

Journal of International Technology and Information Management

Volume 22 | Issue 2

Article 1

11-1-2013

Public Use of an Online Advanced Traveler Guidance Information System: Trust in the e-Service and the Agency

Richard Burkhard
San Jose State University

Benjamin Schooley
University of Southern Carolina

Thomas A. Horan
Claremont Graduate University

Follow this and additional works at: <http://scholarworks.lib.csusb.edu/jitim>

Recommended Citation

Burkhard, Richard; Schooley, Benjamin; and Horan, Thomas A. (2013) "Public Use of an Online Advanced Traveler Guidance Information System: Trust in the e-Service and the Agency," *Journal of International Technology and Information Management*: Vol. 22: Iss. 2, Article 1.

Available at: <http://scholarworks.lib.csusb.edu/jitim/vol22/iss2/1>

This Article is brought to you for free and open access by CSUSB ScholarWorks. It has been accepted for inclusion in Journal of International Technology and Information Management by an authorized administrator of CSUSB ScholarWorks. For more information, please contact scholarworks@csusb.edu.

Public Use of an Online Advanced Traveler Guidance Information System: Trust in the e-Service and the Agency

Richard Burkhard
San Jose State University
USA

Benjamin Schooley
University of South Carolina
USA

Thomas A. Horan
Claremont Graduate University
USA

ABSTRACT

Public transit system web sites have become a tool of choice for many citizens to obtain transit route information and to assist with trip planning. For many of these citizens, the web interface has become the only method of communication with the public service agency and the primary method of obtaining information about transit services. This model-based, multi-method study analyzes data from more than 450 survey respondents and twenty-four focus group participants, seeks to understand the end user citizen trust experience in their interaction with e-government transit web sites. Results of this e-service study provide useful insights into how citizen perceptions of the transit service and transit agencies are affected through web site e-service use.

INTRODUCTION

In recent years, countless public transit systems have installed interactive, web sites to assist riders in obtaining transit route information and assistance with trip planning. For many of these citizens, the web interface has become the only method of communication with the public service agency and the primary method of obtaining information about transit services for bus, train and other local and regional methods of travel. This study seeks to understand the end user citizen trust experience as users with e-government transit web sites, including how citizen perceptions of the transit service and transit agencies are affected through web site use. In addition to the service satisfaction offered by online trip planners, several studies suggest that use of e-government services such as transit planning systems may be dependent on users' trust in the government services provided and government agency outcomes (Grimsly & Meehan, 2007). The current phase of research investigates trust in the transit planning website as a service, the transit authority, and the intent to use services in the future.

We begin with a review of the state of e-government services and systems, along with the specific context of the study, an online advanced traveler information system (ATIS) installed in

Minneapolis, MN. The methods are presented, followed by results and discussion of the statistical analysis and qualitative focus group discussions.

Trust in Online Public Services and E-Government

In recent years, public services have been redefined due to the implementation of e-government services (Gauld, Goldfinch, & Horsburgh, 2010). For example, it is now commonplace for a transit service to provide a web site to citizens with route information along with the ability to plan trips. In this way, a wide range of transit planning systems offer expedited and flexible services to citizens while providing opportunities to improve service planning and route efficiencies.

However, trust in e-government systems and services varies greatly, partly due to the “distant and impersonal nature” of interaction with such systems (Belanger & Carter, 2008). Specific instances of success with online services, such as with transit planners, have emerged in a context of broad claims that e-government benefits society by reducing overhead and contributing to the digital economy (Bakry, 2004). As the nature of e-government mediated interaction services has changed, so have citizen expectations. For example, a particularly appealing characteristic of e-government is that it allows citizens to seek public services at their own convenience rather than just when the public service office is open (West, 2004). While the promise of ubiquitous e-Government services is desirable, there are important government-to-citizen interactions to consider in the design of such systems. The simple objective of online delivery of information to citizens should not be the sole aim.

Improving the performance of e-government in response to rising citizen expectations underlines the need for confidence in government-sponsored digital initiatives. Recent studies have focused on technical aspects of such interactions that help to motivate confidence (Hof, 2003; Nelson, 1997; Steimke & Hagen, 2003). For example, some public sector websites attempt to convince the public that they are secure by explaining the implementation of methods for process management and security (e.g., Beer, Kunis, & Runger, 2006; Weerakody, Baire, & Chaudhrie, 2006; Zheng, Okuyama, & Finley, 2005). However, a rationale for the technical processes of e-government does not necessarily result in adoption of e-government services by the public. Initiatives delivering citizen-centric services through existing digital government initiatives suggest that citizen perceptions of public institutions and their digital initiatives remain critical factors needed for effectiveness.

Understanding citizen perceptions of web-based e-government services can begin with examining citizen trust and satisfaction. In e-Government, trust is often seen as the foundation for cooperative relationships between citizens and government (e.g., Alvarez & Brehm, 1998; Welch, Hinnant, & Moon, 2004; West, 2005). Furthermore, in research spanning across several domains, citizen or user satisfaction is often seen as a key outcome that helps define performance expectations of an interactive system (Delone & McLean, 1992; Orren, 1997; Shneiderman, 2003b). Other studies have argued that trust is strongly associated with satisfaction, which in turn, is linked with citizen’s trust in government (e.g., Welch et al., 2004).

