

Using Maps to Promote Health Equity

This report is one in a series of papers on best practices for using maps to promote health equity. Commissioned by The Opportunity Agenda, in partnership with the Health Policy Institute at the Joint Center for Political and Economic Studies, this project was made possible by The California Endowment. The complete volume of research and case studies is available on-line at: <http://www.opportunityagenda.org/mapping>.

Utilizing GIS to Support Advocacy and Social Justice

A Case Study of University-Led Initiatives

Kirwan Institute for the Study of Race and Ethnicity

The Ohio State University

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I. Executive Summary

The following report was commissioned by The Opportunity Agenda¹ and the Joint Center for Political and Economic Studies² to study the role of Geographic Information Systems (GIS) and mapping in addressing issues of social equity, neighborhood poverty, and community health through university-led initiatives. The Kirwan Institute for the Study of Race and Ethnicity worked with Brian Smedley to outline the scope and limitations of the study and to present both the interim findings and the final report. The Kirwan Institute is a research, advocacy, and policy institute with the Law Department at The Ohio State University.

GIS is an expanding field with applications in a variety of disciplines. With new technology and awareness, cartography has advanced significantly since the days of hand-drawn maps. Internet technology acted as a catalyst toward outreach and brought mapping into the cultural vernacular. However, use of GIS in the field of advocacy and social justice is relatively new. It has been effectively used in the field, but faces many challenges and barriers. This research investigates the use and effectiveness of GIS mapping, identifies benefits and challenges, and projects its future course.

Our research adopted a multipronged strategy to study the role of GIS and its impact through a collaborative initiative between academia and community organizations. Initially, 34 organizations, professionals, and their GIS-related work were reviewed in order to assess compatibility with our research agenda. We conducted surveys and interviews on a subset of 14 GIS and academic professionals via phone and email. Our questions covered four broad categories, and the responses, supported by examples of community projects, were organized under these themes:

1. GIS mapping and its contribution to community issues
 - a. Initiatives must capitalize on the communicative power of maps
 - b. Mapping can successfully serve two functions:
 - i. Identifying targeted areas of discrimination or areas for intervention
 - ii. Showing universal problems of concern across communities
 - c. Maps add value to deliberation and debate
 - d. “Bridge organizations” can strengthen the linkage between academia and the community
2. Community feedback
 - a. Community engagement
 - b. Ownership
3. Challenges and benefits
 - a. Soft benefits
 - b. Guide to better policies
 - c. Measuring the impact of mapping on advocacy goals is a challenge
 - d. The challenge of getting accurate and reliable data

¹ For more information regarding The Opportunity Agenda, please visit <http://www.opportunityagenda.org>.

² For more information regarding the Joint Center, please visit <http://www.jointcenter.org>.

4. Measuring impact

- a. The evaluation of impact is limited by the lack of resources and is conceptually difficult
- b. Soft measures of impact

A number of issues outside those listed in our survey were raised by our panel. These issues are important in understanding collaborative relationships and address challenges in project funding:

1. Future direction (areas of growth)
 - a. Participatory mapping
 - b. Online mapping
2. Resource and funding shortages
3. The disconnect between academia and the community
4. Are intermediary organizations advocates or just data/service providers?

This analysis was supported by an evaluation of the Kirwan Institute's community-based mapping projects. Our work fits well within the research framework, as we are a university-based organization and a leader in the application of GIS for social justice. Clients of our GIS initiatives have varied from advocates in the legal community to community organizers and nonprofit leaders, the philanthropic sector, and public officials and policy-makers. Our experience working with these individuals and agencies has been rich and varied. The lessons learned from these initiatives, as listed below, support many of the themes generated from interviews with our panel:

- Mapping is powerful in identifying systemic community-based disadvantage and spatial racialization.
- Mapping is very effective at identifying strategic intervention points.
- Mapping is a good entry point for uniting diverse coalitions or stakeholders.
- Maps must be clear and easy to comprehend.
- Maps work best when framed to convey specific advocacy issues.

Based on our research and findings, we conclude that advocacy mapping is an evolving field. It must therefore address various challenges as we move forward, fostering strong collaborative relationships and increased community participation while using GIS as a communication tool.

II. Purpose and Methods

The technology of Geographic Information Systems (GIS) has become an increasingly useful tool in a variety of disciplines. At the same time, it has also become more mainstream in its application among users who are not experts in cartography or database management. As a result, the sharing of GIS data and analysis has become highly political and technologically complex.

For these reasons, a multifaceted approach is necessary in order to understand how GIS can be effectively used in support of advocacy and social justice. The research methodology employed in this study draws on a variety of resources and aspects related to the science of GIS, including a *literature review* of organizations and professionals in the field, practitioner *qualitative surveys*, a series of *case studies*, and an *internal assessment* of GIS projects that have been undertaken by the Kirwan Institute. Collectively, these methods help in building an understanding of how GIS can best serve the causes of equality and social justice.

Literature from a total of 34 organizations and academic professionals was reviewed. This literature focuses on the importance of community interaction, the usefulness of maps as a communication tool, the ability of mapping to provide information and analysis in guiding better policy implementation, and the growth of online mapping systems. Several of the articles that were reviewed contain case studies from throughout the United States, which illustrate how collaborative GIS programs have fared under a variety of circumstances.

A number of in-depth interviews of GIS and academic professionals were conducted, covering both domestic and international projects. The interviewees represent a diverse breadth of research expertise, including community health, public policy, urban affairs, ecology, and geography. These interviews provided expert knowledge into how the application of GIS has progressed in recent decades and how it is currently being used throughout the social and political sciences. Interviewees also contributed to the case-study research, as each interviewee provided at least one example in which GIS was utilized in a community for research, advocacy, and policy-making. Having several case studies available to compare with one another was a valuable resource for developing a set of transferable principles.

The final component of the study was an analysis of ten community/client-based “opportunity mapping” projects performed by the Kirwan Institute. These projects, which cover a mix of national and international community-development, disaster-management, and public-health issues, show how widely GIS can be used for the purpose of social justice. They also provide valuable examples of the kind of cooperation that is necessary for the successful and long-term implementation of a project.

The methods used in this study represent a comprehensive effort to understand how GIS technology can effectively help communities to diagnose problems, perform research, make decisions, and implement timely policies that produce lasting solutions. The methods are based on a diverse sum of expertise and professional experience and contribute to a rich and collaborative research project overall.

III. Interview and Research Findings

During fall 2008 we contacted academicians, researchers, and people from various university agencies with an initial email survey. Some interviewees responded to the survey and held a follow-up phone call, whereas others preferred to have a conference call only.

Our survey addressed four broad topics:

1. The community-based projects that the participants have worked on and the contributions GIS mapping has made toward addressing issues of social equity, neighborhood poverty, and community health;
2. Community feedback on mapping projects;
3. Challenges and benefits of using GIS mapping, static or dynamic (online), in advocacy;
4. Measurable impacts of the projects.

These interviews raised a gamut of issues relating to GIS mapping and its application to community-based projects. Whereas some of the issues are social in nature, others are more technical, and some relate to institutional resources. Interviewees raised issues of applicability, usage, and impact. Our participants while focusing on their area of research were engaged with domestic and global issues.

Below are a few memorable quotes from our survey:

“The major challenge for community-based organizations to affect policy change is access to accurate, appropriate, and current data.”

“There is a lot of community development occurring under some sort of asset-based model; most public data is collected on a deficit-based model.”

“Foundations are innovation junkies.”

“People are able to look at the information based on where they live or areas they are familiar with and obtain a better understanding.”

“We were told by the people on the committee that maps provided a breakthrough moment for them in the discussion.”

“GIS is an important component, even if it does not end up in a map.”

“Open-source is part of the future for GIS. With more people working on it, there is a scope for more explosive use of the technology and software in the years to come and more applications.”

“People feel like they understand maps. Nobody will give you feedback on regression analysis.”

“They [community organizations] do not want to go to a meeting without a map or one of those documents that we produced for them.”

“When we present our maps in a meeting and nobody comments on it then we realize we have done something wrong in the maps.”

Major Themes

Our interview participants ranged from professors to project managers. They were working in small community-based organizations and large state agencies. They addressed issues of housing, crime, the environment, and health. Despite these differences in agency and focus, several broad themes emerged.

First, we must note that GIS is not reducible to a map. As one of our participants commented: “GIS is an important component, even if it does not end up in a map.” This statement opened up the discussion to differentiate GIS from mapping. While GIS is a tool effective in collecting, cleaning, and analyzing data by putting inbuilt processes to work, mapping is really a product of this process. Though our main aim was to look at mapping as a means to address community issues, our participants provided examples of how GIS processes were instrumental in addressing those issues and creating awareness as well.

Second, there are many distinct goals, roles, and partners in the field, including professors, researchers, and research organizations; state and local government agencies; nonprofit advocacy agencies; as well as neighborhood organizations and residents. Though each is an important partner in the process, each has a different role and degree of contribution. For example, some agencies distinguish themselves as providers of accurate data and analysis to the community with no specific advocacy or research agenda. These agencies position themselves as “intermediaries” or “bridge organizations.”

Our discussions generated a broad spectrum of themes, which can provide valuable feedback to the GIS community in general and to the academia-community relationship in particular. We will examine these themes under the banner of the four overarching questions that we posed to our participants:

GIS mapping and its contribution to community issues

The use of GIS mapping is exploding. The Internet and continuous, often fast-paced, technology upgrades are allowing people access to nearly unlimited information. Google technology has made mapping a household name. Accessing weather, traffic, and other place-based information has made people understand the utility and potential of mapping.

Our panel spoke to the use and effectiveness of GIS in addressing neighborhood issues specifically. Some common lessons learned emerged in this category:

- Initiatives must capitalize on the communicative power of maps.³

The majority of participants stressed the importance of maps as a communication tool. The common message that resonated among all those responding was that pictures are worth a thousand words. One of the interviewees mentioned that the groups that she worked with had stated that maps carry more weight in meetings than

³ Kheir Al-Kodmany, “GIS and the Artist: Shaping the Image of a Neighborhood in Participatory Environmental Design,” a position paper submitted for the NCGIA Specialist Meeting on Empowerment, Marginalization, and Public Participation GIS, Santa Barbara, California, October 15–17, 1998 (conclusion).

residents testifying. Another stated, “People feel like they understand maps. Nobody will give you feedback on regression analysis.”⁴

- Mapping can successfully serve two functions:
 - Identifying targeted areas of discrimination or areas for intervention;
 - Showing universal problems of concern across communities.

Participants provided exemplary evidence of the effectiveness of maps in identifying areas of concern, be they the project cancer maps in Iowa, neighborhood knowledge in California, lead exposure in North Carolina, or an AIDS care and treatment program in Africa.⁵ Other projects addressed a number of issues, including foreclosures, prenatal health care, neighborhood safety, and human services.⁶

- Maps add value to deliberation and debate.⁷

As one of the participants stated: “They [community organizations] do not want to go to a meeting without a map.” Providing an additional layer of detailed information and analysis helps inform an ongoing decision-making process. Most participants agreed that maps make it easier for an audience to understand the issue, though they warned against making complex maps with overlapping information. Simplicity is the key, and the onus lies on the researcher to convey complex information in simple terms. The youth Participatory Photo Mapping Project in Wisconsin is a useful example of how maps provided a platform for discussions and deliberations. Additionally, since maps carry location-based information, an audience can easily relate to this information (that is, “locating” themselves in the discussion), adding credibility to the issue being discussed.

- Bridge organizations can strengthen the linkage between academia and the community.⁸

Mapping initiatives completed by intermediary organizations that acted as bridges between academia and the community were often identified as more likely to be successful. As a neutral entity, these organizations “broker relationships between local governments, city hall, city council, and community groups.” They provide technical support to projects identified by communities, funders, or academicians. Some of these organizations are the central collection and dissemination points for

⁴ Gregory Glass, “Geographic Information Systems for the People,” *Progress in Community Health Partnerships: Research, Education, and Action* - Volume 2, no. 1 (spring 2008): 3–4.

⁵ Linda M. Caley et al., “Community/Campus Partnership: Tailoring Geographic Information Systems for Perinatal Health Planning,” *Progress in Community Health Partnerships: Research, Education, and Action* 2, no. 1 (spring 2008): 24.

⁶ Jeff Matson, “Community GIS,” PowerPoint presentation to the MetroGIS Policy Board Meeting,” Minneapolis, July 30, 2003: 16–26.

⁷ J. Albrecht and J. Pingel, Chapter 1, “GIS As a Communication Process: Experiences from the Milwaukee COMPASS Project,” in *Geographic Information Systems and Crime Analysis* (Hershey, Penn.: Idea Group Publishing, 2005), 14.

⁸ Kheir Al-Kodmany, “GIS and the Artist: Shaping the Image of a Neighborhood in Participatory Environmental Design,” a position paper submitted for the NCGIA Specialist Meeting on Empowerment, Marginalization, and Public Participation GIS, Santa Barbara, California, October 15–17, 1998 (results).

data from multiple sources, and use this data to address spatial issues for their clients with limited or no GIS capabilities. One participant identified her organization as a “service center” rather than a “research center.”

Community feedback

Community involvement is a critical ingredient for the successful outcome of projects. On one end, this interaction provides the ground truthing, and, on the other, it provides an informed response to analysis and outcomes. Scholarly literature suggests that collaborative work has a positive effect on outcomes.

- Community engagement

Community interaction is as critical in identifying issues, concerns, and problem areas as in defining strategic intervention and policy solutions. Collaborative relationships with the community can supply a project with valuable, reliable, and current information.⁹ It is imperative to keep the community engaged in the process. The community must be actively involved in evaluating and guiding map development, and this must be an ongoing process. Some of the online mapping systems allow users to upload their own data and view them spatially, as a means to foster community participation. “We rely on community groups to tell us what is and is not working,” summed up one interviewee.

- Ownership

One participant suggested that “everyone felt they can understand [mapping], and at the same time everybody had ownership of the picture.” A sense of shared value builds mutual trust.¹⁰ It creates a sense of empowerment for the community through local knowledge and active engagement.

Challenges and benefits

Maps are powerful communication tools. GIS maps using accurate and reliable data can identify critical intervention areas and can reach a large audience through good visualization and representation of community issues. An extensive body of literature has analyzed the benefits and challenges of a participatory GIS process and supports some of our survey findings.

