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Developing The Next Generation Of Technological Aids To Effective Public Involvement In Public Transportation Planning & Design

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ABSTRACT

Problem

Public involvement in the design of complex public infrastructure solutions, such as a new light rail line, including stops, stations and transit centers, and associated Transit-Oriented Developments (TOD), often relies on lengthy public meetings during which the complexities and subtleties of design preferences, their articulation and communication is overwhelming to both participants and design professionals. Such gatherings can produce more confusion than clarity for the public and design professional alike, especially when strong personalities highlight differences and discourage compromise and consensus. More effective methods of discerning, developing and evaluating the nature of the public's different preferences and perspectives, without fostering destructive confrontations, are desirable.

Methodology

The Transit Authority of River City's (TARC) Transportation Tomorrow (T2) Light Rail Project is collaborating on the community-based design of a transit oriented district planned for the South Central Corridor, Louisville, KY., with the Policy and Systems Analysis Team of the University of Kentucky's (UK) Transportation Research Center, and UK's College of Architecture, and the Urban Design Studio in Louisville in combining virtual reality and other visualization techniques with cutting-edge decision modeling tools. Neighborhood residents provide their input to professionals through the use of anonymous electronic scoring keypads, after having helped the professionals develop the design issues about which they are queried. The public's input is modeled mathematically to help architects, planners and other design professionals understand the precise nature of their design preferences, which then becomes one aspect of the design problem. While these user-friendly electronic gadgets are novel in themselves, it is their judicious use that enables more effective input, especially from less vocal participants. They can

transform potential confrontation scenarios into collective learning experiences for the public. Members of the local community are able to quickly and easily express their views and preferences, while learning about the significant aspects of the design problem. In turn, their preferences are clearly documented and modeled so as to be useful to the design professionals charged with producing the ultimate design solution.

Conclusion

Used properly, this Next Generation of Technological Aids:

- Empowers the public participant, by providing a coherent method of both educating and soliciting input
- Gives the design professional measurable, qualitative information she/he can interpret and utilize in the design process
- Moves the design discussion from a personality conflict to a problem solution context
- Gives the public confidence that they can effectively contribute to the process
- Enhances public willingness to participate in future processes
- Makes community meetings more time-efficient

INTRODUCTION

Over time, particularly since the latter 1980s, and encouraged by the policy and regulatory changes introduced under ISTEA and its successor, levels of public involvement in transportation planning and decision making have increased. Across the country where major transit investments and associated transit-oriented development has been promoted, citizen involvement and community input has been sought over a wide range of issues. The range includes, for example, the input of local artists in adding motifs and designs to infrastructure in the case St. Louis' Light Rail system (Arts in Transit 2003) (1). Similarly, in

planned or future transit developments, such as those being proposed in Seattle, public involvement is being sought on many aspects of route planning, station location and other considerations (Seattle Monorail Project 2003) (2), as well as the design and visual characteristics of the stations.

Designing and implementing effective public involvement tools and programs continues to be a challenge, both for practitioners and for the public alike. Because of increasing public involvement, decisions that formerly were held to be the preserve and domain of professional engineers, architects and planners have been opened up to public input. Yet despite the best efforts of practitioners, the public continues to express frustration regarding the perceived effectiveness of their input, especially in relation to highly technical engineering and design decisions. Thus, although there has been an unparalleled growth and interest in new and alternative approaches to public involvement, including the identification of best practices, progress frequently seems minimal in the face of both rising public expectations on one hand, and persistent public apathy on the other. The search for more effective methods of discerning, developing and evaluating the nature of the public's preferences is the key to breaking this seemingly endless circle.

In Louisville, Ky., the Transit Authority of River City (TARC) is actively engaged in the development of the first light rail line for the region. The public involvement program being deployed in relation to the Transportation Tomorrow (T2) Light Rail Project is being accomplished through an intensive program, including grass-roots consultation, which has been commended as regional model. Always on the look out for opportunities to expand the quality and effectiveness of the T2 program, TARC collaborated in 2002 on a project within the Smoketown and Shelby Park Neighborhoods, when the opportunity arose to test a new methodology for integrating community preferences in the design of a transit center.

