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16. Abstract

Intelligent Transportation Systems (ITS) techniques are improving mobility for travelers throughout the nation and world. To date, ITS has largely been the focus of professionals who are applying innovative methods to complicated traffic and travel information needs in their communities. Consumers utilize these breaking technologies, often with little notice or understanding of the systems underlying their more convenient travel. For example, up-to-the-minute weather and safety information are available to commuters in most states allowing travelers to modify routes and travel times before being inconvenienced during their trip. Travelers in Colorado receive emissions reading that encourage improved air quality. Transit riders in Virginia have more reliable bus schedule information through an "electronic village."

Despite ITS advances, recent journal articles and conferences stress the difficulty of gaining broad support from elected officials and the general public for ITS. Developing processes and building a support base of elected officials and community planners are important to continue ITS deployment and implementation. This document provides a summary of an ITS conference focused on the roles of consumers, ITS and Transportation professionals and community decision makers. This document also includes some the projects that reflect the range of possibilities utilizing ITS.

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INTELLIGENT TRANSPORTATION SYSTEMS: INCORPORATING THE CONSUMER

Proceedings from an Interactive Workshop
February 19-20, 1998

by

Carol A. Lewis

Research Report SWUTC/99/467602-1

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Executive Summary

During February 1998, transportation professionals, urban, regional and transportation planners, media and public relations personnel, and general citizens met to discuss methods to increase utilization of Intelligent Transportation Systems by consumers. Conference attendees addressed the issues surrounding greater ITS participation from three principal perspectives:

- ITS Engineers and Practitioners (Engineers),
- Urban, Regional, and Transportation Planners (Planners), and
- Media, Public Relations Personnel, and Consumers (Consumers).

Group facilitators posed a series of questions designed to gauge opinions about advantages, hindrances and strategies to facilitating greater ITS utilization among consumers. Some common themes permeated the three groups, whereas other ideas showed a degree of diverse thinking. The groups generally showed agreement in that more attention should be targeted toward educating and convincing the consumer about greater ITS utilization.

In specific, members of the *Consumer Group* expressed concern about cameras and the impression commuters are "being watched." While this idea is mentioned frequently during dialog about ITS, it is noteworthy that the "big brother" concern was noted in this consumer break session. Attendees cautioned about transportation professionals sending conflicting messages (i.e., a community provides improved travel options for single occupant vehicles, while encouraging ridesharing). The dominant concept from the consumer group centered on improved communication with the traveler.

The *Planners'* view of ITS and its capability is not materially different from that of the engineers. Planners expect technologically applied techniques to increase mobility and improve

safety, leading to a better environment. A bit of skepticism was voiced in this group reflecting a somewhat repressed level of confidence in ITS to achieve expectations; it was noted that ITS will help, but not solve transportation problems.

This group is particularly interested in the vast databases that may be available to incorporate ITS strategies and benefits into comprehensive plans. To include ITS as a standard component of planning activities, planners need estimates of available financial resources and methods to quantify benefits. Better ITS project definitions would allow components to be strategically incorporated into long range plans.

Engineers and Practitioners agree in general about the potential of ITS to solve transportation problems. However, because ITS architecture is varied and has an array of applications, there are a variety of underlying assumptions about specific applicability. The majority of engineers and technicians advocate that more efforts should be directed to addressing consumer awareness of ITS. Better public acceptance may translate into more funding and more widespread use of the systems. It was also thought that a more proactive public information component of ITS could help avoid negative images or ideas that could hinder ITS programs. According to this group, the most impressive avenues for public focus are those ITS techniques that will speed travel flow and reduce travel times. Higher visibility of incident management was considered as one such opportunity.

Several ideas emerged from the group sessions that would benefit efforts to increase the knowledge base, usability, and overall integration of ITS into the routine of daily commuters. The ideas were purposely focused on how ITS concepts could be clearly communicated and expressed to the consumer as well as the transportation planner.

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PART ONE:
FINDINGS FROM INTERACTIVE WORKSHOP SESSIONS

Introduction

Transportation professionals are enthusiastic about recent advances in transportation systems management that are being experienced by implementation of Intelligent Transportation Systems (ITS) infrastructure. Many early ITS projects have reached the end of their developmental phases and a number of demonstration projects have proved successful. Transportation officials can visualize the potential of ITS to be a primary contributor to improved mobility. Several challenges face the transportation community in pursuit of full ITS implementation. Key among these is increasing consumer acceptance of ITS methods and incorporating ITS capabilities into the commute routine. Stated objectives of the ITS community are to promote ITS technologies and to make information available to travelers from a variety of sources, including electronic, in-vehicle and on-street. Also needing improvement is the inclusion of ITS into normal comprehensive planning streams. On February 19 - 20, 1998, transportation professionals, urban, regional and transportation planners, media and public relations personnel, and general citizens met to discuss methods to increase utilization of Intelligent Transportation Systems by consumers. The session was sponsored by Texas Southern University's Center for Transportation Training and Research under the auspices of the Southwest Region University Transportation Center. Conference attendees addressed the issues surrounding greater ITS participation from three principal perspectives:

- ITS Engineers and Practitioners (Engineers),
- Urban, Regional, and Transportation Planners (Planners), and
- Media, Public Relations Personnel, and Consumers (Consumers).

The conference received support from ITS America and Texas Chapter of ITS. Professor Joseph Sussman, JR East Professor of Civil Engineering at MIT, provided the conference keynote and set the tone for the conference discussion. Conference participants detailed methods, strategies and areas of concentration that can serve as a framework for continued mainstreaming of ITS technologies. The findings from the conference sessions confirmed that information dissemination is a critical component of future ITS success. It is important that the ultimate users become stakeholders in the development of ITS. The growth in ITS has been due in large measure to partnerships that have been forged between academics, government, and industry. Individuals with backgrounds in high technology, mathematical methods, communications sensors and information systems worked jointly to improve transportation choices through advanced operations research and systems analysis methods (Sussman, 1996). The next critical partners will be the general traveling public, and a more active planning community. This conference was designed to contribute to the knowledge base and serve to facilitate improved interface between the consumer and ITS architecture.

Initial Opinions about ITS: Conference Attendees and Market Research

ITS America conducted a survey to ascertain the perceptions of the general public about ITS. One key finding is that only 8% of respondents has knowledge of Intelligent Transportation Systems; however, when examples were explained those surveyed indicated the ITS techniques would be useful to travelers. (Full report conducted and reported by Market Research Bureau for ITS America, June 1997.) The same survey was administered as part of the conference activities. In the conference consumer and media

group, 75% were aware of ITS technologies. All other participants reported knowledge of ITS.

The survey asked respondents to describe what ITS means to them. Among the planners, definitions of ITS focused on efficiency, technological applications for transportation problem solving and safety enhancements. The media and consumer group's responses generally paralleled those of the planners. One reply stressed a cleaner environment; another that ITS should be synonymous with "user friendly". The engineers and practitioner's group used many of the same concepts to describe ITS as did participants in other groups. However, the engineers were slightly more likely to define ITS in terms of traffic flow rather than general travel or communications improvements. The definition of ITS was the initial question posed in the group session, also. The range of responses is shown in Figure 1.

When asked about the potential for traffic to be improved through ITS technological advances, the consumer group had the greatest level of confidence, followed by the planners and then the ITS engineers. On a scale of one-to-ten (with one representing "disagree" *that there are ways the traffic situation can be improved through technological advancements*, and "ten" complete agreement with the statement), 72% of the consumer group rated 8, 54% of planners provided that rating, and 51% of the engineers group. The ITS America survey response to that question provided a mean response of slightly over 7. This finding suggests that consumers would likely be receptive to more technologically based options for travel improvements. Since the conference attendees show a much higher level of familiarity with ITS than the surveyed public, the findings from this conference should be viewed with that background in mind.

A summary comparing the ITS Market Research Bureau responses to those of workshop participants is included in the appendices .

Figure 1: What do you think of when you hear the term ITS?

Answers: *Similarities*	**Technologists**	**Planners**	**Consumers**
Technology to improve transportation safety and efficiency	X	X	
Improved mobility	X	X	
Traffic Management Centers	X	X	
Dynamic Message Signs (DMS)	X	X	
Innovative Transportation Systems Mgmt.	X	X	
Roadway systems, signal control, etc.	X	X	
ATIS, communication devices	X	X	X
Automated Vehicle Information (AVI), travel times, etc.	X	X	
Real-time information dissemination	X	X	
In-vehicle navigation systems	X	X	
Automated Highway Systems, future	X	X	
Technology coordination	X	X	
Reduced commute times	X	X	X
Integration, fiber optic cable, etc.	X	X	
Answers: *Differences*			
Cameras "big brother is watching"		X	X
Environment		X	
Bureaucracy		X	
City planning impact without coordination		X	
Oversold technology		X	
Lack of communication to the public		X	
High costs - benefits unproved		X	
Removal of human element		X	
Transit		X	
High expectations	X		
Fast accident/incident response	X		
ITS America, ITE and other professional associations	X		
DMS as big clocks on the road			X

(Table by Rita Brohman, Program Manager--Houston Priority Corridor)

Perspectives From Group Discussions

Group facilitators posed a series of questions designed to gauge opinions about advantages, hindrances and strategies to facilitating greater ITS utilization among consumers. Some common themes permeated the three groups, whereas other ideas showed a degree of diverse thinking. The groups generally showed agreement in that more attention should be targeted toward educating and convincing the consumer about ITS.

Media, Public Relations, and Consumers: Public relations personnel, management staffs, and students comprised this discussion group. They were slightly more exposed to ITS than the public-at-large, but provided some particularly important insights. Members of the group expressed concern about cameras and the impression commuters are "being watched". While this idea is mentioned frequently during dialog about ITS, it is noteworthy that the "big brother" concern was noted in this session. Attendees cautioned about transportation professionals sending conflicting messages (i.e., a community provides improved travel options for single occupant vehicles, while encouraging ridesharing).

The dominant concept from the consumer group centered on improved communication with the traveler. Attendees expressed a desire for more avenues to be explored for information dissemination including strategically located kiosks, internet, interactive telephone, and messages transmitted through pagers. An educational program should be developed that informs the consumer of ITS options and describes the advantages. The educational component would be made available to organizations that publish newsletters, through open houses and speaker's bureaus, and as a component of

driving schools. The messages must be simple and straightforward: ***You can make better travel choices.*** The focus should be on how ITS advantages the consumer. Some in this group proposed that a part of the education process should include discussion of when ITS may not be effective, as well as when ITS strategies can make a difference. The point is that ITS is one component contributing to improved mobility.

Another critical priority expressed is making better use of dynamic message signs with a focus on consistency and standardization of communications. A three-part theme emerged from this group: 1) to encourage the commuter to think trip planning, and then utilize the capabilities of ITS to facilitate adjustments to the trip plan; 2) send the message that ITS can improve our quality of life by saving time and money; and 3) standardize ITS communication terms and educate the public on these terms.

Urban, Regional and Transportation Planners: The planners view of ITS and its capability is not materially different from that of the engineers. Planners expect technologically applied techniques to increase mobility and improve safety, leading to a better environment. A bit of skepticism was voiced in this group reflecting a somewhat repressed level of confidence in ITS to achieve expectations; it was noted that ITS will help, but not solve transportation problems.

This group noted the vast database that is an outgrowth of ITS systems. Of interest to planners are responses to technical questions including what are the tools available to incorporate ITS strategies and benefits into comprehensive plans? They wish to see land use affects and travel behavioral implications explored.

To include ITS as a standard component of planning activities, planners need estimates of available financial resources and methods to quantify benefits. Better ITS project definitions would allow components to be strategically incorporated into long

range plans. Identification of low cost options that can be incrementally added to existing plans might offer a starting point.

This group suggests the principal mechanisms for providing more information to planners are trade magazines and professional organizations, conferences, and specific education sessions. A compilation of case studies would enable members of this group to review past experiences of others, assess appropriate locations for implementation and determine appropriate applications within their planning domain.

Engineers and Practitioners: Engineers and Practitioners agree in general about the potential of ITS to solve transportation problems. However, because ITS architecture is varied and has an array of applications, there are a variety of underlying assumptions about specific applicability. Therefore, it is understandable that there may be some confusion and lack of understanding by those not involved in the day-to-day operation of ITS. Many engineers have high expectations for the non-traditional technical methods of viewing transportation system improvements. Others worry about proving cost-effectiveness. Still others expressed concern that expectations may exceed the short-turn capability of ITS to respond to system needs. This group agreed that ITS has the greatest potential to assist with incident management and congestion problems by redirecting traffic or through signal coordination.

A few engineers believe greater public understanding is not necessary; they tout focusing on utility and benefiting users of ITS rather than concentrating on educating persons about the technologies. The thinking is principally that individuals do not need to understand ITS to use it. The majority of engineers and technicians, however, advocate that more efforts should be directed to addressing consumer awareness of ITS. Better public acceptance may translate into more funding and more widespread use of the

systems. It was also thought that a more proactive public information component of ITS could help avoid negative images or ideas that could hinder ITS programs.

