

Immersive planning: a conceptual model for designing public participation with new technologies

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Received 27 January 2010; in revised form 21 September 2010

Abstract. Public participation is an important part of the urban planning process. However, too often the goals of this participation are not clearly articulated and, as a result, the platforms for participation created with digital technologies are often poorly designed or simply lack clarity. Immersive planning is a conceptual model with which to conceive the process of public participation that focuses on the depth and breadth of user experience. Borrowing from literature on games and virtual environments, we frame recent, technologically aided approaches to public participation within three categories of immersion: challenge-based, sensory, and imaginative. Geographic information systems, computer aided design, planning support systems, virtual environments, and digital games are all methods of obtaining user immersion in one or a combination of these categories. In this paper we provide a review of the foundational literature and influential projects in this area, and by framing them within the model of immersive planning seek to connect these efforts to provide a clearer path forward in employing new technologies for public participation.

Introduction

Urban planning is the science of planning cities. From the layout of streets to the height of buildings to the planning of sewer and communication systems, the modern city is complex and is in need of macroconsideration from professionals trained in the patterns and flows of good urbanism. Of course, like any science, planning is subject to the whims of the prevailing paradigm. While Haussmann's Paris is near universally celebrated as a model for the modern metropolis, the urban renewal tactics for mid-20th-century American cities are widely critiqued for their technocratic approach to complex urban problems (Jacobs, 2002; Whyte, 1980). The urban critic and activist Jacobs famously critiqued the policies and practices of urban renewal in her seminal book *The Death and Life of Great American Cities* (2002). With the assertion that sidewalks are instrumental to urban function because they are filled with people, not just traffic flows, Jacobs was instrumental in the reconsideration of the science of planning. The simple and yet complex notion that cities are composed of people, all with their individual desires and needs and all potentially invested in the physical growth patterns of where they live, provided a rather strong case for the *art* of planning. That the lay public should be able to participate in planning decisions was an idea that garnered significant influence.

Until the 1950s, government decision making about urban land use lacked meaningful public input. This began to change because of the work of leaders of the civil rights and environmental movements who argued for greater direct public participation—giving people more say over how their representative government acts (Hall, 2000;

Krueckeberg, 1983). The 1954 Urban Renewal Program was the first US federal program to mandate public participation and scores of others have followed since. Of course, this also set the stage for Jacobs's critique in the 1960s. Within the field of planning, Sherry Arnstein's paper "A ladder of citizen participation" (1969) was the definitive statement on the matter. In her article, Arnstein showed how even with the introduction of new federal and state laws requiring public participation in government decision making, most of that participation was low on a theoretical ladder of meaningful participation. She called for greater and greater levels of government power sharing with the people on higher and higher rungs of her ladder, from 'nonparticipation' to 'tokenism' to 'citizen control' at the top.

The response to Arnstein's work was profound, as evidenced by the fact that forty years later it is an idea embraced in urban planning textbooks (LeGates and Stout, 2003; Stein, 2004) and is a required concept to be understood on the national American Institute of Certified Planners examination. But there is a wide range in the understanding and implementation of Arnstein's work. Some, known as equity planners, embrace the highest ideals of Arnstein's ladder, seeking the closest possible thing to citizen control (eg Clavel, 1984; Forester, 1989; Krumholz and Clavel, 1994), while others merely go through the motions to satisfy requirements. Though most agree that planning agencies should be required to inform citizens of agency actions, receive input, and invite consultation (Brody et al, 2003; Burke, 1979; Godschalk and Mills, 1966), the actual practice of doing these things varies widely.

Simply inviting the public to participate is insufficient for fostering legitimate and sustainable public engagement. Most planners are aware of the corresponding contradictions. An uninformed public can make bad decisions about urban growth patterns, just as a public agency can make bad decisions about the quality of life for people in neighborhoods. A community group can feel too emboldened and derail the public process, just as community groups not consulted can become embittered and disengaged with their neighborhoods. In other words, community control, which Arnstein places at the top of her ladder, is not a simple solution for better democracy. There is space for experts, just as there is space for the public—these are not necessarily opposite ends of a spectrum. Public participation is a complex process that in most cases requires careful design (Gordon and Manosevitch, 2010). However, in practice it is most often treated as a compulsory task and typically slotted into an existing format which does not consider the complexities of the urban social situation.

