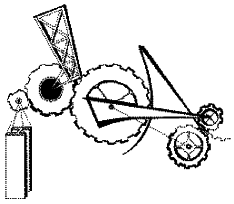


Innovation Φ Development Φ Enterprise Φ Action Φ Service

IDEAS Competition
Cover Sheet

Project Name: Salvation Army Cambridge Corps Drop-In Center Data Collection System

Team Members:

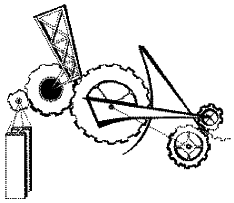
Name	e.mail	Affiliation
Ji-Jon Sit	jijon@mit.edu	MIT Graduate Student, Electrical Engineering
Ben Leong	benleong@mit.edu	MIT Graduate Student, Computer Science
John Pittard	jpittard@use.salvationarmy.org	The Salvation Army Cambridge Corps, Project Manager
Leo Lloyd	lmlloyd@use.salvationarmy.org	The Salvation Army Cambridge Corps, Director of Programs and Operations
Indraneel Chakraborty	indranil@mit.edu	MIT Graduate Student, Computer Science
Cynthia Lo	clo@mit.edu	MIT Graduate Student, Chemical Engineering
Lik Mui	lmui@mit.edu	MIT Graduate Student, Computer Science
Steven Richman	richman@mit.edu	MIT Graduate Student, Computer Science
Archit Shah	ashah@mit.edu	MIT Graduate Student, Computer Science

PrimaryContact:

Name: Ji-Jon Sit MIT ID#: 927092029

Address: 75 Cambridge Pkwy, W1005 Phone #: (617) 253-3881
Cambridge, MA 02142

Document available online at: http://web.mit.edu/ideas/www/download/



Innovation Φ Development Φ Enterprise Φ Action Φ Service

Project Summary (100- 150 words):

In this project, we plan to develop a system to automate the sign-in and data collection process at the Salvation Army Cambridge Corps Drop-In Center. Our basic plan is to issue all shelter clients with a barcoded discount card or key chain tag, and to equip the shelter workers with handheld barcode readers. The shelter workers will scan these barcoded discount cards as services are provided to the clients, and the data from the handheld readers will be transferred to a main database and integrated with ServicePoint (the existing state-wide homelessness database system) at the end of each day. The three objectives that this project aims to achieve are:

(a) to streamline and automate the current data collection process which is unduly labor-intensive and unreliable, thereby improving the accuracy of the data collected;

(b) to allow data which is not currently captured by the existing system to be captured automatically and to provide the capability to perform statistical analyses on the services used by individual clients; and

(c) to act as a proof-of-concept for automated data collection in a community service organization, specifically in the context of a homeless shelter.

IDEAS Competition
Application:
Salvation Army Cambridge Corps
Drop-In Center Data Collection System

ABSTRACT

The Salvation Army in Cambridge provides a large array of services to the homeless population in Cambridge through its drop-in center and emergency shelter. Unfortunately, The Salvation Army collects very little information on the majority of its clients and how they use its services. This problem, not unique to The Salvation Army, is largely due to the inadequacy of information-management systems used by homeless services providers.

The case of The Salvation Army is an example of the larger problem of inaccurate and incomplete data on homelessness. This lack of data is one of the major barriers to improving policies and programs designed to combat the root causes of homelessness. For example, research is already being done to find links, if any exist, between homelessness and health-related issues, or homelessness and educational level. But in the absence of adequate hard data, the results are often questioned, and consequently, increased support for the homeless in these areas is not forthcoming.

Information on how homeless individuals use social services (like those provided at The Salvation Army), especially when correlated with individual demographic information, could therefore be very valuable information for homeless services providers and for researchers attempting to learn more about homelessness. Consequently, The Salvation Army in Cambridge has identified an improved information-management system as a significant need.

When The Salvation Army met up with some MIT student volunteers during the MIT Graduate Student Volunteer Day, the assistance of the volunteers was sought to develop a system that would enable The Salvation Army to capture this potentially important data. We are the MIT team that was formed to help them design and build this system.

The idea to provide all shelter clients with a bar-coded "discount card" is the brainchild of Leo Lloyd, Director of Operations for The Salvation Army Cambridge Corps. It allows for card-carrying shelter clients to be efficiently scanned into an in-house database whenever they receive services like a meal or bed for the night. In order to access many of these services, clients currently are

required to sign in using a paper and pencil. The new system would replace this existing process, producing electronic data which can be used for research and analysis.