According to this group, the most impressive avenues for public focus are those ITS techniques that will speed travel flow and reduce travel times. Higher visibility of incident management was considered as one such opportunity. Incorporation of the media as a transmitter of ITS information was suggested as an option, particularly using video to explain traffic situations and focus public attention on how ITS is improving traffic flow.

Another suggested area of focus is information provision. Increased use of the internet and other methods such as flyers explaining how to use ITS and describing the benefits should be employed. It was stressed that techniques of information sharing do not need to be high technology driven, when simple methods would suffice. Case studies, testimonies, and demonstrations could be presented through public forums, seminars, and other targeted efforts.

Summary of Concepts

Several ideas emerged from the group sessions that would benefit efforts to increase the knowledge base, usability, and overall integration of ITS into the routine of daily commuters. The ideas were purposely focused on how ITS concepts could be clearly communicated and expressed to the consumer as well as the transportation planner. The most important concepts and strategies are described below.

Consumer Focused

- Develop a Clear Description of ITS to Facilitate Understanding. There is a need to prepare a definition of ITS that is simple, conveys the message and includes the advantages of ITS. The description should be broadly disseminated by professionals in communication with consumers.

- Allocate Resources to Market ITS. ITS professionals and transportation public relations personnel must designate financial and personnel resources targeted to increasing consumer awareness and use of ITS. Methods need not be costly, but require forethought and creativity. In many cases, the ITS emphasis may be incorporated into on-going agency community relations and marketing budgets (Conference papers on this subject by Betty Taylor of *Transguide* and Leslie Honaker of *Katherine Christensen & Associates* in Part Two: Workshop Speakers and Panels.)
- Develop Feedback Mechanism to Improve Dialogue About ITS Research and Demonstration Projects. Critical to incorporating increased consumerism is the availability of two-way dialog about ITS projects with the travelers who utilize them. Traditional survey methods or focus groups could be used, as well as contemporary on-line communications techniques.
- Standardize and Increase the Types of Message Provided on Dynamic Message Signs. There was the sentiment that communication via dynamic message signs should be standardized across local jurisdictional and state lines. The messages should be informative, relevant and provided early enough to assist in travel decision-making.

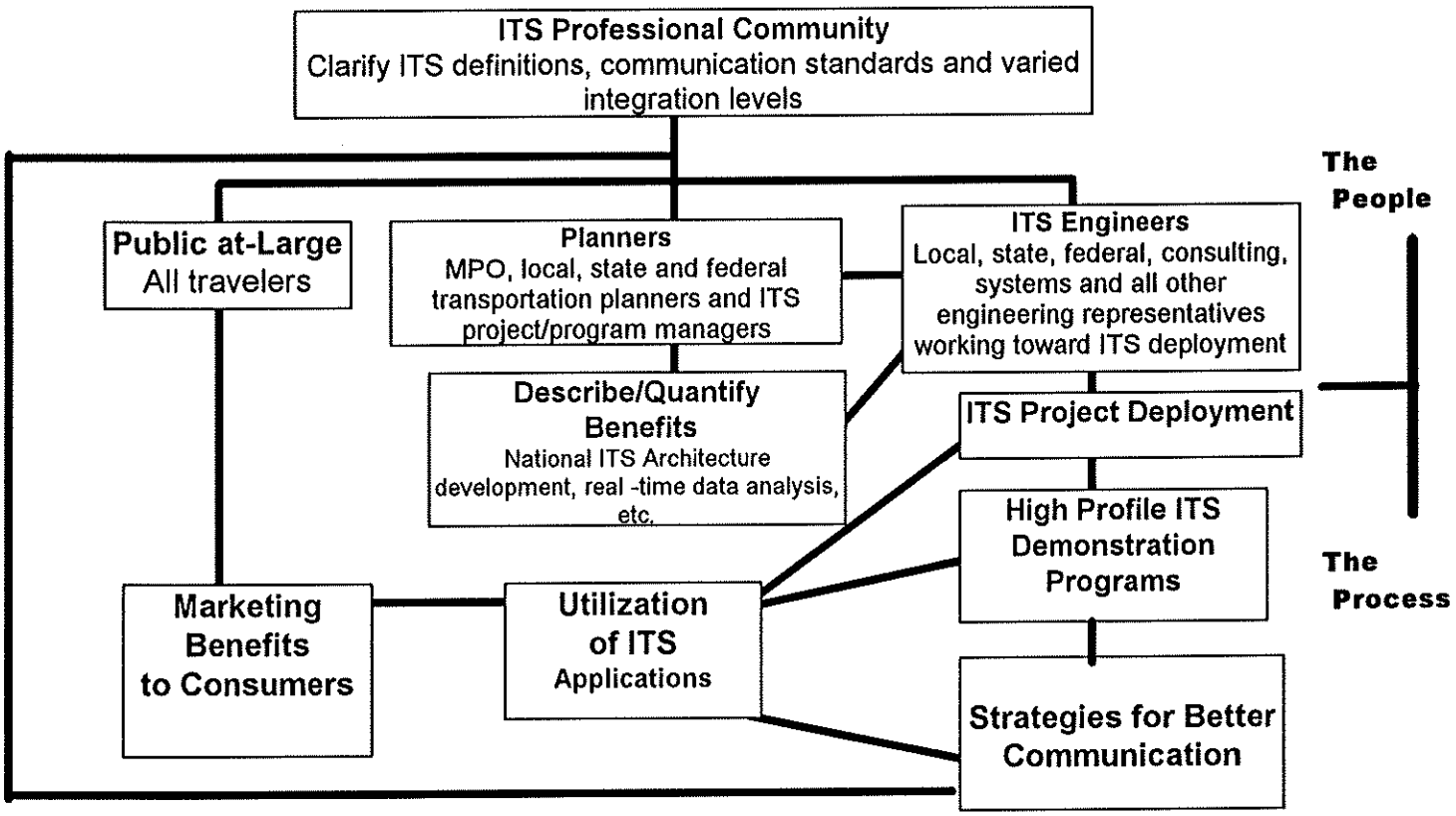
Planners

- Focus Attention on Quantifying and Explaining ITS Benefits. Planners are impressed with the depth and quantity of information collected through ITS techniques. Some of these data should be provided to planners in a joint effort to determine land use and environmental influences. Calculations of time and cost savings should be distributed for inclusion in long range planning activities.

- Increase Coordination and Communication with Transportation and Community Planners. Planners need to know who is the central point of contact of ITS planning activities in their locale. Numerous avenues exist to increase the flow of information between the planning and ITS professionals. ITS sessions can be arranged for planning conferences, articles may be written for professional journals, and special education and training sessions could be developed. ITS professionals may wish to compile ITS case studies that describe project initiation, implementation steps, and project outcomes as one tool to improve communication with planners.
- Include ITS Planning and Implementation Curriculum for University Students. Discussion is underway in a variety of circles about the innovations and updates that are needed in curricula for engineers and planners. Professors may consider entire courses on the subject or incorporate semester syllabi to accommodate an ITS module. (Conference paper on this subject by Beverly Kuhn Thompson is included in *Part Two: Workshop Speakers and Panel* section of this document.) The relationships and interactions between the consumers, planners, and ITS engineers are depicted in Figure 2. Federal, state, and local level transportation professionals must work cooperatively to yield the results anticipated and desired from ITS technologies. The consumer desires improvements in travel methods and opportunities; now is the time to aggressively initiate programming to make ITS a routine part of daily tripmaking.

Figure 2

Implementation Steps to Improved Linkages: Engineers, Planners and Consumers



Graphic developed by Carol A. Lewis and Rita Brohman

PART TWO:
WORKSHOP SPEAKERS AND PANEL

KEYNOTE ADDRESS

Joseph M. Sussman
JR East Professor
Dept. of Civil and Environmental Engineering
Massachusetts Institute of Technology

History and Background

(from Sussman, Joseph M., "ITS: A Short History and a Perspective on the Future," Transportation Quarterly 75th Anniversary Issue, December 1996, ENO Transportation Foundation, Inc., Landsowne, VA p. 115-125.)

In 1986, an informal group of academics, federal and state transportation officials, and representatives of the private sector began to meet to discuss the future of the surface transportation system in the United States. These meetings were motivated by several key factors.

First, the group was looking ahead to 1991 when a new federal transportation bill was scheduled to be enacted. It was envisioned that this 1991 transportation bill would be the first one in the post-Interstate era. The Interstate System, a $130 billion dollar program, had been the centerpiece of the highway program in the United States since the mid-1950's. By 1991 this project would be largely complete. A new vision for the transportation system in the United States needed to be developed.

While the Interstate had had a major and largely positive impact in providing unprecedented mobility at a national level, transportation problems remained. From the perspective of 1986, highway traffic delays were substantial and growing. Rush hour

conditions in many metropolitan areas often extended throughout the day. Further, safety problems abounded, particularly highway safety.

Also, the US was concerned with the environmental impacts of transportation and the energy implications of various transportation policies. Any new initiatives in the surface transportation world had to explicitly consider environmental and energy issues.

Another major motivation for considering the future of surface transportation was national productivity and international competitiveness, both closely linked to the efficiency of our transportation system. In 1986, our major economic rivals in western Europe (Project Prometheus) and Japan (Project AMTICS and RACS) were advancing very quickly in areas involving the development of new technologies for use in advanced surface transportation systems. Their use of high technology concepts in the information systems and communications areas were recognized to have the opportunity to revolutionize the world of surface transportation, improving the competitiveness of these nations, and providing them with an important new set of industries and markets.

Further, it was recognized that these congestion, safety, environmental and productivity issues would have to be addressed largely by means other than simply constructing additional conventional highways. Particularly in urban areas, the economic, social and political costs of doing so were becoming too high.

Thus, in 1986, this small, informal group saw before it an opportunity and a challenge based upon:

- New transportation legislation (at that time five years in the future),
- Concern for continuing transportation problems in the US despite major investment in the transportation system,

- The development by our economic competitors in western Europe and Japan of various technologies that could enhance their industry posture and their productivity, and

- Future limits on conventional highway construction, particularly in urban areas.

The essential concept was a simple one: marry the world of high technology and dramatic improvements in areas such as information systems, communications, sensors and advanced mathematical methods, with the world of conventional surface transportation infrastructure; provide capacity with technological advances that can no longer be provided with concrete and steel; improve safety through technology enhancements and better understanding of human factors; and provide transportation choices and control transportation system operations through advanced operations research and systems analysis methods.

What was envisioned and what came to be called Intelligent Vehicle Highway Systems (IVHS), and eventually Intelligent Transportation Systems (ITS), is but another example of the marriage of transportation and technology as a phenomenon that has existed throughout human history. In the early part of this century, innovation in construction and manufacturing technologies made the current transportation system possible. We now have the need for a new round of technological innovation, appropriate to the transportation issues of today.

We speak of the "ITS-4" technologies. These technologies deal with: first, the ability to *sense* the presence and identity of vehicles or shipments in real-time on the infrastructure through roadside devices or Global Positioning Systems (GPS); second, the ability to communicate (i.e., transmit) large amounts of information cheaper and more reliably; third, the ability to process large amounts of information through advanced

information technology; and fourth, the ability to use this information properly and in real-time in order to achieve better *mathematical methods* used to develop strategies for network control. These technologies allow us to think about an infrastructure/vehicle *system*, rather than independent components.

The small, informal group described above became "Mobility 2000," which produced a landmark document in 1990[1], laying out a vision for ITS.

In 1990, the need for a permanent organization became clear and IVHS America (the Intelligent Vehicle Highway Society of America) was formed as a utilized Federal Advisory Committee for the US Department of Transportation.

In December 1991, the Intermodal Surface Transportation Efficiency Act (ISTEA) became law. Its purpose was "...to develop a National Intermodal Transportation System that is economically sound, provides the foundation for the Nation to compete in the global economy, and will move people and goods in an energy efficient manner."

As was envisioned in 1986, ITS was an integral part of ISTEA, with $660 million allocated for research, development and operational tests. Additional federal, state, local and private-sector funds were added to this initial allocation, leading to a substantial program.

In June 1992, IVHS America produced "A Strategic Plan for Intelligent Vehicle Highway Systems in the US." and delivered it to DOT as a 20-year blueprint for ITS research, development, operational testing and deployment.

The plan noted that the US market for ITS hardware and software services would be on the order of $230 billion over the next 20 years. Extrapolating this internationally, it was not unreasonable to think about a $1.0 trillion international market in ITS over that

[1] *Proceeding of a National Workshop on Intelligent Vehicle/Highway Systems Sponsored by Mobility 2000, Dallas, TX 1990.*

time period, with 80% of this being in the private sector, well worth the effort to pursue. This projection was updated in 1996 by Apogee Research to $1.5 trillion.

