Visualization Tools and Public Participation: From Crayons to Computers

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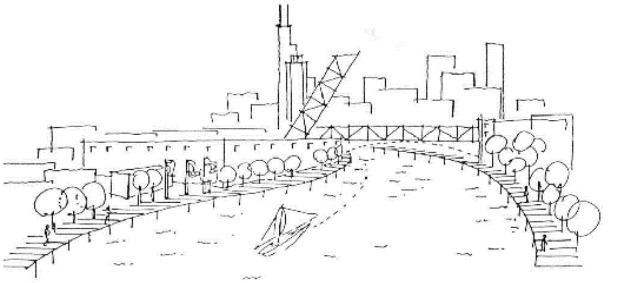
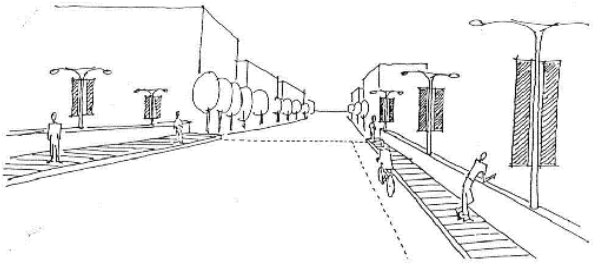
The emphasis on the participatory and communicative side of planning has grown in the past decade, and planners have developed various theories to empower communities and increase communication (Healey 1992; Innes 1996, 1998; Talen 1999). Planners increasingly find that public participation is fundamental to develop appropriate and effective solutions for community design and planning problems. The benefits of broad-based community involvement in planning are widely documented.





They include: enhancing the capacity of citizens to cultivate a stronger sense of commitment, increasing user satisfaction, creating realistic expectations of outcomes, and building trust (for example, Alexander 1977; Altschuler 1970; McClure, Byrne and Hurand 1997; Sanoff, 1978, 1991; Smith 1993; Towers 1995). While planners bring technical skills and knowledge, citizens provide community history, local knowledge, and an understanding of cultural values. These types of expertise complement each other and result in richer, more comprehensive planning and design solutions.

Too often, however, planners are not equipped with appropriate planning tools—in particular, visualization techniques—to generate meaningful public input. Stanley King and his co-authors (1989) suggest that

visualization provides a common language to which all participants, technical and non-technical, can relate. Consequently, an exploration of alternative visualization techniques could be a key to the promotion of a higher level of citizen participation in planning.

In this paper, we review a wide range of visualization techniques: from surveys, model-building, and creative drawings to computerized methods using geographic information systems (GIS), the Internet and computer simulations of the urban environment. We then present a case study of a community planning process in Chicago where a combination of high-tech and low-tech visualization techniques was used to enhance public participation. We conclude with an examination of the benefits and costs of developing these visualization tools.

Review of Visualization Techniques for Public Participation

Visualization can play a key role in gaining meaningful public input in a planning process: it provides a focus for a community's discussion of design ideas, it guides community members through the design process, it raises their design awareness, and it facilitates better communication. Several types of visualization techniques have recently been developed to stimulate public participation in planning. These range from creative, hands-on activities to some newer methods that employ computer technology.

In his book, *Visual Research Methods in Design* (1991), Henry Sanoff presents several case studies where a variety of visualization techniques are used to expand community participation in planning and design. One technique, called the "Activity Location Method," was used in planning the revitalization of Gibson, North Carolina (1970-1980). The organizers produced a workshop package for each participant that included a base map of the town, a set of activity charts that defined a variety of public and private uses for the vacant buildings with corresponding graphic symbols for each use, and a set of building survey sheets that described the size and condition of each building. The participants were randomly divided into teams with one designer who acted as facilitator for each team. In the first stage, each participant developed a downtown plan by placing his or her individual activity choices on a score sheet corresponding to the base map. Next, the team reviewed each score sheet. Then each team arrived at a consensus plan through discussion. When each work team arrived at an acceptable plan, the entire group reviewed each team's proposals.

Another planner who writes about visualization for public participation planning is Anton Nelessen. In his book Visions for a New American Dream (1994) he describes two visualization techniques—the Visual Preference Survey (VPS) and Hands-On Model Building—that he uses to promote democratic design and planning. These methods ensure that community preferences will be considered and help planners to create the types of places in which people really want to live. The VPS is a research and visioning technique that attempts to articulate community residents' impressions of their present community image and to build consensus for its future.

Community residents are asked to numerically rate images of their town and other places on a scale from +10 to -10. Once the VPS results are generated, the calculated image value is recorded on each image. The resulting product of the process is called the vision plan. Nelessen's second method, to be used in conjunction with the VPS, is the Hands-On Model Building activity. Participants begin by completing an exercise in which they place one model residence and one model garage on a parcel of land. They move the two pieces around until they are comfortable with the layout, draw lines around the base of the models, and complete the site plan using simple graphic notations. Following this exercise, groups of 8-10 individuals team up to create a small village on a site with various ecological constraints and road layouts. After the design group has agreed on a design and has penciled in the layout, the site plans can be analyzed to tabulate the necessary bulk, yards, setbacks, and road standards.

