The Intersection of Data Access And Public Participation: Impacting GIS Users' Success?

David L. Tulloch and Tamara Shapiro

Abstract: *Discussions about Public Participation Geographic Information Systems (GIS) often combine ideas about access and participation as if the terms were nearly synonymous. This article describes a framework that treats access and participation as distinct characteristics of public GIS use and suggests ways in which they interact. It builds this framework with two "ladders;" a new conceptual "ladder of data access" is offered to compliment the more traditional ladder of public participation. The framework also suggests that successful and unsuccessful outcomes may not rely as heavily on access and participation as is often presumed. Both real and hypothetical cases are used to illustrate the eight different types of situations that are created in this framework.*

Introduction

A growing literature is emerging on the topics of Public Participation Geographic Information Systems (PPGIS) (e.g., Craig et al. 2002) and access to data (e.g., Craig 1992 or Masser and Campbell 1995). Much of this is predicated on a basic assumption that healthy participation in public decisions requires relatively fluid sharing of data from producers to likely participants (Onsrud 1998). While there is a common assumption that limited or no access has prevented participation, there has been little exploration of the relationship between data sharing and participation. This relationship deserves more attention than it traditionally receives. Our examination offers reasons to believe that participants' "success" is not as closely linked to access and participation as might be assumed.

There are many different ways of describing the activities of participation and access, but we are particularly interested in the supply-side aspects of these issues. That is to say, we are interested in occasions when a data-producing government agency is responsible for limiting access or when a decision-making agency prevents citizens from participating in decisions. This should not be taken to imply that other barriers to access (such as economics, education, and geography) are not equally important, but simply focuses the discussion on this one important and visible component of access and participation.

This article offers a practical means for describing different levels of public access to data. It describes a framework for considering the relationship between access and participation in public situations. The framework that we describe argues for a more complex relationship than might be suggested by the common binary offering of either no access and participation or an abundance of access and participation. Additionally, this framework illustrates areas where future research should be directed to help fill gaps in the Geographic Information System (GIS) case-study literature.

Public Participation As a Progression

Arnstein's "ladder of participation" (1969) has been used to describe public participation as a multi-level process (Carver 2002). Each rung on the ladder represents a level of public decision-making authority, ranging from manipulation (tokenism) to citizen control (citizen power). Arnstein's ladder was comprised of only eight rungs, but there could be many more with using more detailed distinctions. The point is that many gradations and distinctions exist in the spectrum of public participation programs (Arnstein 1969:217). In 1993, Weidemann and Femers adjusted Arnstein's participation ladder to reflect a somewhat more pragmatic viewpoint (Figure 1).

The first two rungs of Weidemann and Femers' ladder, "the public right to know" and "informing the public," reflect a common understanding of access as a form of participation. This conceptualization blurs the distinction between participation and access by suggesting that informing the public is simply a form of participation. One could just as easily define access based on "access" to the decision-making process. This would render access and participation as not only closely linked, but practically indiscernible. Although this may lead to some very interesting discussions, that discussion undermines the utility of the distinctions we are exploring here. Instead, we suggest that public access and participation be treated as occasionally overlapping, often related, but never quite the same.

The Ladder of Public Access

In discussions of public decision-making processes, the term "access," like "participation," can be interpreted in a variety of ways. Here we use it narrowly to describe the degrees to which data users might use or acquire public data from a variety of public and private sources.

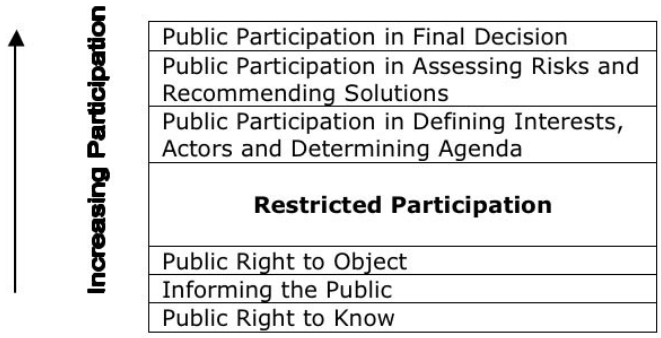

Figure 1. The widely embraced "ladder of public participation" (from Arnstein 1969) is reproduced from Weidemann and Femers (1993). This metaphor has served as a basis for public participation research (and subsequently PPGIS work) for the better part of the last three decades.