BACKGROUND

Transportation Tomorrow – The T2 Light Rail Project

The Transit Authority of River City (TARC) is in the Preliminary Engineering/Draft Environmental Impact (PE/DEIS) phase of developing a light-rail transit system in the South Central Corridor, Louisville, Kentucky. The Transportation Tomorrow Project, popularly known as “T2”, is part of a long-range plan to address transportation needs in the new regional city of Louisville for the next 25 years

and beyond. The T2 Light Rail proposal for the South Central corridor is anticipated to open in April 2007, and will not only improve mobility in the River City, but will make getting around more fun. T2 will cover some 17.5 miles, in a corridor running north south along the I-65, from downtown near the Ohio River, due south to the Gene Snyder Freeway. With a total of 28 stations and stops, light rail will connect Louisville's major entertainment hot spots. Half of the region's top 20 attractions are on the T2 route.

The light rail line is projected to serve some 18,000 daily riders. A significant part of the T2 initiative is the associated expansion of bus services. Bus routes will be redesigned as feeders to and from the Light Rail, and to improve cross-county connections. The anticipated regional strategic benefits of this major investment go beyond narrow concepts of traditional transportation improvements, and will mean not only less congestion on the I-65, but improved air quality with reduced auto emissions, more travel alternatives and choices, and significant economic development and redevelopment opportunities (See Figure 1).

Planning With the Community

A central goal of Transportation Tomorrow Light Rail Project has been to respond to the needs and desires of the community it will serve. From its inception, TARC's guiding principle has been to “democratize” the T2 Planning Process. That is, to proactively engage as many involved parties as possible, as far ahead as possible, to listen to their concerns as expressed through a variety of media, and to ensure that as many of them as possible feel that they have a genuine stake in both the process and the product.

Since 1996, hundreds of meetings have been held with neighborhood groups, government agencies, and community leaders to gather input on where T2 should be headed and how to get there. Collaboration and coordination are essential to ensure that the project generates the most benefit for the greatest number of people. Planning with the community means sharing information and involving all concerns of the community in decision-making. From 1997 to present, the TARC T2 Team has held a total of nearly 600 meetings; some 300 community meetings, almost 140 meetings with public agencies, and more than 160 interviews with key leaders and stake holders. No issue or group is considered too small for focused individualized attention. Indeed, typically, the community has come to embrace the premise that “Where two or more people are gathered, T2 will come to talk – and to listen”. This open and proactive approach to community involvement has earned the T2 process notable merit, as a model for the Greater Louisville Region. A Federal Highway