The continued development of designs for public participation is given little attention in planning schools. That there should be public participation is clearly established; however, the form and content of that participation is not. Inviting people to gather in a room for a public hearing is the recognized format for engaging citizens, and has been since New England town hall meetings were implemented centuries ago. But like any medium designed to be engaging, the organizers of the public hearing have to consider their audience and the mechanisms through which that audience participates in cultural dialogue. The public hearing, and its staid approach to information dissemination and dialogue, has become the butt of its own joke. Boring, contentious, geriatric, and filled with the same participants again and again, it composes the image too often associated with the democratic process and the day-to-day dealings of urban planning. To argue that contemporary public participation processes are inadequate or unfair is not enough. Arnstein offered a ladder to evaluate the level and intensity of citizen participation, but there are other adjectives to describe participation. New research in media studies suggest another path.

In this paper we make the case that successful public participation considers the nature of the public participating; it is designed to engage, and in doing so borrows

from the media practices that have proven to be engaging in other realms. Social software, computer mapping, and videogames all provide lessons about interaction, participation, and engagement, together demonstrating that users find such experiences meaningful and relevant to their own lives. Referring to videogames, Ermi and Mäyrä (2005) characterize three types of immersion: sensory, challenge based, and imaginative. Each describes how individual players are engaged with a game space. They, along with other scholars, argue that this kind of *being there* immersion provides meaning and relevance to users in a way that nonimmersive experiences simply cannot (Dourish and Bell, 2007).

Under this new media paradigm where meaning and relevancy are paramount, it is possible to measure the success of participation processes not only by how much control or power the public wields (as Arnstein does), but also by how immersive the experiences are. In this paper we outline the key dimensions of this immersive characteristic, provide examples of the public participation processes that exhibit immersive qualities, and argue that immersiveness ought to be a yardstick for measuring success in the participation processes. As such, we argue that the more ways a process can be immersive, the more effective that process can be at engaging the public in discussing planning decisions and engaging in neighborhood life more generally.

We begin by discussing some established platforms for engaging the public, including the public hearing and the design charrette, and then we review several projects and approaches that exhibit the characteristics of immersion. We discuss methods of challenge-based immersion such as public participation geographic information systems (PPGIS), where communities are invited to map elements of their neighborhood's present and future. We then look at visualization strategies that seek sensory immersion, including realistic 3D flythroughs, and imaginative immersion such as role-play.

Platforms for participation: designing engagement

In contemporary planning practice a number of strategies are employed to fulfill mandatory or voluntary public participation. For the vast majority, success is measured in terms of the extent to which participants are given power to voice their opinions about government decision making.

The most common format used by planners to engage communities is the public hearing. While it has been shown to be effective in building community support and trust for new development projects (Brody et al, 2003), it is rarely effective in producing dialogue. It is commonly executed as a one-way communication stream from the experts to the public. The apparent neutrality presented by government officials in a banal hearing can be seen as equitable, but it provides a limited context for citizens to understand and participate in the process. Public hearings typically fail to meaningfully engage citizens in the affairs of a community and are often emblematic of Arnstein's 'tokenism'. Success of a public meeting process is often measured in terms of the numbers of citizens who voice their opinions and, sometimes, the quality of those opinions.

In some cases, planners have adopted the charrette or workshop to address criticisms of the public hearing. In these meetings, representatives of relevant government agencies, property owners or developers, and community groups come together with citizens under the facilitation of professional planners or architects (Lennertz and Lutzenhiser, 2006). The aims of charrettes vary widely; they may be used to gather public input on a new development project or to develop design guidelines for a new overlay district. In a typical charrette the facilitators educate the public about the context of a project and, in some cases, its intimate details. Then, members of the lay public are invited to draw or sketch their ideas about their neighborhood or about a new project on paper and professional architects, planners, and designers

assist in rearticulating those drawings in a clearer manner—essentially rendering in a professional quality the nonprofessional ideas of the public. The end result of many charrettes is the production of a report synthesizing the graphic and written ideas of the public; this report is sometimes, but not always, included in the official planning and development process resulting in changes to the built environment (Lennertz and Lutzenhiser, 2006).

The key benefit of the charrette is the social capital that can result from intimate, in-person dialogue and collaboration between lay participants and professional planners and architects. The charrette can be a pivotal tool in advancing the ideals of the communicative planning model, as advocated by Healey (1996) and others. Among the weaknesses of charrettes is that they can be very time consuming; some charrettes last an entire weekend, some last several weekends. That time commitment means that very few citizens can be actively involved, so in most cases the numbers are in the dozens for a typical neighborhood of thousands of residents. Another important weakness of the charrette is the power imbalance that occurs in a physical space when highly trained facilitators dictate the rules of engagement and control information, threatening to undermine its effectiveness as a means to advance communicative planning (Dryzek, 1990; Gordon and Koo, 2008; Gordon and Manosevitch, 2010; Young, 2000). Ordinary citizens often feel disempowered and their opinions and attitudes may not fit nicely into the professional discourse of a charrette.