- Soft benefits

Mapping broadens people’s understanding of geographically linked fates. Maps can illustrate the interconnections in issues and have been significant in changing ongoing discussion or debate around particular issues and projects. For a Health and Human Services project in Philadelphia, GIS mapping and spatial analysis highlighted the extent of the problem; as the respondent commented: “No one in the entire city can say that they were not touched by it.” Most of the people surveyed mentioned maps as

⁹ Alan M. MacEachren, “Cartography and GIS: Facilitating Collaboration I,” *Progress in Human Geography* 24, 3 (2000): 448.

¹⁰ J. Albrecht and J. Pingel, Chapter 1, “GIS As a Communication Process: Experiences from the Milwaukee COMPASS Project,” in *Geographic Information Systems and Crime Analysis* (Hershey, Penn.: Idea Group Publishing, 2005).

influential in funding requests. Maps have advanced efforts to obtain philanthropic funding for advocacy and intervention. Well documented on a website (www.healthcarethatworks.org), health-advocacy work by The Opportunity Agenda addresses the concerns of marginalized communities toward targeted hospital closings in their areas. Access to prenatal care for pregnant mothers in Baltimore was mapped, and these maps provided support for funding requests. Another project, again in Baltimore, mapped the spatial distribution of funds to neighborhoods through a foundation, identifying areas that had not received any funding despite the need. Most of the health-related community projects have found support and commitment from local or state agencies for follow-up projects.

- Guide to better policies

Maps are more often cited as guiding better policy implementation than as changing policy. A general consensus was that maps are effective in analyzing a policy or providing support to a policy initiative. It was hard to find examples of a policy change being attributed to a mapping initiative. It is very common, though, for initiatives to provide information and analysis to guide governmental (or nonprofit) service provision.¹¹ The Participatory Photo Mapping Project in Wisconsin started with a focus on healthy eating, but was expanded to include safe walking routes for pedestrians. This project also helped mitigate existing tensions between the community and police, helping build trust. The International Center for AIDS Care and Treatment Programs (ICAP) project in Africa is being used for “programmatic changes principally in location decisions in border regions.”

- Measuring the impact of mapping on advocacy goals is a challenge.

Barring a few instances in which direct policy change was attributable to mapping in a limited way, most bridge organizations expressed that they “do not always know where the work ends up and what the impact is.” Policy change is the result of multiple actions and efforts, and it can rarely be attributed to just one project or product. A detailed discussion on this issue follows.

- The challenge of getting accurate and reliable data

This concern was echoed by many, particularly in the field of public health. The main reason for lack of access to data in public health is the privacy and confidentiality laws governing the health care system in the United States. Though there are agencies reporting and collecting data on health indicators, the data are not publicly available. Some of the data that are available are aggregated at a larger scale, rendering the information unusable for neighborhood conditions. Health advocates in the study of Breast Cancer on Long Island ended up conducting their own local area survey, but were criticized by epidemiologists and the academy.¹² The Iowa Cancer Maps project reported data-accessibility issues and had to agree to implement various data security measures before data could be acquired from the Iowa Cancer Registry.

¹¹ Cherly Parker, “Living Neighborhood Maps: The Next Wave of Local Community Development,” a position paper submitted for the NCGIA Specialist Meeting on Empowerment, Marginalization, and Public Participation GIS, Santa Barbara, California, October 15–17, 1998 (conclusion).

¹² Please refer to our selected list of projects.

Researchers from other professions cite “access to accurate, appropriate, and current data” as a major challenge for community groups and nonprofits. Neighborhoods undergo rapid change and development, and their data concerns fall “between the censuses.” It is hard to keep up in terms of current data. Some ostensibly reportable data (such as crime statistics) are not reported due to reluctance in making certain data public. A few data-service providers explained the need to integrate client data collection with their own work as an effective system in maintaining data accuracy.

Measuring impact

As discussed earlier, a measurable impact of mapping on advocacy and policy change is hard to report. Most panelists expressed an inability to link policy outcomes to their mapping efforts. However, though few evaluation techniques are in place to assess the correlation between mapping and policy change, there are other soft measures that indicate the importance of mapping in the advocacy and policy arena.

- The evaluation of impact is limited by the lack of resources and is conceptually difficult.
- Few initiatives, organizations, and professionals devote significant resources to tracking and identifying the quantifiable impact of mapping advocacy in policy change. Identifying comparable and consistent measures for assessing impact is difficult, as there are challenges in finding consistent benchmarks to measure and compare the success of one mapping initiative to another. “The clear linkage is oftentimes rare,” responded one panelist.

Soft measures of impact

- Most of the community-health projects consider a state agency’s adoption of their project for a statewide evaluation or for implementation to be a success.

Additional Themes

A number of issues outside those listed in our survey were raised by interviewees. The most vital include insights into the future of this field and the issue of generating sustainable funding streams.

Future direction (areas of growth)

Participatory mapping: Participatory mapping exercises were deemed the most promising way to increase community ownership, participation, and collaboration on mapping initiatives.¹³ There are examples of participatory research in environmental management, urban planning, and several other advocacy fields.^{14 15} As more and more citizens participate in the process, issues and concerns can be clearly identified, leading

¹³ Shalini P. Vajjhala, “‘Ground Truthing’ Policy: Using Participatory Map-Making to Connect Citizens and Decision Makers,” *Resources* (summer 2006): 14–18.

¹⁴ Piotr Jankowski, “Towards Participatory Geographic Information Systems for Community-Based Environmental Decision Making,” *Journal of Environmental Management* (2008), 90, no. 6 (May 2009): 1966–71.

¹⁵ Sarah Elwood, “GIS Use in Community Planning: A Multidimensional Analysis of Empowerment,” *Environment and Planning* 34 (2002): 905–22.

to more targeted and accurate solutions. Well-designed community-based participatory research can provide the best opportunity for building community ownership of projects and initiatives. These initiatives allow for the collection of new and unique types of data. Handheld remote mapping or GPS devices will spur the growth of these initiatives.

Online mapping: Web-based mapping initiatives¹⁶ are seen as the future of advocacy and community-oriented mapping efforts. Over the years, Web-based mapping applications have gained popularity, and Google technology has revolutionized Web-based GIS mapping. It has attracted millions of users, who use this technology to create awareness and provide information through their projects every day.¹⁷ As one panelist reported: “Open-source is part of the future for GIS, and will cut some of the cost.” Open-source and commercial software have helped Web-based mapping reach millions of people. Despite exponential growth, Web-based GIS is still in its infancy. The field is being explored, and rich interactive applications are getting more robust and user-friendly. We surely need a “bridge between GIS technology and social science,” as one panelist put it. In short, online mapping systems will grow tremendously. One of the challenges of Web-based GIS is the limitations on interaction and user follow-up.

Resource and funding shortages

All initiatives report severe challenges in finding sustainable funding for projects and initiatives, citing the public sector and foundations as their primary funding sources. One participant explained why it is so hard to get funding for these projects: “Government funders are stretched too thin in this economic environment, and thus do not want to make a long-term commitment. Foundations, on the other hand, primarily want to fund new innovation, but not long-term maintenance of the systems.” This sentiment was echoed throughout our panel. Finding new funding streams to support ongoing work involves a significant amount of time and effort. Our respondents reflected on their experiences with securing funding for their projects. Some successful funding strategies included:

- a. Building a good reputation through positive interaction with the community is a critical selling point;
- b. Collaborating with local and state departments. These agencies can then internalize a group’s work;
- c. Informing funders about the secondary users of a group’s work.

Disconnect between academia and the community

Interview respondents noted that significant challenges exist in bringing academic GIS to community-based issues. Mapmaking for community purposes is different (in style and substance) than mapmaking (and analysis) for academic research and

¹⁶ Suzana Dragic’evic, “The Potential of Web-Based GIS,” *Journal of Geographical Systems* 6, no. 2 (June 2004): 80.

¹⁷ Cherly Parker, “Living Neighborhood Maps: The Next Wave of Local Community Development,” a position paper submitted for the NCGIA Specialist Meeting on Empowerment, Marginalization, and Public Participation GIS, Santa Barbara, California, October 15–17, 1998.

publications. Most stressed the need to create simple maps for clarity and easier understanding for a non-GIS audience. “Academic research on its own does not bring about social change,” noted one of the respondents. In contrast to bridge organizations or intermediaries, academics may not have the ability to consistently interact with the community over the long term, limiting their involvement with the community.

Are intermediary organizations advocates or just data and service providers?

Intermediary organizations often cited themselves as having no set “agenda” or “research agenda,” enabling various stakeholders to see them as neutral. Are these organizations merely providing data and analysis, or are they implicitly framing messages and research to proactively address an advocacy agenda (that is, putting values to mapping)? Inferences from our survey suggest that academics are able to pursue their advocacy efforts through research and collaboration with community groups interested in common issues. As our project list illustrates, bridge organizations provide their expertise (data and analysis) to issues that the community is interested in pursuing. This is also evident in the comments from a respondent who stated that “we do not always know where the work ends up.” Their “neutrality” helps them perform different roles in the entire process. They broker partnerships between the community and funders and assist the community with GIS software and training.

IV. Internal Review: Evaluation of the Kirwan Institute’s Community-Based Mapping Projects

As part of this evaluation, the GIS staff at the Kirwan Institute for the Study of Race and Ethnicity critically reviewed previous and ongoing community-based mapping projects at the Institute. As a leader in GIS applications for social justice, the Institute has undertaken various projects that illustrate valuable findings for expanding the use of GIS in the social-justice field. The Kirwan Institute is a university-based organization and thus fit the scope of the evaluation, which focused exclusively on university-affiliated mapping initiatives.

Background

The Kirwan Institute was founded in 2003 at The Ohio State University. The Institute’s executive director, John A. Powell, placed an emphasis on the role of space in understanding and remedying racial isolation and racial disparity. Previously, at the Institute of Race and Poverty at the University of Minnesota, Powell had developed GIS capacity to provide an analytic lens for the organization’s work on regional equity and spatial racism. Since the Kirwan Institute’s founding, the GIS staff at the Institute has grown from one person to the current staff of eight. The Institute has regularly worked as a GIS consultant to social-justice organizations and community groups across the nation. In the past five years the Institute has completed mapping work throughout the United States and has generated thousands of maps for researchers, community organizations, social-justice advocates, and policy-makers. The organization’s signature work has been its “opportunity mapping,” which creates composite index maps based on numerous neighborhood indicators of community opportunity and vitality. Opportunity maps have been utilized in policy advocacy, litigation, applied research, community organizing, and coalition building and to inform service delivery. GIS work conducted by Kirwan, an applied-research institute, is intended to have direct impact on policy decisions and real-world advocacy issues. In recent years the Institute’s GIS staff has devoted more time to training users in the social-justice field to utilize GIS, and has been exploring the implementation of online GIS applications.

Examples of relevant projects:¹⁸

- *Thompson v. HUD*: The Kirwan Institute has utilized mapping and GIS for litigation support. Executive director John Powell was an expert witness for the plaintiffs in the U.S. district court case *Thompson v. HUD*.¹⁹ A housing-discrimination suit initiated in 1996, *Thompson* was filed by the Maryland ACLU on behalf of 16,000 public-housing residents in the City of Baltimore. After many years of litigation U.S. district court judge Marvin Garbis ruled that the U.S. Department of Housing and Urban Development (HUD) had violated the Fair Housing Act by failing to affirmatively further fair housing for African Americans in subsidized housing in the Baltimore region.²⁰ The majority of

¹⁸ Some of the project descriptions below are directly adapted from a forthcoming article by Jason Reece and Eric Schultheis, “Poverty’s Place: The Use of Geospatial Information Systems in Poverty Advocacy,” *Clearinghouse Review*.

¹⁹ For more information about *Thompson v. HUD*, visit the Maryland ACLU’s briefing document available at <http://www.aclumd.org/aTop%20Issues/Fair%20housing/ThompsonBriefing.pdf>.

²⁰ Hon. Marvin J. Garbis, Memorandum of Decision, *Carmen Thompson et al. vs. U.S. Department of Housing and Urban Development et al.*, January 6, 2005.

the Baltimore region's subsidized housing is concentrated in the City of Baltimore, primarily in African American neighborhoods. The judge's ruling stated that HUD could not consider the City of Baltimore a "container" to house the entire region's poor.²¹ Mapping was utilized extensively in work by Powell and the Kirwan Institute in drafting a remedy to the fair-housing violation. Utilizing Powell's "opportunity-based housing" model, a regional map of opportunity was created.²² The opportunity map for Baltimore was a neighborhood-based analysis of indicators of neighborhood health, educational opportunity, and economic opportunity and mobility in the Baltimore region.²³ Analysis of racial populations and subsidized housing in the Baltimore region found that more than two out of three African Americans, and more than four out of five low-income African Americans, lived in low-opportunity neighborhoods, and that nearly three out of four subsidized housing units were clustered in low-opportunity neighborhoods.²⁴ Powell proposed a remedy that affirmatively connected Baltimore's public-housing residents to neighborhoods of high opportunity through a combination of housing vouchers and new subsidized housing construction.²⁵ The plaintiffs (the Maryland ACLU and the NAACP Legal Defense Fund) utilized Powell's proposal to frame their official remedial proposal, which asked HUD to provide 7,000 housing opportunities for public-housing residents in high- and very-high-opportunity neighborhoods identified by the Kirwan Institute's mapping analysis.²⁶ The remedy is still under deliberation by the district court judge, Garbis, at this time. Although the court's final decision has not yet been issued, many fair-housing advocates in the Baltimore region are utilizing the opportunity maps to explore how the spatial distribution of housing programs and opportunity affect their client communities.²⁷

- **Massachusetts Opportunity Mapping:** This project assessed access to neighborhoods of opportunity in Massachusetts. An opportunity mapping analysis was commissioned by the Massachusetts Law Reform Institute and funded by Massachusetts Legal Services Programs. The goal of the opportunity mapping initiative was to understand how low-income groups and racial and ethnic populations were situated in Massachusetts's geography of opportunity. The initiative not only provided a tool to support advocacy and policy reform but also provided an analytic lens to view the challenges and potential remedies for legal-aid clients in the State of Massachusetts. Legal-aid advocates have used the opportunity mapping analysis as part of their larger statewide advocacy efforts, and are attempting to use more GIS-based analysis in their ongoing work. The analysis also looked at impediments to opportunity, such as concentrated subsidized housing and concentrated foreclosure/subprime lending patterns throughout the state. For more

²¹ Ibid.

