

# **E-government and Planning**



**Key Citizen  
Participation  
Issues and  
Applications**



**Edited by**

**Jennifer Evans-Cowley and  
Maria Manta Conroy**

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## CHAPTER 1

### Introduction

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#### Overview

Citizen participation is a much discussed yet still elusive goal of governmental organizations at all levels. Local governments, which are arguably the entities most directly connected to their constituencies, face a regular challenge of giving information to and getting input from those they serve as their citizenry is both increasingly pressed for time and faced with conflicting priorities. The use of Internet and Communication Technology (ICT) is one potential means for local governments to enhance citizen participation. Public participation in government decision-making processes is often a challenge for both the government entity and the participant. Government challenges include assessing the representativeness of participants, ensuring the clarity of the government message or position, and coordinating meeting logistics of place and time to get the best turnout for public meetings. Citizens must determine whether the intent of the meeting warrants juggling work or family time, whether they feel they will be heard and responded to, and just how important the issue under consideration is to them personally. The government's use of ICT, or more generally e-government, may not be a panacea for all the challenges of public participation, but it provides an alternate communication channel to reach a potentially broader group of citizens.

The intent of this compilation is to provide insight into the available tools and necessary considerations for local governments to initiate successful online citizen participation tools. The first section of the work addresses the existing landscape of e-government tools for local governments (what is out there?) and key considerations when looking at that landscape (what are the pitfalls?) by presenting an overview of the key issues faced by local governments as they attempt to adopt e-government strategies to enhance public participation. The second section provides insights into using e-government tools such as interactive Geographic Information Systems (GIS). We conclude this work with a review of major findings and a look ahead to potential changes in local e-government practice and research.

#### E-Government Participation Issues

Public participation may at times be considered as unattainable as world peace for local governments. Whether updating a land use plan, revising local legislation, proposing budget changes, or just trying to dispense information local officials are often left with a regular and limited "cast of characters" at public meetings. The use of e-government tools offers alternate channels of participation to address this challenge, but they may raise new participation issues as well as issues similar to existing ones. The four papers in this section give both a broad overview of participatory e-government and a more detailed look at key considerations in the design and use of e-government tools.

The section begins with a look at the status of e-government across the United States. Kaylor provides an assessment of e-government offerings in U.S. cities with populations over 100,000. The author's review is part of an ongoing longitudinal assessment called the Municipality eGovernment Assessment Project (MeGAP). MeGAP benchmarks online service provision for information, interaction (e.g., registration, permits, GIS), transaction (eCommerce), and transformation (eDemocracy). The scores from his assessment highlight that while significant progress has been made since the start of the study in 2000, most of the online e-government participation opportunities remain basic and focus on information dissemination rather than entering the realm of engaging and transformative eDemocracy.

Stein takes a more abstract look at the e-government landscape by offering a conceptual framework for evaluating how specific technology tools fit in applying e-government to local planning. Stein then introduces five emerging technology-based tools (e-permitting, content management systems, webGIS, visualization tools, and impact analysis) being used to incorporate e-government into planning. Stein offers that the local e-government tools can not only expand the participation realm beyond jurisdictional boundaries, but can also help local governments to examine e-government services from a regional perspective.

Participation challenges in the realm of e-government are highlighted by two factors that, while also at issue for in-person participation, raise new issues when transported to the realm of ICT: accessibility and trust. Wheaton and Bali provide critical insight into these issues to explore what is needed to create an accessible e-government offering. The authors review the legal framework for creating an accessible website, and then highlight common problems found in websites that make them inaccessible for specific segments of the community population. Wheaton and Bali wrap up with resources for addressing the most common problems.

Mossberger and Tolbert present the influence of e-government on citizen attitudes toward their government. In particular, the authors review the e-government landscape from the perspective of citizens' relationships with their government, why citizens use e-government, and what they expect from e-government. They also raise challenges that transcend any participation forum—representativeness and the digital divide. Finally, the authors wrap up their look at the e-government landscape by posing challenges for future research in this area.

### **E-Government in Action**

A critical component of any e-government offering is that it works in practice. It is a daunting endeavor to create an e-government offering, and it is a disaster to go through the process and then find it is not being used. It is valuable, therefore, to look at specific tools implemented elsewhere. While each community has its individual characteristics, there are a collection of tools that have garnered wide-spread attention. The three papers in this section examine in detail specific examples of popular e-government participation tools in practice.

Prosperi begins the section with an introduction to the use of interactive GIS for citizen participation. Interactive GIS has become a bandwagon of sorts, necessitating a critical appraisal of the tool. Prosperi's discussion of terms and typology of examples serves as a useful foundation for building public participation GIS systems. The author also offers specific findings based on examples which emphasize that the tool offers many possible implementation strategies, not all of which will enhance public participation.

Al-Kodmany focuses on the use of Web mapping and GIS to facilitate communication between local planners and the public. The author presents examples that demonstrate two-way (and even three-way) levels of communication to enhance public participation. The examples show the value of this tool not only for the public, but for the planners as well.

Finally, Evans-Cowley and Conroy highlight the use of e-commerce applications to facilitate business operations between planners and the public. E-commerce, like interactive GIS, is a potentially valuable tool that can not only save citizens and governments time and money, but can also enhance the dialogue between government, citizenry, and developers. The authors present key e-commerce development considerations as well as examples of how e-commerce applications can be used to encourage citizen interaction with government.

### **Summary**

This compilation addresses practical aspects of e-government participation tools as well as research underlying their use. The issues discussed in the first section help define the broad landscape of local e-government—what it is, what it uses, and what precautions are needed. The examples and insights of the second section highlight useable experiences to help navigate this landscape.

As the reader explores this work, it must be acknowledged that this is a snapshot (or a collection of snapshots) of a dynamic landscape. New and improved e-government offerings and issues arise daily. However, fundamental elements that are presented here provide insights that we hope will be valuable for exploring this area whether as a practitioner developing a first e-government offering or addressing expansion of an existing, limited e-government site; or as a researcher interested in grasping the complexities facing citizens and governments who venture to enhance the local participatory experience.

## CHAPTER 2

# The State of Local E-Government and E-Democracy: Benchmarking the Progress of US cities at providing online opportunities for Citizen Engagement

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#### Abstract

Local governments are largely blind to the capacity of technology to foster new participation opportunities for the citizens they serve. New data from the third wave of the Municipality eGovernment Assessment Project (MeGAP), an assessment of web-enabled e-government implementation among US cities over 100,000, show just how little has been done to promote actual public participation. There have been noteworthy successes, of course. Many cities have made information increasingly available and with a high degree of interactivity. But beyond information dissemination, basic forms of e-commerce and occasional streaming media or online forums, most cities have merely dabbled in providing online participatory opportunities to citizens, let alone online democracy.

#### Introduction

Given the dramatic increase in the flexibility and affordability of web-based technologies, manifold opportunities appear for fostering new forms of participation and action. Indeed, precisely because information and communication technologies (ICT) enable far-flung voices and constituencies to coalesce around issues, web-based efforts at bolstering discourse have potentially transformative effects. New interest groups, social movements and forms of activism and deliberation are proliferating, creating the hope that renewed (or simply new) civic energies will have a lasting effect and citizenship will be transformed. An important question regarding the transformative effects of technological implementation, of course, is the degree to which the institutions formally endowed with decision-making powers are themselves undergoing change. This paper describes the evolution of participatory technologies implemented by a subset of these institutions—large U.S. cities.

Since the dawn of western democracy, a tension has existed between those arguing for an active, engaged populous and those interested in maintaining a separation between the *vox populi* and institutions formally endowed with the capacity to make binding decisions. In short, the internal logic of governments as organizations impels them toward isolation of their decision-making processes from the temporal and fickle will of the public (Cf. Weber, Michels). At the same time, those valorizing the role of the public in decision-making and the vital role of public participation to the health and sustainability of democratic institutions have long sought the means to render the processes of governmental action more transparent and accountable to the public. These questions are constantly revisited among those interested in bringing the public voice into decisions with public effects (Cf., Forrester).

In recent years, advances in technology, particularly the advent of the Internet and the World Wide Web, have led to a renewed hope for increases in civic engagement and the strengthening of democratic processes. New and proliferating information and communications technologies seem to promise a broadening of information dissemination and the creation of new modes of communication among citizens and between citizens and their governments. Yet, the study of municipal websites described in this paper suggests local governments have yet to implement technologies in any broad scale that would tend to foster such new modes of citizen participation. Local governments have made impressive strides for the most part at providing more and more access to documents and information. Additionally, local governments increasingly are utilizing models from the public sector to enhance interactive web access to their services and functions. But to date the overwhelming preponderance of technological implementation by local governments has tended to focus

on the potential for them to relate more effectively to their constituents as *customers* but not necessarily as *citizens*. Thus, this study suggests a lacuna remains in terms of fulfilling the promise of technology to provide opportunities for citizens to address public needs, their government and their elected officials.

This paper will detail the most recent findings of the Municipality eGovernment Assessment Project, an observational study of web-enabled services and features of official municipal websites. Longitudinal data now exist via this study, as all 57 U.S. cities with populations over 300,000 according to the 2000 Census have been observed each of the previous three years. This paper will explain the characteristics and development of web-enabled services among the cities and then focus on the degree to which these services include on-line opportunities for citizen participation.

## The Municipal eGovernment Assessment Project (MeGAP)

When they first began to use the web as for information and service delivery, local governments had next to no concrete best practices resources and very little in the way of concrete benchmarks of the progress local government were making in general. Very little consideration was given early on to making strategic decisions regarding which technologies to invest in and which services and functions to provide on line. As such, local governments tended to make *ad hoc* decisions, often with individual bureaus developing their websites without coordination across the organization. The result was that early municipal website development tended to be a cobble of ponderously organized, difficult to find information with very little interactivity or consideration for the audiences that would make use of them.

The Municipality eGovernment Assessment Project (MeGAP) had its origin in 2000 as an effort to provide a comprehensive compendium and benchmark of municipal experiments in the provision of web-based services. The strategy for the development of this methodology was to focus on information that would be of use to egovernment implementers, creating an overview of what other local governments had done to inform their own decision-making. The study focuses, then, on observing the degree of interactivity across a range of performance dimensions. The approach only assesses those services that are accessible to an outsider visiting a municipal government's official website, measuring the existence and level of sophistication of services and providing a summary "eScore."

This approach is deliberately at tension with a variety of rubrics for evaluating services that were available at the time of its development. When this study was initially devised, there were already several efforts at evaluating (and developing metrics for evaluating) the success of websites provided by local (Holden, Norris and Fletcher 2003; Kanfer and Kolar 1995; Johnson and Misisic 1999; and Stowers 1999), state (West 2000), and federal (Eschenfelder 1997, and West 2000) governments. These approaches shared an interest in devising an evaluative rubric for already existing efforts with an eye toward improving implemented services and offering best practices advice for prospective services. What none of these studies could do, however, was provide concrete advice on the sorts of services offered, which cities had provided which sort of web-based services and which services were most common. The result of this lacuna at the time was an absence of a reliable assessment of the state of municipal egovernment.

Contemporaneously with the evolution of the MeGAP as a benchmark of egovernment, several organizations and researchers began publishing rankings of websites. Most notably, Darrell West's "Urban E-Government, 2003" provides one of the more comprehensive assessments of the state of municipal governments, providing "a detailed analysis of 1,933 city government sites in the 70 largest metropolitan areas" in the U.S. Also private organizations such as the Center for Digital Government announces its "Best of the Web" rankings for municipal, county and state governments, based on its annual surveys.

Unlike all of these studies, however, in addition to devising a rating system based on the composite eScore, the MeGAP also provides a fine-grained analysis of particular functions and services that cities have characteristically provided for generations combined with those functions that are the hallmark of the information age. The relatively straightforward method for gathering these data begins with an observational study of official municipal websites. Each website is assessed across a wide range of performance dimensions that fall into four categories (for a full listing, see Appendix A):



- Information Dissemination (online presence)
- Registration, Permits & GIS (interactive functions)
- ECommerce (transactional functions)
- EDemocracy (transformative functions)

The MeGAP uses a 4-point system to assess the degree of implementation of the 75 performance dimensions under these general categories. Points are awarded for each dimension based on the degree of interactivity of that web-enabled feature as follows: 1 point if information on a given subject exists; 2 points if contact information exists for the relevant responsible party; 3 points if documents and forms exist in a downloadable format; and 4 points if the transaction of information and data can take place completely online.

The result of this approach is a hyperlinked database that provides a fine-grained snapshot of all municipal providers of particular services. For example, when complete, the MeGAP will provide a comparison of all the online GIS services offered by municipal governments of cities with populations over 100,000. In addition to the wide swath of current practices by municipal governments, the MeGAP allows some overarching comparisons to be made. The scores for the individual performance dimensions are combined into a composite eScore for each city in the database.

### **The MeGAP's Measurements of Participation**

A major component of the MeGAP assesses the degree to which local government are attempting to foster participation. Arguably, the effort to improve information dissemination and providing better customer service increase civic satisfaction with their local governments. That said, cities are not identical to private sector organizations.

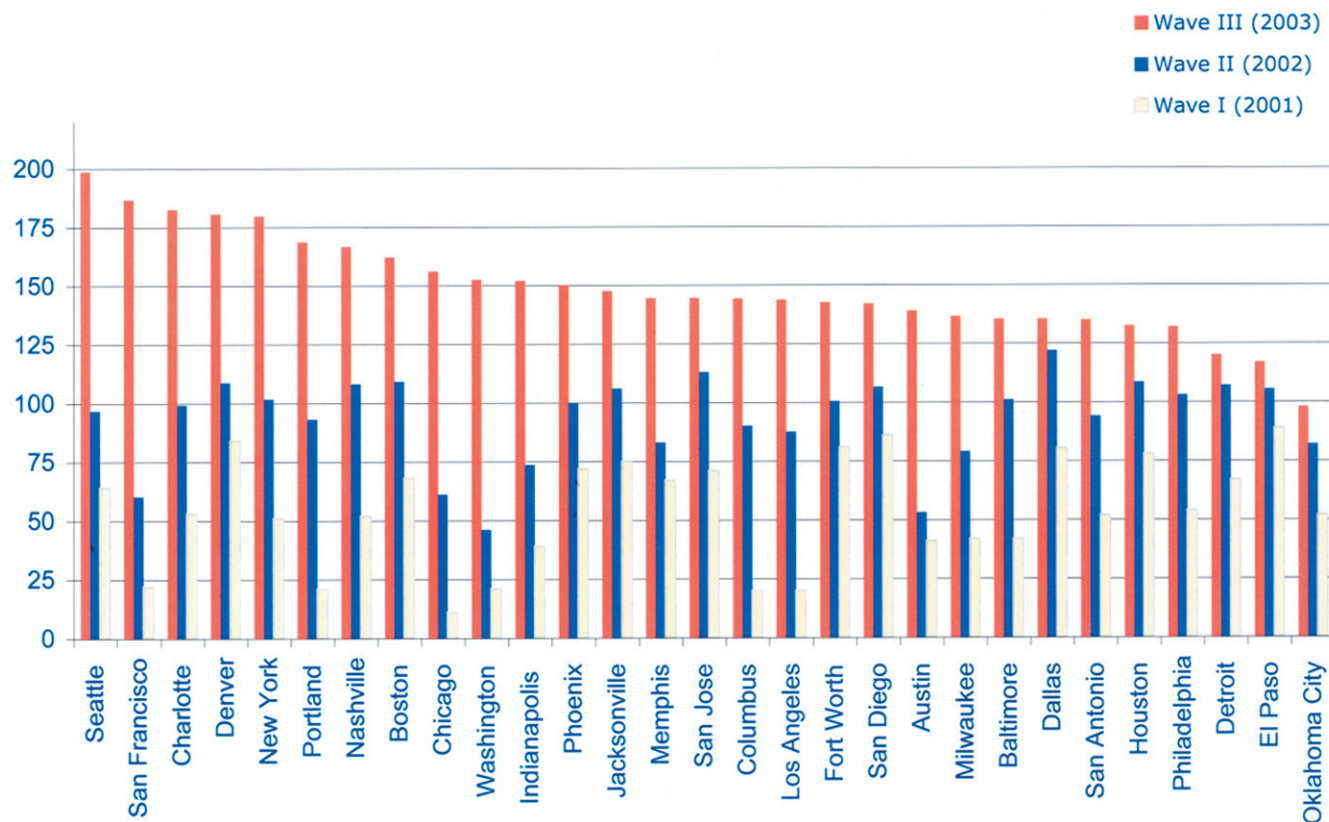
The MeGAP incorporates several measures that are exclusively focused on efforts at fostering participation and edemocracy (see Appendix A). Wave III incorporates assessments of online surveys, forums, e-meetings, e-mail lists, and streaming media. Moreover, the Wave III MeGAP assesses the presence municipal pages devoted to neighborhood specific information, opportunities for participation and voluntarism as well as user customization. In addition to several measures of information dissemination, these performance dimensions are tabulated into a "pScore," that summarizes a local government's effort of encouraging participation.

### **Findings**

The overall finding of this assessment of the largest U.S. cities is that a tremendous amount of progress has been made. For example, from Wave I to Wave III, the increase in the availability, interactivity and quality of web-based municipal services is stunning. As the Figure One shows, among cities over 500,000, eScores improved impressively over time. In part, this improvement has to do with several changes in the assessment instrument itself, primarily the inclusion of several new performance dimensions.<sup>1</sup> That caveat aside, controlling for new dimensions, eScores improved among all cities at each wave of observation. When the first data using what evolved into the MeGAP methodology were gathered in 2000, interactive functions and features were far less common. In fact, in the first wave of observations, only thirty-six of the 141 U.S. cities with populations between 100,000 and 200,000 allowed any interactive access to city hall beyond offering a generic email address or other minimal contact. Among all cities with official websites, a distinct minority offered interactive access to services and functions (Kaylor, Deshazo and Van Eck 2001). Only about one third of U.S. cities over 100,000 offered downloadable documents. The standard in 2000 was basic informational services.

As an example of overall development among local government websites, the basic organizational principal of municipal websites has changed. In 2000 most cities with official websites mirrored their departmental structures online regardless of how ponderous or arcane. The result was that anyone unfamiliar with which departments are responsible for which functions had to navigate the maze of municipal departments to locate particular information or services. Today, municipal websites are increasingly turning their attention to the needs of visitors to the websites rather than to the parochial inward interest of specific departments or other offices. While in the first wave of observations, finding specific documents or forms could be a frustrating and fruitless experience, local governments have clearly made a concerted effort at facilitating this process

in the intervening years. For example, most large cities provide some sort of online repository for forms and documents, easily accessed from the main page. Further, most local government websites are organized by a generalized understanding of who site visitors are likely to be (most commonly residents<sup>2</sup>, businesses, visitors to the city).

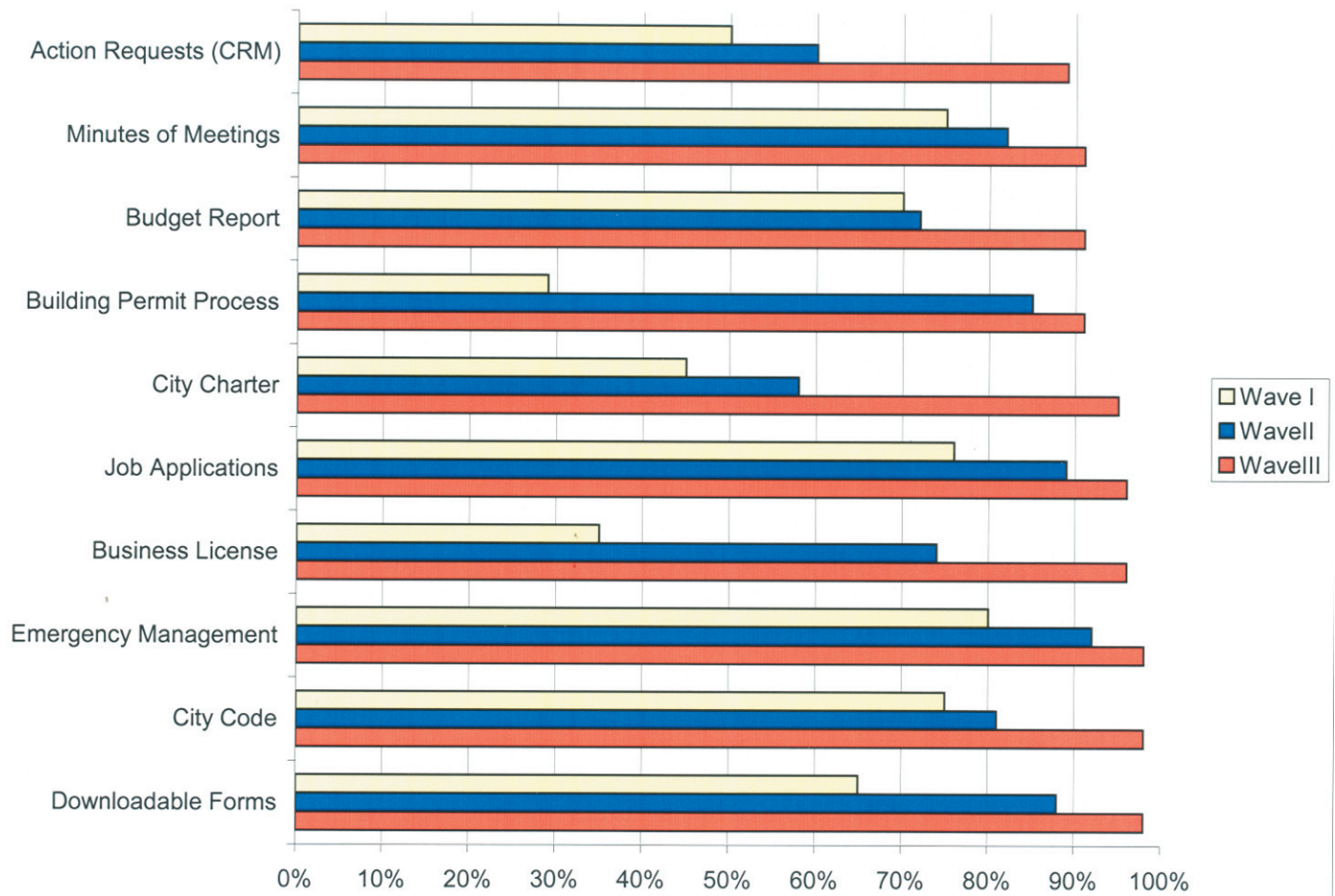


**Figure 2.1: Changes in eScores for US Cities (over 500,000 population)**

The general finding of the third wave of assessments of cities over 300,000 is that cities have made a huge swath of information increasingly available to the public. Figure 2.2 below shows the most common features of all websites of cities over 300,000, irrespective of degree of interactivity. Nearly all of these cities provide downloadable versions of their documents (usually in portable document format or .pdf). The same number has made locating such documents increasingly simple through some sort of centralized online repository or other document management system. Additionally, all cities over 300,000 provide online access to municipal codes and budgetary information (most with downloadable copies of budgets or summary budget reports). Despite the increasingly rich access to information, however, certain basics still elude cities. For the most part, while these large cities provide basics such as directions to facilities or hours of operation of particular offices. For example, while 88 percent have street addresses for facilities, very few provide a mapping feature. Only a small minority allows interactive access to municipal directories, with the large majority providing contact information via a single departmental phone number. Also, most large U.S. cities do not yet provide much website navigation assistance to site visitors beyond basic site maps and simple search engines.

Figure 2.2 demonstrates that large U.S. local governments are clearly offering information on a wider range of services today than they were in 2001. The overall provision of information across departments is emerging as a standard feature for municipal websites. For example, in 2001, web access to municipal codes and the building permitting process, while not at all unusual, were far from standard. Today, the overwhelming majority of cities over 300,000 provide access to these processes (with a growing number of cities providing interactive access to them). Similarly, those functions and features of local government websites that are most

common today had adoption rates far lower only three years ago. While a substantial subset of communities offer interactivity beyond basic information dissemination, an encouraging indication from the most recent wave of observations is just how broadly information dissemination has spread. Of course, this widespread access to increasingly diverse and rich information is essential to the task of citizen participation.

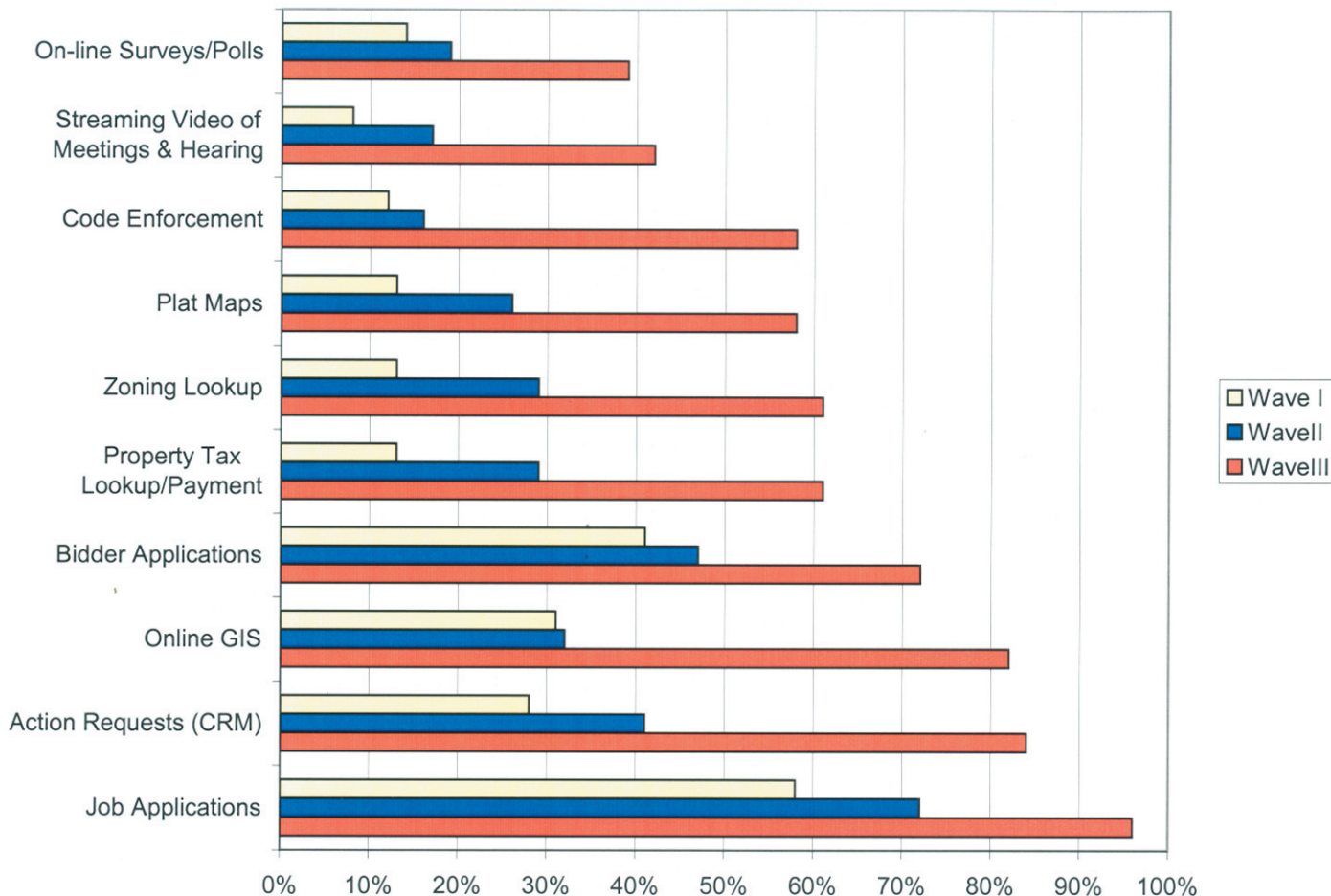


**Figure 2.2: Evolution of Most Common Web-based Features**

A more reliable measure of the improvements at municipal websites in general involves the provision of interactive services. The overall eScores suggest that local governments are broadening the range of services and functions to which they provide access. Without exception, all cities with populations over 100,000 provide access to more and more information. More importantly, however, municipalities are improving the ease of use of these features by offering an increasing number of interactive services online (See Figure 2.3). Interestingly, the most common interactive feature at municipal sites is online action requests.<sup>3</sup> In the most recent wave of observations, over three quarters of the governments of cities with populations over 300,000 allow online submission of service requests or complaints (from anything to potholes or burned-out streetlights to code and nuisance violations).

Other interactive features have proliferated since the 2001 wave of observations as well. The top ten leaders in eScores in Wave I had from eight to ten functions that could take place entirely online. Today, the top ten cities allow from sixteen to twenty. The spreading ease of use reaches across a panoply of city functions—to include building and licensing, utilities payments, assessments, procurement, planning and geographic information systems. Over the period of the three waves of assessment, an increasing number of large local governments provide these interactive and transactive features online. Beyond those displayed in Figure Three, all municipal governments of large U.S. cities have increased their interactivity remarkably in the last several years.





**Figure 2.3: Evolution of Interactive Features**

**General Observations Regarding Online Participation**

Of course, simply providing better information dissemination and customer service misconstrues the notion of citizenship and the unique opportunity that local governments have to change the manner in which residents as “citizens” (as opposed than residents as “clients”) might interact with local government. Beyond the basic provision of information, local government efforts to date at fostering participation have been limited to the relatively low-hanging fruit of providing online forums, streaming media, detailed descriptions of volunteer and participation opportunities, and access to information about public meetings. Even so, as will be shown below in Table 2.1, most cities over 300,000 have not even dabbled in these technologies. The majority of large U.S. cities are doing little more than allowing interactive access to city services, not access to decision-making functions.

An effort was made to mine the data collected by the observational process in order to document the municipal efforts at fostering public participation. As a result, a sub-summary measure was developed, similar to the eScore, but limited to the measures that can be construed as linked to encouraging or enabling public participation (see Appendix A). this pScore is a measure, then, of how particular technologies are evolving to accommodate public participation. Interestingly, the average of these scores has held constantly over the three waves of observation (Table 2.1). In 2001 municipal pScores account for roughly the same proportion of overall eScores as they do today. Thus, as the sophistication and richness of egovernment offerings has increased over the past few years, the proportion of features linked to participation has kept pace. This finding suggests that overall quality of the offerings related to public involvement has increased, particularly due to increasing richness and density of information being offered by local governments. More and more local governments offer detailed information, for example, on voting and voter registration, minutes and agendas from official meetings, budgetary information, planning and zoning, and geographic information systems. However, these summary data suggest, that public participation as a fraction of overall web-based services has

not improved.

**Table 2.1: Comparison of Average eScores and pScores Across Waves**

	<b>Average eScore</b>	<b>Average pScore</b>	<b>pScore Quotient</b>
<b>Winter '01</b>	54.3	19.3	36%
<b>Summer '02</b>	93	30.2	33%
<b>Winter '04</b>	149.1	71.9	40%

Probably as illuminating as the pScore, and perhaps less encouraging, are the measures in the assessment process that focus on transformative functions. While the number of communities offering these specific features is clearly on the increase, the proportion of cities providing such transformative functions is still quite low (Figure 2.4). For example, the number of local governments hosting community forums (a relatively simple and inexpensive online service) is miniscule and shows little improvement since the original wave of observations in 2001 (two cities today provide the features, up from only one three years ago). The most common transformative feature on large city government websites is some sort of volunteer registration.<sup>4</sup> This feature allows interested parties to sign up online to volunteer for various commissions or to become members of various organizations. Such features are a relatively easy for cities to implement and can lead directly to the participation of citizens in city government, but they are not necessarily changing the nature of governance, as they merely provide a new mode of bringing in volunteers.

While the proportion of cities making an effort at implementing these transformative features is increasing, the overall number of cities offering these features is still relatively low. For example, the most recent wave of observations shows that local governments offering new access to government officials (such as conversation forums, online meetings with officials and email subscriptions) are in the distinct minority. Beyond these sorts of easily implemented functions, not much experimentation in online citizen participation was seen at municipal sites. Thus, the net effect of the impressive development of city websites overall is dramatically improved access to information, increasing and proliferating access to information, forms and data, and new forms of conducting transactions with local governments. To date, however, local governments have not shown the same ingenuity when it comes to finding new and innovative ways to energize the public and motivate them to be engaged in the civic life of their communities.