Yet, the assumption that citizens must trust the government agency as a trustworthy entity before they develop trust in an electronic service has not been adequately examined. While citizen satisfaction can be measured through citizen intent to use or to continue to use the e-government service in question, the next step is to understand the relationship between the intent to use web-based e-government services and how that experience relates to trust in the sponsoring government entity. The broad question addressed herein is whether trust in the e-government service, along with trust in the government institution that provides it, will affect intent to use the e-government service. These questions are explored within the context of advanced traveler information systems (ATIS).

Advanced Traveler Information Systems (ATIS)

Use of Intelligent Transportation Systems (ITS) can help ease the strain created by increasing demand for travel on highways and public transit systems in the United States through application of modern information technology and communications (USDOT-ITS, 2003). Advanced Traveler Information Systems (ATIS) are designed as a part of the overall ITS infrastructure, to analyze, communicate and present information to assist surface transportation travelers in moving from a starting location to their desired destination. ATIS systems address the traveler's need for safety, efficiency and comfort by providing (1) real-time network information, traffic or transit, and (2) traveler information, such as route guidance or destination information using advanced technologies such as Internet (Lappin, 2000; Zimmerman, 1999). Advanced Public Transportation Systems (APTS), a related set of services, focuses on providing information to travelers, assisting in transit management, and addressing the use of electronic payments (FTA, 2005) through Internet-based systems. From a broader e-government perspective, ATIS/APTS represents but one type of web-enabled service.

Varying characteristics of travelers and trips, in addition to other factors, create customer demand for ATIS for a wide range of purposes (USDOT, 2002). While in many cases work trips are the primary purpose for travel, many other reasons for use of public transit are important. In a National Household Travel Survey (NHTS, 2001) by the Bureau of Transportation Statistics (BTS), results indicate that nearly half of trips were taken for family and personal reasons such as shopping and running errands. Social and recreation trips, such as vacations and visiting friends, accounted for 27% of the trips. Despite the strong focus on work and commuting trips by researchers and urban planners, commuting and related trips accounted for about 18% of all trips taken. Trips to school and church were also common. In many cases, transit alternatives such as fixed-route and non-fixed-route services are available. Fixed-route travel includes services provided such as bus, rail, or other conveyances, either publicly or privately owned, on a regular and continuing basis. Non-fixed-route trips include flexible trip planning as well as alternative modes, such as walking or biking, that can be planned. While the most common form of transit is the fixed route bus system, other alternatives such as fixed rail are found in many metropolitan areas (APTA, 2004) The complexity of planning is compounded by these alternatives, whether the user is traveling to work, a doctors appointment, or a social engagement.

In addition, recent studies have identified different transit patterns across different socio-economic groups (Hu & Reuscher, 2004; Puccher & Renne, 2003). Groups differ in patterns of use for transit systems based on household income, race or ethnicity, gender, age and disability. Expectations about information delivery can be examined irrespective of such methods. Studies

of ATIS delivery have suggested that various user groups that use ATIS may have widely varying attitudes and expectations (Lappin, 2000). The results of the study indicated suggest a need for accuracy, timeliness, reliability, low cost, personalization, convenience and safety. Features such as maps, route guidance, coverage and related findings were important to users. A much broader evaluation program is continuously being run by the US Department of Transportation (US Department of Transportation). The results of these programs are meant to be mainly utilized by administrators of ATIS initiatives. In these results, specific infrastructural expectations are noted. However, a citizen-centric evaluative perspective seems to be absent. Including end-user needs in designing infrastructural facilities has seen recent emphasis. A 10-year ITS plan developed by the U.S. Department of Transportation explicitly recognizes the importance of end-users (USDOT, 2002). The plan recommends that ITS programs focus on providing improved choice of modes to diverse user groups without regard to age, disability, or use of transit for various purposes. The goal defined in the plan is “universally available information that supports seamless, end-to-end travel choices for all users of the transportation system” (USDOT, 2002). Researchers recommend that planners, policy makers, engineers and service providers associated with ITS infrastructure consider how well they can serve the needs of diverse users (T. Horan, 2003; T. A. Horan & Schooley, 2007). The challenge is to evaluate online ATIS systems and provide recommendations that could ensure that the citizens utilizing the services are satisfied with the delivered information and will use the service in the future.

RESEARCH CONTEXT, CONCEPTS AND MODELS

The research setting for this study is Metro Transit, the principal transit system serving the greater Minneapolis, Minnesota area. The system provides nearly all of the 73 million bus trips taken annually in the Twin Cities. Metro Transit reports operating the Hiawatha light-rail line and well over 100 bus routes using a fleet of over 800 buses.