To ensure that the card is well received, The Salvation Army will be working with other community partners to provide benefits like meal discounts and free MBTA travel with the use of the card. Further care will be taken to ensure that in its deployment, the interests of the homeless will be protected at all times.

The MIT team, after verifying the technical feasibility of this system, now stands ready to develop the prototype system for The Salvation Army. The goal of our involvement is to ensure that a homeless shelter (like The Salvation Army) is equipped to collect data as accurately and reliably as possible, so that we can better understand how best to serve the needs of the homeless.

BACKGROUND AND MOTIVATION

The Salvation Army Cambridge Corps provides several services to the homeless in Cambridge that together form a continuum of care designed to break the cycle of homelessness. The entry point into its services is the daytime Drop-In Center, which serves over 200 meals a day to homeless men and women and provides shower and laundry facilities, clothing, haircuts, medical consultation and counseling. The emergency shelter houses up to 35 homeless men, and those seeking further help in escaping homelessness may enter the longer-term programs which have the capacity to house and serve over 40 additional men.

This project fills a longstanding need to gather a rich set of information on homeless clients and the services that they use. The Salvation Army shelter/drop-in center desires to build a client information-management system that can enable the staff to accomplish the following tasks:

- Efficiently acquire a more complete record of client information during client intake interviews (first admission into the shelter). These fields might include a record of past shelters visited, reasons for being homeless, jobs held, jobs applied for, etc., in addition to detailed demographic information;

- During a client's stay in the shelter, efficiently collect usage information for the various drop-in center services (meals, showers, laundry, clothing, medical care, etc.). Data on individual service usage will be used for program improvements and may indicate trends in the problem of homelessness that can be researched;

- Keep records of shelter stay information current at all times, such as bed

assignments, check-in and check-out times for each client, and late night arrival information; and

- Generate reports from aggregate data collected for purposes of analysis, such as shelter stay frequency and duration. Aggregate information will be helpful in fundraising efforts.

The Salvation Army Cambridge Corps currently employs a web-based program called ServicePoint for its client data collection. ServicePoint is considered the "best in its class" in homelessness information management and has been adopted statewide as part of a data collection effort led by the McCormack Institute of UMass, Boston. Unfortunately, ServicePoint's web-based interface is very slow and labor-intensive, making certain tasks (such as collecting service usage information) utterly impractical for a large shelter such as The Salvation Army.

After significant experience with ServicePoint, the Salvation Army staff feel that the platform is inadequate for the critical tasks listed above. ServicePoint is capable of facilitating client intakes, but the labor-intensive interface (further slowed down by the wait-time to post information to the internet forms) makes collecting only the most basic intake information practical. Though ServicePoint could in theory be used to track individual service usage, this is utterly impractical, since it would require manually entering hundreds of services into the slow system each day. The Salvation Army does currently use ServicePoint to record shelter stay information, though this information must be entered manually through a cumbersome interface and can take up to an hour per day. ServicePoint is an adequate platform for collecting detailed client demographic information during lengthy needs-assessment interviews. These interviews are only conducted for a fraction of its shelter clients, however.

Faced with these limitations of the ServicePoint platform, The Salvation Army is seeking to develop an automated data collection system that can capture needed information more quickly and more reliably. We thus intend to develop an in-house database that serves not to replace, but to augment the ServicePoint program. This database will be designed to store a rich superset of data specific to The Salvation Army's services, and simply report the subset of data that ServicePoint requires, via a secure conduit.

INNOVATION

This plan is fairly simple in its essentials. Clients would be issued a card with a preprinted barcode when they first enter the Drop-In Center.[1] Staff workers would carry a handheld, scanning device (Handspring/Palm device with attached barcode scanner module) and would scan the client's card each time they offer a service (for example when they provide a lunch, or sign them up for a bed). By doing away with the daily sign-in sheets, this system is also more environmentally friendly.

A general-purpose application will be written for the handhelds to allow the staff worker to select the service offered with the simple click of a button. He would then scan the card at the point of service. The handheld device would record the barcode number, the associated service code, and a timestamp. At the end of each day, the data on the handhelds would be uploaded into the database via a hotsync connection, allowing us to collect patterns of service usage over time. If a client returned on a following day and had lost his or her card, another preprinted barcode card could be issued.