²² John A. Powell, "Opportunity-Based Housing," *Journal of Affordable Housing and Community Development Law* 12, no. 2 (winter 2003): 188.

²³ John A. Powell, "Remedial Phase Expert Report in *Thompson v. HUD*," August 19, 2005, <http://www.kirwaninstitute.org/research/projects/thompsonhud.php>.

²⁴ Ibid.

²⁵ Ibid.

²⁶ To view the plaintiffs' official remedial proposal, visit the NAACP Legal Defense Fund at <http://www.naacpldf.org/issues.aspx?subcontext=50>.

²⁷ Baltimore Regional Housing Campaign, "Highlights of *Thompson v. HUD* Proposed Remedy to Address Imbalances in the Regional Housing Market and Expand Housing Choices for Families and Children," <http://www.aclu-md.org/aTop%20Issues/Fair%20housing/RemedySummaryBRHC.pdf>.

information about this initiative, please review the project's final reports at:
<http://www.kirwaninstitute.org/research/projects/massneighbopp/MA-opportunity-mapping-resource-site/index.php>.

- **The Central Texas Opportunity Initiative:** The Kirwan Institute has utilized GIS to support coalition and community-capacity building. Work conducted in Austin, Texas, is a prime example of how mapping can help build coalitions around the multitude of challenges facing local distressed communities. Under the leadership of executive director Frank Fernandez, the Central Texas Opportunity Initiative (led by Community Coalition for the Homeless in Austin) commissioned the Kirwan Institute to conduct a neighborhood-based opportunity mapping analysis for the Austin region.²⁸ The purpose of the initiative was to explore the distribution of opportunities and healthy neighborhoods in the Austin region, and to explore the location of marginalized communities in relation to regional resources. In addition, the mapping provided a window of opportunity to explore the context of pending policy and development decisions in the region. Fernandez pulled together a wide coalition of advocates, stakeholders, leaders, and service providers in the region to steer the initiative.²⁹ The report presented the results of the analysis to the broader community, and the Community Coalition for the Homeless utilized the opportunity maps to bring diverse stakeholders together (from the fields of public health, education, housing, public transit, and community development) and spark discussion on what actions and policies were needed to provide Austin's marginalized residents and communities with opportunities to succeed. Since publication of the findings other groups, including the regional planning agency, the Federal Reserve Bank of Dallas, and private consultants, have requested the data and information to consider in their decision-making processes.
- **Housing Trust Fund Advocacy in Columbus, Ohio:** The Kirwan Institute served as a technical adviser to Building Responsibility, Equity, and Dignity (BREAD), a faith-based organization working for justice and inclusion in Columbus. The Institute comprehensively analyzed housing need in Franklin County (the Columbus metropolitan area). Kirwan researchers compared the need versus the supply of existing housing for different income groups. Findings indicated that the current supply did not provide adequate affordable housing for extremely low- and very low-income households. Utilizing the research of the Institute, BREAD successfully lobbied for an expansion of funding for the Franklin County housing trust fund and for more targeted affordable-housing development for the region's lowest-income families. GIS played a significant role in the analysis of housing need in the region, both illustrating pockets of greatest need and also identifying gaps in affordable-housing supply in areas of projected job growth. The mapping was not the only instrumental item that created the advocacy victory, but was a critical part of a broad advocacy campaign in the county.
- **Mapping for Children's Defense Fund of Ohio:** Maps are powerful visual communication tools and are an excellent medium to quickly present complex information for

²⁸ For more information about the Community Coalition for the Homeless, visit <http://www.austinhomless.org> or the opportunity mapping website at <http://austinhomless.org/events/032107/>.

²⁹ John A. Powell, Jason Reece, and Samir Gambhir, "The Geography of Opportunity: Austin Region," The Kirwan Institute for the Study of Race and Ethnicity, The Ohio State University, March 2007, <http://kirwaninstitute.org/research/projects/centtxoppmap.php>.

educational purposes. This power of communication informed a project undertaken by the Kirwan Institute in collaboration with the Children's Defense Fund of Ohio (Ohio CDF).³⁰ In 2006 Ohio CDF was involved in a statewide effort to expand access to the earned income tax credit (EITC) for low-income families through community education.³¹ The EITC is a credit available to low-income families; unfortunately, many low-income families are not aware of the credit and do not claim it (or do while losing some funds to a third party, such as a for-profit tax preparer).³² Ohio CDF partnered with the Kirwan Institute to map volunteer income tax assistance (VITA) centers throughout the state's largest counties and provided the maps online to the public. VITA centers provide low-income households with free tax-filing assistance and strive to ensure that eligible households take advantage of the EITC. Follow-up mapping included analysis of the location of VITA sites and low-income families, as well as locations of paid tax preparers in Franklin County (the home county of Columbus). The goal was to inform a growing coalition in Franklin County of the geographic gaps in access to VITA sites in the region, and to identify areas with large concentrations of paid tax preparers and low-income families in order to target educational efforts to inform families about the free VITA tax-preparation services

- School Integration in Jefferson County, Kentucky: The Kirwan Institute has long been involved with advocacy efforts to support school integration. These activities have included drafting an amicus curiae brief in support of voluntary race-based student assignment policies in the Supreme Court case *Parents Involved in Community Schools v. Seattle School District and Meredith v. Jefferson County Board of Education*. Following the outcome of the case in summer 2007, the Institute used GIS to explore other school-integration strategies that would fit the Supreme Court's ruling in the *Parents Involved* decision. We reported our findings in [K-12 Diversity: Strategies for Diverse and Successful Schools](#).³³ Jefferson County school-district officials then worked with the Institute and other consultants to devise a place-based student-assignment policy to diversify its schools in accordance with the Court's decision. The Jefferson County school district officially adopted the new plan in February 2008 and will implement its new student-assignment policy in the 2009-10 school year.³⁴

³⁰ For more information on Ohio Children Defense Fund's EITC advocacy efforts, access its July 2008 briefing publication at http://www.childrensdefense.org/site/DocServer/Ohio_KIDS_COUNT_RAL_Issue_Brief_July_2008.pdf?docID=7881. To view other educational maps prepared for Ohio CDF by the Kirwan Institute, please visit <http://kirwaninstitute.org/research/projects/gis-cdf/index.php>.

³¹ For more information about the Ohio Earned Income Tax Credit Coalition, visit <http://keepitsaveit.org>.

³² For more on funds lost in Ohio and Franklin counties, please visit the Ohio Children's Defense Fund July 2008 briefing publication accessed at http://www.childrensdefense.org/site/DocServer/Ohio_KIDS_COUNT_RAL_Issue_Brief_July_2008.pdf?docID=788

³³ To review the Institute's report, please visit our website at http://4909e99d35cada63e7f757471b7243be73e53e14.gripelements.com/pdfs/KIAltSchoolStrategiesVersion3July31_2007.pdf.

³⁴ For more information regarding the Jefferson County school-assignment plan, please visit <http://www.jefferson.k12.ky.us/AboutUs/StudentAssigPlan.html>.

Types of End Users

Users of our GIS initiatives have varied, including advocates in the legal community, community organizers, nonprofit leaders, the philanthropic sector, public officials, and policy-makers. The following summarizes our experiences in merging GIS-based analysis and research with social-justice efforts.

- Advocates in the Legal Field: Our mapping initiatives that have had the most direct impact on advocacy outcomes or actions are generally projects conducted for advocates in the legal field, and have largely been focused on identifying or illustrating a specific disparity, outcome, or policy, legal, or legislative solution. The *Thompson v. HUD* project, described above, is the clearest example of this type of initiative, in which maps were used both to illustrate liability in a case and also to identify a potential remedial solution to a fair-housing violation. Much of this work has been in the realm of fair housing (and, more recently, foreclosure-related issues). We have seen great enthusiasm for integrating more GIS-based analysis among advocates in the legal community. One impediment to greater use of mapping in this context is the limited staff infrastructure to do large-scale GIS work. From our experience, legal advocacy organizations have few staff members who have been trained in using GIS. Legal organizations typically do not have staffing capacity to conduct larger-scale GIS projects. As a result of this limited mapping infrastructure, organizations must rely heavily on outside consultants (such as Kirwan or other organizations) to tackle larger, more complex projects. One solution we have discussed is to develop an internal capacity for GIS analysis via dedicated staff (possibly one staff person shared among several organizations).
- Community Organizers: We have utilized mapping for community-organizing campaigns in several major cities. For example, we worked over a long time period with MOSES of Detroit (a congregation-based regional organizing group) to advocate for a land bank to address Detroit's vacant-property challenges. Maps were primarily used for public information and public education. In addition, maps were utilized as advocacy tools to educate policy-makers about the need for interventions in specific areas (for example, vacant property in Detroit). Again maps were not the sole advocacy tool, but were used as part of a broader advocacy platform. The land-bank reform campaign for Detroit was recently successful, and a land bank has been adopted by both Wayne County and the City of Detroit. Generally, we have found a low degree of staffing infrastructure in the community-organizing field for conducting GIS analysis. Often community organizers do not ask for specific maps, but inquire about a specific challenge that they are organizing around. The Institute then formulates maps and other GIS analysis that support their work in this area.
- Nonprofit Leaders: Nonprofit organizations have a wide range of capacity in conducting GIS analysis. Some nonprofits have deep staffing expertise and capacity in mapping, while others have limited to no capacity. The Institute primarily assists organizations in this sector who have limited to no capacity; it advises organizations with more sophisticated mapping capacity. For low-capacity nonprofit organizations the Institute directly provides mapping services, and occasionally assists these organizations in finding staffing expertise (usually student-based staffing assistance) to aid them in ongoing mapping work. For more experienced organizations the Institute acts as an adviser on more sophisticated methods of GIS analysis (such as our opportunity mapping

framework), and as a partner on gathering more complex mapping data. Partnerships are often very helpful in acquiring expensive data sets through cost-sharing arrangements, as well as in providing student and technical assistance for gathering the labor-intensive data needed in high-priority mapping initiatives.

- The Philanthropic Sector: Most of the Institute's mapping work conducted for the philanthropic sector has been to identify strategic areas for funding to meet foundations' programmatic goals. For example, one recent Institute project utilized mapping to identify neighborhoods for a community foundation that was interested in targeting resources for neighborhood revitalization. The mapping was very helpful in supporting the rationale for targeting specific neighborhoods and in identifying conditions in those recommended communities. From our experience, GIS analysis can be very useful in helping the philanthropic sector strategically utilize its resources.
- Public Officials and Policy-makers: The Institute's use of mapping analysis for public officials and policy-makers has generally involved informal partnerships in which the Institute provides GIS analysis to improve service delivery or to advocate for a particular policy change. From our observations, public agencies have significant mapping expertise and capacity, but do not have time, resources, or political will to investigate the specific advocacy issues promoted by the Institute. The Institute may provide maps and GIS-based analysis to internal work groups within public agencies, or may provide public reports directly to policy-makers to raise awareness around a specific advocacy concern or issue.

Documenting Impact

One challenge in understanding the role of mapping in advocacy outcomes is documenting impact. Rarely are there occasions in which a specific map produced a far-reaching policy outcome. From our experience, the most direct cases of mapping's having contributed directly to policy outcomes involve mapping used in litigation (for example, *Thompson*) or mapping directly done for a public agency with a specific goal or directive in mind (as in the Jefferson County example). Generally, mapping initiatives are part of broader advocacy campaigns on specific issues. Maps play a critical role in communicating advocacy goals as part of the campaigns, but successes are the result of multiple inputs. Maps can also play a powerful (yet more informal) role by informing or framing decision-making. Our work suggests that maps brought into meetings or other informal deliberations can dramatically change the tone of discussion or identify new issues or solutions. In addition, the public dissemination of mapping products often produces unintentional or unplanned positive outcomes, which organically emerge as maps circulate through advocacy circles and communities, as well as among the public. For example, we know through conversations with stakeholders in the Baltimore region that the initial opportunity map for the *Thompson* litigation has been used for other purposes by a large number of advocates and researchers in the region. Often these unintended consequences emerge after maps are first circulated, and they occasionally occur without the knowledge of those directing the mapping initiative. In our view, evaluating the impact of mapping in positive advocacy outcomes must take a wide perspective to capture these broader impacts of using mapping to produce equitable policy outcomes.

Lessons Learned

The following lessons learned are based on the Institute's experience with incorporating GIS- and mapping-based analysis into social-justice advocacy.

- Mapping is powerful in identifying spatial racialization and systemic community-based disadvantage

The root of the study of both spatial racism and regional equity is space. Therefore, maps are the best tool to adequately convey this spatial phenomenon to the broader public. Spatial racialization, or the structural disadvantage concentrated in communities of color, is the primary driving factor behind much inequity and racial disparity. From our experience, maps have proven to be a productive tool to engage a variety of audiences (from supportive to skeptical ones) on the cumulative disadvantages impacting communities of color. Mapping provides indisputable proof of barriers to opportunity for communities of color.

- Mapping is very effective at identifying strategic intervention points.

For policy-makers and advocates, maps are an ideal tool for identifying specific intervention points to address advocacy issues. For example, our policy advocacy on neighborhood revitalization in Columbus focused on strategically targeting neighborhoods to promote revitalization. Targeting was critical for foreclosure mitigation efforts due to the limited resources for addressing foreclosure impacts. Maps of foreclosure patterns were instrumental in making the case for targeting specific neighborhoods where foreclosures were concentrated. As we struggle to identify how to use limited resources to promote community health and prosperity, mapping will continue to play a prominent role in guiding these critical investments.

- Mapping is a good entry point to unite diverse coalitions and stakeholders.

