Delineating "Public" and "Participation" in PPGIS

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Abstract: *PPGIS is often presented and promoted as a more people-centered GIS compared to a traditional technocratic, expert-driven tool or methodology. Yet, the umbrella of PPGIS is quite broad. Within such a wide context, it may be helpful for practitioners and scholars of PPGIS to better understand exactly what PPGIS is. Or, in other words, having a clearer conception of what "public" and "participation" are, and how they relate to expected outcomes and outputs within a GIS context, is very important as the ideas and ideals of PPGIS continue to gain momentum. Understanding the variations in the types of "public," cross-referencing them against the distinctions in "participation" and linking the intersection of types of "public" and "participation" to expected GIS outcomes and outputs would greatly enrich the field. Moreover, such delineation would allow PPGIS practitioners and those considering PPGIS approaches to appreciate the linkages of certain types of participation processes, specific elements of the public, and particular types of expected project results. This paper offers a review of key literature relevant to public participation and presents potential integrated matrices to guide future PPGIS thought.*

Introduction

PPGIS is emerging as a distinct subset of two previously separate activities: technology-based spatial analysis and participatory democracy. With its roots in the GIS and society events in the mid-1990s, PPGIS has matured to a level where in 2002, *Community Participation and GIS,* a book exploring various avenues for GIS to be used in citizen- and organization-based empowerment activities, was released, and the third national conference on PPGIS was held. Clearly, there is a range of researchers, practitioners, developers, and activists who share a somewhat common vision that the use of GIS' visual language along with its spatial analysis capacities present a new and unique opportunity for community change and influence.

As this new field emerges, it is important to be clear on its parameters, its definitions, and its implied meanings. Central to this idea is an understanding of exactly what "public" and "participation" mean and how the different variations of these terms impact our conceptions of PPGIS. The book referenced previously, the PPGIS conferences, journals, and various trade publications offer a variety of case studies of when PPGIS was used, but the more one looks to find a common thread or meaning about what PPGIS exactly means, one quickly realizes that guiding definitions are not to be found and that utilizing the term "PPGIS" is inconsistent across applications and uses. For example, in providing context for their recent book, Weiner et al. (2002) define public participation as "grassroots community engagement" (5), but who exactly is included in the grassroots community and what does their engagement look like? Understanding the range of publics and the range of participation can help all involved in PPGIS more accurately identify and achieve the project outcomes they desire.

It is not surprising that PPGIS practitioners, scholars, and advocates have not developed clearer definitions of "public" and "participation," given that there appears to be a substantial gap in delineating these domains even among those who work in the more traditional realm of public or citizen participation. In this area, public participation generally falls into two broad areas: 1) characterizations of public participation along some broad type of power spectra (e.g., Arnstein) or 2) delineations of types of participation techniques. Who the public is in "public participation" is less defined and often overlooked in favor of such broad categories as "all affected stakeholders." For PPGIS, the public can range from every resident in a neighborhood engaged in community asset mapping to every U.S. citizen interested in viewing census data spatially online.

Understanding how specific publics are linked to certain types of participation is thus an important effort to undertake so that users of PPGIS ideas can appropriately characterize, utilize, implement, and evaluate their PPGIS efforts. For example, when a local public health official wants to use GIS in a community-oriented, participatory way, how can that official identify both an appropriate public and a type of participation that will yield the type of programmatic goals that he or she wishes to achieve?

To illustrate the potential utility of a more detailed delineation of these domains in the context of PPGIS, one could imagine a simple matrix with various types of "public" along one axis and various types of "participation" along the other. The cells that link various points along each axis could contain expected PPGIS project outcomes. So, for example, suppose a project conceived of the public as all city residents and desired the participation technique of World Wide Web–based mapping of various city services. The expected outcome of such an endeavor may be to provide general education to the population as a whole. The process could work in reverse as well, starting with a goal to achieve and then cross-referencing the axes to identify an appropriate type of "public" and "participation."

The remainder of this paper explores the components of this matrix notion in depth, drawing on a diverse set of theories and conceptions about public participation with the goal to bring some clarity to these complex notions so that PPGIS can be utilized with greater impact as a practice and can continue to evolve as an independent line of inquiry and investigation. A simple two-plane

matrix will be presented, and although it is not likely to be able to properly capture the entire complexity of the public participation notion, such an all-encompassing effort is not the goal. Rather, the main goal of this proposed matrix is to provide a basic context for users and researchers of PPGIS ideas to be clearer about what they are doing and hoping to achieve by integrating GIS into a public participation process.

PPGIS

Spatial planning and public participation have recently begun to be thought of in an integrated fashion. As such, PPGIS represents a broad notion that the spatial visualization and analysis capacities inherent in GIS present a unique opportunity for enhanced citizen involvement in public policy and planning issues. The focus of PPGIS remains quite undefined (Jankowski et al. 2003; Tulloch 2003), ranging from issues of "grassroots community engagement" (Craig et al. 2002, 5) to making public data such as parcel and property tax records more public through maps on the Internet. What scholars and practitioners do see in common in PPGIS is that spatial issues are best addressed with spatial approaches and that GIS can facilitate a broader set of participants in the planning process due to its visual orientation (Al-Kodmany 2001). In this sense, a map can facilitate mutual understanding and common agreement about basic facts, and can be used to develop trusting relationships across a diverse set of participants.