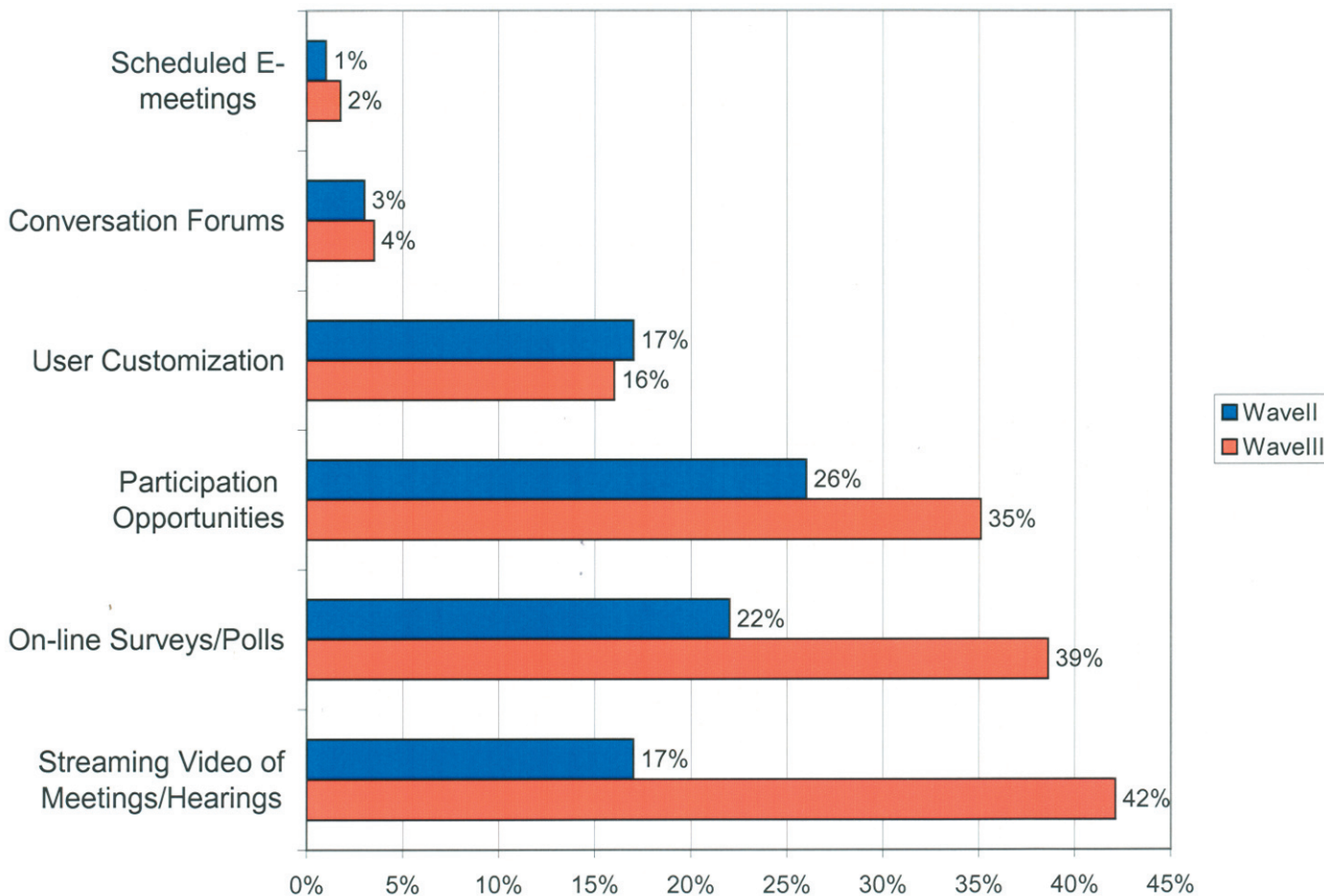


Figure 2.4: Implementation of Transformative Technologies

**Conclusion: Citizen Participation as a Blind Spot?**

Utopians at the advent of the availability of web-based services hoped for a transformation in the ways that citizens engage their governments. Many continue to hold out hope for technology-enabled democratic decision-making. This study of large U.S. cities suggests that, to date, such hope is in vain. There are probably any number of reasons that new modes of engaging citizens are not being developed at city websites.

1) Recent budgetary crises have left little room for experimentation with online participation. Given that investment decisions in information technology are made among fierce competition for increasingly scarce resources, implementation of all web-based services amounts to triage. Increasingly, large U.S. cities are turning toward business modeling to determine which services and features to invest in. This change in emphasis means that technologies that can be shown to increase efficiency or decrease costs are given priority. While by some calculi of costs and benefits an active citizenry is a clear goal of local government, such reckoning cannot be given the hard numbers of return-on-investment and other methods for making strategic decisions. As such, for the most part, investment in services to increase citizen participation have had to wait out the current downturn in municipal revenues.

2) It is no surprise that local government officials are less concerned with providing citizens more access to government than they are with streamlining their own work processes. To be sure, the increases in easily accessible information and data on city functions have the demonstrably positive benefit of empowering citizens. Indeed, access to such data and information is the *sine qua non* of strong and effective citizen engagement. It must be stressed, however, that the goal of providing such rich and dense information is not necessarily to empower the public. Rather, the better cities provide such information, the less city staff is burdened by having to answer telephones, respond to email and interface with the public visiting city hall.

Thus, many of the improvements in municipal websites that are linked in the calculation of pScores to public participation do not necessarily have their origin in an effort to promote participation as such. Likewise, many of the investment decision made by local governments have tended to produce unequivocally positive results that serve the public well, but they are not linked directly to a goal (even one accidentally met) of reducing barriers to and fostering new modes of participating in the decision-making processes of government.

3) Finally, cities have modeled their egovernment efforts as a whole on successful models provided by the private sector. Technological innovation has meant that the private sector has become increasingly adept at understanding and anticipating customer needs and locating new and successful models for increasing customer satisfaction. These advances without question have been reflected in the experience of municipal egovernment efforts as well. There is a vital distinction, however, in understanding constituents as “customers” rather than as “citizens.” Moreover, if local governments collapse the unique needs of citizens into an effort at promoting customer service, there is without question a loss. As governments continue to evolve in their understanding of the needs of their constituents, we can anticipate (or at least hope for) a developing appreciation of this distinction and the unique obligation of local governments to probe the capacity of technology to change the relationship between government and citizen in ways the private sector cannot grasp.

APPENDIX A: WAVE III MEGAP PERFORMANCE DIMENSIONS

Explanation:

The following criteria are weighted on a four-point scale measuring degree of interactivity and summarized to create the overall eScore for each municipal website. The pScores reported above are summarized by assessing only those criteria that appear in the shaded cells in the table below. All previous waves of the MeGAP have utilized a similar set of evaluative criteria. At each wave of data gathering and analysis, performance dimensions have been added, meaning that some improvement in eScores is accountable to the greater set of dimensions coming under observation.

<b>Information Dissemination (Online Presence)</b>	Schedules (hours)	Search Engine
	Directions to Offices/Facilities	Action Requests (CRM)
	Searchable Directory	Document Management System
	Emergency Management	Downloadable Forms
	Real-time Traffic Info	Building Permit Process
	Road Closure/Detour	Bidder Applications
	City Charter	Bids On-line
	City Code	Economic Development
	Budget Report	Info for Businesses
	Demographic Info	Job Applications
	Plat Maps	Online GIS
	AS-built Images	Zoning Lookup
	Minutes of Meetings	Comprehensive Planning Process
	Virtual City Tour	Vital Records
	Live Traffic/Web Cams	Housing
Info for Employees	Recreation/Class Registration	
Strategic Plan	Facility Reservation	
Education	Public Health	
Transportation	Community Services	
Solid Waste	Food Inspection & Safety	
Recycling	Voter Registration	
Scheduled E-meetings	Parking Permit	
Conversation Forums	Temporary Use Permit	
On-line Surveys/Polls	Bike Permit/Info	
Streaming Audio of Meetings & Hearings	Pet License	
Streaming Video of Meetings/Hearings	Taxi License	
Participation Opportunities	Street Vendor License	
User Customization	Business License	
Volunteer Opportunities	Utilities Payment	
Neighborhood Specific Info	Utility Start/Stop	
Listservs	Property Tax Lookup/Payment	
Visualization/Consultation Technologies	Fines	
	Code Enforcement	
	Parking Referee	
	Information Requests (FOIA)	
	Building Permitting Fees	

Registration, Permits & GIS (Interactive Functions)

eDemocracy (Transformation)

eCommerce (Transactional)



**APPENDIX B: COMPARISON OF MEGAP DATA FOR THE LARGEST U.S. CITIES**

**Explanation:**

The eScore is a summary of all scores for the 75 performance dimensions in the MeGAP. The pScore is a summary score of all performance dimensions in the MeGAP that pertain to public participation.

	<b>Wave III -- Autumn '03</b>			<b>Wave II -- Summer, '02</b>			<b>Wave I -- Winter, '01</b>		
Seattle	1	198.5	96.5	9	105.5	29.5	1	89	26
San Francisco	2	186.5	91	10	103	36.5	12	54	23
Charlotte	3	182.5	83.5	4	108.5	32	3	84	28
Denver	4	180.5	81	3	109	33	n/a*	68	19
New York	5	179.5	77	7	106.5	27	2	86	22
Portland	6	168.5	80.5	1	122	41.5	5	80.5	23
Nashville	6	166.5	71	13	100.5	36	4	81	29
Boston	8	162	77.5	15	99	29	13	53	10
Chicago	9	156	62.5	11	101.5	23	15	51	8
Washington	10	152.5	68	22	82	27	14	52	19
Indianapolis	11	152	85	8	106	43	7	75	40
Phoenix	12	150	79.5	12	101	40	16	42	22
Jacksonville	13	147.5	75.5	21	83	22.5	10	67	29
San Jose	14	144.5	79	6	107	36	10	67	29
Memphis	14	144.5	73	19	90	35	18	20	5
Columbus	16		67.75	18	93	27	18	21	10
Los Angeles	17		68.25	2	113	35	9	71	29
Fort Worth	18	142.5	69	24	73.5	27.5	n/a*	39	12
San Diego	19	142	73	4	108.5	39	6	78	28
Austin	20	139	69	16	96.5	28.5	11	64	17
Milwaukee	21	136.5	56.5	20	87.5	32	19	20	8
Dallas	22	135.5	74.5	5	108	41	14	52	18
Baltimore	22	135.5	62.5	26	60	16	18	22	8
San Antonio	24	135	62.5	17	94	29	14	52	19
Houston	25	132.5	67.5	14	100	34	8	72	27
Philadelphia	26	132	64.5	23	79	19	16	42	18
Detroit	27	120	61.5	25	61	24	22	11	5
El Paso	28	117	59.5	28	46	18	18	21	7
Oklahoma City	29	98	48.5	27	53	15	n/a*	41	23

\* Denver, Fort Worth and Oklahoma City all had populations under 500,000 according to the 1990 Census, which was used to collect Wave I data. Subsequent waves use 2000 Census data.

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## CHAPTER 3

### E-Government and Planning: Five New Technologies

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#### Abstract

This chapter begins with a conceptual framework, consisting of the types of e-government and types of technologies, to evaluate how specific technology tools fit into a strategy for applying e-government to planning. The article then introduces five emerging technology tools being used to apply e-government to the field of planning.

#### Introduction

The World Bank defines e-government as “the use by government agencies of information technologies that have the ability to transform relations with citizens, businesses, and other arms of government” (<http://www1.worldbank.org/publicsector/egov/>). A few years ago, e-government was a novelty; in some places, it still is. But in more and more places, it is integral to how government communicates with its citizens, business partners, employees, and other government agencies. Nearly seven out of 10 Americans have Internet access in their home, at school, or at work, and 60 percent of Americans who use the Internet are interested in exploring e-government, according to a study by Hart-Teeter for the Council for Excellence in Government (The Council for Excellence in Government 2000).

E-government can be used by government to achieve many key objectives: serving constituents; reducing operating costs; consolidating operations; and promoting local/regional features. But e-government can be expensive. And, as with any government program, the value of e-government must be measured by the benefits it delivers to the public. For example, the State of Arizona’s Motor Vehicle Division (MVD) web-enabled the state’s auto registration process. What once took 45 minutes in a MVD branch office now takes as little as three minutes online. The manual transaction within a branch office cost an average of \$6.60 to process, while the self-service, technology-enabled transaction costs just \$1.60 (Deloitte Research 2001).

The benefits of e-government to government itself are even more obvious. According to a 2002 study by the Institute for Electronic Government at IBM, government agencies cut costs by 70 percent by moving services online instead of providing them over the counter. Processing a piece of paper costs a government agency \$5 on average. Generating that same form electronically costs only \$1.65 on average; the savings come from labor, postage, paper, and equipment costs, according to a Gartner Group study (Kreizman et al. 2003).

As e-government has grown and diversified, it has improved. According to the third annual study of the official websites of the largest U.S. cities conducted by the Public Sphere Information Group (see in this book, Chapter 1: The State of Local E-government and E-democracy: Benchmarking the Progress of US Cities at Providing Online Opportunities for Citizen Engagement by Charles H. Kaylor for more details), impressive strides have been made in providing online access to information and services. Of the 57 U.S. cities with populations over 300,000, 47 offer five or more services that can be conducted completely online (up from 34 in 2002). Most impressively, the cities near the top end of the rankings (such as Seattle, San Francisco, Charlotte, Portland and Tampa) offer fifteen or more fully interactive services, while leaders in the 2002 assessment averaged about eight.

#### Types of E-Government

There are four different, though sometimes overlapping, types of e-government:

- *Government to Citizen (G2C)*: This is the best known and fastest growing type of e-government, and includes citizen-oriented services, such as disseminating information, searching for public records, providing educational resources, providing social services, and renewing licenses.
- *Government to Business (G2B)*: G2B services attempt to reduce the burden on business by facilitating business interaction with government, such as providing policies and documents, e-permitting and processing services, and paying taxes and fees. At a more sophisticated level, G2B services focus on enabling electronic bidding on government services, government procurement, and adoption of best practices from the private sector, such as supply chain management (tracking how goods are delivered and used).
- *Government to Government (G2G)*: Probably the least known type of e-government, G2G will greatly improve the interaction among local, state, and federal governments. G2G services take the form of interaction and data sharing among various levels of government (local to state, or federal to local), as well as among government at the same level, such as between two neighboring cities.
- *Internal Effectiveness and Efficiency (IEE)*: Internally-focused enhancements can greatly improve the processes used within a local government to more effectively and efficiently deliver services. Frequently these enhancements are adopted from commercial best practices within government operation, such as human resources management (sometimes referred to as “Government to Employee” or G2E), finance, and workflow improvements.

### Types of Tools

There are a wide variety of technology tools that can be used to apply e-government, even within the field of planning. It is helpful to understand these tools by defining a series of categories into which we can then categorize them. While there are several different taxonomies, the following categories have been used by Charles Kaylor, Director of the Public Sphere Information Group, in his multi-year Municipality e-government Assessment Project (MeGAP) reports. These categories can also be considered phases in the adoption of e-government practices, since the tools in the latter categories tend to build upon those in the earlier categories.

- *Information Dissemination Tools*: These are the tools which are typically first used, and most easily-implemented types of technologies used to offer e-government services. In the simplest form, information dissemination tools are static websites offering basic information such as descriptions of services provided, contact information and hours of operation. Other tools that fall into this category include email notifications, as well as documents and forms available for download.
- *Interactive Tools*: Interactive tools begin to use the capability of the Web to let users query for information; for example, a homeowner looking up assessor information for a property or searching a document library for a particular type of form. Tools in this category include web-accessible geographic information system (WebGIS), streaming media, the ability to search public records, document archives, and educational services such as online courses.
- *Transactive / E-Commerce Tools*: Transactive tools enable the user to conduct transactions with government, such as purchasing a permit, or paying a fee. Other examples include web-based data collection and survey, online scheduling of services, and the ability for businesses to bid on government contracts online. A particularly exciting subcategory of tools particularly relevant to planning are called Decision Support Tools, which offer techniques using technology to improve the way planning decisions are made and improve the quality of those decisions by allowing decision-makers to visualize and analyze the impact of their decisions through three- and four-dimensional models.

□ *Transformative Tools*: Transformative tools represent the final step in the e-government evolution, and often represent a fundamental change in the way government does business. Typically, government agencies are a collection of “disconnected silos” -- individual departments that exist and function well on their own but do not have compatibility or connectivity to other departments. When applied properly, transformative tools provide a seamless experience to the citizen, who need not be aware that the services s/he is requesting come from three or four different departments or agencies. Examples of transformative tools include personalized government portals, multi-agency or multi-government services, or fundamental changes in how government seeks public input in a planning process through the use of decision support tools.

**Evaluating How Technologies Fit Into an E-Government and Planning Strategy**

By combining the four types of e-government and the four types of technology tools, we can create an e-government-technology matrix to evaluate where specific technologies might serve within an e-government and planning strategy. For example, in Table 1, we can conclude that the technology tool, a “Basic City Website,” is an information dissemination tool that offers services in the G2C and G2B categories.

**Table 3.1: Basic Website Technologies, E-Tools, and E -Governments**

<b>Basic City Website</b>	G2C	G2B	G2G	IEE
Information Dissemination Tools	<b>X</b>	<b>X</b>		
Interactive Tools				
Transactive / E-Commerce Tools				
Transformative Tools				

**Emerging Technology Tools**

In this section we examine five emerging technology tools being used to apply e-government to the field of planning, and examine a specific case study of how each technology tool has been applied. We will evaluate where each technology tool fits within the previously defined e-government-technology matrix.

*E-Permitting*

There are approximately 34,000 government entities that issue some form of permits, 17,000 of which issue permits primarily for construction. Nationally, there are approximately 100 million building permits issued each year (Accela, Inc. 2000) Of these, approximately 50% fall into the non-discretionary, over-the-counter (OTC) category, representing approximately \$130 billion of the \$1.3 trillion U.S. construction industry. The remaining 50% are categorized as complex permits, requiring the submission and approval of various documents including site plans and detailed construction drawings. Such projects require multiple permits, multiple inspections, and collaboration among a variety of designers, contractors, subcontractors, vendors, and government departments. The management process for these complex permits stands to reap the greatest benefit from e-permitting as government more effectively and efficiently tracks the various steps within these more complex transactions. (Accela, Inc. 2000).

The benefits of e-permitting come from reduced paperwork, improved public participation, improved efficiency, better permit status tracking, improved compliance reporting, better data accuracy, improved technical assistance, and a more accessible permitting process.

In order to facilitate successful collaboration, the permit management process should enable real-time communication, providing all the parties involved -- contractors, sub-contractors, architects, engineers, permit examiners and onsite inspectors -- access to a common set of electronic documents that are updated in real-time. Even more complex is integrating the “disconnected silos” represented by individual departments or agencies to



provide an integrated experience throughout the permitting process.

□ Case Study: King County, WA -- <http://mybuildingpermit.com>

Located in King County, Washington, the adjacent cities of Bellevue, Bothell, Kenmore, Kirkland, Issaquah, Mercer Island, Sammamish and Woodinville are each responsible for building permits in their jurisdiction. Each city’s council sets its own permit policies. As a result, differing regulations and building codes have often complicated the permitting process for property owners and the regional contractors they employ. The King County City Manager’s Association formed an “e-Gov Alliance”, which launched a strategic planning process to identify areas of potential collaboration and leverage investment to deliver consolidated electronic services (e-Gov Alliance in King County, Washington 2002).

The result of this effort is a unified, multi-City e-Permitting portal which provides a single resource where contractors working in multiple jurisdictions can not only get permit information, but also apply for over-the-counter (OTC) permits, submit payments, and request other services regarding building sites anywhere in the eight-city area. Centralizing the permit application process also allows area contractors to consolidate their permit fee payments into one transaction per session. The system then automatically makes the appropriate payments into each city’s merchant account. (Adapted and summarized from: Source: Microsoft Government Services (2003). “Portal Unifies Eight Cities to Deliver On-Demand Building Permits”, Microsoft Government Commerce Server 2000 Customer Solution. Microsoft.)

Simple permits -- including electrical, plumbing, and mechanical -- are a natural choice for electronic delivery because they require no reviews or inspections, according to John Backman, Administrative Services Director for the Planning and Community Development Department for the City of Bellevue, which was the lead agency. Prior to automation through the ePermit Portal, applicants had only two options: visiting City Hall to apply in person, or mailing or faxing printed versions of downloaded, city-specific application forms.

“At least anecdotally,” says Backman, “more permits are now being sold because it’s so much easier to buy a permit and comply with city regulations.” The success target was to provide 30% of OTC permit online within the first year. Launched in 2002, within the first six months, the e-Permitting portal was already handling 35% of all transaction volume.

In this case study, the eight cities in King County, WA, have used e-permitting tools to alter their workflow process and increase the effectiveness and efficiency in how the cities jointly interact to deliver services to citizens, businesses, and adjacent governments. As seen in Table 2, e-permitting is widely applicable to various types of e-governments utilizing both transactive and transformative tools. The process of collaborating to build the e-permitting system has transformed the way that the Alliance thinks about providing services in its jurisdiction.

**Table 3.2: E-Permitting, E-Tools, and E-Governments**

<b>E-Permitting</b>	G2C	G2B	G2G	IEE
Information Dissemination Tools				
Interactive Tools				
Transactive / E-Commerce Tools	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Transformative Tools	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>

*Content Management Systems*

A content management system (CMS) is a system used to organize and facilitate content creation. CMSs allow end-users (typically authors) to provide new content in the form of articles. The system then uses rules to style the article, separating the display from the content, which has a number of advantages when trying to get many articles to conform to a consistent “look and feel”. The system then adds the articles to a larger collection

for publishing.

A common example of a CMS is a system for managing a newspaper. In such a system the reporters type articles into the system, which stores them in a database. Along with the article the system stores attributes, including keywords, the reporter's name, etc. The system then uses these attributes to apply workflow rules to determine who should proofread the article, approve it for publication, and edit it. Editors can choose which articles to include in an edition of the newspaper, which is then laid out and printed, published to the newspaper's website, and syndicated to other news services (Wikipedia no date).

□ Case Study: PLANetizen – <http://www.planetizen.com>

PLANetizen is a web-based public-interest information exchange for the urban planning and development community. (PLANetizen is operated by Urban Insight, Inc., which employs the author of this article). One of the most popular services offered by PLANetizen, which draws approximately 15,000 visitors each day, is a daily summary of the 8-15 top planning-related news stories that have appeared in newspapers, magazines, websites, blogs, radio, television, or any other source.

To find and assemble this wide range of content, PLANetizen utilizes a team of correspondents from across the globe. PLANetizen Correspondents are news contributors who specialize in urban planning-related topics (such as smart growth, transportation, environmentalism, urban design, architecture, landscape architecture, economic development, etc.), or who have extensive knowledge about planning issues in a geographic area (country, region, city).

PLANetizen uses a sophisticated content management system to allow correspondents from around the world to access a secure website and file stories, which are then published in various formats, such as on the PLANetizen website, in email and for mobile devices, such as mobile telephones and personal digital assistants.

When CMSs are applied well to e-government, they can serve both as an information dissemination and transformative tool (Table 3.3), changing the way that information is disseminated, and making the process of publishing current information much more efficient. They are most applicable in government to citizen relationships or for improving internal effectiveness and efficiency.

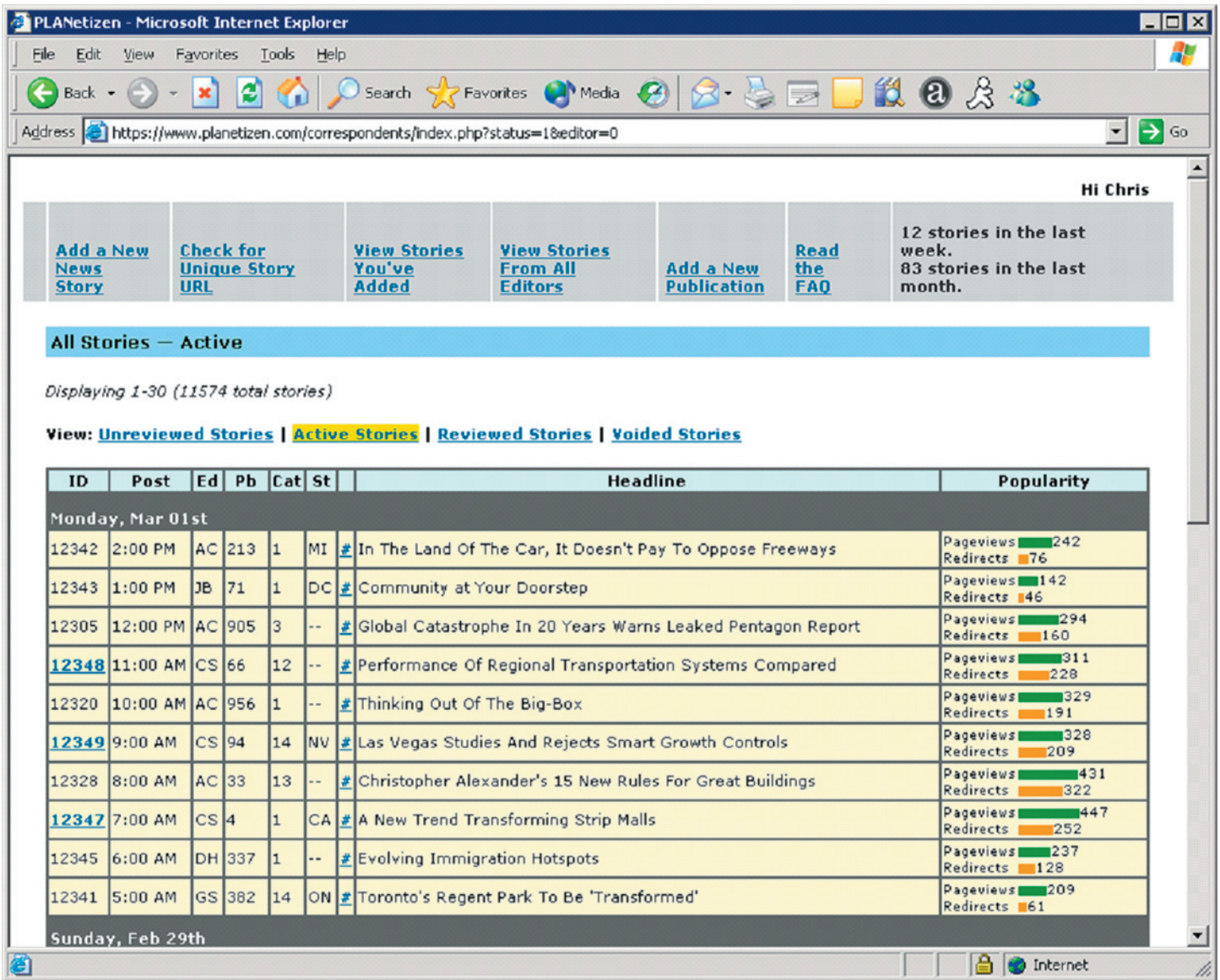


Figure 3.1: Sample screen shot from PLANetizen’s correspondent CMS.

Table 3.3: Content Management Systems, E-Tools, and E-Governments

Content Management System	G2C	G2B	G2G	IEE
Information Dissemination Tools	X			X
Interactive Tools				
Transactive / E-Commerce Tools				
Transformative Tools	X			X

*Web Geographic Information Systems (WebGIS)*

The Federal Geographic Data Committee estimates that 80-90% of all government data has a geographic component (Federal Geographic Data Committee no date). Using this geographic component, it is possible to combine layers of information to give you a better understanding of a place. A GIS makes it possible to link,



or integrate, information that is difficult to associate through any other means. As noted by Allen (2002): “Historically, GIS was a backroom operation reserved for technical staff and used largely for static presentations of data. This role started to change in the 1990’s with the introduction of desktop GIS and friendlier interfaces. The advent of the Internet and Web has focused even more public interest on using the technology.”

By making a GIS accessible via a web interface, the potential audience able to use GIS increases significantly. Because a web browser provides a standardized interface, non-technical users are able to more easily manipulate and analyze data via the web interface. Over the last several years, the sophistication and user-friendliness of WebGIS has increased dramatically, to the point where a well-designed WebGIS offers a powerful alternative to traditional GIS, and has the added benefit of being widely accessible to the public. One of the leading examples of a groundbreaking WebGIS used for planning and community development research is the Neighborhood Knowledge, California, developed by the Advanced Policy Institute at UCLA

□ Case Study: Neighborhood Knowledge, California (NKCA) – <http://www.nkca.ucla.edu>

NKCA is a statewide, interactive website that assembles and maps a variety of databases that can be used in neighborhood research. Its aim is to promote greater equity in housing and banking policy by providing a set of web-based tools for documenting and analyzing trends. In addition, it functions as a geographic repository for users to map their own communities by uploading their own datasets. NKCA also seeks to address the “investment” divide by assembling a broad range of indicators on a statewide scale to highlight trends in public and private investment and the community-level impacts associated with these trends, visually mapping indicators in areas such as mortgage lending, population, and housing.

The website is organized around a Maproom and a section for Data & Charts. In the Maproom, users can create shaded thematic maps from social, demographic, and lending data. The intuitive interface produces clean, understandable maps that can be printed or used in reports. The Data & Charts section provides quick access to basic demographic, housing and mortgage lending information so users can research any California neighborhood.

What sets NKCA apart from other web-based mapping efforts are two tools called the “Data Uploader” and “Neighborhood Selector.” A true innovation, the data upload tool enables any user to add his own set of data (in Microsoft Excel, Access, or delimited data formats) into NKCA’s mapping system. The user can then map and analyze the data by itself or with the other datasets provided by NKCA.

Figure 3.2: Screen shot from the Map Room of NKCA.

By using the Neighborhood Selector, a user can use a map to select several points and define a “neighborhood.” Once the boundaries of the neighborhood have been set, this new geography can be used to view summary data for the neighborhood, perform analyses and comparisons, and create maps. This is of great interest for further distribution of data analysis capabilities on the neighborhood level: “The first stage of community technology has been in democratizing data. The next stage is democratizing the tools for analyzing this data. That’s where we think we are headed, helping grassroots planning groups develop the capacity to work without high priced consultants,” says UCLA Professor Neal Richman, associate director of the Advanced Policy Institute (Steins 2003).

WebGIS is, by nature, an interactive tool. However, in this example, the ability to define a neighborhood and upload data into the Web GIS also makes this a transactive tool (see Table 3.4). The process of building an

enterprise GIS that uses data from multiple government silos is often a transformative technology, as it allows government to evaluate data in ways not previously possible. In many cases, a wider population of city staff is also able to access the WebGIS to perform analysis that was not previously available through the historic GIS system, which makes the WebGIS an IEE strategy as well.

**Table 3.4: WebGIS, E-Tools, and E-Governments**

<b>WebGIS</b>	<b>G2C</b>	<b>G2B</b>	<b>G2G</b>	<b>IEE</b>
Information Dissemination Tools				
Interactive Tools	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Transactive / E-Commerce Tools	<b>X</b>			
Transformative Tools	<b>X</b>	<b>X</b>	<b>X</b>	

*Visualization Tools*

Visualization tools are yet another option for bringing critical information to the local citizen, as well as business and internal efficiency and effectiveness actions (see Table 3.5). As with the other tools, they can give citizens more information and therefore more understanding of the forces shaping their community. Taken a step further, it allows community members to share in the responsibility for creating a livable community and get involved in the planning decision making process. As noted by Snyder and Herman (2003), “Visualization tools can play an important role in both the process and design phases of a planning project... by making it easy for people to see how their choices will look in the built environment. Because images can be compelling and even fun to look at, these tools can be used in a planning process while also providing immediate feedback on the quality of design and the impact of design decisions.”

**Table 3.5: Visualization, E-Tools, and E-Governments**

<b>Visualization</b>	<b>G2C</b>	<b>G2B</b>	<b>G2G</b>	<b>IEE</b>
Information Dissemination Tools	<b>X</b>	<b>X</b>		<b>X</b>
Interactive Tools	<b>X</b>	<b>X</b>		<b>X</b>
Transactive / E-Commerce Tools				
Transformative Tools				

□ **Case Study: Las Vegas Senior Housing Center**

The Las Vegas Development Services Department has been a leader in using visualization tools to support community decision making. The department recently produced a three-minute video featuring a three-dimensional flythrough and evaluation of the proposed site plan and elevation plan for the building. The video is narrated by planning staff so that the video can also be distributed via the web and on CD to interested members of the community. This flythrough assisted in building consensus between the public, developer and city staff.



**Figure 3.3: Screen capture of a three-minute video featuring a three-dimensional flythrough of a proposal senior center (CommunityViz SiteBuilder 3D).**

The video in this case study was constructed using CommunityViz SiteBuilder 3D, which is widely used by public and private planning professionals, landscape architects, and urban designers. CommunityViz SiteBuilder 3D enables users to create photo-realistic, 3D interactive scenes from 2D map data. 2D maps can be turned into realistic 3D scenes that provide insight to support decision making by helping users to see the spatial relationships and visual impacts of multiple alternatives. In this example, visualization is being used to provide a more effective planning process for citizens and businesses.

