CAVEAT Exemplar: Participatory Design in a Non-Profit Volunteer Organisation

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ABSTRACT
This paper reports a university course-based case study undertaken with a volunteer organisation. Our goals were to explore the use of participatory design in a non-profit volunteer setting; to reflect on the experience of learning and applying participatory methodologies; and to create a prototype, using off-the-shelf database software, that could become a sustainable organisational information system. We found system design methodologies that stress cooperation and consensus especially appropriate when working with volunteers, who expect control over their work in exchange for their time and effort. The Future Workshop was particularly valuable in developing group insight into work and consensus around system priorities. The study resulted in a prototype which is being tested and refined in use.

Keywords
case study, volunteer organisation, off-the-shelf software, PD and education

INTRODUCTION
Reported participatory design (PD) projects have typically been conducted within divisions of large, hierarchical organizations, characterized by distinct separation between labour and management. This is in part due to PD's historical origins in Scandinavia's industrial democracy movement in the 1960s and 70s [2], and also in part to the resource issues implicit in projects relating to technology development, adoption, or training. PD tenets and methodologies, however, focusing as they do on processes of mutual learning, inclusivity, and workplace democracy, have applicability outside the industrial, corporate, and governmental sectors.

Although the 'workplace' is generally conceived of as a place where work is done for wages, there are a wide variety of non-profit groups, especially volunteer organisations, which also operate offices and have a variety of information needs [1]. These groups are increasingly introducing new office and communication technologies into their activities, but there are distinct differences in the ways they operate and in the composition of their staff when compared to a business or industrial environment. This paper reports a study performed with a small, non-profit, volunteer organisation called CAVEAT. PD principles and many of its methods are uniquely appropriate to working with such groups, where the "staff" are often peers, working towards a common goal, but expecting in return for their contributions a degree of control over their work. At the same time, the nature of a volunteer organisation means that those working within it come from a variety of backgrounds, work experiences, and degrees of familiarity with technology, creating a challenging environment for technology introduction.

The CAVEAT study was performed in an educational context. The researchers were students in a 13-week graduate course entitled "User-Centred Information Systems Development" at the University of Toronto Faculty of Information Studies. The purpose of the project was thus twofold: primarily, we wished to work with CAVEAT staff to create a prototype of an application that would meet their needs and lay the foundation for further development within the organization after the project ended. At the same time, we also sought to critically explore PD methodologies appropriate to the project setting through use. This resulted in some observations about the learning, and by extension the teaching, of PD in an academic setting, as well as specific observations about selected PD methodologies and their use in a non-profit, volunteer setting.

CAVEAT IN THE CONTEXT OF PD RESEARCH
"First generation" PD projects [8] initially involved unions and designers collaborating to develop a realistic understanding of the way information systems could affect work, and to provide unions with sufficient knowledge to influence technology adoption and training processes [9]. Well-known studies such as the UTOPIA, Florence and PROTEVS projects were conducted primarily within

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designated units at industrial sites, or within departments of large public service organisations. Although the groups participating in such design projects tended to be small, many of the resource, structural and behavioural issues that arose remained characteristic of the wider environment.

More recently, projects such as Rector *et al*'s work with medical practitioners to design a medical workstation [24] and Blomberg, Suchman and Trigg's prototypes for document search and retrieval technology in a law firm [5] are moving towards Carmel's "second generation" category, where "design by doing" becomes the focus of PD activities [8]. They also seem to substantiate Suchman's assertion that over the past decade, studies of work practices have often looked at the ways in which specific organisations use technology, and then applied these observations to the development of new computer-based systems [25]. Clement's SMOAP project [10] is an exception, in that it explored the way in which a participatory approach helped secretaries support their own use of off-the-shelf software after computer technology was thrust upon them.

The CAVEAT setting provided conditions that differed from many PD projects. We expected to find a higher degree of congruity between personal goals and organisational goals in a volunteer environment than in a profit-based organisation. The nature of the system development is also somewhat different, as it involved customization of "off-the-shelf" database software, rather than new software or hardware development. Increasingly, public and private sector organisations are customising off-the-shelf packages rather than developing in-house information systems, yet there is little in the literature that indicates that PD techniques have often been applied in this kind of situation. Since "tailorability" and sustainability are often cited as key goals of PD projects, it would seem that the potential of off-the-shelf systems to meet these aims deserves further study.

