Public Participation GIS—Barriers to Implementation

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ABSTRACT: Although GIS technology has become an important decision-support tool in many private and public organizations, its potential as a resource in local public policy debates has yet to be realized. Creating a supportive climate for public participation requires much more than software and hardware enhancements. In urban communities, access to comprehensive information is limited. Highly charged political environments and a dearth of successful community programs complicate public policy debates. Organization of community data systems and support in the use of GIS tools in policy analysis are important to successful public participation.

KEYWORDS: Information systems, access to data, public participation, public policy, desktop GIS, neighborhood planning, decision making support

Introduction

Geographic information systems (GIS) have long been recognized as an important decision support tool. In the past, the potential of this technology has been realized only by those with the resources and the professional skills to use the tools, and by those with access to the data required to make effective use of these systems.

GIS technology is now reasonably priced, easier to use, and it has approached the status of commodity software—one more element of "office suites." Public information databases have also become more available; a common base of community information has begun to develop. These trends suggest that it is now possible to bring GIS tools to the arena of citizen participation and public decision making. GIS software companies are appealing to this emerging market. Caliper Corporation, working in cooperation with the Community 2020 program of the U.S. Department of Housing and Urban Development (1997), has developed a special version of the Maptitude software program for use in local community planning. The Environmental Systems Research Institute, Inc. (ESRI), has been working with the U.S. Environmental Protection Agency to support lead paint poison prevention programs through use of ArcView software (Mitchell 1997). These and other activities are prototypes of more ambitious plans for a new generation of GIS software.

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"Public participation GIS" is a term that has been coined to represent the vision of those interested in the socio-political contribution of GIS to communities (NCGIA 1996; PPGIS-SCOPE 1997). The vision includes GIS tools that are easily used and understood by citizens, relevant to public policy issues and available to all sides of public policy debates. GIS is envisioned as a real-time aid as citizens review and debate choices in public meetings and hearings. The vision has been enunciated to challenge the developers of the next generation of GIS and database software.

How practical is this vision? What are the barriers to its realization? What are the collateral developments that are necessary for this vision to become substantive?

An optimistic scenario based on more flexible software and hardware may be imagined by combining bits and pieces of what is already possible. Imagine a large video "board" in a conference room. Selections of data are quickly organized for display. Software "wizards" guide the creation of complex displays and limit misuse. Map displays are augmented to include sketches, photographs, verbal comments, and other kinds of information. Trends can be evaluated by creating a series of maps simulating a time sequence. Images may be "captured" and moved to a clipboard area near the edges of the display. The environment is optimized to allow intuitive interaction with users (Nyerges et al. 1996.)

However, GIS is not the center of the public participation universe. Creating a supportive climate for public participation requires much more than software and hardware enhancements. This essay focuses on the challenges to provide relevant information, organize and provide access to complex data systems, and ways to address these issues. The essay suggests that data analysis, public policy assessment

and effective structures for participation are more complex than some would think them to be and will not be realized without substantial effort

The discussion builds on the author's experiences with urban community revitalization efforts in Milwaukee, Wisconsin. Since 1991, the author has worked with a community-based data services program—the Data Center Program of the Nonprofit Center of Milwaukee (Barndt and Craig 1994). The essay explores, to some extent, he extraordinary complexities of urban public policy in troubled urban neighborhoods. Limited resources, multiple actors, a highly charged political process, uncertain futures, and lack of success in the past complicate work in such environments.

The Role of Information in Public Participation

GIS software is a tool for processing information. Although GIS is often mistaken for map making, the "I" for "Information" is the most important part of the acronym. For information to play a truly meaningful role in public participation it should have the following traits:

Public participation requires access to comprehensive information. Most public policy decisions affect interconnected systems. Economic development of depressed neighborhoods, for example, encompasses human resources, education, crime, consumer demand, entrepreneurial activity, capital, and infrastructure resources. Many planning activities are organized by one administrative unit. The perspective is often constrained by the data immediately available to that unit.

Public participation requires tools that recognize the inter-relationships among data. GIS is often used to visualize spatial patterns within data; many public issues are better understood by highlighting the differences across local neighborhoods or communities. Map making itself is usually limited to examining one variable at a time, but the more useful function of GIS is the capacity of software to relate different data sets to one another by linking material through the use of spatial attributes. Public policy requires an understanding of complex relationships among variables. Data from different sources may be brought together for advanced statistical analysis using the data integration tools of GIS.