Wendy McClure and her co-authors provide us with a third example of low-tech, hands-on visualization techniques. In their chapter "Visualization Techniques for Citizen Participation" (in McClure, Byrne, and Hurand 1997), they describe several graphic visualization strategies for engaging citizens in the process of community decision-making: Citizen Murals, Color the Map, and Photo Portfolios. Their team used these three strategies in design workshops in small towns and neighborhoods in the Pacific Northwest. Citizen Murals are large, multimedia pictures that collectively represent citizens' thoughts, ideas, feelings, and suggestions about the future of their community. Instead of the usual discussion format, people communicate information on large sheets of butcher paper using words, sketches, photos, cartoons, and symbols. The Color the Map technique involves the community in developing a set of alternative land use plans by having participants create their own maps. It uses simple tools to help citizens express the location and extent of land uses in their community. The Photo Portfolio technique is adapted from Nelessen's VPS but it is designed as a more focused group decision-making activity. Workshop sponsors compile a portfolio of images to address specific project-related issues. Through consensus building, participants select preferred images (or images that represent undesirable qualities) and organize them as a graphic, pasteboard display that reflects their collective priorities.

While the low-tech methods described above have proven effective in increasing citizen participation, there is a new frontier in the use of computers for realistic, powerful, and interactive visualization. The tremendous potential in this area is just beginning to be explored; for example, in the use of GIS, the Internet, and in urban simulation.

Emily Talen (1999) explains that grassroots and local organizations have started using GIS in a participatory setting. In Minneapolis, planners and geographers have sought to incorporate local knowledge in the building of GIS databases (Craig and Elwood 1998; Elwood and Leitner 1998). In Milwaukee, efforts have been made to maximize participation and the use of local knowledge (Myers, Martin, and Ghose 1995). Planners in Oregon have been working

on a public participation GIS that incorporates "traditionally intangible information," such as feelings about the uniqueness of a given area (Bosworth and Donovan 1998). In a neighborhood in Buffalo, New York, Krygier (1999) investigated ways in which residents can make sense of geographic information and created ways to learn about residents' perspectives. And in Boston, Michael Shiffer (1995) has augmented GIS with multimedia and hypermedia components for public participation.

In a recent paper, Richard Kingston (1998) outlined current research that examined the potential of the Internet as a means of increasing pubic participation in environmental decision-making. He considered traditional methods of public participation and argued that new Internet-based technologies have the potential to widen participation in the planning system. Recently, many geographic information systems have appeared on the Web (Carver, in press). These systems vary in complexity and functionality, but they are giving the general public, or at least those with a connection to the Web, access to a variety of both GIS and GIS data. Web-based GIS is a rapidly evolving technology with potential to promote greater public involvement. The combination of Web-based GIS and the proliferation of public access to the Internet open a potentially important avenue for interactive planning with the public. Planners and designers could communicate with large numbers of people to learn their preferences and to display their responses in a visually appealing format. This could be a highly useful tool for planners and designers in guiding city design and development in the future.

Urban simulators have just begun to be used in planning for public participation. These three-dimensional digital models provide a rich representation environment, where the relationships between information are shown simultaneously and dynamically. They enable viewers to perceive and interactively query and engage the place on their own terms. There is a latent egalitarian potential in these digital technologies since they allow community members to understand and relate to city design on their own, without interpretation by "experts."

This brief review has demonstrated the wide variety of visualization techniques that are currently available or in development. Which methods are chosen for a particular planning process will depend on the type of audience, the size of the geographic area being analyzed, and the resources of the leadership team. In the case study described below, we will show how a combination of high-tech and low-tech visualization techniques were successfully employed in a community planning process in Chicago's Pilsen neighborhood.

Case Study

The following highlights key findings of a case that combines traditional and computerized visualization techniques. The University of Illinois at Chicago (UIC) is an urban campus whose mission includes building bonds of partnership and trust with neighboring communities. Invited to be part of a participatory community planning process in Pilsen, a community adjoining its campus, UIC planners and designers strategized to find visualization methods that would enhance public participation. Ultimately,

they decided to use a combination of high- and low-tech methods: a GIS and an artist. The GIS was selected because of its powerful spatial analysis and its interactive ability to illustrate the neighborhood's context—its geography, its cultural and architectural history, as well as its present condition. The system could also provide design prototypes to stimulate discussion and help participants create a vision for redevelopment. This technology was supplemented with a human artist whose drawing capabilities could quickly transform verbally expressed ideas into realistic drawings.

