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The Development of Community Information Systems to Support Neighborhood Change

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CHAPTER 8

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INTRODUCTION

“Community information systems” are becoming an increasingly common way to distribute administrative data from local governments. These Web-based systems are using these administrative data to create and distribute valuable community and social indicator data to concerned individuals, social service organizations, community development professionals, and planners. Using the infrastructure provided by Geographic Information Systems (GIS) software and the Internet, these systems distribute important and detailed neighborhood data via maps, tables, and sometimes downloadable files. Some also provide analysis tools for users to manipulate or extract key neighborhood indicator data. Such systems have become popular in some municipal agencies because they are inexpensive and don’t require desktop GIS software or expertise (Hillier, McKelvey, and Wernecke, forthcoming).

GIS is often defined as a computerized database management system that can capture, store, retrieve, analyze, and display spatial data. Any data that include information about location—be it a street address, zip code, census tract, or longitude and latitude coordinates—can be considered spatial. Many different types of data can be integrated into GIS and represented as a map layer. When these layers are drawn on top of each other, spatial patterns and relationships often emerge. The most common GIS product is a map, but GIS can be used to generate tabular answers to queries or can be included in a spatial statistical analysis. GIS is also used as a scientific tool in interdisciplinary research that combines elements of geography, cartography, and computer science. Thought of in this way, GIS is a way of representing or modeling the world in a spatial framework. GIS technology was originally developed to model the natural world: land masses and bodies of water, elevation, temperature, soil composition, and suitable habitats for animals. More recently, social scientists have begun applying these tools—and this way of thinking—to understanding the social and built environments, and their

impacts on health, development, and behavior. These technologies form the infrastructural core of online community information systems.

Among a variety of offerings, these community information systems typically have census data, city administrative records, economic and social indicator data, and important housing and poverty indicators. With the availability of the Internet, these systems have significantly increased access to many data sources that previously were either inaccessible or required expert knowledge. Similarly, providing these data with a geographic interface and analysis tools has allowed end-users to access or analyze data in a more intuitive way, as compared to other tabular organizations of data. Community information systems have added to the richness of information that is available to community organizers, social workers, local leaders, and community organizations and it has been especially helpful to those engaged in neighborhood development. New audiences for these data, including commercial entities, continue to emerge as data and tools expand.

Despite the vast improvement of these online systems and their increasing availability, many barriers to access and use exist. Even people who have access to the Internet may not have the technological skills to fully utilize these burgeoning technologies or be knowledgeable regarding the potential applications. In many cases, users are familiar with the technical functionality of a community information system, but lack the ability to use the data they extract for policy, planning, or intervention. Other users seek more advanced functionality such as the ability to export data for use in their own GIS or statistical software. The range of technical skills among end-users requires training and outreach suitable to the needs and abilities of users to be a central requirement for any successfully deployed community information system.

Implementers of a community information system application also need to consider data quality issues and appropriate data to include in such an online system. Who should decide what data elements to include and at what geographic level data should be disclosed? How can community information systems provide valuable data but still protect confidentiality? Furthermore, given the nature of administrative data, are sufficient quality audits in place to ensure that data are reliable and useful to end-users? Similarly, to what extent are users aware of the data's limitations?

These questions represent some of the challenges faced by those engaged in developing and administering community information systems. As users and uses of these online systems grow, critical questions about their reliability and robustness must be answered. This chapter discusses how users access and use small area data in accomplishing their work. The Philadelphia Neighborhood Information System (NIS) is used as a case study to examine ways to address barriers that have traditionally restricted access to data and ways that the Cartographic Modeling Lab at the University of Pennsylvania has sought to reach out to users and to provide technical assistance. The chapter concludes by suggesting future areas of research for overcoming barriers to data access and for promoting further use of community information systems.

THE PHILADELPHIA NEIGHBORHOOD INFORMATION SYSTEM

The Neighborhood Information System was developed by the Cartographic Modeling Lab (CML) at the University of Pennsylvania. The CML is an interdisciplinary research center that

applies GIS and spatial analysis to social policy analysis, teaching, and research with a special focus on Philadelphia. Principal investigators from across the University of Pennsylvania have access to the lab's hardware, software, and data warehouse investments as well as methodological expertise. The CML is funded primarily through research grants from foundations and public institutions, and by contracts for services and application development. The NIS is just one of several successful city-university partnerships designed to distribute administrative data in a user-friendly and Internet-based interface. Other such partnerships include community information systems at the Case Western Reserve University (2004; Cleveland Area Network for Data and Organizing), New York University (2004; New York City Housing and Information System), and the University of California (Neighborhood Knowledge Los Angeles). Similar systems in Chicago (Chicago Neighborhood Early Warning System) and Milwaukee (Map Milwaukee) provide similar data access systems for community groups and private citizens.