It is important to note that although we think of GIS as a tool to create maps, the process that leads to final map creation may be more appropriate in terms of collaborative planning. Maps can be a key component in grassroots change efforts (Elwood and Leitner 1998; English and Feaster 2003; Mitchell 1998; Talen 2000), can be an important component in the work of human service organizations (Hoefer et al. 1994; Kellogg 1999; Queralt and Witte 1998), and can help illuminate issues of equity and community condition upon which a community may organize and take action (Harris 1998; O'Looney 2000; Schlossberg 1998; Spade 1996; Talen 1998). Similar to participatory- or community-based research methods, where joint expert-community problem definition and research is as much about building trust and social capital through the research process (Israel et al. 1998), PPGIS offers the ability for the process of spatially investigating an issue to yield positive returns in terms of group dynamics, consensus building, and joint planning.

Some recent efforts helped create context for this wide range of participatory GIS applications. In 1998, an issue of Cartography and Geographic Information Systems focused on community and participatory uses of GIS, laying out a variety of contexts of such applications (e.g., Craig and Elwood 1998; Elwood and Leitner 1998; Harris 1998). The recent book, Community Participation and Geographic Information Systems (Craig et al. 2002), is itself a context creating work, providing a variety of perspectives on the applications, opportunities, and limitations associated with PPGIS ideas. And two recent editions of the URISA Journal focus on GIS access and participation, with articles ranging from developing frameworks to better understanding how people, cultural

situations, and technology interact in terms of participatory GIS (Jankowski and Nyerges 2003) to a future research agenda for the integration of spatial analysis and community participation (Carver 2003). These efforts, while invaluable in many ways, often fail in being explicit about what public participation GIS means within the context of their effort, and, more specifically, who the "public" is and what form their "participation" is taking. In fact, such a deficiency was in part highlighted by a 2003 international workshop on PPGIS: "Public participation is not a unique and shared construct. It is a complicated process with multiple meanings that lead to numerous expectations" (Craglia and Onsrud 2003, 13).

Jankowski and Nyerges (2003) suggest there is a lack of operational knowledge about PPGIS and they present eight constructs that inform how decisions are made within a participatory GIS context. These constructs include important project-oriented elements such as how social-institutional influence, group influence, and social outcomes may affect or direct particular projects. These constructs, however, remain at a more conceptual and theoretical level and are not easily accessible to one who is thinking about using GIS in an applied, public process way.

Tulloch and Shapiro (2003) also try to add some context to the complexity of the PPGIS notion by looking at access to information in a more nuanced way. In their analysis, there are various levels of access (I–IV), with each type loosely linked to a different user population or "public." The paper then spends a bulk of its content on creating a 2 x 2 matrix that provides structure for simultaneously understanding the intersection between low and high levels of participation on one axis and low and high levels of information access on the other axis. This matrix approach seems to be useful in understanding the complexities inherent when different types of public and different modes of participation are pursued. While Tulloch and Shapiro's article does provide a good initial approach, its expansion is warranted in at least two main ways: 1) to be more focused on public rather than access and 2) to flesh out participation and public into more than just low/high categories. The remainder of this paper works to build on and expand Tulloch and Shapiro's original matrix.

Domain of Participation

"Participation" can be thought of in (at least) two core ways: as specific activities that individuals engage in or in the broader purposes that participation is supposed to achieve. For the discussion here, this latter component—the broad notions of why participatory approaches are often pursued—will be the focus.

The participation domain, then, focuses on the motivation for utilizing participation as a planning and policy approach. Perhaps the most well-known examination of citizen participation is Arnstein's Ladder of Citizen Participation (1969), which frames participation in terms of citizen power. Arnstein defines citizen participation as "the redistribution of power that enables the have-not citizens, presently excluded from the political and economic processes, to be deliberately included in the future" (351). The central tenet of this model revolves around using participation to

Figure 1. "Ladders" of Public Involvement

Arnstein (1969)	Wiedemann and Femers (1993)	Dorcey et al. (1994)	Conner (1988)	
Degrees of Citizen Power ■ Citizen control ■ Delegated power ■ Partnership Degrees of Tokenism ■ Placation ■ Consultation ■ Informing Nonparticipation ■ Therapy ■ Manipulation	■ Public participation in final decision ■ Public participation in assessing risks and recommending solutions ■ Public participation in defining interests and actors and determining agenda ■ Public right to object ■ Informing the public ■ Public right to know	■ Ongoing involvement ■ Seek consensus ■ Task ideas, seek advice ■ Consult on reactions ■ Define issues ■ Gather information, perspectives ■ Educate ■ Inform	Leaders ■ Resolution/ prevention ■ Litigation ■ Mediation ■ Joint planning General Public ■ Consultation ■ Information feedback ■ Education	Increasing Public Involvement or Citizen Control ↑