The multidisciplinary nature of most community-mapping initiatives opens up points of collaboration for diverse groups. Community-based mapping projects may look at a number of issues plaguing a particular community, providing an entry point to engage stakeholders from various domains. For example, a neighborhood-based mapping initiative may illustrate multiple challenges impacting a neighborhood or identify a correlation between issues that can unite advocates. A project may identify the nexus between health disadvantage, poverty, and education in a particular community, providing a point of collaboration for health care providers, educators, and antipoverty advocates. Our work in Austin illustrates the multidisciplinary potential offered by opportunity mapping, in which the initiative by the Community Coalition for the Homeless engaged a number of advocates in public health, community development, finance, education, and public transportation. Region-wide mapping can also identify challenges impacting multiple communities, providing evidence to support coalition-based advocacy or actions between communities. Our work on vacant property in Detroit utilized mapping to illustrate the spreading growth of vacant property throughout Wayne County, Michigan, and documented the existence of concentrated vacant property in communities outside the City of Detroit. The purpose of this mapping exercise was to provide tools to MOSES that would help increase support in the broader community and region for tackling the challenge of vacant property. Once again maps were the most effective visual tools for illustrating this type of spatial relationship.

- Maps must be clear and easy to comprehend.

To be an effective communication tool, maps must be clear and easy to comprehend. Maps allow us to display nearly unlimited amounts of data at one time. Often we fall victim to this possibility, producing maps that are too busy and dense to communicate clearly and effectively. As a rule, our maps are designed with specific communication goals in mind. We must ask ourselves, what is the issue or message we are trying to deliver with this map? How can we deliver this message by presenting a clean and clear image, which our audience can understand quickly? As mapping becomes more commonly used, advocates must discipline themselves to assure that the maps they are using to influence people can be understood easily and quickly.

- Maps work best when framed to convey specific advocacy issues.

Our opportunity maps are good communication tools because of the underlying messages the maps illustrate. Mapping is just another form of communication, and the importance of framing and messaging to convey specific advocacy goals should apply to maps, just as they apply to written communication.

V. Conclusion

GIS has established itself as a unique tool and has found wide-ranging applicability in a number of industries and businesses. From the days of hand-drawn maps to digital technology, mapping has come a long way. Google technology helped mapping reach a wider audience and establish a strong online presence, whereas open-source mapping software democratized participation in its application.

GIS mapping in advocacy and social justice is a relatively new practice and is gaining acceptance across the field. While researchers are studying and analyzing how GIS improves participation in the community setting, advocates and community agencies are addressing technology, personnel, and impact issues. Reviews of the literature and mapping examples showcase the progress made with GIS in addressing issues of social equity, community health, and neighborhood poverty.

Our panel of experts in the field identified and addressed a multitude of issues associated with applying mapping to advocacy and social justice. These experts discussed examples of their work, illustrating the use and effectiveness of GIS mapping. A synthesis of benefits and challenges emerged from this discussion, and is presented in this document as themes under the umbrella of four overarching questions. These themes are the groundwork for effective collaboration and partnership between the academic community and community organizations. The discussion also raised issues of funding and the roles played by some of these organizations in academic-community partnerships.

We have provided a narrative of lessons learned from our own partnerships with community organizations in applying spatial analysis and mapping to advocacy efforts. Our “communities of opportunity” framework is a new approach in addressing neighborhood issues. We have analyzed racial inequities for a number of regions in the nation through our opportunity mapping projects. Our experience in collaborating with local, state, and community agencies adds value to this ongoing research and continues to be a source of improvement, as we help to innovate in the use of GIS.

As an evolving field, advocacy mapping must address many challenges, while reaping and enhancing the benefits that already exist. Exponents of Public Participation GIS (PPGIS) are analyzing issues of inclusion, transparency, and empowerment, whereas activists are increasingly expanding their outreach through innovation and alternative means of delivery. The future direction is being shaped by increased community participation, improved data access and availability, and online mapping applications. As advocacy issues develop with a geographic footprint, we need to collectively move forward with strong collaborations and effective use of GIS as a communication tool.

VI. Appendix A: Survey Instrument and Experts Panel

Survey Questionnaire

1. Have you used mapping to address issues of social equity, community health, and/or neighborhood poverty? If yes, please list the issues addressed.
2. Please list some of the projects and their nature, e.g., advocacy, policy research, awareness, outreach.
3. Please describe the projects in a few words. Please indicate the problems and the potential solutions for the issue addressed.
4. How were maps used in the projects, e.g., primary tool, support tool, Internet-based mapping, etc.
5. If interactive Internet-based mapping was used for the project,
 - a. How user-friendly was the application?
 - b. How was the message conveyed?
 - c. Did the application or the tool find wide usage among online users?
6. Who were the intended audiences for each project?
7. Was the mapping project successful in shaping discourse among key audiences?
8. Depending on who the key audience was, did the issue reach the broader community through this effort?
9. Did the map contribute, directly or indirectly, to policy change, additional funding, offshoot smaller projects, and/or increased awareness?

Experts Panel

1. **Mr. Bill Buckingham**, Applied Population Laboratory, University of Wisconsin
2. **Prof. Mark Becker**, Center for International Earth Science Information Network (CIESIN), Columbia University
3. **Prof. Neal Richman**, Center for Neighborhood Knowledge, School of Public Affairs, UCLA
4. **Ms. Pamela Waterman**, Project Director, Geocoding Project, Harvard School of Public Health
5. **Prof. Andrew Curtis**, Department of Geography, University of Southern California
6. **Prof. Sara McLafferty**, Department of Geography, University of Illinois at Urbana Champaign
7. **Prof. Sarah Elwood**, Center for Studies in Demography and Ecology, University of Washington
8. **Ms. Tara Jackson**, Research Director, Cartographic Modeling Lab (CML), University of Pennsylvania
9. **Prof. Gerard Rushton**, Department of Geography, University of Iowa
10. **Ms. Martha H. Keating**, Associate in Research, Children's Environmental Health Initiative, Duke University
11. **Prof. Frank Hardisty**, GeoVISTA Center, Pennsylvania State University

12. **Ms. Caroline Bhalla**, Associate Director, New York City Housing and Neighborhood Information System (NYCHANIS), Furman Center for Real Estate and Urban Policy, New York University
13. **Mr. Matthew Kachura**, Baltimore Neighborhood Indicators Alliance (BNIA)
14. **Mr. Jeff Matson**, Center for Urban and Regional Affairs (CURA), University of Minnesota

VII. Appendix B: Profiles of Experts Panel's GIS Projects

PARTICIPATORY PHOTO MAPPING (PPM) PROJECT

Community Health Assessment and Planning (CHAMP) Health-Equity

Bill Buckingham, Applied Population Laboratory in collaboration with School of Medicine and Public Health, University of Wisconsin

<http://www.fammed.wisc.edu/research/external-funded/communities-risk/ppm>

Purpose To better understand a neighborhood through the eyes of young people living there.

Methodology Provide participants, mostly affiliated with the Boys and Girls Club of Dane County, with digital cameras and GPS units and have them take pictures of their neighborhood, documenting routine use of community and recreation environments. The images are then geocoded as part of a neighborhood-level GIS that includes other demographic and spatial data, such as population, household characteristics, and crime statistics.

Outcome These photos become the objects of focus-group sessions in which open dialogue creates emerging themes that are attached to particular images. This creates a qualitative GIS focused on the experience of community and recreation environments.



Source: PPM Project webpage, University of Wisconsin, School of Medicine and Public Health
<http://www.fammed.wisc.edu/research/external-funded/communities-risk/ppm>

INTEGRATING GEOSPATIAL TECHNOLOGIES WITH INFORMATION MANAGEMENT SYSTEMS FOR THE DEVELOPMENT AND MONITORING OF AIDS CLINICS IN AFRICA

Professor Mark Becker, Center for International Earth Science Information Network (CIESIN), Columbia University, in partnership with the International Center for AIDS Care and Treatment Programs (ICAP) at the Mailman School of Public Health, Columbia University

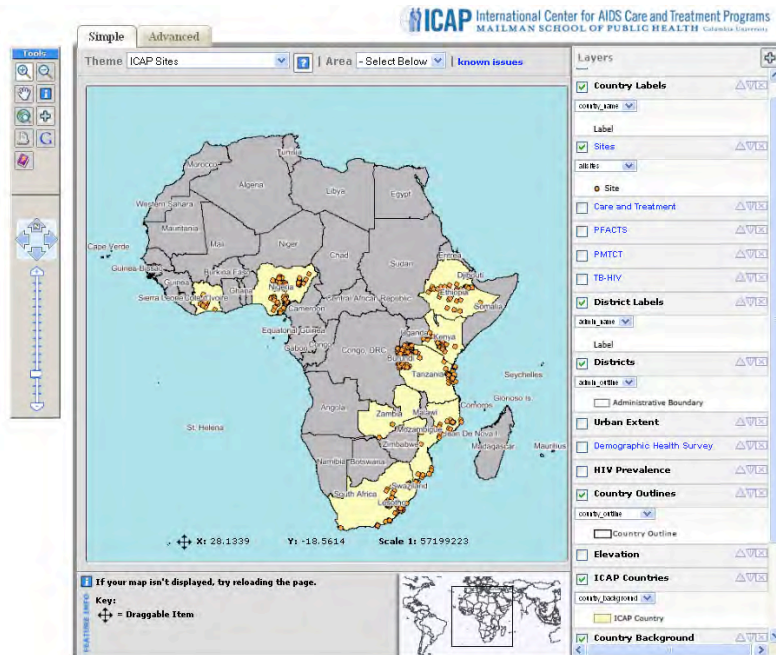
<http://beta.www.ciesin.columbia.edu/icap/mapviewer/>

Purpose CIESIN integrated geospatial technologies into the data-management systems of ICAP, an organization focused on aiding host African countries and other organizations in building capacity for family-focused HIV/AIDS prevention, care, and treatment programs. Specifically, CIESIN developed an interactive online mapping system to supplement ICAP's existing

management information systems, allowing the organization to effectively visualize the location and data from its various programs.

Methodology Created a website for the dissemination of data through a unified reporting system in order to perform integrated analysis. The website contains an interactive online mapping system, through which visual representations of data can be easily accessed.

Outcome ICAP has been able to make programmatic changes in location decisions as a result of the new data tool. It has also functioned to bring additional funding into the programs, as the tool allows donors to quickly visualize and understand data. In addition, other organizations have expressed interest in adapting similar data-visualization strategies into their programs.



Source: ICAP, Columbia University

<http://beta.www.ciesin.columbia.edu/icap/mapviewer/>

NEIGHBORHOOD KNOWLEDGE LOS ANGELES (NKLA) AND NEIGHBORHOOD KNOWLEDGE CALIFORNIA (NKCA)

Professor Neal Richman, Center for Neighborhood Knowledge, School of Public Affairs, UCLA

<http://nkla.spsr.ucla.edu/index.cfm>

<http://nkca.ucla.edu/>

Purpose These projects served functions related to community quality:

- To identify deteriorating housing and neighborhood conditions in order to generate early intervention;
- To generate collaboration among neighborhood residents, community organizations, and policymakers to mobilize support for community improvement in the Los Angeles area;
- To provide tools for accessing property and neighborhood data, and supporting a range of resident investigations into the qualities of their own communities.

Methodology Create an online interactive mapping system using tax delinquency, unpaid water bills, code complaints, and other indicators of housing and neighborhood quality in order to

identify spatial patterns of deterioration for the city and its neighborhoods. In the NKCA project, users should be able to upload and visualize their own data.

Outcome NKLA, in particular, led to changes in housing law related to code enforcement. Both projects held strong appeal for residents, because an interactive, often resident-generated, mapping system allows playfulness and scalability not possible in static maps. The projects invited people to investigate their own communities.



Source: NKLA

<http://nkla.spsr.ucla.edu/DataMaps/LANews/Master.cfm?Page=Maproom/Main.cfm&ZoomToCity=Los%20Angeles&LANEWSLayer=None>

THE PUBLIC HEALTH DISPARITIES GEOCODING PROJECT

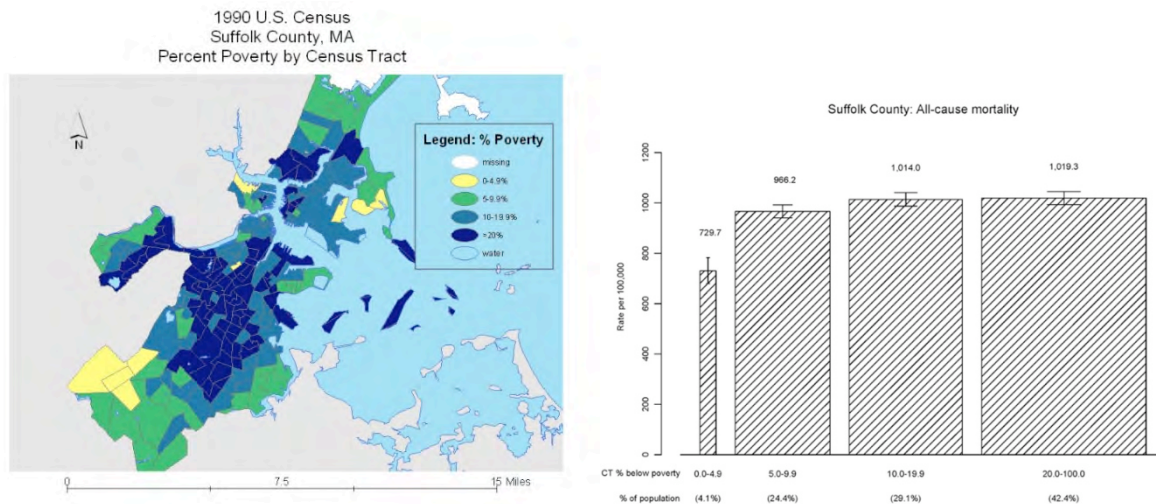
*Pamela Waterman, Project Director, Geocoding Project, Harvard School of Public Health
Professor Nancy Krieger, Department of Society, Human Development, and Health, Harvard School of Public Health*

<http://www.hsph.harvard.edu/thegeocodingproject/>

Purpose The Geocoding Project intended to produce aggregate data and community-based maps of socioeconomic inequities in diverse health outcomes, monitored through routine public-health surveillance. Specifically, it attempted to address the lack of such data in public-health reports due to the absence of socioeconomic data in most routine public-health surveillance data.

Methodology Geocoded public-health surveillance data and used census-derived area-based socioeconomic measures (ABSMs) in order to characterize both the cases and population in the Massachusetts and Rhode Island study areas. The study analyzed rates of several health variables stratified by area-based measures of socioeconomic position.