Metro Transit has a progressive customer service program, with a call center that handles approximately 1.1 million calls per year. However, since the introduction of the online trip planner, the web has become a major tool for trip planning among riders. Approximately four million trips were planned online in 2007. According to Metro Transit representatives, usage continues to grow. Data from June, 2008 shows that over 500,000 trips were planned using the trip planner that month.

In addition to these general factors that make Metro Transit an excellent example of an ATIS, the study coincided with the introduction of several new trip planning features by the agency. This allowed the research to not only provide general findings on the site, but also specific findings relative to these new features.

A series of interviews were performed over an eighteen month period with a number of users of the transit system, as well as with system administrators. From these interviews, four primary factors were identified as leading issues that have the potential to affect attitudes toward the web information service and the transit service itself. The first of these is the perceived usefulness of transit web information service, which pertains to user interface navigability and ease of use. The second is trust in transit web information service, or the expectation of secure, reliable interaction. Third, trust in the competence of the transit system, meaning the capability of transit authority to provide appropriate, timely transit information. Finally, trust in the transit system as

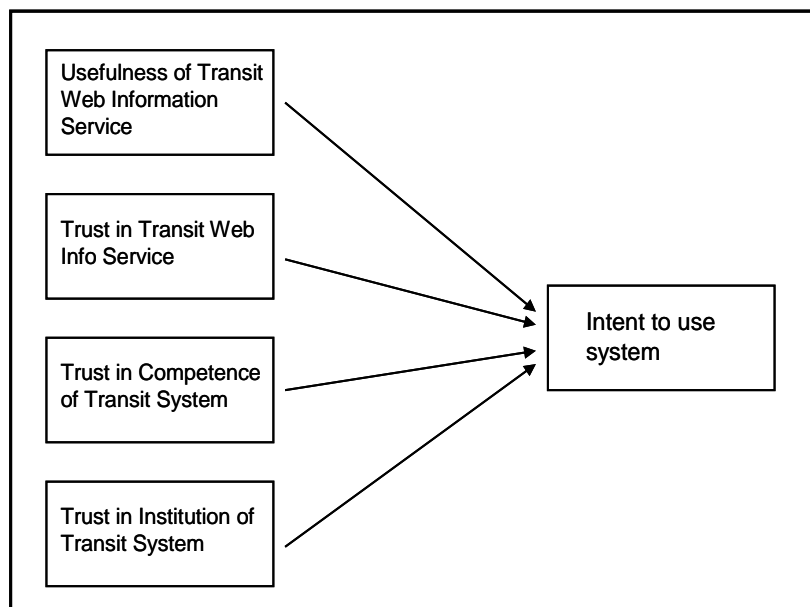
an institution refers to perceived integrity of the transit system and the likelihood of the system keeping commitments.

Proposed Relationships and Study Approach

The primary variables examined as potential influences on the intent to use the Metro Transit Web Information Service are as follows. Figure 1 illustrates the proposed relationships.

1. Usefulness of Transit Web Information Service
2. Trust in Transit Web Information Service
3. Trust in Competence of Transit System
4. Trust in Institution of Transit System

Figure 1: Research model.



On the information system side, the study examines the perceived usefulness of the Transit Web Information Service and trust in the Transit Web Information Service. On the institutional side, the study measures trust in the institution of the Transit System itself.

Research Context

A survey was designed to examine the experiences of users of the ATIS trip planner system and the effect of these experiences on the level of trust in the agency providing the website, and the web services itself. Data were collected in a single-stage, web-based survey using a secure, anonymous, online survey tool. The survey contained items related to the research model (items and sources are included in Appendix C), participant demographics, and experience using technologies. Open-ended questions were included to capture expectations and concerns. Participants were offered the option to disclose their contact information at the end of the survey

if they desired to participate in focus group discussions to be held at a later time. An invitation to participate was posted on the transit system website. In addition, a link to the survey was placed adjacent to features offered by the website, such as route maps and walking maps.

Subsequent to the online survey, focus group discussions were arranged and held on the office premises of Metro Transit. Two sessions were conducted with a total of twenty-four participants. The participants were presented with open ended questions relating to their perceptions of trust in the system and online behavior.

RESULTS

504 respondents answered the survey, of which 452 supplied valid responses, giving a completion rate of 81%. Respondents were 59% male and 41% female. Most were well educated and almost all reported an extensive history of computer use. The demographic profile of the sample is shown in Table 1. Additional detailed results are included in Appendix A.

Table 1: Demographic Summary.

Characteristic	Result
Gender	Female = 58%, Male = 39%
Age	18-24 = 23%, 25-34 = 32%, 35-44 = 16%, 45+ = 27%
Education	High School = 16%, Assoc/Bachelor Degree = 53%, Graduate Degree = 23%, Other = 8%
Years Using Computers	Mean = 16.8 years
Years on Internet	Mean = 11 years
Weekly Use of Public Transit	1x = 18%, 2x = 8%, 4x = 23%, 5x = 51%

Analysis of Results

Four summated scale variables were created from a total of twenty-one questionnaire items to represent the main constructs in the study, with each item exclusively applied to a single scale. All included scales had Cronbach's α scores exceeding the 0.70 criterion (Nunnally & Bernstein, 1994), as shown in Table 2, below, with the exception of Trust in the security and accuracy of the system, which was excluded based on a low alpha.