The NIS started in 1998 as a three-year project funded with \$900,000 from the Pew Charitable Trusts, the William Penn Foundation, and the University of Pennsylvania. Today the NIS relies heavily on the generous funding from the William Penn Foundation and the City of Philadelphia. Maintaining the applications, updating data, adding new functionality, training, and publicity costs approximately \$150,000 per year. Funding for PhillySiteFinder, one of the applications that makes up the NIS, comes from the Pennsylvania Environmental Council and a grant from the Delaware Valley Regional Planning Commission's Transportation and Community Development Initiative (TCDI). A wide range of resources including university-city partnerships, foundation support, and government grants are available to organizations seeking to implement a community information system.

The NIS provides data for the city of Philadelphia, which is coterminous with Philadelphia County. Users can access the system at <http://www.cml.upenn.edu/nis>. Technical requirements for using the system are kept to a minimum; most users only need an Internet browser such as Microsoft's Internet Explorer or Netscape's Internet Navigator and a connection to the Internet. Given the widespread availability of the Internet in homes, schools, workplaces, and libraries, a vast majority of Philadelphians have access to the Neighborhood Information System. Outreach and training are used to promote the use of the system.

The NIS is comprised of five applications: the parcelBase Web site (address-level housing data), the neighborhoodBase Web site (aggregate housing and demographic data), muralBase (information on the 2000 murals in Philadelphia), crimeBase (five years of crime data), and PhillySiteFinder (an inventory of vacant and underutilized commercial and industrial sites in several Philadelphia neighborhoods). NIS users can research individual properties; run queries to locate comparables; plan, site, and evaluate housing development programs; and study neighborhood conditions with user-defined maps, charts, and reports. The integrated database also supports academic research on housing, social indicators, public health, school achievement, and environmental science. Applications under development include schoolBase, a utility for distributing information about schools and children, and a social service locator system.

The NIS also directly supports the broad policy analysis and planning efforts of the City of Philadelphia's Neighborhood Transformation Initiative (NTI), which seeks to "renew and strengthen entire communities, to ensure quality housing, clean and secure streets and vibrant cultural and recreational outlets" (City of Philadelphia, 2004). The NIS is a data management and research tool used by staff members responsible for NTI as well as hundreds of users not directly affiliated with the city's initiative. In some cases, the NIS is the only way that city

TABLE 8.1. Data Providers and Data Elements in the Neighborhood Information System

Data Provider	Data Type
Board of Revision of Taxes	Owner name, type of property, sale date, sale price, assessed value, exterior condition
Department of License and Inspections	Demolition, clean and seal date, housing code violations, vacancy status
Philadelphia Revenue Department	Current tax bill, tax arrearages, lien sale status
Water Revenue Bureau	Water shutoffs, water bill arrearages, vacancy status
Office of the Fire Marshall	Date of fires, cause of fires, type of investigation
Gas Works	Gas shutoff date, vacancy status, bill arrearages
Office of Housing and Community Development	Community foot surveys, digital photographs
United States Post Office	Vacancy status
Police Department	Crime incidents (several hundred classifications of crime)
Mural Arts Program	Mural location, artist, artist contact, photograph
Mayors Office of Information Service	Parks, recreation centers, other layers
City Planning Commission	Parcel layer (spatial)
Streets Department	Street layer (spatial)

employees are able to view the data of their own or other city departments. Given the importance of the NIS to the city of Philadelphia, city agencies have remained an active partner in providing data updates and funding for the project. Many other users including librarians, community health organizations, and educators who use the NIS for reasons not directly connected to NTI.

ParcelBase was the first of the applications developed by the CML and gives users access to address level data. parcelBase is a data warehouse that integrates data on over 500,000 parcels, or properties. Users can access data on any parcel in Philadelphia by typing an address. In most cases, the address entered can be interpreted by the master address table, which tries to account for common misspellings and abbreviations, and users are provided with information on the property that includes its ownership, sales listing, utility and tax information, basic property description, vacancy indicators, and fire history. In addition to this standard information, the parcelBase provides foot survey information and photographs collected by community groups for and uploaded by the CML. Table 8.1 shows the specific data elements and data source for the NIS.

In addition to the traditional sources of administrative data, the NIS utilizes several spatial data sources. Spatial data are electronic files that tell cartographers the location of properties, parks, streets, and other components of the built environment. These data elements are included in Table 8.1, and highlight that well-maintained spatial data such as streets and parcel maps are critical to the mapping component of the online application. The agency attribute data from municipal agencies are updated on a quarterly basis, census data are updated every ten years, and spatial data are updated when new map layers become available.

parcelBase is a password-protected site that is currently restricted to City of Philadelphia employees and nonprofit organizations that are approved by the City of Philadelphia Office of Housing and Community Development (OHCD). Since the project began, OHCD has approved nearly every request for NIS access from a nonprofit organization. The application will be public access in the future, giving the general public access to much of parcelBase's data.

Currently parcelBase creates a barrier for private developers and investors, who are not given access to the system and to a lesser extent for nonprofits because they must apply to OHCD for access.