### *Impact Analysis*

The field of urban planning is undergoing a dramatic shift in perspective. This change is motivated in part by an evolving belief that traditional development has, in many cases lead to the creation of large suburban areas -- a process that has generally become known as urban sprawl. As an alternative to sprawl, many urban and regional planners are promoting a model for development which causes citizens and decision-makers to recognize the implicit trade-offs that come with development decisions by understanding that land use, transportation, water quality and air quality are all interdependent. For example, causing development to occur around the urban fringe may have a direct impact on increased traffic and air quality, as the residents of the new community travel further to their jobs. This is the realm of impact analysis tools. "Impact analysis tools analyze and quantify the implications for various scenarios and make it easy for the general public to understand these impacts and the trade-offs between different choices. At its heart is a set of indicators that are used to benchmark existing conditions, evaluate alternative courses of action, and monitor change over time. (Allen 2001).

□ Case Study: Envision GB-QUEST – <http://www.basinfutures.net>

Envision Sustainability Tools of Vancouver, B.C., has developed QUEST, a computer game that allows people to create and visualize future scenarios for their region. QUEST combines a powerful set of integrated computer models with an engaging game-like interface. The software is loaded with data about the region and runs a series of impact analysis models, developed at the University of British Columbia, that look 40 years into the future and see the results of alternative choices.



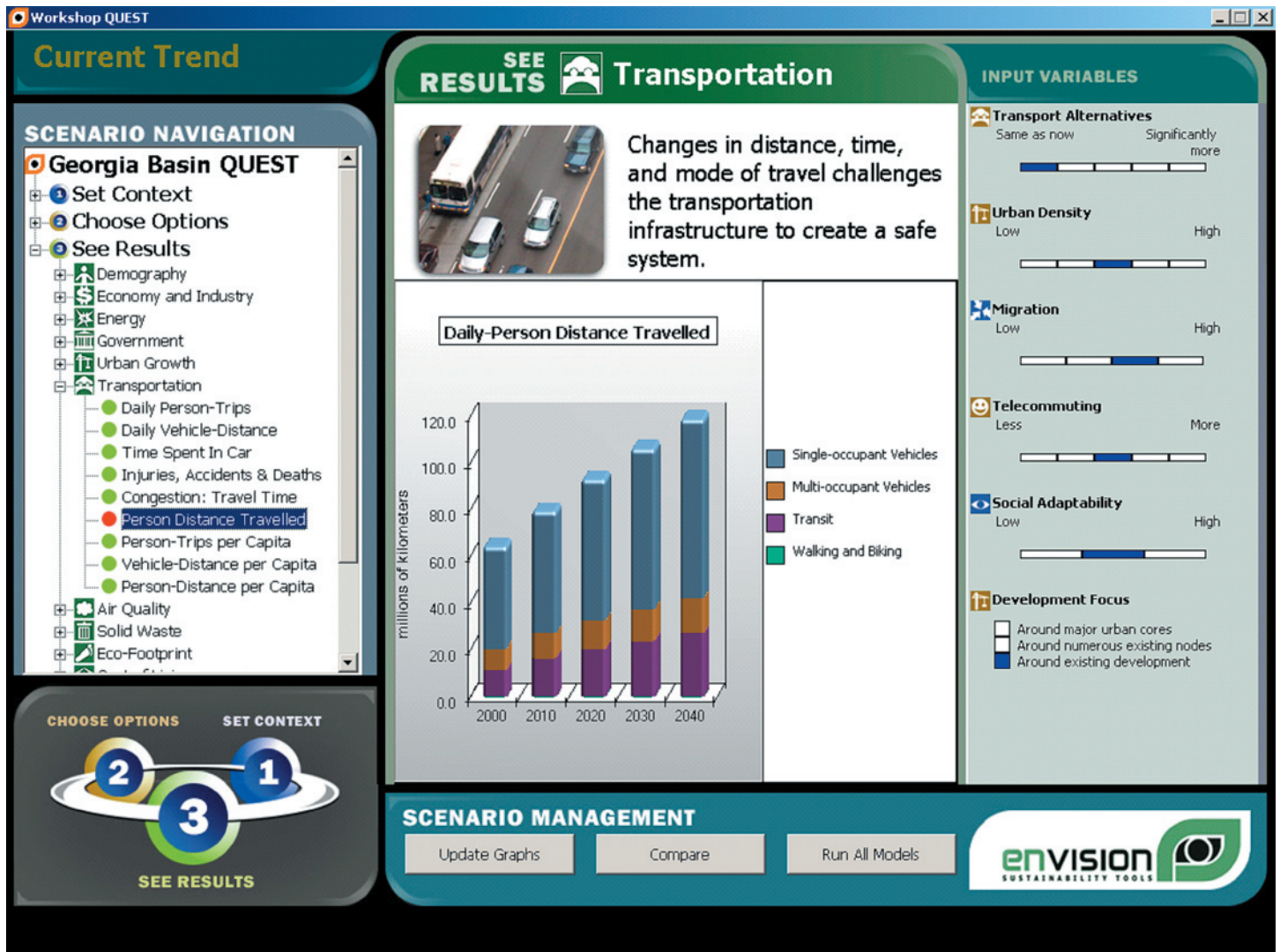


Figure 3.4: Screen shot from the Transportation Results evaluation screen using QUEST.

Recognizing that if Greater Vancouver continued with business-as-usual, the region will fail to remain a sustainable, resilient, or livable region, the Georgia Basin (GB) Futures Project is intended to engage the interested public of the Georgia Basin in a series of discussions about their future over the next 40 years. The project began in 1999 as a collaboration among 15 partner organizations in the public, private, non-governmental sectors, as well as in academia in search of a more sustainable future. “Sustainability,” says David Biggs, President of Vancouver-based Envision Sustainability Tools Inc., “is what people choose when they understand the consequences of their choices.” QUEST was used over a three-year period to generate and analyze a series of alternative scenarios by which sustainable conditions might be achieved over the next four decades.

The Internet version of QUEST allowed over 30,000 members of the public an opportunity to become involved in the process by inviting them to log on and play, then register their preferred scenario for review by decision makers. The game lets users tweak dozens of variables, from land use zoning, and tax codes to air and water quality, transportation, and health care spending, then calculates what Vancouver will look like in 2040 based on those choices. Using a process they call backcasting, the game lets the player go back and change their choices over and over until they reach a future they want. Once they settle on a scenario they like, QUEST records the model and passes it on to government officials (Utne 2003).

Impact analysis tools show great promise in being G2C transformative tools (see Table 3.6). In this example, multiple government agencies collaborated to share data and engage citizens in the region, both allowing participants to interact with the model, and also collecting data from residents about possible

scenarios, which make this an example of a G2G strategy as well.

**Table 3.6: Impact Analysis, E-Tools, and E-Governments**

<b>Impact Analysis</b>	G2C	G2B	G2G	IEE
Information Dissemination Tools				
Interactive Tools	<b>X</b>		<b>X</b>	
Transactive / E-Commerce Tools	<b>X</b>		<b>X</b>	
Transformative Tools	<b>X</b>		<b>X</b>	

**Conclusion**

By creating a conceptual framework through which to evaluate where various technologies fit into a strategy for applying e-government to planning, we begin to see how five promising new technologies are being used by government to communicate with its citizens, business partners, other government agencies, and to make the daily operations of government more efficient.

Perhaps the most exciting use of these technology tools involves the evolving partnership between the government and the citizens it serves. One interesting trend these tools share, however, is that they tend not to be limited by traditional city boundaries, and cause local governments to look at e-government strategies through a regional perspective. Perhaps this is the strongest sign yet that these technologies truly are becoming transformative tools in the quest to apply e-government to planning.

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### Designing Accessible Web Pages For E-government

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#### Introduction

The Internet is a growing source of information, but for many people with disabilities the Internet can be a confusing jumble of images, frames, scripts, and colors that make little sense. Anyone who has spent any time on the Web has encountered text that is barely visible against the background, links that tell you nothing about what will happen when you “click here,” and pages that go beyond the edges of the screen. It takes little imagination to conceptualize what these features are like to a person who cannot see the screen. To acquaint yourself with the problem, go to a short demonstration of screen reading software at the University of Wisconsin-Madison (<http://www.doit.wisc.edu/accessibility/video/index.asp>). Or try this: turn off the images in your browser and go to a familiar Web page.

When you see a web page with the images turned off, what you are witnessing is one of the most common problems on the Web, and one of the easiest to fix – the lack of an alternative text for images. As a designer trying to make your page accessible, imagine yourself as a radio announcer of a baseball game. The announcer needs to describe all the action to a person who cannot see the game. Good radio announcers can make the game come alive. Good Web design makes your pages come alive for your audience, regardless of how they access them.

There are, of course, legal requirements that Web pages be accessible, but even if these did not exist, creating usable Web pages should be every designer’s goal. Creating accessible Web pages means making better Web pages; that is, pages that convey your message clearly and succinctly to the widest audience. Authors wishing to share their message to as many people as possible will find that following the accessibility guidelines will offer the best way to ensure this happens. Thus, accessibility is for everyone.

This paper gives a very brief overview of the two main laws related to accessibility (the Americans with Disabilities Act and Section 508 of the Rehabilitation Act). Then it addresses how to fix some of the more common errors found on inaccessible Web pages. Finally, we identify several resources that you can use to expand your knowledge and improve your Web pages; many of these resources are free and available over the Internet.

#### Legal Background

In 1992, the Americans with Disabilities Act (ADA) went into effect (Americans with Disabilities Act of 1990). Although the ADA says nothing about Web pages per se, it does mandate that commercial establishments, public accommodations, and telecommunications (in the Act telecommunications mainly referred to telephones) must be accessible. Moreover, the ADA mandated that state and local governments must make “programs accessible to individuals with disabilities and [provide] equally effective communications” (U.S. Department of Justice, 1991, Title II, Summary section), although “effective communication” was left largely undefined. Whether the Web pages of commercial establishments and public accommodations are covered under the ADA has yet to be decided by the courts, but it seems logical (as least to many of us) that the same rules would apply to both the “bricks and mortar” establishment and the “virtual” establishment on the Internet. It also follows that if state and local governments must conform to Section II of the ADA, then pressure will grow for others to do the same.

Although the ADA has served as the basis for specific guidelines for buildings through the ADA Accessibility Guidelines for Buildings and Facilities (ADAAG; <http://www.access-board.gov/adaag/html/adaag.htm>), it does not provide similar guidelines for Web pages. Nevertheless, Section 508 of the



Rehabilitation Act, as amended, does specifically address issues of electronic communication, including Web pages, and it is of these guidelines that persons in e-government should be most aware. In general, Section 508 says that federal employees or members of the public seeking information from the federal government shall have the same access to such information as persons without disabilities, provided that doing so does not create an “undue burden” to the agency:

When developing, procuring, maintaining, or using electronic and information technology, each Federal department or agency, including the United States Postal Service, shall ensure, unless an undue burden would be imposed on the department or agency, that the electronic and information technology allows, regardless of the type of medium of the technology. (Architectural and Transportation Barriers Compliance Board, n.d.)

Although Section 508 applies directly only to government agencies and contractors wishing to do business with the government, it has other far-reaching effects, the greatest of which may be heightening awareness of accessibility. Paciello (2000) has noted that awareness is probably more important in making Web pages accessible than is technical skill. The point is that any person competent enough to create Web pages is capable of making them accessible; all they are missing is the knowledge that they need to do so.

How widespread is the problem? Probably, very. For example, Wheaton, Chovan, O’Briant, and Howell (2001) examined 80 home pages (the first page of a Web site) at one university using the Bobby validation program (Watchfire, 2004; see also the resources at the end of this piece for more information about Bobby). Wheaton et al. found that 64% of the pages failed to meet even minimal accessibility standards, but that most of the errors were relatively easy to repair. For example, the most common error was poor contrast between text, images, and background. This type of error is not only easy to repair, it illustrates the need for simple, good Web page design skills, which will improve the Web for all readers.

In the next section we present some of the more common Web problems. These problems are by no means all the issues raised by Section 508, a task that is beyond the scope of this chapter, but they are widespread, easy to fix, and will greatly improve the accessibility of your pages for the vast majority of your viewers. Our information is derived from Section 508 (<http://www.access-board.gov/508.htm>), the World Wide Web Consortium’s Web Content Accessibility Guidelines (WCAG; <http://www.w3.org/TR/WAI-WEBCONTENT/>), and The Ohio State University’s Web Accessibility Center (WAC; <http://www.wac.ohio-state.edu/>). At the end of this chapter, we list other resources that may be of further value.

## Suggested Usability and Accessibility Guidelines

### *Organizing and Naming Your Site*

Organizing and naming your site is not typically seen as an accessibility issue, but it does matter for usability. Many people think naming the site is straightforward and give it little thought. This haphazard approach has led to many Web pages either being untitled or called “Home page.” We suggest you give each page in your site a unique title that will clearly portray what it is about, in about 64 characters. Longer titles will work, but will probably be truncated in the browser, so they add little to the user’s experience. We also recommend that you consider how your page title will be alphabetized when saved as a bookmark or favorite. Do you want your site on accessibility to be listed in the W’s, as “Welcome to...”? Or to appear with the other home pages as “Home page for...”?

Also keep in mind that you want URLs (Web addresses) that are easy to share and easy to remember. To achieve this, you must first organize your Web site logically so that files on a given topic are grouped together into folders with reasonable names. Avoid names that mean something to you, but will be cryptic to others. Similarly, name your home pages as either `default.htm` or `index.htm`. Browsers will automatically look for these files and you don’t need to give the file name when telling people to go to your home page. (It is also a good idea to place all your images in one folder, simply to keep track of them.) Other suggestions include

- Use only lower-case characters (some browsers are case sensitive).
- Don’t use spaces in file names. Browsers cannot read spaces and they will be replaced with a %20. Use a hyphen where you want a space. An underscore will also work, but because hyperlinks are underlined by

default, the underscore can be overwritten by the underline and the link will appear to have a space in it.

- Don't use special characters (#, @, ^, etc.)
- Use short names for your files and avoid nondescript names (e.g., t1s5c7.htm) as users will not be able to remember them and they will become confusing as your site grows.
- Declare the language used in the Web site in the HTML tag. Declaring the language assists search engines, helps speech synthesizers, and is an aid to the browsers as they render text and symbols.
- Provide META descriptions to aid search engines in finding and categorizing your pages. Your pages will not be useful if people can't find them easily.

### *Give Your Page a Consistent Layout with Clear Navigation Mechanisms*

If all your pages are laid out consistently, the user doesn't need to relearn what's happening every time they navigate to a new page. Using cascading style sheets (more on style sheets later) makes fonts, colors and backgrounds consistent and easily changeable site-wide. All pages, except the home page, should have a link to the home page. This allows users to quickly return to the top level from anywhere but prevents confusion when they are already on the home page.

Because most sites are composed of more than one page, easy navigation to these pages is paramount for good design. Navigation elements include: navigation bars (links to the most important parts of a page), site maps (a global view of page or site organization), and tables of contents (lists and links to the most important sections of a site or a page). As a general rule, each page should have a link to the home page, a site map, and basic contact information, and these links should be as descriptive as possible.

A common mistake that many designers make is using "click here" as a link. Many people scan a Web page quickly for links. When scanning, links that clearly define where they go are much more helpful. Moreover, screen readers have the ability to list all the links for quick navigation. Obviously, a list composed of repeating phrases like "click here," "here," and the like, is useless. Vincent Flanders describes navigation that provides little information as "mystery meat navigation" (Flanders & Peters, 2002). Don't let this happen to you.

It is helpful to provide a "skip navigation" link near the top of pages with a long list of links, such as found on many home pages, for persons using screen readers. Skip navigation should link to a target at the beginning of the content. Users with vision will quickly skip to the main content, but users with screen readers will need to listen to all the links each time they arrive at the page, which can be tedious and time-consuming. The skip navigation link needn't be prominent or even visible, but it should be placed as near to the top of the page as possible (right after the BODY tag) so the user hits it right away.

Avoid using images as navigation tools. Even though images with alternative text (alt-tags) associated with them can be rendered by screen readers, they cannot be enlarged or changed by the user, without a loss of quality. As a general rule, avoid using images to represent text; use a style sheet instead to format text. Finally, create keyboard shortcuts to important links using the "accesskey" attribute that is part of the <a> element. For example, <a accesskey="h" href=" ../default.htm"> will allow users to use the alt-h combination to quickly return to the home page. This can be invaluable to persons who have difficulty using a mouse.

### *Color*

Text and background should contrast. Lighthouse International has excellent information on using high-contrast colors (see [http://www.lighthouse.org/color\\_contrast.htm](http://www.lighthouse.org/color_contrast.htm)). A corollary to this is to avoid using images as backgrounds for your page. Even faint watermarks add little to the page design other than clutter and increased download time. Although contrasting text and background seems straightforward, examples of violations of this simple rule abound on the Internet.

Along with making good color choices, information should not be conveyed using color alone. For example, some fields on forms may be required before the user can submit the form. Do not designate these fields using only color, such as "Items in red are required" (an asterisk works just as well). Color can render differently on different monitors and, of course, is useless to persons with color blindness. The Web Accessibility Initiative advises photocopying your page several times. Can you still identify the required fields?

If so your page should render properly.

### *Cascading Style Sheets*

Cascading style sheets are not new, but the browsers have been slow to adopt them. This is finally changing (although the CSS2 standard is still not widely supported). Style sheets give your Web pages a consistent look and feel, allow for changes across the site to be made quickly and easily, and can greatly improve the page's accessibility.

There are several HTML codes that designers have used to format the text in certain ways. For example, authors can use headings to increase font size and boldness, but if a reader is using specialized software that helps organize the page, headings used for formatting can become confusing. The BLOCKQUOTE element indents text, but screen readers say the word "quote" when they hit this tag and can be set to read quotes in a different voice. If the material is not actually a quote, this can be confusing.

The FONT element has been used to make fonts bold, italicized, or underlined. The problem is that setting the font using this code can override changes to the page made by the user, such as magnification. To address this problem, format text using a style sheet and use relative sizes, such as the "em" value. (An em comes from typography as stands for the width of the letter M, which, along with the W, is the widest letter in the alphabet.) Relative units allow the user to change the size of the font easily, while maintaining page layout. The em unit can also be used to set margins and padding around elements. One em equates to a 10 point font. Here is an example of a font style defined using em: `H1 { font-size: 2em }`. This style will produce a font two-times the size of the default (paragraph) text.

Style sheets are becoming more common as a method of identifying formatting, but they are not fully readable by early browsers. Consequently, make sure your page will still display properly if the style sheet is turned off. Fortunately, one of the preeminent page validators (Bobby, discussed below) checks the page without the style sheet, so you can quickly see how it renders.

### *Images and Multimedia.*

Graphics, such as static images (photos, icons, charts, drawings, etc.) or movable images (e.g., video) can be essentially nothing to persons using screen readers, or for those with images turned off (a common practice for persons on slow connections). Failure to correctly identify images is probably the most widely cited error in Web page construction; it is also one of the easiest to repair. All the major Web authoring tools have a method of providing alternative text for images, an "alt-tag." Nevertheless, to be helpful, these alt-tags must be meaningful when read out of context.

Depending on the importance of the image to the content, designers can choose to skip the image, give the user a short description, or provide a link to a longer description (the LONGDESC attribute). When would you do each? When using images as spacers for layout (not recommended, but still widely used), adding an "empty" alt-tag (`alt=""`) does the trick (note that an empty alt-tag is two double quotes with no space between the quotes). A short description, the common alt-tag and usually less than 256 characters, might be used for an image that is worth knowing about but can be easily described. A logo or a picture of a person (`alt="Picture of Mr. Jones"`) would meet this criteria. Unless it is critical that everyone know that Mr. Jones is bald, wears a beard, and has a tattoo on his nose, this is sufficient.

There are, however, images that are central to understanding important content. Graphs rendered as images, for example, often contain critical information that readers need to know. There are two ways to address this problem; probably the safest way is to use both (redundancy can be a virtue). The best way is to provide an explanation of the graph on the Web page, preferably before the graph, using a caption. Placing the caption before the graph tells readers the importance of the graph and its interpretation before they encounter it. After the explanation, they can then refer to the graph for clarification. Alternately, the graph can be given an alt-tag that reminds the reader of the caption. The advantage of placing the explanation on the Web page is that everyone can benefit from the explanation, including persons who have difficulty interpreting graphs and tables. For such persons, additional information is always helpful.

A second method of providing additional information to critical visuals is through the long description

tag (LONGDESC) or the D-link. Both of these are links to another file where as much information as is necessary to explain the image is available. Unfortunately, the LONGDESC has been slow to be supported by the browsers and the D-link (a link where only the letter D is linked to the file) presents the problem of not being descriptive of where the link takes you (mystery meat navigation), although persons using screen readers are sensitive to this type of link and know what to expect.

So far we have been talking about static images (photos and graphics), however video is becoming increasingly common on Web pages as the technology improves and bandwidth increases. Video requires a special alt-tag, if you will – captioning. The major video editing programs have captioning capability, but it can be time consuming to create the transcripts. Free captioning software (called MAGpie) can be downloaded from the Boston public TV station, WGBH, at <http://ncam.wgbh.org/webaccess/magpie/>.

Captioning, although time consuming, benefits many more people than just those with hearing impairments. Persons with English is a second language, persons with learning disabilities, and anyone who has trouble following interactions gains from captioning. Finally, the audio quality of some recordings is less than what might be hoped for, and in such instances, captioning aids in interpretation by everyone.

### ***Identify Column and Row Headers and Summarize Contents of Tables.***

Tables have two uses on the Web: to convey data and for layout. The use of tables for data is commonplace, but in terms of accessibility, several cautions are in order. For data tables to be accessible, the column and row headers need to be identified. This can be accomplished by adding a “header” for each row and column using the <th> element accompanied by the SCOPE attribute. When this markup is added, newer versions of the screen readers can identify the row and column header associated with any cell.

Although using tables for layout has been a common practice for many years, we recommend switching to style sheets instead. Early screen readers read tables line-by-line, not cell-by-cell, as though the text were not in a table but printed as one continuous line across the page. This was typically impossible to comprehend. Fortunately, current screen readers read tables by the cell instead of by the line, vastly improving readability. Nevertheless, for tables to render properly, the cells should make sense when read across the page, “linearized,” and read in order. Consequently, in the future the positioning abilities of style sheets will be a better way to lay out a page.

One final point about using tables – tables should be relatively sized. That is, instead of laying out a table in pixels (<table width=”780”>), use percentages instead (<table width=”95%”>). If you have ever experienced having to scroll across a page to see information that ran off your screen, you know why absolute sizing is a problem. Relative sizing causes the table to automatically resize to fit the screen, regardless of screen size and resolution.

### ***Forms***

The Section 508 standard for electronic forms addresses the issue from the user’s perspective rather than the designer’s. Instead of itemizing specific design elements that must be included in forms, Section 508 simply states that, however the form is designed, it must be functional for users of assistive technology. In practice, this means designers must have a better understanding of how form elements are rendered in assistive technology, and sites relying on forms for functionality should be tested using a variety of assistive technologies and in a variety of platforms and browsers.

### **Form Control Labels**

Each form element (e.g., text box, radio button, check box) should have an associated label. In the past, form designers relied on nearby text to identify the purpose of a particular form element. For example, putting “First Name:” in front of a text box was sufficient. However, if users of assistive technology read the page out-of-order (as frequently occurs) or move around the form to make changes or re-enter information, this preceding text may be missed. Without an associated label, the JAWS (Job Access with Speech, a common screen reader) screen readers reads a text box as “Blank, edit.” -- an unhelpful description to say the least.

To avoid this problem, designers need only to enclose the existing text in the <LABEL> tag and add an



“id” name to text box. Here is an example:

```
<LABEL for="firstname">First Name:  
<INPUT type="text" id="firstname" tabindex="1">  
</LABEL>
```

Note that the “for” attribute in the LABEL tag must be identical to the “id” attribute of the form element the label describes. This is what is meant by an “explicit association.” The result looks like this:

First Name:

Now, when the user selects or “focuses on” the text box, JAWS no longer reads “Blank, edit” but says “First name, edit,” a much more helpful description. The LABELS tags work equally well with other form elements, such as radio buttons and check boxes.

An additional advantage to the use of explicitly associated labels is that assistive technology could even correctly interpret a form where the surrounding text is missing or misplaced. The WCAG, however, continues to require designers to follow the generally accepted practice of putting the label as close to the form element as possible. Generally speaking, labels appearing immediately before or below text boxes, and to the right of check boxes and radio buttons are the clearest.

### Creating a Logical Read Order.

If you don’t specify a particular read-order for your form, screen-readers will try to interpret the page using a top-down, left-right default structure. But, some forms can cause a number of problems when interpreted using this system. Creating a logical tab order resolves the problem.

### Keyboard Shortcuts

Persons who cannot use a mouse often face difficulty with forms when trying to engage “submit,” “reset,” or other buttons or form controls usually activated using a mouse click. One strategy is to create alternate key combinations or keyboard shortcuts to activate form controls.

Keyboard shortcuts are created using the “accesskey” attribute, which is part of the LABEL or INPUT element: `<LABEL for="firstname" accesskey="f">First name</LABEL>` or `<INPUT type="submit" name="submit" accesskey="S">`. This example assigns “f” as the accesskey for the first name text box. Typing “alt-f” places the cursor on the link, requiring only striking the Enter key to activate the link.

### Place-holding Characters.

Although support for forms is improving, some assistive technologies require initial text in form controls to function correctly. A blank space can be used in most cases; however, if you expect a larger portion of your users to be working with older technology, use alphabetic characters instead. Here are two examples of text boxes:

Name:

Email:

In the first text box, the initial value is set to “ ”, or a blank space. In the second text box, the initial value is set to “enter email address.” In both cases, users must delete or type-over the initial value.

### Validate Your Pages

Remembering and applying all the requirements of Section 508 can be daunting, but fortunately, there are tools that will identify many common problems for you. One of the easiest to use, is WebXACT, from Watchfire (<http://webxact.watchfire.com>). The free version will check one page per minute simply by typing in the URL. A paid version of Bobby (<http://www.watchfire.com/products/desktop/bobby/default.asp>) will test all the pages in an entire site. Bobby only tells you the problems that can be identified by the HTML code. The page author still needs to manually check the page for potential problems like contrast between text and background. Bobby and WebXACT will link to files to help you identify and fix problems on the page, but it will not fix the files for you. For that you need A-Prompt.



A-Prompt (<http://aprompt.snow.utoronto.ca/>) currently can only check pages locally (you cannot enter a URL and have A-Prompt check the page like you can with Bobby). To do so, you need to download and install the program (it's free) to your computer and then each page can be analyzed. A-Prompt has the distinct advantage of not only identifying the error, but also taking the user through tools designed to fix it. This is extremely helpful to newer Web page authors.

Both tools rely on human checks of content to identify items that cannot be verified by the computer. Thus, familiarity with the Section 508 guidelines is necessary. Fortunately, a good method of learning the guidelines is to check several of your pages using one or both of these tools then applying the recommended fixes.

Finally, LIFT (<http://www.usablenet.com>) will perform many of the same checks that Bobby performs, but provides more detailed output with suggestions for fixing problems along with how to check the page and an explanation of why this needs to be done. The paid version also provides usability suggestions that go beyond accessibility. There is a plug-in for both Dreamweaver and FrontPage Web authoring programs.

### Conclusion

Accessibility helps everyone use the Internet, and the Internet is becoming more and more important in providing information and services to people throughout the world. Setting up pages using the guidelines from Section 508 and the WCAG increases the likelihood that the widest possible audience will reap these benefits. Additional tools and resources to help you create or modify your site follow.

### Resources

#### *Validation Tools*

Previously we discussed the validation tools WebXACT (<http://webxact.watchfire.com>) and A-Prompt (<http://aprompt.snow.utoronto.ca/>). We add them here for completeness of this list, and again recommend them not only to identify accessibility problems but also as an informal tutorial on accessibility and Web page design. We have chosen to highlight these two programs because they are free. There are, however, several commercial products that may be of interest. These commercial products can help prioritize repairs for large sites and make the corrections.

#### **WebXACT by Watchfire (<http://webxact.watchfire.com>)**

Will check your pages once they have been posted to the Web. It will compare your pages to both the WAI and Section 508 guidelines. The WebXACT site will ask you for your Web page address, automatically check the page for accessibility problems, and then link you to solutions from the WAI or Section 508. It will not, however, be able to check pages that are password protected. The free, online version will check only one page at a time. There is a version of Bobby that can check all the pages on a site, but it must be purchased from Watchfire. The cost is well worth it, however, if one has many pages to check.

#### **A-Prompt (<http://aprompt.snow.utoronto.ca/>)**

Will validate your page and provide menus with solutions. Download *A-Prompt* from the University of Toronto then run it on pages that are saved on your computer. Because the pages are saved “locally” *A-Prompt* can check your password protected pages before you post them to the Web. Much less knowledge of HTML is required to use A-Prompt than is needed from many other validators, although HTML knowledge is helpful for some repairs. *A-Prompt* finds both WAI and Section 508 errors.

#### **LIFT (<http://www.usablenet.com>)**

There is a free version and a paid version of this product. The free version checks Web pages in a fashion similar to Bobby, although the report is more detailed and looks at more than one page on the site. The paid version can be added to Dreamweaver or FrontPage and errors as you create your pages.

The paid version also includes a usability check based on the guidelines from the Nielson Norman Group (<http://www.nngroup.com/>), a very useful addition. This is a very comprehensive product.

### **Internet Resources**

The Web Accessibility Initiative (WAI;<http://www.w3c.org/wai>).

Provides detailed guidelines for creating accessible Web pages. Knowledge of HTML is required.

WebAIM (<http://www.webaim.org/>)

Web Accessibility in Mind is one of the best sites for tutorials and free information about creating accessible Web pages. They frequently conduct free, on-line training sessions.

### **Books**

Flanders, V., & Peters, D. (2002). *Son of Web pages that suck*. San Francisco: Sybex.

A great book for learning about Web page design by examining bad Web page design. Humorous but highly informative, although it is not about accessibility, per se. See also the Web site: <http://www.webpagesthatsuck.com/>

Mueller, J. P. (2003). *Accessibility for everyone: Understanding the Section 508 accessibility requirements*. New York: Springer-Verlag.

This book discusses creating applications for Section 508 compliance, both on the desktop and the Web. It is not as useful as some other books for developing Web pages, however.

Paciello, M. G. (2000). *Web accessibility for people with disabilities*. Lawrence, KA: CMP Books.

Easy to read and comprehensive. Paciello's book covers the basics from the legal background, through the WAI guidelines, to discussion of Java accessibility programs. It has a good section on disability resources and links to useful software.

Thatcher, J., Bohman, P., Burks, M., Henry, S. L., Regan, B., Swierenga, S., Urban, .D., & Waddell, C. D. (2002). *Constructing accessible Web sites*. Birmingham, UK: Glasshaus.

The credentials of the authors are impressive and this book provides specific suggestions for creating accessible Web pages. This book is more technical than Paciello's but is still easily understood. It also addresses Section 508 in depth, and contains a new section on Macromedia's Flash MX program. Flash is becoming increasingly popular as a Web authoring tool. There is also a chapter on separating content for presentation using style sheets.

### **Additional Resources**

Arditi, A. (1999). *Making Text Legible: Designing for People with Partial Sight*. Lighthouse International.

Retrieved March 2, 2004 from [http://www.lighthouse.org/print\\_leg.htm](http://www.lighthouse.org/print_leg.htm)

Center for Applied Special Technology (1999-2000). *Summary of universal design for learning concepts: Underlying principles*. Retrieved March 2, 2004 from

<http://www.cast.org/udl/SummaryofUDLConcepts7.cfm#Underlying%20Premi5e5>

Center for Universal Design (1997). *The Center for Universal Design Home Page*. Retrieved March 2, 2004 from <http://www.design.ncsu.edu/cud/>

HomePage Reader. [computer software]. (2002). White Plains, NY: IBM.

JAWS (Job Access with Speech) [computer software]. (2003). St. Petersburg, FL: Freedom Scientific.

Retrieved March 2, 2004, from [http://www.freedomscientific.com/fs\\_products/software\\_jaws.asp](http://www.freedomscientific.com/fs_products/software_jaws.asp)

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U.S. Department of Justice (May, 2002). *A Guide to Disability Rights Laws*. Retrieved March 3, 2004 from <http://www.usdoj.gov/crt/ada/cguide.pdf>

Web Accessibility Center, The Ohio State University (February, 2004). *Web Accessibility Center (WAC)*.

Retrieved March 2, 2004, from <http://www.wac.ohio-state.edu/>

World Wide Web Consortium (W3C; 1999, May 5). *Web Content Accessibility Guidelines*

*Working Group (WCAG WG)*. Retrieved March 2, 2004, from <http://www.w3.org/WAI/GL/>

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- Watchfire. (2004) *WebXACT*. Retrieved April 22, 2005 from <http://webxact.watchfire.com>
- Wheaton, J.E., Chovan, J., O'Briant, S. and Howell, R. D. (2001). Lack of accessibility on the Web and the need for ADA compliance: Results from one university. *Rehabilitation Education*, 15, 225-232.