Success in charrettes will be tied to their aims, but often success is also measured in terms of the number of participants and the quality of their input into a design process. In some cases charrette organizers will have the additional aim of informing the community and educating the public. Due to the need for tight control by expertly trained facilitators and designers, there is little room in charrettes for individual exploration or meaning making.

Some have tried to expand the influence of the public hearing or charrette by employing computers, either in the physical meeting or remotely. In some cases, computers are used to enable voting during a public hearing (Wyatt, 2002); in other cases, they are used to extend public input beyond the four walls of the meeting hall. This can take the form of Internet surveys of citizens' opinions prior to or during a planning process. Survey questions might ask citizens if they support a new library in town or whether they think there is a need for more restaurants in their neighborhood. This strategy for participation can be quite inexpensive and can yield large numbers of responses (if properly executed).

Within the practice of correspondence participation, success is defined by the numbers of participants who voted or answered survey questions. While beginning to approach the characteristic of immersion, correspondence participation is rarely immersive. Although, by participating, stakeholders are engaging in a public process, the asynchronous voting approach does not allow for a meaningful back-and-forth dialogue amongst citizens and between citizens, planners, developers, or other officials. There is an assumption that the participants simply understand the urban issues and their vote is an informed conclusion.

What is often missing from the traditional process is the acknowledgement that spatial and urban concepts are difficult to understand and that the lay public is typically not adept at making those decisions when prompted by a verbal description or even a set of images. Immersive planning is an approach to communicating with the public that takes as its central challenge engaging a group of people in very difficult concepts about complex systems.

While many planning processes continue to adhere to a set modality of participation—typically the public hearing with perhaps the addition of a charrette or

some computer-supported voting—the increased availability of inexpensive networked computers and social software has opened up possibilities of greater immersion in the process. There are several examples of the computer being employed not simply as a mechanism for expanding the reach of existing platforms, but as a means of reconsidering the methods and goals of public participation. From web mapping tools to virtual worlds and gaming, the interrelation between online tools and face-to-face public processes is fostering new approaches to immersing citizens in urban planning. These new immersive approaches have not only increased the efficiency of the public process, but in some cases made the public more central to the task of planning—where planning is not done *to* a community but transpires within it.

The immersive planning model

Immersion is premised on the feeling of presence. As Smith et al (1998) note, this happens when one shifts from a sense of ‘being here’ (eg, “I am in a community center”) to a sense of ‘being there’ (eg, “I am in my neighborhood”). In writing about what they call “escapist experiences”, including games, Pine and Gilmore (1999) make an interesting distinction between absorption and immersion. Experiences can *absorb* participants—capturing their interest and attention, such as being absorbed in an intriguing lecture; or, they can *immerse* them—bringing them into an experience, such as walking through a space while discussing it. To teach “actively engage[s] the mind” (Pine and Gilmore, 1999, page 32), but also disconnects participants from the subject matter; to immerse is when teaching is combined with the feeling of *being there*.

According to Ermi and Mäyrä (2005) there are three forms in which immersion can take place: challenge based, sensory, and imaginative. *Challenge-based immersion* is based on the nature of interaction. When players are given the opportunity to problem solve they become more deeply integrated into the game space. *Sensory immersion* is related to audiovisual experience. “This is something that even those with less experience with games ... can recognize: digital games have evolved into audiovisually impressive, three-dimensional, and stereophonic worlds that surround their players in a very comprehensive manner” (page 7). Sensory immersion is not necessary, but it is the easiest way to engage users who are not familiar with gameplay. Finally, *imaginative immersion* is when players identify deeply with the character or narrative. According to Ermi and Mäyrä, “This is the area in which the game offers the player a chance to use her imagination, empathize with characters, or just enjoy the fantasy of the game” (page 8). Each of these layers of immersion contributes to spatial immersion. They contribute to the participant having a sense of ‘being there’ that we contend is important for the public participation process.

While practices that reflect the values of immersive planning are gaining in influence, they have not reached the level of mainstream saturation. There are several reasons for this slow progress in adopting more immersive strategies. Carver (2001) suggests that professionals are slow to build upon traditional methods because they ultimately doubt the untrained public’s ability to comprehend the complexities of planning and design—regardless of the participatory method used. Why would planners want to immerse the public in the planning process if there is lack of trust in the public’s ability to be a productive participant? This is a valid concern—one that is addressed by some planners by changing the terms of engagement. When planning is done *to* a community there is a remedial approach to teaching about planning principles. When planning is done *within* the community planning principles are equated with a kind of planning literacy that is taught and practiced within a community of participants.

