# DEPARTMENT OF NEIGHBORHOOD DEVELOPMENT

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SUBMITTED BY:

MATT BOUDREAU

MAGGIE ELBAG

KYLE MCALICE

KEVIN MARTINEZ

ADVISORS:

PROFESSOR SUSAN VERNON-GERSTENFELD

PROFESSOR ARTHUR GERSTENFELD

LIAISON:

BRIAN GOODMAN, DEPARTMENT OF NEIGHBORHOOD DEVELOPMENT, CITY OF BOSTON


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## Executive Summary

The goal of our project was to recommend ways to improve the Boston Community Change (BCC) program's internal database, as well as ways to expand the program itself through integration with other card based programs. We accomplished this goal by completing our two objectives. The first objective was to perform a data analysis for the program. We mined the existing data which enabled us to determine the gaps that existed and make a recommendation on what additional data the Boston Community Change program should collect. We also found new ways to represent the data, using pivot tables and various mapping techniques.

The second objective was to explore options of integration with other card-based programs in the city. We examined the Charlie Card system that the MBTA utilizes, the student ID cards that colleges and universities employ, and the potential card system that youth programs in Boston may be implementing in the near future. This research enabled us to make recommendations on which system would be most valuable to integrate the Change Card with.

The data that we analyzed was split into three categories. One category contained data about the cardholders, one for the beneficiaries, and one for the merchants. After examining the data, we extracted the most important aspects it contained, and organized them in a tree diagram; a data mapping technique that we found best organized the information. After organizing the data this way, we interviewed urban planning scholars, local districts managers, and participating business owners. This enabled us to determine what gaps existed in the data and how they could be filled.

We found that demographic and psychographic profiles were missing for the cardholder. Other pieces of missing information included the frequency and location of the transactions the cardholders were making, as well as the name of the nonprofit they had designated as their beneficiary. Without this information, there is no way of understanding the behavior of the cardholders. If this information were collected, the BCC could use it for marketing purposes, as well.

Missing information for the beneficiaries was the frequency and location of the transactions where the donations were coming from. If this information were collected, the BCC could easily link the transaction among the cardholder, its beneficiary, and the merchant.

The merchant data was missing the type of store, as well as the location and frequency of the transactions being made in the store. Most importantly, however, there was not enough sales data being collected for the merchant. In order to prove the program's success, we found that there has to be some way of comparing the program to an outside source. An assessment could be made by comparing the sales data of the merchants to the personal income data of Suffolk County from the Bureau of Economic Analysis. Theoretically, sales should grow as fast as income. When compared, if the growth in sales for participating BCC businesses is greater than the growth in income for Suffolk County, then it is clear that the program is successful. This comparison could not be made at this time, however, because there is not even data from the merchants, nor is there recent enough data from the Bureau of Economic Analysis.

After making this analysis, we organized the data using pivot tables and charts. Pivot tables and charts allowed us to compare activity of the cardholders, merchants and

beneficiaries to specific parts of the city. In using this technique, we found that Jamaica Plain had the most transactions made by cardholders, followed by Roslindale and then Boston. However, when compared to sales volume, Roslindale had the greatest total money generated in its area, followed by Jamaica Plain, and then Boston. Additionally, places like West Roxbury and Dorchester which had very few transactions, were generating a significant sales volume.

We found these same trends again when we formulated a map using a geocode website. An interactive version of this map can be found at the following link: http://www.batchgeocode.com/map/?i=a7e26cf66494a8ad9b7b523da37ec2b8. When using the interactive version online, all of the dots representing cardholders, merchants, and beneficiaries can be clicked on. When clicking on it, a window pops up showing the address, a zoomed-in image of the street map, and the number of transactions made, or donation total for beneficiaries. By double clicking on the dots, directions to the location can be obtained, as well as a satellite image street view of what is around the site. The map clearly visualizes that Jamaica Plain has the greatest quantity of cardholders and merchants located in its vicinity.

The second mapping technique we used was heat maps. Heat maps use different colors to distinguish between different sets of data. We were able to observe from these maps that many districts have a significant amount of businesses signed up for the program, but they have very few transactions made there.

After extensive research, we found that integration with any of the three options mentioned above would be extremely beneficial for the Boston Community Change program. If the two cards integrate, it will automatically increase the number of BCC

cardholders immediately. This increase will create awareness of the program, ultimately attracting more businesses and cardholders and thus, generating more money for the neighborhoods. There would be no technical barriers to integrating the Change Card with any of the three named options.

We also did extensive research to find the benefits and drawbacks that would exist from integration. Some of the benefits that would attract the MBTA are: good public relations, increased revenue, and the opportunity to generate donations for a nonprofit of their choice. If the Change Card were to be integrated with student ID cards, one major benefit for the school would be that even though they would pay for the cards initially, over time they would be completely paid for. One drawback, however, would be privacy issues of the student. A student may not want a Change Card, nor have their information given to Boston Community Change. The same privacy issues that arise with the student ID cards would also play a factor in integration with the youth cards. Additionally, the youth programs in the city may not even use a card in the future. If they did however, Boston Community Change would be able to play a part in it from the very beginning since it is such a new idea.

From this research we were able to make a clear set of recommendations to the Boston Community Change program. All of this information should be only voluntarily given by the cardholder, merchant, and beneficiary. The information indicated below should be solicited in a range.

At point of sign up the following should be collected:

- Cardholder Data: Age (Range), Gender, Ethnicity, Income (Range), Educational Attainment (Range), Occupation, Name of Beneficiary, Hobbies, Interests.
- Merchant Data: Type of Store, Base Revenue (Range).

At point of sale the following should be collected:

- Cardholder Data: Date and Location of Transaction.
- Beneficiary Data: Date and Location of Transaction.
- Merchant Data: Date of Transaction.

An anonymous survey should collect the following information:

- Merchant Data: Type of store using the North American Industry Classification System (NAICS), Yearly Sales (Range), and if the store is marketing using the BCC program.
    - NAICS uses a six digit code to classify and measure economic activity for businesses. This will provide a standard and consistent way to classify businesses taking part in the program.

Additionally, we recommend that the BCC continue to collect personal income data yearly for Suffolk County from the Bureau of Economic Analysis so that they may compare this with the sales data they collect on the survey. This will provide a gauge of success for the program. We also recommend the use of pivot tables to best represent the data.

We recommend that the BCC contact the MBTA immediately for a co-branded card. Below are the steps that the BCC should complete to begin integration of the cards.

1. Draft a proposal to present to Scott Henderson, a MBTA Project Engineer, which outlines how integration of the two cards will benefit the MBTA, neighborhoods, and consumers.

2. Scott Henderson will then draft his recommendations based on the proposal which he will then pass on for further approval.

3. If approved by the MBTA, the BCC can order co-branded cards directly from Giesecke and Devrient and begin to distribute them immediately.

We recommend that the BCC perform a more detailed study on the integration with student ID cards and the youth programs' potential card.

# Contents

# Tables

# Figures

# ABSTRACT

The goal of our project was to recommend ways to improve that Boston Community Change (BCC) program's internal database, as well as ways to expand the program itself through integration with other card based programs. After completing a data analysis, we found the gaps in the existing database and we visually represented the data in pivot tables and maps. We recommended that the BCC collect data at point of sign up, point of sale, and in a survey administered to the merchants. The BCC may use this information to perform more efficient marketing techniques and to prove the program's success. We did a thorough research of smart cards and recommended that the BCC integrate cards with the MBTA, and possibly local colleges and youth programs.

# CHAPTER 1: INTRODUCTION

Modern society is filled with chains and big businesses that dominate most markets. At the same time, local businesses and organizations are struggling to maintain their existence. Especially within cities, it is important to keep small businesses operating for a number of reasons. A strong set of small businesses in a community creates jobs, supports community growth and well being, and gives the people a sense of pride. Even though many independent businesses are being driven out of operation, some have been proven to be boosted economically by chains. For example, Degroodt (2000) says in the Business Review of Albany that local coffee shops welcomed the arrival of the feared Starbucks chain. They saw it as an opportunity for people to become more appreciative and aware of the gourmet coffee market. This attitude suggests the ability to maintain a strong independent community market.

It is evident that chain stores are being established in communities across the nation at a rapid rate. According to Milchen (2005), however, it is a growing debate whether or not these new chains help or hurt independent businesses in the area. It is not always a clear answer, due to many exceptions. As stated by Mitchell (2003), chains not only take away from local businesses with their low prices; they sometimes serve to benefit small businesses because they attract more shoppers and promote competition that can help surrounding businesses. In some cases, independent owners may not wish to drive chains out all together, as was the case with the Albany example explained above. For example, a large chain may give consumers confident feelings about shopping in a given area.

According to Lewis (2004), stores that have been in existence for decades are falling victim to a recent surge in chain stores. One example that Lewis (2004) highlights is a case in which a popular hardware store suddenly lost nearly a third of its business and was forced to shut its doors when a Wal-Mart and Lowe's opened nearby. Milchen (2005) gives another example in Barnstable, MA, in which a chain store opened and immediately had negative effects on the local community. The presence of the chain store eliminated more jobs than it actually created, and more tax dollars were spent in safety and liability costs. Milchen (2005) also explains a disturbing study done by AMIBA and Iowa State University, done in 1995. The study found that the majority of Wal-Mart's sales dollars shifted money directly away from local businesses.

Mitchell (2003) explains that the presence of local businesses has an effect on a large area. He explains that in an area in Maine, independent businesses spent 40 percent more of their revenue within their local area compared to a chain store. The reason their revenue remains local is the result of the small businesses purchasing inventory from other local businesses, employing local citizens, and patronizing local utilities companies. The result of more revenue remaining in the local community is beneficial to other independent businesses in the area. This benefit is far greater than a chain store could provide. Milchen (2005) shows that every one hundred dollars spent in Austin, Texas at a chain store returned thirteen dollars to the community. When the money was spent at a local business, nearly half of the money remained in the local area. The larger issue is how to promote local business, allow chains to coexist, and build community strength on top of it.

According to the Interra Project website (2008), ethnic-based organizations fill different neighborhoods, each of which are associated with various groups. The Interra Project is a nationwide initiative that was created to promote local businesses and encourage local shopping in order to improve one's community. This initiative is also aimed at preserving local dollars that are being lost to businesses that are not owned locally. Exploring ways to urge shoppers to strengthen their community can serve to benefit local businesses. For example, The San Francisco Chronicle (2005) states that San Francisco shows independent businesses re-circulating much more money back into the community than chains can. This is due to a shift in advertising that aims to promote business by appealing to shoppers in a more sentimental way. Advertising aimed at an individual's community pride is being implemented to get people to wish to strengthen their community through promoting independent business.

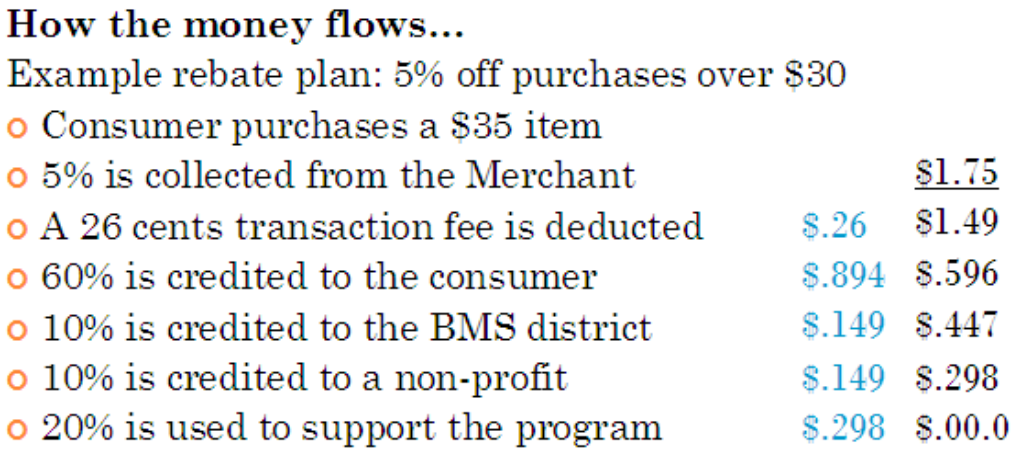
In Boston, efforts are now being made to strengthen communities through independent businesses. One such effort is through the Interra Project. The program is creating awareness of the issues plaguing local businesses and communities to encourage local shopping. The result is improving local businesses and strengthening community non-profits. The Interra project made Boston its pilot city. Shortly after, Interra launched a Seattle-based program, as well. Programs in Ohio and England will be implemented in the near future. Projected goals estimate trillions of dollars being shifted towards community growth, independent business, and the restoration of local economies worldwide (www.interraproject.org, 2008).

In Boston, the Interra Project is operated by The Department of Neighborhood Development. This program is called Boston Community Change (BCC). BCC is a

program that has experienced growing popularity and success for approximately one year (www.bostoncommunitychange.org, 2008). Their program uses a card called the Change Card. Over 170 businesses have subscribed across 19 neighborhoods in Boston. Each neighborhood is organized geographically but operates under the same Boston Community Change initiative. The Boston Community Change program is just the beginning of the goals of the Interra Project.

The card encourages shoppers to patronize local businesses through a series of rebate promotions. A portion of every dollar that is spent at a participating business is given back to the individual in two ways. Part of an individual's purchase comes back to the person in the form of a rebate that accrues over time. Part of this rebate is automatically given to either a school or a community non-profit organization of their choice. The figure below illustrates the way in which the rebate is split up among the cardholder, the beneficiary, the BCC program, and the Boston Main Streets District. See Figure 1: Money Flow. These rebates encourage people to strengthen the communities in which they live by shopping locally.

**Figure 1: Money Flow**



In order to set the stage for the change card to achieve success, an important issue had to first be addressed. The issue was getting the Change Card to be useable on multiple software platforms and independent hardware systems without being a form of credit card. This was an issue that had been hampering programs of this nature up until this point. An existing program in Santa Fe shows the flaws in such programs. Cards of all types run on various software and hardware systems. In the past, the only way to create a card that was compatible with independent systems of all types was to establish a form of credit card. To make a card that was not a credit card and did not operate on a major credit card system, would mean independent businesses that subscribed to the program would need to spend thousands of dollars upgrading their software and hardware to work with the program. Santa Fe was forced to create a credit-based card. Those issues may have limited the success of the program and needed to be addressed.

According to the Interra Project Website (2008), Boston Community Change found a way to eliminate the issue of Change Card usability. BCC has established a contract with MasterCard which allows the Change Card to run on their universal system without being a credit card. Without the contract, it is possible that Boston Community Change would experience similar problems as Santa Fe. It would also mean that Boston Community Change would need to format a universal software system that was unique to their program in order to operate such a card.

The first year yielded much growth and awareness for the Boston Community Change program. The technological barriers have been solved, and the awareness of the program within the community has grown. The goal of our project was to recommend ways to improve that Boston Community Change program's internal database, as well as

ways to expand the program itself through the integration with other card based programs. We will fulfill this goal by completing the two objectives described below.