We will also develop a secure interface which would allow us to perform bulk data transfer between the Salvation Army in-house database and the ServicePoint database. With the bulk transfer mechanism in place, volunteer and staff worker will no longer have to deal with the slow and tedious web interface for ServicePoint.

Although the technology is not new, the innovation lies in the application of the barcode scanning technology, coupled with the data integration to homeless shelter service provision. Other existing barcode reader technologies were considered, but it was felt that the Palm handheld approach is the optimal solution at the present time. If the initial prototype proves to be success, we may attempt to implement the data collection over a wireless network. Not only would this eliminate the need for the staff to hotsync their handhelds on a daily basis, but it would greatly increase functionality as well (for example, by allowing the staff worker to confirm the identity of the card's owner at point-of-scan).

The biggest technical challenge may therefore be the fact that we will make the system platform-independent at the outset. We intend our code to be agile and modular enough to swap in a different database platform, or even a wireless network, without grief. By this token, any shelter should then be able to adopt our software with whatever hardware they possess.

[1] Just as Star Market can quickly issue a preprinted card and then enter the personal information into the database later, we could quickly issue cards and then enter personal information at a later time.

IMPLEMENTATION

The Salvation Army Cambridge Corps has already invested significant resources to make this project happen. John Pittard was hired in February as a full-time project manager for this and two other initiatives, and has been spending one third of his time managing this project. We have met with The McCormack Institute, a University of Massachusetts research institute that administers the ServicePoint program, and with Bowman Internet Systems, the company which designed ServicePoint, and have gained their support and begun discussions on how our in-house database will automatically feed into the existing ServicePoint database. We have written to five hardware and software companies seeking equipment and software donations (with replies pending).

The team has had several meetings to work out the vision for the project, as well as put together a preliminary set of design notes (attached as an Appendix). Finally, we have had initial discussions with Peak Technologies, an international barcode integration firm providing hardware, software, and consulting services, regarding the hardware and software requirements for the project. Peak Technologies representatives confirmed that the project is clearly implementable with the technology we are proposing to use.

The following is the expected timeline for the project:

Phase	***Dates***	***Activity***
I	1 Mar -30 Apr	Apply for grants, write to companies for sponsorship
II	1 Apr - 14 May	(a) Overall System Design (b) Work out data structures for database (c) Set up development and deployment servers (d) Familiarization of hardware
III	1 Jun -15 Jul	System Development (details in Design Notes attached as an Appendix)
IV	16 Jul -15 Aug	Initial trials
-	16 Aug onwards	Prototype System fully deployed

We plan to develop the application in 3 phases over summer and to complete the system by August 2002.

In addition to the technical aspects of the project, we are aware that there are other issues with regard to the deployment of the system that require some creativity to address. For example, an incentive structure will be put into place to ensure that clients will be inclined to keep their cards. The Salvation Army of

course will not deny services to any client simply because he/she does not have a card. Thus we plan to investigate how a simple supermarket card will be received in the first place, and then if it is acceptable, introduce our own card in gradual stages. We will endeavor to persuade clients that it will make things more convenient for them, since they no longer have to sign in. We also hope that an attractive design for the card, and the coupling of benefits like meal discounts and free MBTA travel will allow the card to catch on quickly.

Regarding privacy issues, we will give the client the option to preclude as much information as they want from the barcode, so anyone who scans their card will not be informed of anything the client has not already consented to release. In any case, the barcode is simply a number and without the in-house database to interpret that number, no information can be gleaned. Furthermore, the in-house database will be stored on a protected intranet and will not be released to an outside party under any circumstances.

ServicePoint still requires that complete biographic data be recorded for every new client, so these records will be kept separate from what is viewable by a handheld scan of the barcode. For example, the full biographic data can be stored on the in-house database, but to preserve privacy and anonymity, we can program handheld scans to reveal only as much information as the client is willing to disclose. In the most limited case, only demographic information like race and gender will be available on a handheld scan (characteristics which are usually undeniable anyway).

Additionally, the system will be gradually phased-in, allowing Salvation Army staff to inform clients of the new system and to promote the discount card idea. For example, before the cards are ever introduced, clients could be given information on the new system during an intake, giving them an opportunity to ask questions and discuss the system with Salvation Army staff. After this, participation in the first phase of implementation will be purely voluntary. Clients would (hopefully) request for a card, which would provide them with benefits both within and outside The Salvation Army. By the time the system is fully implemented, we hope that a large portion of clients would already have been using the card for some time.

