [7]), this pitfall could likely be avoided by a much earlier rounds of mockups and prototypes of the web interface that could have helped users concentrate on experiencing the capabilities they thought they wanted and finding a simpler more feasible solution by trading off the excessively expensive features that likely were not a high priority. On the surface, then, the larger conclusion that can be drawn here is that thorough user participation in the early stages may not be adequate, even possibly detrimental, if it is not supplemented by a grounding in the constraints and possibilities of realistic use situations. However, for TWG, this sounds great in theory, but it seems hard to envision this working in a real world scenario, particularly in this case, where given a fixed budget/time/schedule, a set of specific deliverables needed to be defined in order to avoid later disagreements. This continuing debate suggests that attention to the *process* of development should supplement commitment to *deliverables* in contract negotiations.

This difference highlights a central issue in technology systems design that also seems, on the surface at least, to be a specific conflict between PD and projects aiming to address digital divides. Stakeholders’ ability to make informed decisions about technology enabling their work requires an understanding of their work and a basic understanding of the technology, and how it can help. The attention to digital divides tells us that participants cannot be expected to have that technical understanding, and that the knowledge gap may be fairly wide. This matches TWG’s experience here. As a result, it was necessary to partially bridge the digital divisions within SCH in order to engage in collaborative design. Perhaps this distinction is more appropriately drawn between the design and development aspects of the CLN versus its overall function. TWG was oriented to delivering a product, as noted above, in accordance with software engineering practice, as

well as within set scopes of deliverables that could easily be defined. To SCH, the CLN design and development process was in fact part of the effort to bridge digital divides within their organization. That is, there is a contrast between the function of the CLN as a product, and the function of the CLN as a process. It is natural for TWG to want to deliver a set product—this is what they were hired to do. But the fact that SCH saw the design and development process as part of an overarching process of technology engagement more broadly highlights the organizational dissimilarities between SCH and TWG.

The tensions posed by adopting an open source development process in the context of a participatory design project also highlight latent contradictions in what would seem to be congruent design methodologies. When the project was going well, the ability for all interested parties to see the code being developed was widely seen as a positive feature. When concerns about the pace of progress arose, then this view shifted significantly. For the developers, it made them vulnerable to criticism and so adopted a more defensive position about the release of their software. Rather than encouraging an approach of rough and ready prototyping, in which the code may not be robust, but could work well enough to obtain helpful feedback, they became more cautious about putting their work online until it could withstand programmer (as opposed to user) critique. These difficulties may have been avoidable if in addition to the communication channel opened up by Source Forge, there were on-going, active communications via more conventional means that would allow the other, more favourable interpretations. Or put another way, posting software on-line may not obviate other modes of communication, but even make them more vital.

This paper has detailed some of the pitfalls and successes of open source PD projects, and leaves us with important lessons for designing ICT systems for community networking initiatives. These include the need to account for varying levels of digital literacy among participants during the design as well as the implementation phases of this kind of project. There is a definite need to define the scope and terms of work, as well as the level of participation and what this means to all parties, early in the development phase. Budgetary constraints must be openly discussed, as the costs (or perceived costs) of a PD approach must be accounted for in an honest and straight-forward fashion. Iterative prototyping and mockups are definitely an essential part of design that could help to allay pitfalls, provided there is a shared understanding that these iterations are works-in-progress designed to obtain user feedback into the design of the final system itself. In addition, the very use of open source software opens up wider discussions about future support of the applications under development and the refinement of extensible participatory models that can sustain open source initiatives past their original inception.

The experiences recounted in this paper can be read as somewhat typical design problems that plague software development in general, and so at least offer critical case examples in the pursuit of participatory approaches. However, the reflections on the actual experiences of design and developing the CLN, and in dealing with the relationships surrounding the various roles, provide further insights of relevance to community-oriented PD researchers. All parties engaged in this development process have enjoyed the kind of participation under which the project was conducted, but acknowledge that more communication and better alignment of perceptions were necessary on all sides. The kind of participatory

design process this project has engaged to date is seen as largely viable and successful for this community informatics development project.

The lessons learned at this stage of development are helping to inform the continued development process, much as the co-writing of this paper has helped to clear some communication channels and give everyone involved an opportunity to voice their opinions and concerns over the process as a whole. All co-authors of this paper recognize it as an example of being a “reflective practitioner” within the larger design and development of a Community Learning Network. This paper has become a locus for learning about the PD process and its application to community technology development. This learning is on-going, and so there are internal contradictions and useful tensions in this paper that highlight the differences and variety of opinions of the authors. We see these as markers of intellectual engagement, signposts for a participative process that celebrates difference and diversity in keeping with the ideals of what a CLN is, can be, and how it comes into being.

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