Table 2: Survey Scaled Variables.

Indicator items	Variable	α	N
Useful 1, 2, 3, 4, 5, 6	Usefulness of Transit Web Information Service; Independent	0.889	452
Intent 1, 2, 3	Intent to use Transit Web Info Service in Future; Dependent	0.823	452
CompTrust 1, 2, 3, 4, 5	Trust in Competence of Web Info Service; Independent	0.877	452
InstTrust 1, 2, 3, 4	Trust in Integrity of Transit System Institution; Independent	0.913	452

Evaluation of Model

The research model was evaluated via ANOVA, followed by multiple regression. The ANOVA identified two significant variables, Useful and Comptrust ($F = 12.91, p < 0.001$). Multiple regression analysis indicates that the two predictor variables, Useful and Comptrust, account for the majority of the variation in intent to use the system ($p < 0.001$). InstTrust, or trust in the institution, was not significant. Table 3 presents these results. Table 4 summarizes the major findings in terms of the research model shown in Figure 1.

Table 3: Research Model Results.

ANOVA for Intent						
Source	DF	Seq SS	Adj SS	Adj MS	F	P
Useful	21	190.9132	58.9796	2.8086	12.91	<0.001
CompTrust	19	12.7714	12.7714	0.6722	3.09	<0.001
Error	411	89.3977	89.3977	0.2175		
Total	451	293.0824				
S=0.466383, R-Sq = 69.50%, R-Sq(adj) = 66.53%						
Regression for Intent						
Predictor		Coef.	SE Coef.	t	p	
Constant		0.8916	0.1277	6.98	< 0.001	
USEFUL		0.6445	0.0436	14.77	< 0.001	
COMPTRUST		0.2246	0.0432	5.20	< 0.001	
R-Sq = 61.9% R-Sq(adj) = 61.7%						

Table 4: Summary of Findings.

Proposed Influence on Intent to Use System	Result
Usefulness of Transit Web Information Service	Significant
Trust in Competence of Transit System	Significant
Trust in Institution of Transit System	Non-Significant
Trust in Transit Web Information Service	Non-Significant

Additional Findings - Public Transportation Usage

Analysis of survey responses found that participants are regular users of the public transit system. Half of the respondents use public transportation 5 or more times a week. Further, more than 70% of the respondents use the transit service at least twice a week. More than 70% of the respondents use the transit service for getting to work or school; but most used it primarily for commuting to work (Appendix B).

Technology Usage

A large proportion of respondents are advanced users of computers, with 80% having 10 or more years of experience with computers, and most using the Internet for between 6-15 years. Nearly 90% use the Internet daily. Nearly 9.6% of the respondents indicate that they plan their trips 5 using the Metro Transit website five or more times in a week, and about half of the respondents

plan their trips once a week. Ordinarily, online planning for a trip occurs for a new or irregular route.

Respondents were asked in the survey about certain improved features that Metro Transit had recently introduced. The results are presented in the Table 7, below.

Feature	Liked Feature (Percent)	Did not like / No opinion (Percent)	Never Used Feature (Percent)
Mapping	59	19	22
Walking Map	55	13	33
Route Map	48	20	32
Personal Schedule	44	19	37

Table 7: Responses to Online Features

Focus Group Discussions

While the survey provided an interesting investigation into the perceptions of individuals about the online trip planner and the Minnesota Metro Transit services, focus group discussions provided a more in-depth understanding about individual perceptions. Focus group participants were individuals who answered the online survey. The online survey invited all interested respondents to participate in focus group sessions at the Metro Transit building in Minneapolis, Minnesota. Of the 452 individuals who completed the survey, 155 volunteered to participate in focus group discussions. These individuals were subsequently sent an email inviting them to participate and each was offered a gift card to a department store for their participation. Twenty-four individuals participated in 90-minute sessions.

Focus groups were recorded and used together with written notes taken during the focus groups to derive and organize themes from participant responses. These themes are discussed below, organized by the two dimensions: technical benefits and challenges of the online trip planner, and perceptions about trust and confidence as they relate to the technical service.

Need for Technical Enhancements

Participants discussed the online trip planner features they use on a regular basis and their general satisfaction with those services. Participants generally felt that the trip planner provides useful online service, and that new features are both desired and expected in the future. One vision-impaired individual expressed his opinion about the online trip planner. He stated, "I pretty much use all the features. I plan a trip. I use a screen reader 'cause I can't see the screen and it works quite well. I use the walking directions. I really like the new personal bus schedule so I can tweak and fine tune my trips." Another participant said, "I use the trip planner all the time. And I use it more for other people than for myself." There were many comments in support of the trip planner, how it functions, and the features that are offered to the public.