increase the relative level of citizen power. Eight rungs of citizen participation that corresponded to different purposes ranging from manipulation of the public to citizen control of the decision-making process are included in this ladder (Figure 1). At one end is the rung of citizen control, which corresponds to a level of participation where the disenfranchised become responsible for an entire effort, including planning, policy making, and program implementation. The bottom rung of the ladder is manipulation, where the purpose of a participation process is for those in power to remain in power by eliciting public support through education and public relations approaches. Rungs are also grouped into three subsections, representing different degrees of participation, including "nonparticipation," "degrees of tokenism," and "degrees of citizen power." Thus, it is clear that Arnstein's ladder frames public participation in terms of a power orientation existing along a spectrum of manipulation to citizen control.

Wiedemann and Femers (1993) present an alternative ladder of citizen participation. In their ladder, public participation ranges from general education with little direct influence on decision making to public participation in the final decision-making processes (Figure 1). Wiedemann and Femers differ from Arnstein in that their focus is much more aligned with conceptions of public participation that are found within the mandates of large governmental agencies. In such environments, public participation is often a requirement of a decision-making process, although what constitutes the public or participation is often undefined. Therefore, a government agency that provides data in response to a Freedom of Information Act (FOIA) request may consider its work to be that of public participation. Or such an agency may seek close consultation by knowledgeable experts from within and outside of government to help influence and shape new policies—a different, yet typical form of administrative-oriented public participation.

Similar to Wiedemann and Femer, Dorcey et al. (1994) frame public involvement along a spectrum from informing the public to some state of ongoing involvement between the public and decision makers (Figure 1). Dorcey's approach parallels typical stages in many planning processes, rather than focusing on distinct, and separate, approaches to public participation. The stages along the spectrum progress from a general advertisement of an issue to a more involved set of activities as the processes progress. In this way, Dorcey recognizes that the nature of public participation can change over time within a single decision-making process; that certain public participation approaches may be necessary at the beginning of a process, while other public participation methods may be more appropriate toward the final stages. Conner (1988) and Jackson (2001) echo this dynamic nature of participation as well.

Conner, in his New Ladder of Citizen Participation, frames public participation in terms of "preventing and resolving public controversy" (250). In this ladder, there is a range of public participation techniques to be used for dispute resolution, from education of the general public to preventive activities that leaders can take (Figure 1). Other rungs along the ladder include consultation, mediation, and litigation, implying that decision making is inherently confrontational and that there are various participatory methods that the public can use to resolve disputes. So rather than Arnstein's frame of citizen empowerment and Wiedemann and Femers' frame of government-oriented mandates of public participation, Conner frames citizen participation in terms of avoiding or resolving disputes that arise in the public policy decision-making process.

Comparing Participation Purposes

Even with the brief review of a limited set of scholarly work on participation, it is clear that there are fundamentally different approaches or orientations to the basic idea of participation. The purpose of each public participation framework mentioned previously differs along both the general objective of each approach and by the spectrums each includes (see Figure 2). Specifically,

Figure 2. Comparison of Public Participation Purposes

Author	Orientation	Spectrum
Arnstein	Power Orientation	Manipulation ⟶ Citizen control
Wiedemann and Femer	Administrative Orientation	Education ⟶ Joint decision making
Conner	Conflict Resolution	Education ⟶ Prevention
Dorcey et al.	Planning Process	Inform ⟶ Ongoing involvement

the orientations can be thought of as a power orientation (Arnstein), an administrative orientation (Wiedmann and Femer), a conflict resolution orientation (Conner), or a planning process orientation (Dorcey et al.).

Simply mentioning that one wants public participation in his or her GIS effort can imply radically different interpretations of what that participation is supposed to achieve. That is, without clearly identifying and defining the orientation and objective of "participation," there is ample room for confusion and disjointed expectations between the multiple actors who are governing, administering, or participating in a participatory process. Clearly, the adoption of a particular frame of reference or orientation impacts both how public participation is conceived and how it is implemented and evaluated.

Moreover, each orientation may imply a different set of goals and expected outcomes when applied to PPGIS projects. For example, is PPGIS about continuous involvement throughout ongoing planning processes (aka Dorcey et al.); should PPGIS be conceived as a means to enhance citizen power and control over decision making (aka Arnstein); or should PPGIS be about conflict resolution (aka Conner)—using a visual language to enhance multiparty problem solving before the need of hard tactics such as litigation becomes necessary?

Domain of Public

Just as in the domain of participation, one can think of "public" in two distinct ways: as actual people organized in some type of grouping (e.g., decision makers) or in terms of methods for identifying and selecting such people. The former will be more of the focus here because understanding who the public is will help place a PPGIS project into an appropriate context. It is also important to note that we do not place the public as an entity in contrast to elected officials, but rather view elected officials either as a type of public themselves or as potential participants in a public otherwise defined.