Outcome The study found that the ABSM most apt for monitoring socioeconomic inequalities in health was the census-tract poverty level, due to its ability to detect expected socioeconomic gradients across many variables and demographic groups, its easy incorporation with other area-based socioeconomic data, its high geocoding yield, and its ease of utilization by and legibility to other organizations. The study results yielded the recommendation that geocoding of public-health data should be routinely analyzed with census-tract-level poverty measures to enhance efforts to track social disparities in health. There has been follow-up interest in the study from both the Boston Public Health Commission and the Massachusetts Department of Health.



Source: *The Public Health Disparities Geocoding Project*

<http://www.hsph.harvard.edu/thegeocodingproject/webpage/monograph/visual%20display.htm>

INTEGRATED REMOTELY SENSED DATA SETS FOR DISASTER MANAGEMENT

Professor Andrew Curtis, Department of Geography, University of Southern California

Purpose The project, in collaboration with PolicyLink and local communities, utilizes GPS-enabled video to document neighborhood conditions in New Orleans in an attempt to map the recovery effort. This human-level data recording is meant to develop information that cannot be processed through remote sensing alone, such as facts about damaged infrastructure, unstable buildings, evidence of looting, and evidence of return and rebuilding. The data, which are used by communities for advocacy purposes, are intended to identify which neighborhoods are moving along in the recovery process and which neighborhoods need work and investment.

Methodology Create a GPS-encoded digital video recording by utilizing an on-the-ground moving vehicle. The real-time spatial-tagged information is evaluated by a viewer, with relevant information being recorded in a database. The information is then integrated with remote-imaging data.

Outcome Since the New Orleans recovery process is not a straightforward one, it is difficult to evaluate direct success in specific policy changes. However, the directors of the project believe it is helping to aid in evaluating and planning recovery processes.

Abundance Cam/NVR Browser V3.0 (Spatial Enabled Video system)

OBJECT: Bridge
 OBJ_ID: BR001
 OBJ_CLASS: Route_Infrastructure
 OBJ_DESC: Overhead Bridge

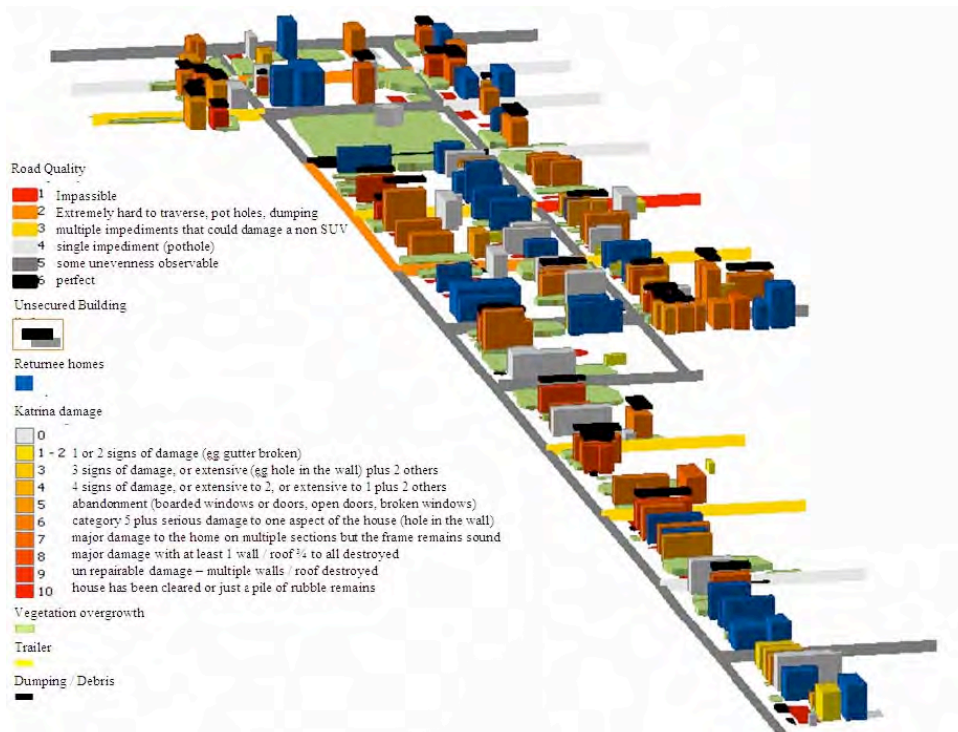
OBJECT	OBJ_ID	OBJ_CLASS
Roll_Gantry	Y001	No Data
Roll_Gantry	Y002	No Data
Roll_Gantry	Y003	No Data
Roll_Gantry	Y004	No Data
Roll_Gantry	Y005	No Data
Roll_Gantry	Y006	No Data
Roll_Gantry	Y007	No Data
Roll_Gantry	Y008	No Data
Roll_Gantry	Y009	No Data

Map Width = 1.33 km
 X, Y = 451447 R, 457476 R
 Video Display Speed: Slow Fast
 NCG

Restricted License (Research & Educational Use only) Survey - m50

Cam-1 On | 150305_105433_1.p | Cam-2 On | 150305_105433_1.i | Cam-3 On | 150305_105433_1.i

Video Display Speed: Slow Fast
 NCG



Source (previous three images): Integrated Remotely Sensed Data Sets for Disaster Management, Timothy McCarthy, Ronan Farrell, Andrew Curtis, and A. Stewart Fotheringham

BREAST CANCER ON LONG ISLAND: THE EMERGENCE OF A NEW OBJECT THROUGH MAPPING PRACTICES

Professor Sara McLafferty, Department of Geography, University of Illinois at Urbana Champaign

Purpose This project resulted from a community initiative on Long Island, New York, to develop its own breast-cancer incidence data through survey data. It illustrates the initiative and ability of a community and researchers to collaborate on data and analysis in a field traditionally left to academia.

Methodology After the state failed to produce the community's desired data on breast-cancer incidence, the community, under academic guidance, conducted its own survey to produce data and analyzed the results through cluster mapping.

Outcome The study was criticized by epidemiologists and academics, who found it portrayed a general condition, but the community was very happy with the results of the study. Community members presented the study to the state, and it was used for policy purposes. Ongoing controversy surrounding the study illustrates the tension and power relations between the public and scientific experts in determining traditionally static jurisdictional boundaries of areas of expertise.

GRASSROOTS GROUPS AS STAKEHOLDERS IN SPATIAL DATA INFRASTRUCTURES

Professor Sarah Elwood, Center for Studies in Demography and Ecology, University of Washington

Purpose In her research Professor Sarah Elwood assesses the effects of GIS usage in community organizations. Recognizing that communities face a vast array of challenges that can be addressed through spatial analysis, she describes how they use GIS to provide information to community members, inform their own activities and policies, and influence other actors such as elected officials and neighborhood service providers.

Methodology Undertake participatory research, including the evaluation of the effects of incorporation of GIS into a community organization over time.

Outcome Elwood's research recognizes that the collection of spatially and temporally useful data of appropriate accuracy is a difficult task for communities, as data production often does not keep pace with neighborhood change. Getting traditional authorities to share data can often be problematic. Elwood's participatory research indicates that as a community's ability to utilize spatial-analysis techniques develops over time, the community's compilation and visualization of local knowledge have positive impacts on its ability to affect policy and planning, lending important credibility in building support for its concerns. In addition, as organizations become more technically savvy, their ability to critique assessments and policies given by traditional authorities also increases dramatically, amplifying their ability to not only produce certain forms of change in their communities but resist change they do not deem to be in their best interest.

PHILADELPHIA NEIGHBORHOOD INFORMATION SYSTEM

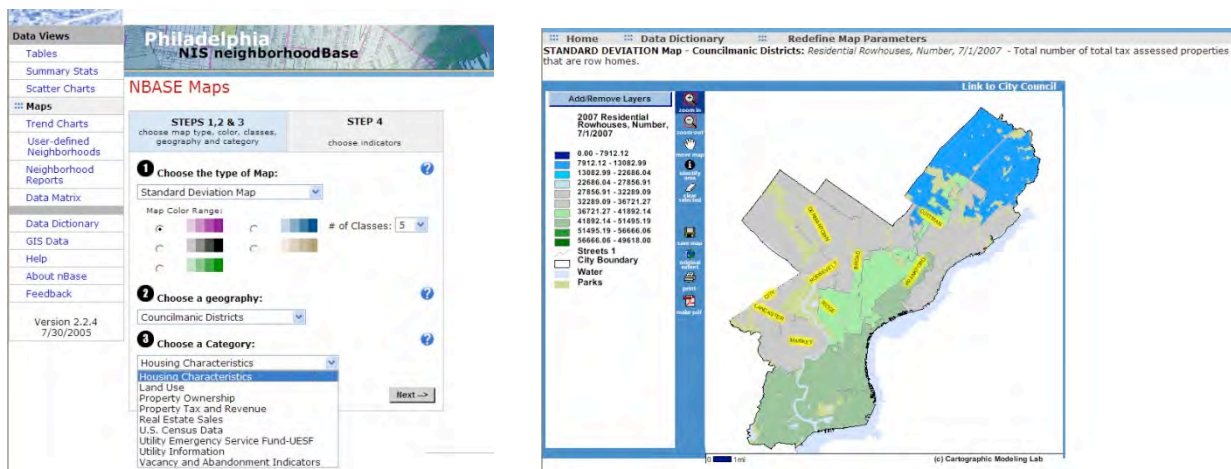
Tara Jackson, Research Director, Cartographic Modeling Lab (CML), University of Pennsylvania

<http://cml.upenn.edu/index.html>

Purpose Rather than following an internal research agenda, CML provides services to researchers and the City of Philadelphia in the form of mapping expertise, spatial analysis, and training and workshops for the broader community.

Methodology CML carries out its support services with mapping and other visual displays of data, Web-based information systems, and innovative analysis using administrative data. It brings together faculty members and students from various disciplines for project collaborations.

Outcome Due to its interdisciplinary structure, CML has participated in a variety of community mapping projects, ranging from investigations into the city's Health and Human Services practices, initiatives supporting access to healthy foods, and Web-based interactive mapping of neighborhood assets and characteristics (shown below). The last study mentioned, the Philadelphia Neighborhood Information System (PNIS) project, provided Web access to a vast array of spatial information through an interactive mapping and data system. The data available through PNIS are utilized by a diverse constituency of organizations, from State Representative John Taylor's office to the Neighborhood Gardens Association. However, the simple user interface allows for ease of public use.



Source: PNIS, Philadelphia Neighborhood Information System

<http://www.cml.upenn.edu/nis/nBase.htm>

IOWA CANCER MAPS

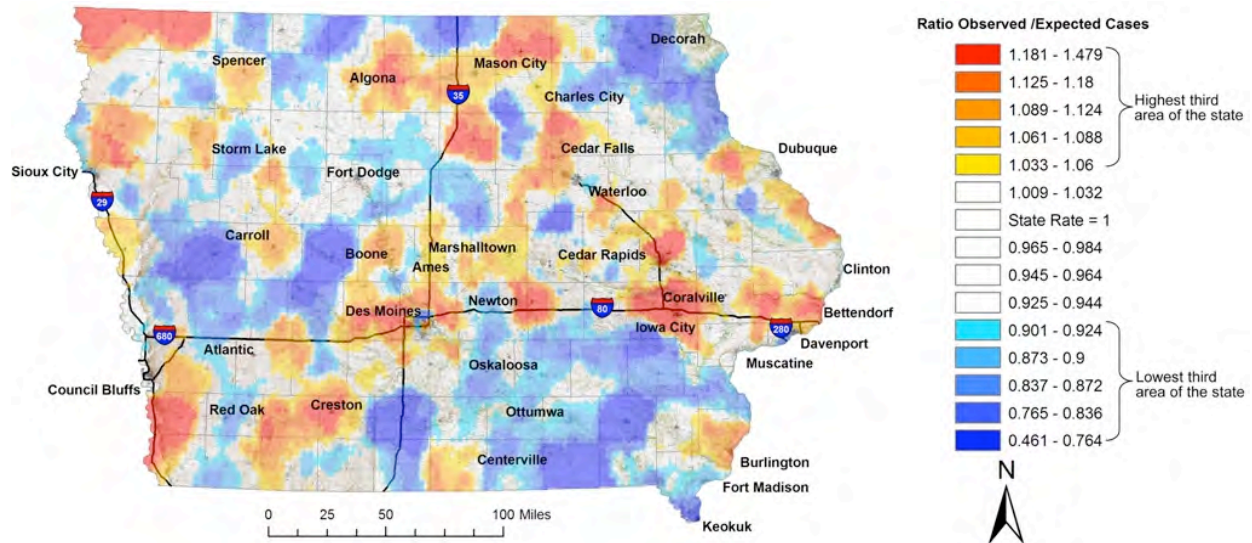
Professor Gerard Rushton, Department of Geography, University of Iowa, in collaboration with the Centers for Disease Control and Prevention through the Iowa Department of Public Health Comprehensive Cancer Control Program

www.uiowa.edu/iowacancermaps/

Purpose The project displays rates of incidence, late-stage, and mortality for breast, colorectal, lung, and prostate cancers in a series of static maps, creating a comparison between the observed number of cancer cases and deaths to the number that would be expected if local rates of cancer incidence and mortality were the same as those of the state as a whole.

Methodology The cancer rates are shown as a continuous surface, using the kernel density estimation method and providing local detail of the cancer burden in Iowa communities. The smooth cancer incidence and late-stage rate maps are based on the 949 Iowa five-digit zip codes of those residing in Iowa who were diagnosed with cancer between 2000 and 2005.

Outcome The Iowa Department of Public Health is using these maps to make decisions on resource allocation. The National Cancer Institute provided grants to create a Web-based program for the public to access information; the New Jersey and Utah Cancer Registries are working on creating similar maps.