If we think about urban planning as a semiotic domain, which the literacy scholar Gee describes as “any set of practices that recruits one or more modalities [eg oral or

written language, images, equations, symbols, sounds, gestures, graphs, or artifacts] to communicate distinctive types of meanings” (2007, page 19), planning can be seen as a set of events that calls upon the public to interact with a distinctive set of literacies they may not possess. Planning platforms such as the public hearing seek to remedy this lack of literacy by lecturing the public about planning, which, at best, gives them the ability to understand, or ‘read’, within the domain. Other formats, such as the in-person charrette, go a step further by allowing participants to produce meaning, or ‘write’, through sketches. Though the latter seems to fulfill traditional notions of literacy (reading and writing), Gee (2007) says that in order for *critical* learning to take place one must not only be able to understand and produce meaning, but also to innovate within a domain—to come to conclusions that are “somehow novel or unpredictable” (page 25).

While digital technologies are not the only answer to this call for innovation they have been widely employed to engage the public in planning decisions, allowing some room for exploration and discovery. In the next section, we look at PPGIS and explore how these technologies and their corresponding practices have significantly opened up the possibilities for engaging the public.

Challenge-based immersion: public participation and mapping

When urban planners make decisions they typically do so in the light of geographically located information—a reliance shared with other sectors, such as transportation, public health, and environmental science. This is because the majority of data used to inform public policy are linked directly to space, whether it is through addresses or coordinates (Seiber, 2006). It seems natural, then, that geographic information systems (GIS) were developed not as tools of citizen participation, but rather as a means for experts to understand, manipulate, and visualize these important layers of spatial information.

A single hardcopy map can only contain a limited amount of data. According to Tomlinson (1998), one of the early pioneers of GIS, “The data content of hardcopy maps is limited by size of sheet on which the information is recorded and the space required by each item of data so that it remains legible” (page 22). The computer could change that by offering near infinite flexibility in display while at the same time hard coding data analysis into the parameters of longitude and latitude. Also, the hardcopy map had to be read and analyzed by a human. “To store a large amount of data on maps, you have to produce many maps. To extract information visually from a very large number of maps represents a formidable task of reading and measurement” (page 22). GIS could automate data analysis, vastly expanding the scope of mappable datasets.

In addition to the increased processing power, GIS were recognized for their convincing rhetorical output that could aid experts in the policy-making process. However, as Obermeyer (1998) notes, this is not without its problems: the “excellent graphics” produced by the systems can add undue authority and persuasiveness to policy reports—so much that an untrained public may lack the aptitude or tools to question or contest these GIS-backed proposals effectively. As the use of GIS became more widespread, and as the link between GIS and power became more prominent, critics launched attacks against the technology, arguing that it was positivist, elitist and nondemocratic (eg Pickles, 1995). And as the debate reached its peak in the mid-1990s, scholars actively questioned the systems’ effects on the participatory process.

In response to this debate, the National Center for Geographic Information Analysis (<http://www.ncgia.ucsb.edu/>) brought together proponents and critics alike for its 1996 Initiative 19—“GIS and society: the social implications of how people, space,

and environment are represented in GIS.” The report (Harris and Weiner, 1996) details some of the earliest steps in establishing a new path for GIS. Attendees debated the state of the technology and created definitions to distinguish between the then-present manifestations of GIS, termed GIS1, which “came out of the scientific tradition and adopted the practices of cartography” (page 12), and laid out plans for GIS2, a future and “more participatory GIS.” It was from this and subsequent meetings that the concept of PPGIS was conceived, to be “attached to the particular problems of bringing a wider public into effective use of the technology” (page 39). Experts realized that these dynamic systems would allow the public to interact and have some control over the way in which space was represented.

Indeed, the resulting PPGIS often have lay citizens performing spatial tasks, perhaps annotating a map, or creating their own, in both multiuser and stand-alone environments. Because the capabilities of PPGIS vary in function, interface, and usability from system to system, it would be impossible to describe all user experiences, but they typically follow some basic functionality principles that all steer toward some level of challenge-based immersion. Some general systems, such as the one hosted by the City of Norfolk, VA (<http://gis.norfolk.gov>), allow users to create maps that display self-selected layers of data relating to factors such as the environment, safety, recreation, and public health. Other PPGIS are geared toward more specific planning questions. For example, argumentation maps, first introduced by Rinner (2001), allow users to place location-specific arguments on a collaborative map to spark discussion and encourage located dialogue. Much like an online message board, the tool allows users to post replies and view the discussion history saved within graphical pushpins or other markers that have been placed on the landscape (Rinner et al, 2008). Carver et al (2001) developed another style of PPGIS to allow users to suggest locations for woodland expansion in a national park. The system showed the public relevant information on the planning task, then allowed them to determine which factors were most important to their final decision. From these selections a custom map was generated for each user, and their preferences were added to a composite map representative of the community’s decision.

