How to Build a Community GIS:
The Minneapolis Neighborhood Information System Handbook
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Executive Summary

The Minneapolis Neighborhood Information System (MNIS) is a community geographic information system (GIS) that enables neighborhood organizations to use spatial data for community planning. The City of Minneapolis along with the Center for Urban and Regional Affairs (CURA) at University of Minnesota support the program by providing data, training, and project management support to neighborhood organizations. The neighborhoods, City, and University work together to sustain the direction and focus of the program while building capacity of neighborhood organizations by training staff to use GIS in daily tasks and adding a mapping role to community organizations work.

MNIS is unique in the community GIS world because of the neighborhood control that guides the program. Neighborhood organizations are the key ingredient that makes MNIS a success. In the late 1990's Minneapolis neighborhoods and the University established a group called the Minneapolis Neighborhood Early Warning System (MNEWS) to aid in housing abandonment prevention. At that time, an increased interest in data sharing and GIS within the City lead to a collaborative effort with the MNEWS group that secured funding for a community GIS application.

This MNIS Handbook is a GIS "how-to" model for community-based organizations, cities, counties, and academic institutions. Community GIS applications are becoming a common tool for assistance in community-based planning and revitalization. The MNIS Handbook introduces readers to community GIS and highlights common tasks and projects. The lessons learned during the MNIS program can be a tool for other organizations and agencies that are interested in pursuing a community GIS.

There are six features exhibited in the MNIS program that make it a successful community GIS. A desire among the neighborhoods, City, and University to collaborate is vital to the MNIS program for data access, application development, training, and quality control. Access to reliable and current data enables neighborhood groups create trustworthy community planning projects. The users of the MNIS system are actively engaged through trainings, meetings, and expectations. Outcomes of the program include not only the delivery of GIS application, but also the results of neighborhood planning efforts that contain mapping. Funding of the MNIS program was essential for the partners to dedicate city money to application development and staff time. Connecting with other organizations involved and interested in community GIS has brought attention and praise to MNIS program.

Figure 1. Sample MNIS project
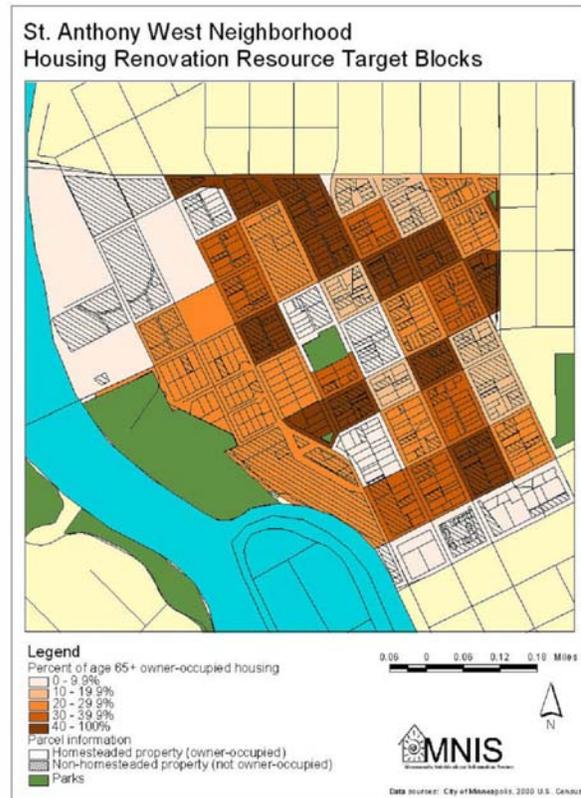
Introduction

The Minneapolis Neighborhood Information System (MNIS) Handbook is a model for community-based organizations, universities, and local governments to develop accessible information systems to inform housing revitalization plans, strategies, and programs. The approach developed in Minneapolis, the collaboration of the neighborhoods, the City, and the University, provides a compelling case study for other communities to learn from and adapt to their own circumstances and stakeholders. The key element of the program has been to increase the capacity of the neighborhoods, the City, and the University to work together to build and use property data and develop geographic information system (GIS) applications.

A GIS is a computer system that is designed for visual representation, manipulation, and analysis of geographic information. The information shown in a GIS can be represented as layers or themes of data. The layers represent a variety of information, such as natural and environmental features, planning and zoning features, cadastral (land ownership), and infrastructure information. GIS is used to map the location of feature as well as particular attributes of layers. Location of parcels in a city can be shown as can specific characteristics of those parcels, like homestead status (*Figure 2*).

Community-based organizations involved in the MNIS program can use the handbook as a GIS reference manual. It includes basic instruction on how to use GIS and data and ideas on collaborating with other neighborhood organizations and levels of government. GIS tasks, project samples, and training sessions are included for participating MNIS neighborhoods and any community-based organization interested in using GIS. In addition to a GIS application that anticipates housing abandonment (Early Warning System), there are local housing resources included in this handbook.

The MNIS manual can inform municipal and county level agencies about how community organization use GIS and about how neighborhood organizations can assist local government with quality control of data. Neighborhood staff has intimate knowledge of the communities they work in and add value to the quality of large data sets that may not be checked regularly in large bureaucracies.

Universities, centers of research and innovation, have pioneered GIS and documented the use of GIS in community-based planning. Academic institutions can act as an intermediary by connecting neighborhoods to resources, showcasing community GIS progress, and evaluating the effectiveness of programs and methods. The MNIS manual can show the university what works for neighborhoods and the importance of evaluation.

Figure 2. Owner-occupied parcels.
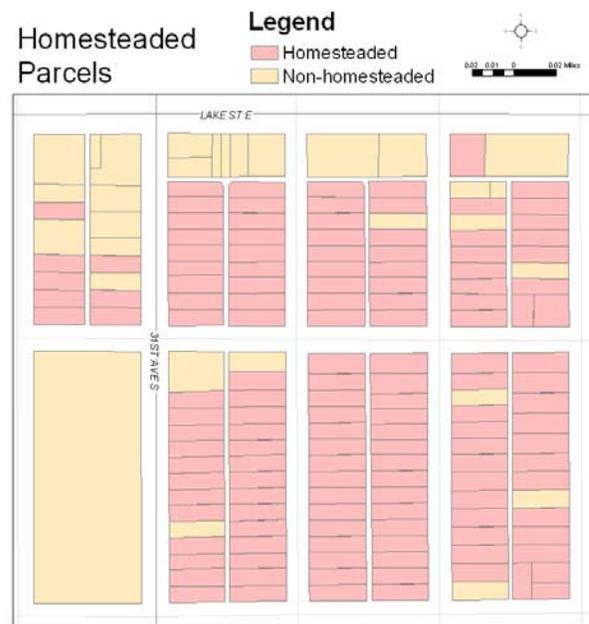
The Value of Community GIS

Community GIS is an application of GIS at a neighborhood or community level. Community GIS is often called Public Participation GIS (PPGIS), Community mapping, or Neighborhood GIS. Whatever the name, it is generally defined as the use of GIS in community settings, like neighborhood groups or community-based non-profits, to create social, economic, or political change from the grassroots level. GIS was once an application primarily used only by academic and government agencies but the ease by which GIS can be implemented has increased the viability for non-profit community organizations to use it in planning and organizing work. These organizations have an inherent interest and need for data in housing and community development and GIS can increase efficiency and effectiveness for neighborhood work.