Public participation requires current information. Ideally, information should be accessible by tapping the very sources that organize the information in the first place, such as the assessor's office, the building inspection records, and the police department. For example, a community-based mobile watch program may need to review crime patterns of the last two weeks to identify areas to increase their vigilance. Neighborhood housing organizations may monitor blocks with high levels of building code violations, combined with up-to-date landlord information.

Public participation requires relevant information. Given the range of values and interests represented in the public debate, it becomes even more important that advocates of particular perspectives are able to acquire the information that informs their point of view. Public information is often limited to material derived from public administrative data. This renders available information subject to the management styles and priorities of the public institutions.

For example, computerized data available at the Milwaukee County Registrar's office was limited to information that had been organized as an "index" to access printed records. Key information, such as tax key references that would allow links to other databases, was not included. Another key variable—a "Homestead" code—was only available in the printed forms. This code distinguished between home sales and mortgages initiated by absentee landlords and those initiated by owner occupants. As another example, youth agencies and neighborhood organizations have been interested in knowing more about the involvement of youth in crime. However, the City of Milwaukee Police Department has not given high priority on getting that information into the computer record.

Public participation requires that information be organized in relevant formats. While the monitoring of current and future trends may be critical to public policy, public organizations organize their management information systems to maintain current data. These data systems may be much less sensitive to the value of historic information. Agency staff have little opportunity to review past patterns in the data. Frequently, the database structures do not allow analysis of temporal patterns.

For example, the Milwaukee Public School System records the current and two previous school assignments of students. Because students frequently change schools, these fields are exhausted for most students within the first four years of school. Additionally, the field containing the home address of students is reused without a reference to prior information. As a result, important mobility information is lost.

Administrative data archives can be restructured to permit trend analysis. For example, the City of Milwaukee and the University of Wisconsin-Milwaukee worked together to organize a series of City of Milwaukee property file tapes. They had been archived at the end of each year, but not analyzed.

This 22-year series is an invaluable resource for tracing housing patterns in Milwaukee. The city parcel file assigns to each parcel a tax key that changes whenever parcel boundaries are redrawn. In the central city, vacant lots are often sold to the owners of adjacent properties. However, there is no way to thread tax key references over time because no transaction log is kept. The new tax key numbers cannot be linked to previous references to the property. Administrative data can to be enhanced to focus on issues of greater interest to public policy. For example, the Children's Hospital of Wisconsin has worked for several years to organize a more complete record of cases involving injuries to children— the Trauma Registry. The staff has been trained to gather a more complete set of information about the child's household and about the circumstances of the injury.

The public participation process can contribute to the creation of more useful data systems. Administrative data should not be the only source for information. In Milwaukee, an annual housing board-up survey was conducted by the city. When it became too expensive to conduct, community volunteers joined with city staff to conduct the survey. Neighborhood-based groups can extend the information-gathering efforts of government by taking advantage of their detailed knowledge of their own communities. For example, the city economic development department was not able to monitor routinely the availability of storefront space in a local retail district or to gauge accurately what kinds of retail establishments local residents preferred. Although local organizations may not have the capacity to *design* and *manage* a database of these sites and may not be in a position to market their neighborhood to potential retailers from outside of their neighborhood, together, they can *maintain* an up-to-date database.

Other data may need to be collected specifically for community monitoring needs. The movement to develop community indicators has recognized the need for a community-wide strategy to gather additional data through surveys or other sources. Several cities have made a major commitment to this process (Community Indicators Network 1997.) For example, Jacksonville, Florida, has developed a series of community indicators that have been tracked annually since 1985. These have included indicators gathered from an annual community survey that measures such things as racial attitudes, mobility, and other measures not available through administrative data (Jacksonville Community Council 1997.)

Most indicators efforts, including Jacksonville's, have implemented surveys that are too small to allow for neighborhood-level distinctions. However, the Metropolitan Chicago Information Council (1997) conducts a survey in Chicago large enough to permit a summary of data on attitudes, household status, and household activity for all 77 neighborhoods within the city.

Access and Confidentiality Issues

Much work remains to be done to insure the right of public access to data. Although an individual may be able to access information about himself or herself in a government database there may not be a public right to access the entire file. Yet, the capacity to analyze patterns of data in the entire file could enhance participation in public policy debates.