Carver (2003) argues that, no matter the method used, PPGIS should do more than ensure the availability of the standard, professional spatial data used in the decision-making process. Instead, the community should be regarded as a database in itself, and power holders should incorporate community knowledge in such a way that it “may lead to different solutions than might otherwise have been reached using purely traditional forms of data” (page 65). At the same time, the public could benefit from the traditional information GIS has to offer. It is a commonly held belief that the more information available to citizens, the greater their ability to make informed policy decisions (Seiber, 2006).

By the late 1990s the ability to deliver GIS tools or products over the Internet changed the social utility of mapping. What was conceived as a tool for professionals to process accumulated datasets for the purpose of professional analysis could now be widely disseminated over the web (Peng and Tsou, 2003). Web GIS emerged not long after the World Wide Web itself. The Xerox PARC Map Viewer (<http://www2.parc.com/istl/projects/mapdocs>) was introduced in 1993 and enabled the retrieval of localized maps via hyperlinks. Specialized applications continued to build, and by the mid-1990s the Open Geospatial Consortium (<http://www.opengeospatial.org/>) set standards of cartographic interoperability, so that individual developers of Web GIS could share geographic data. Companies like ESRI Inc. (<http://www.esri.com>), taking advantage of newly open data sources, were central in the widespread proliferation of GIS over the web and, as a result, its influence in the public planning process.

Many PPGIS practices improve upon earlier participatory models, which were constrained by their reliance on expensive, stand-alone software, by taking advantage of increased broadband access and Internet technologies available in the public realm. In theory, the resulting Web-PPGIS would grant anyone with a computer and Internet connection access to the same spatial data as experts. As such, some scholars argue that Web-PPGIS will help bridge the gap between the lay public and experts, because the latter will no longer hold a monopoly on geographic tools and information (Carver et al, 2001; Kingston et al, 2000; Peng, 2001). According to Harder (1998), this shift in dissemination would have significant implications for society. In response to those who claim that the Internet does not change the fundamental nature of GIS, but only gets it online, Harder (1998, page 1) rebuts that that is “comparable to saying that a printing press doesn’t change the fundamental nature of a book”, and he claims that “The value of geographic information [like all forms of digital information] and the power of GIS applications to solve problems are proportional to their accessibility.” Kingston et al (2000) highlight mobility issues (such as transportation or disability) that inhibit the community’s attendance at a public gathering, and describe the community meeting as having an “atmosphere of confrontation” (page 111), fraught with outspoken citizen regulars who dominate planning discussions. They agree that community members who are intimidated by this planning model could instead access Web-PPGIS and participate in a nonthreatening, anonymous environment.

However, the availability of PPGIS on the Web guarantees neither access nor participation. Elwood and Leitner (1998) argue that our notion of ‘access’ tends to be limited to the mere availability of technology and tools, but that a true definition would go further and include a community’s ultimate ability to apply the technology to community improvements. If we consider this new definition, most Web-PPGIS do not grant their users full access, and even if we think of access only in the traditional sense, many users, those on the wrong side of the digital divide, cannot participate. Peng (2001), though a proponent of Web-PPGIS, cautions that using such systems as the sole means of community participation may actually “override the voice of the poor”, who do not possess equal Internet or computer access, in favor of a community’s more affluent participants.

To use Barndt’s (1998, page 105) words, “GIS is not the center of the public participation universe.” Left to their own devices, the lay public may not use the systems properly, ultimately creating distorted, poorly constructed maps:

“The trend toward encouraging nonprofessional [ie those without cartographic training] to create their own maps is shortsighted. For non-professionals to be [able to] produce accurate maps, they need access to professionals who can offer advice and critique the results, and who can assist with the use of more sophisticated options for analysis” (page 109).

Even with more user-friendly interfaces, PPGIS are still reliant upon the practice of cartography, which seeks to reduce space in a cerebral, abstract manner, requiring users to mentally construct a represented environment—a skill which is not intuitive and must be learned (Hamilton et al, 2001). The bird’s-eye perspective taken by most PPGIS may also be difficult for a lay public to understand fully (Keates, 1996; Monmonier, 1996).