GIS is appropriate for community work because of the geographic connections of neighborhood-based planning. Community groups are often committed to a place or geography like neighborhood boundaries. GIS assists in land use and development decisions and can be used to model and analyze scenarios. Many housing, planning, and development issues have a data or database component and neighborhood organizations can add to existing data with intimate knowledge of the community. Visualization of concepts through the use of maps helps city staff, elected officials, and community members see what going on and understand neighborhood issues.

Neighborhoods, and other community-based organizations have recently taken to GIS because of the increased accessibility and the need to cut costs. Hardware and software have become easier and less expensive to use and data readily available from municipal, county,

and state agencies, either online or through formal requests. In a time of budget cuts and increased accountability, the costs savings that GIS can provide include in-house creation of mailing labels, maps, and statistical analysis. Collaboration and idea sharing is also common in neighborhood organizing and community GIS. Neighborhoods work with municipal and state staff, as well as partnering with other neighborhood organizations and foundations.

Importance of Community GIS

The MNIS program was created as a response to increased levels of housing demolition and the desire to use GIS in community revitalization. MNIS helps neighborhoods develop informed strategies and tactics in community tasks and programs. The ways in which community GIS, through the MNIS program helps neighborhood groups affect change include:
- Describing what is happening in the neighborhood,
- Planning for housing and business opportunities,
- Partnering with other organizations, institutions and agencies,
- Organizing community members, and
- Evaluating progress.

Neighborhood groups must be able to communicate what is happening in their community. Land use patterns, vacancy rates, homeownership, and demographic change are just a few ways the health of neighborhood can be measured. These kinds of indicators are used by neighborhood organizations to identify strategic issues facing the community and ways to address them (Craig and Elwood, 1998). Neighborhood groups can also describe community conditions with GIS to increase the efficiency of daily work tasks (Matthews and Paddock, 1999). Neighborhood staff can look up parcel information to better inform zoning variance requests, development proposals, and

to create mailing labels. Through maps and GIS analysis, descriptive information can be used to solicit funding opportunities based on community demographics.

In Minneapolis and other communities, neighborhood organization boards and committees work with the City, developers, and private planning firms to create neighborhood land use plans, development projects and approve new housing, commercial, and transportation projects. Neighborhood groups use GIS to inform staff and community members about scenarios and impacts of planning changes. GIS can help neighborhoods find areas with large number of vacant lots for redevelopment or community gardens. Planning aspects of community GIS also include using information to intervene on properties at risk for abandonment (LISC, 2002). Neighborhood staff can use GIS to create an Early Warning System (EWS), a predictive GIS application that identifies potential housing abandonment based on characteristics like tax forfeiture and housing condition, and to assist the property owner before the house is lost (Mardock, 1998). The MNIS program is not unique in its goal of an EWS, many other Community GIS program like Chicago's Neighborhood Early Warning System (NEWS) and the Philadelphia Neighborhood Information System (PNIS) utilize similar applications.

Community GIS often leads to partnering with other groups to obtain data, project collaboration, and creating new relationships. One of the hallmarks of the MNIS program is the Neighborhood-City-University data-sharing collaboration. Academic institutions, foundations, and local levels of government support many community GIS projects. The Providence Plan in Providence, Rhode Island is a non-profit community GIS program that relies on funding from foundations, data from the City, County, and school district, and

implementation by neighborhoods (PolicyLink, 2002).

In addition to data-sharing collaboration, working groups form to share ideas and projects. The citywide distribution of the MNIS neighborhoods has given neighborhood staff the chance to meet and foster new relationships within the group. Relationships with foundations and other non-profit groups have also happened with MNIS neighborhoods. MNIS neighborhoods have created maps and collected information that supports the work of environmental and social service non-profits working in their communities. They have also participated in interviews with research organizations and partnered with foundations to host GIS conferences.

Organizing is a major part of neighborhood-based work. Community GIS can help neighborhood become more efficient and effective in this type of work. Neighborhood staff uses GIS to organize community members and decision makers around a specific site or issues. With GIS, neighborhoods create notices for public meetings and other community events. Using effective maps in community meetings can help to educate the public about land use changes. Some neighborhood groups ask members to map community assets or liabilities by displaying maps and letting residents mark them up. Presenting maps that convey complex issues has helped neighborhoods communicate with City officials and other decision makers.

By using MNIS data and maps, a MNIS neighborhood organized community residents to lobby the City Council against a proposed change in zoning regulations that would have lead to an increase in housing density without requiring a design review by neighborhood organizations. With the use of MNIS data, the neighborhood group presented at a City Council meeting and the vote for the zoning

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change was tabled, pending further research (Figure 3). Neighborhood groups communicate scenarios and reasons with the use of effective maps and tables generated from MNIS data. MNIS is not a tool for neighborhoods to fight City Hall, but a way that neighborhoods can create new relationships with City staff and officials that foster cooperation and identify common ground.

Evaluation is an important way that GIS can be used to gauge change and model programs and plans. Program evaluation is part of most funding opportunities, from private foundations to public funding sources. In an environment of increased accountability, the benefits of community programs can be communicated with community GIS. In Minneapolis, a portion of NRP funds are used in low-interest home and commercial loan programs. A MNIS neighborhood used GIS to show the increase in value of grant properties and surrounding areas (*Figure 4*). The spatial relationship of properties improved with NRP funds and

properties located near them has helped this neighborhood show the City why it should continue to fund the NRP program. In addition to impacting financial support, evaluation with GIS increases the level of sophistication of the neighborhood organization through increased expectation of employees' skills.

MNIS is a community GIS because the people that use it work to create change within a neighborhood and city-level context. Neighborhood, University, and City staff have collaborated to bring data to the front lines of community organizing and neighborhood life. The focus and direction of the program requires input from neighborhood staff as well as players from the City and University. The access to and amount of City data available to neighborhood organizations provide a valuable tool that furthers community organizations' missions.

Figure 3. MNIS map presented at City Council
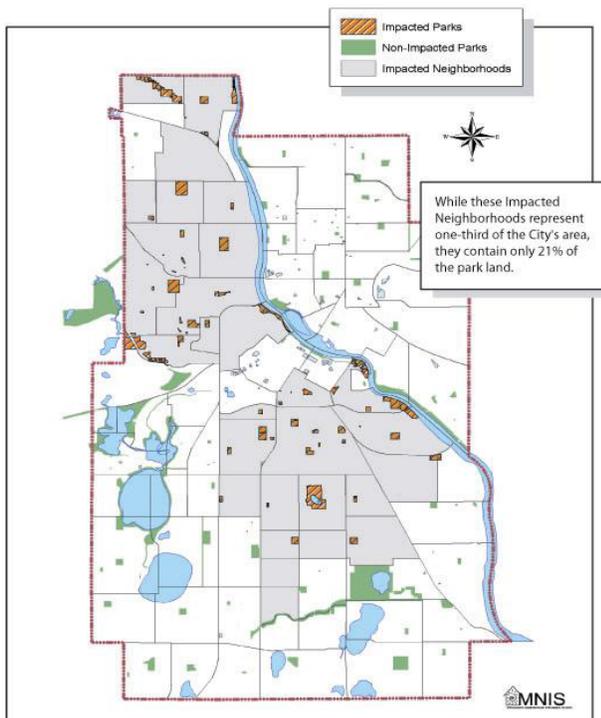
Figure 4. Neighborhood data example
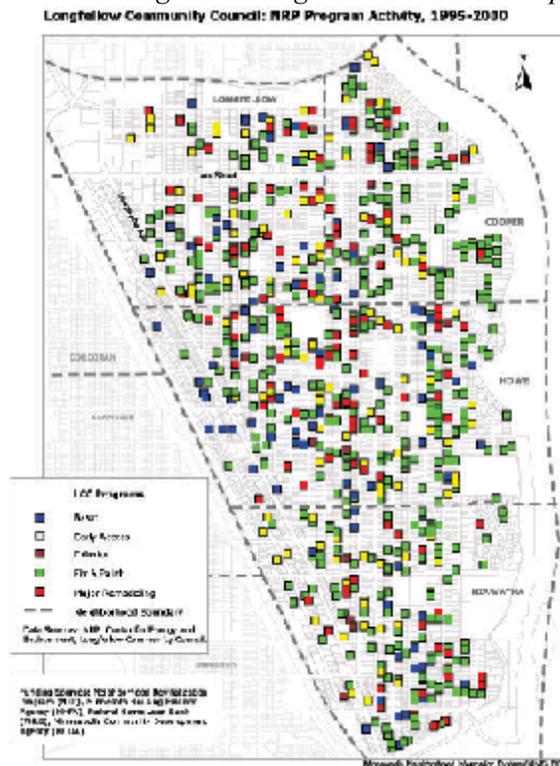
MNIS Partner Roles