THE PROJECT SITE

CAVEAT is a non-profit charitable organisation aimed at reforming the Canadian justice system. It is typical of many such small organisations in that it is underfunded, volunteer-dependent, and its inception is largely the result of the energies and vision of a single individual. It is quite different in other important ways, however.

Through its remarkable efforts at influencing legislation and mobilising popular support, it has grown into an authority respected and recognised at all levels of government, and in police and community circles. CAVEAT members believe that its continued success will depend on its ability to maintain a leadership role in identifying areas of weakness and inequality in the justice system.

This requires the efforts of many volunteers to bring information together from internal and external sources and ensure that it is accurate, current, and accessible to support CAVEAT's advocacy, education, and legal activities. As such, it increasingly requires a high-performance information system to coordinate tasks and to prepare materials for distribution.

The project took place at CAVEAT's head office – a busy place with 15-20 people in the office on any given day, engaged in a shifting mix of ongoing and *ad hoc* activities. Focal operations include membership, publications, research, volunteer coordination, victim support, education, fundraising, and office administration, which are carried out by volunteer committees with help from a small core of paid and volunteer "staff," and guided by both the President's vision of the organisation and her strong daily presence.

APPROACH

At the conclusion of *Design at Work*, the editors describe a workshop they and the authors conducted to evaluate their text, and generate a list of critiques about their work. The one that they conclude they cannot address is the "lack of empirical projects in real life settings to try out the ideas presented in the book" [14]. The CAVEAT project tried to address this perceived lack through the application of selected ideas from this text to our particular setting. The tenets by which the project group wished to abide are those expressed in the introduction to the first Participatory Design Conference in 1990:

- The goal of computerization is not to automate the skills of human workers but to give them better tools to do their jobs.

- Users are in the best position to determine how to improve their work and work life.

- Users' perceptions of technology and feelings about it are equally important as its specifications or capacities.

- Computers and computer applications must be considered in the context of their workplace. [11]

Within these overriding concerns, we chose to implement what might be considered some of the "well established" methods used by PD practitioners. Drawing on the cultural perspectives work of Bødker and Pedersen [6] we sought to become familiar with the workplace through study of artifacts such as publications and the information systems currently in use, through observations of the workplace itself, and through interviews with key stakeholders. The project group also planned a Future Workshop forum where members of the organisation would critique current information systems and envision future systems. Based on these cooperative investigations, we planned to work together with users to develop a prototype system that could be further refined and modified with local expertise.

LEARNING ABOUT THE USE SITUATION
Information gathering at CAVEAT

Previous needs-assessments had been conducted at CAVEAT by two of the current project group members. These were useful in helping our team acquaint themselves with the roles of individuals staff members, the type of information systems they used, the heterogeneous collection of donated computers they worked with, and the type of system they needed. One project group member was also a long-time CAVEAT volunteer, which meant that he

could provide insight into the organisation, although care was taken to use these perceptions as a starting point for group exploration, rather than accepting them unquestioningly.

We began by trying to elicit an overview of staff members' perceptions about the role of the organization and their place in it, and their customary use of the existing information system. Structured interviews were conducted with those who were expected to be frequent users of a new system, and informal chats and observation supplemented what we learned.

The core staff consists of salaried employees and volunteers, who work to ensure the long-term viability of the organisation and short-term effectiveness of CAVEAT's many programmes. At this project's commencement, day-to-day management was provided by an Executive Director, who resigned during the course of the study. Her replacement chose to take the title of Executive Administrator, a change that reflects the essentially organisational and administrative functions this position has come to represent. With this change in leadership came changes in office practices that will continue for some time as the Executive Administrator becomes more established in her position, and which will have ongoing implications for their information system.

Key functions initially identified as priorities for computer support included office management, membership coordination, volunteer coordination, documentation and project management, and fundraising. When the project began, CAVEAT had flat-file databases for volunteer and membership coordination, and an electronic address file that staff named "the rolodex". One person stated that while those who used those databases were somewhat satisfied with them, not everyone knew about them: "Things we have people don't know exist, for example with the rolodex, people ask me for phone numbers instead of using it." Other staff members noted that once they located required information, they doubted its accuracy and currency.