Our first objective will be performing data analysis for Boston Community Change. They have an extensive existing database that will be fully accessible. We will be mining the existing data provided in the Boston Community Change databases. These sets of data will include information on the cardholder, merchant, and the beneficiaries. Mining this data will allow us to create a hierarchy of data, based on the usefulness of existing data, enabling us to recommend what data the BCC needs to collect in order to fill in the gaps with relevant information. After analyzing the data we will be finding ways to visually represent that data to show the impact the program has made across the city.

The second objective will be to explore options of integration with other card-based programs in the city. This can be explored once there is sufficient relevant data in order to evaluate the program. Boston Community Change and the Interra project have plans to integrate the Change Cards into other popular programs within the city. Such integrations would serve to enhance the success of the Boston Community Change program as well as making a convenient way to allow multiple programs to promote each other. We will be exploring potential integrations with the MBTA, youth programs, and local colleges. An example of this would be making the Change Card and the Charlie Card (MBTA) available on one single card. Each time an individual uses public transportation it will be counted as a transaction identical to that of a purchase in a member store or business. In order to make such expansions a reality, we will need to analyze strengths, weaknesses, and threats to these options. We will be conducting

interviews with members from the MBTA and other such organizations in order to show why this integration would be beneficial to all.

Ultimately, through the completion of these objectives, we can fulfill our goal of providing a set of recommendations that the Department of Neighborhood Development can use to improve the Boston Community Change program.

# CHAPTER 2: BACKGROUND

In this chapter, we will review the effects that certain chain stores have had on surrounding independent businesses in various communities. We will discuss the advantages that chain stores have brought to a small business and its community. We will also examine the disadvantages associated with chain stores and the detrimental effect these stores have had on smaller, independent stores. In addition, we will identify the need for revitalization of local shopping and where action is being taken to achieve it. The next section of this chapter will examine the technology behind Smart Cards. It will give a detailed description of the system needed to run Smart Card technology, as well as identify where it is being used in Boston today. These topics addressed will assist the reader in identifying the importance of our objectives and how we will use this to complete our main goal of recommending ways of improving the Boston Community Change program.

## Helping Local Businesses

Large chain stores can help a community and its businesses. The Wall Street Journal describes a Starbucks 'reverse jinx' in which the opening of Starbucks stores has

boosted the business of local coffee shops surrounding it ("Despite Growth," 2007). One explanation for this boost in business is that Starbucks has marketed the idea of coffee drinking to more people, thus making it more popular. The Wall Street Journal explains that people are now attracted to all different kinds of coffee and cappuccinos, but they buy them for cheaper prices at their local coffee shops ("Despite Growth," 2007). Clark (2007) provides data from the Specialty Coffee Association of America that claims from 2000 to 2005, Starbucks has tripled in size and the number of local coffee shops has increased from 9,800 to 14,000. In addition, the association also claims that across the nation, 57 percent of all coffee shops are still "mom and pop" type places. Another example Clark (2007) includes in his article is that in 2002 Starbucks opened six new stores in Omaha, yet business for every single coffee shop in the city went up as much as 25 percent.

According to Roberts (2007), Wal-Mart's low prices are enough to put local stores out of business. However, Hammer (2006) disagrees, explaining that Wal-Mart has spent $1.5 million to support failing urban communities they have opened stores in during the past two years. The program is known as the Jobs and Opportunity Zones (Schroeder, 2007). Hammer (2006) explains that Wal-Mart has helped communities by spending the $1.5 million on financial grants, ads, and training seminars for small local businesses located around the newly opened Wal-Mart stores. The chamber of commerce in each community received a $50,000 donation as well. In addition, each quarter, five local businesses are put in the "Small Business Spotlight." When in the spotlight, these five businesses receive advertisements in local newspapers and on Wal-Mart's in store radio ("Wal-Mart Announces," 2006).

The new Wal-Mart stores were opened in distressed urban neighborhoods. The people living in these neighborhoods not only benefited from low prices on food and other living essentials, but a new job market was also created. According to Lewis (2007), there was fierce competition for the new jobs; when a Wal-Mart opened in Cleveland as part of the program, 6,000 people applied for about 300 jobs. Similarly, in Chicago's West Side, 3,000 people applied for jobs at the new Wal-Mart that is also part of the Jobs and Opportunities Program ("Wal-Mart Hopes," 2006).

## Negative Effects on Local Businesses

There are many claims that argue chain stores are harmful to small businesses. The Wall Street Journal published an article in January 2008 about how the number of independent bookstores has decreased over the years due to the competition from chain stores and online shopping. Popper (2008) backs up this claim by giving an example of this from the American Booksellers Association: in 1993, the association reported having 4,000 members, and in 2008 that number has dropped to 1,800. In addition, Popper (2008) claims that less than half of all books are sold in actual bookstores because stores like Costco are now selling books for a cheaper price.

In recent years, small businesses have had to ban together to fight off the competition of large chain stores. According to Hagerty (1999), hardware stores have joined cooperatives like Ace Hardware and TruServe in order to buy their products for a cheaper price; that way they can compete with the low prices of chain stores. Jackson and Smart (1997) explain that the top two cooperatives have been forced to merge to form bigger nonprofit cooperative buying groups. The cooperatives merged to reduce buying costs as much as possible, keeping small independent hardware stores alive.

Another example of this took place in Durango, CO. There, coffee shops have found that working together they can compete with places like Starbucks. According to Gangemi (2006), three different coffee shops in the neighborhood used the same promotion at the same time. In addition, they continually give out coupons that work in each of the three stores.

A new campaign has been launched by the United Food and Commercial Workers International Union called Wake Up Wal-Mart. According to an article referred to earlier, Wal-Mart provides hundreds of jobs for people in a community (Lewis, 2007). However, what this article left out is what these employees are really being paid. A sales associate working for Wal-Mart in 2001 earned $13,861, while the poverty line for that year was $14,630. In 2005, Wal-Mart claimed its average associate earned $17,114, and in that same year a two person family needed $27,948 for basic needs ("The Real Facts," 2008).

Colin and Bernstein (2004) describe how the presence of a Wal-Mart can also cause pay cuts at other stores in the area because of the effect it has on the unions. Wal-Mart provides so many jobs, but with low salaries, so stores within the same union are forced to lower their salaries as well. Colin and Bernstein (2004) also point out the fact that Wal-Mart fails to provide health care for all of its employees and in 2004, 53 percent of Wal-Mart employees were not covered by the company's health insurance.

In addition, big chains like McDonald's, Target, and Lowe's only offer limited benefit health plans, in which employees receive $1,000 a year for health insurance (Terhune, 2003). Most of the time, this plan is offered to low income employees. The

problem, however, is that the plan is limited; it is not possible that the plan can cover any sort of serious illness (Terhune, 2003).

## Revitalization of Local Shopping

Whether or not chain stores have helped or hurt a community, the revitalization of local shopping is necessary and widespread. A study done in 2002 by WPI students on London neighborhood shopping concluded that local shops needed to be revitalized. The report claims that neighborhood shopping needed to be revived in order to attract people back to neighborhood shopping, thus supporting the community. In Santa Fe, a loyalty program called Locals Care was initiated in order to attract customers to locally owned businesses instead of large chain stores ("Innovative Program," 2006). In addition, the concept of New Urbanism is being promoted by urban planners all over the country to enhance neighborhood settings by making retail stores and services more accessible to people who arrive on foot instead of those who arrive by car ("Creating Livable," 2008). So whether chain stores have helped or hurt a particular community, it does not change the fact that local shopping is necessary for the well being of the neighborhood.

## Smart Card Technology

Holcombe and Hunt (2004) explain that a smart card system is made up of the following components: the card, the equipment and software, and the management system. The smart card is a credit card-sized device that contains an integrated circuit chip (ICC). The chip acts as a mini computer, which can carry out many different functions when it is programmed to do so ("Microsoft Windows," 2000). One major function the ICC provides is security. The ICC can allow its owner to access physical

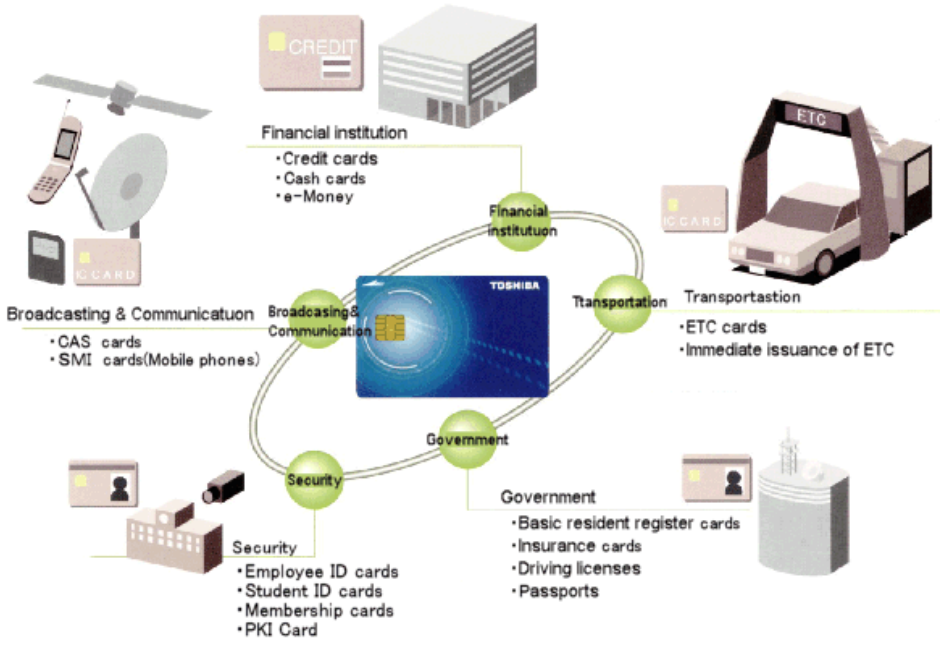
places, like buildings and parking lots, as well as places on the Internet (Holcombe & Hunt, 2004). An integrated circuit chip in a card can also be programmed to act as a credit, debit, or stored-value card. In addition, because it provides so much security, the card can be used to access financial accounts ("System Planning," 2008). The ICC provides extensive memory. One example is that it can store a person's medical information. That way all of their information can either be accessed in an emergency or at regular check ups instead of through hard copy documents (Holcombe & Hunt, 2004).

Holcombe and Hunt (2004) go into great detail on the major types of cards that are used. The first type of smart card that is available is a contact smart card. In order to exchange data, this card must be inserted into a reading device for a direct physical connection. A contactless smart card, however, needs only to be placed in the proximity of a reading device. The data exchange that takes place is done through radio frequency. A hybrid smart card contains two chips, one for a contact connection, and one for contactless connection. A dual-interface chip smart card contains one chip, but can function through either contact or without contact (Holcombe & Hunt, 2004).

As mentioned earlier, the card is conveniently sized; however, many applications can still be added to it. For instance, the card itself will contain its integrated circuit chip on the inside, but it can also host a picture ID, a contactless radio frequency transmitter, a bar code, and a magnetic stripe ("Microsoft Windows," 2000). Conran (1999) explains that any card containing an integrated circuit chip as well as any of the other technologies mentioned is known as a multiple technology card. Figure 2 below shows an example of the many applications that can be housed on one card ("Multiple Application," 2008). Holcombe and Hunt (2004) explain another example: a student campus ID card can be

used to purchase books, and at the same time allow access to buildings. Implementing a card such as this is beneficial because it can support new technology, but at the same time it keeps all existing technology as well (Holcombe & Hunt, 2004). Therefore, a system does not need to be completely converted; the technologies can work in parallel. There are some disadvantages that come with this, however. Many constraints must be taken into consideration, such as card thickness, card cost, and card failure rate (Holcombe & Hunt, 2004).

**Figure 2: Multiple Application Cards**

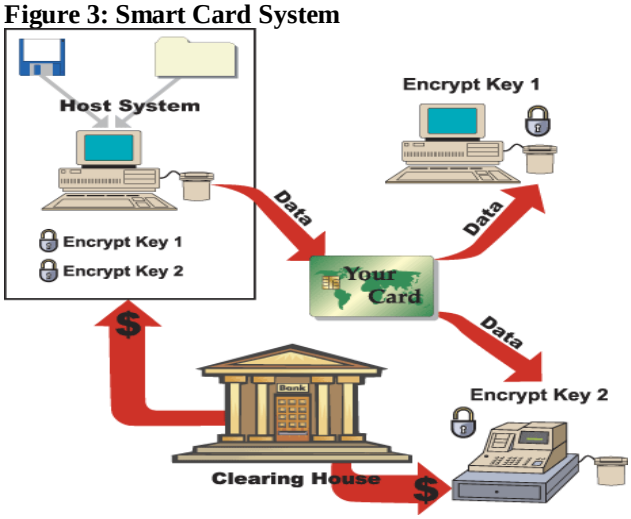



The next component of a smart card system is the equipment and software. This includes all of the computers and software that is needed to capture any information stored on the card, and any data that is being exchanged (Holcombe & Hunt, 2004). The most important piece of equipment is the read/write devices. These devices provide the physical connection between the card and the host system. Holcombe and Hunt (2004) explain that read/write devices not only mediate between the card and host, but they also provide power by inducing a current through the card's antenna, and they can serve to

activate brand new cards. Reading devices are also available to support old card systems, as well as new smart card systems ("Microsoft Windows," 2000). Holcombe and Hunt (2004) claim that this greatly aids the transition from one card based technology to another.

The last major component of the system is the management system, otherwise known as the host system. It is connected to all other system components (Holcombe & Hunt, 2004). As shown in the diagram below, see Figure 3, the host system initially puts data onto an individual's card ("System Planning," 2008). In this example, the card can then be used for purchasing things. When a transaction is made, data is exchanged from the card to the reading device. The reading device then sends the information to a bank, extracting money from the individual's account, which then sends the transaction on to the host system. Therefore, when one purchase is made, it is followed by a continuous flow of information, until it finally gets back to the host system ("System Planning," 2008).

**Figure 3: Smart Card System**



Smart cards are already being used in Boston today. The Charlie Card is Boston's new pass to ride the MBTA transit system. The card is an example of a stored-value, contactless card ("Charlie Cards," 2008). However, Bray (2008) argues that the Charlie Card has a security flaw. Researchers have found that it is very easy to crack the encryption code that protects the data on the chip. Bray (2008) also explains that a card with a higher level of security could be used, but it is much more expensive. In addition, there are many issues of security in all smart card systems (Bray, 2008).

# CHAPTER 3: METHODOLOGY

As stated in Chapter 1, the main goal of our project was to recommend ways to improve the Boston Community Change program. We did this by completing two objectives. The first objective was to analyze existing data and make a recommendation on how to fill in the gaps that existed. Existing data was divided into three categories: data pertaining to the businesses, the cardholders, and the non profits. The second objective was to develop a plan to integrate the Change Card with established Boston programs. Through the completion of these objectives we were able to present maps to the Department of Neighborhood Development showing trends in the data and, thus, a recommendation to collect sufficient data for a full evaluation of the program. Completing our objectives also enabled us to make recommendations to expand the Change Card.