A critical component of MNIS has been the involvement of neighborhood organization staff in all stages of the project including design, development, and implementation. This "bottom-up" approach ensures end users, the neighborhood organizations, are given a user-friendly product that meets their needs and is results and community driven (Matson, 2002). Placing GIS software along with proper training in the hands of those persons who have the most intimate knowledge of housing issues will further promote unique and creative solutions to the problems facing neighborhoods today.

Innovation is the hallmark of the MNIS program because of the original structural design of the program (*Figure 5*). MNIS increases capacity for all the three partners, neighborhood organizations, the City, and the University. Integrating GIS into normal workday functions of community organizations increases the efficiency and effectiveness of all the organizations involved. Each partner contributes a unique set of skills and deliverables and all benefit from the work of the others. The collaborative nature of the program benefits all partners with renewed relationships between them.

The City of Minneapolis is responsible for creating applications that aggregate data from multiple city departments and for creating a data set useful for neighborhoods. In return, the City is provided with data quality control from the neighborhoods using the data. This program also builds on the City's reputation of innovative neighborhood planning initiatives. The University serves as the project manager for MNIS and coordinates trainings and GIS projects with neighborhoods. The University receives national recognition from the GIS and community planning worlds for involvement with MNIS. Many research opportunities and

Figure 5. MNIS Partnerships
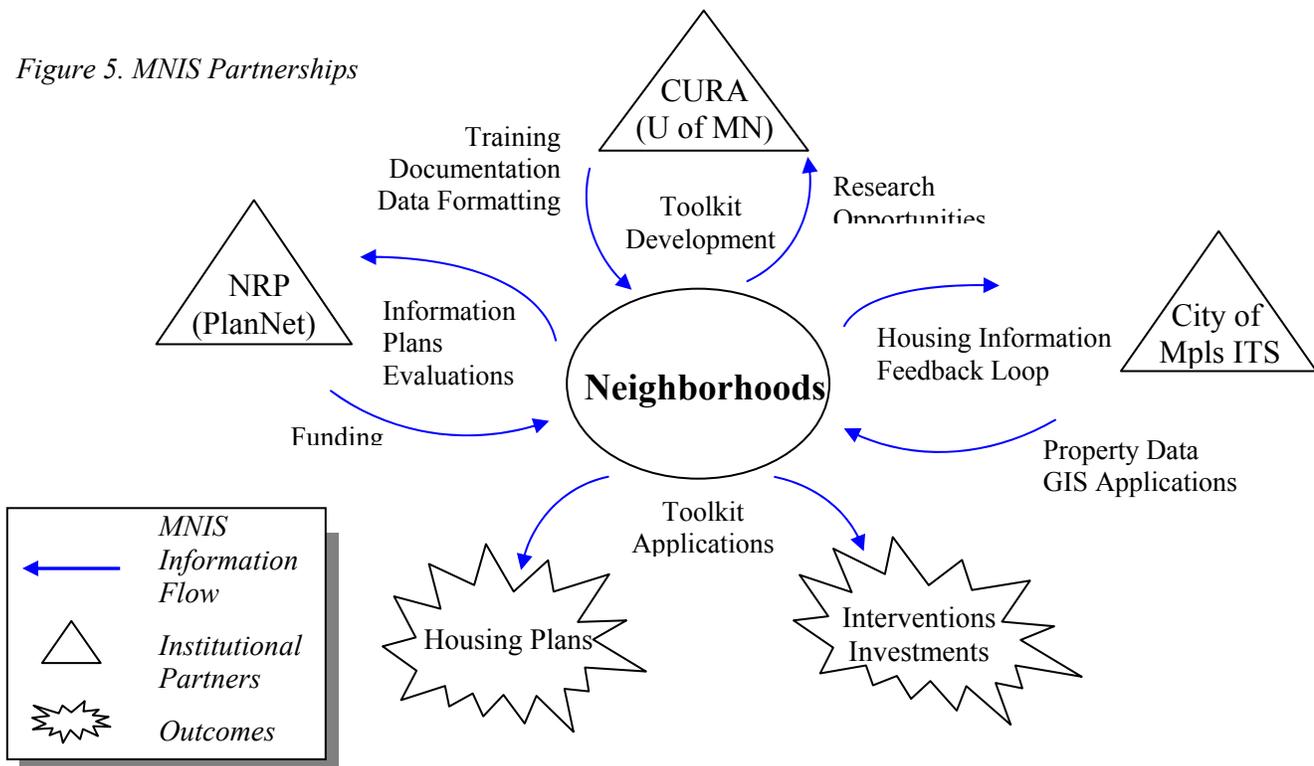
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for faculty, staff, and students are available, as well as a massive new data set for research prospects.

Involved from the beginning, the neighborhoods are the key to implementation of the MNIS program. Neighborhoods receive software and training from the University and data from the City. The goals of the program are to assist community organizations to do their work more effectively and efficiently. Other benefits that neighborhood groups experience include participating in local and national conferences, research opportunities, and exposure. The neighborhoods are the first line of defense in quality control of City data. This service to the City comes at no cost outside the MNIS requirements. Neighborhoods also bring the University to the community, the notion that academia is exclusive is broken down through the program. The University also fulfills its mission as a land grant university dedicated to serving the people of the state.

Part of the "bottom-up" approach requires the end users (the neighborhoods) to define their needs while those responsible for meeting them (City, University) respond. Rather than a top-down approach by which government and academia provide data, create applications, and then wait for users to respond, MNIS begins with the needs of its end users, the neighborhoods. Data requested and projects undertaken thus far reflect the real-world problems and unique questions facing each individual organization. This approach has forced the City to rethink who its customers are and can lead to a fundamental change in the relationship between neighborhoods and the City.

A significant feature of the MNIS project has been its outcome-based approach, which has created the focus and discipline necessary to ensure value. The object is not simply to provide data and GIS training to neighborhood staff, but rather to look at the outcomes of MNIS as a measure of success. The creation of a new universe of GIS users was never a goal of MNIS. Instead, MNIS is focused on providing a valuable tool that neighborhoods can use to continue their community development and revitalization efforts.