With regards to the "public" in public participation, many researchers have asked "Who should be involved?" (Day 1997; Langton 1978; Thomas 1995). Unfortunately, the question largely goes unanswered or is answered ambiguously. A classic definition within the management literature of who a stakeholder is demonstrates a concurrent lack of specificity to this question: "Any group

or individual who can affect or is affected by the achievement of the organization's objectives" (Freeman 1984). Sewell and Coppock (1977) state that those who have a legitimate interest should be included in decision making. Exactly who this would be for a given process is unclear, yet defining the very participants in a public participation process is a fundamental element with clear linkages to the types of goals and outcomes a particular process hopes to achieve.

There are, of course, some scholars who go deeper into the question of who the public is. Answers to the question of "Who?" can be grouped into at least three general categories:

1. Those affected by a decision or program. Sanhoff (2000) claims those who are most affected by a decision should have the greatest voice in the decision. Despite the fact that the general public should be informed about opportunities to participate, the people who have the most at stake should have the greatest level of involvement. Part of what defines a stakeholder is those individuals or groups affected by an organization's activities (Jackson 2001).

2. Those who can bring important knowledge or information to a decision or program. The participating public should include those with technical expertise (Sanoff 2000). These individuals may offer assistance in data collection or contribute essential information if the process has technical components. In general, public participation should include participants who have information that is helpful in solving the issue (Thomas 1995).

3. Those who have power to influence and/or affect implementation of a decision or program. Thomas (1995) describes members of the public "who could affect the ability to implement a decision by accepting or facilitating implementation" (56). Mitchell et al. (1997) describes stakeholders who possess power. These stakeholders have the potential to help or hinder an organization achieve its goals. Jackson's (2001) definition of a stakeholder also includes those who can affect "the activities of an organization."

These scholars' answers to the "Who?" in public participation certainly offer more information for deciding whom to involve when compared with the federal government's generalist and vague mandate of "maximum feasible participation." However,

Figure 3. Circles of Public

Aggens' (1983) Orbits of Public Involvement Activity	
Mitchell's (1997) Stakeholder Typology	
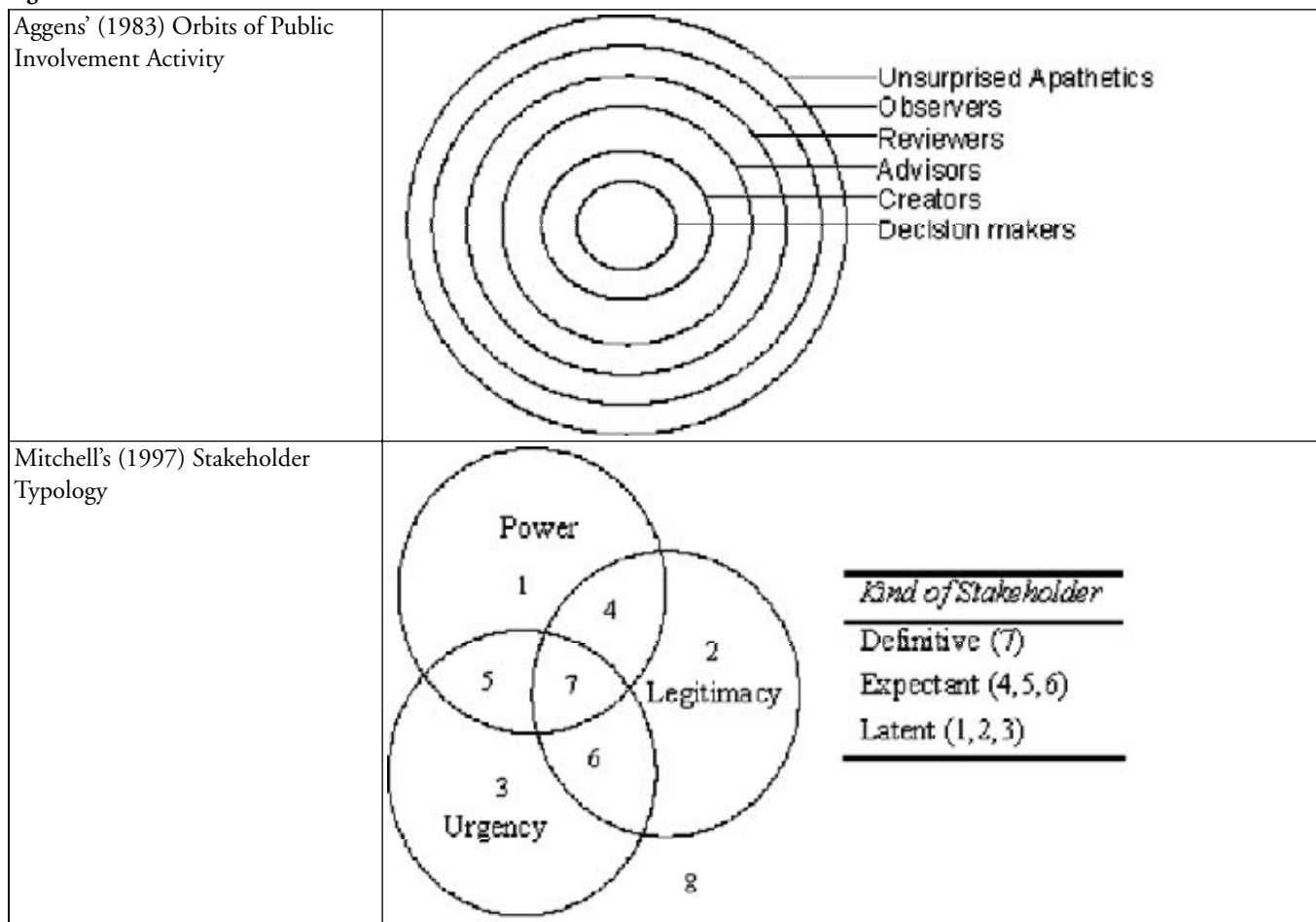
involving the public can be a more complicated endeavor than identifying a single, static set of stakeholders. For instance, the composition of relevant publics or stakeholders can change over time (Aggens 1983; Mitchell et al. 1997); publics may be geographic, economic, professional, social, or political (Creighton 1983); and conceptions of a relevant public may differ according to agency goals and the desires of other interests (Thomas 1995). Aggens (1983) states some of the difficulty: "There is no single public, but different levels of public based on differing levels of interest and ability" (189). It is clear that more specificity is required if planners, policy makers, and adherents to PPGIS ideas are to effectively involve an expanded set of people in decision-making or program implementation processes.