While participants discussed their satisfaction, they also noted several current functions that they felt need improvement in terms of the consistency of information, accuracy of information, and

the display of information in the trip planner. One individual stated, “I know the system pretty well. I usually check the answers it gives me because it doesn’t always give me the best schedule. I check the system map to check on the answers it gives me because sometimes I know of a better route or bus stop than the system is telling me.” Several others confirmed that they used their own intuition and experience to compensate for the trip planner’s inability to always provide optimal travel information.

Future improvements desired by participants included adaptations for mobile devices, including onboard buses and trains, integration of real-time information (e.g., bus delays, detours) into the trip planner, and more personalization of the planning features and notifications: “Alerts [bus detours, delays] should be integrated into the trip planner.” “I would really like to see at some point on the website, integrated with the trip planner and scheduling, real-time accounts of where buses and trains are when you’re planning your trip.” Others mentioned their desire to integrate the trip planner with other modes of transportation: “I have to go to a bike map to find the bike route. The more I can try to mix my bike and transit use the more I would like to see not only a walking map but where bike routes are. There’s no way I want to be on the big streets with the cars.” These sentiments were repeated across both focus group sessions and among several participants.

Participants with disabilities expressed special concerns. One individual described a need for a mapping system coupled with a voice activated system on board a bus to announce situational status: “The biggest problem as a blind person is it’s annoying to not have intersections ‘called out’ by the driver.” Several others agreed, with one saying, “Devices that give voice prompts are good for me too.”

Speaking through an interpreter, an individual with vision, hearing, and mobility disabilities stated, “I use a device called a ‘sidekick’ [a wireless mobile computer for the deaf] but it doesn’t work with the trip planner. I think the mapping feature on the site works good. But presently the trip planner doesn’t work on my sidekick. So that would be nice. My mobile needs are more important.”

Several other participants discussed their desire for greater personalization and intelligence about their individual routes: “Take what you have and personalize it (for us). Give us the memory of our location and past trips. Maybe a monthly email about route changes that relate to my route.” Several others described their desire to receive text messages about their route if their bus is running late or early.

Several participants discussed their desire for greater system intelligence about the transit service. One participant drew a comparison to the airline industry. She stated, “It would be nice to know the reliability of certain routes ‘cause I know that certain routes run behind other routes. When you’re buying a plane ticket now you can see how often that flight is on time.” Another discussed how the trip planner only displays the closest bus or train station to an address, but that she would like to see other stations that are nearby as well for a greater number of choices. She stated, “I would like to put in my address and see what buses go by that address and how far away. And you know be able to show the bus routes even if it’s a mile away.”

The many technical enhancements proposed by users can be grouped into two categories with different priorities. Enhancements that serve disabled persons, such as voice alerts for the vision impaired and interfaces to devices used by those with limited mobility, would normally be considered the first priorities for implementation. The second category of enhancements, such as personalization capability for frequent users and real-time route status updates, have the potential to be highly useful to a majority of system users. These improvements are best considered for implementation after the accommodations for the disabled are installed.

Trust and Confidence in the System and Agency

In general, participants expressed a high degree of trust and confidence in the Metro Transit services compared with other public transportation systems. For example, one participant stated, “[the service is]...much better than St. Louis or Manhattan.” Another said, “I actually moved to Minneapolis because of the Transit system.” Similarly, another stated, “Metro Transit is the best I have ridden. In general, it’s on time. Schedules are logical. I’ve ridden a lot of different bus services. It’s really a well run organization.” While participants described common challenges experienced in many transit systems, they also expressed Metro Transit’s efforts to improve. One individual believed Metro Transit had improved its reputation over several years. He stated, “I’ve used the transit system since 1964. They have slowly climbed out of the ‘bad rap’ hole when deficits were bad and the service seemed to be a least common denominator service.”

For some, the online trip planner has improved perceptions about Metro Transit. One stated, “I think it [online trip planner] shows they’re really trying when you’re on the web site. They’re trying to figure out a way to help you get to where you’re going.” Another stated, “The fact that they offer the web site makes me think that Metro Transit wants me to use their service, wants me to [pause] I think it reflects very well on Metro Transit.” Participants believed that other factors, other than the web site, negatively impacted their confidence and trust in Metro Transit. One participant explained, “The system [trip planner] is easy to use and works well for me. I think that when the bus driver misses a turn or goes on a different route than he’s supposed to, that impacts more of my confidence than the web site.”

Most participants echoed these concerns about the actual, physical, transit service. “There’s two different identities going on there. The site really shows that Metro Transit is trying. Well I think that the web site people are trying. Not the bus drivers.” “I would concur with others that...bus drivers, bus cleanliness, bus driver decisions, customer service, friendliness are bigger issues.”

In sum, participants agreed that while the web site served to improve their perceptions of trust and confidence in Metro Transit, bus driver behaviors, customer service, and bus and bus stop cleanliness caused negative perceptions of trust and confidence.