NeighborhoodBase gives users access to many of the same data elements in parcelBase, but the data are presented at various aggregate levels rather than at the individual address level. NeighborhoodBase provides census data in a format that is much more user-friendly than the Census Bureau's download Web site (United States Census Bureau). The online mapping, reporting, and data analysis tools in neighborhoodBase can be used to focus on a specific council district, elementary school feeder area, neighborhood, zip code, census tract, or block group. Users can draw comparisons between individual neighborhoods or compare local conditions to the city as a whole. Drawing upon physical, demographic, and real property data, neighborhoodBase users have a planning tool that greatly enhances their ability to start new programs, manage resources, and target interventions. NeighborhoodBase is publicly accessible and can be used by anyone with an Internet connection and Internet browser.

MuralBase is an interactive database and Web site showcasing hundreds of murals produced by Philadelphia's Mural Arts Program since 1990. Visitors to the muralBase Web site can search for murals by theme, artist's name, zip code, or year, as well as through a map interface similar to the other NIS applications. The community mural projects it documents are significant both as public art and as neighborhood redevelopment initiatives. Over 2000 murals have been painted on the sides of buildings that serve as canvases for public art in Philadelphia. Having thoroughly documented vacancy and abandonment in Philadelphia through the other NIS applications, muralBase is an effort to document the positive redevelopment that is occurring in the city. It is also an effort to provide virtual access to a wide range of community art installations. MuralBase is publicly accessible and can be used by anyone with an Internet connection and Internet browser.

CrimeBase, released in April 2004, is a publicly accessible application that provides online mapping, reporting, and data analysis tools for crime data from the Philadelphia Police Department (PPD) in a similar form to neighborhoodBase. Users can create tables, maps, charts, queries, summary statistics, or trends and can create their own geographic boundaries by defining a neighborhood and producing aggregated statistics for that area. Users can download much of the data for free and the CML shares revenue with the PPD, for fees paid by researchers who require specialized data tabulations.

PhillySiteFinder, released in July 2004, is a publicly accessible, Web-based mapping application developed in conjunction with the Pennsylvania Environmental Council (PEC), the Delaware Valley Regional Planning Commission, and the City of Philadelphia Commerce Department. The application is designed to provide potential investors with information on an inventory of vacant and underutilized commercial and industrial sites in the Kensington, Richmond, Bridesburg, and Fishtown neighborhoods of Philadelphia. Users can search for parcels and uncover details including size, past sales, property assessment information, data from the Environmental Protection Agency, photographs, and zoning classification.

The Neighborhood Information System contains a wealth of data about Philadelphia. Because so many data are available, choices about what to include in the system are critical. In particular, the U.S. Census provides hundreds of data elements that might be included in any community information system. Choices to include information on race, poverty, income, and housing are represented in the data elements selected for this system. Table 8.2 shows the various data elements in the system. Most data elements include both the raw number and the

TABLE 8.2. Sample Data Elements in the Neighborhood Information System

Sample Data Elements
African Americans, number, 2000
Arson/incendiary fires, percent, 1992–2004
Asians, number, 2000
Bachelor's degree, over 25, number, 2000
Children under 18, number, 2000
City-owned properties, number
Condominiums, number
Fires on property, number, 1992–2004
High school diploma, over 25, number, 2000
Hispanics, number, 2000
Household income, median, 2000
Households, number, 2000
Housing units, occupied, number, 2000
Housing units, owner occupied, number, 2000
Housing units, renter occupied, number, 2000
Income below 100% poverty level, number, 2000
Income below 200% poverty level, number, 2000
Industrial properties, number
L+I clean/sealed properties, number, 4/2004
L+I demolished properties, number, 1992–2004
L+I housing code violation properties, number, 4/2004
Lien sales for delinquent taxes, number
Mortgage housing costs, monthly, median, 2000
Multifamily properties, number
Owner households, income <\$20k, number, 2000
Owners paying >30% income on housing, number, 2000
PHA-owned properties, number
PWD assistance program, number in
PWD senior discount program, number in
RDA-owned properties, number
Rent, monthly, median, 2000
Renter households, income <\$20k, number, 2000
Renters paying >30% income on rent, number, 2000
Residential sale price, median, 2002
Residential sale price, percent change, 2001–2002
Vacant buildings, L+I survey, number, 2000
Vacant properties, L+I survey, number, 2000
Vacant properties, USPS, number listed as, 1/2004
Vacant residential, L+I survey, number, 2000
Water service shutoffs, number,
Whites, number, 2000
Year structure built, median

percent of total. NeighborhoodBase and crimeBase include several hundred data elements and for this reason only a partial list is included here.

Table 8.3 shows the predefined geographic levels at which data are aggregated in the Neighborhood Information System. Census statistical units, such as census tracts and block groups, and governmental units, such as council districts and elementary school feeder areas, may not be how all users understand the boundaries of their neighborhood, study area, or

TABLE 8.3. Predefined Geographic Aggregations

Geographic Division	Number of Divisions
Council districts	10
Elementary school catchments	173
Neighborhoods	69
Zip codes	47
Census tracts (2000)	381
Census blockgroups (2000)	1816
Police districts ^a	25
Police sectors ^a	419

^aIndicates geography available only in crime application.

service area. To overcome this barrier the NIS has developed a user-defined neighborhood function that allows users to define the boundaries of their neighborhood and receive custom data aggregations for their area. This innovation and other improved online functionalities are described later in this chapter.