One way to identify a relevant public is by adopting processes by which the public can be appropriately defined. Rietbergen-McCracken and Narayan-Parker (1998), for example, describe a stakeholder identification process by asking and answering the following five questions:

1. Who are potential beneficiaries?
2. Who might be adversely affected?
3. Have vulnerable groups been identified?
4. Have supporters and opponents been identified?
5. What is the relationship among stakeholders?

Answering these questions prods decision makers into thinking broadly about who should be involved in a particular public participation process. Willeke (1974) goes into more detail with a three-pronged approach to identify relevant publics by using: 1) self-selection, 2) staff selection, and 3) third-party selection. Self-selection includes those who identify themselves through means such as public hearings, letter writing to public officials, etc. Staff selection includes any techniques internal staff may use to identify publics such as geographic, demographic, or historical analyses. Staff may also administer a user survey or consult with other agencies. Third-party identification involves asking councils and representatives of known interest groups for people who could or should be involved.

Thomas (1995) uses the Effective Decision Model of Public Involvement to delineate the public, focusing on the acceptability of public decisions. Relevant publics are defined as either those who have information or knowledge useful for the decision or those who have the ability to affect implementation. These relevant publics are further divided or placed into three categories: 1) one organized group, 2) multiple organized groups, and 3) unorganized publics or complex publics (Thomas, 1995). However, Thomas's focus on acceptability would eliminate relevant groups of the public if they do not possess at least one of the aforemen-

Figure 4. Comparison of the Conception of "Public"

Author	Dimension	Typologies of the Public	
		Focused	**Amorphous**
Aggens	Energy and interest, time and resources	Decision makers ⟶	Unsurprised apathetics
Mitchell et al.	Power, legitimacy, and urgency	Definitive ⟶	Latent stakeholders
Thomas	Organizational complexity	One group ⟶	Complex public
		Selection of the Public	
Willeke	Relevant publics	Self-selection ⟶	3rd party
Creighton	Affected publics	Spatial proximity ⟶	Values alignment

tioned criteria. For example, a group that may be affected by a particular decision may well indeed be a relevant stakeholder to a decision-making process, but may not be included in the Effective Decision Model.

Aggens (1983) provides another typology of who the public is, which delineates different publics based on two factors: 1) the varying amounts of time, interest, and energy a segment of the public has to work on an issue; and 2) the corresponding amount of commitment and resources an agency has to facilitate their involvement. In this model, the public is differentiated between: unsurprised apathetics, observers, reviewers, advisors, creators, and decision makers (Figure 3). Aggens then groups these publics in concentric circles, implying a hierarchy of influence and importance in decision making, with the core circle representing the final "decision makers" and the outer circle representing "unsurprised apathetics."

Aggens goes on to characterize each of these circles in a variety of ways. For example, involvement of the core circle of "decision makers" implies the need for a substantial increase in energy committed by both participants and organizers of a public participation process. On the other hand, inclusion of "unsurprised apathetics" implies only the need for one-way communication between the participation leaders and the public that is involved. An important feature of this model is the fact that it is dynamic for a public may change its "orbit" at any time given certain circumstances. This model is also similar to the typology offered by Thomas (1995) because its focus on commitment in terms of time, interest, and energy (or what participants have to offer the process toward success) may leave out certain publics who have a legitimate right to participate, but who do not possess these attributes.