To address the first objective, we analyzed existing archival data. The three categories of data mentioned above included information on sales volume, the number of transactions in each store, the number of transactions made by each customer, and the total donations received by the non profits. We obtained the data from the Department of Neighborhood Development. We also had access to existing public databases found on the website Bureau of Economic Analysis. Using this data, we created a map of hierarchy of data that helped determine what information still needed to be obtained. From this analysis, we determined what data needs to be collected in the future. We recommended ways to collect this data, and why it is important to the program. This was necessary because the Boston Community Change program needs to prove it is successful in order to expand.

To complete the first objective we then identified the gaps of the database through interviews that our liaison Brian Goodman suggested. The first interview we had was with Karl Seidman, the head of the Department of Urban Studies and Planning at MIT. We also conducted two phone interviews with Janine Michelsons, the Outreach Manager for the Interra Project. These interviews gave us insight on what data was collected in Seattle and allowed us to draw comparisons between the two programs. We also conducted interviews with two district managers to gain their opinion on what data was beneficial for us to find and how to collect it. We also interviewed them on ways to improve the program, and their overall view on how it is impacting their neighborhood. While we were in those neighborhoods, we spoke with three businesses owners who have had a large number of transactions in their stores. We interviewed them on ways they have marketed the program and how they would be willing to facilitate the collection of new data, such as sales and filling out surveys.

To further complete the data analysis, we organized the data given to us, and found ways to visualize it. The first way we did this was with pivot tables. Pivot tables are a way to compare different data points such as cardholders' zip code and number of transactions. These comparisons were then graphed to show a better visual representation. Next we entered data onto the Geocoding website. This allowed us to pictorially show where businesses, cardholders, and nonprofits are located around the city. We also contacted the mapping department within the Department of Neighborhood Development in order to turn our data into heat maps. Heat maps visually represent areas of high activity for the program. All of these tools helped us to determine what data was still missing and why it is necessary to collect it.

To address our second objective, we also used interviews, as well as extensive research. We conducted an unstructured interview with a project engineer from the MBTA and a Community Outreach Director at Wentworth Institute of Technology. We obtained contact information for each of these interviews from our liaison Brian Goodman. We also teamed together with another WPI group working with the City of Boston on developing youth cards. These interviews allowed us to find out whether or not organizations knew about the Change Card. This gave us the opportunity to inform the organizations of the advantages and disadvantages associated with integration of the Change Card with the card other organizations use. We provided them with the information we obtained in our first objective to show the growing success of the program.

In order to complete the interviews, we had to research the benefits and barriers that would come with integration. We researched the challenges behind integration, the specific technology behind the smart card systems, and the structure of the MBTA's smart card system.

Through our data analysis and exploration of future integration of the Change Card with various organizations' cards, we were able to provide the Department of Neighborhood Development with recommendations on how to sustain and improve the Boston Community Change program.

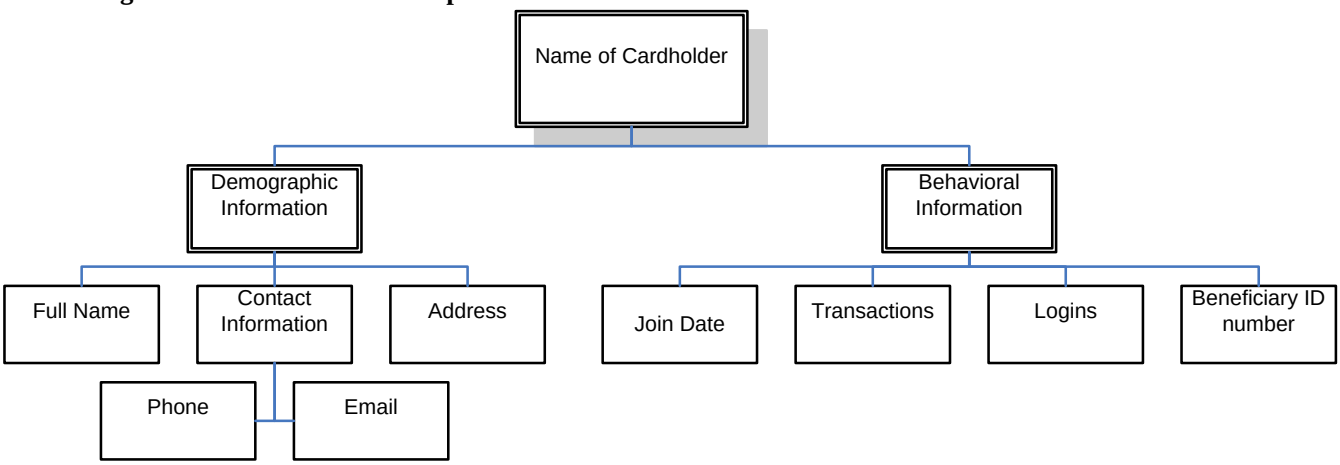
# CHAPTER 4: FINDINGS AND ANALYSIS

## Data Analysis

As stated earlier, the goal of our project was to recommend ways to improve the Boston Community Change program's internal database, as well as ways to expand the program itself through the integration with other card-based programs. We completed this goal by initially accomplishing our first objective: to complete a data analysis for the program. We were given access to all of the program's data. It was divided into three excel files: one contained all collected data for the merchant, another for the cardholder, and one for the beneficiaries. Our first task included organizing the data through data mapping, pivot tables, Geocode mapping, and heat maps. Data mapping is a way to organize a hierarchy of data. Pivot tables are an Excel application that allows comparison of data points. Geocode mapping is a free online resource that allows anyone to make their own interactive map. Heat maps visually represent intensity of activity using different colors and shading. After analyzing the data in this way, we were able to determine the gaps in the database that should be filled in the future. We completed our first objective by recommending a way to prove the success of the program.

The first file we examined contained all of the cardholders' data. The file contained demographic data on where the person lived and how to contact them. The file also contained behavioral data, such as the number of transactions they have made, number of logins on their account, and the ID number of their chosen beneficiary. We extracted the data points were thought were most important and organized them through data mapping. See Figure 4: Cardholder Data Map.

**Figure 4: Cardholder Data Map**

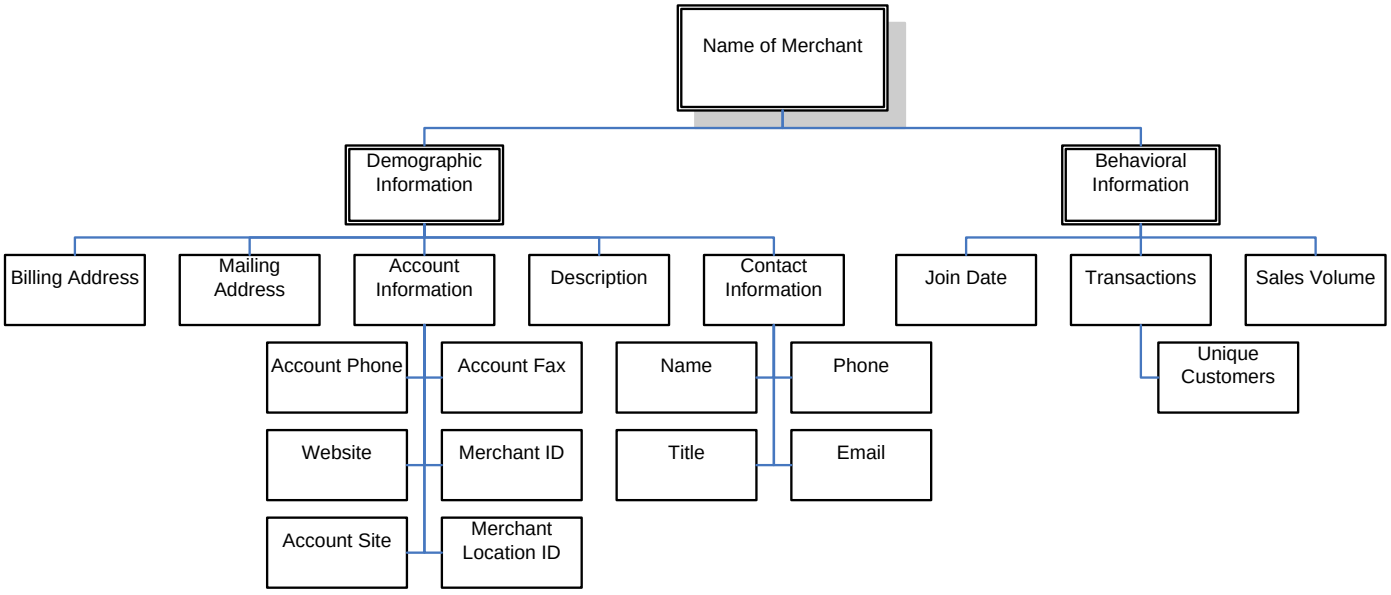



After analyzing our map, we determined what major gaps existed. In order to draw better conclusions on why the program is successful, there is much more data that the BCC should be collecting. One important aspect that is missing from the data is demographic profiles for the cardholders. Another gap is psychographic profiles for each of the cardholders. A psychographic profile would contain information on the cardholders' lifestyle and what their hobbies and interests are. Frequency and location of the transactions are also major pieces of missing information. This information will allow for a better understanding of the behavior of the consumers, resulting in more effective marketing techniques. Additionally, the name of the beneficiary is missing. Only the ID numbers of the beneficiaries is contained in the cardholders' data, which makes it difficult to link a cardholder with the nonprofit of its choice.

Next, we examined the data for the merchants. Again, we organized the data in a map. The file contained mostly demographic information, such as contact information, location, and a description of the business. The behavioral data included join date and unique customers. Unique customers portrayed how many different people used their

cards, showing that some have used their card repetitively in a specific store. The behavioral information that will be analyzed later was the number of transactions made in the store and the sales volume that has been generated from the transactions made with a Change Card. See Figure 5: Merchant Data Map.

**Figure 5: Merchant Data Map**



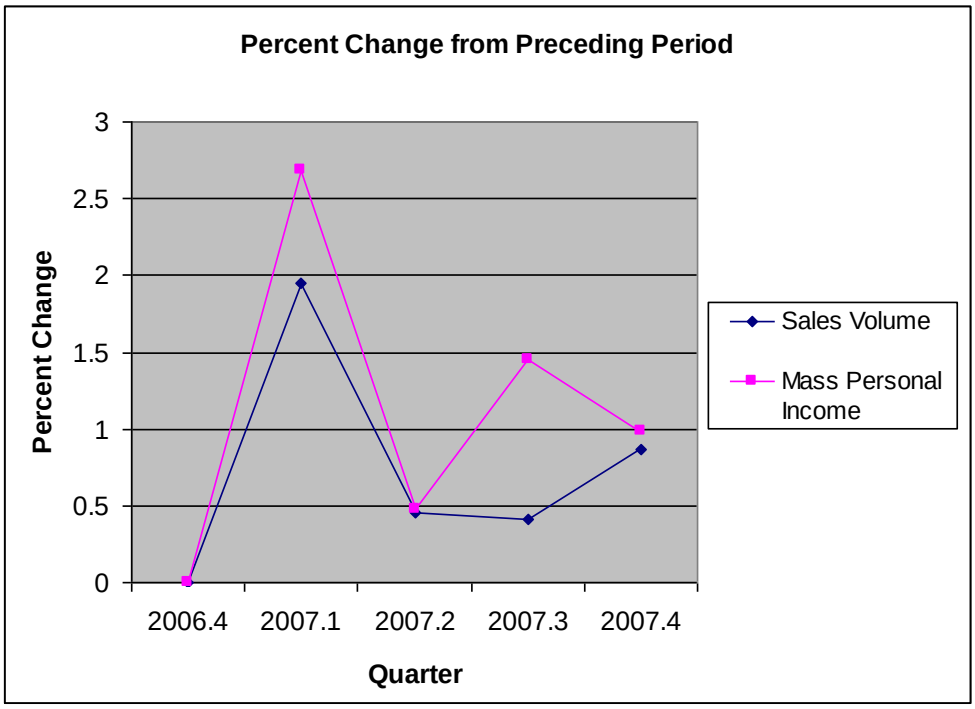

With the help of our interview on March 31st, 2008 with Karl Seidman, who is the head of the Department of Urban Studies and Planning at MIT, we determined that in order to demonstrate the program's success, there needs to be measures of comparison to show how much the BCC is helping small businesses. If sales data were available, it would be possible to compare sales before and after the Change Card. This comparison would determine a percent increase in sales from the card, which could help prove the program's usefulness to the businesses. Additionally, sales generated from the Change Card could be compared to sales generated by transactions without the card. If more

sales are being generated by the card, then the program is clearly a success. The BCC could use this information to attract new businesses to the program.

The merchants' sales data, if collected, could also be compared to national retail data. However, an even stronger assessment would be comparing sales data to income data, which is available by county from the Bureau of Economic Analysis. Theoretically, retail sales grow as fast as income. Therefore, if there is a growth in income, there will be a growth in retail sales. If the comparison were made, and sales for businesses in the BCC program were growing faster than the income growth for Suffolk County, then it could be shown easily that the program is successful.

Unfortunately, since the BCC program is so new, the only data that it can be compared to right now is personal income data for the state of Massachusetts. This is the only data that can be found for the year 2007 and it has been recorded quarterly. We have calculated the percent change of sales volume for BCC merchants from the preceding quarter and put it on the graph. We collected the Massachusetts personal income percent change from the preceding quarter from the Bureau of Economic Analysis website. See Figure 6: Sales Volume versus Personal Income.

**Figure 6: Sales Volume versus Personal Income**




The greatest similarity between the two takes place between the fourth quarter of 2006 and the second quarter of 2007. Both personal income and sales volume have a large percent change followed by a smaller percent change in the second quarter of 2007. However, the increase in sales volume most likely did not take place because of an increase in personal income. Sales volume had an obvious increase because that was the very start of the program and in the fourth quarter of 2006 it was zero. The second quarter of 2007, compared to the first, had a smaller percent change because the program was already accumulating a sales volume; it wasn't being compared to zero, like the sales volume for the first quarter had been. Therefore, this comparison does not prove the success of the program.

