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Use of Web Technology by U.S. Planning Agencies: Results from a National Benchmarking Survey

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Just as it has rapidly changed the world of business, Web technology has created tremendous opportunities for improving the role of good government. Specifically, these opportunities are present in the form of increased information dissemination, increased interaction with the public, and more cost-effective and efficient means of conducting public transactions. Yet government has lagged behind business in its use of the Web. In an effort to evaluate the extent to which online technology is used for local government applications, this research examines the role of Web technology in the field of urban planning.

Although there is a wide array of government activity online, planning was chosen as the focus of analysis because it can be considered representative of the various types of interaction that occur between government and its citizens. Moreover, local (municipal) planning agencies are the unit of local government that most often affects people at the "parcel," or property, level and that actively seeks community input for short- and long-range planning issues. Critical planning theory suggests that improved information should lead to better decisions and planning processes; however, it has yet to be proven that online or Web technologies produce this result.

CITIZEN INTERACTION WITH LOCAL GOVERNMENT

One way to examine the role of Web technology in local government planning agencies is to look at how it has changed the way citizens interact with planning departments and officials. In the case of planning, citizen interaction occurs in one or more of the following three ways:

- *Information seeking (informative mode):* Citizens typically ask questions such as these: What are the applicable zoning ordinances for

my property? What is the plan for growth in my community? When are public hearings scheduled? How do I file for a permit/variance? Before such information was available online, citizens had to visit or telephone the planning office for answers. Now, however, they can find the information online and download it. This kind of information-seeking activity is considered "informative" in that citizens can access the information needed but there is no other interaction between the citizens themselves and the planning office.

- *Interactivity and public participation (interactive mode):* Citizens want to have a voice in how things are being done in the community and what is planned in the future. Prior to Web technology, their options were limited: they could attend public hearings or meetings, visit the planning office in person, call the planning office or city manager, or write letters. However, the Web has provided additional options that make interactivity more feasible. Citizens can download permit application forms, fill them out, and return them from home; they can also review plan proposals online and then comment on them. In some cases there are online forums and chat rooms that are open to residents to discuss issues before the community. The new 24-hour availability of these functions makes planning agency activities more accessible to more people and offers additional communication channels that are intended to improve information availability and decision making.
- *E-business (transactive mode):* Again, many of the activities that would have previously required a citizen to visit the local government offices can now be conducted online. For example, citizens can go online to purchase copies of the comprehensive plan or zoning codes; to file permits, variances and appeals; and to pay associated fees for permit and other applications. The introduction of e-commerce Web activity adds a "transactive" quality to planning Web sites, facilitating more efficient and cost-effective transactions by automating the payment and ordering process.

Selected Findings

Ninety-five percent of planning agencies reported having a Web presence.

Statistical relationships indicate that the more staff a planning agency has, the more that agency will use technological applications and offer a larger number of Web interaction items on their Web site.

Planning agencies tend to use their Web presence for information dissemination, such as posting meeting agendas and ordinances, with less emphasis on citizen interaction and higher-end technological applications, such as visualization or urban modeling.

By making information more readily available, increasing opportunities for citizen participation and feedback, enabling purchase transactions online, and ensuring that these functions are available 24 hours a day for citizens with alternate working hours, physical limitations, or other restrictions, Web technology clearly allows for potentially better government performance across the board.

Nevertheless, no studies have been conducted to date that systematically assess this new approach to local government planning organizations, and the assumption that it increases the performance of those agencies has yet to be evaluated. Also still to be evaluated is the quality and content of planning agency Web sites, on which the added value of an online component would seem to depend.

With these issues in mind, a survey was developed to determine a baseline for existing practices and examine the extent to which planning agencies use Web technology. Given the lack of research in this area, it became clear that this was an opportunity to "benchmark" the state of practice in planning with respect to Web technology and applications.

RESEARCH DESIGN

In order to benchmark Web technology use by planning agencies, it was determined that the most appropriate sampling strategy would be to target local government planning units, especially those that are sufficiently large enough to have some familiarity with computer technology and the Internet. Thus, all 1,432 municipalities in the United States with a population of 25,000 and above were selected to receive a survey.