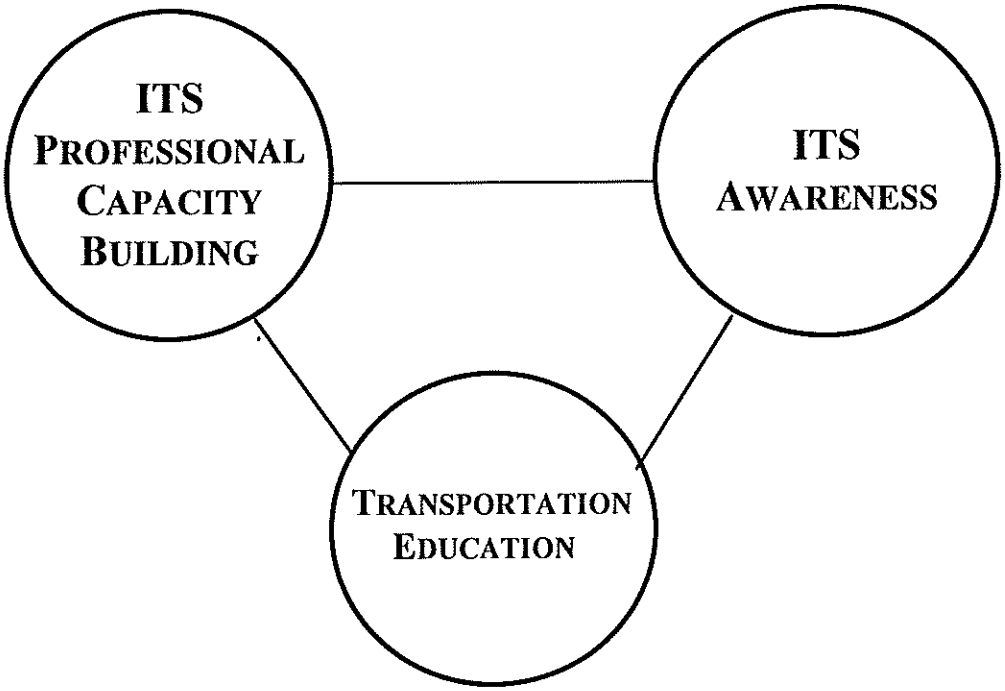
1. While people are aware of components of ITS, like electronic toll collection (ETC), variable message signs (VMS), etc., what they do not yet understand is the concept of ITS as an integrated system, linking vehicle to infrastructure--both electronically and via information flows. Much of the power of ITS will come eventually from that linkage.

I believe that the recognition that ITS is a system--of which the consumer is a vital part--is the key to widespread acceptance. That is where the leverage is for

- consumer purchases of gear for their vehicles;
- consumer support for public investment in ITS infrastructure.

Viewing ITS as a system is not an easy concept, so we have to view this as a long-term goal. We first need to bring the concept forward incrementally, discussing the individual aspects of ITS, and later emphasizing the systems benefits of ITS, building on the fact that people want to be part of the solution.

2. Linkage of ITS Professional Capacity building, ITS Awareness, and Transportation Education



ITS Conference Papers from Workshop Panel

PROFESSIONAL CAPACITY BUILDING AT TEXAS A&M UNIVERSITY

Beverly Thompson Kuhn, Ph.D., P.E.
Texas Transportation Institute, The Texas A&M University System

INTRODUCTION

While Intelligent Transportation Systems (ITS) deployment has been widespread throughout the United States since the passing of the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991, its current and future success depends on developing a larger cadre of transportation professionals capable of designing, planning, managing, operating, and maintaining the ITS program. Furthermore, overall awareness of ITS by the general public is necessary to ensure political, community, and financial support of future ITS efforts. This movement to educate and prepare existing and future transportation professionals and the general public with respect to ITS has been labeled professional capacity building (PCB).

Understanding the obstacles and needs associated with ITS education and technology transfer at the university, professional, and public levels is critical to ITS success. Thus, Texas A&M University and Texas Transportation Institute have taken an active approach to work toward overcoming these obstacles. In response to the national interest in ITS Professional Capacity Building as well as queries from state and local sponsors and agencies, the Texas Transportation Institute (TTI) has established the Center for Professional Capacity Building.

This paper addresses the role of research universities in ITS PCB and the challenges that these universities face in the rapidly advancing arena of ITS. It outlines the mission, goals, and objectives of TTI's Center for Professional Capacity Building and describes current project efforts underway. Moreover, it describes efforts to establish new and innovative partnerships to leverage existing resources and maximize the dissemination of ITS knowledge both within educational institutions and among the general population.

THE ROLE OF RESEARCH UNIVERSITIES

Research universities have three critical roles that directly relate to ITS. These roles are (1) to educate future leaders, (2) to conduct research, and (3) to engage and support technology transfer. Each of these roles can help ensure the success of ITS by fulfilling PCB needs.

Education is the perhaps one of the most fundamental roles of the research university. Through appropriate education programs, the university can provide undergraduates with a base knowledge and awareness of ITS and its applications. Such knowledge can assist them in entry-level positions by alerting them to possible activities in the transportation field. Furthermore, the university can enhance graduate transportation education with more detailed knowledge of ITS issues, technologies,

and applications. Such knowledge helps students prepare for a career in the transportation profession where ITS is commonplace. Research universities are key in this role of PCB as the only provider of this form of education to the college student.

Research is the second critical role of the university which serves several purposes. Obtaining ITS research contracts not only supports the university fiscally, but also serves a role in education. Conducting ITS related research supports the education of undergraduate and graduate students by giving them hands-on experience with emerging technologies and their applications while offering them financial support to complete their degree programs. ITS research also develops human resources within the university and advances the ITS knowledge of all faculty, staff, and students involved with the research, thereby advancing the profession and better preparing individuals to work with ITS in future employment.

Research universities also engage in technology transfer activities which enhance education. For example, technology transfer in the ITS arena can be used to train and retrain the existing work/knowledge force that must encounter ITS issues, technologies, and applications in their jobs. It is a natural outgrowth of the education and research efforts and can be easily used to facilitate the deployment and maintenance of ITS.

The Challenge

What are the challenges that face research universities with respect to ITS PCB? Primarily, a need exists to better integrate universities into the PCB program. As key players in education, research universities have a wealth of expertise that must not be overlooked when developing a viable workforce for the ITS arena. By leveraging existing resources, these universities can serve as a building block to PCB. Further, the universities must promote the appropriate ITS education components so that graduates have key knowledge that can help them in the workplace.

Uniquely poised to lead ITS education efforts, research universities must take an active role in developing tomorrow's leaders, which are critical to the success of future ITS programs. However, collaboration must be undertaken to avoid duplication of efforts. Such collaboration emphasizes strong points of individual universities to generate a comprehensive program to support ITS in the future.

THE OBSTACLES TO PCB

Overcoming obstacles to PCB efforts is critical if research universities hope to succeed in this area of education and training. Under the current process, research efforts are discontinuous, being conducted on a project-by-project basis with no seamless PCB application. Furthermore, most PCB-related material is developed on an as-needed basis. There is a need to become pro-active in the establishment of a nationwide PCB effort and the development of material for the variety of audiences that require ITS knowledge.

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As discussed previously, each university that is actively involved in transportation and ITS-related education and research brings to the table its unique areas of expertise. However, being small in number and scattered throughout the country, their impact is limited as no formal method exists to collaborate and interchange resources, ideas, and research results. A fundamental change in the dissemination process is needed.

The Process

The current process used to disseminate research results to other universities and professionals is informal and lengthy. Consider the following scenario which is typical of transportation research. A university faculty member conducts a research project, which can be lengthy depending on the project. At the conclusion of the project, the faculty member may share results with colleagues and/or incorporate them into university curriculum as appropriate. Once compiled into a paper, the results are most often submitted for publication, where they must endure a review and publication process which can take up to two years depending on the publishing entity. Upon publication, faculty at other research universities may or may not see the results, and then incorporation into curriculum is not guaranteed to occur. This entire process, as illustrated in Figure 1, can take up to 5 years and transferral of knowledge to the intended audience is not insured.

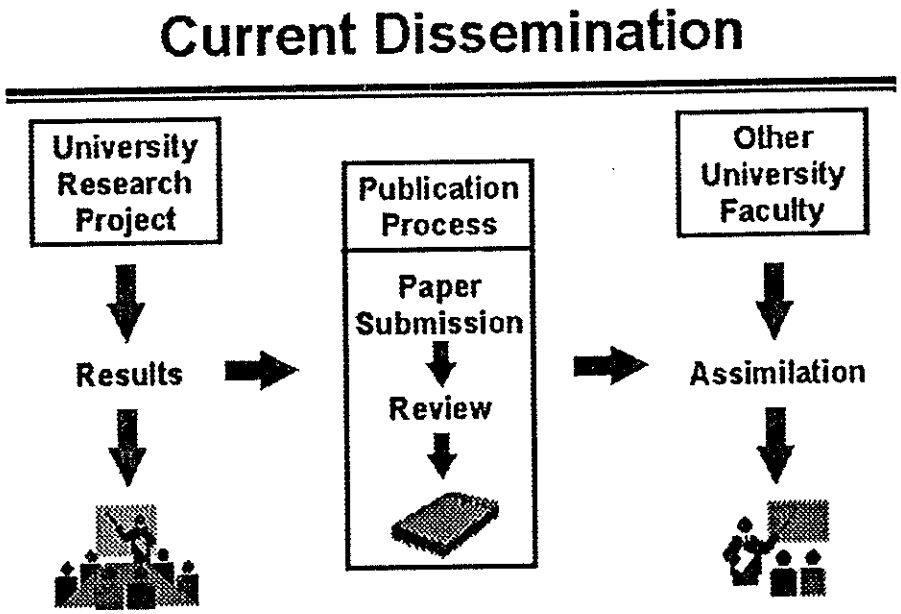

Figure 1. Current Research Dissemination

Needs

What are the needs to improve this dissemination process? First and foremost, the activities of research, education, and technology transfer need to be better linked. Though research universities will most likely strengthen this link on their own, this process can be expedited through direct expenditures and the establishment of a formal process. Furthermore, the number of universities producing informed graduates needs to be expanded, and a repository of information can go a long way toward reaching those universities with limited transportation education. Such a repository, or clearinghouse, would allow easy and widespread access to curriculum and technology transfer material.

Perhaps the key benefit to be derived from establishing a clearinghouse would be a formal mechanism for the transfer of knowledge. Figure 2 illustrates a revised dissemination process which incorporates a national or regional technical clearinghouse.

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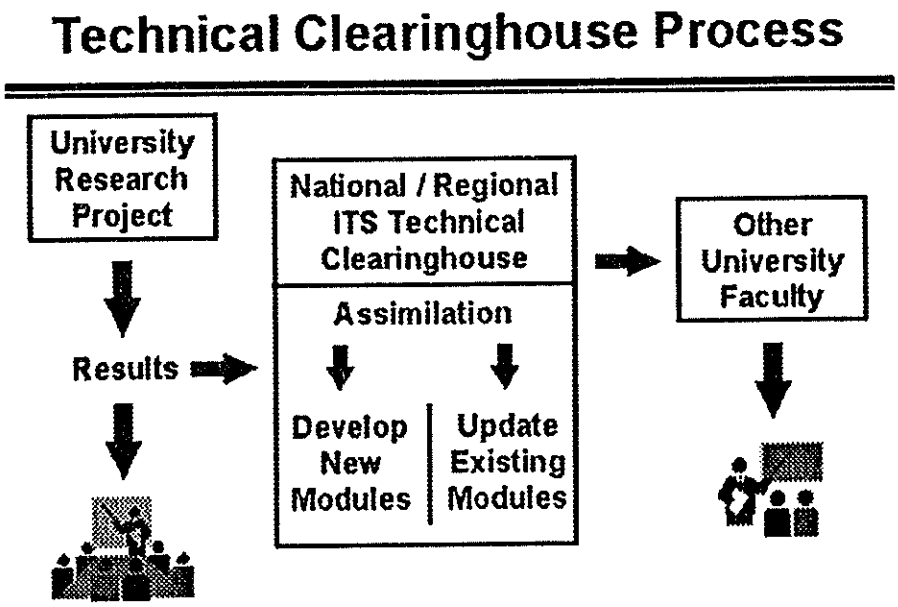

Figure 2. Revised Dissemination Process

As with the current process, in the technical clearinghouse process, a faculty member conducts research and generate results that may be shared with colleagues or incorporated into existing

curriculum. Once completed, project results would then be provided to the national/regional ITS technical clearinghouse, where staff would assimilate them and develop new education modules for undergraduate, graduate, and technology transfer use. The results would also be used to update existing modules. All modules would then be distributed to other research universities or made available via electronic format for easy incorporation into curriculum. The boon is a shorter and formal dissemination process that eliminates publication delays and ensures that research universities have the cutting edge research knowledge they need to impart to students and professionals.