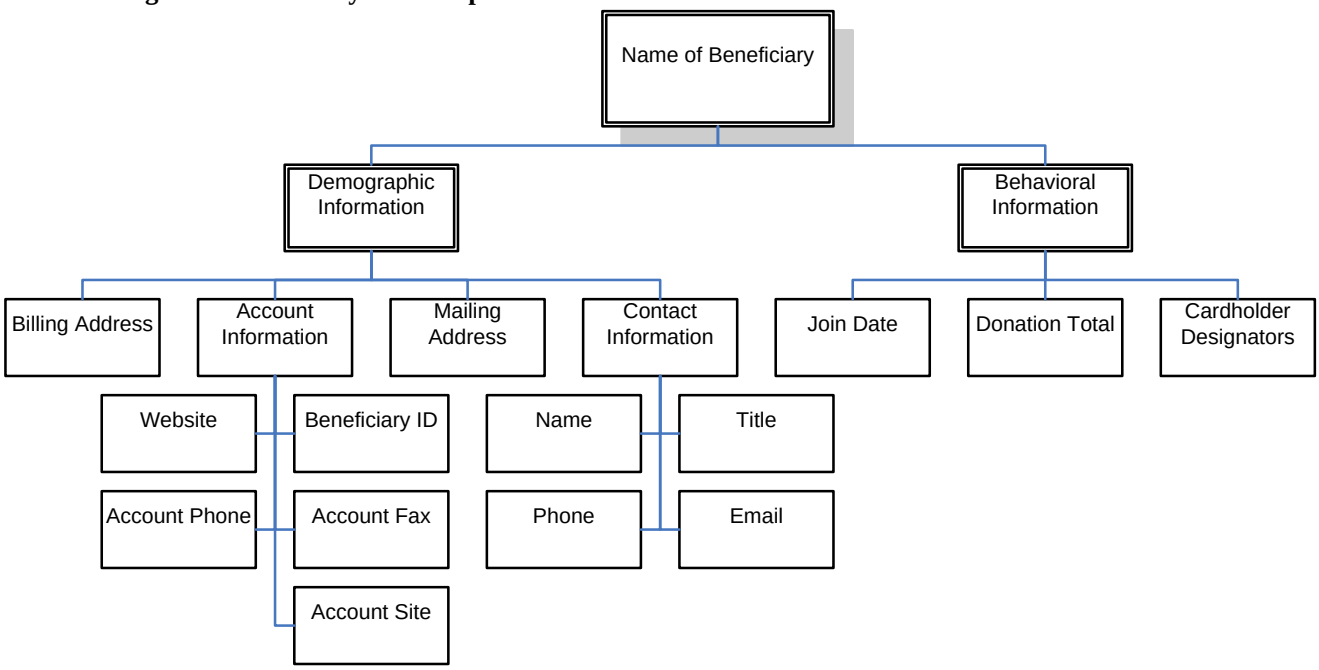
Additionally, one of the major gaps in the merchant data is the type of store. It would be beneficial to determine which type of store, if any, is more successful than others.

Another piece of missing information is the date of the transaction. This could show whether a customer went in one time and spent a lump sum of money or if the business is receiving repeat customers. Frequent visits at one store indicate a higher success rate of the card.

One last gap is the location of the transaction. Another way the program shows success is if people from one district are going out of their way to shop in another district. This could indicate people wanting to benefit their own districts, as well as others.

We organized the beneficiaries' data in the same way as the merchants' and cardholders'. The file contained contact information and location of the nonprofit. The behavioral information included join date, total donations, and cardholder designators. Cardholder designators indicate the number of cardholders that have designated a specific nonprofit as their beneficiary. See Figure 7: Beneficiary Data Map.

**Figure 7: Beneficiary Data Map**




Gaps exist in the beneficiaries' data, as well. One major gap is the date of the transaction. For example, if a school promoted the card at an event, and right after the event the same school received a large number of donations, then it would prove to other beneficiaries how important and useful it is to promote the card on their own. Another missing piece of information is the location and the name of the transaction. Knowing this information could allow BCC to figure out how transactions are being linked among the cardholder, their beneficiary, and the merchant. For example, parents may have their children's school as their beneficiary and parents shopping trends may indicate that they will shop at places such as grocery stores and toy stores.

The next way we organized the data was in pivot tables and charts. We sorted the cardholder data by the number of transactions they made. We then took the data of each person who had made transactions, and put the data points in a new excel file. We then sorted the merchant data by transactions and sales volume. The data of any merchant that

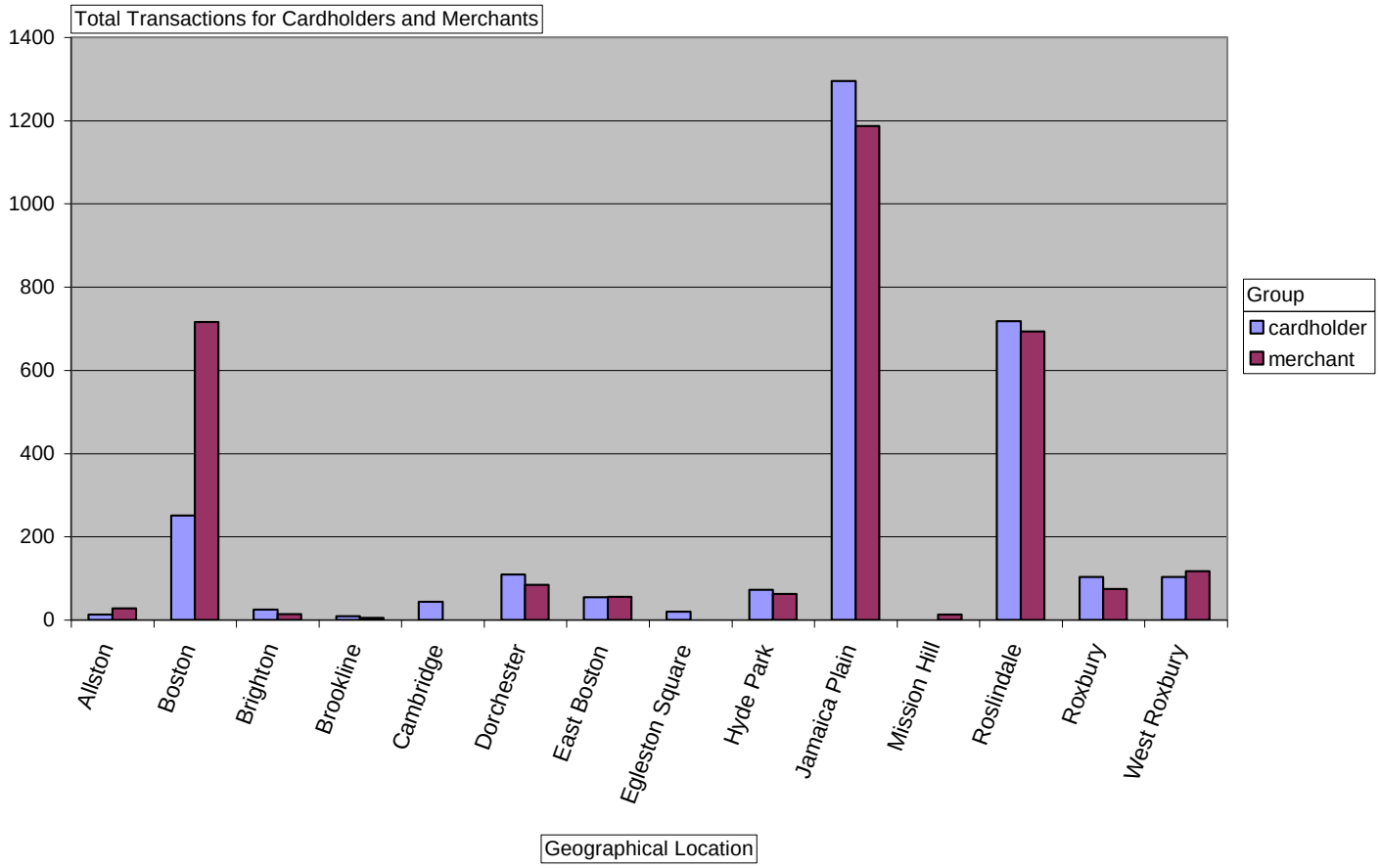
had at least one transaction made in their store was taken and put into the new excel file with cardholders. The beneficiary data was sorted according to donation total, as well as how many people have designated them as their beneficiary. The data of any beneficiary who was the recipient of a donation was added to the new excel file with the cardholders and the merchants. This data was then analyzed using pivot tables.

The first pivot table made displays the number of transactions made by cardholders and the number of transactions made in each store in a given area. A transaction is considered one swipe of the Change Card; it has nothing to do with the money spent. It organized the data showing where card users live and what area businesses that have received transactions are located. See Table 1: Total Number of Transactions for Cardholders and Merchants. The pivot table was then made into a chart to show the information in a clearer way. See Figure 8: Bar Graph of the Total Number of Transactions for Cardholders and Merchants

**Table 1: Total Number of Transactions for Cardholders and Merchants**

| Total Number of Transactions for Cardholders and Merchants | Group | | |
|---|---|---|---|
| Geographical Location | cardholder | merchant | Grand Total |
| Allston | 13 | 28 | 41 |
| Boston | 251 | 716 | 967 |
| Brighton | 25 | 14 | 39 |
| Brookline | 9 | 5 | 14 |
| Cambridge | 44 | | 44 |
| Dorchester | 109 | 84 | 193 |
| East Boston | 55 | 56 | 111 |
| Egleston Square | 20 | | 20 |
| Hyde Park | 72 | 62 | 134 |
| Jamaica Plain | 1295 | 1187 | 2482 |
| Mission Hill | | 13 | 13 |
| Roslindale | 718 | 693 | 1411 |
| Roxbury | 103 | 74 | 177 |
| West Roxbury | 103 | 117 | 220 |
| Grand Total | 2817 | 3049 | 5866 |

**Figure 8: Bar Graph of the Total Number of Transactions for Cardholders and Merchants**




It is now clear that the most transactions are being made at stores in Jamaica Plain, which is expected since Jamaica Plain has the greatest number of transactions made by it's cardholders as well. Jamaica Plain cardholders have made 1,295 transactions, which is almost half of the total 2,817 transactions that have been made by cardholders city-wide. Additionally, the stores located in Jamaica Plain have received 1,187 transactions. These transactions make up almost 40 percent of all transactions made in stores city wide.

The next highest number of transactions made by cardholders is in Roslindale, with a total of 718 transactions. However, Roslindale's merchants come in a close

second behind those of Boston, with a total of 693 and 716, respectively. Boston's cardholders, however, only have a total of 251, which is much less compared to Roslindale and Jamaica Plain.

The total number of transactions made by cardholders who live in Boston, Jamaica Plain, and Roslindale make up 80 percent of the 2,817 total transactions made city wide. The total number of transactions made in businesses in Boston, Jamaica Plain, and Roslindale make up 85 percent of the total 3,049 transactions made in participating stores city-wide.

West Roxbury also has a significant total of transactions for its cardholders and merchants which could be because it is located near Roslindale which, as shown above, has high activity of the Change Card. After meeting with Christine Rose, the district manager of Mission Hill, on April 4th, we found out that the district managers of Roslindale and West Roxbury have been working together to promote the BCC program.

West Roxbury residents have made 103 transactions, and the businesses located their have received 117 transactions. Other areas residents, such as East Boston, Hyde Park, and Roxbury, have made 55, 72, and 103 transactions, respectively. The merchants in each specified area have received 56, 62 and 74, respectively. All other areas in the entire city of Boston have less than 50 transactions for their cardholders and merchants.

One unique fact portrayed by the pivot table and chart is that residents in the Cambridge area have made 44 transactions, yet there are no participating businesses located in Cambridge. In fact, Cambridge is an entirely different city from Boston. This demonstrates that people outside of Boston's neighborhoods are aware of the program and are beginning to use it.

Additionally, businesses on Mission Hill have received 13 transactions, yet there are no people living on Mission Hill that have used their card. These transactions had to have come from cardholders outside the neighborhood. Similarly, Egleston Square residents have made 20 transactions, yet none of the businesses in the neighborhood have received any transactions. Therefore, they have gone outside of their own neighborhood to use the card.

The next pivot table and chart again represents the number of transactions made in stores in the specified geographical locations. Although these figures were displayed in the preceding table and chart, we have displayed the data here again in order to compare it to the merchants' sales volume. See Table 2: Total Number of Transactions Made in Participating Stores and Figure 9: Bar Graph of Total Number of Transactions Made in Participating Stores. The table and chart immediately following demonstrate the sales volume, in dollars, that merchants have generated from the Change Card transactions in their stores. See Table 3: Total Sales Volume (in dollars) Merchants have made from Transactions and Figure 10: Bar Graph of Total Sales Volume (in dollars) Merchants have made from Transactions.

**Table 2: Total Number of Transactions Made in Participating Stores**

| Merchants' Number of Transactions | Group |
|---|---|
| Geographical Location | merchant |
| Allston | 28 |
| Boston | 716 |
| Brighton | 14 |
| Brookline | 5 |
| Dorchester | 84 |
| East Boston | 56 |
| Hyde Park | 62 |
| Jamaica Plain | 1187 |
| Mission Hill | 13 |
| Roslindale | 693 |
| Roxbury | 74 |
| West Roxbury | 117 |
| Grand Total | 3049 |