DISCUSSION

Recent years have seen a rapid increase in online electronic systems as the conduit for interaction between public agencies and the traveling public. Understanding the impacts of this exchange of information allows for a focused design and development effort and a method for constructing a concerted citizen centered online strategy. As such, this study has sought to understand how

citizen perceptions of trust and confidence in an agency, and its services, are impacted by the use of an online trip planner. There are clear relationships that demonstrate connections between online use and perceptions about the agency. Notably, there is a strong positive view of the trip planner and this is associated with trust in the agency to perform the service as well as generally positive responses to new features. Moreover, certain user groups strongly believe that Metro Transit is honest and trustworthy.

Analysis of survey responses clearly showed a strong relationship between a) trust in the competence of the transit web information service to provide correct guidance, as well as b) perceptions of the usefulness of the system, with intent to use the system in the future for planning purposes. However, the survey found no relationship between perceptions of the security and accuracy of the system and trust in the transit institution. Thus, the proposition that trust in the transit agency is transferred to trust in the web service was not supported in the survey responses. On the other hand, the focus group participants generally expressed significant confidence and trust in the transit system itself. Usefulness and demonstrated competence of the system were the key drivers of system use in both cases.

Many under the age of 35 feel that their privacy is respected by the agency's system and have indicated that they use the system frequently and will continue to do so in the future. However, not all groups have such a positive impression. Some were skeptical of Metro Transit's ability to provide advanced information services, and have unfavorable impressions about the reputation of Metro Transit. Unemployed, elderly, and low income individuals were also more hesitant, indicating a preference to avoid new technologies. The needs of these groups appear to deserve increased attention in any system design enhancement efforts.

In contrast to the survey respondents, the focus group discussants offered many comments demonstrating the mixed nature of trust in a public organization that provides an online service, leading to a trust gap. On the one hand, participants felt the web site functioned well and stood as a symbol of Metro Transit's good will towards citizens. On the other hand, the selected negative experiences described by participants, including bus driver behavior and attitudes, customer service functions, and bus stop cleanliness, negatively impacted participant perceptions of trust and confidence in the organization. From a practical perspective, the potential for utilizing additional web based, mobile, and on-board technologies could help mitigate some of these service concerns.

Future Research

In terms of research relevance, this work provided an exploratory and mixed-method approach to investigate citizen perspectives in an online web information service, an associated "brick and mortar" government service (i.e., public transit), and the agency providing both. The research model tested herein was informed by the e-government literature, which suggested that citizens may regard these concepts as important when determining use of a system. The model presented herein is in its first iteration, providing an initial phase of testing and results. Findings show positive results for two items: Usefulness of Transit Web Information Service, and Trust in Competence of Transit System. Trust in Transit Web Information Service and Trust in Institution of Transit System did not show a difference. The model may be unique based in part on the

uniqueness of the study context and the availability of information that could be used for assessment. The researchers note, however the increase and expansion of e-government services where the general contextual example presented herein may become more commonplace. While the model was designed specifically for the goals of this study, the general principles presented here may be adapted and used to inform future e-government studies. Future research may seek to further expand upon the model and in particular to the items that were found to be of impact. One research direction may be to further test the duplicability and generalizability of the research model in the same or other public and e-government contexts. For example, one study may seek to understand citizen trust in an online park planning and reservation system, the associated on-site park services, and the responsible parks and/or recreation agency. Many other examples could be tested to investigate the applicability of the research model presented in this study and expand upon the factors associated with usefulness of a web information service and trust in competence of an associated government service. Taken together, this study provides support for the notion that public agencies can impact citizen perceptions by implementing quality, well designed, online e-government applications. For this study, an online transit trip planner, appreciated by citizens, provided a means for improving perceptions of trust and confidence, potentially mitigating against other frustrating aspects common among transit systems.

ACKNOWLEDGEMENTS

The authors wish to thank Minnesota Department of Transportation, Research Services Section, for their generosity in providing access to the Metro Transit System and its users. In addition, the authors wish to thank the Center for Transportation Studies at the University of Minnesota for their generous assistance with this research.

REFERENCES

- Alvarez, M., & Brehm, J. (1998). Speaking in Two Voices: American Equivocation about the Internal Revenue Service. *American Journal of Political Science*, 42(2), 418-419.
- APTA. (2004). *APTA Ridership Report: Fourth Quarter 2004*. Washington, D.C.: American Public Transportation Association.
- Bakry, S. (2004). Development of E-Government: A STOPE View. *International Journal of Network Management*, 14(4), 339-350.
- Beer, D., Kunis, R., & Runger, G. (2006, April 20-22, 2006). *A Component-Based Software Architecture for E-Government Applications*. Paper presented at the 1st International Conference on Availability, Reliability and Security, Washington, D.C.
- Belanger, F., & Carter, L. (2008). Trust and Risk in e-government adoption. *Strategic Information Systems*, 17, 165-176.
- Davis, F. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340.
- Dayal, S., Landesberg, H., & Zeisser, M. (1999). How to Build Trust Online. *Marketing Management*, 8(3), 64-69.
- Delone, H., & McLean, R. (1992). Information Systems Success: The Quest for Dependent Variable. *Information Systems Research*, 3(1), 60-95.
- FTA. (2005). *Best Practices for Using Geographic Data in Transit: A Location Referencing Guidebook*. Washington, DC: Federal Transit Administration.
- Gauld, R., Goldfinch, S., & Horsburgh, S. (2010). Do they want it? Do they use it? The "Demand-Side" of e-Government in Australia and New Zealand. *Government Information Quarterly*, 27(1), 177-186.
- Gefen, D. (2002). Reflections on the dimensions of trust and trustworthiness among online consumers. *ACM SIGMIS Database*, 33(3), 38-53.
- Grimsly, M., & Meehan, A. (2007). e-Government information systems: Evaluation-led design for public value and client trust. *European Journal of Information Systems* 16(1), 134-148.
- Hampton-Sosa, W., & Koufaris, M. (2005). The Effect of Website Perceptions on Initial Trust in the Owner Company. *International Journal of Electronic Commerce*, 10(1), 55-81.
- Hof, S. (2003). *Security Aspects within e-Government*. Paper presented at the EGOV International Conference.