Typology of NIS Users

The NIS is used by City of Philadelphia employees, private citizens, students, researchers, community-based organizations, community development corporations (CDCs), and other nonprofit organizations. The NIS has many thousands of hits per month and can be measured both in terms of overall use and number of users. Each month the NIS receives about 75,000 data requests. A data request is equal to someone requesting a map or table or someone mapping an individual address. In a typical session, one user might make several dozen data requests. During a typical month, the parcelBase system will handle about 2500 logins to utilize the application. NIS users represent 34 city agencies and 229 nonprofit organizations. There are over 1100 individual parcelBase accounts, suggesting that there are on average five users per organization. Roughly half of users are city employees and the remaining half are employees of nonprofit organizations. ParcelBase use can be tracked by number of users because a login is required of users; however, tracking neighborhoodBase is significantly harder because there is no login requirement. Evidence from training suggests that nonprofits and educational institutions make up the bulk of neighborhoodBase, muralBase, and crimeBase users (Hillier, McKelvey, and Wernecke, 2006).

Uses of the NIS range from simple property queries to look up ownership information on a specific property to sophisticated gathering of neighborhood characteristics for a particular area in Philadelphia. Many city users simply use the NIS to view data from multiple city agencies or to do research for condemnation purposes. Other nonprofit organizations have used the neighborhoodBase application to write grants for community development.

The City of Philadelphia Finance Department uses the Philadelphia Neighborhood Information System to determine property ownership information. The department is responsible for processing tickets for false fire alarm activations, "trash out early" violations, and other sanitation code violations. Locating the owner of a particular property using parcelBase is useful to the department because the department has to send violation notices. Often, properties are not in the city database maintained by the Finance Department, and by using the parcel

map the Finance Department is able to locate the property and contact the owner. Finance Department users utilize the map interface to locate properties where the address might be unknown or is unclear, for example, if a complaint were filed by a resident about someone who was directly behind their property. The department is a transactional user of the system, insofar as they have a very defined work flow that requires them to use the NIS for a routine and usual service that would otherwise require visits to the field. Local community groups, local officials, and caring individuals can also access property owners and initiate improvement projects.

The Philadelphia Department of Public Health Vector Control Services has been using the Neighborhood Information System to help control the spread of the West Nile Virus, a potentially deadly virus spread by mosquitoes. Mosquitoes breed over water and so substantial problems are posed by private residential pools, water reservoirs, and areas prone to flooding in urban areas. Using observations made in the field, the Health Department has used parcelBase to determine who owns vulnerable properties and to determine locations to spray pesticides.

For example, the Health Department identified 2901 South 84th Street as a potential mosquito breeding area because it has a tendency to flood. Mosquito surveillance in the area found mosquitoes that tested positive for the West Nile Virus. This area is an elementary school and the health department is not allowed to spray school grounds with pesticide to kill mosquitoes. To overcome this problem they used the Neighborhood Information System to determine the precise boundaries of the school parcel—it is a wooded area and the parcel boundaries are not immediately clear—so that they could determine an alternate spraying location. They were able to locate areas nearby the school and thus provide mosquito abatement without violating procedures and regulations or harming young school children.

When the Health Department receives complaints about properties with pools that breed mosquitoes, they visit the site to investigate. If they are not able to gain access to the property or speak with the owner, they use the Neighborhood Information System to find the responsible party. Properties with pools are also identified by the City's Community Life Improvement Program (CLIP) during fly-alongs in the police helicopter unit. In this case, the NIS is used to look up ownership information. In the case of vacant lots, which are often very good breeding grounds for mosquitoes, the Health Department finds the NIS very useful in identifying the owner of the vacant lot. The Health Department also uses Microsoft Streets and Trips in their work, and this program often fails to identify some of the city's smaller streets. The NIS is a resource they turn to for more accurate street data in this case. The Health Department Vector Control Services also sees valuable use of the neighborhoodBase application in grant writing and proposals. As the need arises for demographic information, they plan to use the Neighborhood Information System to analyze neighborhoods and parts of Philadelphia. The health department is another transactional user of the system, because they enter with very specific address-level concerns.

The South of South Neighborhood Association (SOSNA) has found the Neighborhood Information System helpful in renewing their community. In SOSNA's neighborhood, residents have renovated a block and a half of land. The residents have turned this formerly blighted stretch of land into a beautiful community garden. The enclosed garden consists of stone walkways, neatly organized gardens, a pond, and over thirty trees that were planted by the residents. This particular stretch of land was placed on the City's condemnation list. The residents were upset and felt that numerous other properties should have been condemned instead, because they were hazardous to the community. SOSNA has recently used the NIS to identify the owners of each individual parcel that makes up the community garden. SOSNA has taken this information to their City Council representative asking for the community's voice

to be heard in the condemnation process. SOSNA is advocating for this community garden to be saved by adding it to the City's land trust. The response has been favorable, but the issue is still pending. However, the NIS has allowed this community to research the area and build a case to impede the demolition process. This community group has utilized their access to the Neighborhood Information System in advocacy efforts to ensure a fair process in the City of Philadelphia's Neighborhood Transformation Initiative.