The proposed system will be developed entirely by the MIT graduate student volunteers, with the full support of The Salvation Army Cambridge Corps. The volunteers will be divided into 2 teams (hardware and software). We do not anticipate any major technical hurdles in the implementation of the system, as we believe we possess all the relevant technical expertise. The biggest obstacle may therefore be providing the social impetus for acceptance of the card system. We also intend to invest a substantial portion of time to train the staff workers (after first being trained ourselves!) to deploy the system sensitively.

EXPECTED IMPACT OF PROJECT

Data on individual service usage will be useful for fundraising efforts. For example, if The Salvation Army were able to accurately document how many showers and loads of laundry are provided each year, they would be more likely to secure funding for their sizable water bill. Likewise, if accurate documentation is available on items that are taken from their clothing room, they could tailor their donation requests in order to receive items most needed by their clients.

And while these fundraising benefits are important, the real power of the system we are proposing is that it is able to track service usage on a client by client basis. We hope that this information will allow The Salvation Army to paint a clearer picture of how their program affects individual lives, allowing The Salvation Army to home in on what measures are actually proven to be effective in fighting homelessness. For example, if the chronically homeless use Salvation Army services (e.g. medical consultation and counseling) significantly less than the short-term homeless, this may indicate that an aggressive use of services should be promoted to break the cycle of homelessness. The Salvation Army could test this conclusion by encouraging its long-term clients to use its services more extensively. Alternatively, if the short-term homeless use services less, this might suggest that they have more extensive support networks outside of traditional homeless services providers. Such information could lead to a shift in The Salvation Army's tactics to combat chronic homelessness (for instance it might focus on restoring broken relationships that prevent certain clients from accessing possible support networks).

As another example, The Salvation Army could research whether certain populations, for example immigrants or the elderly, receive fewer services than other groups (i.e. because of language or cultural barriers). This information could lead to changes to improve service access for these groups (by hiring more Spanish-speaking staff, for example).

These are only some of the lines of research that could be conducted given individual service usage data. Though data alone usually cannot prove causation and suggest obvious program improvements, it may reveal important trends, thus focusing further research which can then be used to institute program changes. Additionally, this data will allow The Salvation Army to adequately measure the effects of a program change when it is actually instituted.

In order to design and deploy the system, most of the MIT student volunteers will work with The Salvation Army Cambridge Corps to better understand their procedures. In the process, the MIT student volunteers will

undoubtedly gain some valuable experience working with a community service provider and serving the community.

Should the initiative prove to be a success, there is a significant chance that it will be expanded and adopted by other homeless services providers, both within The Salvation Army and throughout the homeless service provider network at large. Thus, this work can potentially have national implications.

BUDGET

The following is the breakdown of the estimated budget required for the project (see attached Design Notes in Appendix):

Item	***Cost per unit (est.)***	***Quantity Required***	***Sub-total***
Development Server (1.5 GHz Intel Pentium 4, 40 Gig HD, 512 MB RAM 10/100 Ethernet, Windows 2000, 40xCDROM)	$1,000.00	1	$1,000.00
Production Server (1.5 GHz Intel Pentium 4, 40 Gig HD, 256MB RAM 10/100 Ethernet, Windows 2000, 40xCDROM)	$900.00	1	$900.00
Handspring Visor (Reconditioned)	$100.00	3	$300.00
Symbol CSM 150 Barcode Scanner Module	$150.00	3	$450.00
CodeWarrior for Palm OS	$400.00	1	$400.00
Anticipated Miscellaneous Hardware (Hotsync cables, palm accessories, etc.)	$450.00	-	$450.00
TOTAL			$3,500.00

We have applied to several community service grants for funding for this project and also written to several hardware and software companies to ask for donations, namely Handspring, Symbol Technologies, Dell, Gateway and Metrowerks. Of course we will not be purchasing any items that get donated, so money allocated to such items will be returned to any grants that we receive.

OUR TEAM

The following are the short bibliographies of our team members:

- Ji-Jon Sit - Hardware team leader. Second year graduate student in Electrical Engineering, Research Lab of Electronics. Long-time Palm aficionado, with some experience in programming Win32 apps.

- Ben Leong - Software team leader. First year graduate student in Computer Science at the Advanced Network Architecture Group, LCS. Obtained S.B. and M.Eng. from MIT in 1997, currently in the PhD program. Experience in Computer systems design, web applications and databases.