Private information is usually protected by confidentiality regulations. The public right to summary data, using procedures that protect individual privacy, needs to be asserted. The value of access to comprehensive data may conflict with the value of individual privacy. In a completely open system, access to identifiers associated with persons would make it possible to connect personal information from one system with material from another. The problems, resources, and experiences of individuals could be traced. Ideally, one could better evaluate welfare reform if income transfer payments, employment records, credit records, health and education records, and services to family members were all linked. There are a few uncommon examples of work which link highly confidential data systems for policy research purposes. The Employment Training Institute of the University of Wisconsin-Milwaukee has completed an analysis of the employment outcomes of Milwaukee residents who have left the Welfare program. AFDC records were linked to the files of the State of Wisconsin, Department of Workforce Development, to analyze employment patterns, jobs held, and earnings of the residents after welfare (Pawasarat 1998.) Appropriately, procedures protecting privacy rights severely limit the ability to access data in this way.

Some valuable data is totally inaccessible. For example, in Milwaukee, the Wisconsin Electric Power Company has one of most complete household databases. The data could be used to understand the extent of residential mobility. But the company does not want its customers to feel that information about them is not secure. They have chosen neither to share any of the information nor to process the data to generate the summary information that would be useful for community planning.

In order to preserve confidentiality, original data sources are usually aggregated in one step. Most often the zip code field is used for aggregating data rather than geocoding addresses to permit combining data in some more meaningful

fashion. Zip code areas are large and arbitrarily shaped for the convenience of postal delivery. Information tailored to neighborhood boundaries of sociological and political significance would be more helpful in developing public policy. Areas that are internally more homogeneous would reduce the error introduced when representing an area by aggregate statistics.

Aggregation tends to be performed in a conservative fashion. For example, birth data reports from the State of Wisconsin are limited to sets of combined zip codes to ensure in advance that reported numbers will not be too small. It would be more appropriate to report constraints based on numbers generated for a specific report, applying suppression or further aggregation as required.

Most data available at the neighborhood level have been aggregated so that they are limited to descriptions of "place." When individuals or households move, the trend data are relevant to the neighborhood but not to the individual resident. Answers to public policy questions are limited when only place trends and not individual trends can be traced. For example, when the level of poverty increases in a neighborhood, have long-term residents become poorer or have they moved out to be replaced by households with a lower income?

The organization of data records may also limit place-based perspectives. For example, in Milwaukee, the public school system operates an open enrollment, school desegregation program which leads to local schools enrolling a majority of children from other neighborhoods. School-based data are broadly available. But the status of children attending a school may not provide much insight into the status of children living in that neighborhood.

Online public access to data has been limited by concerns for abuse. However, the concerns may be addressed by aggressive security protection in software. New database software permits the generation of reports from an active database without allowing access to individual records. Reports can be designed which suppress data when the numbers are too low.

Opportunities to link data between administrative systems are limited. Agreements `are needed which permit some linking of individual records from various sources through detailed protocols to preserve the confidentiality of data. The process is made even more difficult when different political jurisdictions must work together. A number of "community clearinghouse" programs (discussed below) have negotiated to work "within the confidentiality wall" established by an agency. Access to individual records is restricted to clearinghouse staffs, who are permitted to link these records to records from other sources.

Institutional Models for Organizing Public Information

The effort to build an accessible, comprehensive pool of public data is similar to efforts within the private sector to create a "data warehouse" within an enterprise. For a private corporation, a data warehouse may organize data on production, orders, delivery, costs, and earnings within a single system (Kimball 1996; Gill and Rao 1996). Software facilitates complex inquiries of the data crossing all elements of the corporation. An "executive information system" (EIS) may be built around basic reports that consolidate critical information. Details that explain basic patterns are also available through software tools that permit the user to "drill" into the data to retrieve material from individual records.

While enterprise-wide data systems may be complicated, those systems are simple when compared to community-wide public data warehouse models. Public data is in the hands of a wide variety of administrative units not accountable to each other. The variety of potential users of the information is also complex. Confidentiality rules can restrict access and prohibit complete integration of related data systems. The detail acquired through "drilling" may be off limits to most users.

How can "enterprise-wide" community data be organized? In several cities, there have been efforts to create a "data clearinghouse"—a single, independent organization that organizes and archives valuable local data from a variety of sources for public use (Urban Institute 1996; Kingsley et al. 1997; Sawicki and Flynn 1996.) Such organizations are able to focus on the technical barriers to integrating information. They can set the tone for defending the right of the public to information. They can work to create the political setting for effective information access. They can provide the resources to make the data accessible and to preserve confidentiality. They can integrate information from different sources by working with individual records under agreements that allow the organization to work with confidential data. They can sponsor surveys and other data-gathering efforts to fill in the gaps in administrative sources.