## CHAPTER 5

### Improving the Citizen-Government Connection Through Technology?

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#### Introduction

As contributions in this volume show, information technology has been proposed as an innovative solution for making government decisions and processes more transparent, and for involving citizens more intimately in them. Are these participatory planning processes, or e-government more generally, opening a new era of relations between citizens and their governments?

According to the United Nations and the American Society for Public Administration, e-government “improves citizen access to government information, services and expertise to ensure citizen participation in, and satisfaction with the government process. . . it is a permanent commitment by government to improving the relationship between the private citizen and the public sector through enhanced, cost-effective and efficient delivery of services, information and knowledge” (Moon, 2005, 425).

Using the Internet and technology-based decision tools to engage citizens is just one potential aspect of e-government, which has been broadly defined as “the delivery of [government] information and services online via the Internet or other digital means,” (West 2000, 2). On the participatory side, examples of e-government have included online town meetings, deliberative polling of panels of citizens, chat rooms, and interaction between officials and citizens through e-mail (Mossberger, Tolbert and Stansbury 2003; Thomas and Streib 2003; Heyman 2004). Improved service delivery through online transactions and more convenient access to information about services and policies may also enhance citizen evaluations of government, including trust and confidence in government.

The concept of trust holds a central place in discussions of citizen-government relationships in the U.S. and abroad, because of its significance for the legitimacy of government in a democratic society. Trust in government plummeted during the 1960’s, and has hovered around 40 percent since the 1970s, with some occasional, short-lived spikes upward, particularly after the terrorist attacks of September 11, 2001 (Donovan and Bowler 2003, 17-18). Trust is a diffuse judgment about government that may involve current events, past experiences, and feelings about particular administrations, politicians, electoral outcomes, or policies that are beyond any specific interaction with government that is mediated by technology (see, for example, Mossberger and Tolbert forthcoming, Nye et al. 1997, and Levi and Stoker 2000 for more comprehensive reviews.) Yet participatory mechanisms or better service delivery may have some role in restoring trust in government. A majority of Americans now believe that “People like me don’t have any say in what government does” (Bowler and Donovan 2003, 19), and increasing citizen participation through technology may be one remedy. Surveys show that one of the most common reasons given for low trust in government is the perception that government is inefficient, wastes money, and spends it on the wrong things (Nye et al. 1997, 18; Baldassare 2000, 12). If government online is more efficient and effective, this may also enhance citizen trust and confidence in government.

This chapter surveys research on e-government and identifies needs for better evidence on whether or how it can transform relationships with citizens. To better understand e-government and its potential, we need to ask:

- What do citizens want from e-government?
- How do they feel about what is currently provided?
- If e-government does indeed improve citizen attitudes toward government, or relationships with government – how and why?
- What types of studies are needed to provide more rigorous answers to “how and why”?

- How representative are current e-government users, and what does that mean for the transformative potential of e-government?

Before turning to these questions, it is useful to review two distinct visions of reforms designed to change the relationship between citizens and government that have informed the development of e-government.

### Two Reform Paradigms

E-government has been proposed as a solution for increasing citizen communication with government agencies, and ultimately political trust (Seifert and Peterson 2002; Chadwick and May 2003; West 2004; Ho 2002; Norris 2001; Clift 2000; Thomas and Streib 2003; Tapscott 1997). The literature on e-government identifies two different, but co-existing reform paradigms related to digital “government-to-citizen” relationships. These can be characterized as the entrepreneurial approach and the participatory approach (Chadwick and May 2003; Musso, Weare and Hale 2000; Moon 2002; Mossberger, Tolbert, and Stansbury 2003, 95-96; McNeal et al. 2003). Both reform paradigms predate the widespread use of e-government, but have embraced the use of the Internet to either modernize government or to promote e-democracy.

#### *The entrepreneurial approach*

The entrepreneurial approach to e-government is closely associated with the idea of “reinventing” government in the U.S., and with “new public management” reforms abroad (Osborne and Gaebler 1992; Chadwick and May 2003; Fountain 2001, 19). The critical task is creating government that is customer-driven and service oriented (National Performance Review 1993; Osborne and Gaebler 1992). Emulation of the private sector is significant for the entrepreneurial model, and the rise of e-commerce clearly influenced later reinvention initiatives (Fountain 2001, 18-20; Chadwick and May 2003). Responsiveness in the entrepreneurial model is represented by customer service. The Internet provides a flexible and convenient interface with government customers, who can access government around the clock and experience “one-stop shopping” for information and services. Efficiency is another important value in this model. The single portal creates an atmosphere that is conducive to the interagency and even inter-organizational collaboration that is also part of the reinvention paradigm for enhancing efficiency and effectiveness (Ho 2002; but see Fountain 2001, 201 for discussions of the limitations of integration). E-government also has the potential to reduce the cost of service delivery, although the front-end costs of development may mean that cost savings are not immediately realized. This is also consistent with the philosophy that government that “works better, costs less” will increase citizen confidence in government. Indeed, the original federal government report on reinvention, the National Performance Review, identified government waste and inefficiency as reasons underlying current lack of trust in government (National Performance Review 1993). Viewing citizens as customers emphasizes satisfaction with service delivery, particularly quality, convenience, and cost-effectiveness. While customers are concerned with results, their views of the effectiveness of government processes count, too.

#### *The participatory approach*

Another major model of government reform that has been associated with e-government is the participatory model. To revitalize trust in government, prescriptions range from direct democracy through ballot initiatives and referenda to more transparent representative systems (Dryzek 1990, Barber 1984, Fishkin 1993, Bowler, Donovan and Tolbert 1998; Donovan and Bowler 2003; Tolbert 2003). Citizen participation and public dialogue are deemed critical for fostering greater government accountability, transparency and responsiveness. Some scholars see information technology as the most important ingredient for creating a more participatory democracy and increasing confidence in government (Toffler 1995; Norris 2001; Bimber 2003; Budge 1996; Rheingold 1993; Grossman 1995). The information capacity available on the Internet allows citizens to become more knowledgeable about government and political issues, and the interactivity of the medium allows for new forms of communication with elected officials and between citizens – through chat rooms, listservs, e-mail, and bulletin board systems. The posting of contact information, legislation, agendas, and policies are all preliminary steps that make government more transparent, enabling informed participation



online and offline, while the Internet offers direct channels of communication as well. Technology-based decision tools for use in public hearings or meetings (discussed in many chapters here) also fit the participatory paradigm.

In practice, the implementation of e-government varies widely. The posting of information is most common, with online transactions spreading, but not universally available at the state and local level. For all governments, information and service delivery are more prevalent than participatory opportunities through e-government (see Chadwick and May 2003 on federal policy, West 2003a and West 2003b on state and local government, Norris and Moon 2003 and Musso, Weare and Hale 2000 on local government). Some of the constraints on e-government implementation reflect a lack of experience and capacity (Moon 2002; Ho 2002). Other evidence indicates, however, that governments have consciously favored the entrepreneurial paradigm over the participatory one. Cost-savings are a primary motivation for adoption of e-government at the local and state levels (West 2000; McNeal et al. 2003).

Survey research has addressed citizen use, needs, and attitudes toward e-government. National surveys have focused on the use of government websites rather than the broader array of technology uses represented in this volume.

### **What Citizens Use and Want**

Citizens turn to government websites for a number of activities, but looking up information (63 percent) is more common than online transactions (23 percent) (Hart-Teeter 2003). There are relatively few opportunities for direct democracy through online town meetings or chat rooms (Mossberger, Tolbert and Stansbury 2003; Ho 2002; West 2004). This partly reflects the configuration of current e-government websites, as well as citizen preferences.

#### *Information Search and E-mail for Contacting*

Internet users log onto e-government sites to obtain official government documents or statistics (41 percent), tourist or recreation information (34 percent), health information (28 percent), or government benefits (23 percent) (Horrigan 2004). Other surveys report that about 23 percent of Internet users have used government websites to research voting records or to get information on voting (Hart-Teeter 2003). Twenty-seven percent of all Internet users have used e-mail to contact officials (Horrigan 2004).

#### *Use for Different Levels of Government*

The majority of Internet users have used federal government websites (59 percent) or state websites (54 percent), with a smaller proportion who have used local websites (43 percent) (Hart-Teeter 2003). African-Americans and women are most likely to use local websites, however (Larsen and Rainie 2002).

#### *Needs Identified*

Surveys have yielded only very general information about what citizens need or want to see on e-government websites. One-third would like more security, and others cite difficulty navigating the sites. Twenty-two percent say that government websites need to be easier to use or to understand. Others want more links to other agencies (15 percent) or more information and services (13 percent) (Hart-Teeter 2003).

While online transactions are not yet as widespread as information-seeking, many Internet users express interest in using the web for obtaining licenses and permits, applying for programs such as unemployment and financial aid, and answering jury summons. One-third of Internet users are interested in filing taxes online, and about two-thirds would like to file a change of address online, with other activities mentioned above falling between one- and two-thirds of Internet users (Hart-Teeter 2003).

### **Attitudes toward E-Government**

How do citizens feel about e-government, given these uses and preferences? What do they cite as the benefits of government websites, and do positive attitudes toward e-government influence more general

assessments of government, including trust in government?

Digital government may convey an impression of government in general as being more responsive, transparent and accountable, responsible, efficient and effective, or participatory. Survey research offers some evidence relevant to these potential benefits of e-government.

### *Responsive*

Does e-government improve communication and interactions with citizens, thereby increasing responsiveness? By making available information and services that citizens want, and improving the speed and ease of interactions, e-government may be an antidote for the decrease in external efficacy, or the belief that government “cares about people like me.” Both websites and e-mail create new opportunities for interaction with officials that are convenient and quick, potentially enhancing responsiveness.

In fact, 60 percent of e-government users say government websites improve interactions with government. This differs by level of government, with 49 percent of e-government users believing their interactions with the federal government improve online, compared to 44 percent for state government, and 30 percent for local government (Larsen and Rainie 2002).

### *Transparent and Accountable*

The posting of information online may make government processes more transparent, increasing accountability to the public (see Welch and Wong 2001). Information commonly posted includes data, policies, laws, meeting schedules, minutes, and contact information. Searchable databases on web sites may also make information retrieval easier for citizens.

According to one survey 28 percent of e-government users believe that its most important benefit is to make government more accountable to citizens, while 18 percent state that the most important benefit is greater access to public information (Hart-Teeter 2003).

### *Accessible*

E-government provides accessibility around the clock, and seven days a week. Single, integrated portals and links to other sites have the potential to make information and services from a number of agencies available to citizens through a single website. Government online may also feature foreign language translation capabilities and websites that are accessible to people with disabilities.

More convenient government services are cited by 13 percent of e-government users as its most important benefit, but nearly three-quarters of e-government users view online government as being more convenient and easier to access (Hart-Teeter 2003).

### *Responsible*

Citizens may have confidence that government will protect their interests if websites display privacy and security statements, and divulge policies for handling personal information submitted online and government data that is posted online. Such responsibility might encourage citizens to see government as fair and ethical.

Nearly 45 percent of Americans strongly agree that if they submit personal information about themselves to government websites, government will be able to provide them with better services, yet the same percentage of Americans worries that submitting such information carries security and privacy risks. Accordingly, 54 percent of Americans advise that government should proceed slowly in handling personal information (Hart-Teeter 2003).

### *Efficient and effective*

E-government may convey an image of effective and efficient government through the use of the latest technology to automate processes, improve service delivery, produce budget savings, and save time. Online transactions and downloadable forms are examples of more efficient and effective processes through e-government. More generally, however, automation emulates the convenience and efficiency of e-commerce, and so suggests that government is adopting state-of-the-art private sector practices.

Nineteen percent of e-government users felt that efficiency and cost-effectiveness are the most important

benefits of e-government. This is interesting, given the surveys of government officials who cite efficiency as the primary benefit of e-government (Hart-Teeter 2003).

### *Participatory*

E-government is capable of providing new, electronic venues for citizen input. Online town meetings, bulletin board systems, chat rooms, deliberative processes for e-rulemaking, and use of technology for feedback in public meetings are examples of how this might be realized through e-government.

Mossberger, Tolbert and Stansbury (2003) asked about the use of the Internet for online town meetings and Internet voting, as well as online voter registration. Fewer Americans are interested in online town meetings and Internet voting than e-government – just under half professed interest in either online forums or online voting, compared to 78 percent who supported the idea of looking up government information online. Still, the availability of participation opportunities may be significant for attitudes toward government, even if individuals aren't personally interested in taking advantage of them.

In summary, there is no consensus on the most important benefits of e-government, but users rank accountability, cost-effectiveness and efficiency, access to information, and convenience as the most significant, in that order. Survey data does not address how Americans think e-government is performing on all of these goals. The record is somewhat mixed on how Americans feel about government's ability to protect their privacy and security online. A majority of e-government users, however, feel that their interactions with government are improved by the use of the Internet. While half of Americans say that they support innovations like online town meetings, this compares to over three-quarters of the population that feels positively about looking up government information online.

Overall, 74 percent of e-government users say it will have a positive impact over time, and 58 percent believe that it has a positive impact now (Hart-Teeter 2003). Descriptive evidence also suggests that positive attitudes toward e-government produce a greater likelihood of expressing trust in government. According to Hart-Teeter (2003), those who are very interested in e-government rate the federal government's ability to solve problems and to help people highly (42 percent) in comparison to others (28 percent). The Pew Internet and American Life Project has also found that e-government users who are satisfied with government websites are more likely than others to express a high level of trust in government. (Larsen and Rainie 2002).

Such descriptive data raises the question of causality – whether those who trust government are simply more likely to become e-government users, or whether satisfaction with e-government produces a change in attitudes toward government. The descriptive data reported by Pew and Hart-Teeter lack any statistical controls, measures of statistical significance, or means of establishing causation. Academic analyses based on these surveys, however, have produced some support for the positive effects of e-government.

West (2004) analyzes national survey data collected by Hart-Teeter in 2001 and finds that *exposure to information about e-government* is significantly related to the belief that government is effective at solving problems, but not related to trust in government. West uses multivariate regression, controlling for other factors, such as demographic variables and partisanship. The telephone survey conducted by Hart-Teeter and analyzed by West described the concept of e-government. Respondents were also questioned about their general attitudes toward government, including trust in government, before and after the priming, or the description of e-government.

Other research does find a statistically significant relationship between trust in government and use of e-government, employing two-stage multivariate models to control for endogeneity, or the lack of independence, in the factors that are associated with use of e-government and attitudes toward government. Welch, Hinnant and Moon (forthcoming) use a two-stage analysis of Hart-Teeter 2001 data to demonstrate that e-government users are in fact more likely to trust government as a result of their experiences online. Similarly, Mossberger and Tolbert (forthcoming) conduct a two-stage analysis of a Pew 2001 survey. This analysis conceptualizes changes in trust as a two-stage process, where use of e-government might lead to improved attitudes toward government (as more responsive or transparent, for example), which may in turn lead to greater trust. They

show that e-government use is related to positive attitudes for all levels of government, but that trust in government is a significant result of e-government use only at the local level.

### **How Representative are Current E-Government Users?**

One limitation of most of the existing survey data is that it is limited to Internet users or e-government users. The Hart-Teeter poll analyzed by West included some questions directed at both e-government users and those who had no experience with e-government, but this is not typical of most of the national surveys. Previous research reveals systematic inequalities—about 45 percent of Americans are not online, and individuals with access to computers and the Internet and the skills to use this technology are disproportionately white, educated, wealthy and younger. The question remains, then, would we find a similarly positive view of e-government among the population as a whole?

In a recent random-digit dialed national survey that included a sample of high-poverty census tracts as well as a general sample, Mossberger, Tolbert, and Stansbury (2003) gathered data on attitudes toward e-government and its possible uses, among users and nonusers. They found that while only 40 percent of Americans reported looking up government information online (in July 2001), that 78 percent said they support the idea. Many who are not online therefore express interest in e-government, but those who support e-government or currently use e-government are younger, more educated, more affluent, and voted in the last election, holding constant other demographic factors. Race, ethnicity, and gender were not significant factors in predicting either attitudes toward or current use of e-government, after controlling for other variables. Most Americans, especially young people, see e-government in a decidedly positive light. But poor Americans, in particular, who often depend upon public services for their daily needs, may be bypassed by the potential benefits of e-government.

### **Needs for Future Research**

Knowing that current e-government users value its availability is useful. There is some initial evidence that e-government may, under some circumstances, improve citizen evaluations of government more generally, including trust in government. Two-stage models show that improved interactions or responsiveness may be a key (Mossberger and Tolbert forthcoming; Welch, Hinnant and Moon forthcoming). Still, more research is needed on the causal mechanisms that link e-government to increased trust, or to other positive views about government. We also need to know more about whether a more representative sample of the population would have the same attitudes toward e-government, and whether these attitudes vary across income levels or demographic groups.

One methodological issue has been that the telephone survey instrument used in all of these studies has some disadvantages. Those who have not used e-government are responding to a description of e-government or a phrase such as “looking up government information online,” devoid of the specific content of e-government or the variation that exists across websites. Even for e-government users, telephone survey research forces respondents to recall using various forms of e-government from memory, so the stimulus, visiting a government website, is not held constant for all respondents.

Another question is whether telephone survey respondents have a clear understanding of e-government and the variety of information and services it offers. According to Hart-Teeter (2003), 32 percent of Americans say they don't know enough about government websites to rate their reliability. While half of Americans have used e-government, fewer than 8 percent say that they are very familiar with it, and 19 percent categorize themselves as only somewhat familiar with e-government. Coupled with the half of the American population that has not used e-government, this demonstrates some limits to the scope of telephone survey research on the topic.

An Internet-based experiment is needed to move beyond telephone survey research. Provision of Internet access and the administration of an online experiment could overcome the existing limitations. First, an online experiment could expose respondents to actual government websites, allowing them to use these websites to gain experience and to explore their features. Second, Internet access and instructions for finding e-government websites could be provided to those who do not currently have Internet access or who do not have

experience using e-government. Some Internet survey research firms provide WebTV or Internet access to a large number of participants, and are able to draw representative samples from this pool. Online surveys could probe respondents on their attitudes about government in general using pre and post-tests, thereby establishing a baseline from which to measure any change, and a firmer basis for understanding cause-and-effect. By directing respondents to common websites, such an experiment could hold website variation constant, and could also explore what aspects of the websites, if any, lead to positive evaluations of the site, and any changes in attitudes about government.

Digital government has attracted attention as one way of improving citizen interactions with government because of the dilemmas that citizen apathy and distrust pose for democracy. There is currently a shortage of empirical information about whether e-government in fact influences citizen attitudes about government, and if it does have some effect, how or why it matters. More positive citizen attitudes might be due to increased ease of communication with government, greater transparency, or perceptions of improved efficiency. Providing more and better participatory opportunities may also have a greater impact than current options available online. The development of e-government is at an early stage (Moon 2002), and time series analyses may help to trace the impact of e-government as both citizens and governments gain more experience online. Finally, the impact of e-government may vary across groups within the population, and with technology access and experience. Research should also take into account whether and how those who currently are not online view e-government as beneficial.



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## CHAPTER 6

### Interactive GIS as a Tool for Citizen Participation

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#### Introduction

The purpose of this chapter is to expose -- in clear, simple, and take-away usable terms -- the potential of “interactive GIS” as a “tool” for “citizen participation.” There is a sense among governments and officials and staff that “interactive GIS” is one of a panoply of tools that could be the panacea for a number of concerns including: increasing trust of government, increasing both participation rates and the quality of participation, increasing social inclusion and promoting greater democracy, and obtaining more efficient decisions. All potentially true.

My purpose here is threefold. First, I spend some time coming to terms with terms. What exactly is “interactive GIS?”; what exactly is “citizen participation?,” and how are these terms related in an electronic or electronic-enhanced environment. Second, I provide a series of illustrations or examples of representative “interactive” or “participatory” GISs. Third, within the confines of space, I seek to provide an extensive set of references (both “click-able” and not) to important theoretical and practical thinking and opportunities.

The chapter is organized as follows. The next section, entitled “Getting to Now” contains three parts: an overview of GIS, an overview of citizen participation, and a description of the “public participation GIS nexus.” Throughout this presentation, I proceed with a bias: the bias is *from the perspective of a city or agency* rather than starting with individual citizens. Thus, it is the city or agency’s aspirations and desires to deliver services, including the opportunity for meaningful citizen participation that provides the focus for the discussion. The third section contains the rudiments of a framework for categorizing existing Public Participation GIS (PPGIS) systems in terms of substantive area and level of citizen participation as well as a five “interactive” or “participatory” GISs. The final section presents a summary, several preliminary findings, and a discussion of next steps and resources.

#### Getting to Know

This nexus between two the concepts – “interactive GIS” and “citizen participation” – is neither simple nor straightforward. In part, this is because both of the concepts are themselves characterized by multiple definitions and cry out for elaboration and further refinement and sub-categorization. Indeed, it is useful to think of both concepts as emerging. In such circumstances, the best that we can hope is to capture them “in process.”

I proceed as follows. Once described in simple terms, this section focuses on the nexus between the two concepts and attempt to arrive at a final statement of where we are now in describing “interactive GIS as a tool for citizen participation.”

#### GIS -> Interactive GIS -> Public Participation GIS

Geographic Information Systems (GIS) have been around for quite some time. The largest vendor of GIS software - the Environmental Systems Research Institute (ESRI) – is in its thirty-fifth year. At its simplest conceptual level, GIS is a way of abstracting geography into five basic elements: maps, geo-referenced data sets, workflow models, data models, and metadata (Dangermond 2003).

GIS continues to evolve from a “back room” elitist single purpose system accomplished on a single machine to its current status characterized by visualization, interoperability, versioning, and web service networks. GIS has become an entire way of thinking and abstracting knowledge and principles about both the globe and the ways in which groups or collections of individuals manage it.

But what is meant by the adjective “interactive?” At a cursory level, it might represent the early 21<sup>st</sup>

century concept of instant gratification: plug it in, ask it a question, and get an instant response. True enough, but in the real world, interaction with the electronic knowledge system (i.e., the GIS system) can occur in a number of conceptually distinct ways, each of which is a legitimate use for the adjective “interactive.” These include:

- Interacting [individually] across functions or departments. This can be either an employee of the city/ agency or a citizen. The idea is that it is possible to peruse a large amount (breadth of search) of data “owned” by many individual departments or functional areas. The ability to share data across units is one characteristic of an “interactive” GIS system.
- Interacting [individually] within a single data set by applying workflow models or data models, usually in pursuit of an analytical response. The ability to perform analytical tasks, such as choosing a site or combining layers of information in a land suitability analysis, within the GIS system is second, but different characteristic of an “interactive” GIS system. Here, the interaction is meant in terms of getting an “answer” to a specific problem.
- Interacting [as a group] either across functions or departments and/or in depth in an intra-agency capacity is a third characteristic example of “interactive” GIS. This typically involves use of newer web-based GIS systems in an intra-agency setting. Here, the focus is clearly on “intra-agency” efficiency or effectiveness improvements. It is similar to the first type of interaction, but involves groups.
- Interacting [as a group] either across functions or departments and/or in depth in an environment of public access up to and potentially including shared decision- making. Again, an answer is sought or a decision is created and supported.

This last version of what could be meant by “interactive GIS” has evolved, since the advent of the Internet Age (roughly post 1995), into what is now known as Public Participation GIS (or sometimes “participatory GIS”).

### **Citizen Participation -> Citizen E-Participation**

Citizen participation is well recognized as an important conceptual component in governmental processes, particularly in urban and regional planning, and yet it remains troublesome in practice. The difficulty lies once again in the ambiguity of the term and its plethora of variations. Two major questions persist: who are “citizens;” and “how do they participate.”

#### *Who are Citizens?*

In its purest form, citizens are all of us. We live our lives; we vote in elections; and we form special interest groups to influence decisions. Most westerners, I suspect, share the values that Downs (1989) attributes to us: the desire to own a home, have a car, live in a small community with an unobtrusive local government, and have a job nearby. Downs points out that it is the role of government, among others, to deal with the flaws that arise from those values: excessive travel, poor housing, the provision of services, and accommodation of regional infrastructure needs. If government driven, what emerges is government action accompanied by some form of government-led citizen involvement. The alternative, government inaction or ignorance, could and does lead to another form of action, grassroots driven, normally emerging in some form of citizen led advocacy.

Normal citizens, us, however, are only part of the network of “citizens” that a government faces. Without belaboring the point, these other “citizens” are other governments, the business community, and the government’s own employees or subcontractors. So pervasive is this network of “citizens” that a specific language has grown up to capture these participatory patterns and interactions. G2G refers to government-to- government communications. G2B refers to government to business connections. G2E refers to a government’s interaction with its own employees (sometimes call IEE – internal efficiency and effectiveness).



And, finally G2C refers to how a government is involved with its citizens. G2C is the “usual” arena when discussing citizen participation although clearly it is a partial understanding.

Finally, citizens participate differentially (in both nominal measurement – they do or do not – and interval measurement (time and level of commitment) due to either variation in inclination or skill. This is true for all classes of citizens: government staffers, business people, government employees, and citizens. Leaving out for the moment those that are not inclined to participate in governmental affairs still leaves two groups: those with skills and those without skills. Much of the discussion in the Internet era (roughly post 1995) has focused on the ability of the Internet to increase the participatory skills of citizens via the Internet. Citizens are becoming e-citizens; one function of government is to help enable citizens obtain these skills.

### *How Do They Participate?*

Sherry Arnstein (1969) has provided the most enduring metaphor of variations in G2C citizen participation. She described a “ladder of citizen participation” composed of eight rungs: Manipulation, Therapy, Informing, Consultation, Placation, Partnership, Delegated Power, and Citizen Control. One level abstracted, Arnstein argues that the bottom rungs represent **non-participation**, the middle rungs **tokenism**, and the high rungs **citizen power**. These are perhaps harsh descriptors, but Arnstein was writing in harsh times.

Scholars and practitioners worldwide have used the Arnstein typology to both **design** and **evaluate** citizen participation processes. Design and evaluation are clearly two distinct activities; the first is pro-active and normally occurs at the beginning of processes, the latter more critical and contemplative and normally occurs at the end of processes. The focus on **design** points directly to the organization or agency that, for better or worse, is accountable for initiating and conducting citizen participation processes. How do they design that process? What quality of participation are they attempting to achieve? How do they increase participation? And, of course, what tools do they use? The overall literature on citizen participation is clearly too voluminous to recite here, but a useful summary can be found in Sanoff (1999).

The Internet offers the potential to affect substantial revisions in the ways that governments design citizen participation processes. E-government is here to stay; and those involved are already differentiating between e-government and e-governance. Three recent examples serve to focus this difference. First, Abramson and Morin (2003), the summarizers of the IBM Endowment for the Business of Government, distinguish between *e-government* (those activities that focus primarily on providing information and transaction-type services to customers of government) and *e-governance* (those activities that focus on the public in its role as citizen and include such attributes as on-line dialoguing and polling among others, all designed to make government more accessible and transparent). Second, various surveys conducted by West and his associates (e.g., 2003) have focused on usability, transparency, and issues of privacy. Finally, the noted Canadian commenter Riley (2003) has forcefully argued for more precise definitions of the over-defined concepts of e-government, e-governance and e-democracy. How exactly should governments be designing e-governance and e-democracy processes?

### **The PPGIS Nexus**

Public Participation GIS (PPGIS) is, as the name implies, the use of the Internet and web-based GIS systems in citizen participation processes. It is, however, only one form of Internet based technology that is currently being used to improve such processes. This is clear enough conceptually, but as Tulloch (2003) notes, “PPGIS lacks a clear definition.” In this section, I provide a brief historical perspective (focused on major events) and then examine what appear to be common elements of PPGIS.

Before proceeding, however, it is useful to reflect that the Internet and web-based GIS is at best still a child of between seven to ten years of age. Asking a child to play a major role in designing new governmental processes is risky business. But, for the most part, I adopt the position of “enthusiastic techno-positivist” (e.g., Carver 2003) rather than “social critic” (e.g., Pickles 1995) and focus on the potential for using interactive GIS to improve public participation. PPGIS, despite its youth, appears to be of sufficient interest to allow for independent consideration as a field of academic inquiry, as a brand or market for GIS vendors, and as

the subject for an increasing number of conferences and workshops. It is still a new field; and the major accumulator of knowledge is still the Internet. To benchmark just for a moment, I performed a GOOGLE search of key terms in February 2004. The phrase “participatory GIS” yielded 40900 hits, the phrase “public participation GIS” yielded 299000 hits, and the phrase “interactive GIS” yielded over 685000 hits.

### *History*

The name “public participation GIS” or “PPGIS” appears to have been first used in 1996 at a conference (July 10-13) hosted by the National Center for Geographic Information and Analysis (NCGIA) in Orono, Maine (Obermeyer 1998). In the US, the NCGIA is the dominant academic GIS community. It is composed of several research centers around the country and has, over the years, structured its activities around a number of “initiatives.” The two initiatives most related here are I-17 (Collaborative Spatial Decision Making) and I-19 (The Social Implications of How People, Space & Environment are Represented in GIS; known more simply as GIS and Society).

Two years later, a conference was held (October 15-17, 1998) at Santa Barbara, California on the topic of “Empowerment, Marginalization, and Public Participation GIS.” The results of this conference were subsequently published in the book **Community Participation and Geographical Information Systems** (Craig, Harris & Weiner 2002) that is and is sure to remain a seminal reference.

Three years later, an international workshop on access to geographic information and participatory approaches in using geographic information, with participants from both the US and Western Europe, was held in Spoleto, Italy. The results of this conference were subsequently published in a two volume special issue of the **Journal of the Urban and Regional Systems Association** (Onsrud & Craglia 2003, Craglia & Onsrud 2003) available online for free at: <http://www.urisa.org>.

The transition from “special ad-hoc conferences and workshops” to institutionalized ongoing activity began in 2002 when the Urban and Regional Information Systems Association (URISA) began hosting annual conferences devoted to PPGIS. The first was held in New Jersey, the second in Portland, Oregon in 2003, and a third occurred in Madison, Wisconsin in July 2004.

Four observations can be made about these early years. First, the earliest (published) reports of “interactive” GIS in a planning mode have come from outside the US. The seminal study by Carver et al. (2000) of environmental planning in Slaithwaite stands out. Second, it is exactly that type of problem (aggregating environmental preferences) that provided the lightning rod for the developing interactive systems. The work of Harris and Weiner in South Africa (2002) and the IAPAD project in the Philippines (2001) are other examples. Third, there has been some activity at the neighborhood level in the US (e.g., Al-Kodmany 2001, 1999). And, finally, there have been attempts to generalize the process or to theorize about the process of participation in an electronic or electronic-enhanced environment.

### *Elements of PPGIS*

As noted by Tulloch, “PPGIS lacks a clear definition.” Nevertheless, there appears to be four key elements. These are: meaningful *inclusion*; a notion of a *PPGIS organization* or agency; and the *level of interaction*. The fourth element, not discussed here, is the collective efforts of the vendor, academic, and professional organizations.

#### **Element (1): Inclusion**

The importance of inclusion to PPGIS is represented here in two illustrations. First, there have been attempts to update the Arnstein ladder to its e-participation analogue. Figure 6.1 shows my attempt to develop a summary of the correspondence between the (abstracted) Arnstein ladder and recent contributions by Carver (2003) and Smyth (2001).

ARNSTEIN	CARVER	SMYTH
Citizen Power	Public Participation in Final Decisions	
	Public Participation in Assessing Risks and Recommending Solutions	Online Decision Support Systems
Tokenism	Public Participation in Defining Interests, Actors and Determining Agenda	Online Opinion Surveys
	Restricted Participation	Online Discussion
Non-Participation	Informing the Public	Communication Barrier
	Public Right to Know	Online Service Delivery

**Figure 6.1: Updating Arnstein to E-Participatory Environments**

The second manner in which inclusion is given priority is in the form of manifestos or “guiding principles.” Reproduced below as Figure 6.2 are the “guiding principles” developed by Aberley and Sieber (2002) that appear on the home page of URISA PPGIS Conference web site.