THE TEXAS A&M APPROACH

In response to the challenges and obstacles research universities face in promoting and ensuring the success of ITS, Texas A&M University and Texas Transportation Institute have established a Center for Professional Capacity Building. To date, an ITS Professional Capacity Building Program has been formed within the U.S. Department of Transportation, thereby formally recognizing PCB as an issue that must be addressed on a national level. Furthermore, TTI has seen the need for PCB through work with state and local sponsors and agencies.

The overall consensus is that education, research, and technology transfer are the keys to ITS success. By capitalizing on what the Institute does best, TTI's Center for PCB can work to ensure that ITS knowledge is disseminated to appropriate audiences while avoiding duplication of effort. By encouraging collaboration and coordination on a regional level, the efforts of various universities can be combined to form a more cohesive alliance.

Mission, Goals, and Objectives

The Center's mission is to foster the development of knowledge, skills, and abilities of existing and future transportation professionals to ensure the success of ITS deployment both now and in the future. Furthermore, information developed for these audiences can be easily tailored to incorporate the user, including policy and decision makers who will help determine the success and maintenance of ITS in the years to come.

The Center has three primary goals established to achieve its mission. First, the Center will develop education and technology transfer materials and products. Such material, i.e., knowledge modules, will target undergraduate and graduate education along with the existing work force via technology transfer. Also, the Center will encourage and ensure the continuous update of these materials so that they offer the state-of-the-art and -practice with respect to ITS technologies and applications.

A second goal of the Center is to engage in outreach assistance. Such efforts can work to disseminate knowledge to selected audiences and capitalize on a variety of media for the most effective and efficient transfer of knowledge.

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Finally, the Center will foster research implementation by (1) encouraging research studies to include implementation efforts; (2) developing an understanding of how transportation agencies implement research; and (3) establishing a clearinghouse of implementation products and related research. Through these efforts, the Center can address the needs of state, regional, and local agencies and promote the practical application of research results into the daily activities of transportation agencies, thereby maximizing the benefits of research dollars.

The Center will meet these goals by pursuing a variety of funding opportunities. For instance, the Center will work to pursue PCB efforts evolving out of the U.S. Department of Transportation and other national agencies interested in PCB and its benefits. Second, the Center will work within existing interagency contracts to determine if current projects can incorporate PCB activities. Third, the Center will ensure that future interagency contracts provide for the transfer of knowledge gained from research projects. Finally, the Center will pursue partnerships with a variety of entities, including other research universities, public agencies at the national, state, regional, and local levels, professional organizations, and the private sector. All of these efforts will take on a national and international flavor, thereby broadening the impact of ITS research and providing leadership in this arena.

Current Projects

Since its inception, the Center for Professional Capacity Building has undertaken a variety of short-term projects which begin to address its goals and objectives. The following list provides a brief overview of several of these projects.

- Regional Education Assessment - A regional effort to determine the professional education needs, resources, and delivery mechanisms for knowledge and curriculum at the college level.
- ITS Training Facility Assessment - An assessment of the elements needed in a training facility for ITS PCB, including delivery demands and mechanisms for such activities.
- ITS Overview Module - The development of a pilot knowledge module for ITS that could easily be incorporated into an undergraduate curriculum.
- ATMS Training Course - The development of a two-day course aimed at educating and training traffic management center employees within in Dallas area, with possible regional and national applications.
- Standards Technology Transfer - The creation of a framework for standards technology transfer, specifically NTCIP and TCIP standards.

FINAL REMARKS

Perhaps the most critical issue facing the transportation profession with respect to ITS is the need for a paradigm shift. Such a shift in attitude is critical for the long-term success of the ITS program. This shift must address activities that ensure that the future leaders are prepared to maintain and advance the ITS program. Furthermore, this shift must incorporate the policy makers and the potential users, as they are the audiences on whose decisions the success of ITS ultimately rests. The

universities are critical to this shift, as they are virtually the only avenue to educating the future transportation leaders, and their expertise in technology transfer can easily lend itself to educating and incorporating the consumer. By collaborating regional and national efforts, duplication is eliminated and the educational strengths of the universities are exploited. Finally, there is a need for a better link between research, education, and technology transfer. The link would create a seamless flow of knowledge from research, to the education of future leaders, to the training and retraining of the existing work/knowledge force, to the exposure of the consumer and policy makers to ITS technologies, applications, and ultimate benefits to the community.

TxDOT Projects for Providing Multimodal Traveler Information

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TxDOT currently provides both static and dynamic traffic information to the public via the Internet. Most static information such as construction notices and lane closures is served through the Online @ TxDOT Web site. The Houston TranStar and San Antonio TransGuide sites provide real-time traffic speed maps of the local freeway systems. To reach more members of the traveling public, the department is developing public kiosks that will provide information similar to that available through the Internet.

The ITI and Traveler Information

The portion of Intelligent Transportation Systems (ITS) that is deployed in metropolitan areas is the Intelligent Transportation Infrastructure (ITI) of the National ITS Architecture. There are nine integrated components to the ITI, one of which is titled "Regional Multimodal Traveler Information" [Ref. 1]. This component is used to supply items such as transit schedules, ridesharing details, traffic reports, construction notices, and other information that helps people reach their destinations quickly and safely.

While there are some local efforts at providing traveler information to the public, the Texas Department of Transportation (TxDOT) is working on several projects with potential applications around the state. The department is already using the Internet to distribute contractor information, notices of lane closures, and more; TxDOT also is involved with real-time traffic Web sites in two cities. To reach travelers without Internet access, the department will deploy public kiosks in two test regions.

Internet

According to study results reported by *USA Today*, "More than one in four adults in the USA and Canada now use the Internet..." [Ref 2]. Now that such a large number of people have access, the Internet can serve as a powerful tool for providing travel information to the public.

There are essentially two types of traveler information: static and dynamic. Static or slowly-changing data includes items such as transit schedules and lane closures due to construction. Dynamic or real-time data includes information that continually changes such as incident reports and traffic speeds. Both kinds of data can be provided to the public through the Internet but there are significant differences in the efforts and equipment needed to serve the information.

Static Web pages are comprised of text and graphics files. The text portion is in a format called HyperText Markup Language (HTML) that implements a page-layout scheme. There are now many dedicated Web page development tools that can be used to create HTML files; newer word processing applications can save documents in HTML format. For example, an administrator can maintain a lane closure notice with maps as a word processing document. When a change in the project occurs, the administrator makes changes in the document and saves an HTML version. The updated page files are then loaded onto a Web server for distribution to the public. The effort required to create and maintain pages is modest and involves desktop computer programs.

Pages with real-time data require much more effort and equipment than those with static information. The real-time information (traffic speeds, incident reports, etc.) must be gathered automatically and reformatted for distribution as Web documents. Text must be converted to HTML while graphics must be converted to the compressed file formats used throughout the Internet. Although there are additional costs for serving real-time data, the results are displays of useful and timely information.

TxDOT Web Site

The "Online @ TxDOT" Web site (http://www.dot.state.tx.us) currently provides highway conditions, maps, links to tourism sites, and more (see Figure 1). In fact, the site is so large and contains so much information that the Information Systems Division of the department expends much effort in making the pages useful to the Texas travelers.

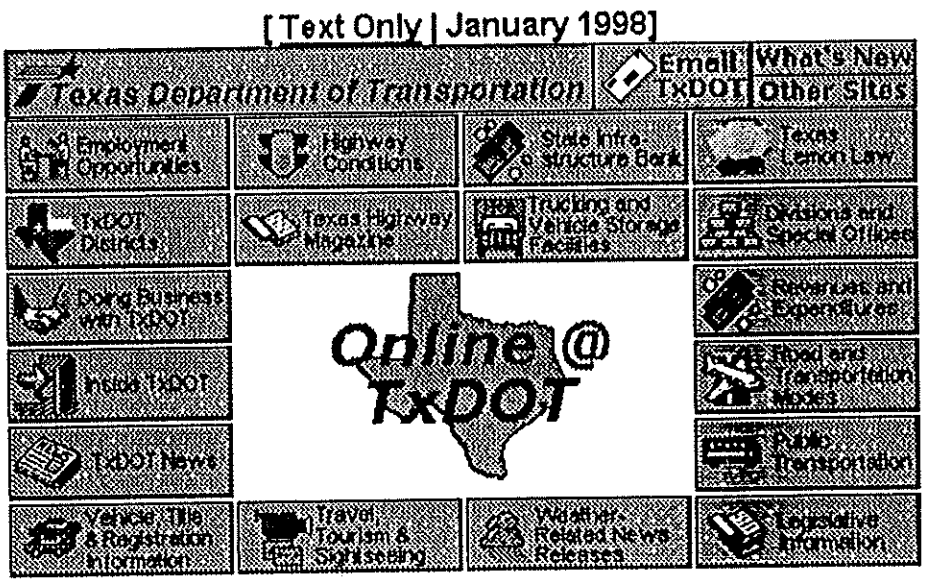

Figure 1. Navigation Buttons of the TxDOT Web Site

Most of the traveler information on the site is distributed through pages corresponding to each of the 25 TxDOT districts (http://www.dot.state.tx.us/insdtdot/geodist/geodist.htm). A map for selecting a district Web page is shown in Figure 2. The page for the Houston district (http://www.dot.state.tx.us/insdtdot/geodist/hou/houdist.htm) is typical of the large urban districts in the state. The page provides links to lists of lane closures, a library of news releases, details of a freeway improvement study, and lists of contracting information. Links to other sites such as Houston TranStar and local government pages for the region are located near the end of the text.

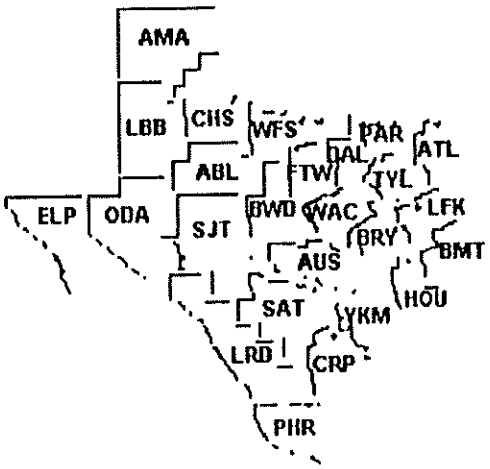

Figure 2. Map for Selecting TxDOT District from the TxDOT Web Site

Although ITS is a high-priority item within TxDOT, the undertaking has relatively low visibility with the traveling public. One effort to increase that visibility is the proposed addition of pages about ITS to the Online @ TxDOT Web site. The primary focus would be on explaining, in lay terms, the purpose of ITS and how it is implemented. Some pages would describe the infrastructure that is deployed in Dallas-Fort Worth, Houston, Laredo, El Paso, and San Antonio. Plans for future deployments in Austin, El Paso, and other cities would be detailed as would rural ITS applications as they are developed. One page could be a "user's manual" for the new components such as Dynamic Message Signs, Lane Control Signals, Flow Signals, and Changeable Lane Assignment Signals.

Sites with Real-Time Traffic Information

At present, there are Web Sites for two Texas cities that contain real-time traffic information. Both the Houston and San Antonio Web sites provide data that is collected by the centralized transportation management centers.

The Houston TranStar Web site (http://traffic.tamu.edu) contains a great deal of information about surface transportation in the metropolitan area. Static information includes a summary of the HOV lane system, descriptions of the flow signals (ramp meters) used on some freeways, and links to the METRO transit agency. The primary purpose of the site is to distribute real-time traffic speed data. The TranStar system measures speeds by interrogating toll-tag units inside many vehicles at known sites along the freeways. The information is presented on Web pages through a color-coded speed map as well as text reports from various sensor locations.

The TransGuide Web site (http://www.transguide.dot.state.tx.us) in San Antonio is served from a TxDOT computer. Real-time traffic speeds in the downtown area are shown on a color-coded speed map. Coverage of city freeways is being expanded by the deployment of a toll-tag reader system similar to the one in Houston. There are no toll roads in San Antonio, so the toll-tags are being distributed to fleet vehicles and to individual volunteers. Users cannot be identified because the tags were issued anonymously. The TransGuide Web site also features several technical papers and an illustrated brochure about the project.

Possibilities for Additional Web Sites

Other TxDOT districts are working to provide information through the Internet. For example, the Laredo district has a small Transportation Management Center (TMC) that monitors three video cameras on IH-35. A local Internet service provider has contacted the TMC and requested access to the video feeds in order to display still images of traffic conditions via the Web. The technical aspects of such an arrangement are straightforward but the legal issues are more complicated. Fortunately, the Fort Worth and Houston districts have been pursuing development of license and lease agreements for video that will set precedents for other districts to follow.