The University of Pennsylvania has fifteen libraries, located throughout the campus, housing a collection of over 4.5 million volumes. The Van Pelt-Dietrich Library includes an undergraduate center, which is open for study all night during the fall and spring semesters. Lounges, study carrels, group study and seminar rooms, and over one hundred fifty public computers for student use are located in the center. The Van Pelt Library Center holds the University's main social sciences and humanities collections and is considered to be the most frequently used library at the University. Van Pelt librarians are responsible for assisting students, faculty, and administrators of the University in their search for information.

The University of Pennsylvania's Van Pelt Library staff use the neighborhoodBase to assist patrons seeking access to neighborhood-level data for research and activism. Students are often involved in community activities that require them to investigate their surrounding environment. Students are also required to write reports and conduct research projects that focus on particular communities within the City of Philadelphia. NeighborhoodBase has been utilized by many patrons to pull demographic information about Philadelphia neighborhoods. Prior to giving patrons access to the Neighborhood Information System, librarians spent many hours teaching students to extract data from the United States Census Web site. The use of neighborhoodBase gives patrons access to data at a finer geographic level and a user-friendly Web interface. Librarians are gateways to many potential users and their value in outreach and training cannot be stressed enough.

Located in West Philadelphia, the Friends of Clark Park is a volunteer association dedicated to improving Clark Park, the largest green space in University City. The diversity of the organization reflects the diversity of University City, as it unites students, university faculty and staff, families, and representatives of major institutions within University City in caring for the park. Through its involvement, the Friends of Clark Park transformed the open area from an overgrown park to an active and welcoming space.

The Friends of Clark Park relies extensively on the Neighborhood Information System to reach its mission of public space maintenance and education. Because of its volunteer-dependent structure, Friends of Clark Park faces difficulty in raising funds. Although the organization receives support from the William Penn Foundation and other partners such as University City District, it continues to rely heavily on individual donations and membership drives for its operating expenses. The Friends of Clark Park uses the Neighborhood Information System in assessing the potential fundraising base. Using the parcelBase application, Friends of Clark Park queries recent home sales to locate potential new members/donors. Also, the organization looks at the average housing sales prices to evaluate the levels of membership dues. These measures assist the organization in assessing their potential funding base, which aids the organization in determining the scope of projects that it can undertake.

In addition, Friends of Clark Park also refers to the Cartographic Modeling Lab's University City Indicators' annual report when determining on which projects it should focus. The University City Indicators' annual report describes the fabric of University City, and provides extensive demographic data. Specifically, Friends of Clark Park looks at the percentage of undergraduate students and university staff members that are present within its target area. Recognizing that undergraduate students and staff members comprise the base of its volunteer

labor pool, Friends of Clark Park tailors its project selection to reflect the percentage of undergraduates and staff in the population. If there is a trend of large numbers of undergraduate students in its target population, then the organization can embark on a volunteer-intensive project.

The Ogontz Avenue Revitalization Corporation (OARC) was established to create and stimulate economic development and improve the quality of life for the West Oak Lane community located in Philadelphia. OARC provides a wide range of services including mixed-use and commercial development, employment training referral services, clean sweep and business association support programs, civic programs and activities, and family and recreation centers. OARC works with the West Oak Lane residents to address concerns about troublesome and dangerous properties within their community.

OARC has primarily accessed the Neighborhood Information System for information about individual properties in their community. However, OARC also utilizes aggregate data included in the NIS to compile neighborhood condition reports about their community. OARC often acquires properties that were located using the NIS. OARC gave an example of a commercial property about which several residents complained. OARC used the NIS to gather information about the property's owner, debts, and condition of the property in order to plan an intervention. When OARC gathered this information they approached the property owner and made an offer to purchase the property. Often the organization is successful in acquiring nuisance properties.

The Neighborhood Gardens Association (NGA) is a community-based organization dedicated to ensuring the continuity and long-term preservation of community-managed gardens and open space within Philadelphia's moderate- and low-income neighborhoods. NGA's mission is to make Philadelphia communities greener places to live. NGA is able to accomplish their mission by assisting community residents in several ways. NGA assists individuals and community groups with identifying potential land, information, and assistance with acquiring land to create community gardens, as well as providing materials and labor to improve the quality of pre-existing gardens.

NGA has been using the NIS since its creation. NGA often receives calls from concerned residents and community groups interested in either creating green space in their neighborhoods or preserving pre-existing gardens that have been a source of inspiration for communities. The NIS has allowed NGA to identify vacant parcels that can be used to create green space as well as identify ownership of pre-existing gardens in the hopes of preserving them. NGA has used the NIS as a tool to establish credibility in their neighborhood redevelopment efforts. In the past NGA relied on a paid neighborhood information service that provided only a fraction of the information available in the NIS. Today NGA relies heavily upon the query capabilities included in the NIS to locate and identify properties within specific neighborhoods. Having access to the NIS has allowed NGA to save money and, most of all, valuable time.