Is an interdisciplinary research, community development and environmental stewardship tool grounded in value and ethical frameworks that promote social justice, ecological sustainability, improvement of quality of life, redistributive justice, nurturing of civil society, etc;
Is validly practiced in streams relating to place (urban, rural), organizational context (community-based organization, grassroots group, non-governmental organization, local government, regional government, state/provincial government), or sector (transportation, watershed restoration, food security, housing, public health, etc.);
Endevors to involve youth, elders, women, First Nations and other segments of society that are traditionally marginalized from decision making process;
Is both functionally and holistically based, that is, can be applied to help solve problems in specific sectors of society, and/or to provide broader integrated assessments of place-based or bioregional identity;
Is best applied via partnerships developed between individuals, communities, non-governmental organizations, academic institutions, religious or faith-based institutions, governments and the private sector;
Endeavors to always include a strong capacity building dimension in its application;
Is linked to social theories and methods originating in planning, anthropology, geography, social work and other social sciences;
Is linked to applied qualitative research tools including participatory action research, grounded research, participatory rural appraisal, etc;
Is a tool that is best applied in a wide variety or manual, digital, 2- and 3-dimensional formats and all data types (digital, oral, image);
Enables public access to cultural, economic and biophysical data generated by governments, private sector organizations and academic institutions;
Supports a range of interactive approaches from face-to-face contact to web-based applications;

Promotes development of software that is accessible to broad acquisition and ease of use;
Supports lifelong learning of its practitioners in a manner that helps to bridge the divides that exist between cultures, academic disciplines, gender and class;
Is about sharing the challenges and opportunities of place and situation in a transparent and celebratory manner.

**Figure 6.2: Guiding Principles of Participatory GIS**

**Element (2): PPGIS Organizations**

The design and implementation of a public participation GIS framework is an overt action taken by some organization or agency. The recognition that PPGIS involves elements of organizational design and change is a particularly cogent observation. It is not surprising, therefore, that Tulloch (2003) argues that PPGIS be treated as a “science” (i.e., the science of organizational design) rather than just as a “technology.” Tulloch, as a starting point, refers to Sawicki and Peterman’s (2002) description of a “PPGIS organization” wherein a PPGIS organization is defined as those that:

- “collect demographic, administrative, environmental or other local area databases;
- do something to the data to make it more useful locally (e.g., address matching of individual records; creating customized tables), and
- provide this information to local nonprofit community-based groups at low or now cost. This can include local non-profit community groups that are collecting and processing data in-house, or data ‘intermediaries’ that process and analyze data for others (data intermediaries might be government offices, nonprofit groups, university-based centers, etc.)”

Thus, the GIS community recognizes the need to go outside their own mostly technologically driven community to get help in understanding and designing citizen participation situations where GIS can help. This is occurring at both the theoretical and practical levels of abstraction. Three papers at the Spoleto conference on the topic of “methodological and research framework issues” are instructive of the various types of theoretical work being pursued. Jankowski and Nyerges (2003), extending their preliminary work (2001) explored the possibility of a general framework for research on GIS-supported participatory decision-making. This article relates “convening constructs” and “process constructs” to “outcome constructs.” The central conclusion is that there needs to be a way to compare and contrast the myriad empirical research strategies that exist. A “theory of planned behavior” introduced by When de Montalvo (2003) that draws insights from the field of social psychology is used to analyze spatial data sharing in South Africa. And Eric de Man (2003) uses cultural theory to help understand the issues involved in access and participation in using geographic information. He explores the dimensions of “culture” from both Hofstede and Douglas to demonstrate that access and participation are culturally and institutionally embedded.

At a more practical level, the conceptual issue of organizational design has been reflected in two different studies. First, Leitner et al. (2002) have identified six different “delivery mechanisms” including: community-based (in house) GIS; university-community partnerships, publicly accessible GIS facilities at universities and/or libraries; map rooms, Internet map servers, and neighborhood GIS centers. Second, and this borders on a manifesto-type statement, is a piece of a participatory GIS web site reproduced below as Figure 6.3 that compares the differences between “traditional” and “participatory” GIS delivery systems ([http://www.geography.ccsu.edu/kyem/PPGIS/GIS\\_PPGIS.htm](http://www.geography.ccsu.edu/kyem/PPGIS/GIS_PPGIS.htm)).

Traditional GIS	Characteristic	Participatory GIS
Technology and People	<b>FOCUS</b>	People, Process and Technology
Facilitate Official Policymaking. Improve Software Programs Public Officials, Decision Makers	<b>MOTIVATION / GOAL</b>	Empower Communities Facilitate Public Participation
Supply Driven, Technological Push	<b>PARTICIPANTS</b>	Local, Underprivileged Groups
Because it is Possible Rigid, Hierarchical & Bureaucratic	<b>IMPLEMENTATION</b>	Demand and Need Driven
Decided by GIS Experts	<b>WHY ADOPT?</b>	Because it is Needed
Led and Controlled by GIS Experts	<b>ORGANIZATION</b>	Flexible, Open and Participatory
Multipurpose Applications Public Organizations & Large Scale Private Enterprises in Western Developed Nations	<b>DETAILS OF APPLICATIONS</b>	Decided by Users/focus Groups
Top Down, Hierarchically Structured	<b>ROLE OF GIS EXPERT</b>	GIS Experts act as Facilitators
Capital Intensive Projects State and Corporate Funding Big and Complex Systems	<b>PROJECT TYPE</b>	Specific project
	<b>PLACE</b>	Local, Rural, and Indigenous Communities in both Developed and Developing Countries
	<b>INFORMATION FLOW</b>	Bottom up, Grassroots, and Citizen Participation
	<b>EXPENDITURE</b>	Low Cost Projects
	<b>SPONSORSHIP</b>	Donations, NGO support
	<b>SIZE OF SYSTEM</b>	Small and Simple systems

**Figure 6.3: Differences Between Traditional and Participatory GIS Delivery**

**Element (3): Levels of Interaction**

As in the ladder of citizen participation, GIS systems – interactive or participatory – are built with certain capabilities. At a very gross level of abstraction, these capabilities vary roughly from:

Viewing -> Analysis -> Support for Decision Making

Viewing is akin to passive interaction. It is like searching *Expedia.com* or some other travel related web site for information. The fact that the data and maps are available should not be overlooked or downplayed, but this level of interaction is at best minimal in terms of participation in a government process. Analysis involves seeking an answer – usually to a well-defined problem. So, one can examine a GIS system to obtain both data and maps about crime within a neighborhood or finding the “best” site to locate a discount apparel store. Notice that the answer is an answer to a question that a citizen, singularly or as a representative of a group, pose. The third level of interaction involves some discussion about both the modeling effort being employed and/or some aggregation of preferences in an environment where group decision-making is important. Citizen participation processes are clearly more akin to the last level of interaction than the previous two.

Peng (2001) introduced the notion of web-based public participation system (WPPS) to examine the potential for Internet GIS in public participation models. He created a matrix of alternative participation modes, the marginal elements of which are reproduced here as Figure 6.4. One side of the matrix contains steps within a planning process (general information, alternatives, data, and analysis). The other side of the matrix contains functions of GIS (web browsing; static map images or clickable maps; communication channels for discussion and voting; interactive map-based search, query and analysis; and scenario building and on-line editing). The element of PPGIS focused on level of analysis obviously proceeds as a diagonal across the matrix from top left



(viewing) to the bottom right (group level discussion about analytical matters).

Planning Process /GIS Functions	Web Browsing	Static Map Images	Communication Channels for Discussion	Interactive Map Based Search, Query, & Analysis	Scenario Building/ Online Editing
General Information					
Plan Alternatives					
Data					
Analysis Tools					

**Figure 6.4: Peng Matrix (Peng 2001)**

### Summary

So, where are we in terms of describing “interactive GIS as a tool for citizen participation”? Each of the four elements provides a “pair” of endpoints to encapsulate a summary statement. The notion of inclusion is basic to democratic participation; but, governments cannot force individuals to become involved. What they can do is to provide as much information in as accessible a format as is possible. On the other hand, government may or may not want to undertake specific projects that are better initiated by individuals or groups of individuals. The notion of a PPGIS organization suggests that some governments or NGOs are more likely to initiate activities related to sharing of information. The area of inquiry known as organizational behavior and design can be very instructive in helping design future participatory GIS environments. Finally, there seems to be a clear distinction between government led initiatives that produce highly sophisticated web-based GIS systems allowing lower levels of participation (mostly map viewing, some analysis) from those created to be more meaningful (but perhaps less sophisticated) in using the web to enable aggregation of preferences. Vendors, academics, and professional organizations continue to play an ongoing role.

### A Typology and Some Examples

In this section, I illustrate five interactive GIS systems (and discuss very briefly a number of others). For the most part, they are interactive GIS systems initiated by and maintained by government units. I use a two-step process. First, I develop a method to categorize “interactive GIS” and “citizen participation” web sites. Second, I proceed with the illustrations.

#### The Range of PPGIS Possibilities

Table 6.2 is a matrix of PPGIS possibilities. On the vertical axis are functional areas of urban and regional planning, beginning with a “general” category and then focusing on more specialized areas of practice. On the horizontal axis are summary descriptors of forms of participatory GIS that encapsulate the thinking of Arnstein/Carver/Smyth, Peng, and the functional capabilities of GIS systems. In addition to the marginal descriptors, each cell is conceptually partitioned into four “micro” cells reflecting the categorization of “citizen” developed earlier. Finally, I have included in Table 6.2 “names” or “examples” for five possibilities. These are the ones to be illustrated below.

**Table 6.1: The PPGIS Possibility Nexus**

Participation/ Function	Non-Participation (Viewing)	Tokenism (Analysis)	Citizen Power (Decision Making)
General	G2G: G2E: G2B: G2C: PORTLAND, OR	G2G: G2E: G2B: G2C: ORLANDO, FL	G2G: G2E: G2B: G2C:
Economic Development	G2G: G2E: G2B: G2C:	G2G: G2E: G2B: INDIANPOLIS, IN G2C:	G2G: G2E: G2B: G2C:
Environment	G2G: G2E: G2B: G2C:	G2G: G2E: G2B: G2C:	G2G: G2E: G2B: G2C: LEEDS, ENG
Services	G2G: G2E: G2B: G2C: SAN DIEGO, CA	G2G: G2E: G2B: G2C:	G2G: G2E: G2B: G2C:
Transportation	G2G: G2E: G2B: G2C:	G2G: G2E: G2B: G2C:	G2G: G2E: G2B: G2C:

**Selective Interactive GIS Sites**

The order of presentation is as follows: I focus first on the “general” web sites, those available to the public that contain information from many different agencies. For the most part, these are parcel level systems, accessible by either address or map. I then focus on two examples that are sector specific that represent slightly higher levels of participation, and conclude with a description of a truly “participatory GIS” system.

*Portland, Oregon*

The first example is from Portland, Oregon. The GIS capabilities of the collective Portland governments are astounding. The metropolitan area government, METRO, maintains an interactive site at <http://topaz.metro-region.org/metromap/metromap.cfm> that is worth visiting. But, here we focus on a relatively simple web site maintained by the City of Portland, <http://www.portlandmaps.com>, for use by the public.

PORTLANDMAPS is mostly a “viewing” web site accessible to the general public. Among the interactive GIS systems demonstrated here, it is the easiest to use and navigate. It has what a web site analyst would term transparency. Looking simply at the “mapping” home page, shown in Figure 6.5, one immediately “feels” the presence of tabular data (top right portion of the map), the presence of layers (bottom left portion) and the capacity to zoom and pan (right hand side).

# PortlandMaps

An Information Service by The City of Portland

**Street Address or Intersection**

*/e. 1211 SW 5TH or MADISON AND 5TH*

**Search**

### Recent Searches

[NO ADDRESS AVAILABLE, PORTLAND](#)  
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**Figure 6.5: Portland Maps**

Indeed, the Web site contains mapped and tabular information from many agencies or departments including: property, crime, census, schools and parks, capital improvements, and development. The user is given two choices to begin: to focus on a parcel or to focus on a layer. Focusing on the “parcel” choice, information can be returned about the information table requested. For example, if choosing “property” information is returned about taxing district, deed information, land use type, property improvement information and details, tax history and assessment history. If the user chooses “crime” information is returned about all crimes within a quarter mile of the parcel.

Focusing on the “layer” choice, information is returned as a map. There is a capacity to zoom in or out. It is also possible to obtain the tabular data for the variable on interest, which it itself analyzed in a number of ways. For example, crime data will be displayed month, day of week and time.

### *City of Orlando, Florida*

The second example is from the City of Orlando. Built by ESRI and Latitude Graphic Group, Ltd, [http://www.cityoforlando.net/public\\_works/esd/gis/interactive\\_mapping.htm](http://www.cityoforlando.net/public_works/esd/gis/interactive_mapping.htm), is a multi-layer very interactive mapping system of Orange County, which contains the city of Orlando) and portions of surrounding counties, see Figure 6.6.

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gis

**The City of Orlando's Geographic Information System**

**Orange County INFOMAP Interactive Mapping**

Create your own map and see where your address lies anywhere in Orange County!  
Continue to the [Orange County INFOMAP Interactive Mapping](#)

Any questions about INFOMAP should be directed to [Lisa.O'Neil@ocfl.net](mailto:Lisa.O'Neil@ocfl.net)

**Orlando GIS Info**  
One City Commons  
400 S. Orange Ave.  
P.O. Box 4990  
Orlando, FL  
32802-4990

**Mark Hoover**  
Project Manager  
407-246-3060  
e-mail

**Orlando GIS Directory**  
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[Orlando GIS en Español](#)  
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**En Español**

**Government Web Directory**

**Figure 6.6: Orange County Interactive GIS**

This site has a number of features that have the ability to increase the level of citizen participation interaction. First, the entire site is available in Spanish. Multi-lingual capability is becoming one of the most important criteria for all Internet applications. Second, there is an ability to download and print maps by employing a PDF reader and mapmaker from the tool bar (in ADOBE). Third, there is a mechanism for the user to provide information back to the city about the map and/or data. And, finally, tools are provided to allow notes to be placed on the map and to send save, store, and transmit “marked-up” maps.

Layers available include political, property, imagery (at certain scales), jurisdiction, transportation, water, land use, zoning, education, fire rescue, law enforcement, environmental, recreation, public services, utilities, census, and points of interest. Each of the main categories has a number of sub-categories; so for example, environmental includes soils, drainage basins, wetland habitat, and national wetland inventory.

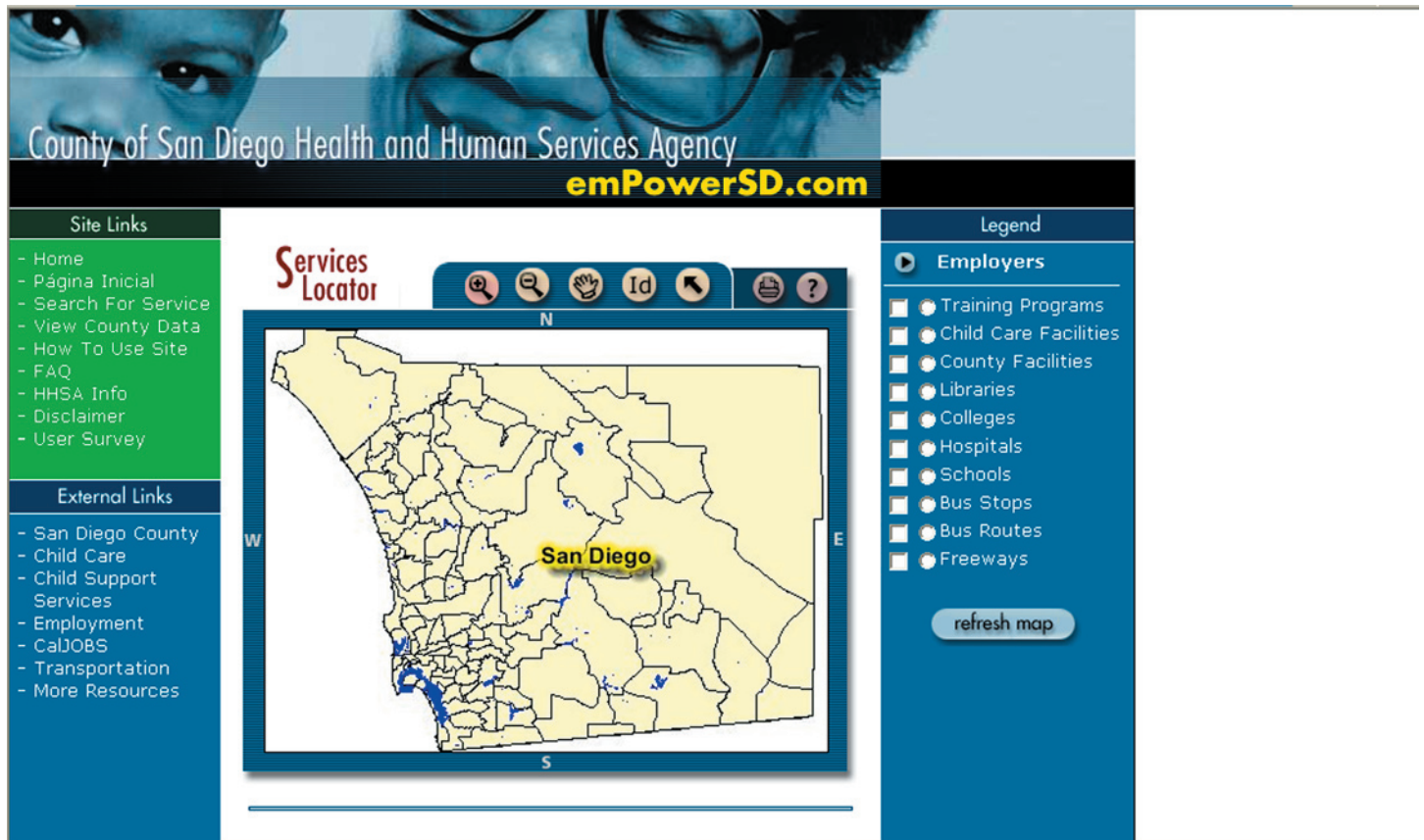
### *County of San Diego, California*

The third example is from San Diego. There is an overall GIS for the San Diego region maintained by SanGis, a joint powers agency of the City and County of San Diego found at <http://www.sangis.org>. Here, as in the case of Portland, I focus on a different web site. The County of San Diego Health and Human Services Agency's web site is found at <http://www.empowersd.com/map.asp>. This site is chosen for presentation mostly because it is not a parcel based system, it is sector specific (i.e., social services), and is paradoxically (in terms of the PPGIS ideology outlined above) buried within the County of San Diego Web site. A user can get to it, but the user must really know that it is there.

The site “emPowerSD” allows the user to search for services. Services are broken up into two categories: first, places of employment using traditional BLS categories of services, finance, retail trade,

wholesale trade, transportation, manufacturing, construction, and agriculture; and second social services such as training programs, child care facilities, county facilities, libraries, colleges, hospitals, schools. Bus stops are also included.

The home page, shown in Figure 6.7, contains instructions, a map frame, and a set of layers. Only the home page is in Spanish. As with most GIS systems, the user can start from a known address or proceed to a layer.



**Figure 6.7: EMPOWERSD**

For known addresses, buffering capability at 1, 3, 5, and 10 miles is available to enable compilation of data. Normal zooming and panning are available. Maps created can be saved and printed. If an address is known, driving directions to a destination can be obtained.

### *Indianapolis and Marion County, Indiana*

The fourth example is from Indianapolis and Marion County, Indiana. The joint government, at its economic development portal, maintains the web site, <http://impas.indygov.org/ed/ed.asp>. The web site has been produced by GIS Planning, a private firm that specializes in web GIS applications for economic development. This web site, while useful as a general tool for all citizens, is not a general purpose GIS aimed at providing a vast amount of information. It is an “economic development” site primarily directed at the development and real estate communities. It is principally a place where potential users can find relevant information.

The opening page shows, see Figure 6.8, a base map of the region with major roads. There is a zoom capability.



Researchers at Leeds University have developed a number of participatory GIS platforms that have been used in actual planning applications. They have coined the term “planning for real” or PFR. The classic, original, application focuses on land use and environmental planning issues in the town of Slaithwaite. Here, I illustrate a web-based participatory GIS that focuses on how users (citizens) can create an aggregate map of tree planting preferences in the Yorkshire Dales, a national park. The opening page of the Web site is shown in figure 6.9.



**Figure 6.9: Opening Web Page from Leeds, England**

The purpose of the web site application is to develop a consensus view of replanting native woodlands. Users employ both constraints (something that rigidly defines areas that can or cannot be replanted) and factors (something that describes how suitable an area is for replanting). The aggregation over all users represents a consensus view. Moreover, the web site records and stores individual choices, allowing for potential socio-economic analysis.

### **Other Interactive GIS Web Sites and Some Resources**

As indicated above, the number of “hits” from a search for “interactive GIS” is approaching 700,000. It is virtually impossible to account for them all. In this section, I identify several additional sites that are both different and indicative of the current state of development. The first is from Dublin, Ohio, (<http://www.dublin.oh.us/business/gis/intro>) that is built on an AUTODESK platform. Simpler than the others, it is typical of smaller town GIS systems. The second is a site developed by ESRI for the National Association of

Realtors (<http://www.realtor.com>) that is a search engine for both rental and sale transactions. The third is from ESRI itself. Their “showcase” of sites ([http://www.esri.com/software/internetmaps/visit\\_sites.html](http://www.esri.com/software/internetmaps/visit_sites.html)) contains the latest in developments of technology.

### **Conclusion: Summary, Findings, and Next Steps**

#### **Summary**

This chapter has attempted some definitions of “interactive GIS” and “citizen or public participation”, describing the potential of the former to improve the latter, and providing several examples of working local government interactive web-based GISs.

The overall conclusion to be drawn is that, despite several whiz-bang applications promulgated by vendors, most current examples of web-based GIS tend to be demonstrative of low levels of (conceptual) participation. However, there are several substantive based GIS systems – mostly for economic development purposes – that contain “higher” levels of usage and participation (analysis).

#### **Specific Findings**

This review of interactive GIS as a tool for citizen participation points to five specific tentative findings. First, there appears to be higher levels of participation in situations where the object of study is regional development or environmental preferences. The studies in Leeds, South Africa and the Philippines are instructive.

Second, more specific substantive scopes of inquiry tend to result in higher the levels of analysis. Any of the GIS Planning sites for economic development planning are instructive.

Third, many web-based GIS are simply “out there.” Many of these are associated with low (i.e., map viewing only) levels of interaction.

The fourth major finding is that GIS is being used for more than simply property layers. Social phenomenon (crime) and social services (workforce, health) are increasingly being made available on web-based GIS.

The final major finding is that GIS is a useful “in-house” management tool. Several examples of GIS that were not accessible to the public but to employees of government demonstrate this trend. action.

#### **Next Steps**

In this final section, I outline some general findings about the state of the “interactive GIS” as a tool for “citizen participation”, and identify some next steps. This chapter has attempted some definitions of “interactive GIS” and “citizen or public participation”, describing the potential of the former to improve the latter, and providing several examples of working local government interactive web-based GISs.

This chapter is concluded with a number of suggestions for “next steps.” They are simultaneously reflective, technological, and organizational. First, each reader should carefully consider where their organization IS in terms of the attributes of a PPGIS organization outlined in section two above. Second, each reader should actively play with the examples cited in part three above. One of the hallmarks of any good reference is to allow potential users to “play” – to develop insights and questions that will lead to their own terms such as “interactive GIS” and “public participation GIS” in the hope of staying timely in terms of newer developments. Third, each reader should develop a spirit of research by continuing to search (GOOGLING!) relevant services as such. Finally, participation in the activities of professional organizations such as URISA and ESRI conferences where latest developments are likely to be shown is encouraged.

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### Web Sites

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**Engaging Citizens in Public Affairs: Online Applications**

Kheir Al-Kodmany, PhD

**University of Illinois at Chicago****Abstract**

This chapter addresses innovative methods in using Web-based mapping and Geographic Information Systems (GIS) in public participation and community planning. The ultimate goal is to explore how Web mapping can be advanced to facilitate two-way communication between planners and the public. Presently, most Web-based mapping systems use one-way communication to provide static information to the public. Current GIS technologies lend themselves well to one-way communication. While this type of system can be very useful, it is important to consider new technologies that offer opportunities to use the Web in ways that have not previously been recognised. Using examples from a university-community partnership between the University of Illinois at Chicago (UIC) and community groups in Chicago's Pilsen and North Lawndale neighbourhoods, several such new technologies are introduced and examined. These examples show the progression from one-way communication to two-way and even three-way communication using Web-based maps. The challenges of creating interactive screen-based maps for public participation include navigating large geographic area maps on a small screen, selecting specific map features, geo-referencing public input and transferring this input to conventional GIS systems. These challenges as well as many successes of our Web mapping research are explored in detail. As Web-based mapping capabilities are refined and improved, new avenues are opened for public participation in the planning process.

**Introduction**

The research in this chapter reflects recent views about the importance of incorporating citizen participation into computer-based planning efforts. The phrase "public participation GIS," or PPGIS, describes recent research from the planning profession that is rooted in the concern that all voices should be heard in a democracy. In particular, it aims at improving access to GIS among non-governmental organizations and individuals, especially those who have been historically under-represented in public policy making. Individuals and citizens' groups without access to GIS may find it difficult to gain entry into a public policy-making process that relies on GIS data and difficult to challenge policies that were created through the use of "expert" GIS systems. Advocates of PPGIS claim that GIS technology does not adequately represent many societal groups. Some researchers and practitioners instead seek to develop alternative GIS systems (called GIS/2) that are more adaptable to input from citizens and non-official sources (Obermeyer 1998b). In this model, the role of participants in creating and evaluating data is primary. GIS/2 systems seek to accommodate an equitable representation of diverse views (Aitken and Michel 1995; Rundstrom 1995; Curry 1995; Obermeyer and Pinto 1994; Obermeyer 1995; Al-Kodmany, 2000).

This chapter also follows the framework first developed by Lynch (1960), Nasar (1998), and Sanoff (1991). These scholars advocate users' need-driven design and planning or a user-oriented approach. They argue that current practices do not adequately address users' needs and preferences. The research described here is propelled by the belief that public needs are underrepresented in today's planning and design practices and that Web technology offers a medium of communication that can potentially address this problem. The goal is to determine a strategy that allows residents to voice their views on existing conditions or on proposed plans and development schemes and to share these views amongst themselves and with community organizations and authorities. While it has become common for local governments, community planners and community agencies to utilize the Web to offer information to community members, this project takes the next step by using the Web



as a medium for two-way communication; the tool allows people to become both receivers and providers of information. This project lays out some of the potential contributions and limitations related to enabling two-way communication and participation over the Web.

The University of Illinois at Chicago, where this project originated, aims at building mutually beneficial relationships among and between faculty, scholars, students, community leaders, institutions, and researchers. It promotes engaged urban research that relies on collaboration and partnership between the university and individuals and organizations in the public and private sectors. The communication among the partner groups is a model for the type of two-way communication that we strive for with Web-based technology in planning. Two-way interaction is critical for supporting the university-community partnership. In two-way communication any partner may originate and/or receive communication, and as a result, a cycle of communication, or a flow of knowledge is generated. Two-way communication enables each partner to become both a consumer and a producer of knowledge and opens the possibility for sharing that knowledge with neighbouring communities throughout Chicago, the region and the world.

The project described in this chapter consists of a number of prototypical Web sites that represent a variety of attempts to expand upon present Web-based and GIS technology to a new kind of interactive mapping. Each application we have developed is intended to provide a structured process to gather information from multiple participants and then to present these views pictorially. The goal is to help the University and communities think more effectively as a group focused on a common endeavour without losing their individuality, and to help Community Based Organizations (CBO)s manage the complexity of their ideas without trivializing them or losing detail.

In developing the one-way, two-way and three-way spatial communications, we address several challenges in creating Web-based participatory maps. One challenge has been to create a way to access user spatial feedback without using a GIS system. Since GIS software such as ArcIMS, demands long download times and substantial bandwidth, and its interface design is not intuitive, in our view, we have developed interactive websites using other technologies.

Other challenges involve efforts to replicate traditional, paper-based participation methods on the computer. For instance, we have experimented with various ways of representing and navigating a large geographic area on a small computer screen. Unlike paper maps, computer screens limit the amount of geographic area that can be viewed at one time. Scrolling across a large map online is usually impossible because of the slow speed and large amount of computer memory that is required to reload the images. We have developed two interfaces that present alternative ways of presenting a map of a large community area without excess complication or computer resource use.

Another challenge is developing a flexible, accurate way for users to select and comment on a specific neighbourhood, block, or building. In one Web interface design, we used pre-defined square units on a map (using a grid system) so that it would be possible to easily analyse the location selection data from a large group of participants. However, we subsequently found that this method could excessively limit user choices and so we developed a new interface that features freeform drawing as the method of selection. The development of Web-based freehand drawing tools, where users can use an online “pen” to select their own locations, is a particularly exciting innovation. In both of these research areas we have experimented with the use of aerial photographs, structure base maps and GIS maps of the community as the background upon which users can select locations of concern. After presenting several options for navigation and selection, we discuss one interface where we attempted to incorporate the best features into one “complete” or integrated interface. It will be most helpful to read this chapter in front of a computer in order to try out the interfaces. It will be most helpful to read this chapter in front of a computer in order to try out the interfaces. The Internet Explorer browser is recommended for best results.

### **Theoretical Background: Imageability and Public Participation in Planning**

The theoretical foundations for these Web interface designs can be found in the work of Lynch (1960) and Nasar (1998), who argue for the importance of discovering how city design affects citizens. By studying what kinds of evaluative images residents have of their community, planners, researchers and community leaders can

derive valuable information about how to improve the physical form of their communities.

In his seminal book, *The Image of the City* (1960), Lynch uses the concept of “imageability” as a theoretical framework for studying cognitive maps, urban form, and the spatial relationships of cities. Imageability “is that quality in a physical object which gives it a high probability of evoking a strong image in any given observer. It is that shape, colour, or arrangement that facilitates the making of vividly identified, powerfully structured, highly useful mental images of the environment. It might also be called “legibility” (Lynch 1960, 9). If most people like the imageable elements of a city, then it will probably convey a positive evaluative image. If they dislike them, the city will convey a negative evaluative image, suggesting a need for changes in the city’s appearance. This aspect of city image is what Nasar calls the *likability* of the cityscape. Likability refers to the probability that an environment will evoke a positive evaluative response among the groups of people experiencing it. Inhabitants of a city with a good evaluative image find pleasure in the appearance of its memorable and visible parts.

The city landscape may be a source of pleasure and delight to its residents and visitors, and can potentially counteract the stresses of daily life. Thus, the development of a city’s form should be guided by a visual plan that is concerned with visual form on the urban scale (Lynch 1960). However, to devise such a plan, we need to know how the public evaluates the cityscape and what meanings they find in it.

Nasar suggests that it is possible to learn the public’s preferences by empirically measuring them. Just as we weigh objects to find how light or heavy they are, Nasar says that we can measure preferences to determine the degree to which people like or dislike various areas of a city. Nasar developed and implemented a method of surveying residents (using traditional phone surveys and manual map-making) to determine which areas they like and dislike in their community, with the goal of creating a single “evaluative image” of the community that could guide future design and development.

In the Web-based mapping projects described in this chapter, we have adopted and advanced Nasar’s original method by using the Web and GIS to survey and map resident preferences. Most of the interfaces we have developed are based on the concept of surveying a group of community residents to discover their preferences and opinions about the imageability of their community. GIS is in the background, in the sense that it functions as the method for analysing the data that is collected via the Web. The Web is used as the primary platform for collecting spatial information.

### Current Work on Public Participation and the Internet

The Internet has already proven to be valuable on its own as a low-cost mode of communication for participatory planning through Web sites, email, surveys and on-line conferencing (Craig 1998, Al-Kodmany 2000). The Neighbourhood Knowledge Los Angeles project (<http://nkla.spsr.ucla.edu/master.cfm?Language=English&Look=Graphic&SessionOn=Yes>) provides a strong example of how the Internet is being used as a communication tool for empowering the public. The project, a collaboration of the municipality of Los Angeles and UCLA, knits together 6 municipal databases and inspection records, looks for indicators of urban decay, and plots the information on city maps posted on its Web site. The project utilizes off-the-shelf software for database management (Microsoft Access and Internet Information Server) and for Internet mapping (ESRI’s MapObjects and Internet Map Server). Their aim is to provide public access to government records and electronic mapping through home computers and at “touch-screen” information kiosks.

The Internet is now able to support interactive programs in a manner similar to stand-alone GIS and stand-alone hypermedia systems. Peng (1999) concludes that the speed of technological development provides an opportunity to expand GIS technology and spatial information to the general public. While the technology is not quite there yet, “it is likely that we will see an increasing number of distributed GIS with multimedia components which are organized around a spatial data infrastructure and delivered through wide-area networks such as the WWW” (Shiffer 1998, 731). Krygier notes that the WWW has great potential for implementing Public Participation Visualization (PPV) and Public Participation GIS (PPGIS) (1999). Recent developments in Web-based programming languages are making highly interactive advanced GIS applications available to

anyone with a modem and Internet browser. Even novices can access geographic information, amend and add information, and interactively explore “what if” scenarios.