Like many other low-income neighborhoods, Pilsen is faced with a host of urban challenges, including heavy traffic, dilapidated and vacant buildings, and crime. Community residents were eager to harness their creative energies to foster the enthusiasm required for serious actions toward improving the neighborhood. The meaningful involvement of a broad range of residents would strengthen the overall sense of community, and a cooperative effort would help present a "unified front" when funding opportunities arose. A planning team was formed that included twenty-five community members, two architects, two planners, and a graphic artist.

The Pilsen planning process needed a system for illustrating a broad array of past and current community characteristics—its strengths, weaknesses, opportunities, and threats—while fostering discussion about how the neighborhood might look five, ten, or twenty years into the future. First, the supporting database needed to illustrate the neighborhood context, including its history, geography, architecture, and cultural values. An interactive GIS image database was developed, consisting of maps, images, tabular data, and textual information about Pilsen and the surrounding area. Thematic layers were created for land use, zoning, base and plat maps, historical fire insurance maps, and current aerial photographs. Historical photographs showing neighborhood features in various periods were collected; these were linked to corresponding historical maps. The images were coordinated with a key plan showing the position and alignment of each image, then overlaid on the historic maps. This arrangement was meant to serve as an orientation tool in the design process.

While this technology provided a strong contextual base of information, it did not have the capacity to transform ideas into conceptual designs. For this purpose, a highly trained artist was needed to quickly draw freehand sketches to capture community residents' emerging ideas. The UIC artist was trained to draw urban scenes—including streets, parks, plazas, and retail areas, as well as landscape and detail elements such as shrubs, street signs, benches, and chairs. She also depicted human activities in her sketches to bring a human scale to the drawings. With a few lines, this artist captured the salient features of an image. She used an electronic sketchboard—an easily erasable drawing board—from which sketches can be saved as electronic files in a graphic format.

Benefits and Costs

The combination of the GIS and the artist had three primary benefits. First, the use of this technique pro-

moted strong community involvement in the planning process, which was a principal objective of the community and UIC. The GIS image database and the artist working in tandem helped community residents articulate their ideas in relation to neighborhood context. Together, they reinforced each other in creating a common visual language. While people not trained in the design professions sometimes have a difficult time communicating ideas about architecture and urban design, most people have definite design preferences. To draw out these viewpoints, the GIS image database contained examples of numerous developments near the neighborhood and throughout the city. Images that represented design examples and prototypes were used as anchor points for discussing development alternatives. As participants suggested solutions, the planner would display images on the large screen that most closely matched the participants' ideas. Design examples were used to probe and support the audience's ideas.

Second, the GIS helped highlight the importance of cultural values and history in planning the future design of the neighborhood. One of the major concerns of the Pilsen neighborhood is to preserve their cultural heritage as represented in the physical form. The GIS images reminded the artist, the planners, and the community residents of the cultural artifacts and environmental elements in Pilsen. These images supported discussion of cultural issues in the neighborhood. Images helped the artist to incorporate some of the cultural and symbolic features and artifacts into the new designs. Also, the GIS showed the geographic distribution of these features so that it became clear to everyone which were areas of greater and lesser cultural and historic significance.

Third, and most importantly, the workshops and visualization tools helped to build a relationship of trust between UIC and the community. The GIS and the artist helped empower residents to plan and design for the future of their own community. The designs that were created reflected the community's wishes and input, and respected their cultural heritage. At the end of the process, the community felt that the purpose of the university was not to destroy their lifestyle but to revitalize their community. This helped to overcome some of the distrust problems experienced in the past.

Finally, a cost of this method must be discussed. Building the GIS database was a tremendous undertaking, requiring many months to complete. University planners and designers exceeded the budget for this project due to the labor-intensive activities required to gather and assemble the images, maps and historical data. However, the benefits of this system for UIC and the neighborhood far outweighed the expense. The visual context provided by the GIS image database was critical to the success of the project. Everyone on the planning team had access to the same contextual information and could formulate their ideas and designs accordingly. The expense of this project is further justified because the City Design Center, the Great Cities Institute, and the Urban Data Visualization Program at UIC have longer-term projects involving various types of visu-

alization of the metropolitan Chicago urban environment.

Conclusion

The findings of this research reinforce views about the importance of visualization in participatory design. Visualization is essential for drawing out maximum public participation because it is the only common language that all participants can relate to. The most important finding in our case study is how successfully the high- and low-tech components of the method intertwined and complemented each other. The sketching provided a way for residents' input to be immediately visualized and the GIS provided a powerful method of displaying the contextual information quickly in easily understood maps and images. This combination resulted in an optimal visualization environment.

In describing the workshop experience, this paper aims to reinforce the work of others in the field of visualization for public participation. By sharing our experience, we hope to further the search for better methods of cooperative community design, whether those methods are more or less technical. Clearly, the development of methods and skills in community design is still at the exploratory and discovery stage. While we see great value in the creative and hands-on methods being implemented, we look forward to further research into the development of advanced computer applications for community planning. This paper describes a step forward in the development of such methods and progress toward the art of designing for people.

Endnotes

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