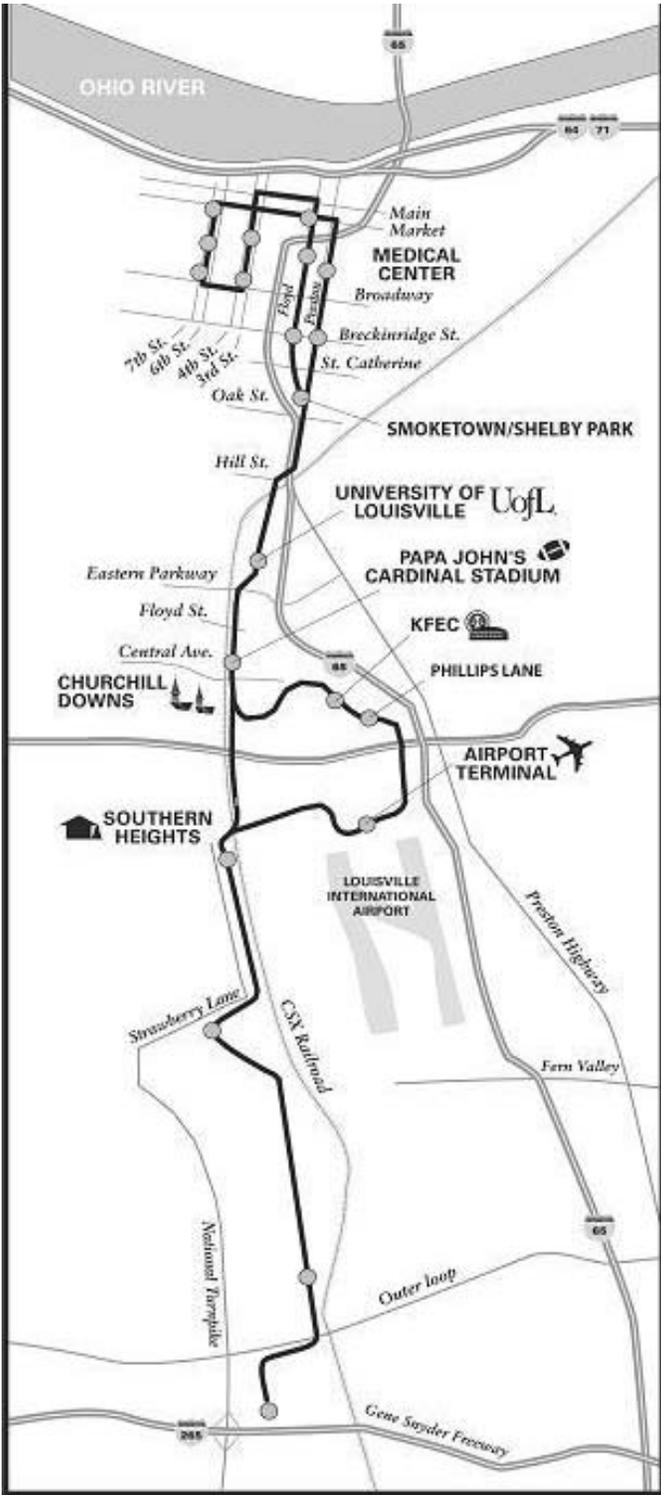


Figure 1. The T2 Light Rail Alignment, Louisville, Kentucky.

Administration and Federal Transit Administration document noted that TARC “did a masterful job of getting and keeping the public involved in their Transportation Tomorrow initiative,” and recommended that another federal agency imitate the TARC model.

The Smoketown-Shelby Park Neighborhoods

Smoketown and Shelby Park are twin historic inner-city medium-density neighborhoods. The area has lost more than 60 % of its residential housing population since 1950. By 1980, most of the neighborhoods’ industrial and retail employers along Preston Street had abandoned the area, leaving behind vacant lots and disinvestment. In recent years, the neighborhood has been struggling to attract new residents, jobs and commercial and retail establishments, while maintaining and revitalizing its economic and social health.

When long-time community advocate Ella Roberts first heard in 1996 that rapid transit was being considered in Louisville, she attended the first citizens’ work group meeting at TARC to learn more, and has been actively engaged in the process ever since.

“I saw light rail as an economic development opportunity, a way to revitalize our neighborhood, to provide the transportation we needed to get from home to work... Smoketown and Shelby Park used to be a thriving area, filled with businesses, shops, grocery stores lined Preston and Shelby Streets. Rapid Transit can help us return to that time, to bring those businesses back to the heart of the neighborhood.”

It was Ms. Roberts, Chair of the Smoketown-Shelby Park Neighborhood Coalition, who first suggested that TARC explore Preston and Floyd Street alignments, that would take the light rail project through her neighborhood. Her insight has resulted in a win-win project planning and development process, based on an informal agreement between TARC and the Smoketown-Shelby Park Neighborhood. As a result of the T2 Team’s extensive outreach in the Smoketown and Shelby Park neighborhoods over a span of several years, residents have been fully engaged in the T2 planning and design process. With growing and significant enthusiasms within the neighborhood for change, and in recognition of the potential that could come with light rail, the neighborhood has undertaken a major update to its Neighborhood Plan, which was completed in Summer 2002. This has been followed up with the pursuit and approval of area-wide rezoning to support its new neighborhood plan vision in December 2002.

With ongoing strong participation and support from the neighborhood, the T2 Project is proposing a “transit center” within the Smoketown-Shelby Park neighborhood, that has the potential to act as a physical and economic focal point. A suitable site for the station area was identified, to be developed over an entire block between St. Catherine and Oak Streets that would include the light rail station, bus access and parking. The neighborhood was chosen as an ideal site for the location of one of a handful of transit centers, where it would function as a hub for bus connections that would attract heavy ridership, and that could potentially generate demand for market rate and affordable housing and new business in the area. T2’s proposals are, therefore, consistent with and supportive of the neighborhood’s vision for revitalization.