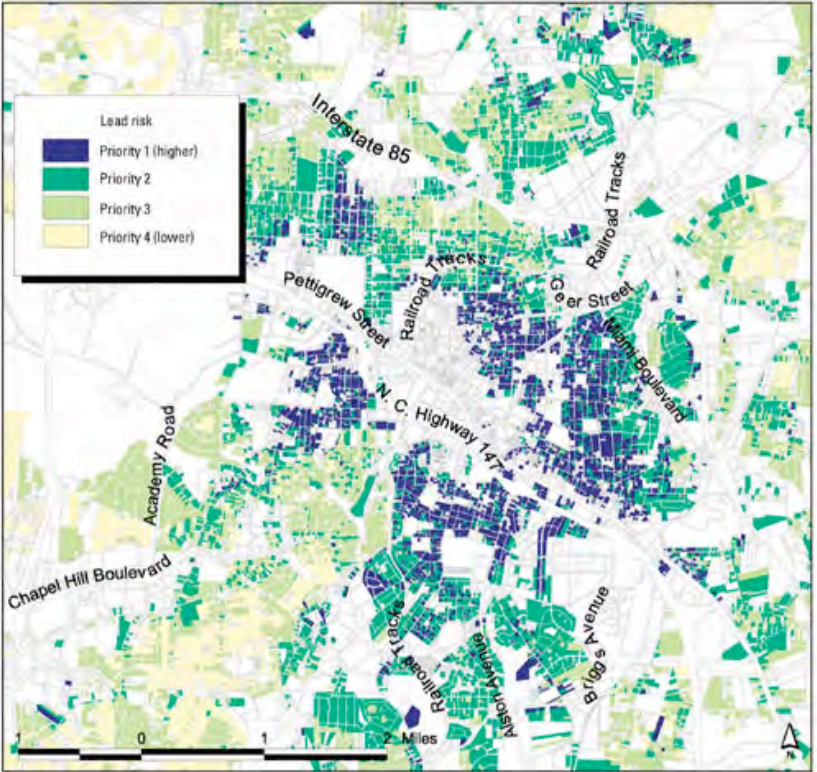
Source: Iowa Cancer Maps, Department of Geography, University of Iowa
http://www.uiowa.edu/iowacancermaps/breast_incidence.html

LEAD-EXPOSURE RISK MODEL, CHILDREN'S ENVIRONMENTAL HEALTH INITIATIVE Martha H. Keating, Associate in Research, Children's Environmental Health Initiative, Nicholas School of the Environment and Earth Sciences, Duke University
<http://www.ehponline.org/members/2002/110p947-953miranda/miranda-full.html>
http://www.adukeconversation.com/CEHI_Lead_Model_User_Guide_execsummary.pdf

Purpose The lead-exposure risk model is a GIS-based model that identifies lead-exposure risk at the individual tax-parcel unit level, for the purpose of prioritizing areas for preventive intervention of childhood lead poisoning. This model is a complex statistical analysis, but the output is an intuitive color-coded map for multiple audiences, representing the spatial distribution of housing stock likely to contain lead hazards.

Methodology Combine U.S. Census demographic data, tax-assessor parcel data, and North Carolina blood lead screening data into a single spatial overlay theme in GIS, in order to perform statistical analysis on all the data together. Along with literature on lead exposure, the results are used to construct a risk-index value for each residential tax-parcel unit in the study area.

Outcome Using the Web portal (currently in development), users can download data to evaluate the risk of lead exposure at a specific location. Community advocates and public-health officials use the model to prioritize blood-screening efforts and housing rehabilitation. The research has identified over 6,300 priority housing units in Durham, North Carolina, and the model continues to be expanded to other cities. Counties across the state use the model to recruit landlords into lead-abatement programs, and the state uses the model to enforce Title X disclosure provisions.



Source: Marie Lynn Miranda, Dana C. Dolinoy, and M. Alicia Overstreet, "Mapping for Prevention: GIS Models for Directing Childhood Lead Poisoning Prevention Programs," *Environmental Health Perspectives* 110, no. 9 (September 2002)
<http://www.ehponline.org/members/2002/110p947-953miranda/miranda-full.html>

**GEOVISUALIZATION AND SPATIAL ANALYSIS OF CANCER DATA
 THE STRENGTHS AND WEAKNESSES OF EXPLORATORY SPATIAL DATA
 ANALYSIS (ESDA) AND SPATIAL STATISTICAL METHODS FOR PROSTATE
 CANCER**

Professor Frank Hardisty, GeoVISTA Center, Pennsylvania State University
<http://www.geovista.psu.edu/grants/nci-esda/index.html>
<http://www.geovista.psu.edu/grants/CDCESDA/pubs.html>

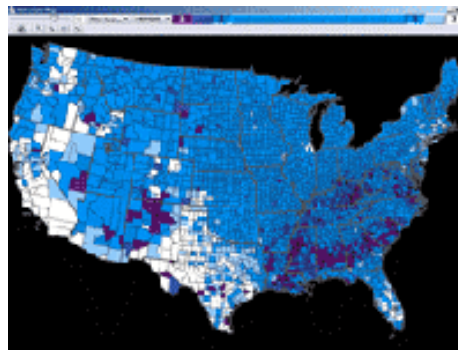
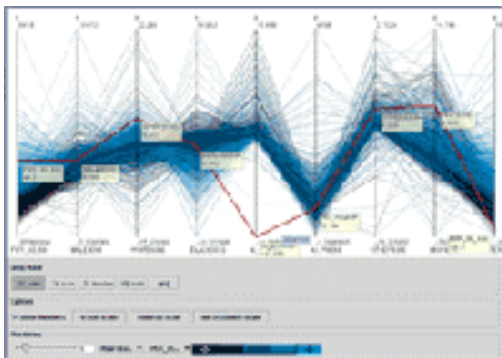
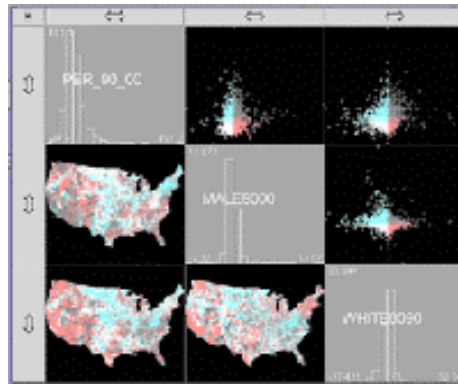
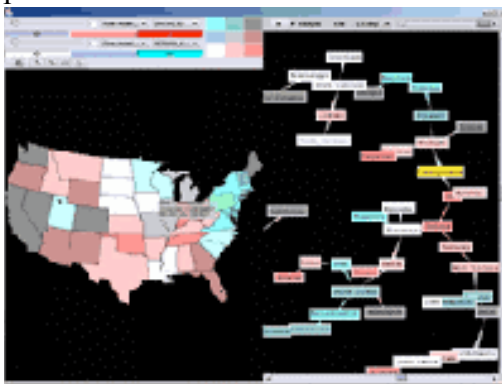
Purpose Cancer is rarely spread uniformly across the population. These two projects aim to better understand—and expand current abilities to understand—the spatial patterns of cancer incidence and mortality. Specifically, the research attempts to develop, implement, and disseminate geospatial-analysis methods and tools to support cancer-related public-health research and policy.

Methodology The projects developed GeoVISTA Studio to integrate geographic visualization, statistical graphics, and information visualization into more rigorous and accurate research, analysis, and geographic visualization methods and tools. For example, the ESDA of prostate cancer has focused on:

- The development and testing of new spatial analysis, machine learning, visualization, and data-mining techniques for identifying clusters of disease;

- Carrying out a thorough theoretical, empirical, and practical evaluation of these new approaches;
- Exploring the roles of visualization and developing a set of best-practices guidelines;
- Utilizing open-source software technology to facilitate the spread of effective strategies.

Outcome This research has helped to identify flaws in cancer surveillance networks. It has also aided the development of effective cancer-control policy through the generation of geographic visualization and analysis techniques in GeoVISTA open-source software and in academic publications.



Source: *Geovisualization and Spatial Analysis of Cancer Data*, Pennsylvania State University
<http://www.geovista.psu.edu/grants/nci-esda/software.html>

NEW YORK CITY HOUSING AND NEIGHBORHOOD INFORMATION SYSTEM (NYCHANIS)

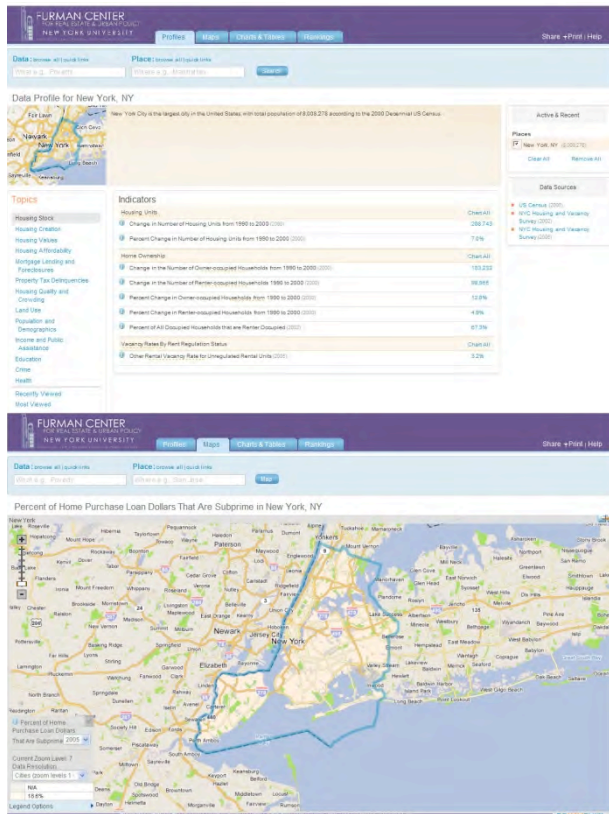
Caroline Bhalla, Associate Director, Furman Center for Real Estate and Urban Policy, New York University

<http://NYCHANIS.dataplace.org>

Purpose The data system was developed in response to the search, by a growing number of community-based and nonprofit organizations, for customized data sets beyond the static maps available through NYCHANIS at the time. Its purpose was to satisfy demand by streamlining data access.

Methodology Develop an interactive Web portal for the investigation of spatial data across a wide variety of variables. The online interface allows not only the production of interactive maps but access to the underlying data sources. The data are maintained and updated by permanent staff.

Outcome As intended, many diverse organizations are able to access customized data sets to plan out their programs and develop funding proposals. For instance, the University Neighborhood Housing Partnership Program has used the system to create a model evaluating risk of home foreclosure using data provided by the system, in addition to their own data sets. Organizations often use NYCHANIS data for their own analysis and map production; the primary users of interactive maps produced on the website are the media.



Source: NYCHANIS

<http://nychanis.dataplace.org/map#>

BALTIMORE NEIGHBORHOOD INDICATORS ALLIANCE (BNIA)

Matthew Kachura, Project Manager

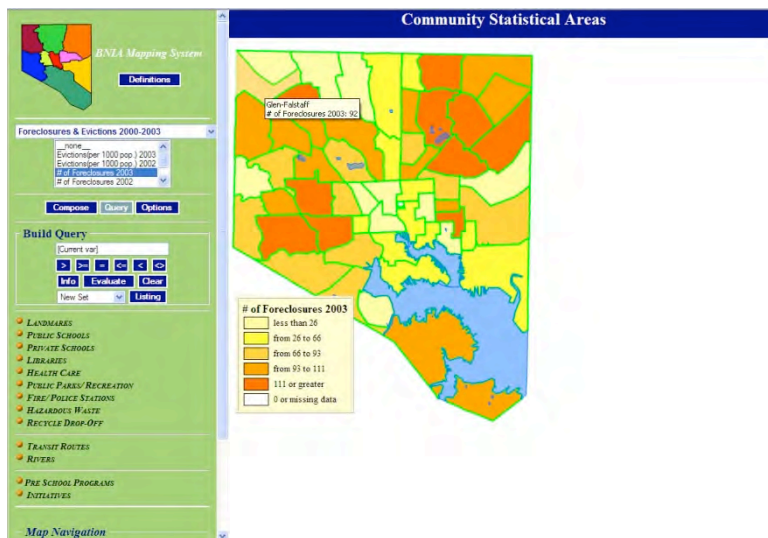
<http://bnia.org>

Purpose A central collection and dissemination point for administrative data from the City of Baltimore, the State of Maryland, and other public and private sources, BNIA makes information available to various agencies in search of specific data sets. The goal of the BNIA is to promote, support, and help people make better decisions using accurate, reliable, and accessible data and indicators to improve the quality of life in Baltimore neighborhoods, by building on and coordinating the related work of citywide nonprofit organizations, city and state government agencies, neighborhoods, foundations, businesses, and universities.

Methodology BNIA focuses on, among other data and indicators, development of the Vital Signs, 40 outcome indicators, developed through community-driven forums and planning, that measure progress toward building strong neighborhoods and communities. BNIA also provides

assistance and training in accessing, understanding, and using various data types and provides access to online resources for those needing assistance or lacking the necessary resources.

Outcome Through the organization's data distribution and mapmaking capacities, client organizations, such as nonprofits and community groups, are able to access data and BNIA's mapmaking capacities they otherwise could not afford or perform themselves. This data, especially the visual data provided by maps, is often necessary in demonstrating issues to project donors and in securing funding.