The East St. Louis Action Research Project (ESLARP) is one of many examples of community organizations utilizing this new technology. ESLARP (<http://www.eslarp.uiuc.edu/>) is a reciprocal learning effort between members of the East St. Louis community and students and faculty at the University of Illinois. Their primary goal is to help community-based development organizations increase their planning, design and development capabilities while educating planning and design students. One result of the partnership is EGRETS, a geographic information retrieval system designed to be used by community residents. This allows the public to interact with GIS data through a web browser without ever owning GIS software on their machines. In EGRETS, residents can either search for maps already made or create their own maps.

The Internet as a medium of communication will be increasingly utilized in all aspects of planning. It is valuable on its own as a low-cost mode of communication for participatory planning but it becomes particularly powerful when it is used to distribute and disseminate other visualization technologies. While there is great excitement about future possibilities for Internet-based public participation, concerns generally centre around access to the technology. First, access must be ensured in terms of making sure the pool of participants has Internet access so that there will be wide representation in public participation forums, and second, in terms of creating a critical mass of users of a particular Website to sustain meaningful interactions.

Shiffer and others at MIT have researched a variety of ways of using the Web for urban planning and design. They have explored how emerging information technologies and Web technologies can improve the processing and communication of planning-related information in metropolitan planning organisations. They provide case studies illustrating how to deliver spatially-referenced multimedia material for site planning and reviews using projects in Washington DC, the South Boston Seaport and Boston’s waterfront development. Such multimedia interfaces, coupled with the accessibility of the Web, have the possibility of opening up a new paradigm within urban design, one which helps to communicate ideas and developments to other agencies and the general public (Shiffer 1995).

As Shiffer’s work has demonstrated, one result of this move toward digital visualisation of urban form and distribution of information on the Web is that there are new possibilities for involving the lay public in design decision-making. As the number of households with Web access increases, and the demographic profile of Web users diversifies, the potential for using the Web for public participation planning increases exponentially. Thus, the exploration of which types of digital tools and interfaces can best engage the public in planning activities is a promising avenue for research.

A survey is one important tool for public participation on the Web. Citizens can use a Web-based survey to become information creators, rather than passive recipients of information. This is an important leap forward in using the Web as a communication tool. Most of these applications utilise simple feedback forms where users type in comments in response to questions and then click “submit” to send their responses to the Web server. There are fewer examples of Web-based surveys that utilise graphics, maps or other kinds of visualisation to inquire about the public’s locational preferences. One example is the Landscape Scenic Preference survey developed by the Macaulay Land Use Research Institute, which aims to quantify the landscape preferences of the general public. Participants are shown pairs of landscape images and asked to choose which they prefer (<http://www.mluri.sari.ac.uk/agroecos/>). The same survey was conducted in a traditional manner where people were shown photocopied photographs and then asked to give each landscape an evaluative score. Early indications have shown that the results from the paper-based questionnaire were not significantly different from the on-line version. The researchers identified areas that needed improvement but the initial reaction was that the on-line survey worked well.

In another example, Kingston (1998) has developed several projects that use the Web to facilitate public input on several environmental problems in Britain (<http://www.ccg.leeds.ac.uk/democracy/>). In one project, a Web-based decision-making environment was developed which allows the public to model a number of possible planting scenarios in locating areas for regeneration of native woodland (Kingston 1998).

The drawbacks of using the Web for communication between planners, designers and the public centre around the broad issue of access. First, though access to the Web is increasing, it is still difficult to draw a

random, representative sample since Web users do not yet accurately reflect the real demographic makeup of the general public. Also, users must be quite motivated to log-on and find the Web site in order to participate. This fact underlies a concern about creating a critical mass of users to sustain meaningful Web interactions. This prompts the question of what factors are needed to achieve a critical level of activity (Shiffer 1995). The examples given above suggest that Web-based surveys need to be further refined but have now become quite feasible as public planning tools.

### **Background of our Projects**

#### **The University of Illinois Chicago**

In 1993 the University of Illinois at Chicago (UIC) established the Great Cities Institute (<http://www.uic.edu/cuppa/gci/about/index.htm>) to respond to urban problems facing American cities. "Great Cities" refers to the university's commitment to use its teaching, research, and service programs to improve the quality of life in metropolitan Chicago. Under the Great Cities program, UIC has worked with mainly Chicago communities on approximately 220 different projects and programs.

One of the newest urban outreach initiatives under Great Cities is the Great Cities Urban Data Visualisation program (GCUDV), established in 1998. GCUDV's mission is to explore how advanced visualisation capabilities can be used in community planning to create innovative computer applications and to test them in actual urban projects (<http://www.uic.edu/cuppa/udv/>).

Researchers in the GCUDV program work to link databases, GIS, and 3D visualisation into a medium suited for urban and regional planning and policy. Projects focus on social and ecological data as well as urban image visualisation. The program is staffed by a multidisciplinary team that includes faculty, students and recent graduates from UIC's Electronic Visualisation Laboratory and from several other disciplines such as Architecture, Art History, Information Technology, and Urban Planning.

#### **The Communities**

Our research focuses on two Chicago communities: Pilsen (Lower West Side) and North Lawndale. Pilsen, the first of the three communities we work with, has long served as a port of entry for many of Chicago's immigrants. By the end of the 19th century, rapid industrialisation and urbanisation had transformed the largely Bohemian (Czech and German) working-class neighbourhood into a national centre of labour activism. This activity drew Poles, Croatians, Lithuanians, Italians and other immigrants to the community. After a few decades, these residents moved on, giving way to newer Mexican immigrants. In 1990, 88 percent of the area population was Hispanic, and Pilsen had the second highest concentration of Mexicans of all community areas in the city. Interestingly, each of the successive groups has, in turn, left its unique imprint on the architecture of the community, creating a cultural mosaic in the built form of Pilsen.

Despite being a welcoming home for new immigrants, Pilsen presently struggles to retain residents; many people start out in the community but eventually move on to other neighbourhoods or the suburbs as they assimilate into American culture and become financially secure. The number of housing units in the community has declined and little new residential construction has taken place since 1930. In 1980, 27 percent of the housing units were overcrowded, having more than one person per room (CFBC 1990). Over the years, several strong community organisations have formed to help Pilsen's disenfranchised residents address issues like housing and economic development.

The second community, North Lawndale, is located northwest of the university, four miles from downtown and near the United Centre sports stadium. This community, like Pilsen, experienced successive waves of immigrants, beginning with Bohemians and Polish, and followed by a wave of Russian Jews. However, the population decreased by approximately 30,000 people per decade between 1960 and 1980. The 1990 total population was 47,000, a decline of 23 percent from 1980's total of 61,000. Ninety-six percent of its 1990 population was African American (CFBC 1990).

The number of housing units in North Lawndale continues to decline, causing a housing shortage. The



community has experienced a net loss of almost half of its housing units since 1960. North Lawndale has an abundance of redbrick and graystone homes, mostly built in the 1910s and 1920s, and though the community has suffered from urban blight, the housing stock has proved to be surprisingly solid for renovation. Recently, the area has begun to see some revival, as one development corporation has turned the old Sears catalog complex into homes at Homan Square, which brings infrastructure and housing improvements to 55 acres. New businesses and families are moving into Lawndale and the economy is starting to turn around. However, the community still has many vacant lots and abandoned buildings.

### Methodological Approach

Most of the Web-based GIS sites that are currently available provide one-way information delivery. Although providing proper spatial information is an important aspect of participatory planning; however, it lacks engaging the public in the planning process. In order to become a robust tool for use in participatory planning, Web-based GIS should go one step further: it should be a medium for two-way spatially based information exchange. Interactive Web-based GIS could become a critical and widely used tool to gain important feedback in community planning.

The general intent of most of the interfaces described below is to discover how residents of Pilsen evaluate the appearance of their community by asking what particular places they like and dislike. The survey instructions, while not included in all of the interface prototypes, emphasise the issue of *community appearance* and encourage respondents to think of which places they find to be pleasant and which places they find to be blighted and unattractive. The results are intended to be used as guidelines for decisions on community appearance and visual form. The map tools have been developed to work on average computers and do not require the loading of geographic information systems (GIS) or Internet map-server (IMS) applications. Local residents simply interact with Web-maps by clicking map locations and typing text to give us their opinions.

Conceptually, the prototypes discussed here are organised into three categories: one-way, two-way, and three-way spatial communication. We present the development of the tool from simple Web sites that display spatial information to more complex and interactive sites that actually allow participants to draw and comment on maps of their community. The increasing levels of sophistication can be described as follows: 1) simply displaying a map (such as disseminating the results of a spatial analysis) 2) viewing a map with different types of data included, and some ability to navigate the map, 3) maps that include some GIS functions so that users can retrieve attribute data along with the map and 4) map surveys that allow users provide feedback directly on the maps (Kim, 2001). The degree of user interaction is associated with the type of tools and software that are used, such as HTML, plug-ins, Java applets, Java Servlets, and Internet Map Server technologies.

### One-Way Spatial Communication

One-way spatial communication describes a paradigm by which information is presented to an audience without any possibility for interactive response. There are several approaches to one-way communication that help to make a large geographic area navigable online, including map view, map overlay, nesting maps with increasing resolution and the use of thumbnail photographs.

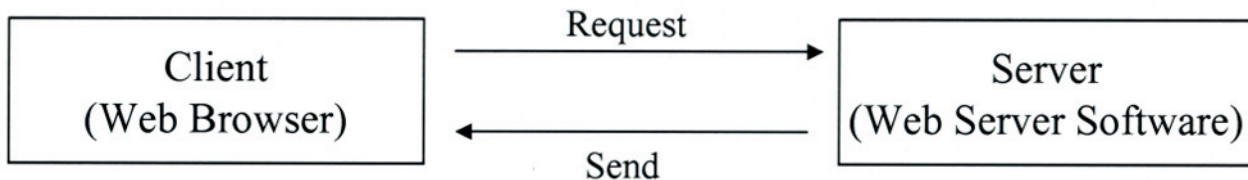
#### *Viewing maps online*

Viewing maps online is a basic function and the simplest to deliver. It is a one-way communication method in which information is transferred in only one pre-assigned direction. Examples of maps that we used for the purpose of neighbourhood planning include site and neighbourhood plans, survey maps, topographical maps, census block and tract maps, transportation and land use maps, utilities map, and aerial photographs.

By using simple HTML or Web authoring tools, we are able to publish these maps in a one-way static format. A very minimal level of interaction is provided by the Web browser, which allows scrolling right-left and up-down to view the different portions of the map. Maps are published directly on the Web page after preparing them in an HTML compatible image format, such as GIF or JPEG. The maps can be snapshots from a digital map, exported using electronic software or scanned in from a paper map. The Web site, [http://www.uic.edu/~kheir/community\\_maps/main.html](http://www.uic.edu/~kheir/community_maps/main.html), shows examples of GIS maps of two neighbouring



communities, Pilsen and North Lawndale. These maps include locational, ethnicity, population, median income and median rent information for these communities. These maps were produced using U.S. HUD (Housing Urban Development) Community 2020 Maptitude GIS software. Later, maps were exported as GIF image from the application and embedded and hyperlinked in an HTML document. The client and server architecture adopted here is exactly same as the basic framework of the client and server model. When the client requests maps embedded in regular HTML documents, the Web server pass them to the browser in the client computer (Figure 7.1).



**Figure 7.1: Client Server Architecture**

### *Map Overlay*

Overlay analysis is a classic technique that has been discussed extensively by numerous geographers and planners (McHarg 1963, Hopkins 1975, and Edwards 1984). It is an excellent method for analysing spatial and component relationships. Various facets of a developing concept can be synthesized using successive layers. Physical and non-physical considerations can be fused and viewed graphically, as this procedure illuminates more complex relationships. The map layers act as transparent acetate sheets that, together, form a composite image. By overlaying individual images, in which each details different pieces of information for the same geographic location, one can better understand complex relationships between different types of spatial data within an area. That level of analysis may only be available by examining the overlaps between the various images. Moreover, computerized image manipulation on the Web can be done in ways that have never been possible by traditional graphic means.

By using Java Applet layers, we simulate the GIS overlay function on the Web. The user can interactively turn layers on and off to visualize spatial information and relationships. With this method, there is no need to use ESRI GIS ArcIMS. The Web enables users to display and interact with thematic layers intuitively. The Web site, <http://www.uic.edu/~kheir/layer/p1/>, provides examples of using a Java applet for overlay function. Layers include the background of the Lakefront community as well as maps showing census tract, median rent, median value, and median income information.

### *Nested maps*

This Web survey attempts to evaluate participants' likes and dislikes for the four square-mile community of Pilsen. In earlier versions of this Web map/survey tool, we had the problem of not being able to zoom on the map. We wanted to publish the map at the highest possible resolution, yet this took up too much space on the screen; users had to scroll up and down and right and left to see the map. In this new interface, where we are trying to cover a much larger geographic area, this was a serious problem. We found a solution in the concept of a geographic hierarchy with three zooming levels. This Web interface utilises a grid and an aerial map of the community. Users are able to navigate the map by utilising three zooming levels, each with increasing resolution.

When the user selects one of the 16 squares on the initial map (the first level), the program zooms in, and the selected square appears as a new full-screen aerial map that is again broken down into a grid of 16 squares (the second level). When one of the 16 cells is selected from the second level, an aerial close-up of the selected area (the third level) then loads into the window. The actual geographic size of the final selection

is four city blocks. The highest resolution is on this third level with six inches per pixel. At all times, the user has the ability to zoom in and out between the three levels. At the third level, users can see the fine details and distinguish buildings and streets. In a later stage, we further developed the above Web site to allow two-way communication by adding a selection and textbox tool for participants to type in comments about the location.

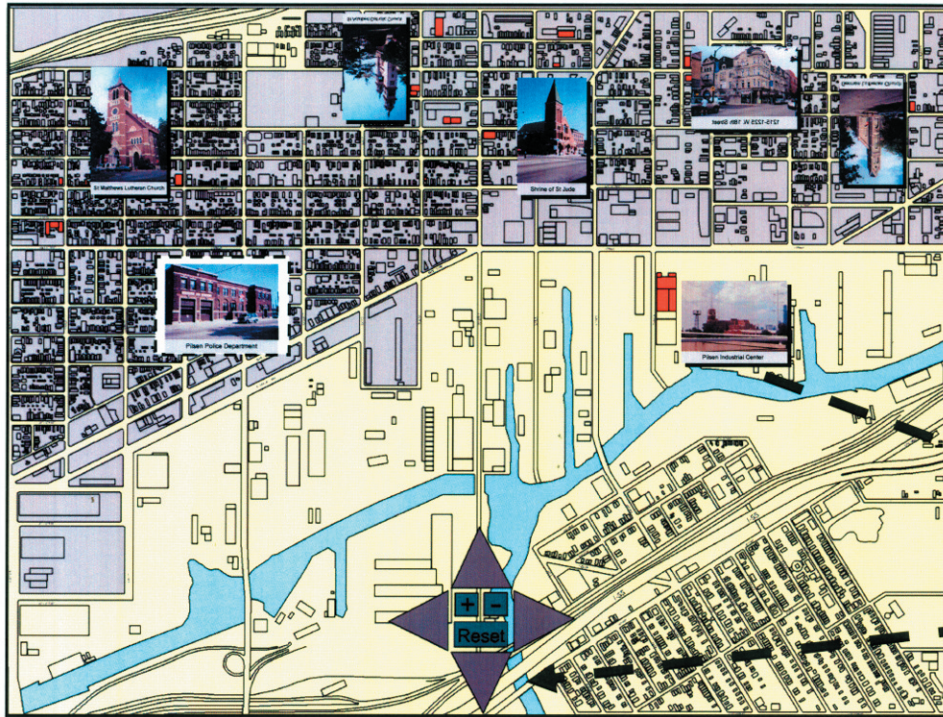
### *Thumbnails*

Another option for navigating a large community area is to show a number of very small “thumbnail” photos, or tiles, which, upon clicking, bring up a larger map of the area. Like the other interfaces, this one is designed using an aerial map of the Pilsen community. Cells (miniature photographs) are displayed across the top of the screen with some street names visible to help orient participants. The instructions read, “Select one of the thumbnail photos by clicking on it. In the text box below the map, describe any physical changes to the community that have occurred since the map photo was taken 10 years ago.” This is only one possible use of thumbnails; other uses could also be envisioned. Also, more tiles could be used to cover a greater area of the community (however, this will slow down the interface).

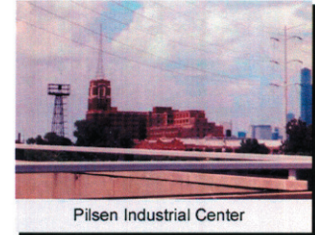
### *Zooming*

The two prototypes described above utilise different methods of “zooming” on a Web-based map, and each has pros and cons. The first method, using nested maps, uses Java. In the Java interface we write the scripts for zooming. There are four Java layers of different scales (zoom). Once you click the zooming function on the map you call one layer after the other, simulating a “zoom” on the photograph. When the user clicks to get the next map (zoomed version) the new map is called from the remote server. The disadvantage of this method is that it can be extremely slow, particularly for users with modem connections. The advantages are that Java provides great flexibility in creating and adding new features.

The second method (the thumbnail interface) uses Flash Shockwave software. Flash is a Web design tool to create animated Web pages. The strength of this tool is that it handles images in vector format. Thus, users do not lose resolution no matter how closely they zoom in on the map. This is a very fast method of zooming since the function is available within the program itself. Zooming is done via a small movie file that makes the zooming easy and in real time. Once a user enters the Web site, a message appears asking the user to install Flash software. If the user clicks yes, it loads in just a few seconds. The Web site contains a small movie file that automatically gets loaded on the user’s hard drive and then the zooming is done from the user’s own machine and it is very fast (Figure 7.2). While speed is a significant advantage of this method, the present Flash software package does not allow the incorporation of features from other programs. Thus, we cannot mesh this site with other functions available with the Java programming language (Figure 7.3). For instance, at this time there is no way to include a selection feature so that users can select a building within the photo.



Upon moving the mouse cursor over the red landmarks, a thumbnail picture comes up on the screen. Clicking on the thumbnail brings up an enlarged view in a separate window (see below).



Clicking on a thumbnail brings up an enlarged image in a separate window.

Web-based navigation tool allows users to zoom in and out and pan in four directions.

Figure 7.2: Pilsen map using Macromedia Flash

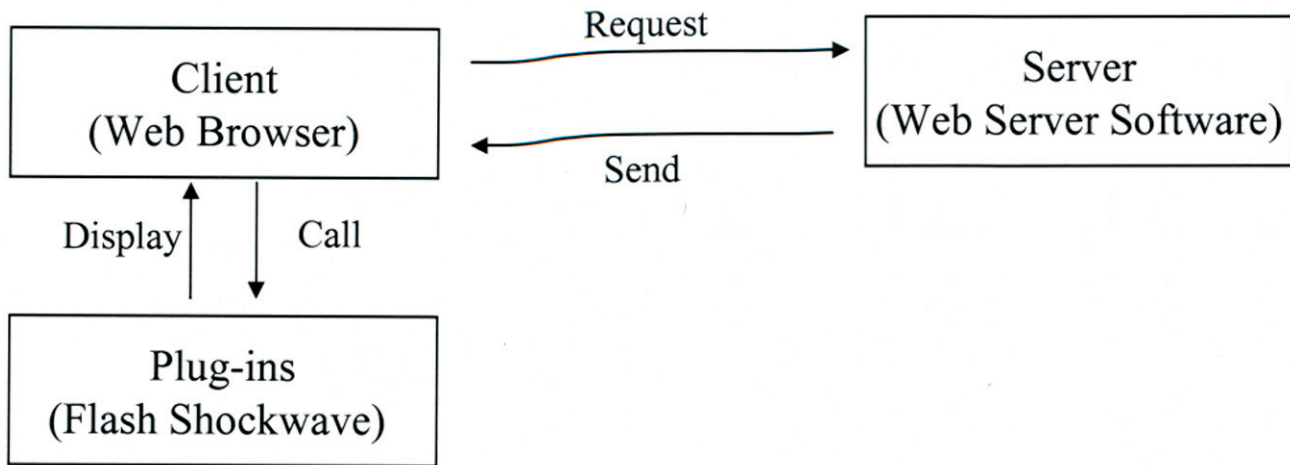


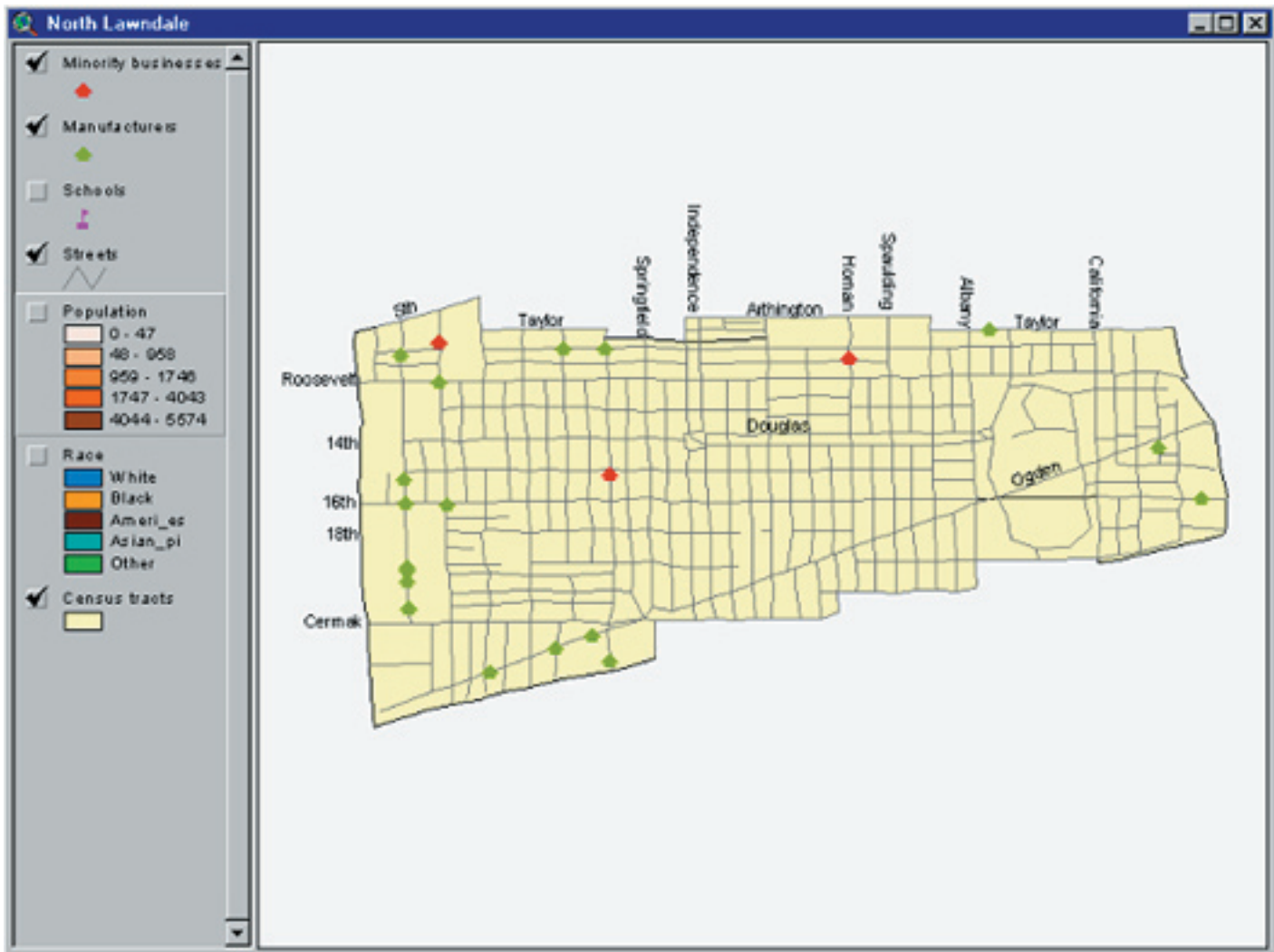
Figure 7.3: Relationship between the server, the client computer, and the plug-ins

*Map and data retrieval from GIS*

Map and data retrieval refers to enabling users not only to navigate maps but also to examine attribute data and perform spatial queries. The purpose is to bring simple GIS functionality on the Web without the need for GIS software at the end user machine. However, this technology continues to provide limited spatial function on the Web. The user cannot perform advanced analytical functions but can perform simple ones such as turn on or off layer, set active layer, examine attribute data related to map feature and basic spatial queries. Commercial Internet mapping software from major vendors, such as ESRI ArcIMS, Intergraph GeoMedia Web Map, AutoDesk MapGuide, and MapInfo MapXtreme, are appropriate for performing simple GIS functions online. The following Figure 7.4 shows an example of using ArcView IMS software for delivering spatial

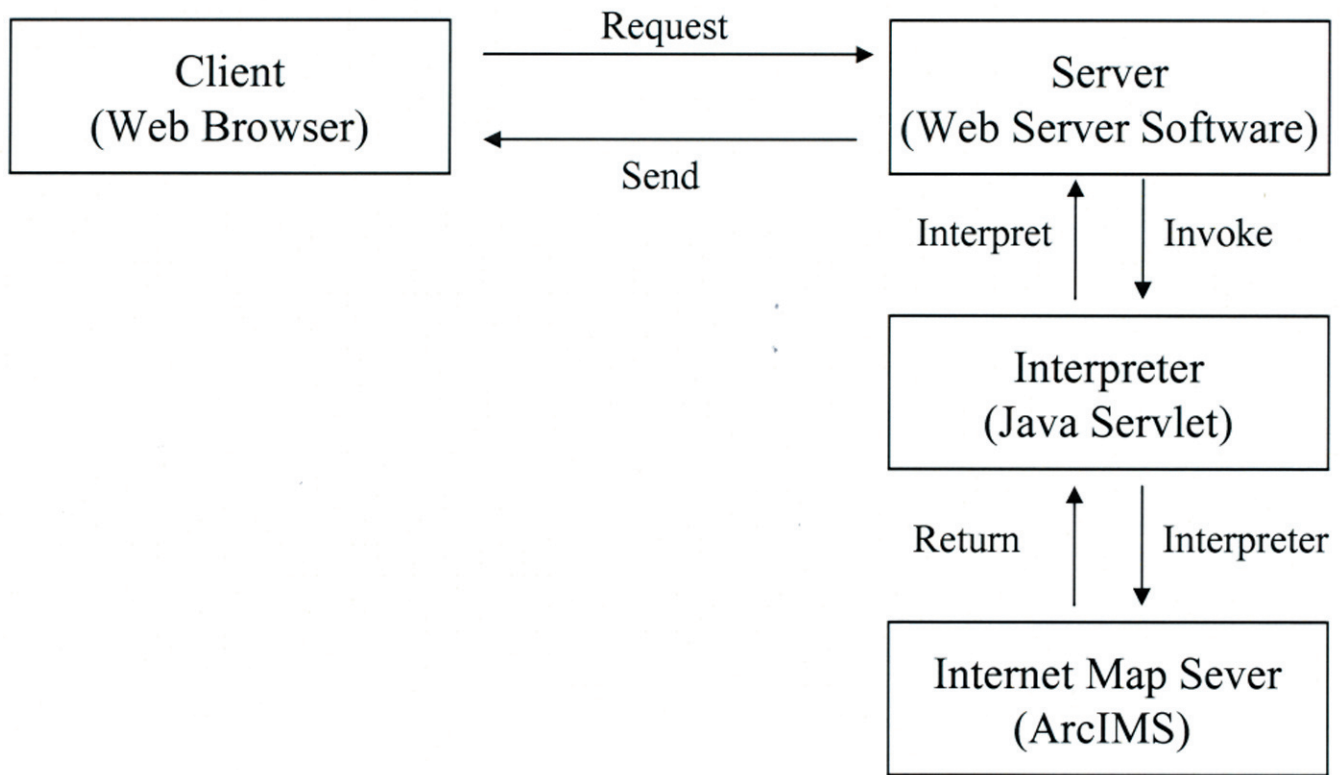


information to the North Lawndale community.



**Figure 7.4: ESRI ArcView IMS Information System for North Lawndale Community**

Map retrieval enables users to retrieve maps and related attribute data from the server at runtime. The Web server, interpreter, and GIS software work together for this. Whenever users change the view or perform spatial query, the Web server pass it to the GIS software via the interpreter. The GIS software performs the tasks and passes the outcomes, via the interpreter again, to the Web server. Then, the Web server sends final outcome in HTML format to the client. A key part in this framework is GIS software. What implements user request spatially is the GIS software. The Web server only receives user requests and sends final outputs. However, since the GIS software cannot directly communicate with the Web server, a middleware is required. The middleware acts as an interpreter for the Web server and GIS software. It passes parameters received by Web server to the GIS software and the results of the task done by the GIS software to the Web server. The Common Gateway Interface (CGI) has often been used for this, but Java Servlet technology is rapidly replacing CGI (Figure 7.5).



**Figure 7.5: The interaction between client computer, server, interpreter, and GIS software for map and data retrieval**

### Two-Way Spatial Communication

Getting user feedback on the Web is becoming increasingly popular. Sending text input or polling choices is widely used to get users' opinions. However, when working with spatial information, it is important to be able to visualize such feedback. In two-way communication, we want to allow users to annotate maps and to delineate their concerns on maps. One option is to allow users to draw various features, such as points, lines, circles, and polygons on the map. It is also possible to add text along with drawn features. When users send their input to the server, the server detects the x, y coordinates of such drawings and saves them. This makes it possible to define a particular location. Users can indicate exactly which location they are talking about.

Such a spatial feedback system may be designed with or without GIS software. However, at the time of this writing, the only solution that receives spatial user feedback on the map is GIS software, specifically, ArcIMS. The workflow on the server side is the same as in the data retrieval method. However, the function of drawing on the map requires Java applets and Java and ArcIMS plug-ins in the client side. The server and client must work together heavily for this method. The following Figures 7.6 and 7.7 show an example of two-way communication using ArcIMS.