One option that TxDOT may consider in the future is to have the private sector distribute real-time traffic information. In this model, a state department of transportation TMC gathers traffic speeds, camera images, and incident reports; instead of posting the information on a public Web site, the department could forward it to Internet providers that have signed agreements. A well-known example of this practice is the Seattle Sidewalk TrafficView Web site (http://trafficview.seattle.sidewalk1.com) that is operated by Microsoft. Real-time information is furnished by the Washington State Department of Transportation (http://www.wsdot.wa.gov) for Microsoft to provide to the public through a color-coded map of speeds with links to camera views.

One technique used in some states to streamline real-time data distribution through the private sector is the installation of dedicated data servers in TMCs (see Figure 3). The concept is for an information service provider to sign an agreement with the agency and be granted access to the data server. While this model was developed for the Internet, it is applicable to other applications such as paging services that notify subscribers of incidents along certain routes.

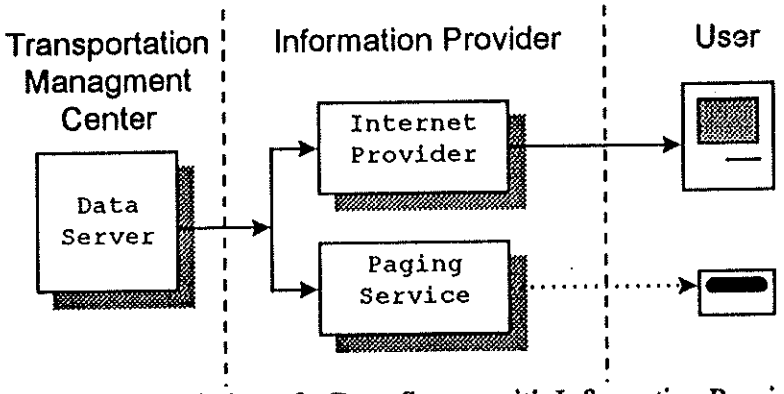

Figure 3. Interfacing of a Data Server with Information Providers

Kiosks

While the Internet can be a powerful tool for traveler information, it has a major weakness—only a fraction of the population has access. In an effort to reach more people, TxDOT has begun projects to develop and deploy public kiosks. These units would provide both static (e.g., transit schedules) and dynamic (e.g., traffic speeds) traveler information.

San Antonio was selected as one of four federal Model Deployment Initiative (MDI) sites for ITS. One of the MDI projects is the SA OnLine Traveler Information Kiosks that receive data from the TransGuide control center. Software and integration are being supplied by Southwest Research Institute with hardware from Factura Kiosks. Items displayed will include real-time traffic information, bus schedules, airport information,

weather conditions and forecasts, and points of interest maps. The units will be placed at high traffic areas such as hotels, transit stations, shopping areas, and the airport. The kiosks will receive data from TransGuide both by modem and by FM subcarrier transmissions.

The kiosk effort in Houston is similar to the San Antonio one, but the funding is from the federal ITS Priority Corridor program. The project will deploy units in places such as City Hall, the Northwest Transit Center, the University of Houston, and Methodist Hospital. The goal will be to provide users with real-time information so that they can choose routes and modes that minimize travel times.

The San Antonio and Houston kiosk projects will likely have a statewide impact by virtue of being pathfinders. Any lessons learned will be incorporated into future efforts. The projects will also help lower costs in other cities by providing software for reuse as well as a testbed for developing kiosk standards. TxDOT is committed to ITS standards; compatible and interoperable kiosks would help formulate standards in this area.

References

1. *Building the ITI: Putting the National Architecture into Action*; prepared for the Federal Highway Administration by Mitretek Systems; April 1996; page 5. The National ITS Architecture documents are available electronically from the following two locations:

    http://www.itsa.org/public/archdocs/national.html
    http://www.odetics.com/itsarch/

2. Miller, Leslie; "1 in 4 now using the Net;" *USA Today*; December 11, 1997; page 1A. This electronic version of this article should be available on the newspaper site throughout 1998 (see http://www.usatoday.com/life/cyber/tech/ctb774.htm).

Model Deployment What?

Explaining the Model Deployment Initiative: Leaving Algorithms Behind

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Introduction

In late 1996, TransGuide, the advanced traffic management system in San Antonio, Texas, was chosen as one of four systems by the US Department of Transportation to participate in the Metropolitan Model Deployment Initiative, or MDI. As part of the US DOT Operation Timesaver program, MDI participants received federal funding to demonstrate the benefits of integrated Intelligent Transportation Systems (ITS) and technologies. The objective of the TransGuide Public Information office was not only to inform and educate the public about these technologies, but also to ask for the public's participation in the projects.

Acronyms alone provide a daunting task for public information representatives. The task for the San Antonio District of the Texas Department of Transportation was to explain MDI, USDOT, ITS, TxDOT and TransGuide (Transportation Guidance System) without making alphabet soup. The purpose of this paper is to introduce the San Antonio Model Deployment Initiative, examples of how new technologies were introduced to the public and of lessons learned.

The first lesson was learned during the infancy stages of TransGuide. Acronyms aside, some technical terms can sound quite impressive. When talking about new technology, it is easy to become carried away with some of these technical terms. Presenters, oblivious to the glazed over eyes of their audience, have sometimes been sucked up into a technological tornado of words. Words are thrown out in wild abandon, sometimes hitting the audience right between the eyes, leaving listeners utterly perplexed and exhausted. During the early stages of TransGuide the word "algorithm" was used casually, almost as an everyday term, when explaining the TransGuide system to the public. Fortunately, a public relations agency was already on board with TxDOT at that time. The agency representatives pointed out that the word "algorithm" and press releases do not mix. It was an important reminder to remember who the audience is. It was then, that TransGuide presenters decided to leave the algorithm behind when explaining ITS to the public.

TransGuide - Phase One

TransGuide went operational along 26 miles of state highway in San Antonio in July of 1995. Since that time, the system has performed remarkably well. A Texas Transportation Institute before-and-after study of the system indicated a 15 percent decrease in the overall number of accidents in the areas where TransGuide is operational and a 20 percent decrease in the emergency response time. It is important to any ITS public information effort to release quantitative results as early in the program as is feasibly possible. The numbers give the public and the media a tangible result to grasp, especially when ITS representatives are explaining how the system will improve highway efficiency.

Expansion of TransGuide continues with 27 more miles of freeway being added to the system this year. Currently, the system operates with more than 800 loop detectors, 59 cameras, 51 electronic message signs and 379 lane control signals. The system notifies motorists of incidents ahead on the highway such as major and minor accidents, weather, debris on the road, congestion and construction. The system has warned motorists of almost every possible situation . . . including flooding along frontage roads, ice on bridges and mainlanes, Ozone Action days, chemical spills and glass on the roadway. When smoke from a fire located near the highway caused visibility problems for motorists, TransGuide changeable message signs notified drivers to use caution. TransGuide has also enhanced TxDOT's courtesy patrol service. The 24-hour road service assists stranded motorists. TransGuide operators assist Courtesy Patrol drivers by notifying the drivers of exact locations of stranded motorists. Again, when traffic management personnel begin collecting significant incident information in which they helped improve the traffic flow, it is highly encouraged to cite those incidents when talking with the public and the media.

TransGuide was the first system of its kind to respond to traffic incidents with preprogrammed solution scenarios -- a process adapted from NASA's space program. More than 32,000 traffic solution scenarios are currently stored in the mainframe computer database.

Early Public Information Efforts

Early public information efforts for TransGuide began with selection of a public relations agency. Anderson Advertising was hired to help the Texas Department of Transportation introduce this new traffic management technology to the public. One of the first tasks undertaken by Anderson Advertising was the development of a twelve-person focus group. This group of San Antonio drivers met for two hours and discussed the highway department, Intelligent Transportation Systems and transportation in general. The group gave TxDOT feedback on how much they knew about TxDOT, Intelligent Transportation Systems and other transportation issues. Most importantly, they gave ITS personnel feedback on a possible name for the new San Antonio traffic management system. This particular group disliked any name with the word "smart" in it. The general consensus

was that any "smart highway" term insinuated that the highway was smarter than the driver. The feedback from this session was highly beneficial. After the algorithm lesson, the second lesson learned was that several, not just one, focus group sessions are beneficial in establishing audience feedback, expectations and understanding.

Anderson Advertising helped TxDOT establish an issue plan to address questions from the public and the media. The most common question asked by the public was "Will TransGuide issue speeding tickets in the mail?" Motorists were informed that the TransGuide system was not set up as a law enforcement tool and that the loop detectors in the system were not able to measure individual speeders. A third lesson learned during this process was audience conditioning. When informing the public about your technology, do not let one audience viewpoint "condition" you. For example, are speeding tickets good or bad? Judging from the responses TransGuide received, it was assumed that for most members of the public, speeding tickets were bad. However, not all audiences agree that speeding tickets are bad. Members of a senior citizens group touring TransGuide were disappointed when it was explained that TransGuide technology would not be used to issue speeding tickets. Do not become so conditioned to an explanation of ITS technology that the opposing viewpoint is overlooked. In addition to speech and tour events and milestone press events (the first sign testing, etc.), a major effort was also made to choose a logo and name for the San Antonio traffic management system. After sifting through more than 400 names and several designs, TransGuide representatives chose a name and logo. A fourth lesson learned was to be careful not to involve too many people in the decision making process. The logo decision took longer (approximately four months) than it should have.

A TransGuide Grand Opening on July 25th, 1995, was attended by then Secretary of Transportation Federico Peña and more than 400 guests. One of the most successful public information tools was Low Power Television Channel 54. Anyone within a 20-mile radius of the LPTV antenna, located at the San Antonio District headquarters, can receive traffic video on a continuous 24-hour basis by tuning in to UHF Ch. 54. The purchase of a low power television was a first-of-its kind endeavor for TxDOT.

Early Results

The early results of the TransGuide Public Information campaign demonstrated very favorable results. More than 1000 tour groups visited the TransGuide Operations Center during its first year of operation -- including visitors from Japan, Australia, Germany, Mexico, Russia, Denmark, England, South Africa, France, Korea, Brazil, Taiwan, Norway, Canada and Scotland. More than 500 articles and broadcast pieces were also produced during TransGuide's first year, providing local, state and international coverage. TransGuide became recognized as a national leader and prototype in the ITS industry.

The low power television channel surpassed all expectations in the amount of publicity and community service it would bring to San Antonio. The live traffic video can be seen regularly on all three major network affiliates during the morning and evening newscasts.

Many of the visitors to TransGuide also comment that they tune in to UHF Channel 54 during other times of the day to view traffic conditions before they leave the house.

The best example of how low power television helped the San Antonio community occurred during an ice storm in 1996. At one point, major freeways in the city were shut down. However, motorists continued to drive around the barricades, and attempted to drive on the highways. Most of their vehicles were hitting guardrails and becoming stuck. Some motorists had to wait several hours before extremely busy police officers could reach them. During the storm, TransGuide remained open the entire time. News crews filmed live from the TransGuide Operations room for their newscasts. One station aired live TransGuide footage of motorists disobeying barriers and becoming stuck on the highways. The video served as a good warning to other motorists who may have been thinking about disobeying barrier warnings. A fifth lesson learned was that some of the best public information tools can come from surprising places and are sometimes the simplest tools to implement.

MDI - The Announcement

On January 10, 1996, Secretary Peña launched Operation Timesaver - the departmental ITS deployment initiative. According to the US DOT, "Operations Timesaver urges governors, mayors and county executives to make "smart" ITS decisions. The goal of Operation TimeSaver is to integrate these separate ITS systems by constructing an Intelligent Transportation Infrastructure (ITI) that saves time, increases safety, enhances mobility, and improves quality of life. Operation TimeSaver aims to reduce travel times by 15% regardless of mode - the equivalent of saving one week each year." Four U.S. sites were chosen by the US DOT for full ITI deployment. They include San Antonio, Seattle, Phoenix and the tri-state area of New York, New Jersey and Connecticut. The MDI announcement was made in December of 1996. San Antonio received $7.1 million in federal funding. Additional local and state funding for MDI amounted to a total of $13.5 million for six new TransGuide technologies. Southwest Research Institute was awarded the $8.5 million contract as systems integrator for the Model Deployment Initiative. Partners in the TransGuide MDI effort include the City of San Antonio (police/fire/EMS/hospitals), VIA Metropolitan Transit and the military.