A survey was constructed to address the myriad ways in which a local government planning agency might use the Internet and related technology. The survey asked 33 questions, most of which offered a closed set of multiple selections, resulting in 165 coded variables; 3 other questions were open ended. The survey was pretested,

The survey was supported in part by the American Planning Association Information Technology Division, ICMA, and Urban Insight, Inc.



and it was estimated that most respondents could complete it in 15 minutes or less.

The survey was addressed to the planning director (if known) or the city manager of each municipality. In an effort to improve response rates, four separate mailings were sent. The first, which included a cover letter, the survey, and a postage-paid return envelope, was mailed in January 2004. The second was a reminder postcard. The third mailing was another complete survey, cover letter, and postage-paid return envelope. The fourth mailing, another postcard, was both a thank-you and a final reminder for those who had yet to return their survey. The American Planning Association (APA) Information Technology Division and ICMA allowed their logos to be placed on the cover letter and the survey instrument and were identified as well in the cover letter as participating in the project. All responses were compiled in a Filemaker Pro database, and the numerical data were exported to SPSS for statistical analysis.

RESULTS

Of the 1,432 surveys sent out, 505 were returned for a response rate of 35% (not shown). This response rate is on the higher end of “cold” mailouts of this type, and it is presumed that the involvement of the APA and ICMA had a positive influence. Local government planning departments in 48 states responded, representing a cross section of the country. More populous states had higher representation (California, Texas, and Michigan accounted for approximately one-third of the respondents). In terms of population, the average size of responding jurisdictions was approximately 100,000, with 75% of them reporting a population of 88,000 or less and five jurisdictions reporting a population of more than 1 million (Table 4/1).

Table 4/1 DISTRIBUTION OF SURVEY RESPONDENTS

Classification	Respondents	
	No. (A)	% of (A)
Total	505	100
Population group		
Over 1,000,000	5	1
500,000–1,000,000 ...	9	2
250,000–499,999	18	4
100,000–249,999	78	15
50,000–99,999	156	31
25,000–49,999	238	47
10,000–24,999	1	*
Geographic division		
New England	43	9
Mid-Atlantic	45	9
East North-Central ...	98	19
West North-Central ...	45	9
South Atlantic	52	10
East South-Central ...	17	3
West South-Central ...	58	12
Mountain	41	8
Pacific Coast	106	21

* = Less than 0.5%.

Respondents were asked to indicate their planning unit’s area of responsibility, and more than 90% reported that they represent a city planning unit (not shown). The remaining 10% reflect planning agencies that have planning responsibilities that extend beyond the city boundary; often these areas are called extraterritorial jurisdictions, planning areas, or spheres of influence, depending on the region of the country.

Budget

The overall responses indicate that planning agencies have modest budgets, with very little money, if any, allocated to information technology (IT). Approximately 52% of respondents reported an agency budget of \$600,000 or less; of the 388 who indicated what their IT budget was, 22% reported an IT budget of \$10,000 or less, while 33% reported having no budget for IT at all (not shown).

Agency Use of Web Technology Tools

Most agencies appear to have a minimum familiarity with technology (if measured by access to machines and e-mail): specifically, more than 96% of respondents reported that everyone on their staff has access to a computer and has e-mail (not shown). Fully 95% of respondents also indicated that their planning agency has a Web presence. Among the 461 respondents who reported where their Web site is located, 94% said it is on the local government’s main Web site while 4% said it is on an independent site; the rest reported other host arrangements (not shown). In

most cases, the Web presence is maintained by individuals who are not part of the planning department (60%) (not shown). When asked to estimate how much of their department’s or agency’s budget is annually allocated to the maintenance of their Web presence (cost for staff, equipment, hardware, software, etc.), nearly half of the respondents said zero.

Beyond that, the number and type of technological tools used in local government planning departments vary. One hundred and twenty agencies (24%) reported no available Web interactive tools; among the remaining 385 agencies, two thirds reported having between 1 and 4 tools (not shown). Only 2 reported having 16 of the 23 listed, and no agency reported having more than 16 of them.

Respondents were asked to identify which types of technology tools their agencies use, with the choices of planning support systems (INDEX, CommunityViz, WhatIf? Urban Sim, or similar), GIS, 3-D modeling, virtual reality simulations, permit tracking software, a global positioning system (GPS), photo interpretation, remote sensing, and zoning and code enforcement management software. (The glossary in the sidebar on page 24 provides more complete definitions of these terms.) By far, a geographic information system (GIS) is the leading technological tool used (88%), followed by permit tracking software (58%); reported usage of other tools is far behind (Figure 4/1). Considerably fewer agencies use the more advanced tools such as remote sensing (4%) and virtual reality simulation (1%).