The Queens Village Neighbors Association (QVNA) is a community organization dedicated to the preservation and beautification of their Queens Village community. QVNA is made up of various committees; among them are a town watch group, clean street committee, and a zoning committee. The QVNA is interested in maintaining and improving the quality of life in their community. The Queens Village Community actively monitors events and development located within their community in order to remain successful.

The Queens Village Neighbors are continuing to discover new ways of using the NIS in their organization. The NIS has allowed the Queens Village Neighbors to identify the owners of neglected properties and QVNA has had success using the NIS to address issues of neglect.

Once the association identifies a property owner, they write a letter to the owner identifying problems and outlining the requested remedies. The group used the NIS to identify vacant parcels that were overgrown with weeds. The NIS informed them that there were four separate lots, with three different owners, and provided them with the owners' mailing addresses and specific open code violations for those properties as reported by the Department of License and Inspections. The Queens Village Neighbors used the information to contact the owners asking them to address the issue of neglect on their properties. As a result of the inquiry the owners of the properties complied. The Queens Village Neighbors have also made use of the NIS to identify and gather information for an entire block that is vacant in their community. The Queens Neighbors have taken this information to their City Council representative advocating for these properties to be included in the City's Neighborhood Transformation Initiative planning.

Training and Outreach

Having built the Neighborhood Information System and made it publicly available online, significant barriers to access remain. With a sophisticated GIS interface and multiple layers of data aggregations, training and outreach are a key part of reducing barriers to access. Giving users the skills to use the NIS effectively, to understand the limitations of the data, and to access policy-relevant data are important goals of the training and outreach program. High levels of Neighborhood Information System usage are directly tied to outreach and training efforts made by the Cartographic Modeling Lab. This section describes how training and outreach for the NIS have evolved and how staff meet the needs of a wide range of users through training and outreach.

Since 2002, the Neighborhood Information System has employed an outreach coordinator responsible for communicating with users, providing support, and organizing a training program for potential and current NIS users. In 2004, a decision was made to move from a demonstration-based training in which an instructor operates the Neighborhood Information System displayed on a large screen to a hands-on interactive training in which users have their own computer terminal and follow examples provided by the trainer. These computer lab-based trainings have proven more effective in reaching users and giving them the skills to use the Neighborhood Information System. These trainings are staffed by two staff members who are very familiar with the Neighborhood Information System. Users are given guided examples to provide experience with the types of functions available in the online application and the types of data they are able to access. Trainings are scripted to include examples that give users a sense of how they might use the NIS to advance the goals of their organization.

In addition to these introductory trainings, which are open to any user and free of charge, the Neighborhood Information System offers advanced trainings. These trainings offer users the chance to review some of the basic principles of the NIS and to explore the system's more advanced functions. For example, users are taught how to use the *user-defined neighborhoods function*, an advanced function that gives users custom data aggregations based on geographic boundaries defined by the user. More of these advanced uses are explained in the section that follows. In addition to reviewing and teaching, these sessions give users an opportunity to ask sophisticated questions and troubleshoot topics with the help of the NIS trainer and the other seminar participants. Often the most important component of the advanced training is the conversation that occurs among those users who attend the training. NIS staff have begun to view these trainings as a chance for users to informally discuss how they are using the

system, to gather ideas about how they might use the system, and to learn about new advances in technology that improve the system.

To reach specific groups, the NIS has sought to provide customized trainings to groups ranging from the City of Philadelphia Human Relations Commission to students pursuing masters' degrees in elementary education. In direct consultation with an agency or organization, NIS staff create trainings that utilize examples relevant to the organization. These trainings are often most effective because they have a specific goal or objective in mind.

NIS professional staff consistently seek to work with librarians, because they provide a valuable gateway to knowledge and serve thousands of library patrons per year. Training one librarian is the equivalent of training several dozen potential users. Librarians are encouraged to funnel users that are seeking to learn more about the Neighborhood Information System to a free training. Other user groups include children doing a neighborhood survey, fire department officials, Philadelphia Gas Works employees, school district employees, and students pursuing higher education.

In addition to trainings, the staff of the Neighborhood Information System engage in targeted outreach efforts. For example, the outreach coordinator attends Philadelphia Town Watch conferences to encourage crime watch organizations in the city of Philadelphia to use crimeBase to plan and monitor their patrol efforts. In addition to face-to-face contact, fact sheets, postcards, and other public relations material are prepared for targeted groups.

Training and outreach are often the first things to be liquidated when budgets run low or when costs need to be cut from a grant. However, community information systems require a strong training and outreach program. Without adequate publicity and training, the likelihood of the intended use being realized is greatly diminished. Furthermore, the provision of ongoing user support is critical in order to ensure that users have a direct line to help navigate their way through the online system. Some of this support should be provided with online help tools and tutorials. However, experience has shown a need for live help that is provided on the telephone or through electronic mail. Users often call with simple questions about how to update their password or how to log into the application. Explaining the nuances of administrative data and the limitations of the online system are most effectively accomplished through a staffed outreach and support team of people. In addition, this contact provides a crucial line of communication between users of the system and those people who manage the system. This communication is an important part of evaluating how the system is being used and how it can be improved.