There was also a concern that each system was idiosyncratic, which made their use more difficult for those volunteers who were infrequent users. The flat-file databases had been created "on the fly," and were functional but not easy to use. As the Membership Coordinator noted, "I couldn't teach someone this [database] unless they know a lot about computers." This was not a problem so long as the system designer was also the only person who used the system, but several staff members expressed the opinion that information sharing was becoming increasingly important as CAVEAT grew.

Saving time was another central concern. For example, the Membership Coordinator described his use of two separate database programs, updated concurrently, because one system was preferable for producing mail labels and reports while the other provided more efficient entry of financial information. Since he has recently taken over additional responsibilities in the area of publication production, this time-consuming duplication was a burden.

It was revealing, on looking back over the interview transcripts, to notice that complaints and concerns almost exclusively focused on the larger issues – primarily the ability of the information system to support the organisation's work – rather than personal likes or dislikes. The organisational culture genuinely seems to be informed by a strong sense of shared purpose. Given the kind of work that CAVEAT does, fighting against injustice and supporting victims' rights, this is not surprising. The documentation that CAVEAT produces for the public reflects this purpose, and also reveals the starkly emotional chord that this work has struck in those involved with the organisation. Prominent among CAVEAT publications is StopWatch, a quarterly broadsheet that profiles victims and describes the legal and educational efforts of CAVEAT. Headlines like "Victims Groups Unite to Demand 'Life Means Life' " and "SafetyNet 1995: The Protection Of Our Children" give some flavour of its content, and of the issues which unite and motivate CAVEAT staff.

Perhaps even more than in most participatory design projects, the individuality of the CAVEAT staff members, and the motivation behind their work, had to inform the process and outcome of the project. Respect for their work and their methods was an essential component in the design of this information system. At the same time, we felt that it was necessary to bring people together to develop a consensus around the goals of a shared information system, and chose to do so through a Future Workshop.

Future Workshop
The Future Workshop concept was developed by Jungk and Müllert [17] for citizen groups who wanted to contribute to public planning in their community. According to Kensing, who suggested its use in information system development [19], certain basic assumptions must be met for the technique to work: participants should share a problematic situation, a desire to influence change, and a means to make the change. If these conditions are present, as they were at CAVEAT, a Future Workshop helps define system goals by: focusing on how to get the job done rather than on technical details or costs; helping users actively and meaningfully to contribute their knowledge; and creating a framework to permit attention to future changes. The insight this provides, into the way workers understand their workplace and into the organization's 'soul', helps designers conceptualize a useful and usable system [18].

The Future Workshop as described by Kensing and Madsen [18] consists of three main phases: Critique, Fantasy, and Implementation. These phases are preceded by a preparation period, during which the context is set, the anticipated outcomes highlighted, and the focus agreed upon, and followed by a period during which a consensus is explicitly sought. This method echoed, for one of the project group members, a facilitation technique called "the workshop method" that she had learned and used successfully in another non-profit setting. The technique was taught by the

Institute of Cultural Affairs (ICA), a 20-year-old Canadian affiliate of a world-wide organization. The technique coincided well with the aims of the Future Workshop but had the advantage, for an inexperienced group, of providing a step-by-step format [16]. Therefore, the project group decided to marry the overall framework of the future workshop with the methodology of the ICA workshop method.

Kensing and Madsen also integrate Madsen's metaphorical design [21, 22] into the Future Workshop in order to help participants think more expansively during the fantasy phase. However, the project group had difficulty generating metaphors that seemed useful in our setting and reluctantly decided not to explore metaphorical design as a component of our workshop. We also decided not to include an Implementation stage, primarily due to time constraints in the workshop itself and course deadlines for prototyping which required us to move more quickly than an Implementation schedule tied to CAVEAT staff members' timetables might permit.

Using the ICA workshop method, we developed focus questions for the workshop. The ICA literature states that "the focus question should name the subject, identify the stakeholders, identify the time frame and be an open-ended question". We composed an overall focus question, "What do we want a new, computerized information system to do over the next 2 years?" as well as one for the critique phase, "What problems do we encounter in getting information?" and one for the fantasy phase, "What would the perfect information system do?"

Three of the four group members served as facilitators; the group member who is a key computer resource at CAVEAT participated in the workshop, along with 10 other individuals who represent the major functional groups of CAVEAT.