When public data systems become accessible, the ideal situation would be to allow access to active data sets through a direct Internet link. This would ensure immediacy, accuracy, and public accessibility. Although a number of data systems are becoming available in this way, the implementation has been generally limited to viewing individual records. More thorough analysis and extraction programs would be needed to report aggregate results or to select

appropriate subsets for transfer to the analyst's computer for further review.

The real costs of managing information also limits access. Some public organizations recognize that the information they have is of value to others and that it may be a source of revenue. This will further restrict access by public organizations or persons with little funds. For example, the City of Milwaukee now distributes a CD containing property assessments and other related information. The CD sells for $300. A CD updated within a year costs another $100. Largely because of these costs, few of the local non-profit housing organizations have chosen to purchase it.

Regardless of the profit motive, there are costs associated with managing information that must be met. Organizations and individuals are expected to pay for the costs of services through user fees. This permits the rationing of services that are in short supply. While effective public participation requires the encouragement of access, charging for data access discourages use. Information ought to be priced in a different way. Once development costs have been paid for, additional costs are minimal. It makes more sense within an open environment such as the Internet to cover costs as a one-time public investment and to allow information access to be free from that point.

Limitations to Simplifying GIS Technology

Producing presentation maps may become easier, but creating accurate maps will be as difficult as ever (Monmonier 1991.) Any map can distort reality. Frequently, a series of map variations are necessary to help identify the distortions introduced by any one map. Presentation of actual numbers within areas on a map can be distorted by the different sizes of polygons. The use of ratios can be distorted when the base number is small. Population characteristics may also be correlated with population density. However, correcting for population density can reduce the visual recognition of the concentration of an attribute. Unusual characteristics of a physical area —a park, a nursing home, a high rise building— can also affect the results.

Citizens without professional training in the subject can easily create maps which are poorly designed, contain distortions, or which are inappropriate. Future GIS software should be able to point out some of these problems in the same way that statistical software has been designed to point out statistical errors.

Given the ambiguity of the visualization process, it is appropriate for maps to be designed to communicate a particular message. Business graphics are explicitly designed for this purpose. As maps become useful for the purpose of advocating a particular position, others will need to know how to detect the bias in them and how to offer alternative views.

Using GIS technology to associate information from different data sets is more complex. For example, a client file containing the addresses of persons may be linked to data describing a neighborhood. Caution is recommended to avoid the "ecological fallacy" of improperly attributing neighborhood data to the individuals in the client files. Data interpretation is more challenging when using advanced mapping procedures such as surface grids. The use of grids to interpolate data requires a clear understanding of the underlying statistical process.

The trend toward encouraging non-professionals (i.e., those with out cartographic training) to create their own maps is shortsighted. For non-professionals to be produce accurate maps, they need access to professionals who can offer advice and critique of results, and who can assist with the use of more sophisticated options for analysis.

Limitations to Simplifying Policy Analysis and Research

Not only are GIS and other analysis tools complex, but analysis of public policy choices is also a complex subject. Most public debates address problems that are inherently difficult to solve. Not even program professionals agree on the best way to rebuild a housing market in an old urban neighborhood, to reduce the demand for drugs in a community, or to organize supportive resources for at-risk youth. Laymen understand events and public choices from their own personal perspective and experience. The political frameworks brought to the discussion substantially complicate policy choices. Advocates for one policy argue that the evidence supports their point of view. Their opponents are likely to be equally convincing. It is important to help participants recognize the weaknesses in a particular case and the alternative ways to test the assumptions behind a point of view.

Informed policy debates become even more complicated when the best critique requires assessing information not generally available. For example, the critics of current urban policy may focus less on the problems of individuals in poverty and more on the limitations of institutional delivery systems. Such information may not be readily accessible, particularly for private sector institutions. In Milwaukee, the

NAACP and ACLU brought a court suit against the American Family Insurance Company for "redlining" central city Milwaukee neighborhoods when selling home insurance. A lengthy court suit was required to gain access to the data that would demonstrate the redlining pattern. Included in the settlement was access to, and analysis of, data on the pattern of insurance sales over a five-year monitoring period aimed at demonstrating to other insurance companies that central-city markets can be successfully expanded within traditionally under-served areas.