The New Technology

Six major new technologies are being implemented as part of the San Antonio MDI and will be full operational by September of this year. They include:

- LifeLink – video and audio teleconferencing between paramedics in ambulance units and doctors in hospitals
- S.A. OnLine Traveler Information Kiosks – 42 interactive touch screen kiosks that offer real-time traffic information, current weather forecasts, bus schedules, airport information, points of interest maps, route guidance and printers

- In-Vehicle Navigation Units – 590 In-Vehicle Navigation Units were installed in city, county, state and federal vehicles to offer route guidance, pretrip planning, location reference, TransGuide real-time traffic data and assistance to emergency crews
- Real-Time Travel Information Tags – 78,000 real-time travel information tags are being distributed to volunteers around the city to help collect real-time travel speeds in San Antonio; the beam-activated tags send signals back to TransGuide via 53 antenna reader sites located around the city
- Real-Time Areawide database – offers real-time traffic information based on City of San Antonio Police Department traffic reports, TransGuide real-time traffic information, real-time travel speeds in the city and Texas Department of Transportation lane closure information
- AWARD – Advance Warning to Avoid Railroad Delays; Doppler radar sensors placed along a five-mile section of the Union Pacific Kerrville train line notify motorists (via in-vehicle navigation units) in advance of train delays at three major road intersections where train crossings affect traffic

The Plan

As part of the early MDI public information efforts, a public information plan was developed in early 1997 to address the outreach and education strategy for the above programs. The mission of the plan is to utilize all applicable mediums to inform the public and key decision makers about TransGuide, ITS systems in general and their benefits. Specific goals include maintaining a proactive approach, providing TransGuide information in an easily accessible manner, monitoring feedback, maintaining TransGuide's status as an international showcase and maintaining an active TransGuide partners program. Constituencies were identified as drivers – divided into subcategories of teenagers, adult, and age 65 and over; the transportation community; the medical community; the ITS community; tourists; and legislators.

Early public information efforts for the Model Deployment Initiative included brainstorming sessions with public information MDI partners; a news release officially announcing the MDI selection; and a kickoff event in conjunction with the first MDI quarterly meeting which was held in San Antonio. The kickoff event, held in March of 1997, provided the media with a demonstration of the LifeLink program . . . the most tangible and understandable of the MDI projects. This event served as a great catalyst in informing the public about the new MDI technologies. Other early efforts included the purchase of a new 10 by 20 foot TransGuide MDI display booth for conferences; media brown bag luncheons; news releases on each major project development; and production of a full-color one-page MDI flyer.

The plan included campaigns for distributing the tags and kiosks to the public and asking for active participation from the public. To date, the public information efforts have included: public information partners brainstorming sessions; a kickoff event for the MDI technologies; a new TransGuide MDI display booth and active participation in conferences; LifeLink demonstrations to the media and to key stakeholders; media brown

bag luncheons; news releases on each major project development; more than 40 print articles to date (local, state and national); more than 30 broadcast interviews to date (local, state and national); a full color one-page MDI flyer; project fact sheets; continued tours of the TransGuide Operations Center (average of three per week); Sen. Phil Gramm press conference and other legislative tours; development of a Real-Time Travel Information Tag brochure and distribution of tags; development of In-Vehicle Navigation Tag and kiosk brochures; partnering with the TxDOT Traffic Safety Office to promote highway safety; internal public information campaign for the In-Vehicle Navigation Units and a public information campaign for placement of Traveler Information Kiosks. In addition, a public/private partnership was developed to produce a full-color eight-page supplement in the local San Antonio newspaper in November 1997. Distribution of the tags included setup of a Travel Tag hotlines for volunteers and participation in various San Antonio shows such as the San Antonio Auto and Truck Show and the San Antonio Home and Garden Show. Tags are also being distributed through partnerships with large San Antonio organizations such as USAA Insurance.

A Public Service Announcement was developed to assist with the distribution of the Real-Time Travel Information Tags. Astronaut Dr. Bernard Harris served as spokesperson for the PSA allowing for a natural tie-in between science and technology. This was especially effective since the TransGuide traffic solution scenarios are modeled after a program used by NASA.

New lessons continue to learned as TransGuide expands and grows with new technologies. A sixth lesson learned was that the public's interest in technology and participation in that technology is underestimated. Although the TransGuide travel tag program does not offer the same kind of incentive as a toll tag program, the majority of drivers interviewed were interested in volunteering in the travel tag program. There was a concern about a misconception by the public that the tag program might be used for tracking. While this was a concern, it was not an obstacle. Once the system was explained to motorists, most were still willing to participate in the program. Many drivers were very excited that it was their city that was involved in this new technology.

A seventh lesson that continues to be learned, and one that is in the forefront of all lessons, is that safety is above everything else in motorists' minds. The TransGuide LifeLink program is the most popular program, and it is the program that has gained the most support from the public. Enhanced emergency care . . . help in the Golden Hour – that crucial first hour of treatment of a patient that can be the deciding factor between life and death – is what matters most to many drivers.

The TransGuide MDI program is scheduled to be completed this summer. Public Information efforts will continue throughout 1998. In January of this year, it was announced that TxDOT awarded a new public relations campaign contract to Anderson Advertising. The agency will be assisting TxDOT with development of new TransGuide and MDI videos and brochures, public service announcements for the kiosk program, surveys and focus groups, a quarterly TransGuide newsletter, increasing national media

exposure, increasing community involvement through speeches and tours, increasing number of public/private partnerships through movie theater PSAs, sporting events and other events, updating and expanding TransGuide traffic map and information on the Web page, meeting and exceeding goals of 500 tours and speeches, 30 special events, 40 broadcast interviews and 50 articles and organizing a grand finale event.

Based on early results of the TransGuide Public Information program, it is expected that the above goals will not only be met, but will be exceeded. It is the intent of the TransGuide Public Information Office to never forget a final lesson -- that the ultimate meaning of ITS to the public is to make the quality of life better. New ITS technologies can be dazzling, exciting and showstopping. But they can also be overwhelming and frightening. As pioneers of this new technology, it is the job of ITS professionals not to become caught up in the glamour of this amazing technology, but to remember what it really means to our next-door neighbors, our family, our friends and our coworkers. This is the inherent lesson. Internal communications is key to a successful public relations campaign. Before telling the world about your project, make sure that your coworker down the hall understands what it is that you are doing. If your coworker, mother or brother or sister understands what you are doing and how it will benefit them, you have already completed half of your public information campaign.

AZTech
Moving Forward Together

" Moving Forward Together" - Arizona's AZTech ITS Public Outreach Plan

Presented by:
Katherine Christensen, Owner - Katherine Christensen & Associates

At the:
ITS Houston Conference at Texas Southern University
February 19-20, 1998

Brief Overview

Once a small town in the heart of Arizona's Sonoran desert, nearly 3 million people now live in 23 communities that make up the "Valley of the Sun". The widespread locations of major businesses, colleges, centers of recreation and culture in the Phoenix area creates a highly mobile commuting public. The favorable climate and economic growth have also attributed to Phoenix becoming a major destination for national and international visitors. Continued residential and industrial expansion into underdeveloped parts of the region has placed an increased demand on the Valley's transportation system. While widening streets and building new freeways, Arizona began to seek out additional ways to improve traffic conditions.

AZTech was awarded the Intelligent Transportation Systems (ITS) Model Deployment Initiative (MDI) grant in October 1996. A partnership of public agencies and private companies administers the $7.5 million federal grant of a $35.5 million dollar program. The AZTech ITS MDI is a seven year project (two year implementation and five year operation) that will develop an integrated intelligent transportation system for the Phoenix Metropolitan area. When fully implemented later this year, AZTech will produce freeway and arterial street networks that are safer and more efficient for the traveling public. Once complete the system will serve approximately 97 percent of the state's population. By applying a regional perspective to traffic management and long-range transportation planning, AZTech's goal is to offer up-to-the-minute statewide traffic information being made available to virtually any traveler. Several communication strategies include personal products (pagers, hand-held computers), in-vehicle navigation systems, cable TV, synchronized traffic lights, emergency incident management and regionalized mass transit.

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Public Outreach Plan

Katherine Christensen & Associates (KC&A) is a full service public relations, meeting planning and special events firm. Founded in 1992, KC&A has worked with several private, government and public clients to execute public relations plans. Selected as a private partner, KC&A has partnered with AZTech to develop and implement their Public Outreach Plan.

The AZTech Public Outreach Plan is scheduled for a 15 month implementation (January 1997 - April 1998). The budget of $264,000 ($140,000 Cash - $124,00 In Kind) supports the general objectives to create and distribute a multi-level information campaign to residents of the Phoenix metropolitan area.

Even the best made products or carefully designed programs can languish and be rendered ineffective, if there has not been a well thought out plan and strategy to communicate or build consensus with the public.

Working with an AZTech management committee, the public outreach plan was crafted with thought to the purpose, plan of action and support activities needed to accomplish program goals. Key to this plan, is the relatively small budget for program implementation. Seeking out untraditional methods, targeting an audience and prioritizing objectives was crucial to setting the plan in motion.

Target Audience

Focusing our message to a selected group helps us to achieve continuity and efficiency of dollars we spend. After all, our budget is limited and unless we focus, we could spend thousands of dollars talking to "car mechanics" when we really wanted to target a "professional organization of automobile makers". The following three audiences have been defined as important to the public outreach plan:

Stakeholders: represent a group of federal, state and local government agencies, congress, special interest groups and professional/technical organizations.

Media representatives: include reporters or editors primarily from press, television, and radio.

Traveling public: people who hit the road for the daily commute in Phoenix metro.

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Objectives

The Public Outreach plan supports two major objectives:

1. Education
2. Communication

After a plan and target audience have been decided, it is important to decide what to say and how to say it. The AZTech plan includes the following education and communication strategies:

-Education
-Bulletins/Fact Sheets
-Community Events
-Executive Slide Presentation
-Printed Materials
-Tours of Traffic Operations Center
-Web Page
-Public Service Campaign

Bulletin/Fact Sheet - Provides information on AZTech's progress for distribution to the stakeholders and media. Four bulletins have been issued and more are scheduled.

Community Events - Plans to build a general awareness through the Arizona State Fair, Electric Light Parade, and Mill Avenue spring festival will give us exposure to a broad general public base.

Executive Slide Presentation - A "traveling road show" with a slide presentation geared for the non technical audience targeting Valley Chambers of Commerce and Top 25 corporations are scheduled for the winter and spring.

Printed Materials- An AZTech brochure was created using eye catching graphics and photos. Designed to be memorable and different from the normal traffic brochures in the marketplace, this piece's copy in the body of the brochure was designed to give the basic facts, but remain undated to take advantage of larger print runs and long shelf life. Funds were used cooperatively among the four MDI sites to create one multi-purpose brochure showcasing all four sites and their projects. Using co-op dollars helped stretch the budget dollars while still offering quality four color brochures.

Tours - Seeing is believing...In order to provide a better understanding of ITS technologies among the targeted groups, tours are encouraged and solicited. We have hosted many congressional delegations, professional groups from around the country and transportation industry professionals from all around the world. Over 100 tours have already been through the Traffic Operations Center (TOC).

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Web Page - In today's' world of instant everything, we utilized the client's Webmasters to design a web page offering immediate access to AZTech's project information, status, and accomplishments! With over 20,000 hits daily, our web page (azfms.com) offers unlimited ability to update and communicate new happenings quickly. Remembering to cross promote this free resource on all project printed materials from letterhead to business cards is another cost effective way to reach the targeted audience.

Public Service Campaign

The Public Service Campaign (PSA) was developed to compliment and support the objectives of the Public Outreach Plan. The PSA was designed in order to reach a large audience on a limited budget. Utilizing a mix of traditional and nontraditional approaches, we plan to build name awareness and educate the traveling public through high concentration sporting venues, grocery and retail stores, public libraries, community events, corporate billing mailers and outdoor boards. Many of these options are provided at no cost to AZTech. The campaign certainly would not take the place of a full fledged media buy, but serves as a layer to build upon name recognition and awareness of the AZTech program or products. The campaign is scheduled to support the education plan and begin implementation Feb - Fall of 1998.

Communication

Media relations and marketing make up the cornerstones of the communication plan. Media relations includes:

-Press Conferences
-Press Releases
-Media Contact

Press Conference - Allows us to display products, announce major milestones, showcase new technology. We have held two major press conferences.

Press Release - Informs the media of major accomplishments or events. The hope is to peak their interest in writing a story or filming a segment for the evening news. Currently AZTech has had over 25 published articles/stories, and 12 television news stories.

Media Contact - Keeping in regular contact with the media by making calls to determine upcoming story developments, special section calendars and provide traffic reporter tidbits helps build leads for future stories.

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MARKETING

The "keeper" of the image and project integrity is housed under marketing and is also the responsibility of the Public Outreach provider. Items considered under marketing are:

-Exhibit Booths
-Logo and Image Development
-Specialty items
-Signs, Banners
-Collateral Production
-Historical Archives
-Benchmark Survey

Exhibit Booths- Static display booths were created to give AZTech presence at industry trade shows, community events or press conferences. An exhibit booth provides ability to project an image to a specified audience, attract people learn more about the program and provide an outlet to showcase ITS products.

Logo and Image Development- The image and identity begins here. The image must be simple and easy to identify, and most important easily reproduced or printed. Small intricate logos are difficult to register or print. The integrity of the logo and it's use is the responsibility of the public outreach provider.