BUILDING TECHNICAL CAPACITY AND FUNCTIONALITY

Community information systems utilizing GIS and providing data on the Internet are a relatively new phenomenon. For this reason, innovation and technological advances constantly change how users interface with the online system. This section describes new technology that has been incorporated into the Neighborhood Information System and other community information systems. How and why new technology is incorporated into the online system and how these new technologies are changing the way end-users interact with online community information systems are discussed.

NeighborhoodBase provides users with data aggregations at various geographic levels such as neighborhood, zip code, and census tracts. These sometimes arbitrary geographic divisions prove challenging for users to interpret, given that each organization determines

its neighborhood or study area differently. In other words, not every group will agree on the boundaries of a neighborhood, nor will they necessarily find the NIS's geographic demarcations useful. Given these limitations and overwhelming demand from users, the Neighborhood Information System recently began implementing the *user-defined neighborhood* function. This tool literally gives users the ability to zoom into a particular area of Philadelphia and draw the boundaries of their neighborhood on a map. Once the user has outlined the neighborhood on the interactive map, she is given a custom data aggregation for this user-defined geographic area. Where users previously had to approximate their neighborhood based on a NIS name scheme and geographic division, users can now create their own geographic divisions and data aggregations.

This new tool is a very powerful way of placing more control in the hands of the users and giving them greater control over how geography is defined for the purpose of data aggregation. However, this new technology has some limitations. Users must define neighborhoods in terms of the smallest NIS geography (census block group). Because administrative data is often not disclosed at a geographic level smaller than this arbitrary census designation, users are required to use it as a building block to create user-defined neighborhoods. Furthermore, the technology requires very precise navigation of an interactive map. Users are required to zoom into a certain area of the city and use the city streets to pick the area they seek to define as their user-defined neighborhood. Early experience with users has shown that this technology will be advantageous to organizations and individuals seeking more precise neighborhood-level data. It has also shown that training is a key method for teaching users how this new technology works.

The ability to extract data from the Neighborhood Information System and use it in statistical software or tables in reports has been sought by users for some time. To meet this need, which has been primarily demanded from a group of advanced users, the NIS recently developed the *export data* function. Once a user has created a table of multiple data elements, he can click on the *export it* shortcut tool and choose to download the data into a common database application such as Microsoft Excel or Microsoft Access. Previously users could only view data on a Web page while browsing the Internet. Now, data can be extracted and used without the Internet or NIS online interface. Many users have taken advantage of this option to remove data and analyze it in their own GIS or statistical software applications. To facilitate this process the Neighborhood Information System has also begun disclosing shapefiles for download. Shapefiles are electronic maps that are required to use any data in a GIS desktop software application. By giving users the ability to download data, the Neighborhood Information System has made a significant step from simply being an online data intermediary to being a data clearinghouse where users can both utilize the NIS's online functionality and extract data from the Internet to use in their own analysis.

Data in the NIS are unique because NIS is geographically related, but also because it gives users a snapshot of how things have changed over time. Since 1997 the NIS has been collecting data from various City of Philadelphia agencies. In 2004, the NIS began to implement a trending capability in the Neighborhood Information System. Given five years of data since its inception, the NIS interface was upgraded to allow users to see how specific data elements have changed over time. By providing users with trend data, the NIS is allowing organizations, individuals, and agencies to measure the effectiveness of interventions. It also helps users plan for future programming and interventions. Furthermore, the NIS is a very rich archive of City of Philadelphia administrative data. For example, the United States Post Office, from which the NIS draws information about which addresses are vacant, destroys their data after only a few months. The NIS archives these data and gives users the ability to trace back in time to see how vacancy patterns have changed.

Other improvements and additions to the NIS are driven by user feedback or by specific requests by outside funding sources. For example, PhillySiteFinder is an innovation that was added to the Neighborhood Information System by outside funding sources seeking to fill the need for an online inventory of Brownfield sites in Philadelphia. The Cartographic Modeling Lab holds focus groups from time to time to discuss the NIS and how it can be made more user-friendly. Improvements to the Web interface are made based on these groups' and other user feedback. Everything from changes in map symbology (the legend) to how a user navigates the site is based on how users experience the NIS. Connecting designers and managers with the users who utilize the NIS on a daily basis is a key way to ensure that the system is serving the community of users for which it was intended.

EVALUATING OUTCOMES

Driven by funding requirements and the desire to incorporate user feedback into future releases of the Neighborhood Information System, the Cartographic Modeling Lab Neighborhood Outreach staff frequently conduct user surveys. This is done in the form of an end-of-year online survey that all users are asked to complete. In December 2003, the Cartographic Modeling Lab (CML) conducted an online survey as part of an evaluation of the NIS. The CML contacted, via e-mail, approximately 797 parcelBase account holders and neighborhoodBase users who have attended a Neighborhood Information System Training. The survey asked users to complete thirty-eight questions about the parcelBase Web site, the neighborhoodBase Web site, the muralBase Web site, about user support, and overall usefulness of the NIS. The survey's overall response rate was twenty-five percent. Thirty percent of respondents received accounts through a City of Philadelphia agency and sixty-two percent through a nonprofit organization. The remaining eight percent did not respond to this question or responded "not sure." The sample size and distribution of users suggest that these findings are broadly representative. These findings were used to plan improvements to the NIS and to report statistical information to the NIS funding sources.