Often, the most important step in policy research is the framing of the question prior to the start of analysis. *Community-based research* recognizes the unique perspective of a particular neighborhood or interest group. The research is structured to provide information and insight relevant to the community's agenda. Importantly, the search for information offers opportunities for collaborative research involving both community representatives and professionals. Laypersons draw upon their personal experience and are likely to incorporate a wider range of qualitative and quantitative information. "When only community members have the experience, and only academics have the theories, both forms of knowledge are weakened" (Stoecker and Stuber 1997). Working together, professionals and laypersons can create a much more accurate picture of a community. "This means engaging community members in defining the research question, developing the research methodology, compiling and distributing the research report, and acting on the results" (Stoecker and Stuber 1997.)

Most data systems—particularly those that are based within centralized bureaucracies—are likely to be missing critical information. Community representatives can be involved in adding this additional insight. Public data have tended to be defined as "read only." Local communities ought to have the opportunity to edit and supplement information when appropriate. A flexible geographic information system should be open to incorporating survey material, transaction-based edits of existing database records, and other formats such as memos, photographs, and recorded verbal notes.

The enthusiasm with which public participation GIS is embraced may lead advocates to suggest that community organizations can be empowered to use the new tools independently of GIS professionals. It seems inappropriate to assume that a layperson can do the work of a professional. It is also inappropriate to limit the layperson to only using GIS for simple data analysis. More flexible tools can intensify collaboration between professionals and laypersons, provided

the latter are assisted in making effective use of these new resources.

The Need to Reform Democratic Participation

Public Participation GIS presumes that opportunities for public participation are in place. A critical examination of experience suggests that models for participation are limited and that successful applications are even rarer. Political and bureaucratic tendencies militate against meaningful public participation. Local community leaders are as likely to be at odds with public authorities as cooperating with them.

Effective use of GIS to enhance public dialogue presumes a partnership between communities and government. Without this cooperation, access to data is likely to be restricted. The perspectives of planners working for government are limited when government is not open to the additional insight that communities may offer. For example, although there has been an increase in "community-oriented policing," the willingness of police departments to share incident and arrest data with the community varies widely. In some cases, community leaders have access to the map and the analytical capacity of the police department. In others, police reports are made available, but the community is limited in the kind of analysis it can perform from them. In some cities, the police department is unwilling to share data, even though it may be beginning to use the data more effectively within the department. Where neighborhood-based "mobile watch" programs have had access to police data, a two-way exchange of information has often developed.

Neighborhood information systems can be organized within two paradigms. One of them is the "war room" where professional staff have organized all the data derived from the interaction of service bureaucracies with the neighborhood. The other is a "neighborhood resource site" operated as an open resource, constructed and used collaboratively by residents, local organizations, and others who seek to serve the neighborhood. The second model is more likely to yield substantive, useful results.

Effective public participation requires resources. The demand for technical resources will increase with increasing demand for information. Serious collaborative research will also require the commitment of professionals. And the very process of participation takes time and resources to develop. A small task force may be appropriate for a business organization to make an investment decision. But the allocation of public resources requires a more open, inclusive process. As technology becomes available to support the resource allocation process,

participants representing all perspectives need to have access to the technology. A contrast in styles became obvious during local political redistricting following the 1990 U.S. Census. Milwaukee County evaluated options using a long established system that involves the reorganizing ward population numbers printed on cards. Only few people were able to participate in this activity. The City of Milwaukee produced a GIS rendition of city population data and made a GIS specialist available at one of the workstations of the Legislative Reference Bureau. Community leaders were able to visit the site and try out various models for redistricting. This increased the sophistication of the debate, as groups were able to propose well considered alternatives.

How Much of a Revolution Are We Talking About?

The devolution of government over the last two decades has placed more responsibility in the hands of local communities. Nonprofit organizations led by citizen boards are becoming important players in planning and program delivery at the local level. These organizations may lack the formal information base to support their planning and to monitor their progress. Their future success will be enhanced by the creative use of solid information.

Advocates of GIS tend to talk as though this tools will revolutionize the community decision process. For example, a brochure produced for the Community 2020 program distributed by the U.S. Department of Housing and Urban Development (1997) claims: "If you can imagine the questions, Community 2020 can provide quick and intelligent answers. The powerful combination of GIS software and region-wide data provides all the tools that one needs to participate in neighborhood revitalization and community redevelopment." There is a danger that the opportunities will be oversold. The presumption that organizations only need new easy-to-use software and the limited data sets already available does not acknowledge the challenges to be met.