- John Pittard - The Salvation Army Cambridge Corps, Project Manager. Obtained A.B. in economics from Harvard University, June of 2000. Formerly worked as a Business Analyst at McKinsey & Company.

- Leo Lloyd - The Salvation Army Cambridge Corps, Director of Programs and Operations, 1996 – present.

- Indraneel Chakraborty - First year graduate student in Computer Science at the Advanced Network Architecture Group, LCS. Obtained B. Tech from IIT (Guwahati) in 2001, currently in the PhD program. Experience in Computer systems design and programming.

- Cynthia Lo - Third year graduate student in Chemical Engineering, PhD research on electronic structure calculations to study heterogeneous catalysis. Experienced in Linux network system administration, Perl, and HTML, some experience with SQL databases.

- Lik Mui - PhD student in EECS. Rhodes Scholar. Obtained EECS S.B. and M.Eng from MIT in 1995, Management MPhil from University of Oxford in 1997. Experience in computer systems design, web applications and databases.

- Steven Richman - First year graduate student in Computer Science in the Programming Methodology Group, LCS. Obtained B.S. from UC Santa Barbara in 2000.

- Archit Shah - Master of Engineering student in Computer Science at LCS. Obtained S.B. in Computer Science with minor in Biology from MIT in 2001. Worked for two years as software developer at ArsDigita Corporation. Experienced in web applications, web security, and databases.

Appendix

Design Notes for the Salvation Army Cambridge Corps Drop-In Center Data Collection System

Ji-Jon Sit, Ben Leong
{jijon, benleong}@mit.edu

April 17, 2002

1 Background

The Salvation Army shelter/drop-in center needs a client information management system which can enable the staff to accomplish the following tasks:

- Quickly record client intake information, creating additional time during the intake for the collection of other client information to be used in homelessness research (such as reason for being homeless, work history, etc.)
- Efficiently collect aggregate and client-level service usage information for the various drop-in center services (meals, showers, laundry, clothing, medical care, etc.). Aggregate information will be helpful in fundraising efforts, whereas data on individual service usage will be used for program improvements and research on the problem of homelessness.
- Collect detailed demographic information from clients seeking to participate in Salvation Army programs. Record shelter stay information. Generate reports from data collected for purposes of analysis.

The Salvation Army Cambridge Corps currently employs a web-based program called ServicePoint for its client data collection. ServicePoint is considered "best in class" in homelessness information management and has been adopted statewide as part of a data collection effort led by the McCormack Institute of UMass Boston. Unfortunately, ServicePoint's web-based interface is very slow and labor-intensive, making certain tasks (such as collecting service usage information) utterly impractical for a large shelter such as The Salvation Army.

Unfortunately, the ServicePoint platform is inadequate for the critical tasks listed above. ServicePoint is capable of facilitating client intakes, but the labor-intensive interface (further slowed down by the wait-time to post information to the internet forms) makes collecting only the most basic intake information practical. Though ServicePoint could in theory be used to track individual service usage, this is utterly impractical, since it would require manually entering hundreds of services into the slow system each day. The Salvation Army does currently use ServicePoint to record shelter stay information, though this information must be entered manually through a cumbersome interface and can take up to an hour per day. ServicePoint is an adequate platform for collecting detailed client demographic information during lengthy needs-assessment

interviews. These interviews are only conducted for a fraction of our clients, however. Many clients that use the drop-in center and emergency shelter never participate in such an interview, which is strictly for clients interested in participating in one of our long-term stay programs.

After significant experience with ServicePoint, the staff at The Salvation Army see a clear and significant need for an improve information management system. It is envisioned that after the system is deployed, each homeless person (client) who uses any services would be issued with some form of identity (ID), perhaps some barcoded card or smart card. At registration, the client's information would be recorded by a staff member and stored in the database. Each time the client uses a service offered by the Drop-In Center or Homeless shelter, a staff member will scan the ID and record the usage. The aggregated data can use then be used to compile statistics on the various services as well as correlate consumption to the client demographics.

Why is this important? Although social welfare agencies like the Salvation Army may have strong suspicions that certain underprivileged groups really need more support and funding than they are currently getting, it is impossible to bring about any change in the status quo without the backing of cold, hard data.