When these results are correlated to see if there are any statistically significant relationships,

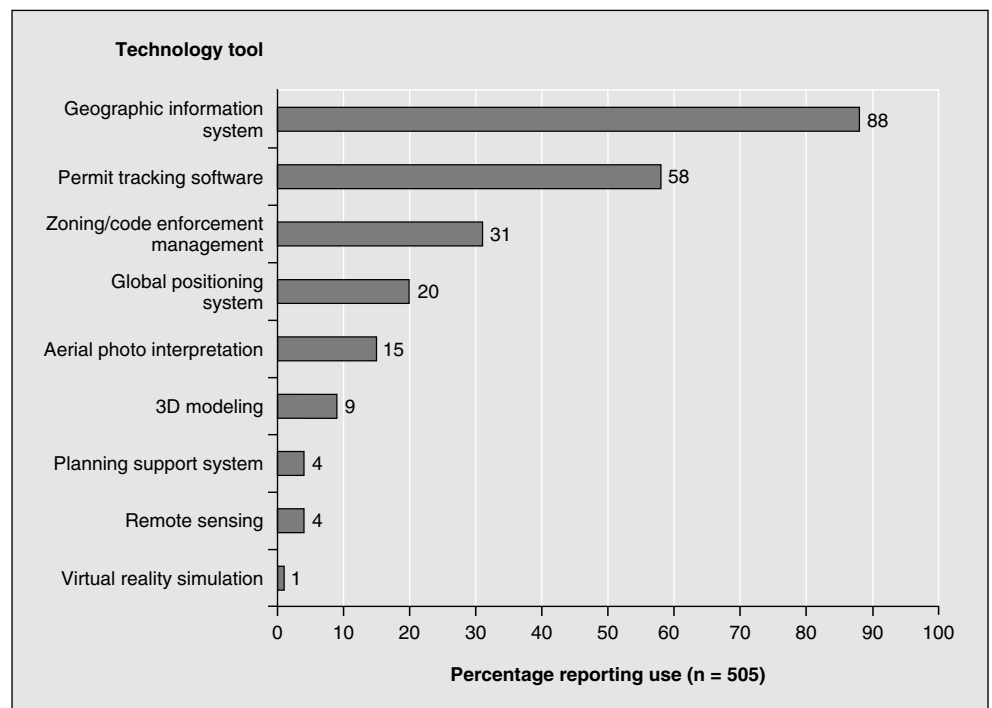


Figure 4/1 Reported use of selected technology tools

a strong relationship is found between having planning support systems and also having 3-D modeling and virtual reality simulations (not shown). For agencies that reported using GIS, there is a relationship (although weaker) with 3-D modeling, permit tracking, GPS, and photo interpretation. Not surprisingly, there is a strong correlation between use of photo interpretation and remote sensing, as well as a correlation between use of zoning software and a permit tracking system.

A significant positive relationship is also found between the number of technology tools offered by an agency and population size. This means that as the population increases, so does the likelihood that the community will be using a higher number of technology tools (see Table 4/2). On the other hand, there is no correlation between the population of the community and the use of GIS. This may be because of

Table 4/2 STATISTICAL CORRELATIONS BETWEEN POPULATION AND SELECTED VARIABLES

	Population and number of tools		Population and availability of GIS		Population and available Web interactions	
	Population	Number of tools	Population	Use of GIS	Population	Web interactions currently available
Population						
Pearson correlation	1	.214**	1	-.023	1	.142**
Sig. (2-tailed).....	.	.000	.	.610	.	.002
N.....	484	484	484	484	484	484
Number of tools						
Pearson correlation214**	1	-.023	1	.142**	1
Sig. (2-tailed).....	.000	.	.610	.	.002	.
N.....	484	505	484	505	484	505

**Correlation is significant at the 0.01 level (2-tailed).

the widespread use of GIS by planning agencies (88%), as reported above. As with agency use of technological tools, population is also

significantly associated with the number of Web interaction items offered by the planning agency (Table 4/2).