While concept plans and engineering drawings sufficient to support for the current PE/DEIS phase of the T2 Project have been completed, there is a strong and growing interest amongst neighborhood residents to be actively engaged in the detailed planning and design of this major investment within their own backyard. From their perspective, the new transit center should not only support the neighborhoods economic development strategy, but should also be reflective of its cultural heritage and aspirations. This was seen as especially important since Smoketown-Shelby Park is an Historic District, noted as the only surviving neighborhood in Louisville that can trace its African American roots back to the end of the Civil War. The pursuit of social and economic revitalization was not to be gained at the expense of cultural heritage. Indeed, growing resident savvy, contributed to their recognition of the vital importance of design and development quality in influencing the ultimate success of a project, and the achievement of the neighborhood’s long-term goals and visions. Indeed, building on the neighborhoods historic and cultural assets are increasingly being recognized for its potential in reestablishing the neighborhoods niche, and in its provision of a strong foundation for ‘branding’ the community with a new image appropriate for its revitalization and renaissance.

TESTING AN INNOVATIVE METHODOLOGY:

In collaboration with the University of Kentucky Transportation Center’s Policy and Systems Analysis team (UK-PSA team), TARC’s T2 Team seized the opportunity that arose in 2002 to test an innovative methodology for enhancing public participation. The UK-PAS team had developed a new and improved, structured public

involvement protocol to solicit and distil information on community preference (Bailey et al. Forthcoming) (3). The Smoketown and Shelby Park neighborhoods easily emerged as the ideal context within which to test its applicability in relation to the design of the light rail transit center, and associated transit-oriented development (TOD) envisioned for the Neighborhood.

Approach

Following the principles of structured public involvement, the collaborative team first considered the scope of the design domain: that is, the domain in which the public's input would be focused. It was agreed that the primary focus at this stage was the appearance of the neighborhood transit development: in this case, the transit station and the two-block area immediately surrounding it. "Appearance" is comprised of two separate, but necessary considerations: the massing, or gross morphological characteristics of the development, best revealed when viewed from a little distance; and overlay, or detail design variables, such as the street furniture, architectural motifs and structural quotations. Massing is fixed: once the buildings are constructed, their general size and relationship to one another cannot easily be changed. Overlay variables, on the other hand, can be added at a later stage.

Appearance cannot be wholly divorced from functionality, however. Therefore, it was considered necessary to seek residents' views on what functionality was desired.

The Casewise Visual Evaluation (CAVE) methodology

To investigate public preference for massing characteristics, several approaches are possible. The first is the most straightforward and frequently used. It consists in principle of a visual assessment, in which an image, perhaps a photograph or an artists' rendering of a development, is shown and feedback is solicited. This feedback can take the form of comments or a preference scoring. In the widely used Visual Preference Survey (VPS®), devised by Nelessen (1994) (4), a photographic image is displayed and public preference feedback is gauged on a 1 to 10 point scale, using an optical bubble-scoring card.

Unfortunately, this method is also one of the least democratic. Because the public has no hand in determining the content of the images shown, in is immediately clear to participants that they are responding to professional input rather than the reverse. All of the major decisions, for example

about the form and height of the buildings, their density and character, and even the minor ones such as the type of foliage and facilities, have been made behind the scenes by architects, planners, engineers, and/or other technical experts. This frequently leads to participants expressing frustration with the visuals shown, when often their resistance is really directed at what they understand as a centralized and autocratic decision making process that renders them powerless in effective participation and leadership in deciding their community's future. It is not surprising under these circumstances that communities often regard professionals and their associated public involvement processes with suspicion. In cases where visualization is used in planning, these practices are often good examples of a process that falls somewhere on the lower rungs of Arnstein's famous "Ladder of Citizen Participation" (Arnstein 1969) (5).

This has led to such processes being called "DAD: Decide, Announce, Defend" by public involvement professionals (Campbell-Jackson 2002) (6).

While the TARC T2 Public involvement record had already developed a reputation for proactive collaboration that erred on the side of inclusion, there was excitement at the prospect of utilizing cutting edge innovative approaches that could further the democratization of the design process, a way to make professionals more responsive to public needs and wants while preserving the quality of professional input in the expert architectural and design domain. Achieving this can be more difficult than it sounds at first blush. For example, if professionals seek input on the design characteristics of a building, it does not help to break the building down into verbal categories and ask people what they think about each. Presenting buildings out of context is not helpful either: rather than asking people how much they like an individual building, this question should be asked in context, when the structure is surrounded by others in an existing neighborhood. Some form of visual preference assessment is required.