PPGIS that depend on annotation tools disadvantage those with some community knowledge in favor of those with an inherently ‘scientific’ view of the world. Much of the information that the lay public possesses cannot be reduced to simple spatial primitives that are the mainstay of PPGIS; ‘fuzzy’ data (information without a precise location) is potentially excluded (Al-Kodmany, 2000; Harris and Weiner, 1998; Kingston et al, 2000; Talen and Shah, 2007). For example, Talen and Shah (2007) found that it

was difficult for community members to articulate and map arguments on topics such as community aesthetics—architectural style and building texture or color—because these elements were “somewhat awkward” to incorporate into traditional PPGIS. This example points to how the limitations of participation platforms (ie GIS as the sole interface for interaction) challenge the effectiveness of the public process. The ‘community as database’ model assumes a neutral interface for interaction; however, it is always the case that the platform with which one interacts sets the terms for that interaction. Just as an auditorium with a podium for a speaker and forward-facing chairs for the audience determines the format for dialogue in a public hearing, so too does a map that requires the filtering of all comments into spatial coordinates. Of course, the fact that GIS does not satisfy all the requirements of deliberative democracy does not lessen its impact on the planning process. Maps are powerful tools that provide some mechanism for input and a valuable platform for engagement. They are not just for plotting information; they function as the interface for many index, search, and preview tools (Kraak, 2004). In other words, maps can become a challenge-based point of entry for immersing the public in planning decisions.

It is clear that GIS has great potential to catalog public input about geographical space. It has proven quite effective in extending the traditional public hearing beyond the four walls of the meeting space. It has also been effective in giving participants a macroview of planning initiatives while allowing them some ability to record their opposition or support. However, PPGIS, while good at aggregating individual experiences, are not good at communicating how those experiences create the complexity of urban spaces. These systems are inherently visual, but their reliance on the abstract is a barrier to some forms of participation.

Taken alone, this type of challenge-based immersion can be ineffective because it assumes an existing understanding of spatial and urban dynamics. Many PPGIS function more like geographical sandboxes than tools for addressing specific problems, leaving it to the user to define his or her own parameters. So while this open-endedness seems pragmatic, allowing a single tool to serve endless spatial functions, its lack of specificity in some cases also means that users are left directionless and unengaged. PPGIS that are designed around specific planning questions give users direction, but only touch upon one immersive principle.

In the next section we discuss visualization and participatory visualization technologies that attempt to achieve a second tenet of immersive planning: sensory immersion. Sensory immersion is geared toward engaging people that might have no previous experience or understanding of how urban spaces typically function.

Sensory immersion: visualization and participatory visualization

Apart from GIS-only interfaces, some planners use planning support systems (PSS) that bring together multiple participation tools. These PSS incorporate information, models, and visualizations much like decision-support systems, but cater directly to the urban planning process (Klosterman, 1999). Geertman (2002) sees this technology as the missing link between GIS and authentic participatory planning, and conceptualizes the most effective PSS as ‘toolboxes’ of integrated, yet separate, programs the planner can draw from to fit specific planning tasks. Here, traditional GIS information is coupled with other datasets, such as statistics, and visualizations ranging from graphs and charts to advanced 3D renderings of urban spaces.

These new visualization tools may be the key to extending GIS’s effectiveness and increasing the sense of sensory immersion. According to Sarjakoski (1998), showing photolike, 3D visualizations of an environment “might be one of the most natural ways to communicate” because observers understand them more intuitively than abstract,

purely challenge-based methods, such as mapping. Appleton and Lovett's (2005) survey of planning and related professionals echoes this conclusion, with respondents reporting that the public had trouble picturing plans shown to them in two dimensions and that nonprofessionals were not able to orient themselves in the location or envision "the wider picture". In other words, they were not able to feel immersed in the space. Much to the dismay of professionals, this disconnect between visualization and understanding is not only a problem for the lay public. As Towers (1995) notes, "Architects themselves only have an approximate idea of how their schemes will look when they are built, and are frequently surprised and even alarmed when they see their concepts emerge in built form" (quoted in Al-Kodmany, 2000, page 161).