Technology Tool Glossary

Aerial photography: *Photographs of the Earth’s surface taken from a platform flying above the surface but not in orbit, usually an aircraft. Aerial photography is often used as a cartographic data source for base mapping, location of geographic features, and interpretation of environmental conditions.*

Decision (or planning) support system, DSS or PSS: *A computer program application that includes data presentation and modeling tools that help people understand problems and explore courses of action.*

Geographic information system (GIS): *An arrangement of computer hardware, software, and geographic data that is designed to capture, store, update, manipulate, analyze, and display geographic information. Typically employed to represent maps as data layers that can be studied and used to perform analyses, GIS enables people to integrate, analyze, and visualize the data; identify relationships, patterns, and trends; and find solutions to problems.*

Global positioning system (GPS): *A constellation of 24 radio-emitting satellites deployed by the U.S. Department of Defense and used to determine location on the Earth’s surface. The orbiting satellites transmit signals that allow a GPS receiver anywhere on Earth to calculate its own location through triangulation. The system is used in navigation, mapping, surveying, and other applications in which precise positioning is necessary.*

Permit tracking software: *Software that offers automated tracking features in order to electronically manage the permit process from application to final approval.*

Remote sensing: *The collection and interpretation of information about the environment and the surface of the Earth from a distance, primarily through the use of sensing radiation that is naturally emitted or reflected by the Earth’s surface or from the atmosphere, or through sensing signals transmitted from a satellite and reflected back to it. Examples of remote sensing methods include aerial photography, radar, and satellite imaging.*

3D model: *A paradigm used to portray an object in three dimensions.*

Virtual reality: *The simulation of a real or imagined environment that can be experienced visually in the three dimensions of width, height, and depth and that may also provide a visually interactive experience in full real-time motion with sound and possibly tactile and other forms of feedback. The simplest form of virtual reality is a 3-D image.*

Zoning/code enforcement software: *Comprehensive tracking of all code enforcement information, providing access to pictures, variances, permits, complaints, inspection processing and reports, and similar types of software.*

Source: ESRI GIS dictionary at <http://support.esri.com/index.cfm?fa=knowledgebase.gisDictionary.gateway>.

Agencies also use their Web sites to provide information of various types to the citizens of their communities. Figure 4/2 shows the particular items available on planning agency Web sites, irrespective of where the Web site is hosted.

Existing and Planned Web Interactions

Another question asked about existing and planned implementation of the 23 specific types of Web interactions on the agencies' Web sites (Table 4/3 below). Among those respondents who reported on each specific type, the more popular types of interaction currently in use are the posting of commission minutes (62%), a Web site search engine (58%), an e-mail list (54%), a form on which citizens can submit questions (49%), a feedback form for citizens to submit (48%), and a Web GIS mapping system (40%). Those currently used least are chat rooms, discussion forums, virtual reality simulations, and online filing of fee payments (2% each). Highest among those interactive tools that are planned for the future are online permit applications (64%) and online permit payments (63%). Among those tools generally *not* planned for implementation in the future are chat rooms (93%), virtual reality simulations (91%), discussion forums (84%), and live broadcasts (75%).

Staffing, Technology Tools, and Web Interactivity

Fifty-seven percent of respondents reported having planning staffs of eight or fewer, and most had no dedicated in-house IT staff at all (60%) or only one staff person (20%) (not shown).

There are some interesting findings with respect to staffing levels in planning agencies, the number of tools employed, and the number of Web interaction techniques that are available. There seems to be a fairly large break point among agencies that have 1 to 15 full-time staff (77% of respondents) and those that have more than 15 (23%) (not shown). Agencies with 15 full-time staff or fewer tend to offer on average only three interaction items on their Web site, whereas those with 16 or more full-time staff have on average more than double that number of interaction items (see Figure 4/3). Similarly, although again perhaps not surprisingly, agencies with higher numbers of staff also use many more technology tools than do those agencies with smaller staffs.