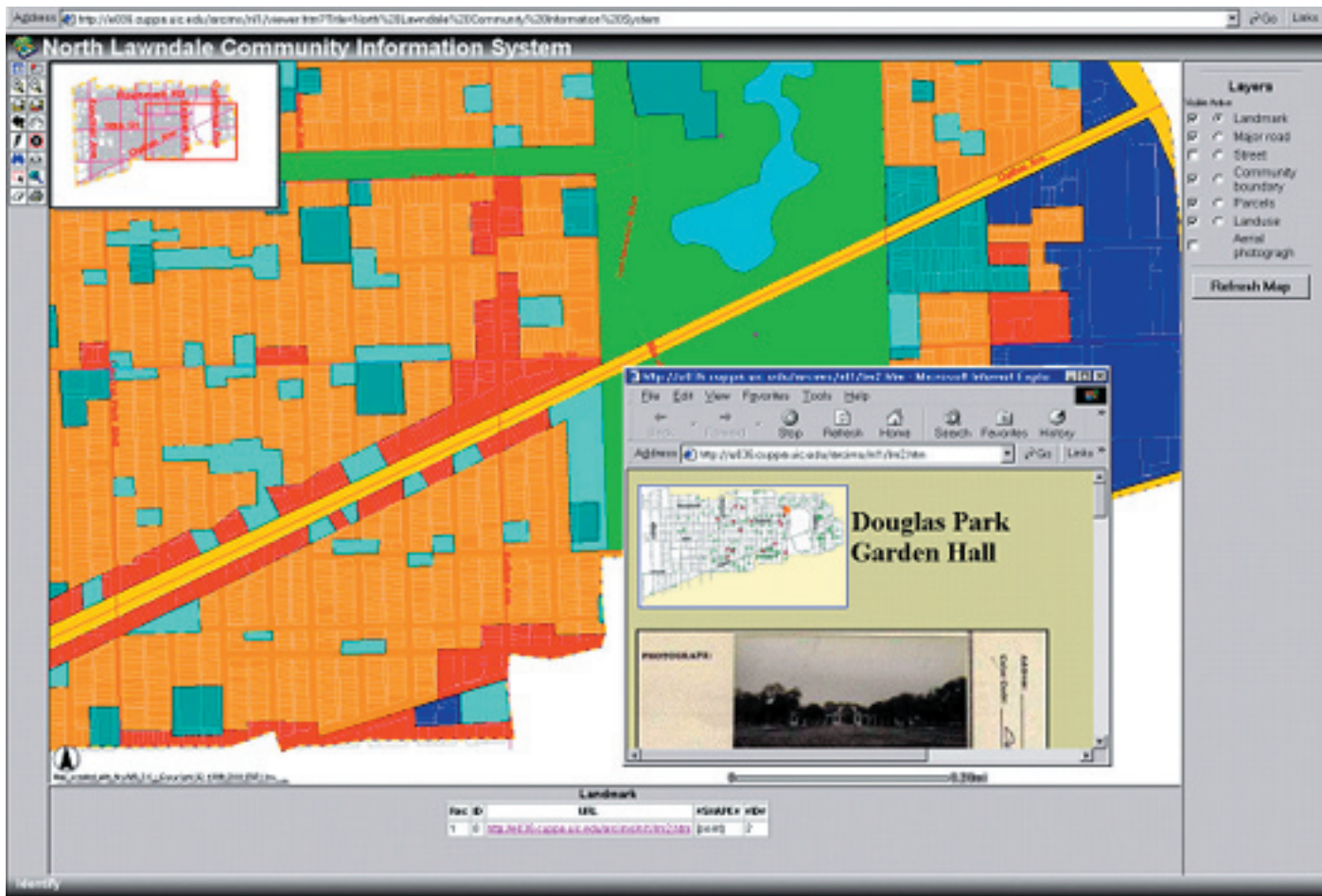
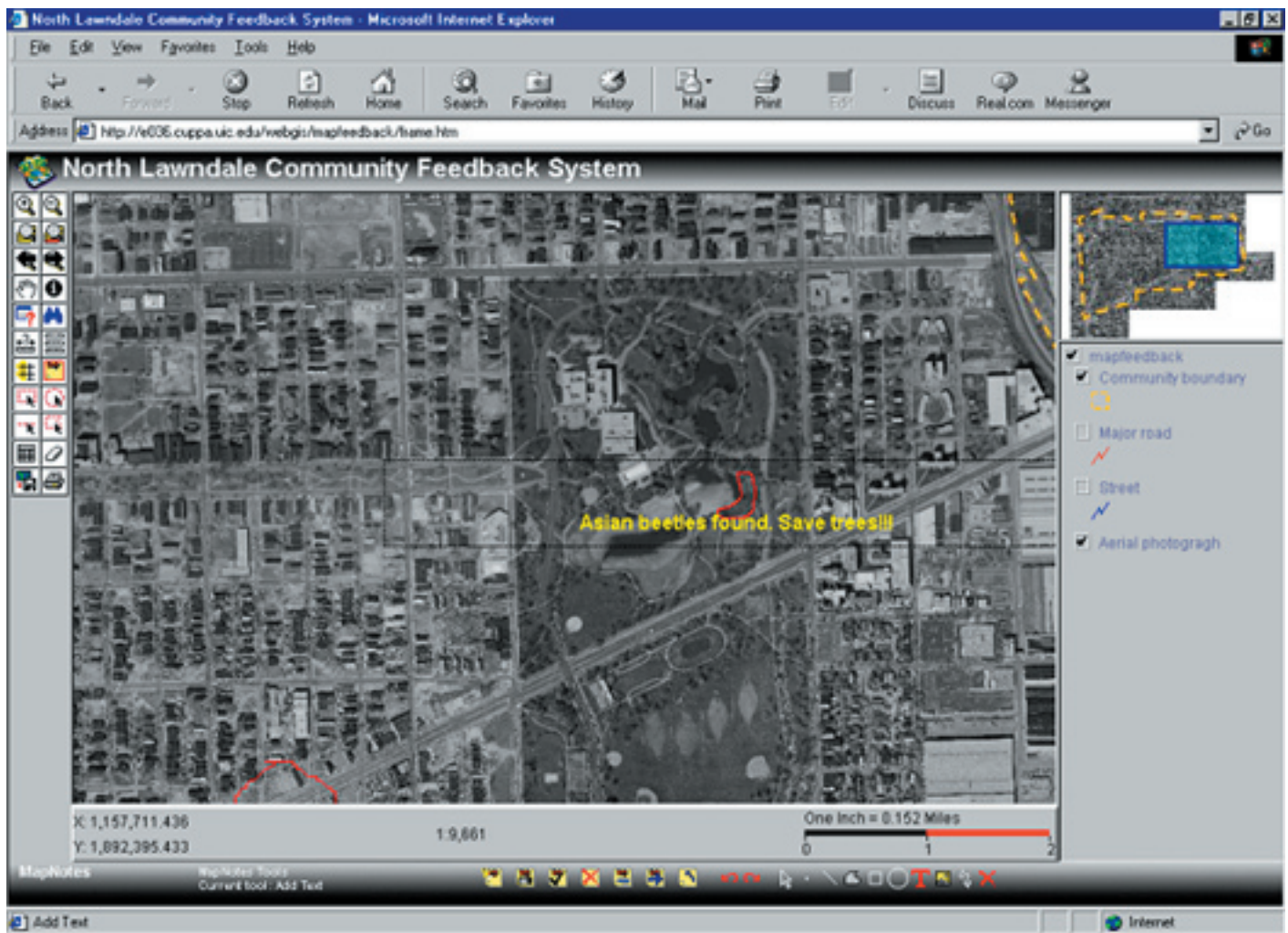
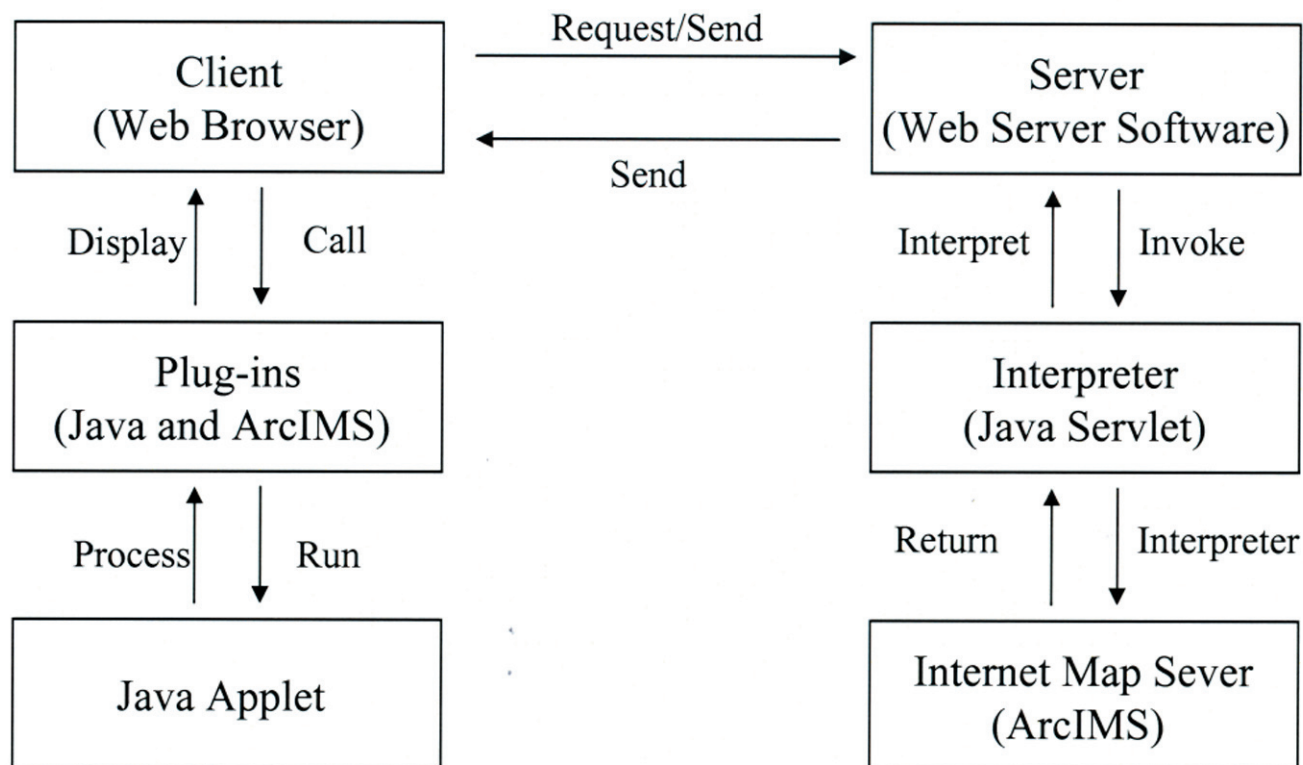


Figure 7.6: ESRI ArcView IMS Property Information System for North Lawndale Community



**Figure 7.7: Two way spatial communication: ESRI ArcIMS**

However, ArcIMS has substantial drawbacks, particularly at the client side. It requires a thick client and a heavy server. A “thin” client means a client computer with just a Web browser, while a “thick” client implies a computer with a Web browser with other add-ins, such as Java applets, ActiveX controls, and plug-ins to evoke special effects. The thick client needs to download such add-ins at runtime or beforehand. A “light” server is a Web server computer having only HTML documents and related files, but a “heavy” server has other components, such as database applications and GIS software working together with the Web server. For ArcIMS, the server requires heavy processing with GIS software and a Java Servlet, and the client also needs a Java plug-in installed beforehand and Java applets at runtime to enable the drawing functions (Figure 7.8).



**Figure 7.8: Two way spatial communication**

In ArcIMS, the download time for data, map and attribute data retrieval is quite long and it requires substantial bandwidth. Most importantly, the interface design and interaction behaviour is not intuitive. Because of these drawbacks of ArcIMS, we have invested research in developing alternative methods for two-way communication. We divide them into four categories: grid-based, freehand, a combination of grid and freehand or a “complete interface,” and a compositional method.

#### *Grid Based*

We have created several different prototypes that utilise a grid as the underlying selection structure behind a given map. Below we describe three different interfaces that utilise the grid-based selection method.

Our earliest project was a survey consisting of one exercise titled, “Urban Likability and Dislikability” (ULD) for Pilsen. Simply speaking, participants logged on to the project Web site where they could view a high-resolution aerial photograph of Pilsen with a grid overlaid on top of it. We limited the geographic area to the vicinity of the 18th Street commercial district, since this area was the primary focus of revitalisation efforts. Participants were asked to point out areas on the map that they liked and disliked and to provide the reasons for their responses. Each square of the grid was identified by its centroid (the center of the square). This centroid was coded as the actual longitude and latitude of the centre of the square.

Participants were asked to identify the areas of their community that they most liked and disliked by clicking on the appropriate square on the grid. The only visual assistance on the map was the name of the streets. They were to use a GREEN pointer to indicate liked areas and a RED pointer to indicate disliked areas. By clicking on one of the two radio buttons located on the side of the map, they could “load” the pointer with either color. When participants clicked on the square, a small window with a question mark appeared, asking them to state their reasons for liking or disliking that area of the community. When finished, the participant clicked on a button labelled “submit” and their input was transferred to the UIC server. Each of the participants’ selections could then be stored in the Web access logs for analysis and feedback into the planning process.

Since the server was linked to an Oracle database and a GIS application, we had the capability of taking all the points that were selected by the participants, sorting them by longitude and latitude, and plotting them



on a map automatically. The Oracle database could also group the associated comments. In this manner, a community-input database was created that contained the range of views about areas liked and disliked with the associated reasons.

We then created a number of GIS choroplethic (patterned) maps to illustrate the intensity of likes and dislikes (urban likability and urban dislikability). We used dots to represent intensity: the number of dots in each cell of the map was proportionate to the number of times that area was selected by the residents in the survey exercise. In addition, these GIS maps were interactive; clicking on an area (or cell) of the map opened a window of text that listed the residents' stated reasons for liking or disliking that area. Since the maps provided written evaluations for each point, they were extremely useful in supplying specific directions for improvement and could easily be incorporated into the next stages of the Pilsen community planning process.

In a later prototype (Figure 7.9) we used nested maps. We also used a grid but it advanced the initial project by dealing with a larger geographic scale. Not only does the user navigate using the grid, but he or she also selects a square of the grid to comment upon. As mentioned above, the primary disadvantage of this method is that users cannot select the specific buildings or combination of buildings that they wish to comment upon, since the size of the final selection square is predefined. The advantages are clearly evident in the above example where the uniform selection areas allowed us to easily create sort and analyse the users' feedback.

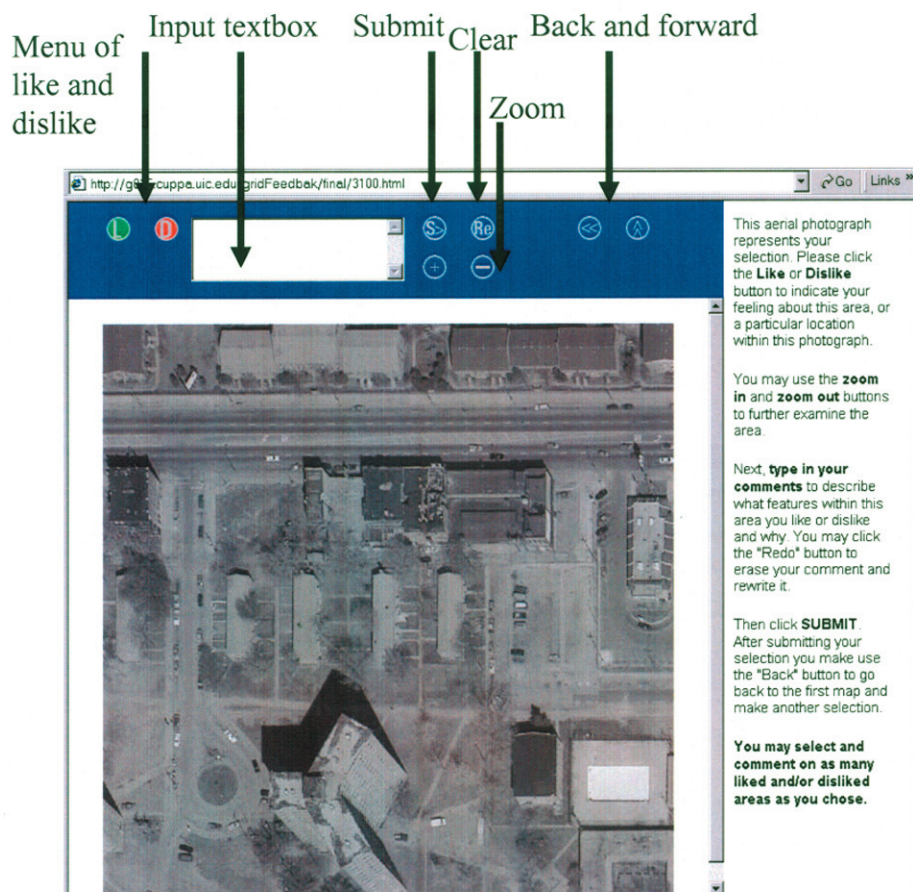
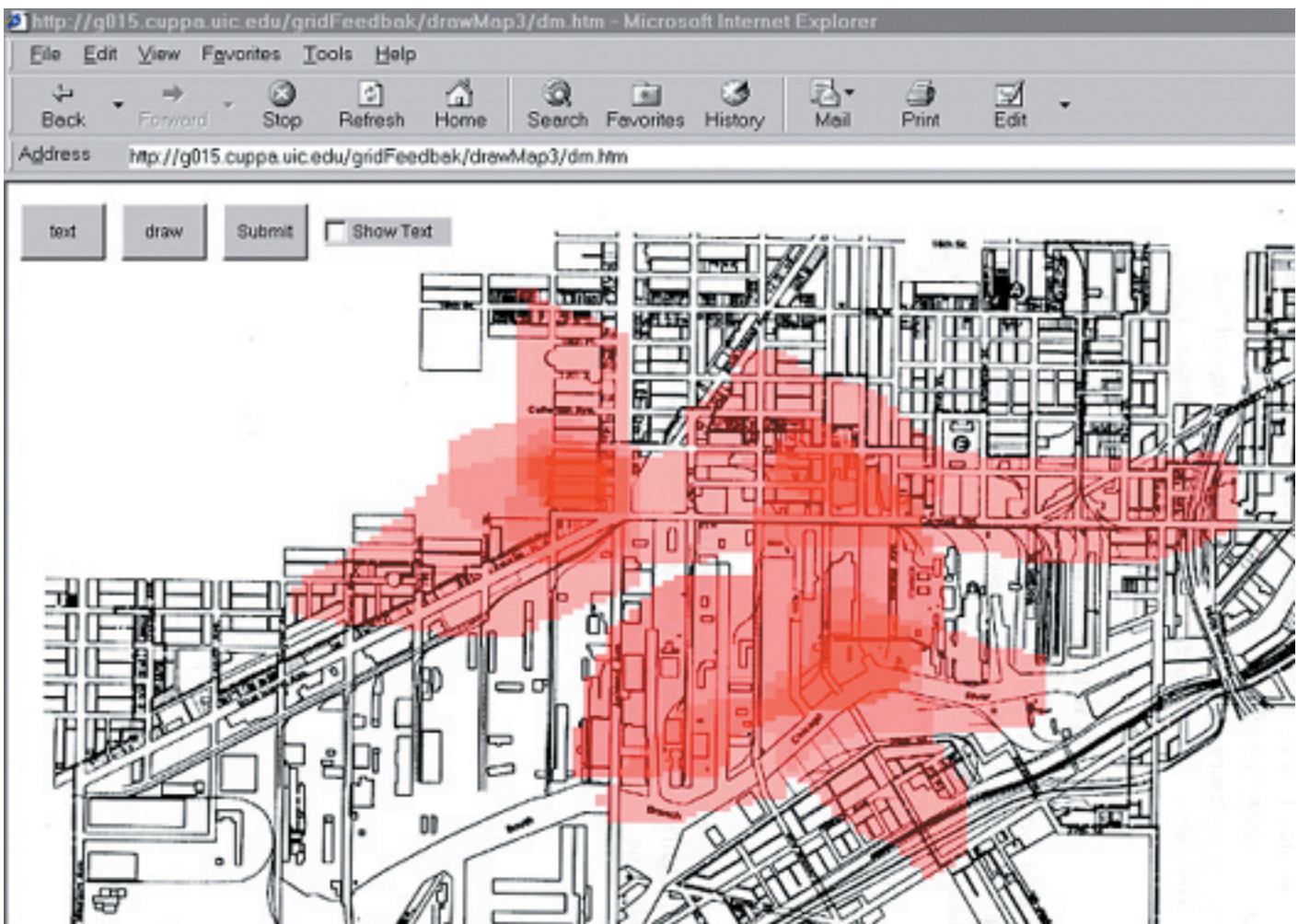


Figure 7.9: Two way spatial communication: the nested map method

In evaluating the grid as a selection mechanism, it has clear advantages and disadvantages. As in the above example, the grid enables very fast analysis and compilation of spatial data that can be easily compared among participants. On the other hand, we found that users did not have enough discretion in selecting the particular areas of the community and buildings that they wished to comment on. In addition, they were constrained to the square shape of the grid: even if they only wanted to comment on one building in a corner of this large square, they had to select the entire square.

### *Freehand*

This project introduces an entirely new technology for enabling user feedback using Web-based maps. In this new prototype (Figure 7.10), participants can go to the online survey Web site and use a drawing tool to select the areas of the community that they wish to comment upon; their locational choices are not limited by the pre-defined geographic areas of the square grid. On the initial screen, the participants view a structure base map of the community along with two buttons labelled “Click to select area with drawing tool” and “Click to type in comments.” When a participant clicks on the drawing button, the cursor turns into an arrow and upon pressing and holding down the left button of the mouse, it starts to draw. The user may draw any shape on the map and when the mouse is released, the lines close on themselves to form a polygon. If the user does not draw an enclosed shape, the program approximates the line that closes the shape into a polygon.



**Figure 7.10: Two-way spatial communication: freehand sketch on the Web.**

Once the participant draws a shape and releases the mouse button, the shape is immediately filled with a light color. As the participant continues to select additional areas with the drawing tool, other shapes are filled in as well. When areas overlap, the program indicates this by increasing the density of color in these areas. Areas that participants delineate most frequently will be the darkest, while the areas chosen the



least would be lightest. This works through the placement of a very fine grid at the back of the map. When a participant delineates an area, cells underneath will be activated and will create one tone. As participants highlight additional areas, the overlapping areas would be activated twice, generating “double” tones and hence increasing the density of the color. This shading technology is beneficial when compiling multiple users’ responses, so that the darker shades would represent the most frequently chosen locations.

Once the user has drawn and selected an area with the drawing tool, the participant can then click on the text button to type in comments about the delineated area. In order to avoid clutter on the map generated by multiple annotations when a participant selects several areas, we added a check box that would allow a participant to turn the text boxes on or off. The participant may add a text box for each section of the community that is selected. It is possible to make two separate interfaces: one for drawing and writing about liked locations and one for disliked locations. This may assist in sorting positive and negative opinions in the database. Another possibility would be to simply use one interface and allow participants to record all opinions, positive or negative.

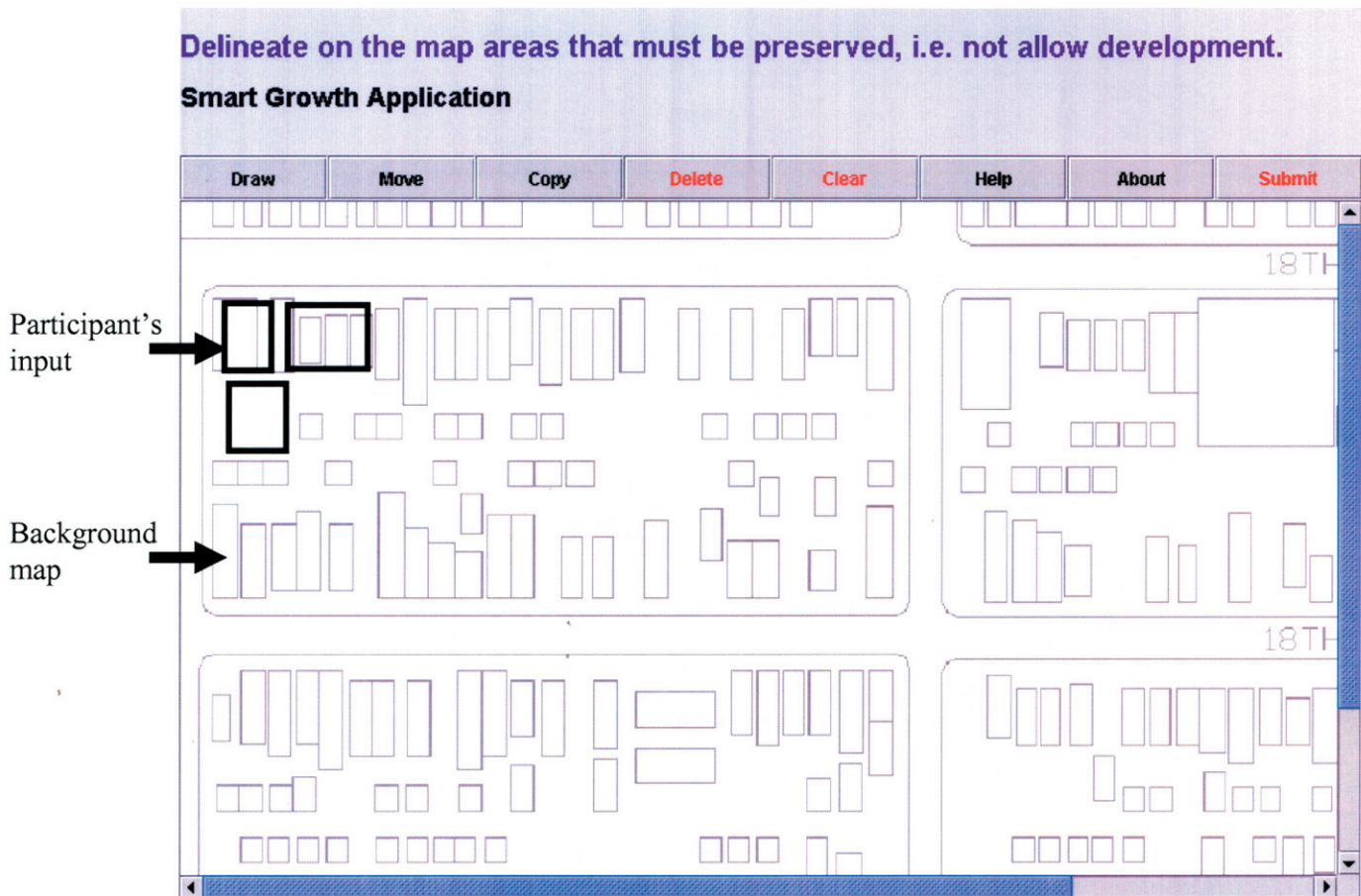
The most important feature of this project is that we replace the Java applet grid with freehand sketching capabilities using Java to create the Web interfaces so that the user is not restricted to pre-determined geographic areas within a grid. This new capability of doing freehand sketching on the Web may have numerous applications. People can make their own maps and then share these maps with other participants. Another possibility is that the map could be a photographic image and we could ask participants to comment on the scene by drawing directly on the picture, indicating elements that they like or dislike. Also, we hypothesise that community residents will appreciate this feature since it enhances the ability of the computer to mimic traditional public participation tools that people generally enjoy, such as drawing and writing comments on a paper map.

### *Toward a Complete Interactive Web Map Design*

The prototypes discussed above each represent a particular feature; some are designed to sketch, others to type in comments. Some are grid based and others are based on freeform drawing. Some have zooming others do not. We are in the process of developing a Web site that will combine the best design features of the interfaces described above. Users will have options to work with or without the grid, to zoom in and out, to add layers, to type in comments, to sketch, and so on. This has apparent advantages (more choices) and disadvantages (confusion, technical difficulties to create the interface and to work out the database). This site is currently undergoing further development.

### *Compositional Methods*

The final challenge we attempt to address using Web maps was how to allow participants to essentially create their own maps. This prototype (Figure 7.11) was developed for a slightly different use than the ones described above. While the others use maps of the community to help residents share their opinion and knowledge about the community by selecting locations and typing comments, this prototype aims at allowing community participants to draw alternate site plans for a specific location, such as to show a preferred arrangement of houses in a new subdivision. Called the Collaborative Decision Support System, it utilises the freehand drawing technology described above. Users actually draw their own boxes (to represent houses, other buildings, or land use zones) and then move them around into a desired configuration. The purpose of this project is to allow users to create and compose maps online.



**Figure 7.11: Two way spatial communication: compositional method**

In the current prototype, the boxes are drawn on a structure base map of Pilsen. The primary buttons available are “draw,” “move,” and “copy.” Users may correct their work with “delete” and “clear” buttons. When the drawing is complete, the participant clicks “submit” to send the drawing to the server database. The user is then able to view all the drawings previously submitted by other users. While at present the prototype simply demonstrates the capability of creating and moving the boxes, there are many possible applications for the tool. It could be used for planning work on a small scale; for instance, the survey site could open with a site map and a description of the particular site along with a set of development plans. Users would be given a set of instructions, such as asking them how they would prefer to site the structures in a development that calls for 8 single family homes, 16 town homes, a community center, and a playground. Users would then create the boxes and move them around on the screen until they developed a satisfactory plan. Some of the fixed details of the site could already be indicated on the site map, such as the direction of traffic, existing driveways, etc.

Alternatively, the proposed issue could be planning work at a larger scale, such as a land use and zoning plan. In this case, participants could help deal with the issue of urban sprawl by drawing shapes of different colors to indicate their preferences for placement of various types of land use zones. As the Web site is further developed, it will need to incorporate a legend to explain what each drawn shape is representing so that various users could interpret one another’s sketch plans.

### Three-Way Spatial Communication

Three-way communication enables users not only to view and input data but also to view input data of all participants. The user is able to tap into the database and view all entries. The user may receive a return map in real-time showing the accumulative responses of all participants.

In the following example, we created a “real-time feedback” interactive map. Participants could view a structure base map of Pilsen and choose areas of “like” and “dislike.” They could also type in comments about

the selected areas. Once their selections were submitted, they could immediately receive a return map showing the accumulative evaluative image of the examined area. This worked in the following way: the update servlet on the database is contacted and the data sent to the servlet translates the visual information into numeric, string data that is stored into the database. Once the database is updated the data servlet is called which queries the database for all the relevant information and then translates the data into visual information and sends it back to the user. The visual information includes the cumulative “like” and “dislike” opinions of the area, represented by increasing intensity of color along with the user comments for each block in the grid. The data obtained from different surveys can be co-related as it is stored in the database sorted by the latitudes and the longitudes. The grid was a good structure that was easy to code and to be read by the Oracle database that created the return map.

Several of the other Web design interfaces can easily be upgraded to function as three-way communication mediums. For instance, in the Collaborative Decision Support System described above, we have added a feature whereby when users submit their design, they are then able to view all the drawings previously submitted by other users.

### **Implications for Participatory Planning**

Public participation in a community planning process is important in democratic society; however it is a complex undertaking. Our research explores state-of-the-art information technology (IT) to facilitate the process. Web-based mapping opens up the potential for involving a wider range of people by bridging time and space. At the same, IT has the potential to automatically collate participants’ responses and ideas in a cohesive manner as described in the previous examples. Traditional public participation in planning usually relies on same-place and same-time meetings, which restricts involvement. Web-based mapping can be utilized for widening and diversifying channels of communication among the public, planners, and politicians.

Our research has asked the question, how can Web-based GIS aid participatory planning? It would be useful to place this question in the framework provided by Weidemann and Femers (1993). They presented a public participation ladder model that arranged the tasks of public participation in a vertical dimension. The order, from top to bottom, is as follows: 1) public participation in final decision, 2) public participation in assessing risks and recommending solutions, 3) public participation in defining interest, actors and determining agenda, 4) public right to object, 5) informing the public, and 6) Public right to know. Kingston (1998) argues that most Web-based GIS models are confined within the bottom two rungs of the public participation ladder; the “public right to know” and “informing the public”.

Our research aims at expanding the role of Web-based GIS from being limited to the last two tasks to including as many as all six tasks. We envision that a loop of communication facilitated by two-way spatial communication may enable the public to “object,” to “define interests and agenda,” and to “assess risks and recommend solutions.” This could be possible by further developing Web-based mapping that employs a wider range of increasingly powerful Web technology.

Present commercial Web-GIS software mainly enables one-way communication. The method is appropriate to allow the public to access spatial information from remote places such as home or office. Two-way communication on Web-based maps is intended to not only provide spatial information about a particular planning problem, but also to provide a forum for the public and planners to express their perspectives and concerns in a spatial format. Planners as well as government officials can learn about local knowledge, which is necessary for sound planning. The three-way communication concept further supports democratic decision-making by allowing the public to view the opinions of all participants.

The tools we have developed in these prototypical interfaces have the potential to be used by a variety of agencies for multiple purposes. For example, it has been observed that transportation planning and local “comprehensive” planning tend to occur separately, resulting in some cases in policies that work at cross purposes. A partial solution could be that comprehensive planning and transportation planning leaders could incorporate these kinds of Web-based tools to both inform the public and also learn about public concerns and views. By sharing future planning ideas and learning about public concerns, costly mistakes could be avoided. This kind of communication could be used to address other issues such as urban sprawl, creating subdivisions,

transportation planning, landscaping, and identifying advantageous options for development and environmental protection.

### Conclusions

It is increasingly important to direct research to discovering the most effective methods and tools for interacting with the public using maps. As there has been a dramatic increase in the number of people exposed to and using screen-based geographic information products for general use, two-way communication of spatial information must become more efficient and more easily comprehended. Researchers in the field have estimated that “up to 90 percent of all business data has a geographic component” (ARC News 1997), while an estimated 80 percent of all government information is spatially referenced (Huxhold 1991). Governments themselves publish geographic information on-line. For example, the San Diego, California Police Department publishes data on crimes on a public Web site just 24 hours after the incidents occur. Local planning agencies use the Web as an adjunct to the traditional public meeting format. A number of U.S. government agencies, including the U.S. Census Bureau (<http://web.census.gov>), the Geological Survey (<http://web.usgs.gov>), and the National Cancer Institute (<http://web.nci.nih.gov/atlas>), provide maps via the Web. Without direct research into which designs, tools and methods of presenting and receiving spatial information are most easily used and comprehended by the public, we may be misinformed in estimating the level of communication that is actually occurring.

In this chapter we have described a variety of digital map designs and tools created for a dual purpose: to communicate spatial information to average map users, and to allow those users to navigate and make selections on the maps in order to give feedback into a community planning process. We have provided examples of solutions to the basic problems of creating interactive screen-based maps, which include navigating large geographic area maps and making selections on maps. New Web technology has made it possible to create map-based surveys to receive feedback from the general public, but it is not yet clear what kind of graphic design alternatives and digital map designs and tools are the most useful for novice map-readers. This research attempts to explore different interface designs with the purpose of finding which combinations of online tools and maps are most productive in soliciting feedback in a community planning process. In the future, we plan to empirically compare these interfaces to learn more about how people comprehend screen-based maps vs. paper-based maps. More research is needed in order to understand the unique challenges and important advantages of Web-based maps in general, and the usefulness of each graphic design and tool in particular.

Our project has explored how Web-based maps can be advanced beyond mere information provision to actual two-way interaction with the public. Tools such as free-hand drawing may provide new avenues for people to take a greater role in public decision making. By beginning to examine the graphic design alternatives possible on the Web, we are taking one step further toward understanding how people comprehend and utilize screen-based maps.