Mitchell et al. (1997) present a sophisticated stakeholder typology, delineating three major attributes of stakeholders: power, legitimacy, and urgency. Power is defined as the ability of one social actor to get another social actor to do something he or she otherwise would not have done. Legitimacy is "the perceptions or assumptions that the actions of an entity are desirable, proper,

or appropriate" (869). Urgency is the urgency of a stakeholder's claim. These attributes are then used to plot stakeholders on a Venn diagram as seen in Figure 3.

This figure shows three major zones. One is in the center where stakeholders possess all three attributes of urgency, power, and legitimacy. These stakeholders are said to have a high degree of salience and are called "definitive stakeholders." The second zone is stakeholders who possess two attributes. They have a moderate degree of salience and are called "expectant" stakeholders, stressing the fact that they may easily move into the zone of high salience as circumstances change. The third zone is "latent stakeholders" with one attribute and a low degree of salience (Mitchell et al. 1997).

Creighton (1983) developed a different set of ways to identify affected publics, including:

- Proximity: A group lives near where a project is implemented.
- Economic: Some segments of the population may stand to gain or lose financially.
- Use: A program or policy may limit some people's use of a resource or facility.
- Social: A project or policy may threaten a tradition or culture, or it may significantly alter a community's demographics.
- Values: A group may be affected only in terms of how an action relates to its values (e.g., the abortion issue or gun control).

Comparing "Public" Framings

So, just as "participation" can be thought of in substantively different frames of reference, so, too, can the ideas of "public." Figure 4 presents a comparison of the notions of public described previously, divided into two sections: typologies and selection of the public. Within typologies, one can conceive of the public along a variety of different means, sharing continuums that range from some sort of narrowly focused, small in number conception of public to a more amorphous, ill-defined concept. The different

models of selecting the public follow a looser continuum ranging from a more clearly identifiable public selected by personal closeness to an issue, project, or decision maker, to a public that is less obvious and more tangentially connected.

In terms of pursuing a PPGIS endeavor, one must be clear about who the public is because how the public is defined relates to the types of outcomes and goals one can achieve. More concretely, being clear on who the public is will make it easier to include them in the PPGIS effort. For example, decision makers are often a group that is desired to be included in a planning or policy-making endeavor, but who are decision makers? Are they elected officials who are defined by legal power and legitimacy? Are they neighborhood leaders who are defined by their relevance and urgency to a particular issue? Participatory decision making is more than deciding if the public should be included or not; the type of "public" needs to be explicitly defined based on the goals and outcomes that are desired for a public process.

Integrating the Conceptions of Public and Participation

While it is helpful to understand the separate domains of "participation" and "public," for PPGIS purposes, understanding the intersection is crucial for project planning, because it directly impacts both front-end and back-end decisions. On the front end, different PPGIS techniques may be possible or relevant depending on exactly who is targeted and what the participation goal is. For example, are all citizens targeted? Only voters? Only people likely to be impacted by a policy or plan? Only decision makers? And what is the goal—citizen power, placation, public education, or conflict prevention?

Joining the domains of "public" and "participation" in a more explicit way can also help at the evaluation stage of PPGIS projects. With each intersection of a particular type of "public" and "participation," expected goals and outcomes can be developed for each intersection node. For example, a project goal may be "to educate the public by representing complex data in map form with the hope that more citizens will become part of the public debate." Alternatively, a goal might be to "develop increased social networks in specific neighborhoods through the use of community-based, GIS-oriented data gathering." Explicitly understanding the idealized outcomes directly leads to the capacity to evaluate projects, thereby understanding whether PPGIS endeavors truly achieve their desired results. Such an integration of public and participation would certainly aid planners and administrators in designing PPGIS projects or events.

A few authors have made connections between typologies of the public and participation, although the link may be a bit circuitous. Thomas (1995), for example, created a matrix with a typology of the public on one axis and a decision-making style on the other. In this matrix, different decision-making styles are related to various groupings of the public, so that one can either look at one decision-making style across a variety of types of public or look at a single type of public across a variety of decision-making styles. In this way, a manager or project planner can conceptualize different sets of strategies and approaches to public participation (or effective decision making as Thomas frames his work) depending on what type of decision-making style and what type of public is either appropriate or desired.

Konisky and Bierle (2000) create a similar framework to compare several innovations in public participation. Their model relates participation processes to participants, intended outcomes, and decision-making authority, linking specific types of participation processes with a type of public and expected outcomes. Including expected outcomes in the mix adds a level of sophistication and guidance to their model that can be helpful for PPGIS users.

Jackson (2001) goes a step further by using a matrix to create something of a guide for administrators or planners to make decisions about public participation. In this model, the objectives of participation are made primary, and then combined with a broad categorization of the public. Starting with the project objective is a useful evolution of these models because public participation in general, and PPGIS more specifically, should exist to meet certain goals. Users of these approaches to decision making should be explicit about the goals they are trying to achieve, and it stands to reason that the type of participation and the type of public one chooses should flow out of specific goals that a project is trying to achieve. Jackson goes on to offer guidelines for when to use and when to avoid such approaches, providing guidance for practitioners who may or may not be familiar with public participation approaches toward planning, policy making, and decision making. Starting with the project goals in mind, then, one can use Jackson's model to subsequently identify the appropriate "public" that may be most applicable and relevant to reach those goals. Accordingly, once the overall project goals are understood, it may be easier to recognize situations in which certain public participation approaches are likely to succeed or fail.