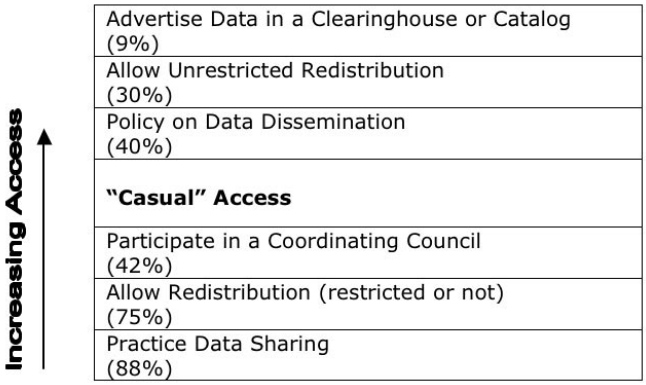

Figure 2. The ladder of public access as constructed from responses to the FGDC Framework Data Survey. Each rung of the ladder is labeled with the percentage of local governments reported to be engaged in the different levels of access (Tulloch 2001).

The United States Federal Geographic Data Committee (FGDC) conducted a nationwide survey of likely framework data producers (the survey process has been detailed by Tulloch and Robinson 2000). The FGDC Framework Data Survey asked data producers questions about several different ways in which they allow access to data (Tulloch and Fuld 2001). The responses indicated a progressing spectrum of access activities. While the vast majority of producers allowed data sharing, very few producers actively advertised their data in data clearinghouses or catalogs. In between the producers who actively facilitated the distribution of their data and those who did not share data at all were four other levels of access (Figure 2). Three common forms of access were: data sharing (88%), limited data redistribution (75%), and participation in a coordinating council (42%). Since these three activities often require minimal exertion on the part of the data producer, we group them as "casual" access practices. The three less common access activities were: implementation of a policy on data dissemination (40%), unrestricted data redistribution (30%), and advertising data in a clearinghouse or catalog (9%). The latter three activities demonstrate a greater commitment to access, since they often require more work and can involve additional exposure to risk.

Based on the results of this survey, we constructed a somewhat parallel "ladder of access" metaphor that shows a range of access levels, from the low rung of data sharing to the high rung of advertising data (Figure 2). Admittedly, the levels in this ladder are more measured and specific than those in either participation ladder.

There are many reasons that access may not be available. Some organizations would suggest that they simply do not have the resources, such as time, finances, or technology, to facilitate access to their data. Others might seek to increase the value of their data by limiting its availability. Speculation about low-quality data or inappropriate decision making often surfaces in association with limited access. Many limit access as part of a larger attempt to generate revenue through various cost recovery efforts. Some organizations have not enacted a policy of access, but only casually release their data to those who "jump through hoops" to get it.

For the purposes of this article, we suggest another reason that data might not be available: the government agency (associated with a low level of access) simply does not have the data. Certainly, it would not be a surprise to find that agencies with less data are less aggressively pursuing advanced access policies such as advertising their data.

Bringing Together Participation and Access

Participation and access, while often linked, are clearly distinct issues. The ladders of participation and access demonstrate ways that they each can be experienced at varying levels. How the two activities relate is more complicated.

Conventional wisdom holds that access is a key prerequisite to participation, with the general assumption that GIS use will be unsuccessful when access and participation are denied and will be successful when they are both present at high levels. Clearly, participation and access are related, but does access bear participation as a necessity? What roles do access and participation play in determining successful outcomes? We can explore these ideas further by examining possible combinations that could exist between the presence and absence of both concerns.

For simplicity, we identify the extremes of four different descriptions of situations: 1) No or Low Levels of Access, 2) High Levels of Access, 3) No or Low Levels of Participation, and 4) High Levels of Participation. These descriptions can be combined to describe four different types of access and participation situations (Figure 3). Types I and IV seem to represent a positive correlation between increasing levels of access and participation that reflects the conventional wisdom on the relationship between participation and access. However, further discussion of the permutations reveals the opportunities that lie elsewhere.

	No or Low Levels of Access	High Levels of Access
No or Low Levels of Participation	I	II
High Levels of Participation	III	IV

Figure 3. This matrix shows the four types of situations that result from considering different combinations of the presence and absence of access and participation.

In our analysis, we also consider participant outcomes: did the data user (organization or individual) meet his/her objectives using the data or information that they attempted to access. We will assume two different thresholds: the role of the user and the difficulty of the project. The potential participant should actually play a role in the successful achievement of their goal if it is to have some significance in our framework. The potential participant should also have a goal of some difficulty in order to be considered.

Four Types of Access/ Participation Situations

For each of the four types of situations, we describe the conditions at play in that circumstance and a case of successful and unsuccessful GIS use.