Public data provided by City departments combined with neighborhood knowledge is the real power behind the project. Neighborhood staff members know the individuals behind the City's parcel data and are in a unique position to provide assistance to those individuals. For example, using GIS one neighborhood in Minneapolis, Powderhorn Park, has combined data on building condition, market value, and tax delinquency in order to derive a list of residents that may be at risk of losing their homes (*Figure 6*). The staff members involved

Figure 6. Powderhorn Park Neighborhood At-Risk Properties
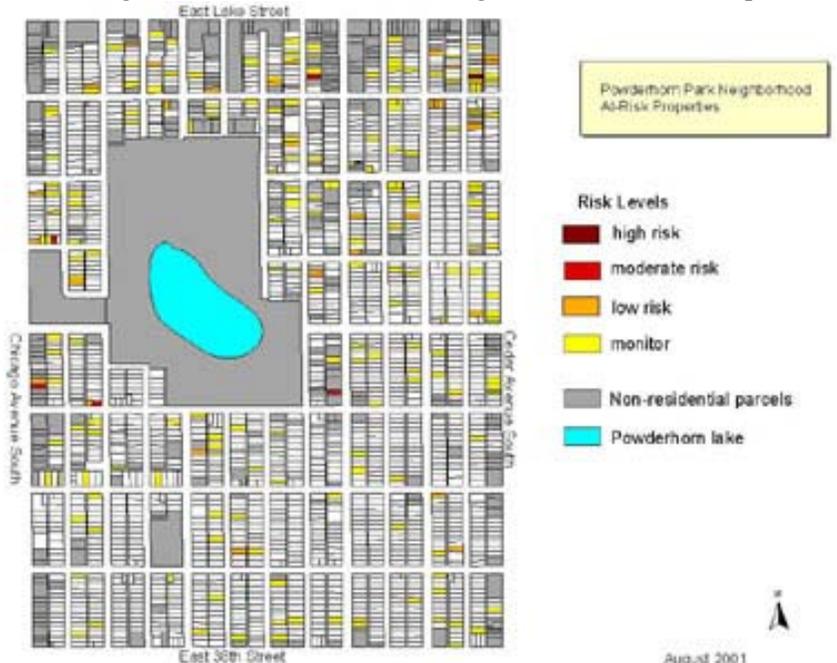
have first hand knowledge of the particular needs of many of the homes that were selected in this application and were able to provide a list of resources and referrals to some of those residents. It is highly unlikely the City agencies would work together in this capacity or would be able to provide this local perspective necessary to effectively intervene.

An additional part of the value-added nature of MNIS is that neighborhood organizations collect their own data on housing programs, loan recipients, block club members, problem properties, and other items. This data can be combined with City data for a more comprehensive picture of neighborhood health, strengths and weaknesses. Neighborhoods also submit this type of information to NRP as well as potential funders.

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Original MNIS Goals

The MNIS program was created with the intention to define and fulfill the following six fundamentals:

- Project Purpose
- Innovation
- Diffusion
- City Deliverables
- Community Involvement
- Evaluation
  (Matson and Moffit, 2001)

These components explain the need for the MNIS program, project specifications, partners, goals, and outreach strategies.

Project Goals

MNIS is a property data system that provides neighborhoods with timely access to housing information, a visual means for displaying housing data, and a specialized application that can be used to identify properties at risk of abandonment. From 1998 to 2001, the City of Minneapolis demolished close to 2000 housing units, resulting in a net loss of almost 200 units. Combined with low rental vacancy rates, housing availability and affordability in the City declined during this time period.

An early warning system (EWS) concept was the result of University research into predictive indicators that led to housing abandonment in one of Minneapolis' more troubled neighborhoods. From this research the Minneapolis Neighborhood Early Warning System (MNEWS) steering committee was founded. The MNIS program is the result of a desire to broaden the scope of MNEWS. The MNIS system aspires to be a system that provides community organizations with accessible information that can be used to inform revitalization plans, develop housing

strategies, study trends, and evaluate the effectiveness of housing programs.

The creation and utilization of MINS was brought about by collaboration of two initiatives within the City of Minneapolis, the Enterprise GIS and NRP. Enterprise GIS is a focus towards E-governing that consolidates administrative data from various departments and agencies within the City. The NRP, created in the early 1990's, seeks to change the future of the City's neighborhoods, making them better places to live, work, learn, and play. Neighborhood-based planning and priority setting are NRP's main goals. A primary goal of MNIS is to help neighborhoods incorporate data such as PlanNet, an internet-based application to track and report on NRP activity and review long-range plans, and city databases resulting in more comprehensive neighborhood profiles and analysis opportunities.

The City and neighborhood organizations are bridged together by the Center for Urban and Regional Affairs (CURA), at the University of Minnesota. In 2001, CURA formed a steering committee comprised of twelve of the sixty-six residential neighborhood organizations, local housing service providers such as Fannie Mae, along with City and University staff that oversee the design, development, and implementation of MNIS. As the project moves forward, additional neighborhoods and community-based non-profits utilize the database and mapping capabilities of MNIS. In the summer of 2001, a Technology Opportunity Grant (TOP) from the Department of Commerce secured funding for a 3-year period. The grant enabled all partners to invest in GIS resources and dedicate staff to work on the project.

Neighborhood organizations often have limited staff and technical resources to fully support the use of information technologies. CURA

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provides assistance through capacity building efforts designed to make neighborhood staff better consumers of data. This includes computer hardware and software maintenance necessary for neighborhoods to access, maintain, and analyze data. Recognizing that limited neighborhood staff time can be spent on the program, MNIS staff also acts as a technology center that completes projects based on neighborhood requests. CURA filters neighborhood projects to undergraduate and graduate- level courses at the University of Minnesota and surrounding Minneapolis and St. Paul colleges and universities.

MNIS has created a neighborhood consortium of GIS users that share resources and ideas, develop innovative housing strategies and partnerships, and promote the ongoing support of the City's Enterprise GIS and CURA research efforts. The mutual value of the three-way partnership sustains continued involvement and leads to a growth in membership.

Innovation

Innovation is at the core of the MNIS program. In addition to the capacity building qualities of MNIS, all partners collaborate of the direction and milestones for the program. Parcel information is updated on a regular basis and the City encourages feedback about data quality. With the knowledge and expertise that comes from training, neighborhood organizations are able to use the power of GIS to further the goals of community-based planning.

MNIS has involved neighborhood organization staff in all stages of the project including design, development and implementation. This "bottom-up" approach ensures the neighborhood MNIS users are given a product that they find useful. Placing GIS software along with proper training in the hands of those

persons who have the most intimate knowledge of housing issues further promotes unique and creative solutions to problems facing neighborhoods today.

One hallmark of the project is the commitment by the City of Minneapolis to provide neighborhoods with real-time access to parcel data through the City's website. Using a data download website, web-based mapping, and property information applications, neighborhood staff has access to the most current housing data available. Rather than depending on periodic data updates, neighborhoods have access to data within hours after it is entered into City databases through the online download website. The stability, quality, support, and sustainability of this data sharing effort are dependent on the partnership with the City.

Data access via the Internet has also added value to City database through the establishment of a feedback loop. Neighborhood staff can verify the quality of data through an online feedback form. With over 110,000 parcels and dozens of City's offices contributing parcel attribute information to the MNIS database, verifying accuracy of the data is a no-cost benefit that the City receives from neighborhood users. With first hand knowledge of housing and community situations, neighborhood staff is often the best line of defense in spotting inaccuracies in City data.