Specialty Items- Unity, ease of identity, and program awareness are all features specialty items can bring to a program. Ties, scarves, pins, hats, plastic trade show bags and golf shirts were produced to support the program.

Signs/Banners - Gives name recognition and exposure at large events, conference and trade shows.

Collateral Production- The production of all marketing brochures/flyers including concept, design, copy and printing are part of collateral production. Coordinated with the AZTech management, KC&A sees through each project to completion.

Historical Archives- The compilation of articles, videos, collateral and marketing materials is important to maintain the history and evolution of the project. Facts and figures summarized at the conclusion the program will be beneficial for the client to seek additional funding or showcase the success of the project.

Benchmark Survey- A base awareness survey was conducted in March 1997 of 1,000 people to gauge the awareness of ITS technologies and AZTech. A follow up survey at the conclusion of the Public Outreach program will be conducted to see if a shift in awareness has occurred.

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COOPERATIVE EFFORT

The key to a program involving public agencies and private companies is cooperation. The success of the AZTech program has been the spirit of teamwork and the ability of all to work together for a common goal. Several factors have contributed to the success. The two most important are:

- Public Outreach Committee
- Teamwork/Frequent Communication

Public Outreach Committee – Many organizations private and public have worked together to guide AZTech to it's successful launch scheduled in late April 1998. Monthly meetings keep all informed and involved in the Public Outreach activities. By involving key representatives from contractors, private partners and government agencies, we have been successful in communicating the public outreach needs, soliciting advise, building consensus and networking to achieve our goals.

Teamwork – Agencies must have the ability to set aside their "company/agency" agendas for the good of the project. At AZTech each have been able to focus on what's best for the project whether it involves providing their time, staff or resources. The primary administrators Arizona Department of Transportation and Maricopa County Department of Transportation have worked together with Katherine Christensen & Associates, Federal Highways Administration, BRW and others to develop and implement this Public Outreach program. The tone that has been established from the top on down will make or break the manner on how the partnership is defined. At AZTech it was defined very early on and it is the vigor and determination of the working group that makes AZTech a unique, dynamic and successful partnership.

Conclusion

Our vision is simple. We want to create a public outreach plan that will set a standard of worldwide excellence. The eyes of the world are upon Phoenix and the three other MDI sites. What is done in Phoenix will set the standards by which others will measure. Even with a limited Public Outreach budget, we can be successful at placing Arizona first in the minds of the traveling public as a state on the cutting edge of traffic technology for the 21st century.

UNITED STATES SECRETARY OF TRANSPORTATION, RODNEY SLATER

USHERING IN THE 21ST CENTURY

Delivered via video tape

Intelligent Transportation Systems (ITS) provide the best opportunity to improve transportation networks and make them ready for the 21st century. Many of you in Texas are benefitting from some sort of Intelligent Transportation Systems technology presently. Our goal is to provide better and safer services to our customers. The current transportation systems must change:

- Transportation systems must be better connected
- Systems operations must be better coordinated
- Real-time information and controls should be universal

Intelligent Transportation Systems (ITS) offer the promise of helping us get there. We must begin now—we must plan with the end in mind. That is common sense planning—that is common sense government. One way to do this, is to plan and build transportation systems using technologies across modes, jurisdictions, and regions. Bringing together police, fire, ambulance, transit, traffic, and freeway operating systems to develop a regional architecture. Take home the ideas from this Intelligent Transportation Systems conference. Working together we can create a seamless, integrated, intermodal transportation system linked together as one. I can think of no better way to usher in the 21st century.

Appendix A
Intelligent Transportation Systems

Consumer Project Compendium

"Technology for the Future"

Compiled by

The Center for Transportation Training and Research

Texas Southern University

Sponsored by the Southwest Region University Transportation Center Consortium

*Texas A&M * Texas Southern University * The University of Texas @ Austin*

Intelligent Transportation Systems : Incorporating the Consumer

Intelligent Transportation Systems (ITS) techniques are improving mobility for travelers throughout the nation and world. To date, ITS has largely been the focus of professionals who are applying innovative methods to complicated traffic and travel information needs in their communities. Consumers utilize these breaking technologies, often with little notice or understanding of the systems underlying their more convenient travel. For example, up-to-the-minute weather and safety information are available to commuters in most states allowing travelers to modify routes and travel times before being inconvenienced during their trip. Travelers in Colorado receive emissions reading that encourage improved air quality. Transit riders in Virginia have more reliable bus schedule information through an "electronic village."

Despite ITS advances, recent journal articles and conferences stress the difficulty of gaining broad support from elected officials and the general public for ITS development process and building a support base of elected officials and community planners are important to continue ITS deployment and reach full implementation.

Our desire is that by highlighting early successes directly involving ITS users. We will spearhead discussion of ITS outside traditional transportation circles. This document includes some of the projects that reflect the range of possibilities utilizing ITS. There will be more examples with each passing year. We look forward to the ITS transportation future.

Carol A. Lewis

Carol A. Lewis, Director
Center for Transportation Training and Research
Texas Southern University

Intelligent Transportation Systems (ITS)

ITS may be described as a sophisticated and update innovation that will completely change the perception people used to have regarding Transportation. Whether it be for Freight or Public Transportation, and by Road, Rail, Air or Sea; ITS will definitely make the US Transportation system safer and more efficient. Initially ITS was known as Intelligent Vehicle Highway Systems and divided into five major categories as follows :

1) **Advanced Traffic Management Systems (ATMS).**
2) **Advanced Traveler Information Systems (ATIS).**
3) **Advanced Public Transportation Systems (APTS).**
4) **Advanced Rural Transportation Systems (ARTS).**
5) **Commercial Vehicle Operations (CVO).**

However, recognition of the breadth of options and modal benefits of these improved technologies, resulted in the name change to Intelligent Transportation Systems. Also, growth in methods of applying technologies outgrew the five categories. Today, ITS is considered an "architecture" with numerous potential applications.

For several years, Research Centers, funded by the Federal Highway Administration have been working on a variety of projects demonstrating the capabilities of ITS. Some projects have already been realized and others, because they require more diligence, money and infrastructural changes, will be operational between 2000 and 2020. Four Research Centers already exist under the supervision of the Federal Highway Administration:

1) ITS Research Center of Excellence at the University of Michigan.
2) ITS Research Center of Excellence at Texas A & M University.
3) ITS Research Center of Excellence at Virginia Tech.
4) ITS Institute at the Center for Transportation Studies at the University of Minnesota.

Benefiting from ITS will be the general public, public agency operators, private sector commercial operators, and industry. The general public includes commuters, shoppers, public transportation users and tourists. Public agency operators are federal and state departments of transportation, county and city traffic departments and transit agencies. For private sector operators, there are trucking companies, bus companies, taxis, small package delivery and emergency services. In industry, automotive manufacturers, electronics manufacturers, traffic system suppliers and researchers will experience improvements resulting from ITS. Ultimately, all efficiencies and other gains will accrue to consumers.

The benefits will have impacts in several key ways:
On travel services, drivers and passengers will notice decreased travel time, increased safety, and reduced emergency response times. Economically, ITS will improve productivity and reliability, increase on-time delivery, decrease some operating costs, and strengthens international competitiveness. Information services for public transportation will effectively increase trip efficiency, improve trip planning, and increase comfort and convenience.

TRAVEL SERVICES

A cadre of sign projects inform drivers of matters ranging from road conditions to information about their car's health by analyzing gas emissions. The emissions analysis starts when a car passes through an infrared beam projected across the roadway at tailpipe level. When a car breaks the beam, the sensor reads the tailpipe emissions, an analyzer measures the amount of carbon monoxide using an analytical chemistry technique called absorption spectroscopy, and the sign flashes the result. If the car's health is good, the message will be *Good! Saving You Money.* Cars with fair ratings will have *Fair! Costing You Money* and cars with very bad ratings will read *Poor! Costing You Money* .

Variable message signs, in-vehicle devices, and traffic information centers (e.g.: Houston Transtar), make it possible for drivers to know there are impending problems caused by accidents or construction on the roads. Besides convenience experienced by commuters, schedule conscious truckers may adjust their travel to respond to the incident. Instead of driving more miles than previously expected, a trucker may take the initiative to park his vehicle for a short period of time or revise his route so as to not significantly affect the time of delivery or fuel consumption.

Improved safety is a principle focus of Automated Highway Systems (AHS). More than 40,000 fatalities each year result from crashes on US highways and human error leads to nine out of ten of those accidents. AHS technologies aim to significantly reduce and even eliminate the element of driver error. For those reasons, cars are being automated to overcome some human factors. AHS should improve highway movement by doubling or tripling lane capacity.

ECONOMIC ADVANTAGES

International competitiveness will be improved due to ITS advances. As the movement of goods and people throughout the world increases, so will the number of networks that facilitate transport operational and informational flows. Effective interconnection between modes is the key for being competitive in the future. The principle of logistics is to track the good end-to-end in the transport chain, from raw material to finished product ready for consumption. Sometimes, the quality of service may not be good; the control process can be time-consuming and inconvenient for truckers and shippers. The increases in freight demand are incompatible with the real capacity of freight transportation infrastructure. Finally, various obstacles in managing the huge number of informational and operational flows affect the competitiveness of the freight transportation industry. Transportation industries need something that makes it easier to manage their freight movements. ITS is helping to solve these problems through Fleet Management Systems (FMS). Some other systems exist, but this is one of the most

useful when dealing with freight transportation. The FMS enables all vehicles in a fleet to know the location of other vehicles, rates being charged, destinations of the vehicles, and when the vehicles are due back at the terminal. In this era of modernization and international changes, ITS will open the US economy to new outlets.

PUBLIC TRANSPORTATION

ITS plays a key role in public transportation by helping patrons to avoid congestion and better plan their trips. Traveler information systems give information about arrival and departure times, connecting services, routes, parking locations, schedules on buses and trains, fares, hotels and restaurants. Trip planning is also facilitated through displays on-vehicles.

Pre-Trip Information: the traveler gets the information before and during the trip. In-Terminal and Wayside: real-time information is transferred to the passenger already en route. In-Vehicle: drivers can get the information if their vehicle is equipped with on-board displays and communication devices while the vehicle is moving. Multimodal Information: both highway and transit travel information is provided.

An overview of some ITS products that are contributing to better movement of goods and people are shown below.

GPS Antenna: this antenna is designed to be mounted on the roof of a vehicle for fleet management and other in-vehicle applications.

Overheight Vehicle Detector: the unit is mounted at the same height as a low structure over the highway, and when a vehicle hits the infrared beam, the system triggers a warning device to instruct the driver to divert, turn back, or stop, depending on the circumstances. The warning can be visual or/and audible according to the layout of the road.

Traffic Management: this icon is designed to provide a centralized, integrated platform for traffic signal system control, information management, and graphical data display. The system can control as many as 5000 signalized intersections.

Wireless Traffic Control: this is a complete system for traffic controller synchronization and interconnection to existing wireline equipment. Other applications include road sensors, traffic counters, overhead signs, real-time mapping, and data gathering.

Geocoding on the Internet: this service allows users to send the company (Etak's EZ-Locate) lists of addresses and receive back latitude/longitude coordinates and census data for map displays as well as geographic and demographic analyses.

Fleet Management System: positioning information can be sent to the central computer when the remote units are queried, or automatically as a function of time or distance traveled.

DGPS Reference Station: this MX 9250 integrated keypad display is designed to function autonomously without an external computer or specialized software for setup and control. All of which allows users to initialize the unit, set parameters and view data.

GPS Receiver Upgrade: this receiver is designed for use in automobiles.

Traffic Monitoring: this component uses cameras for traffic detection and video surveillance can be used as a stand alone system or in conjunction with local traffic controllers and operations centers. It supports four fixed or pan-tilt-zoom cameras for vehicle classification by type and length, counts, speed, lane changes, headway, and origin-destination tracking between cameras.

Automatic Passenger Counting: a passive infrared detector array is used to register the thermal image of a person moving through an aperture. This allows traffic engineers and or dispatchers to have real-time information about passenger occupancy.

Adaptive Signal Control: this system calculates a «cost» function for each intersection and then adapts signaling to minimize that cost. The cost function takes into account factors such as delays, stops, excess capacities of links, area control plans, stops by public or special vehicles, and pedestrian crossing calls.

Remote Viewing System: this component provides color, motion video in real time using standard telephone lines, ISDN (integrated service digital network), cellular, fractional T-1, or satellite communications for traffic applications such as electronic toll and traffic management, vehicle enforcement and traffic monitoring.

Multiplexer: this unit is available with various data and voice interfaces. Applications include local-area and wide-area networks used in highway and telecommunications infrastructure.

Various examples of consumer related US ITS projects are outlined in this document.