Computer-aided design (CAD) is one such 'intuitive' method of representing space that not only allows planners and designers to achieve the desired 3D photorealism, but also greatly enhances their ability to incorporate planning alternatives dynamically. This type of visualization can greatly aid stakeholders' perceptions of urban plans, and also allows for rapid, or, in some cases immediate, visual feedback on development suggestions. As Levy (1995) notes, before CAD technology design drafts were fixed objects. As such, incorporating new concepts required significant time in the drafting studio. With the introduction of CAD, however, fewer resources were required for revision, and more fluidity was found between one conceptual draft and the next—the design, in essence, becomes a constant work in progress rather than a single 'still image' in a series. Apart from streamlined revision, CAD also gives designers the opportunity to export 3D views of a space for public viewing. Such computer-generated films can be designed to give 'the experience' of walking or driving through a planning concept (Levy, 1995). These kinds of visualizations may "increase the feeling of reality" for participants (Sarjakoski, 1998) through sensory immersion. There have been some further efforts to create a sense of sensory immersion through *participatory visualizations*, where the public actively navigates its way through a 3D design using a computer terminal. Reactions to participatory visualizations for planning, such as the use of the virtual environment MAVERIK (<http://aig.cs.man.ac.uk/maverik>), have been favorable, with participants enjoying the sense of interactivity with space that they provide (Howard and Gaborit, 2007). Others have appropriated commercial software to create their own 3D environments. For example, Corbett and Wade (2005) reconstructed the University of Victoria campus using the Unreal Tournament 2003 (<http://www.unrealtournament2003.com/>) videogame engine to help users visualize changes associated with campus construction. While the user interface contained the point-of-view of a first-person shooter game (with in-game weapons removed), the experience focused not on videogame play, but rather on exploration and virtual mobility. Here the user is again challenged to forge links between real and represented space, but additionally experiences the sensory immersion of exploring a realistic environment. As with most game-style 3D platforms, model quality is often sacrificed to ensure optimal system performance and functionality (Corbett and Wade, 2005; Rhyne, 2002), thus making them more appropriate for a lay, rather than an expert, audience.

Although game engines are used as the basis for participatory tools, some scholars maintain a strict distinction between 'playful' game spaces and 'serious' visualization or participation spaces. Corbett and Wade's (2005) observation after their Unreal Tournament 2003 experiment was that participants could not see the game-based tool as legitimate because it contained the remnants of playful space:

"Given current attitudes, it is difficult to envision an important decision being made using a 3D model based on a game engine. It is obvious that the 'serious' aspects of game engines will have to be disconnected from their origins in order to increase their level of influence" (page 118).

The game elements were not required in Corbett and Wade's visualization project, so it is reasonable to have removed them from this particular system; however, the assertion that game elements must be 'disconnected' to create a legitimate planning tool is not accurate. On the contrary, games can engage participants effectively, and specifically role-playing games can enable players to approach planning from new perspectives. But games, like any other planning tool, must be thoughtfully designed and implemented into a local process.

So, while these visual systems give the participant a sense of the look and feel of a space they often ignore issues of social dynamics and urban patterns that are central to the actual experience of urban space. Over the last several years, there have been remarkable leaps forward in representing present and future spaces with some of the 3D technologies described above, but the extent to which these representations encompass the necessary complexity of urban space, as a means of engaging participants in planning, is unclear.

We argue that to better represent the complexity of cities, immersive planning technologies should better address the social dynamics of urban spaces. The third type of immersion, imaginative immersion, is achieved when participants are able to role play; where they can extend themselves into a space by imagining a situational context in which they embody that space.

Imaginative immersion: games and role play

Outside the digital realm, games have been recognized as useful to the community process in planning. Innes and Booher (1999) view traditional role-playing games (RPGs) (eg Dungeons & Dragons) as clarifying analogies for the type of playful work that takes place in consensus-building exercises. With a nod to Turkle's (1995) suggestion that RPGs create "a significant social laboratory for experimenting with the constructions and reconstructions of self" (page 180), the authors conclude that through role-play and bricolage, a 'collective tinkering' with ideas and outcomes, stakeholders can bridge previously incompatible positions. Indeed, throughout consensus building, participants must simultaneously negotiate the desires of many internal roles (eg mother, commuter, and environmentalist) all while considering the needs of others.

Also, this type of internalization process is a mainstay of character-based digital games, which require users, as virtual avatars, to solve puzzles or complete quests, and in the process negotiate both real-world and virtual identities. Gee (2007) calls this character-player collision within games a *projective identity*—an identity into which users project their real-world desires—coming to understand their virtual character as "their own project in the making, an identity they take on that entails a certain trajectory through time defined by their own values, choices, goals, and actions" (page 62). Encouraging this type of internal negotiation may be key to fostering an atmosphere of openmindedness and exploration in urban planning through imaginative immersion.