Before the Future Workshop, several people expressed surprise at our desire to meet with them and discuss the information system. And, when asked who should be consulted, just the same two or three names were offered. At the Future Workshop, every participant wrote at least one response that surprised or delighted the others, and each saw their ideas contribute to the process. After the Future Workshop, people were eager to meet with us and expressed disappointment when we weren't able to see them on a specific day. Later, when the prototype was introduced they suggested leaving it in the meeting room so "everyone could try it and offer their opinion."

The Future Workshop also demonstrated to the participants the need for consensus around the parameters of the system and the administrative practices needed to support it. For example, the issue of security arose simply as "privacy codes" written on a piece of paper during the critique phase of the workshop. As the participants discussed the pros and cons of restricting access to information, they quickly realized that this complex issue could not be resolved during the workshop but was a priority for future consideration.

The project group and the participants gained during the Workshop a common experience and language to draw upon in subsequent encounters, and a rationale for decisions. During the discussions regarding the first version of the prototype, one person remarked that a certain feature didn't seem particularly useful. When it was explained that this feature responded to a concern raised by several people in the Future Workshop, further discussion ensued around whether it was the most appropriate solution. In the end it was agreed that it should be retained.

Using the language of the ICA literature, the Workshop has two types of aims: rational and experiential. In our case, the rational aims were to glean information that would aid in development of the information system and develop consensus about its goals. The workshop was quite successful in achieving these aims. We learned a great deal from the individual statements and collective results of the Workshop, and saw how the information needs of the major activities at CAVEAT differ and how they coincide. We also realized that what seemed to be a host of discrete problems could be summarized as just a few surmountable problems, and that simply bringing their disparate systems together would begin to address their major concerns. This made us confident that we could proceed with modeling the new system on their present systems without the fear that it would not provide enough improvement to warrant their participation in the project.

The Future Workshop was perhaps even more successful at fulfilling our experiential aim: to demonstrate to participants the value of their participation (collectively and individually) in the development of the system, now and in the future. The Workshop experience was pivotal for project group members. We felt that we had learned a great deal about CAVEAT and were excited about the potential of the workshop technique in system design. Additionally, we gained facilitation skills and confidence to proceed with prototype development.

DEVELOPMENT OF THE PROTOTYPE INFORMATION SYSTEM

When working with staff members to explore the prototype iterations, our approach was similar in spirit to the cooperative prototyping described and utilised by Bødker and Grønbæk [7]. By involving the users in hands-on system critique in use-based situations, we were able to underscore the flexibility of the software chosen, encourage users to be involved in on-going modification of the system and create opportunities for the users to reclaim "ownership" of the system.

The development of the prototype system was divided into three phases, two of which have been completed and a third which is in progress. First, the project group convened to establish a data model based on the system requirements information gathered through interviews, through examination of existing systems, and through the Future Workshop. Conceptual and relational models of the data were constructed and then refined, as our understanding of the requirements deepened. The second phase translated the theoretical ideal to a working system using the FileMaker

Relational Database, a database familiar in its previous version to CAVEAT staff, using development tools provided by the program.

The third phase included the initial operation of the prototype by users, and its modification and refinement. This continues under the supervision of one of the project group members, who is assisting with ongoing in-house development since the class portion of the project ended. The prototype database is currently in use within CAVEAT.

During prototype development, we attempted to strike a balance between optimal functionality, ease of use, software constraints, the need to allow for future development and, potentially, future conversion to another software package.

Prototype Design

The results of previous studies, individual interviews, and the future workshop showed that users had common concerns. Staff complained that current systems were inconsistent, each with a different interface and way of operating. Some systems were judged too complex, or too hard to use. Few controls existed to ensure the security of the systems or data.

In order to introduce consistency and data integrity while disrupting work practices as little as possible, the conceptual framework of the prototype follows existing work patterns at CAVEAT. The system is divided into different modules –essentially, alternative sets of screen interfaces to the integrated database – according to task or area of operation (i.e. membership, volunteers, fundraising). Users enter the system from the common menu, a screen with six buttons on it, each button being the entryway to a given module. The main menu and some modules are password protected. Future Workshop participants were concerned that "bits of information [are] here, there and everywhere." Centralised access to the data helps to solve this problem, as well as the problem of "more than one copy of things in different places."