The data collected from a shelter like the Salvation Army can show if, say, mental health patients actually comprise a largely overlooked homeless population. Addressing mental health may be more important than the state currently acknowledges. Or, homelessness may really be more of a problem with education – and that improving a certain stage in the educational ladder with an eye on groups-at-risk could help allieviate homelessness more than tackling homelessness by itself.

Hence ServicePoint. However, the data funneling into the ServicePoint database from across the state is crippled and useless if we cannot collect and report it accurately. Also, the present system for data transfer to ServicePoint is via a web interface, which is both labour-intensive and slow. The new system is anticipated to bring the following benefits to the Salvation Army homeless shelter:

- Allow data to be captured more efficiently and accurately than the current sign-in sheet system, which is both error prone and inefficient.
- Allow the Salvation Army to maintain its inhouse database, capturing information which ServicePoint does not capture (e.g. the number of meals served and the clients served).
- Allow for a faster, more efficient and less labor-intensive transfer of data from the Salvation Army to the ServicePoint database.

This system for the Drop-In Center will be a proof-of-concept for automated data collection. If the system works, there is a significant possibility that it will be adopted at other Salvation Army shelters nationally and internationally, and potentially at non-Salvation Army shelters as well.

2 Design Considerations

The following are some important considerations which will govern and guide the design and implementation of the new system:

- An existing application called ServicePoint is currently used for data collection purposes. The new system must be able to complement ServicePoint and integrate/share data with ServicePoint.
- The client machines are likely to be a mixture of Windows variants and possibly even be Macs, so any deployed client programs must be able to run on all these platforms without major porting/re-coding.

- The database application has to be sufficiently modular to enable new services to be added and integrated with existing data. For instance, if a client is a registered user of the Drop-In Center and later a module for the homeless daycare services is developed for the system, his biographic data should be available to the new module (i.e., for statistical/report generating purposes).
- Maintainability is a key consideration since the development team will be handing the system over to the Salvation Army or McCormick Institute for maintenance once the system is deployed. There will be a need for all programmers to adhere to a coding convention and interfaces must be clearly defined. All codes must be well-documented and commented.
- For the clothing store, it might be good to allow requests to be captured and to be able to record exactly what items are given out. For the latter, perhaps bar-coded stickers may be printed and pasted on the items so that they can be scanned as well.
- We will need to design our very own barcode encoding. In designing code, there is a need to ensure that the address space is sufficient to support any future needs.

3 Preliminary System Design

3.1 Overview

The development team will be divided into 2 groups - "interface team" and "database team". The groups will be led by Ji-Jon Sit and Ben Leong respectively. Broadly, the interface team will be in charge of everything on the client Windows PCs, while the database team will be in charge of everything at the server end.

At the client PC machines (running Windows), the interface team is expected to develop and manage the following 3 components:

- Visor (Palm OS) Software - To allow the visor to scan and collect barcodes and transfer the necessary data to the client PCs.
- Client PC (Windows) Interface Software - Simple program that runs on the client PCs which would transfer the scanned data from the visor to the database through ODBC.
- Barcode printing software - To print the bar-coded tags (on stickers).

We are likely to run Windows 2000 on the server and the server will have 2 main components:

- Microsoft SQL Server - To store all data and respond to SQL queries.
- Apache Web Server (with php support) - To run a web application which acts as the interface to the database.

Figure 1 shows an overview of the proposed system. Standard interfaces, i.e. http and ODBC were chosen to ensure that individual components could be replaced if necessary without requiring changes to other components.