The planning and predictive capabilities contained in the project form a final innovative aspect. Neighborhood staff is involved in continuing education and training on how to use GIS and a variety of data. Through looking at past patterns and modeling possible scenarios, GIS can help neighborhood groups effectively target funding programs, development projects, and other resources to areas most in need. One method for achieving

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this is through the development of the Neighborhood Early Warning System (NEWS) model, an integral component of the MNIS project. This early warning system application, created as part of the City's MNIS commitment, will establish a predictive model for risk of housing abandonment allowing neighborhoods to step in and save costly rehabilitation and demolitions, and prevent families from losing their homes.

Diffusion

Housing affordability is a pressing urban problem in Minneapolis and around the country. The need to access reliable and current data can contribute to housing programs. Community based organizations are active partners with local governments to implement revitalization programs, particularly for the preservation and improvement of housing. Local governments and community-based organizations do not have to rewrite the "Community GIS book" and can learn from the MNIS model.

The MNIS program is promoted through a variety of events and media. Participating MNIS neighborhoods are active in monthly training sessions and steering committee meetings in which project ideas, milestones, and accomplishments are shared among neighborhoods, City, and University staff. MNIS participants promote the program at many public speaking engagements, including NRP workshops, University classes and conferences. MNIS and neighborhood staff has traveled across the county to present at state and national conferences (*Appendix E – GIS Resources*). MNIS also hosts events to showcase the program, such as the GIS Expo held in conjunction with a career fair for GIS students and professionals.

CURA promote the MNIS program through publications, events, and students. The CURA

Reporter, a quarterly publication circulated to academics and practitioners in community development and planning, is devoting a series of articles to the MNIS program, progress and neighborhood work. The CURA Housing Forum, a monthly seminar on housing issues, devotes time and resource to publicizing MNIS accomplishments. The Neighborhood Planning for Community Revitalization program, supported by CURA, provides Internet support for the MNIS website. CURA coordinates student research assistant assignments, makes MNIS data available for research projects and matches neighborhood projects with

Figure 7. University students conducting housing study. CURA.

undergraduate and graduate courses (*Figure 7*).

In addition to the CURA reporter, MNIS has been featured in prominent research publications. In 2003, PolicyLink and the Local Initiative Support Coalition (LISC) released Community GIS handbooks that detailed programs in the forefront of Community GIS, and included information from the MNIS program and interviews with participating neighborhood organization staff.

City Deliverables

As a partner in the MNIS program, the City's focus is to deliver data and support throughout and beyond the grant period. The portion of the TOP grant funds the technology and staff

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required to create the MNIS data set and distribute it to the neighborhoods. The five deliverables include a data download website with a feedback quality control loop, an Early Warning System (EWS), user training, and public access to City GIS, and common workflow applications. Neighborhood organizations have access to current City and County property information, sales/property values, permits issued, and planning information. The status for delivery of these aspects varies from completed to future development (*Table 1*).

The MNIS data download load site is deployed on the City's website; the City's ITS and Business Information Services (BIS) departments have been responsible for maintenance and support of the MNIS application as well as user training. Data comes from multiple departments including Assessor, Inspections, Planning, and Public Works departments. The MNIS application takes data from these departments' databases and creates a dataset that is placed outside the City's firewall for access on the MNIS website. City staff maintains the data on a real time basis and depending on the originator of the data and updates data on a weekly, monthly or yearly basis (*Appendix D – MNIS Metadata*).

A feedback loop is contained within the MNIS download website. The feedback loop allows MNIS users to send a database of the incorrect data to City BIS department personal, along with reasons why the data is incorrect. City staff responds to the request within a few days of submission and corrects the data with the original department the data came from or within the MNIS application.

Before the end of the grant period the City will have developed and implemented an EWS, an online housing analysis tool for MNIS users. The EWS application will allow MNIS users to select various attributes that in combination can

be indicators of housing abandonment and demolition. Neighborhood groups would be able to intervene with these properties, by providing education, advocacy, and resources to homeowners and property owners. Neighborhood intervention before the condemnation process can preserve housing stock and affordability.

Table 1. City MNIS deliverables	
	Status
1. Data download	Completed
2. Feedback loop	Completed
3. EWS	In development
4. User training	On going
5. Public access to City GIS tools	Future development

Access to City GIS tools, called Common Work Flow applications, is the final City deliverable. MNIS users would be able to access City GIS tools over the Internet and use web-based GIS applications. Currently, all participating neighborhoods use GIS desktop software on a computer workstation at the neighborhood organization. With the possibility to access the City's GIS tools, neighborhoods could join MNIS without the startup costs of purchasing a desktop GIS.

The support and resources of the City ensure sustainability of MNIS. Because the program is based on access to data, as long as the MNIS download website exists, neighborhoods have the option for using MNIS even after the end of the TOP grant. The MNIS application will also evolve as new data is added, ultimately resulting in all sixty-six neighborhoods organizations using the system.

Community Involvement

The goal of MNIS is to "provide a neighborhood information system with timely and accurate information to Minneapolis neighborhood organizations to aid in the

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development and implementation of more effective housing plans and strategies". Twelve NRP-recognized neighborhoods participate as MNIS members. Other NRP neighborhoods and community-based organizations are welcome to attend MNIS trainings, use MNIS data and workstations, and work with MNIS staff. MNIS members sit on the MNIS Steering committee and comply with MNIS membership requirements.

The MNIS Steering Committee is made up of representatives of the three partners. The committee assures neighborhood participation in the system design and facilitates the inclusion and participation in MNIS by neighborhoods across the City. They have established ethical parameters for access, use, and dissemination of MNIS data. The creation a "toolkit" of housing intervention strategies and development of models for targeting housing resources and addressing at-risk properties have also been supervised by this group.

Membership requirements ensure that users have the necessary skills to use GIS and report back on MNIS activity. As part of the TOP grant, MNIS staff reports to the U.S. Department of Commerce on a quarterly basis.

Neighborhood organization boards annually pass a resolution authorizing participation in MNIS, which includes agreement to abide by the MNIS Acceptable Use Policy, authorize a representative and alternate to represent the organization on the MNIS the Steering Committee and that the MNIS representative shall report back to Board on MNIS activities. Neighborhoods agree to contribute a small amount to the operation of MNIS.

Neighborhood staff participates in MNIS through attending meetings and reporting on MNIS activity. Active participation at Steering Committee Meetings is required and

neighborhoods missing two consecutive meetings or three in a calendar year will not receive project assistance and will have to petition for reinstatement. Neighborhoods must complete at least one project/map per quarter and file quarterly use report with MNIS staff. Active participation includes attending training sessions, developing GIS projects for neighborhood use, occasional attendance at city meetings, conferences and expositions to present, and discuss and display neighborhood GIS projects. Participants work towards incorporating MNIS in day-to-day work activities.

Neighborhood organizations recruit staff and neighborhood leaders for MNIS training, workshops, and other related applications. They incorporate MNIS-generated data into their housing program planning, implementation, and evaluation strategies. An important role for the neighborhoods is to record and format neighborhood generated data to merge with public data for neighborhood reporting and analysis.

Evaluation

The need for evaluating the MNIS program ensures that neighborhoods are continually engaged, secures funding, and calculates measurable impacts. Monitoring the program allows for neighborhoods to change or maintain activities based on the ways in which GIS is being used in their communities. Submitting quarterly reports to the Department of Commerce is a requirement for the continuance of the TOP grant. Evaluation also provides measurable impacts that are promoted as reasons for the City sustain the program after the grant period.