Synthesizing Domains "Public" and "Participation" for PPGIS

Jackson's integrated matrix presents a good model for the PPGIS community to emulate and build upon. PPGIS represents varied types of endeavors, and providing some definition, guidance, and expectations with certain PPGIS goals and objectives will benefit PPGIS practitioners, researchers, and others who come in contact with PPGIS projects.

Figure 5 and Figure 6 present two potential approaches to begin integrating these notions into some sort of reasonable order that can be used to reflect upon PPGIS more diligently. The first matrix (Figure 5) is constructed around more general conceptions of "public" and "participation." Along the horizontal axis are broad types of "public," ranging from simple to complex. In this case, a simple public is one in which the actors are relatively well defined and relatively small in numbers. That is, identifying and engaging this group of people is a relatively simple endeavor. A complex public is one that is either less well defined or one of such a substantive size and/or heterogeneity that any efforts of

Figure 5. Metadomain Matrix of Public and Participation

engagement become more difficult, both logistically and financially (Thomas 1995).

Domains of participation are along the vertical axis and also range from simple to complex. On this axis, however, a simple variable refers to a type of participation that is relatively easy to carry out and tends more toward methods of one-way communication intended for simple education or informing a certain population. A complex variable is one that requires much more in-depth and ongoing interaction, takes longer to develop and carry out, and shares power across parties.

It should be noted that the range of the categories are deliberately minimized for presentation clarity, but could be considerably expanded building on notions presented earlier in this paper. Likewise, some may find that the categories as presented are already too nuanced and could be combined. The goal of assembling these matrices, then, is to provide enough nuances in the domains to reflect real differences in the types of public and participation, while still maintaining a relatively clean conceptual framework. So, although the categories do represent a broad and diverse set of factors, the matrix may be adapted as seems applicable or reasonable.

Each cell of the matrix can then contain certain attributes, based on its location on both axes. It is important to note that PPGIS activities need not reside solely in a single cell; there can be fluidity between cells, and some projects may move from cell to cell during the life span of the project as the needs and objectives evolve over time. The cells therefore, and the entire matrix in general, should be conceived as a way to conceptualize the primary or individual aspects of a particular PPGIS project, providing some initial guidance and context upon which a PPGIS endeavor can proceed thoughtfully and deliberately. In Figure 5, four cells have been numbered to provide examples of the use of the matrix. Each numbered cell represents a particular PPGIS project and in addition to the "public" and "participation" identi-

fied on the axes, it is also possible to examine the expected output and expected outcome of a PPGIS activity. Each numbered cell is described in the following scenarios:

Scenario #1: Poverty Mapping
Public: Decision Makers (city council)
Participation: Educate
Expected Output: thematic maps by city council district
Expected Outcome: increased political support for local human-service agencies
Description: In this case, a local nonprofit organization that works on poverty issues is interested in utilizing GIS to increase the political support of the organization and its larger poverty-oriented goals. The public in this case is the local city council, and static maps of poverty are to be produced by council district to help educate each city councilor about the poverty situation within his or her geographical area of responsibility. Participation is rather simple—simple education. Likewise, the identification of the public is rather simple because the political decision makers are easy to identify.

Scenario #2: Regional Conservation Planning
Public: Implementers (agency staff)
Participation: Joint Planning
Expected Output: maps of conservation criteria and conservation priorities
Expected Outcome: more efficient conservation implementation
Description: In this case, a number of government staff from across agencies within a region want to identify and prioritize conservation projects. Using GIS to visualize the effects of different conservation criteria will help this collaborative

Figure 6. Goal-oriented PPGIS Matrix

Figure 6. Goal-oriented PPGIS Matrix

effort to prioritize projects, with the goal of increasing the efficiency and effectiveness of the regional conservation strategy.

Scenario #3: Community-based Stream Restoration
Public: Affected Individuals (neighborhood residents)
Participation: Partnership
Expected Output: restoration progress reports (with maps)
Expected Outcome: restored stream environment and sustainable community buy in
Description: In this case, a local neighborhood is interested in restoring a local stream that city resources will not be able to address. Working in loose partnership with the city, local residents want to build local capacity and interest for an initial restoration of the stream as well as continued monitoring and upkeep. The neighborhood citizens will create a series of quarterly progress reports to continue to educate the surrounding neighbors (and the city) about the progress being made. Perhaps more importantly, the community-based data collection for the maps and the maps themselves are to be used as ways to seek local volunteers and to build a sustainable streambed-monitoring capacity.