The use of a common opening screen helps users to understand what other information is available in the system, so that they know where to look "without asking everyone in the office." Security is also easier to manage centrally.

Consistency is carried through to individual modules. Information that appears in more than one module (or layout within a module) is presented in the same location and format, aiding users who cross between modules or use many screens. The function of the layout is identified in the top left corner in large print (e.g. "Correspondence Overview"). Common controls (such as the "return to main menu" button) are located in the same place on each layout. Below that are buttons that apply specifically to the layout being displayed. Other buttons may be located throughout the layout when they serve a very specific purpose and are best located directly adjacent to the field(s) affected by their operation.

It is likely that most users will have access to more than one module. At the same time, the division of the database into modules potentially allows some layouts to be customised to the needs of individual users and user groups.

In recognition of the less-than-ideal quality of some donated second-hand computer monitors in use at CAVEAT, field contents are displayed in at least 12-point type (field labels are 9- and 10-point). The use of a relatively large type size had an important impact on the amount of information that could be included on any one interface screen. Better video monitors would permit the inclusion of more information on some screen layouts, possibly reducing the total number of layouts required.

Modifying the Prototype with the End Users

The first version of the prototype system was demonstrated individually to four members of CAVEAT, who were then encouraged to try to use it for a typical task. This met varying degrees of willingness and success. Comments from these individuals were used to make minor modifications on the spot (such as the addition of the phrase "click here" on buttons). More time-consuming modifications (such as the ability to go back one screen) were noted for incorporation in the next iteration. Problems were discussed at length with the appropriate individual and then noted for further discussion amongst the project group. The meetings also provided further insight into work practices and the visions of particular individuals.

CAVEAT originally wanted a system that would be so easy to use that front-desk volunteers (high turnover, infrequent users) could use it with minimal training. The first prototype was designed for this user group, providing tight error control and user guidance. With the new Administrator came revised requirements, including the decision that front desk volunteers would not be using the system. This, combined with the results of user reaction to the first prototype, led to the elimination of many system constraints on user activity. By assuming a higher level of training and basic familiarity with the system's operation, the second iteration was made less cumbersome by removing some controls designed to trap errors made by novices.

Retained from the first prototype are features that users liked, including the overall division of modules, division of tasks within modules (i.e. calls/correspondence division), controls over field content editing, and colour schemes.

Although one member of the project group continues to work with CAVEAT to develop the database, the second iteration of the prototype was presented to CAVEAT staff as the final part of this project. The presentation consisted of an outline of the development of the prototype, a demonstration of the prototype, and a summary of its anticipated progression through short-term and longer-term development. As the prototype is used and refined, a project group member is observing users who work with the system, and providing training. Further modifications have occurred during demonstrations with individual users, and as

a result of issues raised in weekly meetings which have been initiated to discuss the system's current functioning and future development. There is an awareness that modifications will need to be carefully managed in accordance with database administration practices.

DISCUSSION

Our work with CAVEAT has resulted in several observations about volunteer workplaces and technology adoption, and about learning and using PD methodologies in this setting.

Nature of the Workplace: The Volunteer Environment

Benston's study of the use of networked communications to facilitate discussion of women's issues points out two differences between volunteer and for-profit organisations: the time constraints inherent in an environment where staff are participating in their "spare" time, and, typically, the lack of funding available to support the organisation's activities [1]. We found that these issues were integral to CAVEAT, although the range of computer experience and interest, and the role of the system within the organisation also loomed large as challenges in this particular case. Unlike a for-profit organisation that hires selectively, an organisation that depends on volunteers has little discretion in choosing staff, and those who offer to participate in the organisation's work likely come from a wide array of backgrounds and experience. This diversity can be of immense advantage to the organisation, which gains a variety of talents to draw upon, but it also creates a microcosm of the computer user universe. Although, as Blomberg et al point out, individuals in a company often have different backgrounds and different objectives in their work [4], it is likely that at least within hierarchical levels of the organisation there will be some common skills, the minimum hiring criteria. At CAVEAT, staff members ranged from one whose first sentence to us was "I'm not a computer person" to one who designed the current flat-file system, and did an exceptional job.