The MNIS program incorporates an independent evaluation that measures a range of program outputs and outcomes. During the beginning of the grant, the first stage of the

evaluation was to simply document program outputs. This involved monitoring the evaluation of the GIS system, the rate of data collection by neighborhoods and its incorporation into the database, training, and the development of the Early Warning System (EWS) application. Careful documentation of the evolution of MNIS as reflected in these steps provided information about how well the program was implemented, and will also help to inform the evaluation of outcomes.

The second stage of the evaluation will focus on a range of potential program outcomes at the end of the TOP grant period (academic year 2003-2004). The evaluation will examine three sets of outcomes. The first will examine outcomes related to the attitudes of program stakeholders; did the program change what neighborhood groups think was possible regarding problem properties. Next, evaluators will determine the changes in the practices of MNIS participants. An important question will be whether City and neighborhood group strategies for dealing with problem properties changed have changed through the course of the program. Finally, the original catalyst for the program, housing abandonment, will also be examined to see if there have been long-term changes in the housing conditions in the participating neighborhoods.

In addition to the evaluation required by the TOP grant, MNIS participants are constantly evaluating the effectiveness of program components. At monthly meetings, MNIS Steering Committee members redefine program goals, member expectations, and the course of action for the program. This committee, made up of neighborhood, City, and University staff discuss how the program can be more effective and has the authority to modify MNIS to better suit the needs of participants.

The MNIS difference

While there are many community GIS endeavors happening across the country, MNIS is distinct because of the innovative program involvement and control by neighborhoods, the approach to data delivery, and the ultimate goal of capacity building, training.

The "bottom-up" approach of the MNIS program and the knowledge of GIS that community-based organizations now have has increased the power and direction that neighborhoods exercise on MNIS. Neighborhood organizations were elemental in the creation of the MNEWS task force (the pre-cursor to MNIS), the application of the TOP grant, and day-to-day MNIS activities and evaluation of the program. Neighborhood staff collaborates with City and University personnel to determine changes and are kept abreast of technology updates within the City. Neighborhood organizations have the power to green light MNIS project changes or tailor them to better meet their needs.

An example is the Early Warning System (EWS) application for the data download site. The City was prepared to offer an online mapping system, ARC IMS, which would include an EWS application that would use particular attributes to determine when housing abandonment would occur. The results would be a map showing the location of the property. The city believed that this would eliminate arduous GIS tasks for neighborhoods. However, neighborhoods wanted to have access to the data behind the EWS maps and data quality control. Neighborhoods requested that an EWS application be supplemental to the system that is in place now. GIS skills and training are an integral part of the neighborhood staffs' daily work tasks and many neighborhoods do not want to lose the new skill.

City data has the added value of being scrutinized by neighborhood staff more

intimate with particular issues in the community. MNIS data comes from many City and County departments, such as the Assessor, Planning and Inspections. Before the MNIS program, there was no need or request to aggregate parcel information together from multiple sources. The neighborhood information and sources from staff make the data more reliable and assist the City in correcting mistakes. Neighborhoods are ground-truthing, or verifying the accuracy of the City's data at no cost beyond the MNIS program.

Delivery of the data via the Internet allows neighborhoods to access it when necessary without relying on a middle contact person. Three alternatives for delivery of MNIS were considered. The first was a "data dump" system, where the City would provide regular downloads of properties information to an outside organization. While this alternative had merit, it depended on a middle-contact person and poses data integrity and sustainability issues. The second alternative was to provide neighborhoods with access to the City's intranet and download functionality. This alternative assumes that the end users possess the technical knowledge, analysis skills, hardware and software to do so. While this alternative also had merit, the complexity of downloading and equipment expense was prohibitive to end-users, the neighborhoods.

The third and chosen alternative was the creation of web accessible, MNIS application, with data assembled and maintained at the source. The data is collected from sources within the City based on data updates, and placed outside the City's firewall to be downloaded at the MNIS website. This alternative provides users with access to "state-of-the-art'', user friendly technologies, the potential for access to multiple City and County databases, and up-to-date information.

GIS training is an essential part of the MNIS program. Monthly trainings provide beginning to advanced desktop mapping instruction for participating neighborhood groups, as well as other organizations interested in MNIS and Community GIS. While MNIS provides direct resources for the 12 participating Minneapolis neighborhoods, all Minneapolis neighborhoods and other community-based organizations are encouraged to attend trainings and use the MNIS computer lab. Non-profits organizations, such as Mississippi Eastside Neighborhood Development Corporation (MEND), the Midtown Greenway Coalition, Seward Redesign, the Neighborhood Development Center, and the Urban Coalition, and municipalities in the Twin Cities area have benefited from MNIS training sessions and partnering with MNIS neighborhoods to use GIS.

Components of MNIS

Five components are needed for GIS and MNIS to work – data, hardware, software, a user, and expertise. The user and training is an essential value to the system - the computer components of the GIS alone cannot do any work. With training and knowledge of GIS, the user manipulates the data with the assistance of software and hardware in order answer a question with geographic and spatial aspects. The keys to a successful MNIS program involve committed partners, organizational design, and implementation goals.

Hardware and Software

Computer hardware is used in a GIS to support data input, output, storage, retrieval, display, and analysis. GIS can be used on a variety of platforms and easily on personal computer workstations. With the advances of speed and data storage in personal computing, hardware has influenced creation of user-friendly software and more affordable products.

The MNIS program uses a GIS software package called ArcGIS, created by the Environmental Services Research Institute Inc. (ESRI). There are three applications within the system: ArcMap, ArcCatalog, and ArcToolbox. ArcMap, the common and most used application, is used for map-based tasks, such as manipulating and analyzing data. ArcCatalog is used much like Windows Explorer to manage files and can be used to create new shapefiles, preview shapefiles, view and manage metadata, and search for geographic information within the computer and discs. ArcToolbox is used to create Geocoding services and manipulate projections and coordinate systems.

Data

A GIS is considered a data-driven system because data is treated as the central resource. Data used in GIS can be shared among different hardware and software programs because GIS systems are developed around the data, not specific hardware or software requirements. All data used in GIS are either spatial or attribute data. Many other types of files support the basic shape and database files needed to interface with the GIS. Spatial data is the physically representation at a specific location of an attribute or characteristics of that data type. There are three types of geography used to represent where something occurs: points, lines and polygons. Attribute data are the characteristics of the spatial data.

Data can be manipulated with the GIS much like in other database management or spreadsheet software. In addition to the flexibility of working with data within a GIS, the data is also spatially represented, enabling the user to observe patterns and analyze trends.

MNIS Data

The MNIS program is based on neighborhoods having access to reliable and current data. City data is central to the program, however, participating members use a variety of data sets. Data used by neighborhoods includes City-provided parcel/cadastral information, U.S. Census demographics, regional transportation and recreation amenities, natural resources and primary data collected by neighborhood organizations.

City of Minneapolis

The City of Minneapolis Business Information Systems (BIS) department aggregates data from multiple City offices and agencies to create the MNIS data set. Data from the Assessor, Planning and Zoning, Inspections, and Utility

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billing data are available with MNIS data set. Each property in the City is assigned a variety of attributes that can be mapped; ownership and address information, tax status, housing condition, zoning district, and permits issued. Neighborhoods use this data to create mailing lists, identify areas to target resources, verify planning and zoning classifications, and analyze NRP investments. (*Appendix B – MNIS metadata*)

U.S. Census

The last U.S. Census conducted in 2000 provides an incredible amount of demographic information. The Census has a short form that is sent to the total population and a longer form with sensitive information sent to 1 in 6 households. Census data is aggregated into three geographies, blocks (normal city block), block groups (800-1400 people), and census tracts (4000 people). All three have short form information included, however, because of the sensitive nature of the long form, only the block groups and census tracks have this data associated with them. The short form (SF1) contains basic demographic and household data such as age, gender, race, and ethnicity. The long form (SF3) included detailed data on economic, social, education, household, and demographic characteristics.