The Policy and Systems Analysis (UK-PSA) team has developed a methodology called Casewise Visual Evaluation, or CAVE (Bailey et al, 2001) (7). Like the VPS, CAVE relies on showing people a set of images and soliciting preference feedback on a one to ten point scale, where one point represents "unacceptable" and ten represents "most desirable." In this sense it is as intuitive as the VPS®.

CAVE possesses two major differences when compared with traditional visual assessment methods:

1. Because it is based on mathematical modeling logic, it can handle complex interrelationships between

elements. This technique takes into account of fact that design preferences are interdependent: if people prefer tall buildings, and they prefer courtyard style, this does not guarantee that they will prefer a tall, courtyard style building more than other possibilities.

2. It can “fill in” gaps in the knowledge base. Even when a complete set of visualizations is not shown, CAVE can generate accurate and reliable public preference information for specific design combinations.

Further, when used in combination with an electronic polling system the CAVE process can democratize meetings. During previous public meetings, the UK-PSA research team observed that the use of the electronic voting system has the effect of leveling the playing field. Seasoned public involvement professionals are only too well aware of the problems inherent in asking for feedback at public meetings. While necessary and useful, this process can be subject to “hijacking” by the most vocal elements. It can become a “karaoke night” where frustrated citizens take turns to lambaste the professionals, the process, other stakeholder groups and/or the proposal when the professionals seek public involvement with honest intent. Respecting the need to hear the concerns of every group must be balanced by the negative impacts of excessively loud or monopolistic voices. When a very vocal minority persistently beats out the ‘voice’ of the silent majority, citizens can become disillusioned with involvement processes when they seem to provide platforms for marginal or under-representative concerns. As a result, these citizens may choose not to express their opinions in a public forum, or even not to participate in the public process at all.

It is imperative to address these difficulties effectively if a genuinely democratic community engagement process is to be promoted. Keeping meetings relatively small, short and conveniently located within the neighborhoods concerned, helps move towards these goals. This form of public involvement has a number of advantages when compared with more traditional methods. It means that a small number of meetings can be used to gather adequate preference information. It also means that each meeting can be relatively short, but succinct, efficient and effective. This allows more meetings to be held on a limited budget, while the quality of the information and feedback is higher.

Further, the public involvement process should be structured in such a way that public input effectively guides designers and planners. Rather than restricting public input to visual elements or images to be added to the design, the

target of this process was to give community representatives more input into determining the size, shape and style of the buildings in the proposed transit-oriented development.

The Case Study Community Involvement Process

A series of focus group meetings were held in the Smoketown–Shelby Park neighborhood. The meetings were each designed to take no more than two hours and were held in local neighborhood facilities including a middle school and a church. Each focus group was small, consisting of between 10 and 20 people. These distributed logistics were intended to allow for maximum participation. Since a sizable proportion of neighborhood residents are low-income and/or shift workers, it was considered that the most effective way to respect resident constraints was to bring the voting process to them rather than require them to attend centralized meetings at downtown premises.

In the first phase, an initial meeting was held at which the project was explained and a number of questions were asked related to the desired goals of the transit center and associated development within the neighborhood. Questions asked included:

- What does the community want from the transit development in their neighborhood?
- How important are these factors on a numerical scale?

The neighborhoods response to these questions are shown in Figure 2.

In the second phase the CAVE method was used. Utilizing the expertise of Architectural professionals and students that participated in this collaborative interdisciplinary project, a series of 15 images of existing transit developments were selected. These images were chosen to be representative of a cross-section of existing transit developments from several urban contexts. Each image was coded for six critical design characteristics that define massing. Namely:

- Height
- Density
- Typology
- Open Space Characteristic
- Private Space Characteristic
- Parking Space Characteristic

Each image was evaluated and assessed for its composition in terms of these six input elements. A matrix was created that described the properties of each image.