This placed constraints on the kind of system that could be implemented. The new system had to be flexible enough to accommodate different patterns of usage and levels of expertise; staff want the system to "Be easy for someone to work on even if they only come in 1/2 day a week," yet be sufficiently powerful for more sophisticated users. It added an additional level of complexity to the analysis of the organisation also. Suchman suggests that features of work that system designers do not expect to be affected by the information system are typically excluded from consideration. Who comprises the organisation, and organisational identity often number among the exclusions [25]. In a volunteer organisation such as CAVEAT, however, issues like the backgrounds of people who choose to be volunteers, the reasons they work there, and their organisational commitment were central considerations for the design. A volunteer organisation has no ties on most staff members beyond their individual commitment to the work of the group and the personal fulfillment they gain by being a member of the group. To maintain a workforce, it is essential that the organisation facilitate cooperation and communication, not just to assist staff in their work, but to some extent to provide a sufficiently positive experience to ensure that they remain committed and continue to contribute their time and skills.

Another constraint that particularly affects a volunteer organisation is the availability of resources. Costs and equipment limitations are often a greater concern than in a for-profit business. CAVEAT operates almost entirely on donated equipment, and they accept what they are given with thanks. Consequently, they have a mix of PCs and Macintosh computers with varying processing speeds and memory capacities. Any system implemented in this environment had to be capable of running on the majority of the computers they have or are likely to be given. Unlike larger-scale PD projects conducted in association with developers, the project group brought only time and knowledge to the development process; all other resources came from CAVEAT. On the other hand, all results of the project including the prototype will remain with CAVEAT and be further developed in house by local experts. This is not always the case with PD projects – often when researchers bring funding they take both funding and prototype away again when they leave [see 1, 4].

Carmel suggests that one of the obstacles to PD may be uncooperative, unmotivated users [8]. We found CAVEAT staff members, in contrast, to be characterized by their unanimity of purpose. While PD researchers in more conventional settings are often forced to confront competing goals of management and workers, our experience with CAVEAT provided an environment with a shared agenda. Any technological aids that might further that agenda were regarded with enthusiasm, rather than apathy or mistrust, even by those individuals who had little computer experience. This is not to say that a small volunteer organisation is without internal politics; but, in this study, the unified commitment to the organisation's purpose tended to outweigh other factors. This provided a welcoming environment for the project group, and for the technological suggestions that we made.

Another reason for the cooperation and enthusiasm shown by CAVEAT staff was no doubt the connection of one group member to the workplace, as he is a long-time CAVEAT volunteer and had helped implement the flat-file system. This brought with it challenges to the overall objectivity of the project group's interactions with the organisation, and particular care had to be taken to ensure that criticisms of the existing system were not stifled by the presence of one of its originators. On the other hand, it facilitated access to people and resources and meant that the project group could share the language of the organisation relatively quickly. Self-awareness on the part of the relevant group member and vigilance on the part of the others helped to prevent the relationship from becoming a disadvantage.

The relatively small number of individuals in the CAVEAT office on a frequent and regular basis meant that we had the opportunity to work in one way or another with

most of the core staff who would be using the system. It also meant that there was little chance that the project group would fall into the trap of thinking of the organisation as consisting of generalised "users" rather than individuals [15]. At CAVEAT, the intimate, informal office atmosphere meant that accommodating the individuality of staff members immediately became an issue for system design. It is interesting to note that in Muller *et al*'s taxonomy of PD practices, the great majority of techniques they classify are suggested for tiny (2-4 participants) or small (6-8 participants) groups [23]. A small organisation may potentially provide a good testing ground for some of these techniques without the fear that the participant group may not accurately reflect the larger organisational constituency. It is further noted in the literature, by more than one author, that many PD studies do not include participation by management: in the collegial atmosphere of CAVEAT there is a somewhat thin line between management and worker, but there are individuals assigned managerial responsibilities, and one who oversees all daily management tasks. The size and nature of the organisation meant that this individual, the Executive Director (and later, Executive Administrator), was by necessity a key participant in our study.

The nature of the prototype presents another area of difference between the CAVEAT case and other reported PD studies. While the majority of reported PD projects involve designing prototype systems "from the ground up," our CAVEAT database prototype was designed using off-the-shelf technology to support end-user computing. The innovation is not in the programming or the development of the technology, but in the database structure, the interface modules, and the surrounding work practice.