Census data is available from a number of sources. MNIS staff has worked with Census data to aggregate custom data sets tailored to specific neighborhood needs. The University of Minnesota Extension Service has short form data aggregated for Minneapolis and St. Paul neighborhoods by neighborhood and district planning council. The Metropolitan Council has short and long form data as well as the U.S. Census (*Appendix E - GIS resources*).

Regional data

Many types of agencies and organizations collect regional data sets. Two of the best well known and used in the Minneapolis/St. Paul area is the Metropolitan Council's MetroGIS Datafinder and the Minnesota Department of Natural Resource's (DNR) Data Deli. Datafinder includes many data sets of interest to neighborhoods such as transportation data likes bus routes and future public transit lines, regional parks, and infrastructure data. The DNR Data Deli provides neighborhoods with natural resource information including natural features, transportation, and land cover.

Neighborhood data

Some of the most valuable MNIS data comes directly from the neighborhoods. Primary data collected by staff and volunteers who have local expertise and intimate knowledge of their community adds value to any data set. Neighborhoods have created data for programs such as NRP activities, block club membership, community garden planning, and invasive species removal projects. As neighborhood staff are on the front lines of community planning, they are able to identify and intervene on problem properties, work with developers and consultants on new housing and commercial properties, and coordinate with health and human services agencies when relocating or establishing community facilities.

Other data that is used by neighborhoods include aerial photography (digital orthophotographs – DOQs), police incident data, and public school information. Aerial photos can be obtained through MetroGIS or the City, but access to police and school data take more finesse. Obtaining this information often takes personal relationships between neighborhood staff and the respective agencies. Neighborhood partners continue to add value to the MNIS program with these contacts.

The User and Expertise

MNIS

The vital elements in GIS and MNIS are the neighborhood user and expertise, or training, needed to work with a GIS. The MNIS user is a neighborhood organization staff person, not a GIS specialist. The goal of the program is for neighborhood staff to use the software and data to create maps and databases without referring to an outside expert. Learning about GIS and MNIS through training is essential for participants to use the system to full potential. MNIS training is project-based learning work that focuses on tools that are applicable to the business of neighborhood. MNIS staff provides ongoing quarterly training sessions for neighborhood staff and volunteers, non-profit community-based organizations, and City staff working on the MNIS project. Scholarships for neighborhood staff to enroll in GIS courses at the University of Minnesota are also available on a periodic basis. GIS training is essential for increasing the capacity of the neighborhoods to contribute to the MNIS program.

The MNIS approach to training neighborhood staff includes three facets:
1. Access to and becoming familiar with data
2. Practical applications of layouts, images and using maps in other media
3. Learning GIS software

MNIS offers training and support in using City, Census, crime, school district and other types of data. With over 20 attributes for each parcel, becoming familiar with the MNIS data does take time. Neighborhood staff are kept abreast on updates and changes to the data as well as new website features. Before the MNIS data download website site was released, City data was distributed via MNIS staff. With the debut of the City's MNIS website, MNIS users are able to access data anytime.

Neighborhood staff uses maps to communicate with a variety of stakeholders. Maps are used in neighborhood board and committee meetings, presentations to the City, and grant proposals. Through MNIS trainings, neighborhood staff learns how to create effective layouts, incorporate maps into written materials, and what types of media can be used to present maps. From poster boards to PowerPoint presentation to flyers for community garage sales, neighborhoods use maps in many different formats (*Figure 8*).

Figure 8. MNIS Map at a community meeting

MNIS users are exposed to GIS computer software and become familiar with the data through training sessions and one-on-one visits with MNIS staff. Quarterly trainings are scheduled in order from a beginning level to advanced and are based on what MNIS users want to learn as feedback and evaluations are always part of training sessions. MNIS staff regularly visits neighborhoods to help with projects with onsite GIS software.

Figure 9. MNIS data download website

Common MNIS tasks

Minneapolis neighborhood organizations have used community GIS principles and technical data to implement a unique program. The ways in which GIS has benefited neighborhoods can be seen in common tasks that staff routinely uses to further community work (*Example MNIS Projects, Appendix A*). From simple property identification and descriptive information to using maps in funding proposals and city council meetings, neighborhoods are integrating GIS into daily responsibilities (*Table 2*).

Table 2. Common MNIS Tasks

	Difficulty
• Data download	Beginner
• Property look up	
• Creating thematic maps, e.g. zoning classifications	
• Exporting maps	
• Mailing labels for selected properties	Intermediate
• Mapping numerical data, e.g. market value	
• Incorporating data from outside sources, e.g. schools, police	
• Geocoding neighborhood data, e.g. NRP activity	Advanced
• Combining data from multiple sources and scales, e.g. parcels & census blocks	
• Analytical research, suitability analysis	

Neighborhoods access City data through downloads from the City of Minneapolis MNIS website (*Figure 9*). The website is an interactive tool that allows the user to select neighborhoods and attribute information. The data is packaged in a zip file for the user to download. The user unzips the file and is able to integrate or update data into a map project.

Participating MNIS neighborhoods log into the MNIS website, create custom dataset downloads, and save these datasets for future downloads. For neighborhoods that update mailing lists or run reports on a regular basis, this saves time in requesting data. The custom datasets also inform the City on what data is used regularly by neighborhoods.

Property look-up is an efficient way for neighborhood staff to verify land use, zoning, or other property information questions. Neighborhood staff receives questions about properties from residents, property owners, and developers. Without having to rely on City-made maps or requests to the Planning department, neighborhood staff can quickly look up attributes of a property in question. This is helpful for neighborhood approval of projects, zoning and land use verification, and property owner information.

Basic maps, such as land use, zoning, and demographics are used by neighborhoods for public meetings, funding proposals, and internal communications. Neighborhood staff can easily make maps that show location, land use, zoning, and tax assessor information. Neighborhood boards often weigh in on zoning variances and development proposals; maps made by staff inform committee and board decisions for project support. Staff leverages funds by mapping demographic changes for grant proposals and city programs.

Mailing labels are used by neighborhood organizations to distribute information about meetings, neighborhood changes, and membership efforts. Minneapolis neighborhood organizations can request mailing labels from the BIS department at City Hall for a fee. With the help of MNIS, neighborhood organizations easily generate general and custom mailing labels without the time and cost of a request from the City. Planning efforts, such as rezoning and redevelopment often require that residents within a certain distance be notified of changes by the neighborhood organization. With an intermediate understanding of GIS, neighborhoods can create buffers around schools, properties with variance requests and other locations of interests (*Harrison Crime Map project, Appendix A*). The names and addresses of the properties within the buffers can be exported into a spreadsheet and mailing lists.

Neighborhoods have also combined Census demographics with parcel data to create advanced custom mailing lists that target concentrations of particular residents. One MNIS neighborhood used Census information to determine concentrations of elderly homeowners and created a mailing that promoted housing programs and resources. The neighborhood suspected that many senior homeowners wanted to stay in their houses but because of fixed incomes, might not have been able to maintain or repair the property. Low interest loans were advertised in targeted mailings (*St. Anthony West Neighborhood Organization Housing Resource project, Appendix A*).