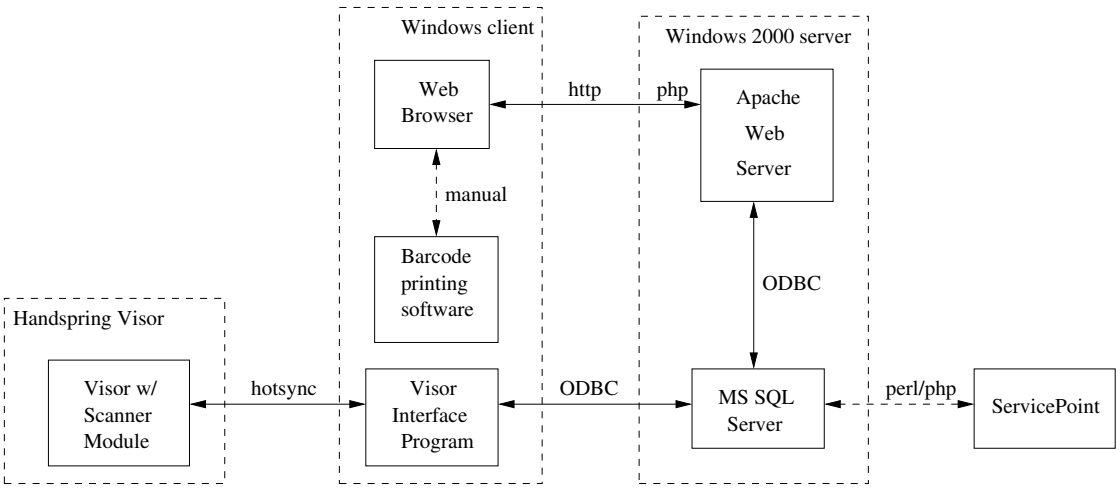


Figure 1: Overview of System Design

3.2 Client Identity Card

We considered the possibilities of using a bar-coded card, a GEMS smartcard or a RF-detectable smartcard. The Director of Operations had indicated that it would be preferable if the device to be used to scan the IDs could be portable and carried by the staff at all times. Also, the device should also be general purpose, in that it can be set to capture data for all the available services. For instance, a staff would use this device to scan IDs as food is collected by the clients; a while later, he/she could be standing outside the clothing store handing out clothes and using the same device to record the items distributed.

With these requirements and with due consideration to availability and cost, we have decided that the Handspring Visor with a bar-code scanner module would be selected for development of the prototype system. At the end of each day, the Visor would be synced with a PC and the information aggregated into the main database server. As the interface used for the database is a fixed standard (ODBC), the data-collection component may be replaced with another technology, i.e. RF-detectable smartcard, if such becomes available and its deployment becomes feasible.

3.3 Registration Host & Barcode printer

It is likely that registration will be done in one of the following ways:

- A set of cards would be pre-printed. After entering the client information into the computer, the staff worker could just enter the code for the preprinted card and that barcode number would be attached to the record.
- We can have preprinted sheets of stickers, and we can just take a sticker off quickly and put it on the card. This also has another advantage. The preprinted sheet could have 2 of each sticker. That way if there were 15 people standing in line at once waiting for a card, we could pass out forms for the clients to fill out while they are in line with their basic demographic information. When they get to the front of the line, we put one sticker on their card and one matching sticker on their form (which we then keep). Then later on, during a quieter time, we could manually enter that information into the computer and scan the sticker on the form to attach the appropriate barcode to the record.

It would probably be good to integrate the 2 steps without requiring a human to type in the numbers all over again and reduce errors. Also, it is clear that the web interface may not be flexible enough for us to deploy the most user-friendly interface. However, upon careful deliberation, we decided that the following two factors make the web interface the preferred choice for the prototype system:

- It is platform independent. Regardless of the client machine type (whether Windows or Mac), a web browser will definitely be available.
- Ease of deployment. Essentially, in case of upgrading, there is little overhead in deployment because only the server has to be modified. If we ran scripts on the clients machines, some way has to be devised to distribute application updates which will complicate our lives at this point.

In any case, it is clear to us that the most important component of the project is not the database interface, but the data collection and database integration system. When the initial system is deployed, we can possibly replace the web interface with some client-side scripting program (perhaps in Ruby) which can communicate with the Microsoft SQL Server directly through ODBC.

3.4 Scanner

This is the most important component of the project. We will require software on the Handspring Visor to allow us to scan and store the data scanned from the barcodes on the ID tags. It is not likely that the available software for the Palm OS will be able to support the user interface we need so it is likely that we will have to write our own application to do the work.

The interface on the Visor envisioned is one where the user should be able to click on a little button which indicates the service type, say "lunch" or "laundry". Then, perhaps the user will then hold the scanner over a barcode and then press one of the buttons to scan. The application will then log down the user ID, service provided and date/time.

In the case of clothing supplies, there are 2 possible approaches. In the first approach, the user selects "clothing" and scans the ID. Then, the user manually enters all the items given to the client using the interface. In the second (and we believe preferable) approach, all items are also barcoded, so the user scans the ID and then proceeds to scan the barcodes on the distributed items and the application will record the user ID, item distributed and date/time automatically. The application will also have to understand the encodings for *clients* and *items* so that it can do the right thing.