- Horan, T. (2003). Integrating the End User into Infrastructure Systems: A Customer Centric Approach to the Design and Function of Intelligent Transportation Systems. In G. Dista (Ed.), *Information Management Support Systems & Multimedia Technology*. Hershey, PA: Idea Group Publishing.
- Horan, T. A., & Schooley, B. L. (2007). Time-Critical Information Services. *Communications of the ACM*, 50(3), 73-78.
- Hu, P., & Reuscher, T. (2004). *Summary of Travel Trends: 2001 National Household Travel Survey*. Washington, D.C.: U.S. Department of Transportation: Federal Highway Administration.
- Kim, K., & Prabhakar, B. (2004). The DATABASE for Advances in Information Systems. *ACM SIGMIS Database*, 35(2), 50-65.
- Lappin, J. (2000). *What We Have Learned About Advanced Traveler Information Systems and Customer Satisfaction?* Cambridge, MA: Workshop on Human Factors and Safety Research.
- Lee, M., & Turban, E. (2001). Trust in B-to-C Electronic Commerce: a Proposed Research Model and its Application. *International Journal of Electronic Commerce*, 6(1), 75-91.
- McKnight, D., & Choudhury, V. (2006). *Distrust and Trust in B2C E-Commerce: Do They Differ?* Paper presented at the International Conference on Electronic Commerce.
- Nelson, M. (1997). Building Trust in Cyberspace. *International Information and Library Review*, 29, 153-157.
- Nunnally, J., & Bernstein, I. (1994). *Psychometric Theory, 3rd Edition*. New York: McGraw-Hill.
- Orren, G. (1997). Fall From Grace: The Public's Loss of Faith in Government. In J. Nye, P. Zelikow & D. King (Eds.), *Why People Don't Trust Government* (1-18). Cambridge, MA: Harvard University Press.
- Pavlou, P. (2002). Institutional trust in interorganizational exchange relationships: The role of electronic B2B marketplaces. *Journal of Strategic Information Systems*, 11, 215-243.
- Pucher, J., & Renne, J. L. (2003). Socioeconomics of Urban Travel: Evidence from the 2001 NHTS. *Transportation Quarterly*, 57(3), 49-77.
- Riegelsberger, J., & Sasse, M. (2003). The Researcher's Dilemma: Evaluating Trust in Computer Mediated Communications. *International Journal of Human Computer Studies*, 58(6), 759-781.
- Shneiderman, B. (2003a). *Leonardo's Laptop: Human Needs and the New Computing Technologie*. Cambridge, MA: The MIT Press.

- Shneiderman, B. (2003b). *Leonardo's Laptop: Human Needs and the New Computing Technologies*. Cambridge, MA: The MIT Press.
- Steimke, F., & Hagen, M. (2003). *OSCI: A Common Communications Standard for e-Government*. Paper presented at the EGOV International Conference, Prague.
- US Department of Transportation. ITS Evaluation Summaries. Retrieved March 21st, 2006, from <http://www.itsdeployment.its.dot.gov>
- USDOT-ITS. (2003). *Intelligent Transportation System Benefits and Costs*. Washington, D.C.: United States Department of Transportation, Intelligent Transportation Systems, Mitretek Systems.
- USDOT. (2002). *Intelligent Transportation Systems America: National Intelligent Transportation Systems Program Plan: A Ten-Year Vision*. Washington, D.C.: United States Department of Transportation.
- Weerakody, V., Baire, S., & Chaudhrie, J. (2006). *E-Government: The Need for Effective Process Management in the Public Sector*. Paper presented at the Hawaii International Conference on Systems Sciences, Waikoloa Village, Hawaii.
- Welch, E., Hinnant, C., & Moon, M. (2004). Linking Citizen Satisfaction with E-Government and Trust in Government. *Public Administration Research and Theory*, 15(3), 371-391.
- West, D. (2004). E-Government and the Transformation of Service Delivery and Citizen Attitudes. *Public Administration Review*, 64(1), 15-27.
- West, D. (2005). *Digital Government: Technology and Public Sector Performance*. New Jersey: Princeton University Press.
- Zheng, G., Okuyama, T., & Finley, M. (2005). *A New Trust Model for PKI Interoperability*. Paper presented at the Joint Conference - International Conference on Autonomic and Autonomous Systems and International Conference on Networking and Services, Papeete, Tahiti.
- Zimmerman, C. (1999). *Advanced Traveler Information System*. Washington, D.C.: Institute of Transportation Engineers.