Type I

This category describes a combination of no or limited level of access with no or limited level of participation. Type I might most easily be associated with environments in which there exists a relatively limited interest on the government's part in allowing the public to have any sort of role in government decisions. A hypothetical Type I example would be a community group wishing to participate in the process of siting of a military facility. Although the community may well have a stake in the location of such a facility, any public access to geographic data and participation in the decision are outweighed by issues of national security. The eventual construction of the facility would render the community group's efforts "unsuccessful."

However, we might include a different scenario, such as one where a user of Geographic Information Technology (GIT) (e.g., The Nature Conservancy) finds the available data lacking (effectively a low level of access) and generates its own data to identify land to acquire as an end-run around government agencies which will not or have not preserved the properties that The Nature Conservancy sees as much important.

The distinction that we can draw between the community group opposing the military facility and The Nature Conservancy is that one group is able to successfully achieve its goals (through a combination of access and participation) and one is not (due to a lack of both access and participation). Certainly, it may be surprising to realize that Type I situations can still lead to outcomes that can be termed successful. Regrettably, these situations do not appear to be very common because they require significant resources and a willingness to employ them.

Type II

Situations in which a high level of access is coupled with a low level of participation are categorized as Type II. These situations involve the denial of participation, which are not well documented within the GIS community. A hypothetical example of an unsuccessful Type II can be imagined in the case of a federal Environmental Impact Statement (EIS). A typical public participation process within the EIS begins with the initial scoping process as a federal agency engages stakeholders in identifying initial project issues. Based on these identified issues, the agency prepares a comprehensive EIS, often generating enormous amounts of data to describe the affected area and to identify the possible environmental consequences of proposed alternatives. After a draft EIS is prepared, the public can access the document and supporting data and provide comments to which the federal agency is required to respond. In some cases, citizens and citizen groups complain that an agency decision is predetermined, that large amounts of data are produced to obscure a flawed decision-making process, or that the data provided are simply too complex or erroneous. If their assertion is true, then a Type II situation would apply: access to data is provided, but the level of participation is limited.

Type III

The Type III situation presents a less expected variation from those where data access and participation are linked so tightly that they are always present or absent together. The Type III situation is one in which there is limited access, but a high level of participation. One example would be a non-governmental organization (NGO) such as a local watershed association that was alarmed by a proposed development (originally described in Tulloch 1998). The municipality whose planning board would be hearing the case had neither GIS nor any spatial data regarding existing conditions or possible impacts from the proposed development; we would describe this as a low level of access. The watershed association collected data from their own resources and from other public resources in order to analyze possible impacts from the development. They presented their findings at the public hearing of the proposed project and convinced the municipality to reconsider giving the "go ahead" for the project. The ability to produce maps from existing data sources helped the watershed association to participate meaningfully in the decision-making process.

In another example, NGOs in New Jersey suggested that maps produced from their "private databases have gotten them

	No or Low Levels of Access	High Levels of Access
No or Low Levels of Participation	**Type I** Successful The Nature Conservancy Unsuccessful Military Siting	**Type II** Successful Watershed association Unsuccessful EIS
High Levels of Participation	**Type III** Successful Watershed association Unsuccessful NJ NGOs	**Type IV** Successful The Wilderness Society Unsuccessful Citizen planning

Figure 4. This matrix includes each of the examples mentioned in the text, placed in correspondence with the type of situations with which they could most closely be associated.

	No or Low Levels of Access	High Levels of Access
No or Low Levels of Participation	**Type I** Successful: Least likely Unsuccessful: Most likely	**Type II** Successful: More likely Unsuccessful: Somewhat likely
High Levels of Participation	**Type III** Successful: Less likely Unsuccessful: Somewhat likely	**Type IV** Successful: Most likely Unsuccessful: Less likely

Figure 5. This matrix is offered to summarize the hypothesized likelihood of successful and unsuccessful outcomes for each type. It includes the two most likely and least likely outcomes that the authors anticipate finding in future research efforts.

more involved in planning board decisions" (Tulloch 1998). They believed that the maps (otherwise unavailable to the board) helped the board to take them seriously. They were only able to truly participate (to have their opinions be fully considered by the board) once the maps demonstrated that the organization possessed a sophisticated understanding or ability that gave their opinion sufficient weight to be considered. Still, they admitted, sometimes they were unsuccessful in convincing the board that the evidence they presented was sufficient cause to deny an applicant permission to proceed with a proposed development. While they were unsuccessful in changing the outcome of the final decision, the NGOs were engaged in a high level of participation very similar to that described by Weidemann and Femers (1993) as "assessing risks and recommending solutions."