3.5 Synchronization Program

A simple windows application would have to be written to synchronize with the Visor and to transfer the collected data directly to the Microsoft SQL Server directly through ODBC. We have not decided on developmental platform for this application. The choice would depend largely on the comfort level of the programmer assigned to this component, perhaps Visual C++ or Visual Basic?

3.6 Server

We intend to run Windows 2000-based server and install both Apache and the Microsoft SQL Server on the machine. All interfaces with the SQL Server will be through ODBC and since Apache has native php support, the database application will be developed in php.

Two servers will be set up for this project. The production server will be set up on the Salvation Army Cambridge Corps network, while the developmental server is likely to be set up at LCS, since most of the developers are likely to be based in LCS. When the project is completed, the development server will be moved onto the Salvation Army network as set up as a backup server for the production server.

3.7 Interface with ServicePoint

ServicePoint is a hugh database program. Although the Salvation Army only uses a subset of its functions, it would be prudent for us to import the entire schema of the ServicePoint database to allow for easier data interface between the two systems. We will need to discuss with Bowman (the software company that developed ServicePoint) how they can share their database schema with us and how data can be uploaded to ServicePoint database. We do not expect them to grant us direct Internet access to their database and hence it is likely that information would be exchanged in the form of an interface file. Once the format is decided, it is likely that we will write a script (perhaps in perl) to extract the information from the database to generate the required file. It is possible to use php as well and integrate the file generation with the Registration program.

In addition to the ServicePoint database schema, we will also have to develop an in-house schema to support the capture of data which we will require locally and is not captured in ServicePoint. It is anticipated that this will require a substantial amount of effort as care must be taken to ensure that the schema designed is efficient and yet modular enough to allow new services to be integrated into the system without code modifications, if possible.

4 Anticipated Requirements/Budget

The following is the breakdown of the expected budget (approximately $4,000) for the major items for the project:

Item	**Cost per unit**	**Quantity Required**	**Total**
Development Server (1.5 GHz Intel Pentium 4, 40 Gig HD, 512 MB RAM 10/100 Ethernet, Windows 2000, 40xCDROM)	$1,000.00	1	$1,000.00
Production Server (1.5 GHz Intel Pentium 4, 40 Gig HD, 256 MB RAM 10/100 Ethernet, Windows 2000, 40xCDROM)	$900.00	1	$900.00
Handspring Visor (Reconditioned)	$100.00	3	$300.00
CSM 150 Barcode Scanner	$150.00	3	$450.00
SPT 1500 Pocketable Computer (4MB)	$400.00	1	$400.00
Barcode Printer	$500.00	1	$500.00
CodeWarrior for Palm OS	$400.00	1	$400.00
Microsoft SQL Server 2000 (Production Version)	$1200.00*	1	$1200.00*
Microsoft SQL Server 2000 (Development Version)	$500.00*	1	$500.00*

*Not included in budget.

Since we do not not have a budget, we intend to approach the respective companies to see if they would be willing to donate some equipment for a good cause or give us a discount on their products. With regard to the Microsoft SQL Server 2000, we plan to seek a donation from Microsoft. If we are unable to secure a donation, we will run instead run a postgres server with ODBC drivers on Linux.

5 Projected Project Schedule

The current projected schedule for the project is as follows:

Phase	Date	Activity
I	1 Mar - 30 Apr	(a) Apply for grants, write to companies for sponsorship (b) Preliminary system design and mustering of manpower
II	1 Apr - 14 May	(a) Acquisition and familiarization of available hardware/software (b) Work out database schema (c) Set up development and deployment servers (d) Refine overall design & define interfaces
III	1 Jun - 15 Jul	System Development
IV	16 Jul - 15 Aug	System trials
V	15 Aug onwards	Prototype System fully deployed and functional (hand over to Salvation Army)

6 Volunteers

The current list of MIT graduate student volunteers who are involved in the project is as follows:

S/N	Name	Department	Email
1	Indraneel Chakraborty	Computer Science	indranil@mit.edu
2	Ben Leong (leader: database team)	Computer Science	benleong@mit.edu
3	Cynthia Lo	Chemical Engineering	clo@mit.edu
4	Lik Mui	Computer Science	lmui@mit.edu
5	Steven Richman	Computer Science	richman@mit.edu
6	Archit Shah	Computer Science	ashah@mit.edu
7	Ji-Jon Sit (leader: interface team)	Electrical Engineering	jijon@mit.edu