Scenario #4: Museum of Technology Exhibit
Public: Random Public (paying museum customers)
Participation: Inform
Expected Output: interactive maps and models
Expected Outcome: greater understanding of spatial relationships
Description: In this case, the local museum of technology has created a GIS-based exhibit that allows the general public to "see" its region in new ways, allowing the public to turn on and off spatial layers of parks, transit, and use, etc. Local GPS-equipped buses are also shown moving about on a large map projected on one wall of the museum, allowing museum patrons to gauge the pulse of their city. The public's participation is quite passive, and thus simple in nature, although the public itself is a diverse set of people from both within and outside the region.

These scenarios represent a few of the types of PPGIS activities that currently take place in a variety of places. Filling out the rest of the cells could provide an even more diverse set of PPGIS applications. What is apparent even in this small set of scenarios is that each project has clearly different participants, ways of participating, and differing project goals. Thus, when one talks about PPGIS as a means to an end, it is important to remember that PPGIS itself represents a multitude of possible realizations.

Also, while these scenarios represent the locations in the matrix of projects that have already happened, a potential project in the planning phase could utilize this matrix approach as well. By extracting the desired outcome from each scenario and placing it in the corresponding cell, those wanting to use PPGIS could locate the type of goal or outcome they would like to achieve, and then scan the axes to get a sense of the type of public and the level of participation that is necessary to reach their goals. For example, using Figure 6 as a basis, one could decide that "community buy in" was the primary goal for a PPGIS project and in order to receive that level of community commitment, a partnership of affected individuals must take place. Of course, it is then critical to have a sense of how to develop partnerships, but the first step in the PPGIS planning process has taken place. It is, of course, possible to have similar goals and outcomes (e.g., increased community buy in) in multiple cells. Therefore, it may be difficult to cleanly work in this backwards fashion—starting with the goal and then identifying a public and a participation to target. Nonetheless, it may be possible to use this goals-first approach to at least focus the discussion at the PPGIS project planning phase and to understand that goals and outcomes can

Figure 7. Techniques-oriented Matrix of Public and Participation

differ depending on the type of public and participation that is included.

An alternative and complementary way of more fully integrating the notions of "public" and "participation" in PPGIS is presented in Figure 7. In this model, the domains of public along the horizontal axis remain the same as in Figure 5, but the vertical axis is now organized around specific techniques of participation. The techniques range in a similar fashion of simple to complex, with a static Web page representing a simple technique of participation and collaborative decision-making processes representing the complex end of the spectrum. A static Web page can be considered a simple participation technique because it represents one-way communication with the hope that viewers of the Web page will then be educated or take some action simply by viewing data in map form. A collaborative process is complex because it requires consensus building of participants and a considerable amount of time to work effectively.

Clearly, there are scores of more participation techniques, which can and should be augmented to this simplified representation. And, as in Figure 5, individual cells of this table can be fleshed out with specific applications of PPGIS, including the goals and objectives that such endeavors encompass. As mentioned previously, when these cells are filled with such information, a PPGIS user then can scan the types of public and participation that is desired or possible and get a sense of what outcomes can be expected. Alternatively, the cell containing desired outcomes can be found, which would then inform a PPGIS user about what type of public and what type of participation need to be used. (Although, as noted before, similar goals or outcomes may be present in multiple cells.)

Conclusions

As the uses of GIS continue to expand beyond technician-oriented, scientific applications and it is recognized as a potential tool to facilitate public participation and decision making, it is important that we become sophisticated in how we think about it. Linking a GIS project to notions of public participation seems arbitrary in the absence of an understanding or consciousness about the domain in which the project takes place. Simply labeling a GIS endeavor as PPGIS because a nontechnician is involved is disingenuous to the many efforts of non-GIS public participation that seek to enhance the democratic process. On the contrary, being explicit about the domain within which a particular PPGIS endeavor falls can enhance the credibility, efficacy, and theoretical foundation of such a project.

As mentioned previously, it is important for PPGIS practitioners and scholars to be conscious and explicit about their conceptions of "public" and how such a public is selected. While the notion of public involvement may seem intuitive at first and easy to understand, clearly there are different biases, opportunities, and limitations to how a public is selected and incorporated into a PPGIS project depending on the frame of reference one uses. Providing a good contextual starting point, as presented in the matrix here, can be an invaluable resource to the administrators and staff throughout a range of government, private, and nonprofit organizations as they seek ways to pursue collaborative, engaged, and spatially-based approaches toward their work.

Clear understanding of the unique and varied domains of "public" and "participation" will help PPGIS users, researchers, and scholars more clearly place their work into specific contexts as well. This paper has attempted to: 1) review the literature on public participation; 2) illuminate the importance of paying attention to these foundational elements of PPGIS; and 3) present a potential model to guide further delineation and exploration of these important concepts. The matrices presented here are not meant to represent the authoritative domains of "public" and "participation," nor are they necessarily a cookbook approach to doing PPGIS. Rather, these PPGIS matrices are designed to provide a conceptual starting point for PPGIS endeavors and a way for those interested in PPGIS to appropriately conceptualize,

plan, carry out, and evaluate their efforts from a more informed beginning place. The visual nature of GIS presents a great opportunity for increased public participation; we just must be clear on exactly what we mean by both "public" and "participation" in a GIS context.

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