Type IV

Another category combining access and participation – called Type IV – is a combination of high levels of both access and participation. The quintessential Type IV participant would be a group, such as The Wilderness Society, who, acting on behalf of their members and trustees, acquires spatial data to be used to influence environmental policy. Norheim (1999, in press) described an example in which the Wilderness Society accessed US Forest Service data and challenged it with their own as a means of participating in a major policy debate. To a reasonable degree, the organization achieves their goals through a combination of access and representative participation.

A less clear situation might be the citizens who download and use public data to create convincing portrayals of development problems in their neighborhood but find that the local planning board – even after fully considering the new presentation of ideas – remains unconvinced and issues a decision that does not satisfy the interests of the citizen-participants. The citizens experienced a relatively high level of participation since they were heard and taken seriously, even though they were unsuccessful in changing the outcome of decision. It is considered unsuccessful because the outcome did not achieve the citizens' goals.

Standing in the Intersection

The previously described examples illustrate ways in which participatory success can be experienced by GIS users. While the examples are more anecdotal, they demonstrate that user success does not depend on high levels of access and participation and is not guaranteed by it (Figure 4). It is worth noting that the successful scenarios for Types I and II both required extremely specific statements of the data users' goals – outside the purview of the involved government agencies – in order to describe a successful outcome. The difficulty in constructing these scenarios illustrates the overall difficulty in success without a relatively high level of participation. The key element is that success requires action by some entity other than the agency making data accessible.

Recognizing that each type of participation-access has both successful and unsuccessful options begins to alter a basic assumption that individuals and groups cannot succeed without access and participation. It also raises the unfortunate possibility in democratic societies of having high levels of access and participation and still feeling as though the effort was unsuccessful.

At this time the relationship between access and participation is described based on limited case studies. However, the very proposal of this identifies some interesting patterns in the case-study literature. In particular it highlights (through our reliance on hypothetical cases) types that are less commonly captured in the literature. There are several potential reasons why these situations are difficult to find in the literature:

a) they simply may not happen frequently;
b) it is harder to write about failures and even harder to write about politically uncomfortable situations (e.g., denials of access and participation); or
c) as the academic GIS community, we have simply been overlooking these occurrences.

Future Directions

The discussion of the relationships described in this article is meant as a preliminary framework for future research. Were it to be used, we would hope for continued revisions and refinements. Certainly as additional cases are identified, they would assist in

the development of much more robust definitions of the terms and assumptions that have been used thus far. Additional cases could also help demonstrate any correlations that might exist between specific conditions.

Building on this preliminary discussion of the framework for considering how access and participation relate, future research is encouraged that better illustrates all eight possible outcomes (successful and unsuccessful example of Types I–IV). Additionally, future research could explore the extent to which each type of situation arises. We have hypothesized our own expectations as to how this likelihood might be distributed (Figure 5). The clustering that may be evidenced by actual patterns of access and participation could reveal much more important realities about the circumstances under which organizations and individuals find themselves trying to succeed.

Another question for further consideration is the relationship between the four types of situations and how it relates to the model for Multipurpose Land Information System (MPLIS) development (Tulloch 1999) which describes the final stage of development as democratization and which links the benefit of equity (or empowerment or engagement) to the MPLIS development model (Tulloch and Epstein 2002). Access and participation are both described as being conditions generally required for successful achievement of democratization, but this framework suggests a more complex view. While it might not alter the fundamental model, the types of access/participation in the framework may offer a new understanding for the model.

The context in which the authors have made their preliminary development of this framework is the traditional American democratic community in which access and participation are typical community standards and agencies generally work toward the appearance or actual provision of access and participation. A very exciting opportunity exists to expand this framework within the much more complex European setting, where expectations about the nature of government vary from one nation to the next.

Like any model, the one described here is a simplification of a much more complex reality. The authors are quite interested in seeing this rather simplistic model expand to capture the more complex realities of access and participation. The metaphors of the access and participation ladders certainly suggest the possibility of a 6 x 6 matrix capturing their possible combinations. However, subtle distinctions between varying levels of participation and access would seem to complicate this as a practical tool. Instead, we might suggest a simple next step of expanding all three axes to three categories (none, low, and high for participation and access; successful, mixed and successful for outcomes). The binary scheme proves useful as an initial point of departure; it offers a very manageable set of eight combinations. In contrast, a 3 x 3 x 3 matrix offers many more possibilities and opportunities to provide a much more complex description of the patterns that are occurring in these systems. Whatever the resolution, this categorization of cases should contribute the ongoing, albeit informal, formation of a taxonomy of Public Participation GIS.