CONCLUSION

The Internet is clearly a valuable tool for planning agencies, and most have made an attempt to use it in some way. The results presented here help take a "snapshot" of where the planning field is with respect to Web technology and where it is headed. While the potential to increase citizen participation is one of the main arguments for creating Web-enabled activity, most planning agencies are not using it to engage the public in discourse (such as discussion forums) but rather

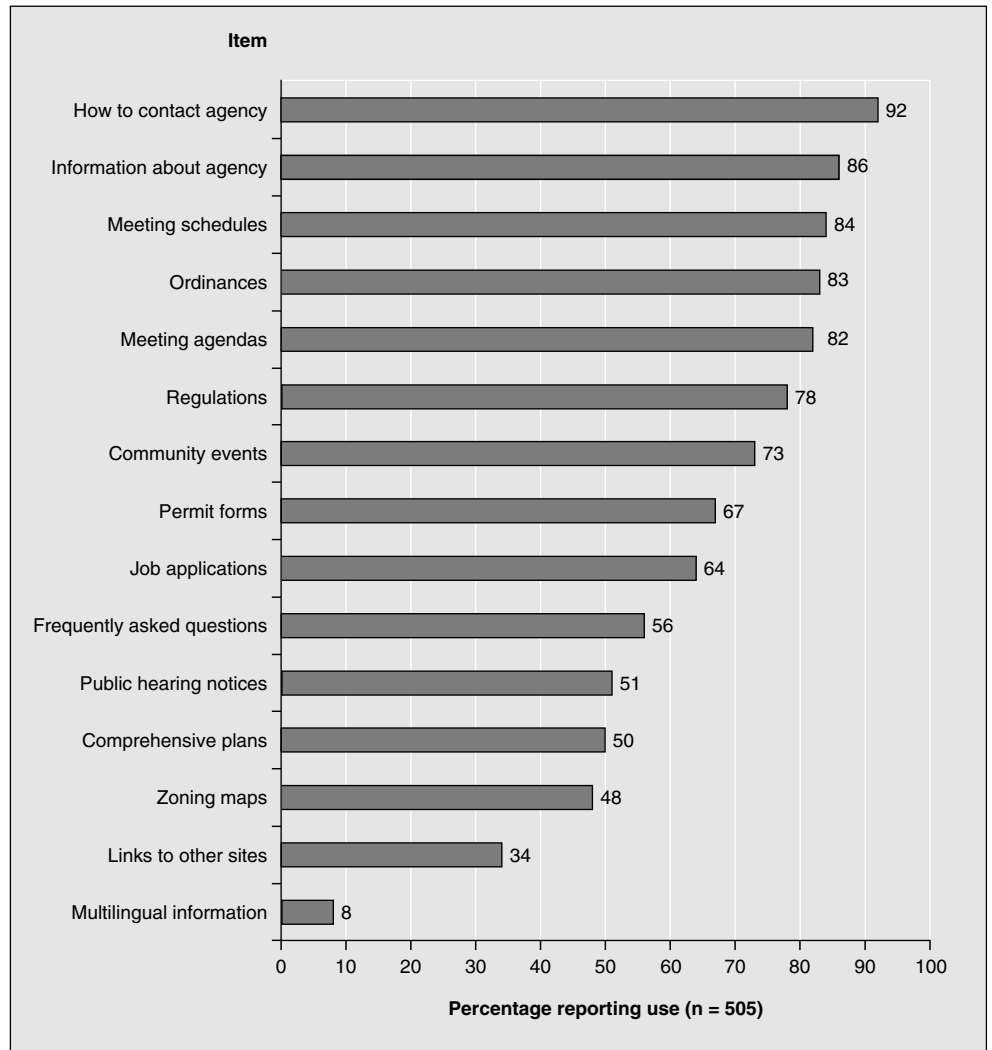


Figure 4/2 Items available on planning agency Web sites

Table 4/3 EXISTING AND PLANNED WEB ELEMENTS

Web elements	No. reporting	Available now, %	Planned, %		
			In next one to two years	In five years	Not planned, %
Feedback form	353	48	22	9	22
Form to ask questions	332	49	20	8	23
Web site search engine	328	58	9	8	25
E-mail list/listserv	327	54	12	6	28
Audio	272	16	10	7	67
Video	277	18	9	8	65
Live broadcasts	264	12	5	8	75
Online surveys	300	26	23	12	39
Chat rooms	254	2	1	4	93
Bulletin boards	265	19	10	9	63
Web GIS/mapping	366	40	31	19	11
Application for permit online	352	20	36	28	17
Pay for permit online	318	9	31	32	28
Schedule building inspection	318	15	32	24	29
Check inspection status	315	15	33	25	27
Discussion forums	253	2	3	11	84
Virtual reality simulations	252	2	4	3	91
Interactive public comments form	267	9	15	14	61
Filing for variance	296	6	23	27	44
Pay filing fees	290	2	26	28	45
Copies of minutes	375	62	18	10	10
Buy copy of comprehensive plan	296	17	28	14	41
Order maps	289	15	29	16	40

Note: Percentages may not total 100% because of rounding.