Neighborhood organizations can integrate data collected by staff and volunteers with MNIS data through many ways. Geocoding or joining neighborhood data are two ways that databases and inventories can be displayed in GIS. Geocoding creates a new point file that represents a unique attribute that shares a common field with the base (MNIS) data. Many neighborhoods map NRP activities, crime data, and membership information with geocoding. Joining data allows a neighborhood database to be integrated into GIS database files within the GIS program. The data collected by the neighborhood is added to the parcel database and those new attributes can be mapped with the original shapefiles (*Hawthorne Area Community Council Homestead project, Seward WeCompost project, Appendix A*).

Exporting maps and tables is a necessity for neighborhoods that want to communicate away from a desktop computer. After a project has been completed, the map can be printed from the computer or exported into a format that is easily used in presentations, overheads, online or emails. MNIS neighborhoods have access to a plotter to create large maps for office display and community meetings. The GIS software the MNIS neighborhoods use can export map layouts into many graphic formats, such as pdfs and jpegs. Maps in these formats can be displayed on neighborhood websites, PowerPoint presentations, included in documents, and sent via email.

Analytical research is one of the most advanced tasks that neighborhoods undertake. MNIS users not only display maps or create a list, but also utilize the attributes and values behind the pictures. Suitability analyses integrate data from multiple sources and scales of geographic information, like parcels and census blocks. MNIS neighborhoods have conducted advanced research on their own and with assistance from MNIS staff and university researchers. These efforts include that projects that show change in estimated market value over time, neighborhood lead exposure potential and statistically determining attributes that affect housing condemnation (*Longfellow*

Community Lead Exposure Risk, Powderhorn
Park At-Risk Properties, Appendix A).

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Lessons Learned

The MNIS program has been an opportunity for personnel from neighborhoods, the City, and University to establish new relationships while creating progressive data-sharing practices. Reflection on the beginnings of the program can help guide how MNIS will function beyond the TOP grant period as well as stand as an example for other communities that wish to embark on a community GIS program of their own. MNIS participants are quick to say that the program is easy to work with and should be a model for other groups.

SWOT Analysis

In the second year of the TOP grant a program analysis was conducted to determine planning and the direction of the MNIS program for the final year of funding. Participants included MNIS neighborhoods, University faculty and staff, City of Minneapolis staff, philanthropic organizations, and other non-profits. The information drew from participants with experience in MNIS and GIS, advocates for community-based organizations and elected officials. The responses classified MNIS characteristics based on strengths, weaknesses, opportunities, and threats (SWOT analysis).

Strengths of the program ranged from increased neighborhood organization capacity to instilling a collaborative spirit in the MNIS participants. MNIS trainings, technical support and project assistance provides a valuable community resource to neighborhood and City staff. GIS projects coming from neighborhoods have added value because of the community-based nature. Respondents reported that MNIS enhances, improves, and informs neighborhood work.

Weaknesses of the program include accuracy problems with data and allocating neighborhood staff time for MNIS. Data

problems include incorrect or missing data. In addition, participants identified that a lag time exists between for city technology infrastructure milestones and the actual delivery of applications, like the data download site or EWS. Some neighborhoods have found it hard to devote time to become proficient with GIS. Lack of time is attributed to high neighborhood staff turnover and competing demands on neighborhoods. Because MNIS is a pilot program with limited participation, the exclusive nature of MNIS was also identified as a weakness. MNIS has also suffered from a lack a visibility to City entities, such as the City Council, and foundations that could be potential funders.

Opportunities for MNIS includes included opening program activities up to more organizations, promoting the MNIS program locally as well as nationwide, and securing funding to continue the program after the end of the grant period. MNIS training sessions and MNIS staff assistance has begun to open up to organizations outside of the 12 participating neighborhoods. Respondents said that with more publicity, MNIS could capitalize on an interest in data access and community mapping. Opportunities for neighborhoods to collect data for City uses and continuing to quality check City data are other opportunities.

The unclear future of the Neighborhood Revitalization Program in Minneapolis is a major threat to the MNIS program. NRP is a city-funded neighborhood planning initiative that relies on City tax increment financing (TIF) to fund the neighborhood organizations. Changes in property tax law, have decreased the amount of funding the City provides to NRP. Many neighborhoods are eliminating staff and redirecting tasks to maintaining organizational existence. Along with these changes, general staff turnover sometimes shifts MNIS to the back burner for neighborhoods. Inactivity of MNIS

neighborhoods threatens the resources that MNIS has provided to neighborhoods.

Steps for Success

Despite challenges, the MNIS program can sustain the momentum of the 3-year federal grant period by building on successes and relationships of the program. These steps for success can be replicated by other groups interested in community GIS.

• Desire to collaborate among partners

All three MNIS partners are committed through the grant period to abide by particular responsibilities and have gone above those to preserve the program. Support by institutions and staff have made the difference in having a mediocre data set and the extensive access provided to MNIS participants. City staff and officials have consistently justified the MNIS program through budget cuts and challenges to releasing data via the download website. University and neighborhoods have lobbied at City Council and other public meetings the benefits of the program. Support by major players, such as council members, grows as the program evolves.

• Access to data

The MNIS program has significantly changed the way participating neighborhoods request and use data. The availability and accuracy of MNIS data via the download website provides neighborhoods with real-time data. Sustainability of the program after the grant period seems hopeful because the City will have invested in the most costly portion of MNIS, the application that brings data together from multiple departments to the data download website. In addition to obtaining data, the key to data access is the knowledge and training to use the information. Without

understanding where the data comes from and how to use it, acquiring the data is futile.

• Keep partners engaged with clear roles and expectations.

Active participation in the MNIS program is required, with regular meeting attendance a minimum of the three partners. Neighborhoods have responsibility to report to MNIS staff how they use GIS in daily tasks and special projects. The City regularly updates the data and website, communicates to the other partners and promotes the program within the City and County. Besides administering the program through CURA, the University publishes MNIS reports and articles, connects neighborhoods with students and faculty for research projects and

• Measure outcomes

Program evaluation has become a standard measuring tool for non-profit organizations and public agencies. MNIS has funding requirements to assess methods and outcomes. Throughout the grant period, MNIS and neighborhood staff have engaged themselves in additional evaluations of the program. MNIS partners have adjusted program components and directions by addressing desired outcomes versus actual outcome on a periodic basis.

• Secure funding for the program and partners

Funding from the Technology Opportunity Program (TOP) via the Department of Commerce enabled the neighborhoods, City and University to allocate resources to the MNIS program. Grants such as this one are vital ingredients to the up and coming community GIS community. The cost for all three partners was more than usual funding would allow. The initial costs to supply GIS to a neighborhood organization are expensive; hardware, software and training are necessary.

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The scale at which the City constructed the data application accounted for half of the TOP funding. The University hired fulltime and graduate student staff to support the program. In times of budget cuts and increased accountability, special funding for community GIS is essential.

- Connect with others involved and interested in community GIS

Even though the discipline of community GIS is relatively young, many groups and organizations are embarking on data sharing, training and promotion. Existing programs can be excellent case studies to be examined for burgeoning community GIS programs. Many national organizations, such as PolicyLink and the Local Initiative Support Coalition (LISC), promote community GIS through reports and speaking engagements. Becoming familiar with agencies and departments that provide data is also a helpful way to development a community GIS. Interested parties should search out local GIS users groups and professional organizations that will be willing to support community GIS. MNIS evolved from connecting with others interested in community-based applications for GIS to the innovative program that changed the way neighborhoods, the City and the University interact and share information with each other.

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MNIS
Minneapolis Neighborhood Information System