According to the survey, parcelBase is the most popular and highly utilized NIS application. NeighborhoodBase was more widely used in 2003 than in 2002 and it is gaining users. MuralBase is utilized by a smaller "niche" group of users. Results of the survey reflect satisfaction with the tools and data elements. CML support of users through training and telephone and electronic mail support is also strong and well utilized. One key finding of the survey is that increases in outreach and training have been associated with increased use of neighborhoodBase. More than half (fifty-four percent) of respondents use neighborhoodBase at least once or twice a month, with over twenty-one percent using it at least once a week. In 2002, only forty-three percent of users logged in once or twice a month or more.

For users who utilize neighborhoodBase, the tools are valuable to their organization. Seventy-seven percent of users found making maps to be very or highly useful (in 2002, this number was sixty percent). In other areas, including tables, reports, querying, summary statistics, and help functions, respondents found tools very or highly useful fifty to sixty percent of the time. In every area, 2003 results outpace 2002 results by a minimum of ten percent. The 2003 Survey also found that trainings are well received. Eighty-eight percent of respondents said the trainings were very or extremely helpful. In addition, users stay in touch with the CML, with forty-three percent of respondents telephoning or e-mailing for support (eighty-five percent rated the help they received as very helpful or extremely helpful). One user wrote on the survey that

the NIS program is extremely helpful for me, as I mainly utilize the system for mapping purposes and neighborhood assessments. In the past, I would have to drag out the heavy Sanborn maps to assess an area, and wait for the Company to once a year update information as far as demos [demolitions], new streets, etc. go. Now I can just click on the information at my computer and printout the report.

Other users requested increased data portability and manipulation tools; one wrote, "It would be extremely helpful if the data was easier to download. If I create a query I would like to be able to download that data into a Microsoft Access database or an Excel spreadsheet." Many users request additional data elements, including the ability to access crime statistics for their neighborhood or study area. These testimonials represent the range of survey responses. Survey comments and data help inform new releases of the Neighborhood Information System.

In addition to the online survey, Neighborhood Information System staff conduct case studies with advanced users of the NIS. This provides insight into how users utilize the system to advance the goals of their organizations. Case studies provide a great deal of the information used in this chapter; they help illustrate how the intended uses match up with the actual uses. Furthermore, this type of information helps to inform how the NIS can be improved and expanded. Again, the importance of connecting the system's designers and the system's users cannot be emphasized enough. Simply providing a Web site with valuable data is not sufficient to encourage best practices and best uses of the Neighborhood Information System. This interaction provides a valuable feedback mechanism that allows the system to best serve its intended end-users.

AREAS OF FUTURE RESEARCH

The Neighborhood Information System is one example of a community information system that provides aggregate administrative data online. The Neighborhood Information System's user-friendly format and simple instructions make the system accessible to a broad range of users and because it is a Web-based application, no special hardware or software is required. Users can use a connection to the Internet and Internet browsers to access the system. With a robust training and outreach program, the NIS has excelled at providing users with access to data, specialized geographic information, and complex analysis tools. The map interface allows users to view data in a spatial context and to make geographically relevant decisions. However, with the advent of this technology come many limitations and areas of future research. This chapter concludes by discussing limitations and suggesting areas of future research.

Past efforts have been made to survey the availability of community information systems across the United States (Caulfield, 2003). Future research should seek to build an inventory of systems nationwide by gathering a holistic picture of how systems are utilized, the technical requirements, the cost, and other policy-relevant information. Efforts should be made to understand best practices in community outreach and technical ease of use. Research should examine the effectiveness of training and outreach. From a usability standpoint, there is a need to examine the effectiveness of training and outreach efforts. Furthermore, research into the level of understanding that users have in terms of the community information system's limitations is needed. How informed of data reliability issues are users? And to what extent is this awareness communicated to others when making policy or intervention decisions? Furthermore, some evaluation of the extent to which community information systems affect policy and change should be made.

Research should address best practices for disclosing aggregate data online. There is a distinct need to develop best practices for ensuring that confidential data, such as health data, are disclosed at geographic levels that are useful to users and protective of confidentiality. Further research should examine how quality checking is incorporated into the way researchers use administrative data and how understanding of the data's limitations is translated by users of the community information system. This field of research is an increasingly important area as researchers use more census data and administrative data in their analysis.

Barriers to accessing community information systems are quickly eroding. However, many intended users have little or no access to the Internet or computing environments that permit access to the Neighborhood Information System. Many City of Philadelphia users and community-based organizations do not have Internet access. Similarly, access to training is limited, with some community information systems providing little or no training. The quality of administrative data is a barrier to accessing the most accurate information. Given access, social workers and others engaged in neighborhood-level activities can use community information systems to examine various neighborhood indicators and inform decisions across space. These powerful online tools hold great potential to affect change.

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