**Figure 9: Bar Graph of Total Number of Transactions Made in Participating Stores**

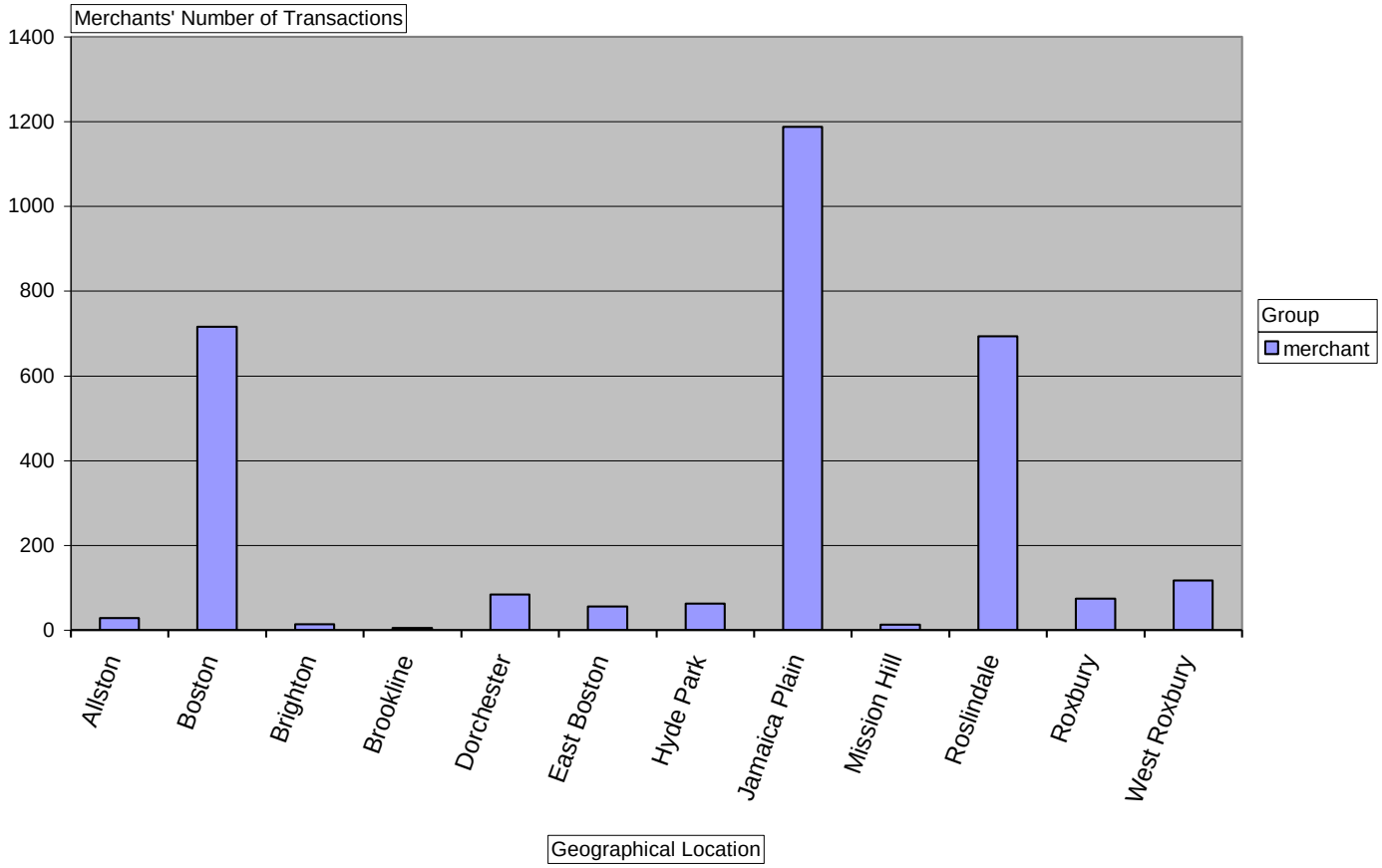
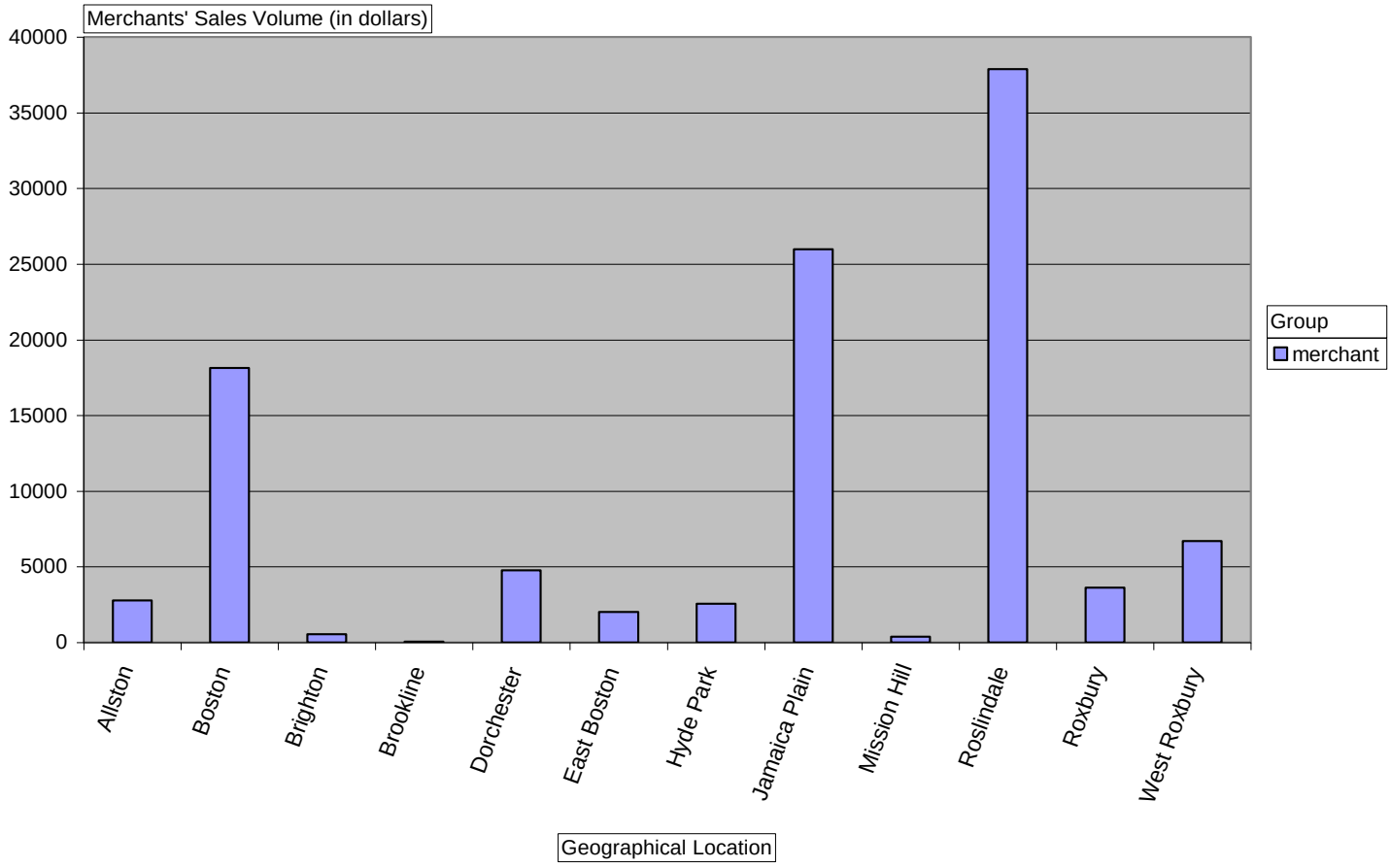


**Table 3: Total Sales Volume (in dollars) Merchants have made from Transactions**

| Merchants' Sales Volume (in dollars) | Group |
|---|---|
| Geographical Location | merchant |
| Allston | 2785.14 |
| Boston | 18146.35 |
| Brighton | 532.12 |
| Brookline | 53.76 |
| Dorchester | 4764.41 |
| East Boston | 2025.89 |
| Hyde Park | 2559.3 |
| Jamaica Plain | 25976.31 |
| Mission Hill | 385.8 |
| Roslindale | 37866.05 |
| Roxbury | 3624.07 |
| West Roxbury | 6688.85 |
| Grand Total | 105408.05 |

**Figure 10: Bar Graph of Total Sales Volume (in dollars) Merchants have made from Transactions**



We used these two tables and charts to compare the data for the merchants. Unfortunately, when combined into one table and one chart, the trends were not as clear. We found that merchants in Jamaica Plain received 1,187 transactions and merchants in Roslindale received 693 transactions; a difference of 494 transactions. However, merchants in Jamaica Plain made $25,976.31 from these transactions, while Roslindale's merchants made $37,866.05. Therefore, Jamaica Plain may have had 494 more transactions than Roslindale, but Roslindale received $11,889.74 more than Jamaica Plain.

Additionally, Boston had 23 more transactions than Roslindale. However, the merchants in Boston only made $18,146.35, which is $19,719.70 dollars less than Roslindale. So although the two areas had a similar number of transactions, Roslindale made more than twice as much as Boston. Cardholders in Roslindale are spending more money at each transaction than both Boston and Jamaica Plain. Since Roslindale's merchants have made so much money from their transactions, this area has also contributed the most money to the BCC program itself and participating nonprofits.

Other areas generating a significant amount of money are Allston, Dorchester, and West Roxbury. Allston has had only 28 transactions, but made $2,785.14 from them. Dorchester had only 84 transactions, but made $4,764.41. So Dorchester has had exactly three times more the number of transactions than Allston, but has made only double the amount of money. Additionally, West Roxbury's merchants had 117 transactions in their stores and generated $6,688.85 from these transactions.

The next two pivot tables and charts can be used to compare beneficiary data among the geographical areas. Unfortunately, they could not be combined onto one table

and graph because the trends could not be distinguished clearly. The first pivot table and chart contains the total number of people who have designated their beneficiary to be a nonprofit located in one of these areas. See Table 4: Total Number of Cardholder Designators and Figure 11: Bar Graph of the Total Number of Cardholder Designators. The second pivot table and chart contain the donation total, in dollars, that all of the nonprofits in a specified area have received from Change Card transactions. See Table 5: Donation Total (in dollars) and Figure 12: Bar Graph of the Donation Total (in dollars).

**Table 4: Total Number of Cardholder Designators**

| Cardholder Designators | Group |
|---|---|
| Geographical Location | nonprofit |
| Allston | 30 |
| Boston | 5284 |
| Brighton | 13 |
| Cambridge | 4 |
| Dorchester | 126 |
| East Boston | 43 |
| Hyde Park | 25 |
| Jamaica Plain | 513 |
| Mission Hill | 5 |
| Roslindale | 252 |
| Roxbury | 96 |
| West Roxbury | 178 |
| Grand Total | 6569 |

**Figure 11: Bar Graph of the Total Number of Cardholder Designators**

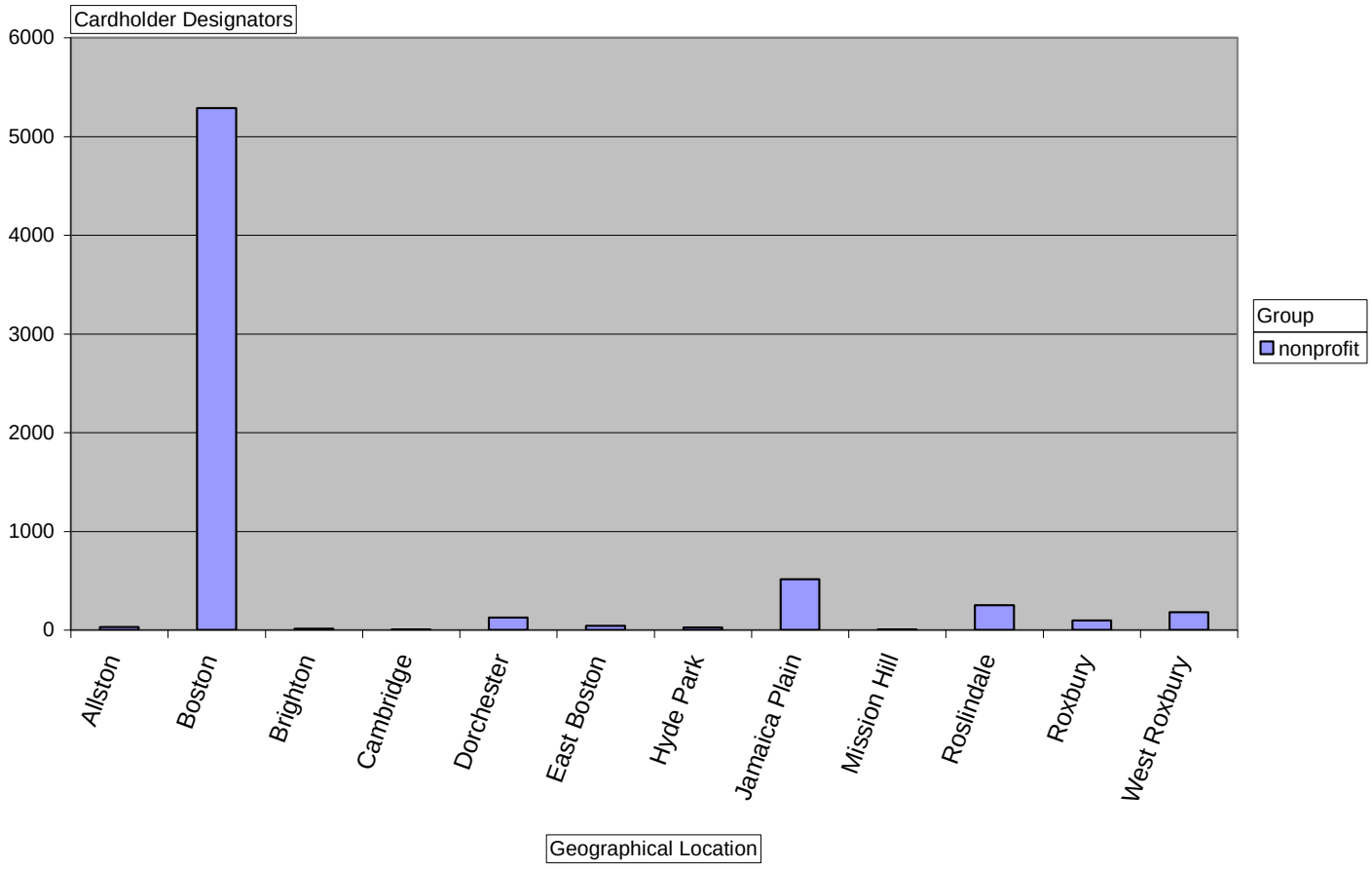
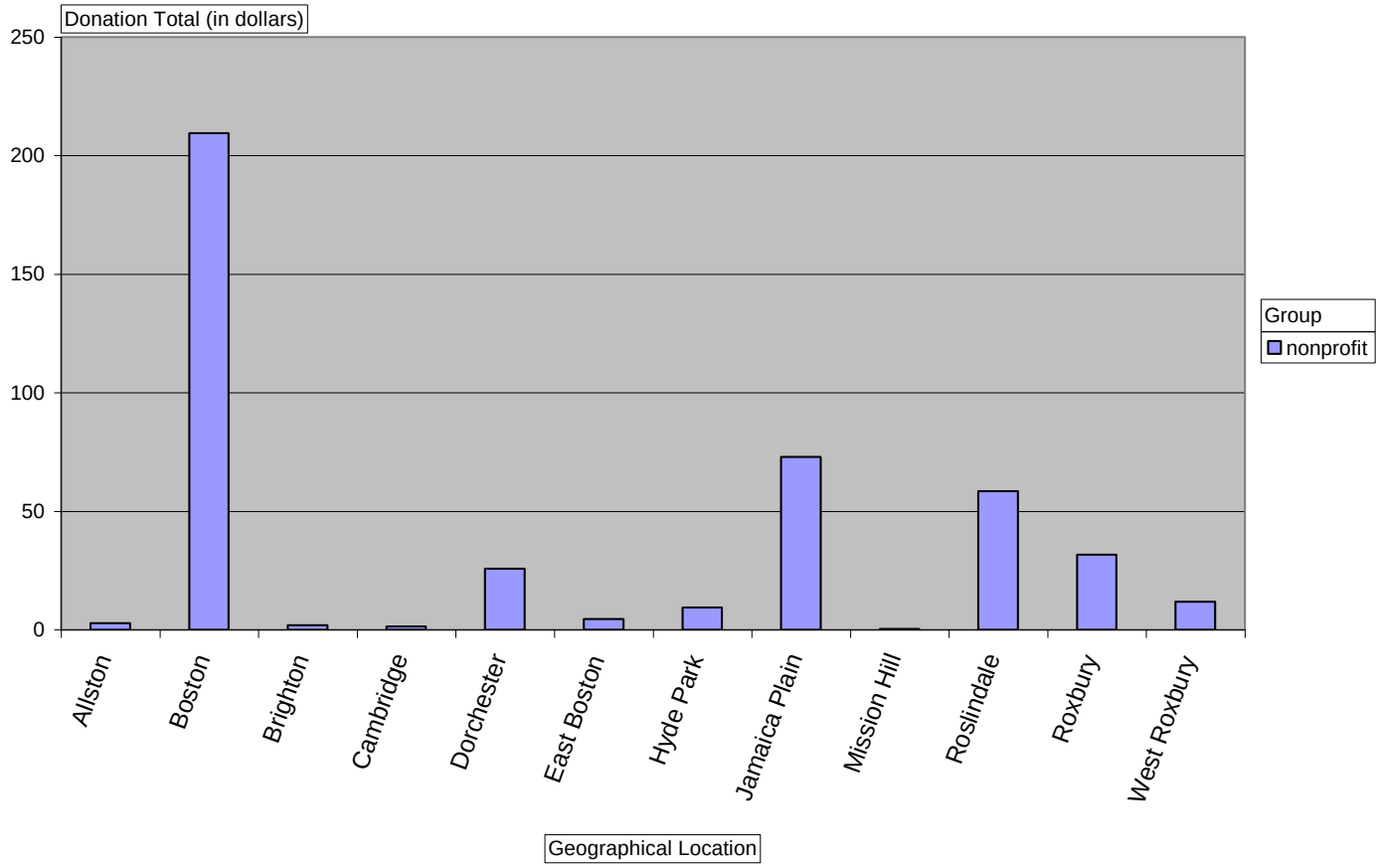