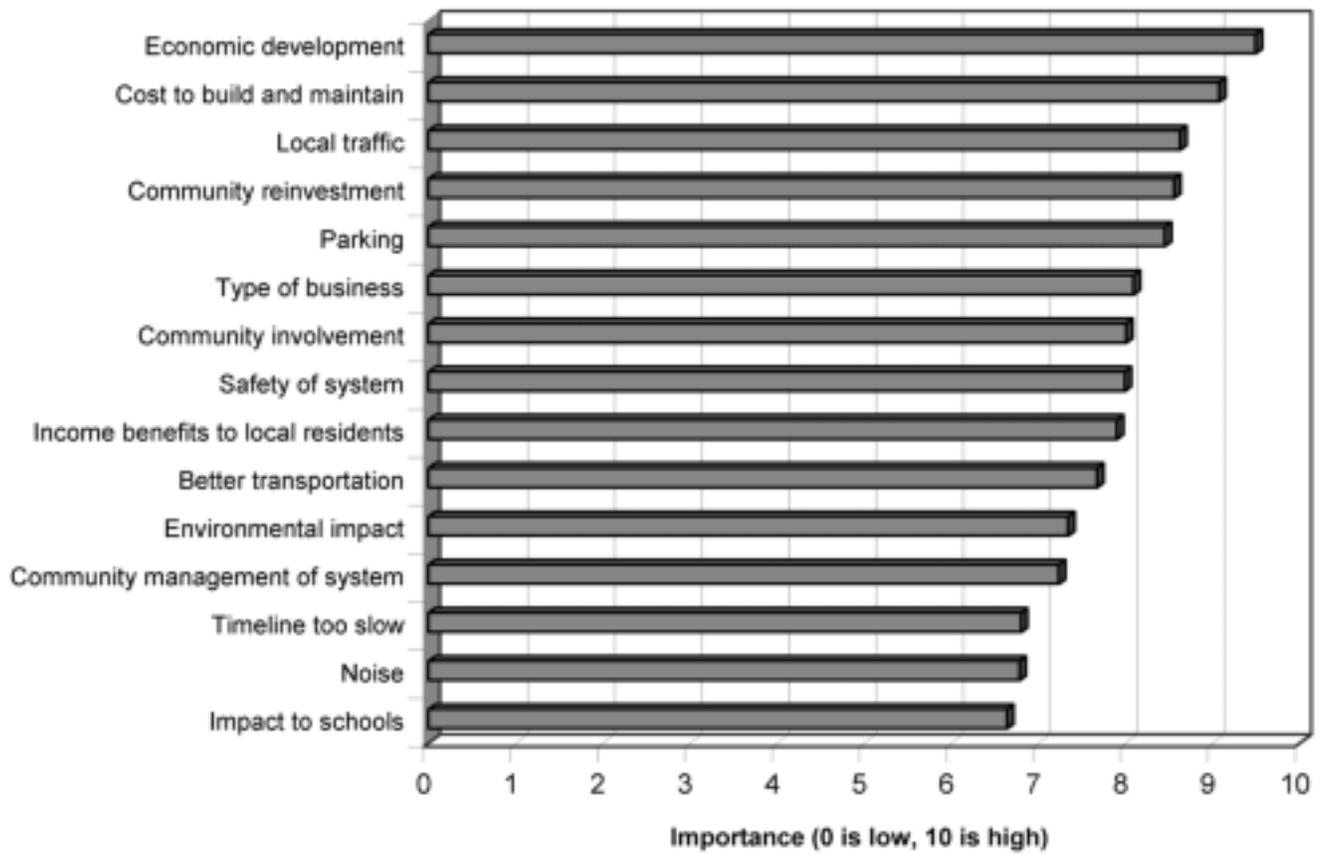


Figure 2. Important Issues for Transit Development in Smoketown/Shelby Park.

At the following focus group meetings, community preference was solicited for each image using the electronic polling system. Two votes were held. The first was an immediate, rapid reaction vote. The system showed the results in real time, allowing participants to evaluate their own reactions to the image. Then, a facilitated discussion was held. Participants were asked what they saw in the image, what they did not like, and what they liked. Additional comments were solicited, allowing the research team to identify elements and design properties not considered in the scoping process, but which were perceived to be significant by the community. One example of this was the building material of brick: because the neighborhood consisted of a large number of older, brick structures, the focus groups felt that any new structures should be built of the same material. Other structures, even if they were considered aesthetically appealing, were not regarded as suitable candidates if they were made of materials other than brick.