Source: BNIA Mapping System

http://www.ubalt.edu/bnia/Axiomap/c_data/main2.htm

MINNESOTA 3D PROJECT RELIGIOUS INSTITUTIONS OF NORTHEAST MINNEAPOLIS

Jeff Matson, Center for Urban and Regional Affairs (CURA), University of Minnesota

<https://netfiles.umn.edu/users/eric0887/www/test8.html>

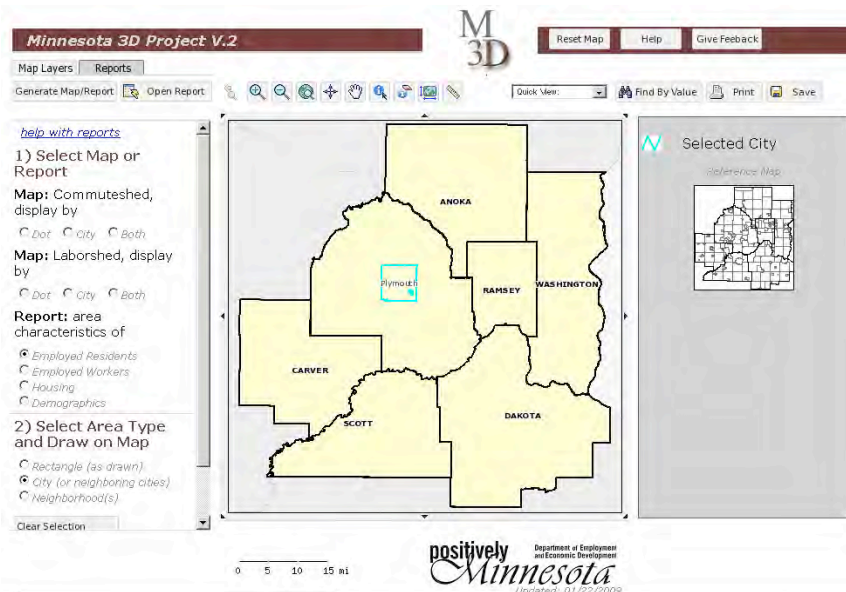
<http://www.cura.umn.edu/M3D.php>

Purpose CURA is an applied research and technology center that connects faculty and students with community organizations and institutions throughout Minnesota. The center's scope crosses traditional disciplinary boundaries to meet the needs of its client communities and organizations in unique ways. It supports a vast array of projects of all sizes, allowing its own growth to evolve in necessary directions wherever possible. The Minnesota 3D Project's dynamic-mapping tool, a creation of CURA, is one example of its diverse project portfolio. This application is intended to increase the capacity of project partners to plan and develop housing and economic development programs that narrow the growing spatial mismatch between housing and employment in the Twin Cities region. It brings together the labor market, housing, and development information and analysis. Illustrating a project with a narrower scope, the Religious Institutions of Northeast Minneapolis documents religious institutions by location through the project area by means of a Google-based mapping interface.

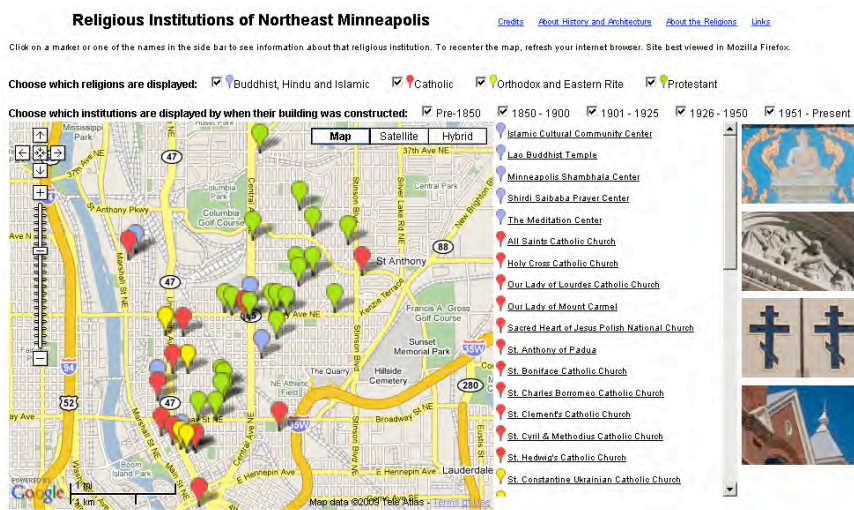
Methodology Through the diversity of projects handled by CURA, it must maintain an adaptive strategy for assisting organizations. For instance, when it found that its initial strategy of

introducing community groups to GIS software was not working due to lack of organizational resources, time, and will to utilize the systems, CURA began developing Web applications in order to become a resource to those same organizations.

Outcome By aggregating data from various sources in one location, CURA has saved client organizations time and resources in their projects. The process led to an increased emphasis on maps and improved technical expertise. An important indicator of CURA’s usefulness to organizations is their return business—the fact that organizations almost always return to request additional assistance. CURA acknowledges the difficulty in evaluating its effectiveness in directly affecting policy decisions, recognizing instead that its work is a factor in the overall decision-making process: a piece of the larger puzzle.



Source: Minnesota 3D Project
<http://map.deed.state.mn.us/M3D/>



Source: Religious Institutions of Northeast Minneapolis
<https://netfiles.umn.edu/users/eric0887/www/test8.html>

VIII. Appendix C: Annotated Bibliography of Relevant Research

Albrecht, J., and J. Pingel. Chapter 1, “GIS As a Communication Process: Experiences from the Milwaukee COMPASS Project.” In *Geographic Information Systems and Crime Analysis*. Hershey, Penn.: Idea Group Publishing, 2005.

In Chapter 1 the authors report their experience from the Milwaukee Community Mapping, Planning, and Analysis for Safety Strategies (COMPASS) project. The National Institute of Justice initiated the COMPASS program in 1999 with an explicit emphasis on using GIS for analyzing public-safety problems and in collaborative partnerships with actors outside the criminal-justice community. The Milwaukee COMPASS project used a Web-based GIS to foster communication among public-safety programs, as well as between government agencies and local communities, and demonstrated the problem-solving capabilities of GIS. This chapter details the project’s implementation process and various challenges, which may be useful for many agencies that are pursuing similar programs. Using numerous practice-derived examples, the authors conclude that GIS not only facilitates and strengthens communication but can be used to defuse political constraints to collaborative decision-making.

Al-Kodmany, Kheir. “GIS and the Artist: Shaping the Image of a Neighborhood in Participatory Environmental Design.” A position paper submitted for the NCGIA Specialist Meeting on Empowerment, Marginalization, and Public Participation GIS, Santa Barbara, California, October 15–17, 1998.

This paper explains how a collaboration of traditional and GIS tools facilitated an environment that fostered public input in participatory design. The project involved a large infill residential and commercial development in the Pilsen neighborhood of Chicago. A GIS image database assisted in visualizing the public’s ideas concerning the built environment. The artist, with traditional felt-tip markers translated and incorporated the residents’ ideas into sketches, merging them into a shared neighborhood vision. GIS and the artist provided a means for residents to visualize past, present, and future neighborhood conditions, enabling them to have a greater voice in the design of their neighborhood. The findings reinforce the view that visualization is a key component in public participation, and that effective visualization may be achieved through combining traditional and computerized visualization tools.

Buckeridge, David L., et al. “Making Health Data Maps: A Case Study of a Community/University Research Collaboration.” *Social Science and Medicine* 55 (2002): 1189–206.

This paper presents the findings from a collaborative community-university research project in Canada, using a GISystem for developing accessible and relevant health-data maps with the goal of improving access to community-health information. The authors discuss the processes of developing a GISystem through partnership and integrating the diverse perspectives and resources represented in the project, as well as the conceptual and technical problems encountered during system development. Results from the study suggest that the GISystem development problems fell into four main areas: maintaining user involvement in system

development, understanding and integrating data, bringing disparate data sources together, and making use of the assembled data. Major themes emerging from the community-university collaborative research process include separate community and university cultures, time as an important issue for all involved, and the impact of uncertainty and ambiguity on the collaborative process.

Caley, Linda M., et al. “Community/Campus Partnership: Tailoring Geographic Information Systems for Perinatal Health Planning.” *Progress in Community Health Partnerships: Research, Education, and Action* 2, no. 1 (spring 2008): 23–29.

This paper demonstrates the use of GIS for perinatal planning in an eight-county geographic area in Western New York through a community-university partnership. The researchers tested the use of GIS over a nine-month period, using community-based participatory research approaches. The general consensus was that the close collaboration in the entire planning process resulted in the development of a perinatal GIS model that became an effective technology for decision-making. The researchers’ findings reinforced the view that GIS use must be adapted to fit with the values and needs of the community using it.

Craig, William J., and Sarah A. Elwood. “How and Why Community Groups Use Maps and Geographic Information.” *Cartography and Geographic Information Systems* 25, no. 2 (1998): 95–104.

This paper seeks to answer the question, “What do community groups do with GIS information?” To gain a broader perspective about how community groups use maps, the authors undertook a research project involving a number of groups from the Minneapolis–St. Paul metropolitan area. The paper identifies four types of information use among the community groups and gives more detail on the nature of those uses with examples taken from exemplary cases and interviews. Besides using maps to address other issues, the neighborhood groups were using maps for strategic, tactical, administrative and organizing activities. This paper also identifies five types of audiences likely inspired by the information and provides guidance about what audiences want out of various relationships, how information can help achieve those goals, how information might be conveyed to each audience, and what type of information should be transmitted. It is worthwhile to note that this paper provides a conceptual framework for organizing information usage and discusses possible audiences for community organizations using GIS and how to reach them.

Delaforce, Wayne H., et al. “GIS As a Tool for Decision Making and Evaluation.” In C. Bailey and K. Barnett, eds. *Conference paper presented at Social Change in the 21st Century, Brisbane, Australia, October 28, 2005.*

The use of GIS to map community and social data is gaining currency throughout the world. However, some academics have suggested that GIS has emerged as an elitist antidemocratic technology by virtue of its technological complexity and cost. The pilot project detailed in this

paper was designed to explore the potential for an information tool that will be more accessible to stakeholders to assist with decision-making. This pilot project, which was based on an action research methodology (that is, participatory action research), involved the development of a prototype Community Information System (CIS) using GIS technology as a platform. The resulting prototype CIS provided access to local information in real time to be used for decision-making, and was also user-friendly compared to perceptions about GIS's technical complexity and cost. The prototype CIS utilized open-source software and components such as Web Mapping Service (WMS), Web Feature Service (WFS), and Geographic Mark-up Language (GML), making it a cost-effective application. It is important to note that the results from the pilot project and the prototype CIS informed both the discussion and strategic planning for cross-sectoral and multidisciplinary objectives in north Brisbane.

Dragic'evic, Suzana. "The Potential of Web-Based GIS." *Journal of Geographical Systems* 6, no. 2 (June 2004): 79–81.

Highlighted in this article is the idea that a Web-based platform for GIS will allow for greater sharing of data and enhance the processes of research and decision-making. A less technical and in-depth overview than the article by Kraak below, this piece is likewise outdated, describing Web GIS technology that is now a mainstream reality. Despite the fact that it is dated, the suggestions made in the article about the promise of Web GIS for planning and public-policy reform continue to be pertinent.

Duncan, Sally L. "Mapping Whose Reality? Geographic Information Systems (GIS) and 'Wild Science.'" *Public Understanding of Science* 15 (2006): 411–34.

The article uses a case study from the Coastal Landscape Analysis and Modeling Study (CLAMS) of western Oregon to show the potential disparities that can arise between GIS scientists and professionals and the common map user and stakeholder. This idea, described as "map tyranny," can be overcome as nonscientist stakeholders become more familiar with GIS as a technology, enabling all parties involved to work better together in order to make decisions and solve problems. The author points out that the playing field can only be evened if the proper resources are made available, and if new perceptions of responsibility are held by stakeholders and researchers. The author stresses the importance of understanding how society can be a good steward of the advancing technology of GIS, so that it can be an effective and equitable tool for community research and development.

Dunn, Christine E. "Participatory GIS: A People's GIS?" *Progress in Human Geography* 31, no. 5 (2007): 616–37.

This article describes the technological advancements that have been made in the field of GIS in recent years and how they have affected public participation in GIS usage. The author compares "expert" and "indigenous" GIS data control and ownership, as well as the various uses and applications for each. The democratization of GIS and sustainability are also important topics

within the article. Although the article is outdated in terms of the extent of technological development to which it refers, it provides a useful discussion on the philosophical foundation for GIS and its future application.

[NOTE: I GET WEB ADDRESS BEFORE TITLE WHEN I PRINT! PLEASE CHECK:]

Elwood, Sarah. "Beyond Cooptation or Resistance: Urban Spatial Politics, Community Organizations, and GIS-Based Spatial Narratives." *Annals of the Association of American Geographers* 96, no. 2 (2006): 411–34.

In this article Elwood discusses the challenges commonly faced in urban politics, such as resource and funding shortages, political complexity, data structure obstacles, and personnel expertise needs. She also discusses the importance of understanding the role of community-based organizations in the political landscape, and what involvement and contributions such organizations should expect to make in the data and decision-making worlds. The author points to the facts that local politics are increasingly spatial and knowledge-based, and that the more spatial data an organization creates, has access to, and can analyze and use effectively the more influence the organization will have in the political process. The article highlights the nature of an increasingly complex and changing social, political, and technological environment and the need for stakeholders to be dynamic and adaptable in these areas. The author concludes by stressing that, in the face of these challenges, it is important to maximize spatial data influence and input, sustain working relationships with powerful political entities, and be able to adjust and be dynamic as priorities and resources change.

Elwood, Sarah. "GIS and Collaborative Urban Governance: Understanding Their Implications for Community Action and Power." *Urban Geography* 22, no. 8 (2002): 737–59.

This paper details the process through which GIS technology changes the activities, role, and power of community organizations. Drawing on research with a Minneapolis neighborhood organization, the author discusses how GIS use advances changes in the language, practices, and paradigms of community planning, strengthening an instrumental rational approach to community planning and revitalization. The impact of GIS use on community planning practices, however, complicates and strengthens a tension between incorporation and autonomy that community organizations experience within collaborative governance approaches.

Elwood, Sarah. "GIS Use in Community Planning: A Multidimensional Analysis of Empowerment." *Environment and Planning* 34 (2002): 905–22.

The primary consideration of this article is the extent to which the use of GIS technology empowers or disempowers different actors and institutions in the political landscape of community development. The author defines various kinds of change (distributive, procedural, and capacity-building) that can lead to empowerment, and describes in what ways these forms of change can lead to empowerment or disempowerment. Following this explanation, the author defines a framework for maximizing GIS technology in order to empower otherwise

marginalized community stakeholders. A case study from the Powderhorn Park neighborhood in Minneapolis is provided in order to illustrate the complex nature of ensuring that GIS does not become a tool for further marginalization of community members and organizations, but rather an opportunity for all members of a community to become involved in the political process and be able to meaningfully contribute to research and policy change in their community.

Elwood, Sarah. “Grassroots Groups As Stakeholders in Spatial Data Infrastructures: Challenges and Opportunities for Local Data Development and Sharing.” *International Journal of Geographical Information Science* 22, no. 1 (July 2008): 71–90.