**Table 5: Donation Total (in dollars)**

| Donation Total (in dollars) | Group |
|---|---|
| Geographical Location | nonprofit |
| Allston | 2.78 |
| Boston | 209.51 |
| Brighton | 1.85 |
| Cambridge | 1.36 |
| Dorchester | 25.73 |
| East Boston | 4.56 |
| Hyde Park | 9.33 |
| Jamaica Plain | 72.94 |
| Mission Hill | 0.29 |
| Roslindale | 58.42 |
| Roxbury | 31.75 |
| West Roxbury | 11.8 |
| Grand Total | 430.32 |

**Figure 12: Bar Graph of the Donation Total (in dollars)**




Clearly, from the data, Boston has the largest amount of cardholders that have designated their nonprofit as one located in Boston. The total number of people that have a nonprofit located in Boston is 5,284. This could be because the Boston Main Streets Foundation is located in the Boston area, and when you sign up for a Change Card the foundation is automatically designated as your nonprofit beneficiary. Unless cardholders login into their account, Boston Main Streets remains the beneficiary. Again, the areas with the highest amount of cardholder designators are Jamaica Plain with 513 and Roslindale with 252.

Nonprofits located in Boston have received the greatest amount of donations as well. They have received $209.51 while Jamaica Plain has $72.94 and Roslindale has

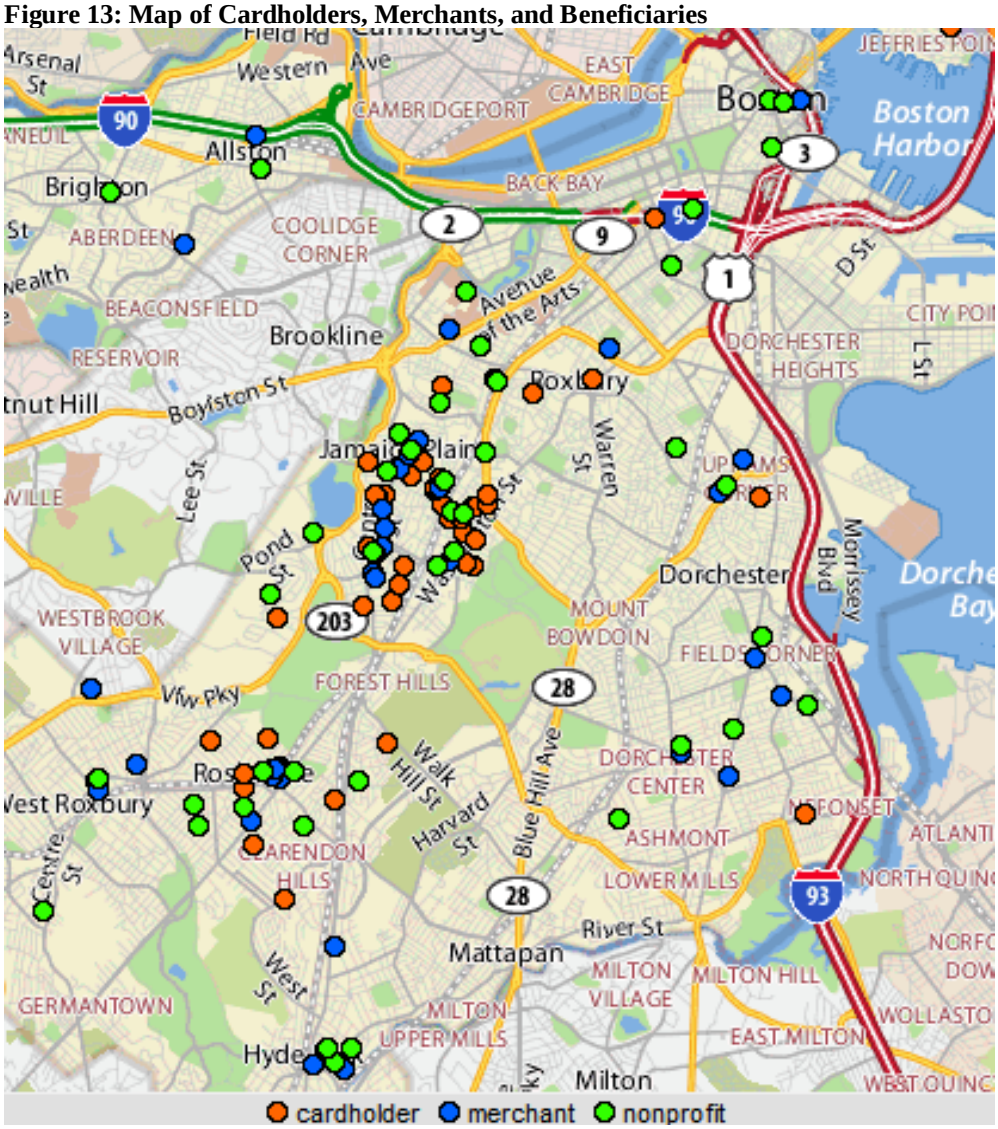
$58.42. Nonprofits located in every neighborhood have only received $430.32 in total. The nonprofits located in the Boston area have received almost half of this amount. Other areas that have received significant donations are Roxbury, West Roxbury, and Dorchester, each with $31.75, $11.80 and $25.73, respectively.

These trends discussed above for each of the cardholders, merchants, and beneficiaries can also be observed on a Geocode map. See Figure 13: Map of Cardholders, Merchants, and Beneficiaries. The map below contains the top fifty cardholders with the most transactions, the top fifty businesses with the most transactions, and the top fifty beneficiaries with the most donation totals. The top fifty was taken for each because the Geocoding website allows only a limited number of data points to be plotted. An interactive version of this map can be found at the following link: http://www.batchgeocode.com/map/?i=a7e26cf66494a8ad9b7b523da37ec2b8. When using the interactive version online, all of the dots representing cardholders, merchants, and beneficiaries can be clicked on. When clicking on it, a window pops up showing the address, a zoomed-in image of the street map, and the number of transactions made, or donation total for beneficiaries. If clicked again, it is directed to yahoo maps, and directions can be obtained for each location. Another feature found with the yahoo maps is a street view of the location. So, if a cardholder would like to find a store in the BCC program, they can easily find directions. In addition, using the street view, a consumer can view what landmarks are around the store, making it easier to find.

Most importantly, however, this map again shows the same trends as the pivot tables. Clearly, Jamaica Plain has the most active cardholders living in the area, and in

turn they are using their cards and making transactions in their neighborhood. Additionally, there are numerous beneficiaries in the area which are receiving donations. This does not prove, however, that Roslindale is generating the most money from its merchants. The geocode map is another way to pictorially represent the data, and the additional features of the interactive map are useful to not only BCC staff, but cardholders, merchants, and beneficiaries, as well.

**Figure 13: Map of Cardholders, Merchants, and Beneficiaries**

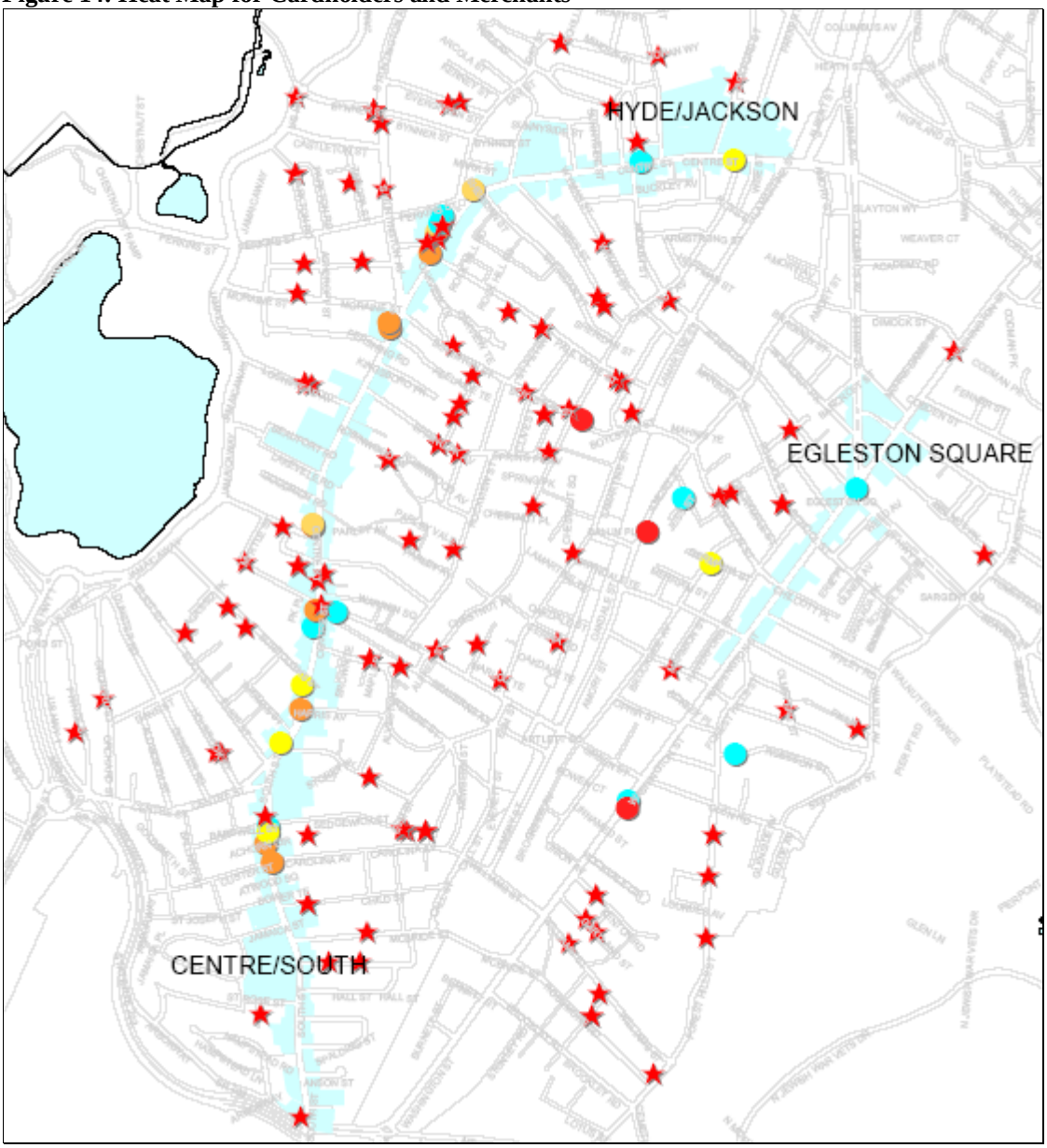



The final way we organized our data was using heat maps that were made for us by the Department of Neighborhood Development's Mapping Department. These maps

are considered heat maps because they use different colors to distinguish the data. Our data was divided into three different maps, one containing cardholder and merchant data and two containing only merchant data. We presented a hard copy and PDF file for each map that was made to our liaison Brian Goodman so that he may reference them in the future.

As mentioned above, the first map contains data for the cardholders and the merchants. A zoomed-in section of the map can be seen below. See Figure 14: Heat Map for Cardholders and Merchants. The light blue sections highlight the different neighborhoods. The red stars on the map represent where the cardholders live. The round dots represent where the participating businesses are located. The different colors represent the different number of transactions that have been made in those stores. The red dots represent any merchant that has received anywhere between 245 and 534 transactions in their store. Only four merchants have received this number of transactions. The orange dots represent the 17 different merchants that have received between 35 and 245 transactions. The 23 merchants that have received between 9 and 35 transactions are represented by the orange/yellow dots. The yellow dots represent the 56 total merchants that have received between 1 and 9 transactions. Finally, the merchants that have received either one or no transactions are represented by blue dots; there are 86 of them. This color coding was used on the following two maps as well.