This information was used as input into the CAVE mathematical model knowledge base software. By entering the 15 known data points and running the software, the gaps in the knowledge base were filled in. The community preference knowledge base could then be queried for any possible combination of the six input elements – even ones that were not shown in the sample images – and public preference for that combination could be predicted with satisfactory accuracy.

Final Visualization

The community preference knowledge base was interrogated by the architectural design team to determine which combination of elements was most preferred. In summary, there were several “high spots” on the preference surface corresponding to preferred designs. The important combinations of elements were identified and tabulated, together with the overlay variables, such as the brick construction material, so that they could be used to generate virtual reality visualizations.

Creation of computerized Virtual Reality (VR) visualizations is extremely resource-intensive. Accordingly, a sample of three final VR visualizations were created. Two of the VR Models were created to maximize public preference. A third was created as a high-density option that scored acceptably, but not outstandingly. This third scenario was visualized in order to retain a wide coverage of possible designs, given that the final decision would be made in conjunction with developers and other parties. Figure 3 shows one of the preferred scenarios, featuring a

combination of medium low density, medium height, assembly typology, sidewalk-type open space, on-street parking and courtyard-type private space.

Public Reaction to the Process

Feedback was solicited through an expert panel including a number of citizens’ representatives. The design process was evaluated favorably. In particular, the citizens’ comments included the note that they “had not seen this level of public involvement before”.

During the public meetings, similarly encouraging comments were offered: in one case, a neighborhood resident noted that, “There is power in these little gadgets”. Another noted, “This isn’t like the old public involvement. We’re being given real input. Why aren’t my neighbors here?”

Notwithstanding the relative success of the T2 public involvement process as a whole, and this demonstration project in particular, these comments point to some interesting additional issues that need to be explored. While this demonstration of the CAVE structured public involvement process convincingly reassured existing participants that their voices were being effectively heard, and that professionals, architects, engineers and planners were responding to their concerns, it did not immediately address the broader problem of directly encouraging a wider array of participants. The project was, of course, not expressly designed to address this greater concern, especially in the short term.

Enhancing public involvement processes, and developing its legitimacy is a marathon rather than a sprint. In the longer-term, public confidence is developed in large part by experience, obtained through direct exposure and frequent use, and by consistently demonstrating that people’s voices can and will count. While it could not be expected that a relatively small demonstration project, including a limited number of well-received meetings, can on its own immediately overcome general and pervasive skepticism about public involvement processes in general, the CAVE process certainly holds out a lot of promise.

CONCLUSIONS

While the CAVE methodology, and the utilization of user-friendly electronic keypads are novel in themselves, it is their judicious use within the CAVE process that enables more effective public input. It is especially effective in soliciting input from less vocal participants. The process and the technology can transform potential confrontation



Figure 3. Preferred Scenario – An example.

scenarios into collective learning experiences for the public. Members of the local community are able to quickly and easily express their views and preferences, while learning about the significant aspects of the design problem. In turn, their preferences are clearly documented and modeled so as to be useful to the design professionals charged with developing the ultimate design solution.

The Smoketown-Shelby Park Demonstration Project suggests the, used properly, The CAVE Methodology and Process is an exciting evolution in public involvement capabilities. This emerging next generation of technological aids promises at least six advantages:

- Empowers the public participant by providing a coherent method of both educating and soliciting input
- Gives the design professional measurable, qualitative information she/he can interpret and utilize in the design process
- Moves the design discussion from a personality conflict to a problem solution context
- Gives the public confidence that they can effectively contribute to the process
- Enhances public willingness to participate in future processes
- Makes community meetings more time-efficient

The TARC T2 Team is reviewing the process and products of this dynamic case study demonstration, with a view to expanding and developing its use both within the neighborhood and at other locations along the alignment. The input generated by residents from Smoketown and Shelby Park, in the form of the preferred virtual reality visualizations, serve as tangible products that generate increased public confidence. The project very effectively demonstrates that public input can be effectively captured, is meaningful and is being taken seriously by TARC and T2.

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Louisville Urban Design Studio who participated in the during the spring 2002 semester.

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