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<http://www.mluri.sari.ac.uk:80/~mi550/landscape/> Macaulay Land Use Research Institute (Web survey using images)

<http://www.ccg.leeds.ac.uk/slaithwaite/> Kingston's Web-based decision making systems in Britain

<http://www.uic.edu/cuppa/gci/about/index.htm> University of Illinois at Chicago's (UIC) *Great Cities Institute*

<http://www.uic.edu/cuppa/udv/> UIC's *Great Cities Urban Data Visualisation program* (GCUDV)

<http://www.census.gov>, the U.S. Census Bureau

<http://www.usgs.gov>, the Geological Survey and

<http://www.nci.nih.gov/atlas>, the National Cancer Institute

#### Project interfaces:

<http://www.uic.edu/~kheir/layer/p1>, Map overlay

## CHAPTER 8

### Incorporating Development Services

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#### Introduction

E-government can reorient service delivery to become more citizen focused due to the restructuring of the way services are provided. One of the ways that service delivery can be improved is through e-commerce applications. E-commerce is a business application that allows the buying and selling of goods and services, as well as the transfer of funds, over the Internet (Institute for Telecommunication Services 2002). The challenges to successful e-commerce initiatives are numerous. However, addressing the challenges can lead to improved customer service. E-commerce is an example of how e-governments are being transformed from simply providers of information to providers of transactions.

Online commerce transactions vary from relatively simple transactions to gain information, to more complex activities such as paying taxes and processing building permit applications. E-commerce is also used to sell goods such as documents. Local governments may see e-commerce as a way to save on labor costs, eliminate mailing costs, improve communication, and reduce data entry errors.

A small but growing number of cities are developing e-commerce capabilities to allow planning, development, or building permit applications to be submitted and paid for on-line (Evans-Cowley & Conroy 2004). A content analysis of the planning department websites of those cities with a population of 50,000 or more revealed that only 4 percent of cities have an e-commerce application for development services (Conroy & Evans-Cowley 2005). E-commerce provides an easy way for customers to interact with their government from their home or office. E-commerce goes beyond simply providing information and allows citizens to fulfill planning department obligations. The convenience of an e-commerce application can encourage more citizens to follow the correct procedure for obtaining a permit. By allowing citizens to apply for a fence permit, as an example, whenever they choose and from wherever they choose, citizens will more likely apply for that permit rather than simply begin clearing brush and digging post holes without the proper authorization. This improves the safety of construction and improves the communication between the local government and its citizenry.

E-commerce can also improve the communication local governments have with developers and contractors. The development process traditionally involves the local government, the property owner, designer, contractor, and subcontractors. These parties are connected to the development process in different ways and require different levels of interaction with the government. Traditionally, interactions between these groups have been sequential, paper-based, and have included significant time lags between interactions. For example, a contractor gets to a point within the construction project where an inspection is needed. He must then leave the job site during regular business hours and go to the development department office and submit an application requesting an inspection. The paperwork must be processed and an inspection time is set. The contractor then has to wait for an inspector to visit the site. The travel time to and from city hall, as well as the time to process the application can slow down the development process. When e-commerce is applied to the construction process, the way these groups interact can be changed significantly. The Internet allows immediate access to information and concurrent involvement from multiple groups for real-time collaboration.

While all of these advantages can be seen through the implementation of e-commerce applications, there are significant upfront costs. E-commerce applications require the acquisition and development of the e-commerce software application, on-going maintenance, and trained personnel to operate and manage the application. What follows is a discussion of considerations in developing an e-commerce application.

### Considerations in Developing an E-commerce Application

#### *Website Development and Maintenance*

Providing an e-commerce application requires expenditures for both development and maintenance. Costs to develop e-commerce applications vary widely depending on existing telecommunications and database infrastructure. There are three primary costs involved in developing an e-commerce application. First there is the cost of software and personnel costs for application development. Second, there are the maintenance costs of updating information, updating software, and other site maintenance. Third are the costs of upgrading and enhancing the e-commerce application, which can include software, hardware, and personnel costs. If the e-commerce application is developed by a third-party additional costs may be incurred. For small local governments these costs may be more than the jurisdiction can handle. In this case, collaborating with other communities to provide an e-commerce application may be possible. Later in this chapter the Mybuildingpermit.com regional permitting e-commerce application is discussed as an example of intergovernmental cooperation.

These initial costs may be recovered through increased efficiencies in service provision. Reduction in staff time and copying costs may be enough to more than cover the cost of implementing the e-commerce application. Additionally, the local government should also consider that an e-commerce application is likely to improve customer service without increasing staffing costs.

#### *Authentication and Profiling*

Local governments can collect and maintain profiles of their customers, maintain information on previous development projects, and customize the content for users. Customer profiling and customization is discussed in more detail below.

When a user visits an e-commerce application many governments want the system to be able to authenticate the user. Authentication means identifying the user accessing the e-commerce application. Authentication is performed via IP address and often uses a cookie, which allows the website to determine information about the user. In addition, to identifying the user, profiling information may also be collected.

Profiling is the process of collecting information about website users. For example, with a building permit e-commerce application, a government would want contact information about the users, employer, and the contractor identification number. Typically the user is asked to select a username and password. However, in some cases information may be collected on historic purchases and demographics. Profiling can be setup so that the user is tracked throughout the e-commerce site based on the user name.

Having stored profiling and authentication information can assist user content selection. Content selection targets information to the users' needs and preferences. For example, if the building department knows the user is a commercial plumbing contractor, when the user logs in they would immediately be taken to the section on plumbing permits. This is a relatively complex feature to develop on a customized basis and in many cases a local government may opt not to provide this level of customization.

If an organization is going to store profiled information there must be a content management system in place to manage the profiled data. It is important that the scalability of the data be taken into account when designing the management system. The data cannot simply be stored in a simple database. There are laws that regulate privacy (e.g., Children's Online Privacy Protection Act of 1998), so there needs to be limited access to the user data.

In addition to maintaining information about the user, e-commerce applications can also provide customer support through the posting of frequently asked questions, procedures, and regulations. Online customer support can be provided, as well as tracking of customer problems.

### *Security*

Citizens have concerns about the security and privacy of their personal and financial information. They are also concerned about whether their personal information will be sold to third parties. Citizens want some assurance that when they make a purchase over the Internet that their credit card or other financial information will not be stolen or sold. Secure sockets layer (SSL) has assisted in addressing these concerns by creating a way to secure web transactions. Users know they are on a secure site because the address may begin with https instead of http, there is a lock symbol at the bottom of the screen, and/or a notice appears that lets the user know they are entering a secure site. Security is also addressed through encryption processes which transform information from emails or web pages into more secured code for sending across the Internet where it is restored to original format. There are a variety of types of encryption that are available to assist in securing a site. For more information on encryption see Ackermann (2000).

While providing a secure transaction website is an important part of ensuring data security, internal data management procedures should also be considered. For example, internal to the organization, who will have access to customer information? There is the potential for employees to tamper with or steal data, such as a credit card number. Additionally, there is the concern of hackers trying to overcome the site's security to gain access to confidential information. Firewalls and passwords on database and web sites can limited access to data.

Customer security concerns also can be alleviated by providing a detailed privacy policy statement that informs the citizen of the security of the information collected and whether or not the information will be used by others. For example, Manchester, New Hampshire includes the following privacy statement on their website: "In the State of New Hampshire there are laws to ensure that local government is open and that the public has access, with limited exceptions, to information obtained and held by local government. Consequently, while information collected and held electronically will be afforded the same protections as non-electronic information, such information will be available to the public unless its disclosure is limited by law." Neenah, Wisconsin provides a statement in plain English that clearly explains how information collected will be used:

"...at certain areas of the City of Neenah's Web site(s) you may be asked to provide personal information, including, but not limited to, your name, your electronic mail address, your postal mailing address, your home and/or work telephone number(s), and/or your date of birth. The City of Neenah requests this personal information for purposes of correspondence or for conducting city business. The City of Neenah does not share this personal information with anyone outside the City of Neenah nor disclose personal information to any third party. Users are cautioned that this information may nevertheless be subject to disclosure to any Wisconsin citizen under the Wisconsin Public Records Law."

### *Transaction Fees*

Local governments most typically accept payments by cash and check, although some accept credit cards. One challenge to implementing an e-commerce system is the need to process credit cards. Credit card companies charge fees. The local government must decide whether building permit and other fees should be increased in order to cover the cost of the credit card fees. However, it may be possible to avoid these fees. According to the Center for Technology in Government, Monroe County, New York negotiated with a bank to waive the credit card fees because the county's account balances were sufficiently large (Cook et al., 2002).

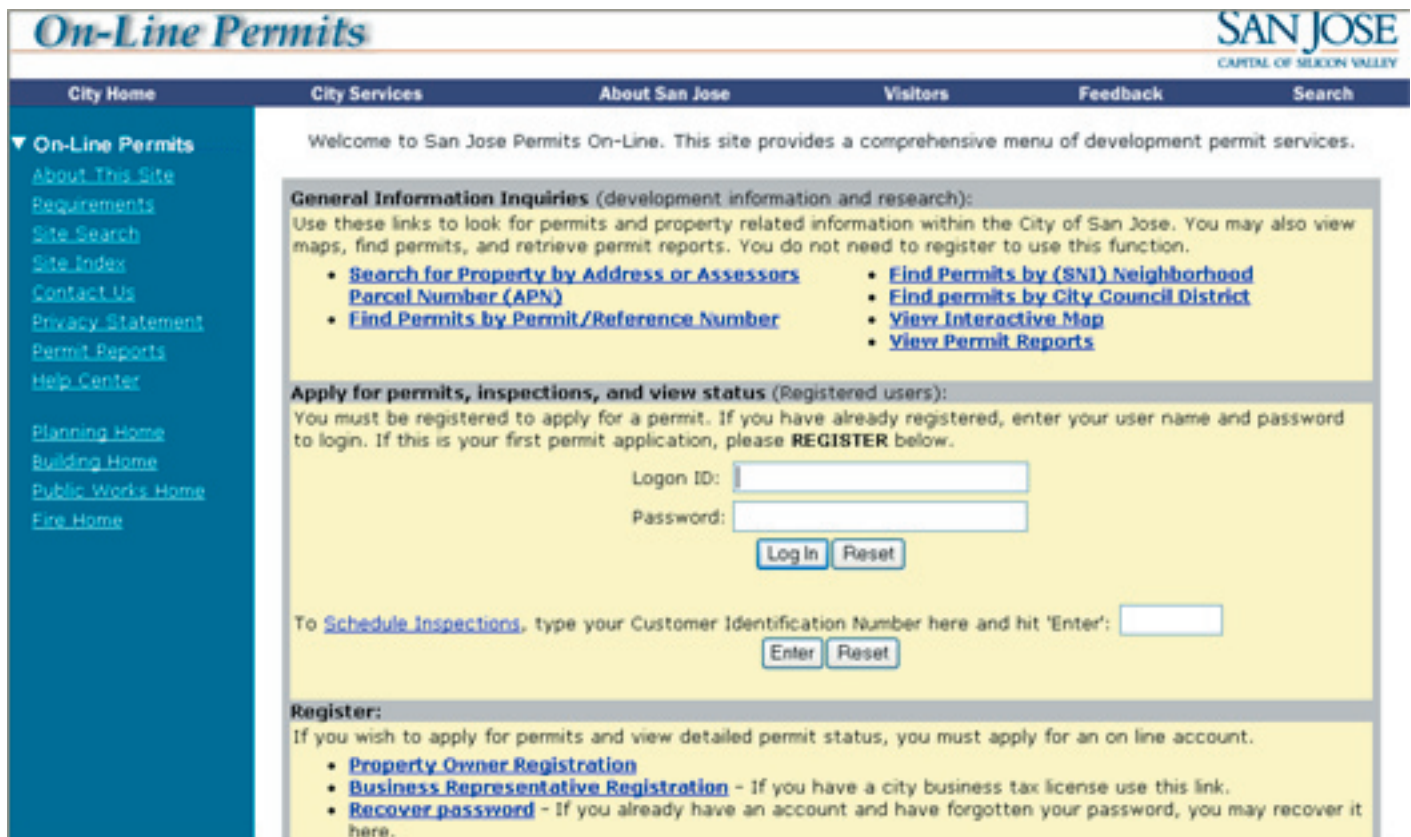
## **Case Studies of E-commerce Development Applications**

As mentioned previously, a small but growing number of cities are developing e-commerce applications to process development permits. These e-commerce systems handle building permits, code enforcement, and inspections. The e-commerce application can be setup to operate through the Internet, phone, or wireless device. Cities with e-commerce applications have chosen several different alternatives in terms of how to implement an e-commerce system. Some have contracted with a third-party to develop and manage the

permitting process, while others have partnered together to create a regional permitting system. The following cities provide examples of how e-commerce can be effectively used to better provide service to citizens, as well as the challenges of implementing an e-commerce application.

### *Internal E-commerce Solution*

Some cities have the internal capability to develop e-commerce solutions in-house. Developing an application in-house requires a significant level of information technology personnel. As a result, developing an application in-house has primarily been limited to large cities with large staff. The City of San Jose, California, for example, allows citizens to gain information about building permits online. Customers can purchase permits and schedule inspections via the e-permitting website. One of the unique features of San Jose's permit information is that it allows citizens to find permits by neighborhood or city council district (City of San Jose 2004). The building permit system is tied to the City's Interactive GIS system, allowing citizens to view permits on a map, see Figure 8.1.



**Figure 8.1: City of San Jose Permitting System**

The City of San Diego, California offers another example of internal ecommerce development. San Diego allows citizens to obtain no-plan permits for water heaters, electrical outlets, gas lines, and simple plumbing work through its simple epermits system (City of San Diego 2004a). These types of permits represent more than 60 percent of the building permits issued in San Diego. During 2000, the City issued 24,913 building permits, of which 15,066 could be processed through the epermits system (City of San Diego 2004a). The system allows the customer to obtain a permit on the same day the application is submitted (assuming the application is submitted during normal business hours).

San Diego decided to develop the permitting system in-house using the City's Development Services, Information Technology, and Communications departments, with the assistance of the San Diego Data Processing Corporation (City of San Diego 2004b).

The City of Charlotte/Mecklenburg County developed an e-permit system known as the Posse Outrider. The system is administered through the Code Enforcement Department. The system serves over 2,000



registered contractors and the general public. Contractors can submit permit applications, view status of their active permits and inspections, schedule inspections, view any permit by address or permit number and check the status of their account through the system. Registered contractors enter the system with a User ID and Password. The general public can view any permit information by permit number or address with no login required.

The system was first implemented in September 1999, at a cost of approximately \$200,000. The department used WebServe, Inc., an outside firm, until December 1, 2003, at which time the Posse System was put into service.

Currently, approximately 400 permits per week are processed online with approximately 21,000 permits being issued yearly through our E-permitting System (Bartl 2004).

#### *Third Party E-commerce Solution*

The most popular option among cities is the use of a third-party to develop and implement the e-commerce application. There are a variety of companies that provide this type of application, the most popular among local government is the VelocityHall service offered by Accela, a California-based software and Internet services company. Accela operates on-line permitting systems, for more than 40 local governments, that are hosted on its VelocityHall website, see Figure 2. The company provides the software to support on-line transactions, as well as hosts this service. Cities can customize the service to meet the specific needs of their permitting system. Additionally, the company offers add on services such as 24 hour touch phone access.

# Permit Manager

Welcome to Concord, CA

---

## City of Concord Building Division

This department handles all of your building permit needs, including pulling a permit, scheduling an inspection, and checking on the status of your permit.

---

\*\*NOTE: WHEN APPLYING FOR A PERMIT, IDENTIFY ANY WORK THAT REQUIRES RELOCATION OF ANY APPLIANCE, EQUIPMENT, FIXTURE OR SERVICE IN THE DESCRIPTION OF WORK TO BE PERFORMED.

---

### Contact Information

#### Check/Research Permits

Check on filed permits or get permit information on pending projects, projects under construction, or completed projects.

#### Check/Request Inspections

Schedule inspections for projects and receive immediate confirmation of the inspection date and time.

#### Apply for a Permit

Complete the online permit application, pay all applicable permit fees, and print out the final permit for immediate posting.

---

### About Permit Manager

Looking for another area or region? [Click here.](#)

Learn more about Permit Manager including:

- [Common Questions](#)
- [Helpful Tips](#)
- [Usage Fees](#)
- [Getting Started](#)

[My Permit Manager](#)

### Customer Support

[ychsupport@accela.com](mailto:ychsupport@accela.com)  
1-888-791-2999

How can we make it better for you? Send us [your suggestions.](#)

VERIFIED BY  
**GeoTrust**  
Accele, Inc.  
CLICK 18.04.05 18:58 UTC

Figure 8.2: VelocityHall

Cities selected Accela for different reasons. Toledo, Ohio sent out an RFP to find a provider to handle development permits. After the Division of Building Inspection reviewed three proposals, they selected Accela in 2002. The division’s primary goal was to improve customer service and they believed Accela would be the company best able to meet that goal (Weiss 2003). Concord, California decided to use Accela after the company had handled upgrades to the city’s permitting system in 1998 and 2002 (Phillips 2003).

Concord, California’s Planning Department decided that adding an on-line permitting service would provide another service option for customers. During the 2003–04 fiscal year the city expects to issue 500 building permits over the Internet, about 10 percent of total permits issued (Phillips 2003).

Tallahassee, Florida, began offering on-line permitting through Accela in July 2003 on a limited basis. The city moved to this system at the request of contractors, who wanted to pay for permits by credit card and to check on the status of permits. The City asked contractors to volunteer to participate in using the Accela system for HVAC permitting on a trial basis. The volunteer contractors are helping the city to improve and finalize the system for wider use. The testing period ended in early 2004 and the City has expanded the system to allow permit inspection requests and the issuance of mechanical permits. Over 2004, the site will be expanded to allow plumbing and electrical work to be permitted through the site (Bixler 2004).

Accela provides the software and management of the permitting system on its own server. Other

third-party providers develop the application, which is hosted and managed from the city's website. Buffalo, New York, developed its permitting system with the assistance of California-based Hansen Information Technologies. Buffalo's Department of Permit and Inspection Services first approached Hansen in 1998 because of Y2K concerns. The department had determined it needed a new permitting system and worked with Hansen to develop a system that allowed better tracking of permitting, inspections, and court cases. The PC-based local area network that was created for the department now allows it to enter permit applications instantly, to communicate with other city departments whose approval is required for some permits, and to monitor all aspects of the permit process. Among its many uses, the system plays a key role in tracking any work being done on preservation district properties (Hansen 2003). The department has also collaborated with Hansen to develop an Internet portal for basic homeowner permits, called ePermits, which was launched for public use in January 2003.

Sunnyvale, California, partnered with GovPartner and Microsoft to create PermitPartner in 1999 (see Figure 2). Sunnyvale developed this system so as to provide minor building permits, but the city has since expanded its on-line offerings to allow citizens to schedule building inspections, to check on the status of a building plan, and to search the permit history of any property in the city. Based on its work with Sunnyvale, GovPartner now offers its PermitPartner software system to other local governments, such as the City of Rancho Santa Margarita and Gardena, California.

Using an e-commerce application has not been without technical complications. Local governments should recognize that it will take time to work out the kinks in the application. For example, Concord, California encountered some technical difficulties caused by out-of-date user information, such as expired credit cards, workers' compensation insurance, or business licenses. The VelocityHall system will not process a permit application if a user's information is not current, which requires city staff to spend time diagnosing and solving the problem. But these problems also alert staff to outdated information and help to keep records accurate (Phillips 2003). Tallahassee, Florida experienced some server and payment transaction problems during the initial testing period and the City and Accela have worked together to eliminate these issues (Bixler 2003).

#### *Regional E-commerce Solution*

While most cities with e-commerce applications for development services developed their systems with the assistance of a third-party, Bellevue, Washington, took a different approach. It joined with several other cities in Washington to create a common on-line permitting system known as MyBuildingPermit.com (Figure 8.3).

**MyBuildingPermit.com**  
a service of eCityGov.net

eCityGov.net

Application & Registration | Information Center - What you need to know.

How to Apply | Registration | Application | Permit Research | Code References | Public Info | News & Events

18 APRIL 2005 | 12:03:35 PM

**Home** **WELCOME!**

**Search** MyBuildingPermit.com is an easy-to-use permitting portal that makes it possible to [apply](#) for, pay for, and receive electrical, low voltage, mechanical, plumbing, and re-roof permits from each of the participating jurisdictions. This is one-stop government service at its best.

**Site Map**

**Contact Us**

**Low Tech**

The site also provides [permit research and status information](#), [construction tip sheets](#), [inspection checklists](#), [links to resources](#) and contacts, and [lists of upcoming events and seminars](#).

**New Member:** [Snohomish County](#) is the newest member of MyBuildingPermit.com and now offers residential mechanical, residential plumbing, and re-roof permits through this site.

**Note to Contractors:** If you are already registered with MyBuildingPermit.com, it is not necessary to re-register to pull Snohomish County permits on this site.

MyBuildingPermit.com is sponsored by the eCityGov Alliance. The Alliance is a unique collaborative effort of the Washington State cities of [Bellevue](#), [Bothell](#), [Issaquah](#), [Kenmore](#), [Kirkland](#), [Mercer Island](#), [Sammamish](#), [Snoqualmie](#), and [Woodinville](#). The goal of the Alliance is to simplify access to government services for citizens and businesses. At the same time, Alliance members, by working together can lower the costs associated with providing on-line services.

Please note that changes are regularly made to enhance the site with additional information, functionality, links, and services. Please visit us again.

**Figure 8.3: MyBuildingPermit.com**

MyBuildingPermit.com is part of the eGovAlliance. This intergovernmental organization was formed in King County, Washington, in December 2000 to bring together nine local city managers to talk about joint strategic planning for technology services. Each of the jurisdictions equitably shares the cost and staffing of MyBuildingPermit.com and future planned applications such as a parks and recreation reservation and permit system. The joint approach allows smaller jurisdictions to offer on-line transactions, which they would otherwise be unable to afford. The on-line permitting system lowers the development and operating costs because infrastructure and application development costs are shared. The eGovAlliance also partnered with Microsoft to use the company's .Net technology, incorporating Commerce Server 2000, BizTalk Server 2000, and SQL Server 2000.

To encourage use of MyBuildingPermit.com, the jurisdictions agreed to maintain the same fee for permits acquired on-line and in person. They also agreed not to assess an additional charge for use of credit cards. The eGovAlliance set a clear goal for the permit project: 30 percent of all over-the-counter permits were to be transacted on-line within one year of operation. The site met this goal and, in fact, according to John Backman, the Administrative Services Director of Bellevue, Washington, 50 percent of certain types of permits are now acquired on-line.

The eGovAlliance has also been active in other aspects of e-commerce. When fully implemented, its MyParksAndRecreation.com site will allow citizens to register for classes and make reservations for park facilities. The eGovAlliance is currently considering future applications such as regional GIS access, payment systems for utility bills and parking tickets, and a job application site (Backman 2003).

An on-line permit application system provides convenience to citizens and can save staff time by eliminating paperwork and speeding processing time. Electronic systems can also detect missing information,



applications were processed per day? How many telephone calls were fielded? And, what is the average time to process a paper application? Evaluation after the implementation should be used to make changes to the application and start a cycle of continuous improvement to the development process. For example, the City of Concord, California has an objective of having 80 percent of customers using online services provided by the City to rate the services as satisfactory or better. As a performance indicator, the City wants to see a 2 percent increase per year over the baseline satisfaction with online services. Additionally, another performance indicator is to reduce the transaction cost by 5 percent (Concord 2002).

### **Conclusion**

The benefits of a well-designed e-commerce application is a transformation to a more citizen oriented service provider. This change encourages a dialogue between the government, citizens, and other customers. For citizens and customers e-commerce offers a convenient alternative to in-person transactions. Citizens may be more likely to obtain appropriate permits if they can be easily obtained through an e-commerce application. For the government, in addition to the increased dialogue there can also be increased efficiencies and cost savings. While the establishment of an e-commerce system requires a substantial commitment from the government agency, the results can mean increased customer satisfaction, increased efficiency, and lowered costs of administration.

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## **CHAPTER 9**

### **Conclusions**

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### **Participation and E-Government**

Lack of participation in the United States continues to challenge public officials. It has proven difficult to engage citizens in decisions that impact their lives if the issue at hand is not considered an emergency (Laurian 2003). Daily lives are consumed with individual- and family-oriented priorities—work, school, dinner, soccer practice, music lessons, reality TV. How can we carve time into such overly scheduled lives in order to give information and get input on community-oriented issues? The use of the Internet and communication technology by local governments (e-government tools) is a potential means by which governments can gain input according to the discretionary schedule of the citizen, thereby reducing the “cost of participation” (Weber et al. 2003). The chapters in this compilation highlight three major themes as we move forward to improve citizen participation by using e-government tools. We conclude this effort with a review of these themes and a look ahead toward future practice and research related to participation and e-government.

### **It is Out There**

As the Kaylor and Cowley and Conroy chapters make clear, e-government participation tools are being offered by local governments across the U.S. The types of offerings that are provided vary widely among communities, and while we do not have information on whether they are finding a receptive audience, they are being provided with increasing regularity and increasing sophistication. There is significant evidence that there is widespread adoption of e-government tools in general, and participation-oriented tools specifically (see, Kaylor, Chapter 1; Cowley and Conroy, Chapter 8).

Early entrants into the e-government realm focus on information provision by simply moving paper-based information to electronic formats; fewer local governments are making inroads to more technologically advanced offerings (Kaylor, Chapter 1; Cowley and Conroy, Chapter 8). However, there is a broad range of tools being offered, from the simple provision of an informational website to online permit and payment transactions to interactive GIS to the engagement of citizens in online policy deliberations. As noted by Steins, different types of e-government tools have varying strengths with which they promote government to citizen, government to business, government to government, and internal effectiveness and efficiency. Therefore, the type of tool used by a local government must be selected with a comprehensive e-government plan in mind.

It is critical for local governments and citizens to understand the state of e-government participation tools in the U.S. in order to compare their own efforts as well as to inspire advances. The regular benchmarking of government progress is a necessity in this regard, and Kaylor’s longitudinal assessment of large cities is a vital contribution to our understanding of not only where we are and how far we have come, but also where we need to improve.

### **It is Not Sufficient**

Although there is evidence of e-government tool adoption, there is also corresponding evidence that local governments are not yet taking full advantage of the technologies at their disposal. The technology is much more advanced than the tools being utilized and, as Kaylor points out, “Local governments are largely blind to the capacity of technology to foster new participation opportunities for the citizens they serve” (p. 4).

The source of the limitation appears to be more a problem of resources than of interest, though both issues merit attention.

Local governments are challenged to make e-government technological advances while consistently facing limiting budgets and lack of personnel. Increases in efficiency and longer term returns argue in favor of advanced tools such as online commerce transactions (e.g., Steins, Chapter 2; Cowley and Conroy, Chapter 8). Limited funding may also inspire more creative options, such as partnering with local university researchers. Projects described by Al-Kodmany (Chapter 7) highlight the potentially mutually beneficial nature of these relationships.

While there is little doubt that given sufficient funds many local governments with basic offerings would upgrade to more interactive and participatory-minded tools, it is also likely that some would not. Some concerns may rest in basic issues of Internet security and privacy. Are people online being forthright in their representations? What sort of personal information should government solicit and store for certain online transactions? However, interactive and transformative e-government tools signal a new relationship between citizens and their government often, as noted by Steins (Chapter 2), representing a “fundamental change in the way government does business” (p. 19). These changes include interdepartmental communication and coordination that can, for example, address problems from a holistic mindset whereby no one agency “owns” an issue. Because this mindset is foreign to standard governmental operations, change will be slow in coming.

Another possible reason for reluctance or resistance to adoption of true participatory e-government strategies may rest in basic concerns over equity. Advanced participatory e-government tools provide an alternate communication and deliberation channel for possible influence into local government decision making. There is concern, though, that the channel is being or would be utilized by a small proportion of the citizenry who are typically young, white, middle-class, and educated (Mossberger and Tolbert, Chapter 5). The Internet may provide a bias-blind venue for discussion of which John Rawls would be proud. However, if advanced participatory e-government tools are to be a viable means to contribute to and influence public discourse, we must move beyond awareness of the problem toward measures (e.g., library access, education, skill training) that will build access and self-efficacy for the general citizenry.

### **It is for the People**

E-government participation tools that are discussed in this work are also tools that theoretically help to make local governments more efficient and more effective. Citizen perceptions, including ones regarding government responsiveness, accessibility, transparency, and accountability, may increase their overall trust of government (see Mossberger and Tolbert, Chapter 5), there needs to be a greater user-centered focus to e-government tool provision. We know, for example, that “the availability of information in readily accessible electronic form is insufficient alone to encourage citizen participation” (Marcella et al. 2002, 371). In fact, there is some evidence that trust in public agencies may decrease an individual’s motivation to participate (Laurian 2004, 63). Therefore, it is imperative that the e-government offering is designed to address citizen needs and wants, and that it is made accessible to the community.

We need to better understand accessibility implications both for local governments and their citizenry. Local government accessibility primarily revolves around available resources as discussed previously. Citizen access to participatory e-government tools must not only consider the ability of a person with disabilities to read a web page and interact with the media, but also the basic physical access to a computer and the Internet. The “digital divide” between those with physical and/or social access and those without, as noted by Mossberger and Tolbert (Chapter 5) and alluded to by Wheaton and Bali (Chapter 4), can undermine the success of e-government participation. Participation bias—and potential exclusion—is a concern regardless of the form. Verba et al. (1995) note that “citizen participation will be often loud, sometimes clear, but rarely equal” (in Weber et al. 2003, 39).

Regulations governing the development of accessible government websites for disabled citizens have been in place since 2001 through Section 508 of the Rehabilitation Act. However, as noted by Wheaton and Bali (Chapter 3), non-compliance with the regulations is far more common than compliance. Resources, many at no cost, are available to address the problem, and yet problems of time and unawareness continue to exclude



community citizens from participation opportunities. The effectiveness of these tools to provide representative participation can only happen when governments make a concerted effort to be inclusive in their design.

E-government participation tools raise other issues of access. For example, it is not only access to the technology in a useable form (i.e., computer and modem, 508 and WCAG compliance) that is important, but also access to Internet technology language and skills (e.g., “window,” “link,” “click,” mouse use) (Shelley et al., 2004). Improving citizen skill levels, especially for those groups most typically at a technological disadvantage (e.g., lower income, minority, urban, rural remote, physically challenged), will require efforts by school systems, job training organizations, and local, state, and federal government agencies. This will need to be in conjunction with efforts to establish physical access to the technology.

Furthermore, the potential of the e-government tools rests in their ability to engage the public in democratic discourse. This is not yet happening, as surveys reveal that governments focus on tools to enhance the citizen-as-customer experience rather than the citizen-a-voice-of-the-community experience (Kaylor, Chapter 1). Technologies, such as Public Participation GIS (PPGIS) as discussed by Proserpi (Chapter 6) and Al-Kodmany (Chapter 7), can enhance meaningful participatory inclusion when, for example, citizens are able to contribute to visually enhanced online discussions, surveys, and decision-making processes. Although reasons why this is not commonplace have been addressed already (i.e., resources, equity, power), it bears repeating that the shortcomings of specific tools should not diminish the overall value of the goal of universally accessible e-democracy.

### **Looking Ahead**

The future of citizen participation may indeed be a bright one if interactive e-government tools become as ubiquitous as the standard public meeting. These tools not only make it easier for citizens to obtain information but, as interactive tools become more prevalent, to provide their own insights and concerns into the decision-making process. This transition will require increased financial, temporal, educational, and personnel resources for governments as well as their citizens. It will also require an evaluation of changes needed from current participation practices to integrate new tools, including changes to organizational structure. As we move ahead into greater participatory opportunities using e-government tools, two cautionary notes are necessary.

First, we need more understanding of the users’ perspectives in the design of participatory e-government tools. As we take fuller advantage of technology to offer more advanced participatory e-government tools, it must be remembered that more is not always better, sometimes it is just more. Citizen responses to the different tools will vary depending on their demographics, life experiences, and other self-efficacious elements. Therefore, research is needed to assist governments in developing e-government plans that are tailored to the participation elements most comfortable to the citizen user. There is already the basic case where citizens can personalize a local government page to provide them with personally relevant information where they want to see it on a page (Kaylor, Chapter 1). However, further research may reveal that citizens respond differently to certain tools, page designs, and other e-government aspects. Designing e-government offerings to respond to citizen participation comfort levels, for example, may reduce citizen resistance, whether conscious or unconscious, to new participation opportunities.

Second, e-government tools are a valuable addition to the participation toolbox. They should be thought of as supplementary to traditional venues rather than as a replacement. While a high-tech future vision has global, free wireless Internet access, the 21<sup>st</sup> century reality has not reached this point, nor should it. Participation is best served with many options that best fit the comfort and accessibility of the citizenry. Greater accessibility to government decision-making processes through many and varied venues will provide officials with the spectrum of concerns and insights needed to be truly representative.

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