**Figure 14: Heat Map for Cardholders and Merchants**



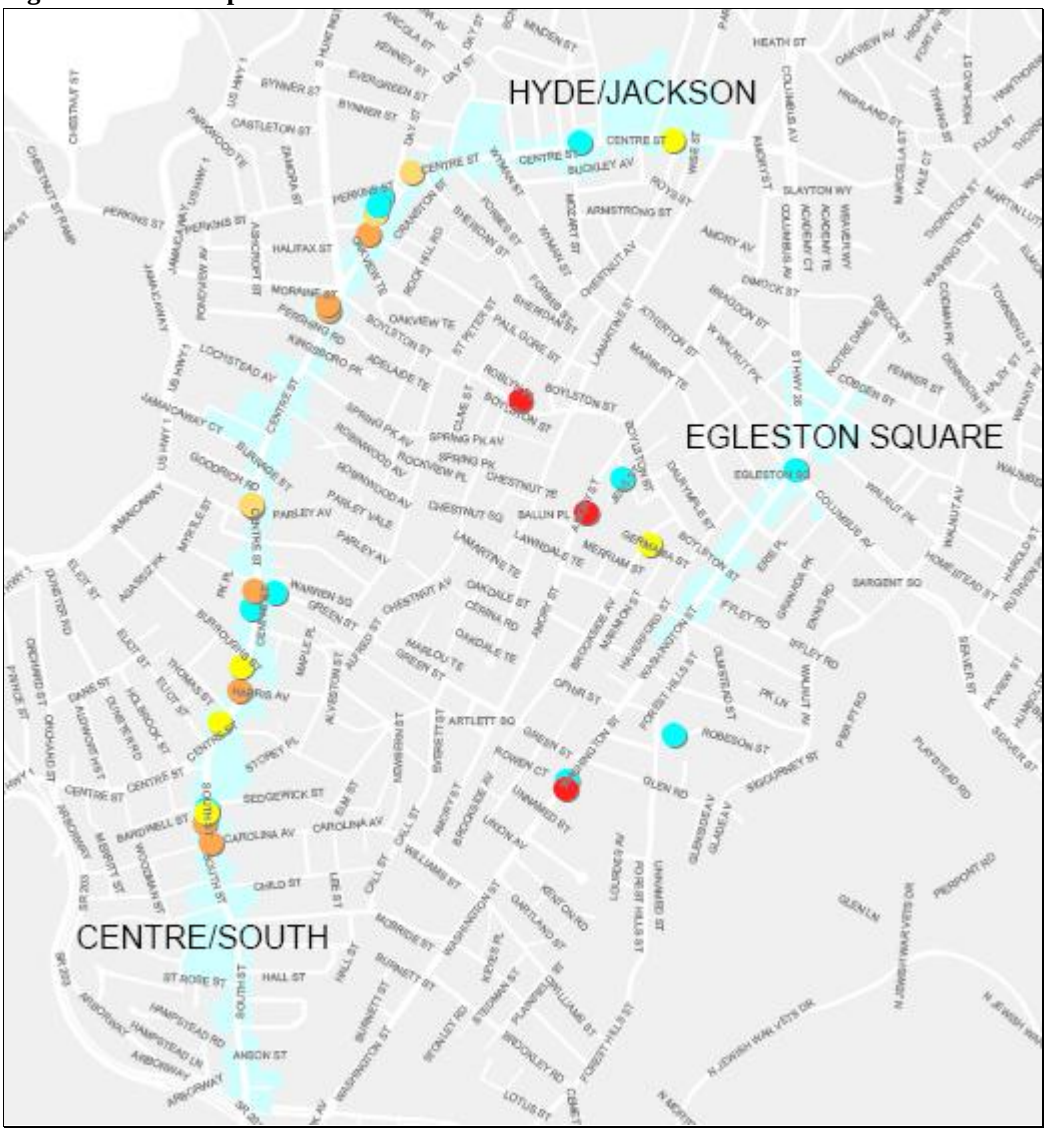

On this map the region Centre/South represents Jamaica Plain. Clearly, as observed with the pivot tables and Geocode map, Jamaica Plain has a large number of cardholders. Also, three of the four red dots are located in and around this region. The

fourth red dot is located in Roslindale. As stated above, the red dots represent merchants with a high number of transactions made in their store.

All of the same trends mentioned above in the pivot tables can be viewed on this map. The map is useful in illustrating how the densest areas of active cardholders are located very close to the designated neighborhoods, and therefore their businesses. It also shows that in other parts of the city, as well as outside of the city like in Cambridge, there are active cardholders. These cardholders' locations, however, are very spread out and much sparser compared to the cardholders living in neighborhoods within Boston.

The next heat map contains only the merchants' locations and their designated color according to the number of transactions explained above. See Figure 15: Heat Map of Merchants.

**Figure 15: Heat Map of Merchants**

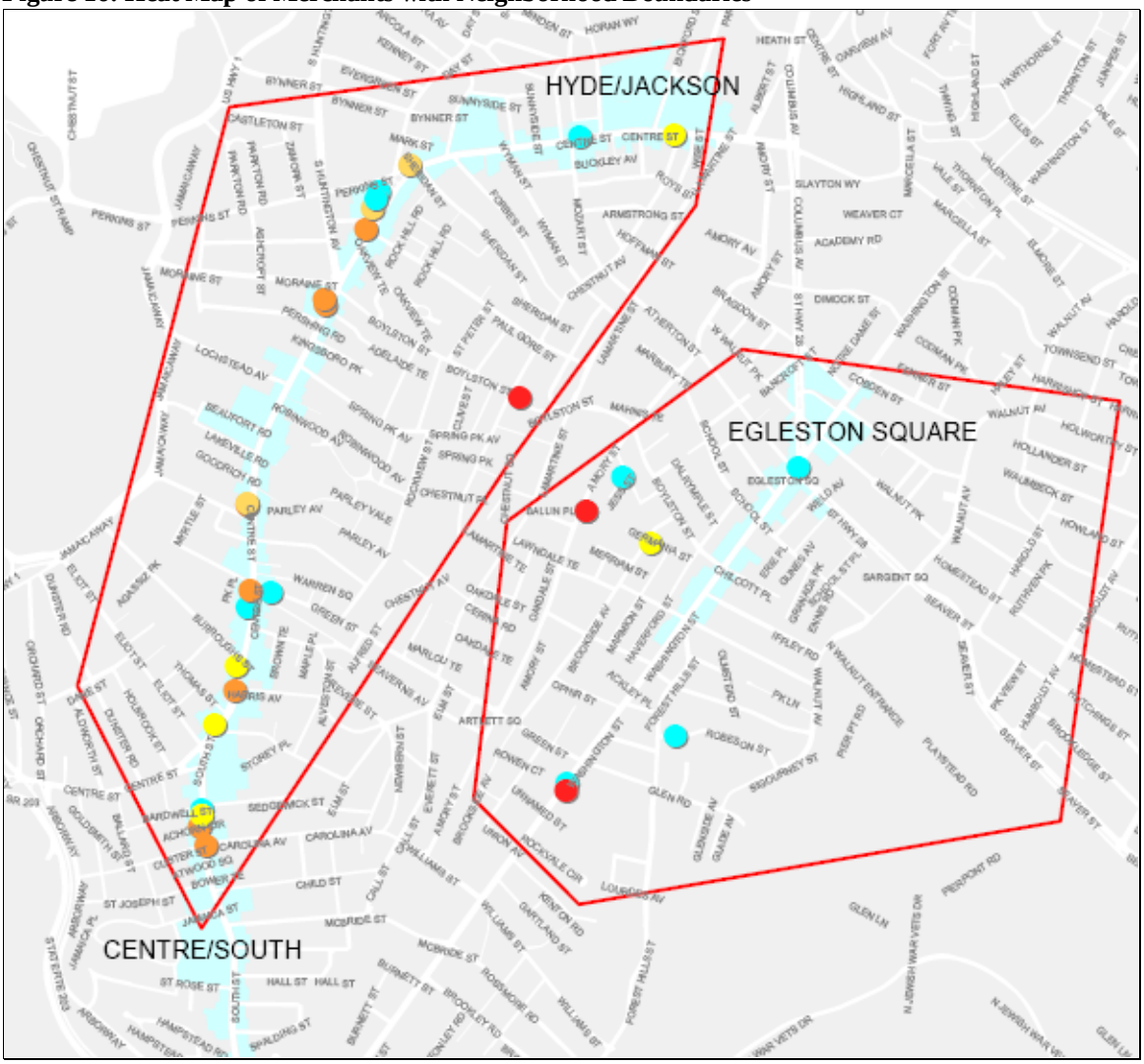



This map makes it much easier to analyze the merchant data. It is easier to distinguish the location and color of each individual dot. It can also be easily observed that all of the neighborhoods besides Jamaica Plain, Roslindale, and West Roxbury have a majority of yellow and blue dots, indicating that the stores have between zero and nine transactions.

It is also interesting to note that there are a large number of blue dots in East Boston, Field's Corner, and Hyde Park, signifying that these places have a large number of businesses signed up for the program, but the are not receiving any business from the Change Card holders. Again examining the first map which displayed cardholders, it is obvious that these areas have very few cardholders as well.

The third map again only shows the merchants location and dot color. This time, however, the neighborhoods are distinguished from one another by red boundaries. See Figure 16: Heat Map of Merchants with Neighborhood Boundaries.

**Figure 16: Heat Map of Merchants with Neighborhood Boundaries**



The most important piece of information that can be extracted from this map is the location of the three red dots shown in Figure 16. According to Figures 9 and 10, Egleston Square has a negligent amount of transactions and sales volume made in its stores. This information does not match with the map above. If these two businesses were located in Egleston Square, then their transactions would have definitely shown up in Figures 9 and 10. Therefore, either the red boundaries on the map are wrong, or when the business signed up for the program the wrong neighborhood was recorded. All of the other trends seen in Figure 15 and in the pivot tables can be observed on this map.

## Integration

Working towards our goal of recommending ways to improve the Boston Community Change program's internal database, as well as ways to expand the program itself through the integration with other card-based programs, we completed our second objective of finding ways to integrate the card with other city programs. These programs include: the Massachusetts Bay Transportation Authority (MBTA), the Youth Card initiative being explored by WPI's MIS team, and local universities.

Before we could explore the option of integration with the MBTA, we first had to research the technical architecture of the smart card system they currently utilize. The major aspects of the system are split up into three categories: the chip, the card, and the reading device. Researching these aspects allowed us to investigate the barriers of integration, as well as build a strong case to present to the MBTA.

The chip is made by NXP Semiconductors, which was founded by Phillips. The MBTA uses a Mifare Classic; it is a stored value smart chip, which uses an IC chip and an antenna. This allows for money to be stored on the card. Additionally, this chip

allows for a contactless transaction which reduces wait time and in turn increases revenue. As explained in the Background Chapter, a contactless card needs to be only placed in the proximity of a reading device. The chip has the ability to support forty different applications, namely, for example, banking, identification, transportation, and loyalty. The Mifare Classic makes up 70 percent of the contactless chip market.

The Charlie Card is made by Giesecke and Devrient. Right now it is a contactless card that houses the Mifare Classic. The card can be used as a multiple application card, which, as explained above in the Background Chapter, means that many different applications can be added to it. Such applications include: access control, electronic purse, loyalty, and digital signatures. Multiple application cards are already being used for transportation in Chicago, Washington D.C., Sweden, Brazil and Germany. Multiple application cards can house a chip and a magnetic stripe. This is extremely important, since the BCC uses a magnetic stripe. Therefore, if the Change Card were integrated with the Charlie Card, it would not require any change in the hardware needed to run both systems. This information was confirmed in our interview with Scott Henderson on April 23, 2008. Scott Henderson is a Project Engineer at the MBTA and he explained that the Charlie Card has already been integrated with magnetic stripe cards in the past, and there were no technological barriers. The MBTA signed a contract in December of 2006 with Giesecke and Devrient and will receive five million cards over the course of the next three years. The cards will be distributed in shifts; therefore, if the MBTA wanted to co-brand with BCC a new contract would not be required.

The reader is produced by Scheidt and Bachmann. In addition, they also run the central database server for the MBTA. The MBTA has 600 fare-vending machines, 50

ticket office machines, and 650 fare gates. The system is capable of reading contactless and contact-based cards. This means that the BCC cards' magnetic stripe would be compatible with the exiting hardware. Our research suggests that there would be limited technical barriers to integration.

The major benefit to the BCC of co-branding the card with the MBTA would be increased awareness of the program, ultimately increasing the number of cardholders and money generated for businesses and nonprofits. Successful co-branding with a supermarket in Seattle resulted in 500,000 dollars generated by the program in under six months. Ninety percent of the 500,000 was generated at the grocery stores alone. Boston's program, however, has only made 100,000 dollars in a little over a year.

There are many benefits of co-branding for the MBTA as well. The first is that it reflects well upon the MBTA and the city because they would be helping the local neighborhoods just by being a part of the program. Another benefit would be increased revenue for the MBTA. For example, if the MBTA had a rebate of five percent for every twenty dollars added to the card then people would have more of an incentive to spend more money than they originally planned. In addition, if the MBTA pays for the cards, they will receive money back on every transaction which will cover the cost of the card and provide a profit. The MBTA would also have the option of creating their own nonprofit, or have all donations go to a nonprofit of their choice. Additionally, if a transaction was made in a Main Streets District, a portion of the rebate could go back to that particular district.

Another option we explored was integration with local universities' student ID cards, specifically Wentworth Institute of Technology. After speaking with Christine

Rose on April 4th, 2008 we were informed that Wentworth students are already working with the Mission Hill Main Streets. These students belong to an international organization known as SIFE, Students In Free Enterprise, which works to support local communities. The students are working with Christine Rose to promote the card around their campus and their community.

Before contacting the university about a potential integration, we explored and brainstormed the benefits and barriers that would exist. If the integration were to take place, each student would be issued a co-branded student ID as soon as they arrive to campus. This would bring an immediate increase in cardholders for the BCC program. With all of these cardholders, new businesses around the campus would be attracted to the program, as well. If the schools paid for the co-branded cards up front, they would ultimately receive money back, and all of their ID cards would be paid for. It would also be good public relations for the school, as their students to be giving back to their local neighborhoods and nonprofits. Additionally, once one school co-branded the card, it would attract the rest of the colleges in Boston to do the same.

After interviewing Sean Bender of Wentworth Institute of Technology, we confirmed that there would be limited barriers to integrating the two cards. Currently, student ID cards use a magnetic stripe, so there would be no technological barriers to the integration. One potential barrier would be how each school views their students' privacy. This may vary for each different school. Additionally, a student may not want a Change Card, which would result in the school offering two different ID cards.

The last option would be integrating the Change Card with a card designed for students of the Boston Public Schools. The City of Boston has recently begun a five year

plan to track students' after school activities. The City is exploring card-based options to tracking the students. Since this is the beginning of their five year plan, if a card is used BCC can co-brand it from the very beginning and every student will have a Change Card. Depending on what type of card is chosen will determine the technological barriers. Additionally, integration would bring about the same privacy issues that exist with college ID cards.

# CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

After completing the data analysis of our first objective, we were able to draw conclusions on how the BCC can improve its internal database and its program. The goal of the BCC program is to strengthen local communities. We have concluded that this can be attained through engaged residents, strong institutions, and strong businesses.

In order to prove that residents are engaged, the BCC must have a demographic profile, a psychographic profile, and a way of showing that residents are using their card. To prove that the BCC is strengthening nonprofits, it needs to track that the donations are constantly increasing. Finally, a strong business needs to be profitable and to be always creating sales. The BCC can collect additional data to prove the businesses' profitability.

However, to create sales the BCC and its participating businesses need to work together to strengthen their marketing techniques. This can be achieved by collecting demographic and psychographic profiles of the cardholder so that the BCC can better understand the behavior of the consumers. The BCC could deliver these profiles to the merchants, who could in turn focus their advertising and promotions in a more effective way.

In addition, knowing when and where the transactions are being made can help market in another way. If a high intensity of transactions is made during a certain time of the year, the program or store can use this information to market the card, and their products, respectively. Date and time of the donations made to the beneficiaries could also work in the same way; stores and beneficiaries could promote the program at the same time.

To prove the existence of each of the three groups mentioned above, we recommend that the BCC collect data in three ways: the point of sign up, the point of sale, and a survey. All of this information should be only voluntarily given by the cardholder, merchant, and beneficiary. All of the information indicated should be solicited in a range.

At point of sign up the following should be collected:

- Cardholder Data: Age (Range), Gender, Ethnicity, Income (Range), Educational Attainment (Range), Occupation, Name of Beneficiary, Hobbies, Interests.
- Merchant Data: Type of Store, Base Revenue (Range).

At point of sale the following should be collected:

- Cardholder Data: Date and Location of Transaction.
- Beneficiary Data: Date and Location of Transaction.
- Merchant Data: Date of Transaction.