GIS software is capable of producing impressive visual results. But how much will this change public decision making? City governments have been able to realize substantial savings in their work when a complete, property-based GIS system was integrated with administrative procedures. Community-based GIS applications may transform the effectiveness of public policy debates and improve the quality of neighborhood programs, but the change will require additional resources rather than reduce the need for resources.

Public participation is a fragile process, prone to a wide variety of challenges. A number of these issues have been addressed in this essay. But even when resources are available and the information is readily accessible during community debates, the contribution of GIS will only be one part of the process. Increased use of GIS is not likely to change the perspectives represented at public policy debates. In rare instances does the exploration of data lead to new perspectives. The most obvious advantage of GIS is that it assists visualization and communication. Organizations most commonly use GIS to persuade others of the conclusions they have reached.

What current GIS applications are relevant to neighborhood decision making? A wide range of examples of applications could be presented. Consider a list of recent projects at the Data Center Program of the Nonprofit Center of Milwaukee (1998). Many of them are modest in their impact—relating more to organizational program needs than to broader public policy. The most common applications are intended to communicate with others and to present a point of view:

* Suggest the next blocks to target for development in the Lisbon Avenue neighborhood given current target areas.
* Demonstrate to potential new retailers the high levels of aggregate income in an East Side neighborhood, given the high urban density of the area.
* Investigate the relationship between home insurance sales and neighborhoods with predominately African American population.
* Identify high concentrations of malt liquor licenses within the central city area.

Applications serving organizational and program activities:

* Display the locations of residents attending community meetings to assess where additional outreach may be required.
* Create a list of vacant lots and identify appropriate actions to improve their use.
* Identify the location of drug stores with delivery services closest to a client's home.

Applications for program planning and evaluation:

* Compare the proportion of members of a youth agency with the number of youth on each block in the neighborhood.
* Determine whether housing investment has had any long-term impact on neighborhood property values.
* Locate neighborhoods that should be targeted for prenatal programs to reduce low birthweight births.

- Locate areas on the northwest side that are appropriate for a day-care services program.

Least common, but quite important, are applications which support neighborhood planning and research:

- Determine which neighborhoods have experienced important increases in the number of children since the 1990 U.S. Census.
- Demonstrate the need for an additional grocery store in the Grandview Walnut Heights neighborhood.
- Illustrate the rapid spread of sales of crack cocaine in Milwaukee neighborhoods in the last several years.
- Review the long-term effects of policies addressing boarded-up homes.
- Evaluate characteristics that identify a neighborhood where children are at a higher risk for assaults.

A number of case studies are included in two recent surveys of GIS applications—*Mapping Your Community*, distributed by the U.S. Department of Housing and Urban Development (Kingsley et al. 1997) and *Zeroing In: Geographic Information Systems at Work in the Community*, distributed by E.S.R.I. (Mitchell 1997.) Effective use of GIS will require collaboration between lay persons and professionals with GIS and other analytical skills. What are the organizational frameworks that will encourage this process? Each of the current experiences represents only a part of the vision. Organizations are limited by available local data, by little experience with new tools and by inadequate resources.

A number of programs serve as prototype efforts to bring GIS applications to the service of local community organizations: The Data Center program of the Nonprofit Center of Milwaukee (1998) has served as a data and GIS service center to neighborhood-based organizations in Milwaukee since 1992. The Center for Urban and Regional Affairs (1997) at the University of Minnesota links university students and faculty with neighborhood programs in Minneapolis and St. Paul. The Community Information Clearinghouse Program of the Urban Coalition (1997), also in the Twin Cities, has co-produced major neighborhood policy reports with local organizations. The Center for Urban Poverty and Social Change (1997), of the Mandel School at Case Western Reserve University, has organized a major collection of local data on line and has established a neighborhood liaison to assist neighborhood organizations in the use of these data. The United Way of Central Indiana (1997) has been working with nonprofit human services organizations to identify new target areas for programs. City of Seattle, Office of Management and Planning (1997) has distributed neighborhood data on CDs (backed by consultation) to local organizations as a part of a Neighborhood Planning Toolbox.

Public participation will be served by the growing use of GIS and public policy analysis tools. There are many early examples of university, government and nonprofit involvement. The most successful will be those which commit of data, resources, and professional personnel to the effort.

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