CAVEAT users were coping with the series of flat file databases that made up their previous information system, in part because they were better than no system at all. They also had two local experts with considerable skill in designing these databases to meet immediate needs. At the same time, there was increasing frustration, in an environment where people come and go constantly and where time pressure dominates projects, with the inability to figure out what might be stored where, and how to access it. Furthermore, in a system where updates had to be done to more than one database to make a single change, reliability and currency of information were obvious problems. A previous project group recommended that CAVEAT upgrade to the relational version of their previous database system in an attempt to rationalize data management. We agreed it was an appropriate choice for several reasons: first, the early flat-file version is familiar to CAVEAT staff; additionally, it provides the ability to easily modify interfaces for individual users, and it operates across several computer platforms, an essential criteria in this environment.

Kyng points out that when end users and professional designers cooperate through most steps of the PD process, by the time they reach the experimental prototype stage they have established a shared practice of using and

modifying design artifacts [20]. This is certainly the ideal. One of the decisions made in our project, however, was to begin the prototype design from the model provided by the current user-developed systems rather than engage in mock-up exercises. The rationale behind this decision was that as CAVEAT users had their own "experimental" experience before we began to work with them, our role was to respect those artifacts they had developed, using them to build on during the design process. It became clear early in our interactions with CAVEAT staff that they tolerated what they had, but wanted the system to do more and respond to more of their needs. Our contribution was not to bring in a completely new system, but to improve what they had: a change in degree rather than in kind.

However, it is worth noting in conclusion that despite the differences discussed above, the ultimate purpose of the prototype system, which is to support a specific group of participants in a specific organisation, rather than to develop a product for wider distribution, is typical of many PD efforts [9]. There is of course the most pragmatic of reasons for this: to gain an organisation's participation, it is necessary to ensure they will receive some clearly anticipated benefit. Particularly in a volunteer organisation where work time is donated at the volunteer's discretion, there would be insufficient motivation to contribute the substantial time and effort involved in a PD project unless there was some indication that staff contributions to the project would be rewarded with tangible results.

WHAT DID WE LEARN?
Part of project's purpose was to reflect on the utility of PD principles and methodologies in our study situation, based on our experience. From these reflections come some cautions for those approaching such a project for the first time.

1. Gro Bjerknes warns "Take the users seriously!" but then cautions "On the other hand, do not do everything the users propose" [3]. The project group found that in our zeal to be responsive to CAVEAT staff and to take their ideas and practices seriously, we had a tendency to self-censor our ideas if the two conflicted. When we realized that this was the case, however, project group members made conscious efforts to resist this tendency and to present our ideas as options to be discussed. An example of this arose while planning the fundraising module of the database, which will contain information that CAVEAT had not previously collected. We encouraged the Fundraising Coordinator to examine other volunteer organisation's databases, and she came back from her fieldtrips with many suggestions for the CAVEAT system. One idea was to create codes for different donor levels. The project group felt that using descriptive names rather than codes which required memorisation would provide a higher level of usability. Initially we hesitated to mention this because she had clearly put a great deal of effort and thought into her proposals, but when we decided to open the topic for discussion, it proved mutually beneficial. We learned more about her concept of levels, and she began to think about

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the fundraising module as something others might also use.

2. Despite a theoretical appreciation that "participatory design is a collaborative approach to design, not a rigid set of design methods" [13] and that "mediating artifacts and activities must be flexibly adapted to the demands of the situation" [4], the project group was perpetually afraid of "not doing it right." Confidence in our instincts and rapidly growing knowledge evolved over the course of the project, to the point where we felt comfortable making a difficult decision about omitting paper mockups during the prototyping process in favour of studying and discussing artifacts from the current system with CAVEAT staff members. Most projects have time constraints; the final guideline has to be to choose the course of action that will best move the project towards its goal.