About the Authors

David Tulloch is an Associate Professor of Landscape Architecture at Rutgers, The State University of New Jersey. He also serves as the Associate Director for Program Development at Rutgers' Grant F. Walton Center for Remote Sensing and Spatial Analysis.

Corresponding Address:
Department of Landscape Architecture
93 Lipman Drive
Cook College
Rutgers, The State University of New Jersey
New Brunswick, NJ 08901
Phone: 732.932.1581
Fax: 732.932.1940
dtulloch@crssa.rutgers.edu

Tamara Shapiro is the Sumner M. Swaner Professor of Landscape Architecture in the Department of Landscape Architecture and Environmental Planning at Utah State University. She holds a Master of Landscape Architecture degree from Cornell University and is a Ph.D. student in the Department of Geography at Rutgers University. Her research interests include PPGIS in natural resource planning.

Corresponding Address:
The Swaner Green Space Institute
Landscape Architecture and Environmental Planning
Utah State University
4005 Old Main Hill
Logan, UT 84322-4005
Phone: 435.797.0960
Fax: 435.797.0503
shapirot@hass.usu.edu

Acknowledgments

This research was made possible, in part, through support from the New Jersey Agricultural Experiment Station (Hatch No. 84101).

This article is based partially upon work or participation in a workshop supported by the National Science Foundation under Grant No. 0098389 and the European Science Foundation. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation or the European Science Foundation.

References

Arnstein, S.R., 1969, A Ladder of Citizen Participation. American Institute of Planners Journal, 35, 216-224.

Carver, S., 2001, Participation and Geographical Information: A Position Paper. Workshop on Access to Geographic Information and Participatory Approaches Using Geographic Information, Spoleto, Italy, December 6-8, 2001. http://www.shef.ac.uk/~scgisa/spoleto/workshop.htm

Craig, W., 1992, Why We Couldn't Get the Data We Wanted. Journal of the Urban and Regional Information Systems Association (URISA), 4(2), 71-78.

Craig, W., T. Harris, and D. Weiner (Eds.), 2002, Community Empowerment, Public Participation and Geographic Information Science. (London: Taylor and Francis).

Masser, I. and H. Campbell, 1995, Information Sharing: The Effects of GIS on British Local Government. In Onsrud, H.J. and G. Rushton (Eds.), Sharing Geographic Information (New Brunswick, NJ: Rutgers, The State University of New Jersey), 230-252.

Norheim, R.A, 1999, How Institutional Cultures Affect Results: Comparing Two Old-Growth Forest Mapping Projects. International Conference of Geographic Information and Society, Minneapolis, MN.

Norheim, Robert A. In press. How institutional context affects process and results: Comparing two old growth forest mapping projects. Cartographica (special issue on PPGIS).

Onsrud, H.J., 1998, Legal Access as a Necessary Prerequisite to Participatory Processes. Workshop Paper for National Center for Geographic Information Analysis Specialist Meeting on Empowerment, Marginalization, and Public Participation GIS. http://www.ncgia.ucsb.edu/varenius/ppgis/papers/onsrud.html

Smith, N., 1992, History and Philosophy of Geography: Real Wars, Theory Wars. Progress in Human Geography, 16, 257-271.

Tulloch, D.L., 1998, Environmental NGOs: Community Access to Technology as a Force for Change. Workshop Paper for National Center for Geographic Information Analysis Specialist Meeting on Empowerment, Marginalization, and Public Participation GIS. http://ncgia.ucsb.edu/varenius/ppgis/papers/tulloch/tulloch.html

Tulloch, D.L., 1999, Theoretical Model of Multipurpose Land Information Systems Development. Transactions in Geographic Information Systems, 3(3), 259-83.

Tulloch, D.L. and E. Epstein, 2002, Benefits of Community MPLIS: Efficiency, Effectiveness, and Equity. Transactions in Geographic Information Systems, 6(2), 195-212.

Tulloch, D.L. and J. Fuld, 2001, County-Level Production of Framework Data: Pieces of a National Spatial Data Infrastructure? URISA Journal, 12(2), 11-21.

Tulloch, D., and M. Robinson, 2000, A Progress Report on a U.S. National Survey of Geospatial Framework Data. The Journal of Government Information, 27, 285-298.

Wiedemann, I. and S. Femers, 1993, Public Participation in Waste Management Decision Making: Analysis and Management of Conflicts. Journal of Hazardous Materials, 33, 355-368.