This has been demonstrated in the Hub2 project (<http://www.hub2.org/>) (Foth et al, 2009; Gordon and Koo, 2008; Gordon and Manosevitch, 2010). The project stemmed from the premise that face-to-face deliberation can be enhanced through role-play and virtual copresence. Hub2 organized workshops wherein residents, each with a laptop, gathered in a physical meeting space and simultaneously gathered in a virtual space. The project took place during the summer of 2008; participants used Second Life (<http://www.secondlife.com/>) to build a future park space in the Allston neighborhood of Boston, MA, just as they discussed the implications of that park space with people in a physical room. The process created a kind of augmented deliberation (Gordon and Manosevitch, 2010) where participants were able to augment verbal talk with the simultaneous experience of inhabiting the virtual space under consideration.

A similar project, called Participatory Chinatown (<http://participatorychinatown.org>), was launched in Boston in May 2010. Participatory Chinatown was a 3D game designed to be played in large groups of physically copresent players. Through character role-play, player collaboration, and group decision making participants were encouraged to confront other perspectives before providing personal feedback about a master plan. Being in ‘both places at once’, and being there as a character not oneself was meant to create a sense of imaginative immersion that could provide a strong foundation for deliberation (Gordon and Schirra, forthcoming).

By getting people out from behind their own concerns (if only for a few minutes), the project aimed to create the kind of empathy and civic mindedness that is ideal for providing valuable input into a planning process. Yee and Bailenson (2006) demonstrate how the strength of stereotypes that college students hold about the elderly is reduced when they inhabit an avatar of an elderly person. By taking another’s perspectives, a player is able to identify with that person in a substantial way. They call this *perspective-taking*. When we judge ourselves, they argue, we tend to rely on situational factors (eg “I did poorly on the test because I didn’t sleep well the night before”). On the other hand, when we judge others, we tend to rely on dispositional factors (eg “He did poorly on the test because he’s not that bright”). They discovered that when people were forced to observe their own actions (via a videotape), they tended to make dispositional attributions rather than situational attributions. The reverse is also true. When participants were asked to take the perspective of the person they were observing, they tended to make situational attributions rather than dispositional attributions (page 148).

Getting participants to experience this sort of empathy is a lofty goal for planners. However, if one of the goals of planning in general is to help community members understand one another’s stakes in a decision, this kind of role play would seem to be an important element. As demonstrated in the Participatory Chinatown project, when participants approach planning decisions as characters different from themselves, through a factor such as household size, socioeconomic status, or disability, they can come to a better understanding of the impact of their personal desired outcomes versus those of other affected communities.

Participatory Chinatown was effective in creating imaginative immersion, and it also included elements of challenge-based and sensory immersion. It challenged players to make decisions individually and in groups and it inserted players into a 3D photo-realistic representation of Chinatown. Games, in general, provide a very productive mechanism for immersing participants in planning decisions, as they provide the singular framework from which challenge-based, sensory, and imaginative immersions can come together. So, while Corbett and Wade (2005) claim that games are antithetical to the creation of “legitimate planning tools”, there are clearly important implications for game structures in producing and sustaining immersive experiences. In fact, games provide one of the few structures of user participation that potentially incorporate all three forms of immersion.

Next step for immersive planning

Immersion is a powerful mechanism for engagement; it brings people into the process above and beyond the traditional approaches that are usually quite content with simply letting the public *see* the process. Conventional public participation practices in planning seek to enhance power sharing with the public, often with very mixed results. We present a new conceptual model with which to understand the design of public-participation processes on the basis of a body of literature in media studies that shows how immersion generates meaning and relevance to users. Rather than designing

public processes that simply aim for increased power for the public (and often fail at that), immersive planning means a new way for the public to be engaged, to generate an ongoing sustainable dialogue with local officials, and to shape government action in a way that is informed in a meaningful way by its citizens.

We have presented evidence of the affordances of immersion in the planning process; however there is considerable need for studies that examine the sustainability of such practices. There needs to be more research to determine if immersion is an indicator of sustained engagement. This might be accomplished by linking immersion to evaluative measures of civic engagement in order to study whether or not immersion results in an individual's prolonged interest in that space, as manifested through continued involvement or willingness to be involved in local affairs. Of course, the context of planning is more complex than the immediate engagement of the public. Planners have to juggle the public's participation with the realities of local politics, economic shifts, and the whims of developers. If immersion is to work as a model from which to design participation, the benefits of immersion need to be clarified to the participants from the beginning. Immersion does not mean 'getting what you want', but instead means a deep involvement in the process with all its political and economic complexity. Further research is required to determine if there is any correlation between the depth of immersion in a particular experience and one's willingness to put up with and learn about the complexities of urban planning and development. The evidence at this time would suggest a correlation, but more empirical studies are necessary to make this definitive determination. Immersive planning is an ideal, and with the rapid development of immersive technologies, from mobile devices to 3D games, there is ample opportunity to realize this ideal in everyday planning practices.

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