APPENDIX A
DEMOGRAPHICS OF SURVEY RESPONDENTS

	N (T= 446)	Percent
Gender		
Female	258	57.9
Male	174	39.0
Did not disclose	14	3.1
Age		
18-24 years	103	23.1
25-34 years	141	31.6
35-44 years	69	15.5
45-54 years	80	17.9
55-64 years	37	8.3
65 and above	6	1.3
Did not disclose	10	2.2
Ethnicity		
Black	22	4.9
Asian	16	3.6
Native American	4	0.9
Hispanic	6	1.3
White/Caucasian	340	76.2
Other	39	8.7
Did not disclose	17	3.8
Education		
High School	71	15.9
Associate	54	12.1
Bachelors degree	182	40.8
Masters degree	82	18.4
Doctoral degree	22	4.9
Other	18	4.0
Did not disclose	17	3.8
Employment		
Employed Full-Time	247	55.4
Employed Part-Time	35	7.8
Unemployed	27	6.1
Student (Working)	54	12.1
Student (Non-Working)	34	7.6
Homemaker	18	4.0
Retired	16	3.6
Did not disclose	15	3.4
Income		
Less than 25,000	99	22.2
25,000 – 49,999	105	23.5
50,000 – 74,999	66	14.8
75,000 – 99,999	50	11.2
100,000 – 149,999	38	8.5
150,000 and above	12	2.7
Did not disclose	76	17.0

**APPENDIX B
TRANSIT SERVICES USAGE**

Frequency	N (Total = 446)	Percent
5 or more times a week	220	49.3
2-4 times a week	98	22.0
Less than once a week	29	6.5
1-3 times a month	32	7.2
Less than once a month	51	11.4
Don't use	16	3.6
Purpose		
Work	233	52.2
School	72	16.1
Shopping	23	5.2
Medical	17	3.8
Recreation	32	7.2
Visit friends/family	6	1.3
Vacation	8	1.8
Other	12	2.7
Do not use	43	9.6
Total	446	100
Frequency of planning trips using website		
5 or more times a week	43	9.6
2-4 times a week	120	26.9
Once per week	71	15.9
1-3 times a month	121	27.1
Less than once a month	91	20.4
Total	446	100

APPENDIX C

SURVEY QUESTIONS AND SOURCES

Code	Questions
System Trust (Kim & Prabhakar, 2004; Lee & Turban, 2001; McKnight & Choudhury, 2006; Pavlou, 2002; Shneiderman, 2003a)	
SysTrust1	I can verify that the Metro Transit provides facilities to ensure secured interaction between users and their website.
SysTrust 2	I believe if I provide personal information to Metro Transit, they will respect my privacy.
SysTrust 3	While using online trip planner, I feel confident that the bus service shown will occur as portrayed.
Competence (Dayal, Landesberg, & Zeisser, 1999; Lee & Turban, 2001; McKnight & Choudhury, 2006)	
CompTrust1	I feel certain that Metro Transit is a capable and a competent online transit information service provider.
CompTrust2	I have full confidence in the ability of Metro Transit to provide different kinds of public transit information.
CompTrust3	Metro Transit is willing to customize its website based on our needs.
CompTrust4	Metro Transit organization has knowledge and resources to serve us with online and real-time transit information.
CompTrust5	Metro Transit service towards efficient delivery of transit information is predictable.
Benevolence (Gefen, 2002; McKnight & Choudhury, 2006; Pavlou, 2002)	
InstTrust1	Metro Transit agency keeps promises and commitments.
InstTrust2	I believe Metro Transit keeps my best interests in mind.
InstTrust3	I believe promises made by Metro Transit are likely to be reliable.
InstTrust4	Metro Transit website gives a sense of guarantee that the information provided reflect actual transit services provided through buses.
Usability (Gefen, 2002; Hampton-Sosa & Koufaris, 2005)	
Useful1	I learned to use the website very quickly
Useful 2	I found helpful features on the website for accomplishing my task
Useful 3	I found the design of the website visually appealing
Useful 4	I found that various functions were well integrated
Useful 5	I found the website was easy to use
Useful 6	I found the information on the website to be useful
Intention to Use (Davis, 1989; Riegelsberger & Sasse, 2003)	
Intent1	It is very likely that I will use Metro Transit website, for trip planning, in the future.
Intent 2	I would suggest the online services of Metro Transit website to people who intend to obtain transit information.
Intent 3	I believe using Metro Transit eases my task of trip planning for my transit.