3. The instincts of the people with whom the information system is being designed also need to be respected. Lucy Suchman, in "Making Work Visible," cites Agre, who argues that functionality is integrally related to the degree of a user's behaviour it encodes; more behaviour encoded leads to greater functionality, but with a concurrent increase in the degree of prescription the technology can force onto that user's behaviour [25]. At CAVEAT, some workers seemed distinctly aware of the danger of having their behaviour dictated by the system, and to resist it. The best example came while discussing a call-history feature in the prototype. This function was provided in response to staff concerns that people are unaware of others' activities, particularly their interactions with external contacts. However, one person looked at the initial prototype and asked bluntly, "Do I have to fill in that little box every time I talk to someone, and what happens if I don't want to?" What she questioned was whether the change in her behaviour necessitated by this feature will be worth what is gained; in this case, because workshop evidence showed that this was a common concern for a majority of staff, she agreed to experiment with the feature. Call-history was eventually discarded, however, after in-use evaluation.

4. It became obvious during the course of the project that many of the points expressed as problems by CAVEAT staff were issues of organisational policy and management that no information system could address. The project group often felt that the process of learning from staff about their work was in some ways creating expectations about an information system that were far beyond the scope of the project. Simultaneously, as the degree to which the information system and information practices were seen to be related increased, it took effort to confine our attention and suggestions to the system, which was within our mandate, and leave CAVEAT to deal with the rest.

5. The project group began working with CAVEAT with the idea that PD's focus is not only to improve information systems but to empower workers, so that they can codetermine both system and workplace development [9]. What we learned during the course of the project is that it is far easier to believe an ideal than to live it. After the project group had spent hours devising what we considered

an innovative technological response to something that had been presented to us as a problem, it was hard to put both ego and effort aside when CAVEAT staff members did not like it. For example, during the examination of the prototype's first iteration, the process for generating addresses for mailing labels was stated to be "too complicated and inflexible". When the problem was pointed out it seemed obvious. Knowing it to be true didn't make it any easier to hear, however, or to fix. Technology contains within it the power to change organisations; to responsibly participate in the introduction of technology or change in technology in a workplace, we have to, in the words of Dahlbom and Mathiassen, force "our philosophy to confront our practice, and our practices to confront our philosophy" [12].

CONCLUSIONS (THE END OF THE BEGINNING)

Although the project has ended for the group, in some ways it feels like it has only begun. The project was always intended to provide an infrastructure on which the CAVEAT staff could continue to develop their information system. This has been accomplished, with refinement of the prototype continuing in-house. Most PD case studies report that the participants emerged with a greater competence on new technology and willingness to take technological initiatives [9]; at CAVEAT, participants expressed feelings that their understanding of work issues in the organisation had increased, and were willing to experiment with technological solutions to those issues. The prototype will go through further iterations as it is explored in use situations, facilitated by one project group member, but full implementation remains distant.

We came to the project as students of participatory design theory and techniques. Project group members came from varying backgrounds and enrolled in the class with different ideas about what we'd extract from the course, and different levels of predisposition to the principles of PD. While our primary motive at the project site was to work with CAVEAT staff to design an information system that would meet their needs as they defined them, we were also, in class, explicitly exploring and evaluating the techniques we were learning as tools for design. This has implications for our study, as we did not begin with a clear overall plan for interacting with CAVEAT staff and developing the prototype that was based on a comprehensive knowledge of PD options. Our goal remained the same throughout, but the steps we took to achieve it changed and evolved as we learned and expanded on our original ideas. At the same time, however, most PD projects seem to be, in essence, about learning: the mutual learning of designers and/or researchers and the people with whom they work to develop a system, and the individual learning and reflection of the designer/researcher about the results. In many ways, the PD commitment to interpreting actions within the work situation [26] means that the methods need to contain within them the flexibility to permit on-going learning to be reflected in the outcome of the project, be that outcome a more technologically-aware group of people at the project site, a prototype, or both.

CAVEAT's priority as the project developed was to achieve a computer system that would provide reliable and pooled information. The new system's primary direction, based on user comments and workshop results, is to eliminate the duplication and dispersion of information by providing a shared and up-to-date resource. Simply having a system in place cannot dictate procedures of information collection or data entry that support this goal. But the most gratifying moment of the project came after the "final" prototype demonstration, when the Executive Administrator told the project group that working with us through this process has helped CAVEAT to think about the way they worked. She went on to state that the new system, while it would not address all of the organisation's problems with information handling, had taken them to the point where there was "light at the end of the tunnel." It has been suggested that computerization may serve as a "catalyst" that expands the possibilities for organisational change [10]. At CAVEAT, this seems to be the case. We hope we helped.

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