This article cites the growing demand for access to and use of geospatial data among nonprofit community organizations, which are increasingly becoming part of the governing and policy-making process. The author points out the challenges faced by such organizations (including administration and policies, database and system architectures, semantic and epistemological complexity, and the political nature of data in urban governance) as they attempt to gain access to and contribute quality data. A case study from the Humboldt Park neighborhood of Chicago is provided in order to illustrate these obstacles, and a series of alternative approaches and solutions is discussed by the author. The author stresses the need for all stakeholders to collectively engage in conceptual and methodological frameworks from GIS and society research. As society becomes more globalized, as issues become increasingly recognized from a regional perspective, and as public dollars are forced to be stretched, the issues of data sharing discussed in this article are more relevant than ever.

Elwood, Sarah. “Negotiating Knowledge Production: The Everyday Inclusions, Exclusions, and Contradictions of Participatory GIS Research.” *The Professional Geographer* 58, no. 2 (May 2006): 197–208.

An interactive and inclusive approach to generating and sharing GIS information is the theme of this article. It also addresses the associated obstacles, as GIS technology continues to advance as a research and communication tool. In particular, the author discusses the idea of enabling those most affected by the subject of research to participate in the formation of research questions, methods, and application of findings. GIS is recognized throughout the article as a tool that can both empower and discriminate, depending on the extent to which it is made accessible to and usable by all members of a community. Local experience-based knowledge is contrasted to rationalist expert data; each should complement the other in the process of research and decision-making in order to represent the ideas of more stakeholders. Examples from community research in two separate Chicago neighborhoods are provided to show the importance of knowing how to prioritize different kinds of knowledge, as well as to illustrate various ways to connect and empower stakeholders.

Elwood, Sarah, and Helga Leitner. “GIS and Community-Based Planning: Exploring the Diversity of Neighborhood Perspectives and Needs.” *Cartography and Geographic Information Systems* 25, no. 2 (April 1998): 77–88.

While there has been a significant effort to assist community groups in gaining access to information technology and associated data, concerns have been raised about the constraints groups face in accessing and utilizing GIS-based information and technology. This paper presents the findings of a participatory research project (the Minneapolis Community GIS Project) to determine how GIS can be made more accessible and available in a manner that is most appropriate to communities' needs and activities, and that minimizes the potential for exclusion of less powerful communities. This paper tries to address the accessibility issue from three perspectives. First, using a participatory research approach, it attempts to contribute to a better understanding of the problems community groups face in accessing and using GIS-based data sources and associated technology. Second, it provides an alternative view of the notion of access, arguing that access is not simply a question of the acquisition of hardware, software, and data but also the awareness of information sources and GIS technology and the capacity to apply and maintain the technology and information in ways that are useful to groups' activities. Finally, it accounts for the variation among community groups in their capacity to access GIS, application ideas, and concerns by a complex set of factors and conditions present at the citywide, organizational, and individual scales.

Elwood, Sarah, and Helga Leitner. "GIS and Spatial Knowledge Production for Neighborhood Revitalization: Negotiating State Priorities and Neighborhood Visions." *Journal of Urban Affairs* 25, no. 2 (2003): 139–57.

The adoption of and use of GIS by neighborhood organizations stand out as an important development related to the expanded recognition of these organizations in planning and revitalization efforts. This paper examines the contradictory scenarios emerging from the literature addressing the changing role of community organizations in urban development due to the rising use of GIS (that is, that the adoption of GIS by neighborhood organizations promotes state priorities and strategies; on the other hand, some community organizations use GIS to advance alternative visions of neighborhood revitalization). The paper also focuses upon the kinds of spatial knowledge that these organizations produce and the revitalization initiatives they engage in. It is worth noting that the findings suggest that the reality encompasses both scenarios. This paper was based upon research about neighborhood organizations in Milwaukee, Minneapolis, and St. Paul.

Glass, Gregory. "Geographic Information Systems for the People." *Progress in Community Health Partnerships: Research, Education, and Action* 2, no. 1 (spring 2008): 3–4.

The author provides a brief review of a few articles that address in depth the topic of how GIS has developed as a usable technology over the past few decades. He specifically recommends Mark Monmonier's *How to Lie with Maps*, citing its timeless and comprehensive overview of the challenges presented as GIS technology becomes more mainstream. The article also presents an overview of such challenges as the need for GIS applications to be developed by experienced professionals, the need for an emphasis on consistent and accurate metadata, the problems associated with sharing and using data on the Internet, and the risk associated with individuals who are inexperienced with basic cartographic principles making and using maps for decision-making.

Jankowski, Piotr. “Towards Participatory Geographic Information Systems for Community-Based Environmental Decision Making.” *Journal of Environmental Management* (2008), 90, no. 6 (May 2009): 1966–71.

The need for more effective forms of public participation and empowerment has been the main motivation behind Participatory GIS (PGIS). This article discusses the potential of GIS to become an information technology enabling groups of people to participate in decisions shaping their communities and promoting the sustainable use of natural resources. It explains the concept of participation in the context of planning and decision-making. In this context PGIS offers tools that can be used to help the public become meaningfully involved in decision-making processes affecting their communities. Following an overview of research on PGIS and its current status, the article presents two recent studies of PGIS in water-resource planning. One involves rural communities’ use of computer-generated maps to represent water-source protection zones. The other involves the use of more sophisticated information tools (a collaborative spatial decision support system) by stakeholders representing water providers and users from a mixed urban-rural river basin. The combination of both studies provides the basis for discussing the prospects of PGIS to empower citizens in making decisions about their communities and resources.

Kellogg, Wendy A., and Anjali Mathur. “Environmental Justice and Information Technologies: Overcoming the Information-Access Paradox in Urban Communities.” *Public Administration Review* 63, no. 5 (September–October 2003): 573–85.

The authors provide an overview of how marginalized urban populations tend to not only suffer from the greatest risk from environmental hazards but also lack the access to critical information about risks, as well as the understanding of policy-making decisions associated with harmful environmental conditions. The article then provides a discussion and case study about (1) enhancing the availability and relevance of environmental information provided to urban neighborhoods by government agencies and nonprofit organizations; (2) improving the capacity of community leaders to use the Internet as an information-access tool; (3) improving the capacity to use environmental information among community leaders, so that the information gained from the Internet or other sources can be used effectively to address problems; and (4) facilitating new and enhanced working relationships among neighborhood-based organizations, regulatory agencies, and the environmental-advocacy community. The case study involves a series of projects performed in various Cleveland neighborhoods to attempt the above-mentioned improvements.

Kraak, Menno-Jan. “The Role of the Map in a Web-GIS Environment.” *Journal of Geographical Systems* 6, no. 2 (June 2004): 83–93.

The author provides an overview of how the World Wide Web will continue to expand the application and capability of maps and mapping software. Topics covered include trends in mapping, the function of maps, map appearance, the dissemination of maps, and maps in Web-GIS. This article, although very technical, is quite a bit outdated due to the rapid advancement in

Web-based mapping over the past five years. Significant advancements, such as Google Maps/Earth, ArcIMS, and the use of GPS technology in automobile navigation and cellular phones, have occurred since this article was written, making it somewhat prophetic yet nonetheless dated.

Leitner, Helga, et al. “Models for Making GIS Available to Community Organizations: Dimensions of Difference and Appropriateness.” Paper presented at the NCGIA Specialist Meeting on Empowerment, Marginalization, and Public Participation GIS, Santa Barbara, California, October 15–17, 1998.

One major question addressed by Public Participation GIS concerns the appropriateness of GIS technologies for supporting and furthering the goals of neighborhood and grassroots organizations, focusing on issues of access and whether or not such technologies can empower such groups. This paper looks at the authors’ experiences with different models for making GIS available to community organizations in Minneapolis and St. Paul. Besides describing six different models—community-based (in-house) GIS, university-community partnerships, GIS facilities in universities and public libraries, local government map rooms, Internet map servers, and shared neighborhood GIS centers—the paper provides a conceptual framework for identifying dimensions of difference among these models. It is worth noting that in order to overcome resource constraints and to maximize the utility of GIS for serving their needs, neighborhood organizations generally attempt to draw simultaneously on different ways of gaining access to GIS, altering these strategies over time.

MacEachren, Alan M. “Cartography and GIS: Facilitating Collaboration I.” *Progress in Human Geography* 24, 3 (2000): 445–56.

This author looks at how maps and GIS are well suited to facilitating collaboration among stakeholders in decision-making with an emphasis on same-place collaboration. The author addresses four research themes that deal with the extension of cartographic and GISystem methods to facilitate same-place collaboration:

- The design, implementation, and theoretical basis of Group Spatial Decision Support Systems;
- Public Participation GIS (PPGIS), which has empowered people through access to mapping and GISystem tools;
- New software and display forms to facilitate group work;
- Understanding group decisions and groupware use.

The author expresses optimism that, given the recent advances in information technology, we are on the verge of a substantial increase in the role of maps and GISystems as appropriate tools of collaboration in decision-making.

Matson, Jeff. “Community GIS.” PowerPoint presentation to the MetroGIS Policy Board Meeting, Minneapolis, July 30, 2003.

This presentation discusses a range of issues that reinforce the relevance of the use of GIS to support the work of communities and community organizations. Drawing on his experiences in Minneapolis, the presenter outlines the reasons why GIS is relevant for community work, namely:

- Community groups are bound by geography;
- Many housing, planning, and development issues have a data or database component;
- Visualization (maps) helps people to see what is going on and understand the issues, increasing participation.

The presenter also highlights some projects utilizing GIS, addresses some obstacles to community adoption of PPGIS tools, and discusses the guiding principles behind the use of GIS for community work.

McCarthy, T., R. Farrell, A. Curtis, and A. S. Fotheringham. “Integrated Remotely Sensed Datasets for Disaster Management.” *Remote Sensing for Environmental Monitoring, GIS Applications, and Geology VIII*. Proceedings of the SPIE, Cardiff, Wales, 2008.

This paper traces the root of spatial video as a remote sensing tool from the early 1980s to the present day. The background of a new spatial-video research initiative based at National University of Ireland, Maynooth, is described by the authors. New improvements are proposed, and low-cost encoders, easy-to-use software decoders, timing issues, and interoperability are discussed. These developments will enable specialists and nonspecialists to collect, process, and integrate these data sets with minimal support. This integrated approach will enable decision-makers to access relevant remotely sensed data sets quickly and thus to carry out rapid damage assessment during and after disasters.

Mills, J., and A. Curtis. “Geospatial Approaches for Disease Risk Communication in Marginalized Communities.” *Progress in Community Health Partnerships, Research, Education, and Action* 2, no. 1 (2008): 61–72.

This article provides an assessment of the benefits and limitations of geospatial technologies for risk communication, particularly in marginalized communities. The authors present a brief classification of the foremost geospatial technologies by how dependent their use is on specialists, what level of technology and equipment is necessary for use, and how interactive the products are, followed by an overview comparison of the types of products that exist. Prominent GIS products, such as ArcExplorer and Google Maps/Earth, are compared for their accessibility, functionality, and usability. As part of the comparison, the authors cite the common barriers faced by marginalized and isolated communities in obtaining valuable information about health risks, such as exposure to toxic release, hurricane storm surge, and disease.

Parker, Brenda. “Constructing Community through Maps? Power and Praxis in Community Mapping.” *The Professional Geographer* 58, no. 4 (2006): 470–84.

The author looks at the process of creating community maps and how it can empower communities through these “counter-maps.” The author argues that three main themes in community mapping are inclusion, transparency, and empowerment. Community mapping projects have proved to be catalysts of social change, but there are exceptions in which these themes can be counterproductive.

Parker, Cherly. “Living Neighborhood Maps: The Next Wave of Local Community Development.” A position paper submitted for the NCGIA Specialist Meeting on Empowerment, Marginalization, and Public Participation GIS, Santa Barbara, California, October 15–17, 1998.

This paper presents a case study of how the South of Market community in San Francisco has developed a dynamic GIS model, or “living neighborhood map,” and has used it toward modifying zoning controls and in developing several Internet-based applications designed to strengthen the local economy through local merchants’ and residents’ daily transactions. According to the author, a living neighborhood map is a simulation of a community’s people, businesses, and buildings and serves as a continuous archive of its growth. It is a tool that empowers communities to control their own economic and physical development. It enables up-to-the-minute planning and supports creating applications tailored to fit local development needs. The paper demonstrates two very powerful community-development applications of South of Market’s living neighborhood map. The first is at the center of a grassroots planning effort to control gentrification and the displacement of uses. The second is as a series of GIS-based tools designed for use by merchants, brokers, and property owners to assist people in finding commercial space, finding a job, or arranging cooperative-buying collaborations with neighboring merchants. The first application of the map empowers groups that might otherwise be disenfranchised, while the latter strengthens the local economy by facilitating transactions among local people.

TIES. “GIS Gives Superintendents a Powerful New Tool.” *Geographic Information Systems for School Districts*. January 2001. www2.ties.k12.mn.us/pdf/GIS/GIS_web_part1.pdf.

TIES is a nonprofit school-district cooperative that has been delivering technology solutions to educators for more than 30 years. The author provides a brief overview of how GIS can be a powerful tool for school-district superintendents, along with a few real-life examples. These examples show how GIS has been used by superintendents to communicate, make decisions, negotiate agreements, shape community attitudes, plan for change, and monitor patterns and trends in districts. Mapping mediums included in this paper are maps on posters and in newsletters, as well as electronic maps that can be accessed via the Internet by interested parents and stakeholders.

Vajjhala, Shalini P. “‘Ground Truthing’ Policy: Using Participatory Map-Making to Connect Citizens and Decision Makers.” *Resources* (summer 2006): 14–18.

The goal of this article is to identify ways to use maps to communicate to various kinds of stakeholders in the planning process, because of the differing ways that people view communities and environments. The author outlines an experimental mapping study that was performed in the Pittsburgh area, which revealed that mapping can be an integral tool in understanding citizens' perceptions of their community and of proposed development projects. The experiment showed that community planners and government officials often view local communities and projects more technically—and require a different set of knowledge about an area or project—than do the individuals who make up that community. Residents tend to have a more intimate and conceptualized understanding of the area. The article concludes by showing that the use of mapping, if used in the right way, can help bridge gaps between citizen and professional perceptions of the conditions and needs that exist in a community.

IX. Appendix D: Additional Maps Referenced in Report

The following maps are from the Kirwan Institute projects identified in this report.

- *Thompson v. HUD*
- Massachusetts Opportunity Mapping
- The Central Texas Opportunity Initiative
- Mapping for Children's Defense Fund of Ohio
- School Integration in Jefferson County, Kentucky