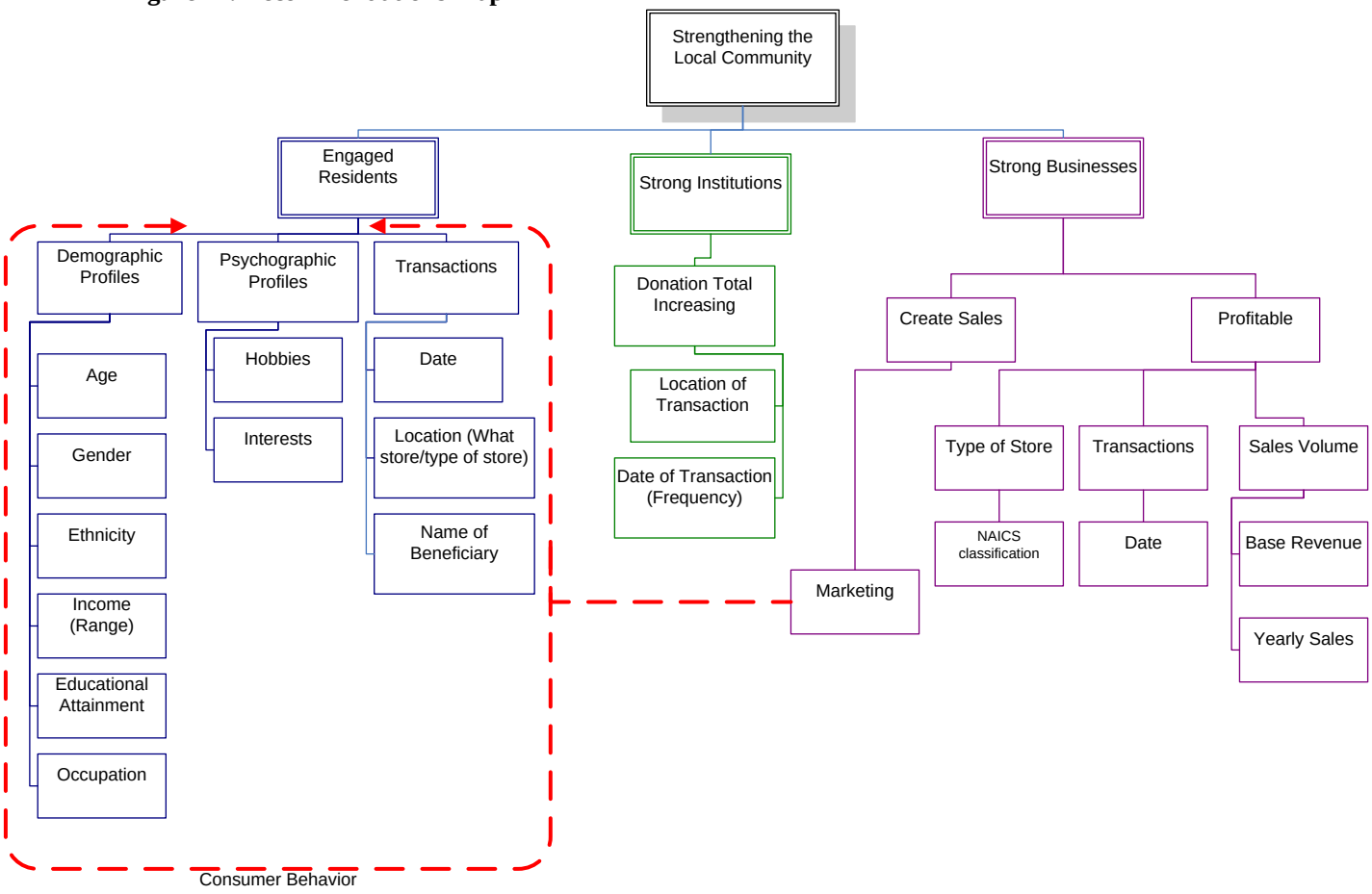
An anonymous survey should collect the following information:

- Merchant Data: Type of store using the North American Industry Classification System (NAICS), Yearly Sales (Range), and if the store is marketing using the BCC program.
    - NAICS uses a six digit code to classify and measure economic activity for businesses. This will provide a standard and consistent way to classify businesses taking part in the program.

We recommend this data to be collected in order to lend support to the existence of engaged residents, strong institutions, and strong businesses. Each specific data point that we have recommended to collect is important for completing an overall picture of the

program's success. These data points and how they connect with one another can be seen in Figure 17: Recommendations Map.

**Figure 17: Recommendations Map**




Additionally, we recommend that the BCC continue to collect personal income data quarterly for Suffolk County from the Bureau of Economic Analysis so that they may compare this with the sales data they collect on the survey. This will provide a gauge of success for the program. We also recommend the use of pivot tables to best represent the data in the future.

After completing our second objective of exploring options of integration, we were able to conclude that integration is necessary to bring the program to the next level of success.

We recommend that the BCC target the MBTA immediately for a co-branded card. Below are the steps that the BCC should complete in order to integrate the two cards.

4. Draft a proposal to present to Scott Henderson, a MBTA Project Engineer, which outlines the benefits of integrating the Charlie Card with the Change Card.
5. Scott Henderson will then draft his recommendations based on the proposal which he will then pass on for further approval.
6. If approved by the MBTA, the BCC can order co-branded cards directly from Giesecke and Devrient and begin to distribute them immediately.

After performing these steps with the MBTA, the BCC should then contact Sean Bender of Wentworth Institute of Technology. Wentworth has already expressed interest in co-branding, but further study needs to be complete before integration can be attained. We also recommend that the BCC do further studies on integration of the Change Card with the potential youth card being explored by the City of Boston.

# APPENDIX A-Department of Neighborhood Development

The Department of Neighborhood Development is one of the many different financial and social agencies that Mayor Thomas Menino has implemented to improve the City of Boston. The goal of the Department of Neighborhood Development is to make Boston the most livable city in the nation. To accomplish this mission, the city will work alongside separate communities to build strong local neighborhoods through strategic investment of public resources. This goal will be reached through five subdivisions: the Office of Business Development (OBD), the Neighborhood Housing Development Division (NHD), the Real Estate Management & Sales Division (REMS), the Homeowner Services Division (HOS), and the Homebuyer Services Division (HBS).

The Office of Business Development's objective is to expand and revolutionize the local neighborhood business districts. The department uses the work of local subdivisions: the innovative Main Streets program and the Boston Business Assistance Center. The OBD gives aid to small businesses looking to expand, as well as to potential small businesses that are looking to start. It also assists non-profit organizations in improving their facilities with matching capital funds.

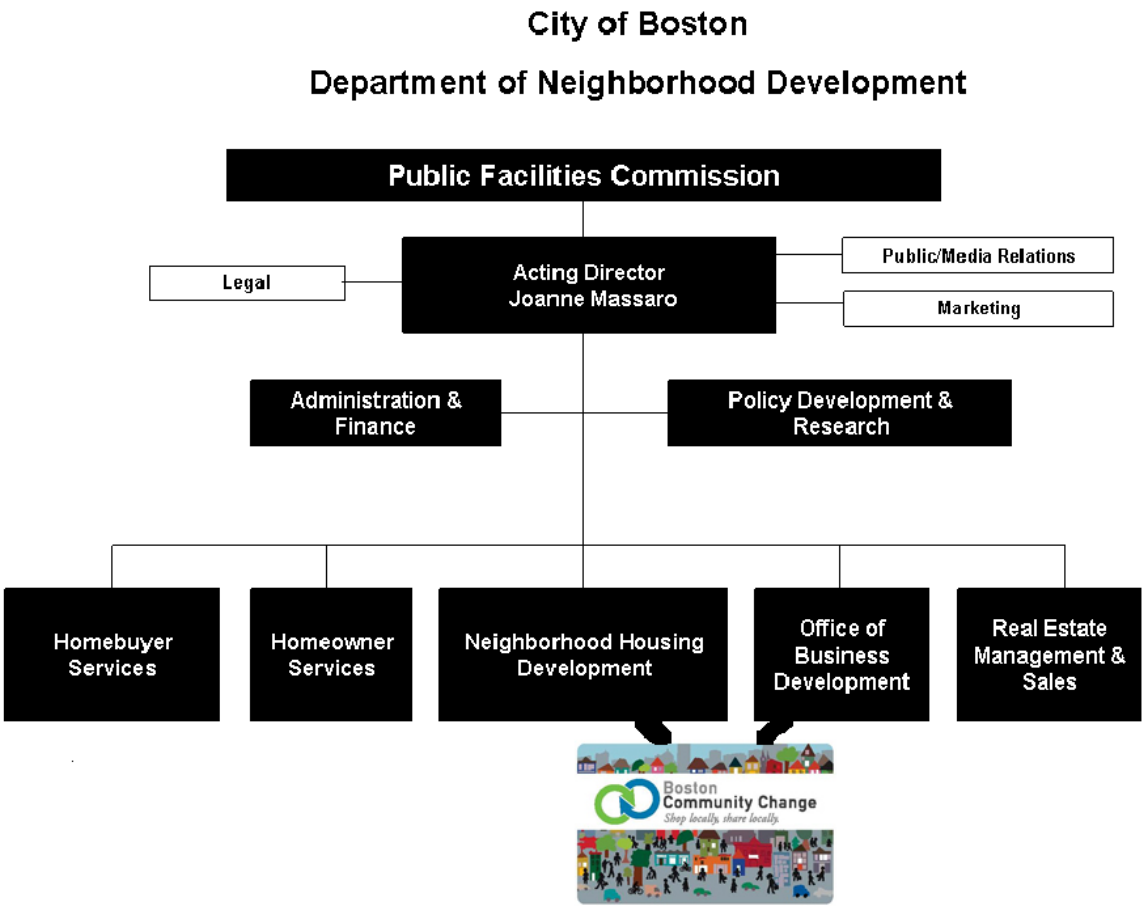
The Neighborhood Housing Development Division works alongside with for-profit partners and non-profit organizations to preserve affordable housing, but also develops this housing into attractive neighborhoods that people want to live in. It works to renovate abandoned property that Boston's lower class society can afford, yet still allowing them to live in very attractive and safe neighborhoods.

The Real Estate Management & Sales Division works to handle the city's vacant and tax-foreclosed land and buildings. It works alongside the community to determine what to do with the vacant and tax-foreclosed city-owned property. It develops these lands into potential housing properties or into commercially developed land.

The Homebuyer Services Division provides first time homeowners with all the knowledge that they will need to know when buying their first home. It gives educational help along with financial assistance. It markets property that first time owners can afford based on their financial status. The HBS operates the Boston Home Center. The Boston Home Center educates homeowners with foreclosure prevention counseling.

The Department of Neighborhood Development changed its name from the Public Facilities Department in November of 1997. The change was necessary because the mayor wanted this department to be included in his broader and more involved Neighborhood Development Strategy plan. This new plan was seeking to improve on many aspects including affordable housing, neighborhood business districts, local jobs, loan programs, neighborhood goods and services, and public land and building programs. The mayor's new strategy included finding a new local leadership that would look to use public and private resources to fulfill all community needs. He also wanted to develop affordable housing as well as promoting local business districts. He believes that with strong local business districts and dependable housing, neighborhoods can expand in a tremendous matter and therefore attract new businesses and shopping. The mayor also wants to have a consistently strong job market. This requires strong technical assistance for citizens who are trying to make a difference. All of these different aspects the mayor is working to improve in Boston are well defined in every program of the Department of

Neighborhood Development. Therefore, Boston's goal of becoming the most livable city in America is an attainable objective.



## APPENDIX B-The Interra Project

The Interra Project is the mastermind behind all of the "Community Change" programs. These programs have already begun in Boston, Massachusetts and, the second program, in Seattle, Washington. While using the Interra program, card members will receive cash rewards with every transaction and can direct money into a specific local nonprofit organization or to a school of their choice. By doing this simply process members will bring money back into the community while contributing to build a strong quality of life to the community.

The Interra Project was founded after a five year work process which involved over 100 of the leading social entrepreneurs. The co-founders of the Interra Project are leaders in the business world including Visa International founder Dee Hock, Greg Steltenpohol, the founder of Odwalla Juice Company, and Jon Ramer, founder of ELF Technologies and SmartChannels.

The Interra Project is a non-profit tax-exempt project. The financial sponsor is the Natural Capital Institute (NCI). As stated in www.ncinstitute.org (2008) the NCI is a non-profit organization that works with private organizations to revitalize local neighborhoods in cities. The Interra Project is funded through grants from the Russell Family Foundation, Steltenpohl Family Funds, the Tides Center, the Rudolph Steiner Foundation, the Columbia Foundation and individual donors.

The process for an Interra Project card member is first they will show the card during their purchase. Next the salesperson swipes the card through the credit card terminal, and then the customer pays for the purchase in any form of payment, whether it

be a cash, credit card, check. The customer will then receive a monthly cash reimbursement either through mail or in direct deposit. Also a portion of the rebate is donated to a local community nonprofit organization or to a school of choice.

The mission of Interra is to have a community based movement of spending that consumers will use daily to build a strong local economy. The goal of Interra is to involve a new economic infrastructure that involves participating citizens, local businesses and nonprofit organizations that will work with each other to build a strong value-based economy. The Interra project hopes that one day all citizens will continue to shop locally which will spread internationally and will eventually put billions of dollars back into the local community and restore the economy. Bernard Lietaer who wrote the book "The Future of Money" is quoted talking about the potential of the Interra Project as saying "The Interra model has the potential to transform the Cultural Creative subculture into an economic reality. Such a process would have huge significance, not only economically, but also in the social and the consciousness awareness realm."

## APPENDIX C- Boston Main Streets

One of the Department of Neighborhood Development's division's the Office of Business Development (OBD) has developed a program called The Boston Main Streets. The Boston Main Streets Foundation is dedicated to developing the commercial districts in Boston, creating vibrant centers of commerce, and to excite the citizens to support their local economy. The Boston Main Streets Foundation has developed long-term strategies that will increase local neighborhood's economic strength's and resources as well as working to build knowledge within the city on the Main Streets program.

The Boston Main Streets program was created in 1995 by Mayor Thomas M. Menino. The program was the first urban, multi-district Main Streets program in the nation. The Boston Main Streets program gives funding and other technical assistance to the 19 different neighborhoods throughout the City of Boston. These nineteen districts are Allston/Brighton, Back Bay, Beacon Hill, Charlestown, Chinatown, Dorchester, East Boston, Fenway, Hyde Park/Readville, Jamaica Plain, Mattapan, Mission Hill, North End, Roslindale, Roxbury, South Boston, South End/Bay Village, West End, and West Roxbury. The Main Streets program provides businesses and the citizen's of the community with the assistance and tools that will enable them to compete in today's market that is trying to wipe out the local historical commercial districts. The Boston Main Streets program helps local districts to utilize the fact that they have a unique history and culture while still focusing on the continued expansion of the community's economic development needs. The Boston Main Streets program as served as top model

for urban areas looking to revitalize their neighborhood's commercial district. Some of these cities include Baltimore, Washington D.C., Milwaukee, Detroit and New Orleans.

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