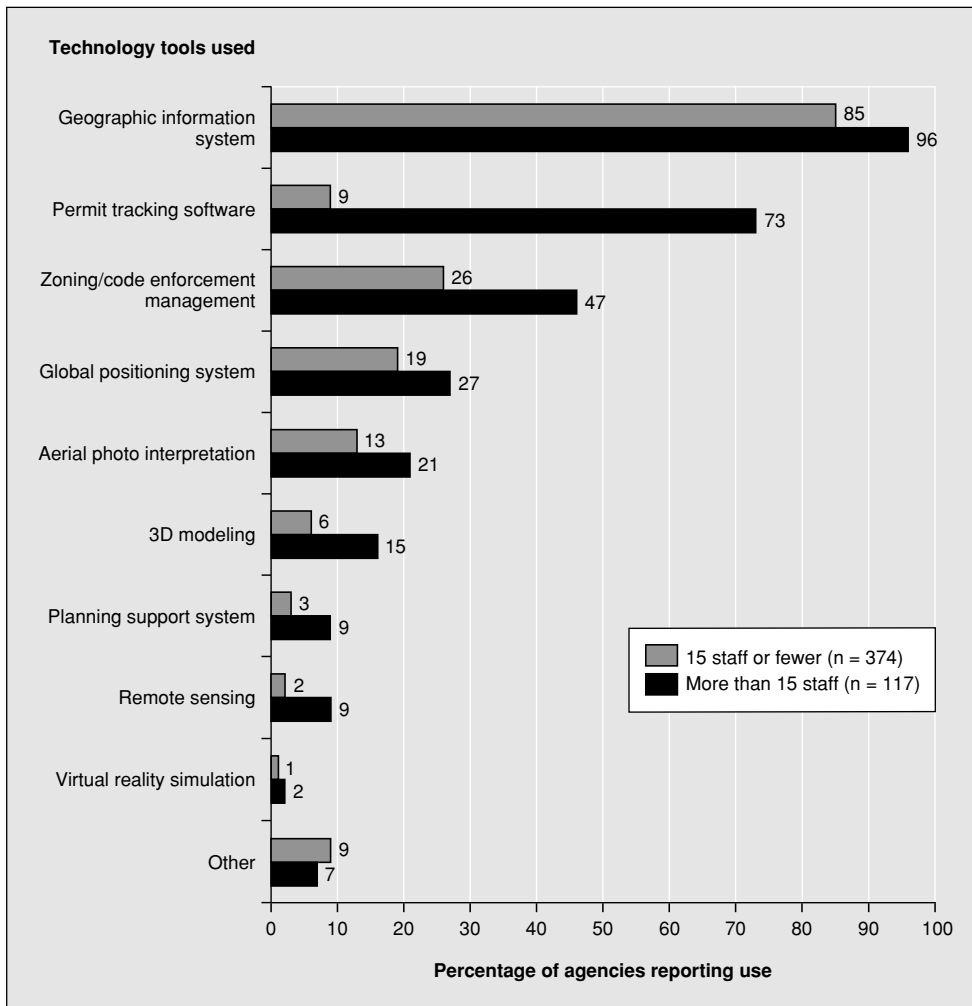


Figure 4/3 Reported use of technology tools by planning agencies, by number of agency staff

to provide a one-way communication channel (such as static maps or agendas and minutes). Nevertheless, planning agencies are using Web technology and plan to implement additional Web elements in the next several years.

The results indicated here are preliminary in nature and represent a first-cut analysis of the data collected. More in-depth analysis is needed to understand the significance of the survey and what the field can learn from it. In general, more research is needed to fully understand the uses of technological and Web-based applications in urban planning. Although most planning agencies are considering the adoption of more interactive applications, survey data show, again, that most activity is basically information oriented. It is unclear what forces, whether technological or other, will push agencies toward more interactivity.