TRANSCAL

This inter-regional Traveler Information System provides data on road, traffic, transit, weather and value-added traveler services, through the entire geographic region. Information is transported to and from travelers via telephones, personal digital assistants, in-vehicle devices and kiosks. Land line and cellular telephone, and wireless FM subcarrier networks will be used. In addition, this project will assess the ability to integrate information from multiple sources and the ability to integrate traveler service and transit information with real-time regional congestion and incident content.

LOCATION:	California and Nevada
START DATE:	July 1994
END DATE:	December 1997
CONTACT:	☛ *www.itsa.org/public/project/transcal.htm/*

Paul Olson	FHWA Region 9	
	(415) 744 2659	
Frank Cechini	FHWA California Division	
	(916) 498 5005	

BOSTON SMARTRAVELER

The goal of this test is to assess the public acceptance and potential traffic impacts of a telephone-based audio-text traffic information service.

LOCATION:	Boston, Massachusetts
START DATE:	September 1992
END DATE:	December 1994
CONTACT:	☛ *www.smartraveler.com*

Jonathan McDade	FHWA Region 1	(518) 431 4224
Edward Silva	FHWA Massachusetts Div.	(617) 494 2253
Michelle Bouchea	Massachusetts Hwy Dept.	(617) 973 7315

HOUSTON SMART COMMUTER

This is a real-time traffic and transit information system divided into four goals: Assess the market potential to increase bus, vanpool and carpool use by providing information on traffic, bus choices, and vanpools to travelers at home and work. Evaluate available technologies and identify those most feasible and cost-effective. Examine various ways of gathering and distributing transit and traffic information to include the identification of roles and costs for the agencies involved. Identify the project's administrative requirements and projected costs.

LOCATION: Houston, Texas

START DATE: February 1993

END DATE: May 1997

CONTACT:
- HYPERLINK *http://www.itsa.org/public/project/houston.htm*
- *www.itsa.org/public/project/houston.htm*
- *http://traffic.tamu.edu/smartfrm.html*
- *www.fta.dot.gov/library/technology/APTS/tech10/APTSAB/06Houst.htm*

Dennis Symes	FTA Headquarters, TRI-11	(202) 366 0232
Mark Olson	FHWA Texas Division	(512) 916 5966
Gloria Stoppenhaggen	Houston Metro	(713) 881 3310
Jerry Jones	FHWA Region 6	(817) 978 4358

GENESIS

This ATIS through personal communication devices provides real-time information to travelers. This element of the Minnesota Guidestar ITS program is a combination of transit and traffic data. The portable Genesis PCD enables the urban traveler to get current data relevant to a chosen trip mode and route.

LOCATION: Minneapolis / St-Paul, Minnesota.

START DATE: September 1992

END DATE: March 1997

CONTACT:
- HYPERLINK *http://www.syntonic.saic.com/its/mnguide.htm*
- *www.syntonic.saic.com/its/mnguide.htm.*
- *www.imic.state.mn.us/gc/dir/mdotguid.htm*

William Browne	IIFHWA Region 5, HES-5	(708) 283 3549
Jim McCarthy	FHWA--Minnesota Division	(612) 290 3259
Ray Starr	Minnesota DOT	(612) 296 3000

HERALD EN-ROUTE ADVISORY SYSTEM VIA AM SUBCARRIER

This project which consists of message generation, transmission and reception, aims at disseminating important traveler information in difficult-to-reach remoting rural areas using a subcarrier on an AM broadcast station. It will be beneficial to broadcasters, travelers, and equipment manufacturers. Basically, it should have impacts on transmission of traveler information in challenging terrain (Colorado), potentially interfering environmental conditions, (Iowa) improvements to safety and the overall market ability of the system. Herald is a three phase project.

LOCATION: Colorado and Iowa

START DATE: January 1995

END DATE: October 1997

CONTACT:

- HYPERLINK *http://www.tlhre.gov/its/optests/atmsakis.htm*
- *www.tlhre.gov/its/optests/atmsakis.htm*
- *www.tc.faa.gov/act200/ATClabs/essf.html*

John Whited	Iowa DOT	(515) 239 1411
Lloyd Rue	FHWA Region 8	(303) 969 5772
Jim Arnold	FHWA-TFHRC, HSR-13	(703) 285 2974
Scott Sands	FHWA Colorado Division	(303)969 6730

IDAHO STORM WARNING SYSTEM

The purpose of this project is to implement various sensor systems that could provide accurate and reliable visibility and weather data and to use that data to provide general warnings, speed advisories, and possible road closure information to travelers on a section I-84 in Southeast Idaho that is highly prone to reduced visibility from blowing snow and dust. Primarily, the goal of this system is to reduce multi-vehicle accidents in rural areas due to low visibility, by providing variable signs to motorists.

LOCATION: Interstate 84 in Southeastern Idaho

START DATE: June 1993

END DATE: January 1998

CONTACT:

- *www.tlhre.gov/its/optests/atmsakis.htm*
- *www.state.id.us/ITD/contents.htm*

Ed Fischer	FHWA Region 10	(503) 326 2053
Greg Laragan	Idaho Transportation Dept	(208) 334 8558
Ben Frevert	FHWA Idaho Division	(208) 334 1843

National Capital Region Traveler Information Project

A traveler information system will be developed to improve the transportation conditions in the region. The brainchild of a coalition of public transportation agencies throughout the region will have various advantages: loss of time and stress are eliminated for the traveling public information flows among public transportation agencies are more effective and then, the coordination of their operations will be improved.

LOCATION: Washington, DC Metropolitan area

START DATE: December 1996

END DATE: December 1999

CONTACT:

- *www.vdot.state.va.us/*
- *www.wmata.com*
- *www.mdot.state.*

Jim Robinson	Virginia DOT-Richmond	(804)786 6677
Pam Marston	FHWA Region 3	(410) 962 0077 ext. 3054
Glenn McLaughlin	Maryland State Hwy. Admin.	(410) 787 5815
Ron Boenau	FTA Headquarters	(202) 366 0195
Chung Eng	FHWA Headquarters	(202) 366 8043

Atlanta Atis-Kiosk Project

This project focuses on traveler information statewide, during and after the Olympics. Information will be provided to rest areas, welcome centers, shopping, employment, lodging centers and Olympic venues. The Georgia network will operate the kiosks.

LOCATION: Georgia, Statewide with a concentration in the Atlanta Metropolitan Area.

START DATE: January 1994

END DATE: February 1997

CONTACT:

- *www.dot.state.ga.us/*
- *www.itsa.org/public/project/atlantaatiskiosk.html*

Larry Dreihaup	FHWA Region 4, HES-04	(404) 562 3685
Keith Sinclair	FHWA Georgia Division	(404) 562 3630
Ms. Toni Dunagar	Georgia DOT	(404) 657 6699

ATLANTA TRAVELER INFORMATION SHOWCASE

The showcase provides real-time information to travelers through personal communication devices, in-vehicle navigation devices, on-line computer information services, interactive television in selected hotels and cable television. The project was operational before, during and after the 1996 summer olympic and paralympic games. It provides information on multimodal travel options and also includes an extensive public information campaign.

LOCATION: Atlanta, Georgia

START DATE: February 1995

END DATE: March 1997

CONTACTS:
- *www.georgia-traveler.com*
- *www.atlanta.traveler.com/*

Bob Rupert	FHWA Headquarters, HTV-3	(202) 366 2194
Susan Bruce	FHWA Region 4, HES-04	(404) 562 3630
Mark Doctor	FHWA Region 4	(404) 562 3685
Felton Rutledge	FHWA Georgia Division	(404) 347 0325

ANALYSIS OF TRAVELERS' PREFERENCE FOR ROUTING

The strategy here is to provide traffic status information for travelers on routes and schedules. This will make the roadway infrastructure more effective. The goal of this strategy is to influence traveler decision-making after identifying important factors in terms of decision criteria for departure times, routing and rerouting.

LOCATION: Maryland

START DATE: May 1995

END DATE: January 1998

CONTACT:
- *www.itsa.org/public/project/analysis.html*

Nazemeh Sobhi	FHWA	TFHCR, HSR 30	(703) 285 2907

DRIVER INFORMATION RADIO EXPERIMENTING WITH COMMUNICATION TECHNOLOGY (D.I.R.E.C.T.)

DIRECT communicates advisory information to motorist through radio data system (RDS), FM subcarrier, automatic highway advisory radio (AHAR), low power highway advisory radio (HAR) and cellular phones. Traffic information is collected from various sources and fused before being provided to travelers by the Michigan ITS Center.

LOCATION: Along sections of I-75 and I-94 in the Detroit, Michigan area

START DATE: May 1991

END DATE: December 1997

CONTACT: ☛*www.mdot.state.mi.us/inside.htm*

Dr. Kunwar Rajendra	Michigan DOT	(517) 373 2247
William Brownell	FHWA Region 5, HES-5	(708) 283 3549
Morris Hoevel	FHWA Michigan Division	(517) 377 1837

TRILOGY

This project is part of the Minnesota statewide ITS program, Guidestar. Travelers are provided information through the Radio Broadcast Data System-Traffic Message Channel (RDBS-TMC), and a high-speed FM subcarrier. The basic principle of Trilogy is testing and comparison of an array of user devices, and the evaluation of its impacts on the existing transportation network. End users will be provided with area and route-specific en-route advisories on the highway operating conditions in the twin cities Metropolitan area.

LOCATION: Twin Cities Metropolitan Areas

START DATE: July 1994

END DATE: December 1997

CONTACT: ☛HYPERLINK *http://www.dot.state.mn.us/*
☛*www.dot.state.mn.us/*
☛Email : *info@dot.state.mn.us*

Jim McCarthy	FHWA--Minnesota Division	
Gary Hallgren	Minnesota DOT--Metro Division	(612) 296 3000

SEATTLE WIDE AREA FOR TRAVELERS (SWIFT)

This is a test to deliver traveler information via a Seiko receptor message watch, an in-vehicle FM subcarrier radio, and a portable personal computer. SWIFT is an expansion of the Bellevue Smart Traveler Project.

LOCATION: Seattle, Washington

START DATE: August 1994

END DATE: December 1997

CONTACT: ☛ *www.itsa.org/public/project/seattlewidearea.html*

Larry Senn	Washington State DOT	(206) 543 6741
Ed Fischer	FHWA Region 10, HEO-10	(503) 326 2071

TRAVINFO

This is a comprehensive, region-wide traveler information system than can provide transportation information to a large range of devices and users. Information is provided to the general public, public agencies and commercial vendors from a multimodal transportation information center. The « open access » architecture will facilitate the transfer of technology in the future.

LOCATION: San Francisco Bay Area, California

START DATE: April 1993

END DATE: December 1998

CONTACT:

☛ *www.hooked.net/corp/fastline/docs/projects.html*

Paul Olson	FHWA Region 9, HPD-09	(415) 744 2659
Melanie Crotty	Metro Transportation Commission	(510) 464 7708

DENVER COLORADO HOGBACK MULTI-MODAL TRANSFER CENTER

The purpose of this project is to provide a Multimodal Transfer Center on I-70 near the Western edge of the metro area and for Downtown Denver. Real-time or near real-time information will be provided to a kiosk via electronic methods. All of which tends to: Provide transit users, carpoolers and recreational users with a convenient, attractive, secure and *user-friendly* parking facility. Test APTS and ATIS within 18 months in specific information kiosk. This must increase cooperation with other related regional traveler information initiatives in the Denver area.

LOCATION: Denver, Colorado.

START DATE: May 1993

END DATE: September 1998

CONTACT:

- HYPERLINK *http://www.itsa.org/public/project/denverhogback.html*
- *www.itsa.org/public/project/denverhogback.html*

Lloyd Rue	FHWA Region 8, HPD-08	(303) 969 5772
Debra Angulski	Colorado DOT	(303) 757 9111
Scott Sands	FHWA Colorado Division, HFO-CO	(303) 969 6730

NEW YORK METROPOLITAN TRANSPORTATION AUTHORITY TRAVEL INFORMATION SYSTEM

In addition to the TIS , there is a pilot project for a GPS-Based locating system. About 200 buses will cover North-South and East-West destinations through 250 major bus stops equipped with travel information devices. This three type information devices will consist of: 50 interactive kiosks installed at major bus stop points, as well as transfer points between Railway routes, Subway routes and other Bus routes. Tourists will be provided with clear information. 100 video monitors plus voice announcements at major bus stops. 100 variable message signs at high volume bus stops. 50 vehicle equipped with on-board displays.

LOCATION: New York

START DATE: September 1994

END DATE: September 1997

CONTACT:

- *www.itsa.org/public/project/new.html*

Dennis Symes	FTA Headquarters, TRI-11	(202) 366 0232
Harold Brown	FHWA NY Division, HDA-NY	(518) 431 4127 ext. 234

MIAMI REAL-TIME PASSENGER INFORMATION SYSTEM

Thanks to the MDTA, customers are provided with an automated trip planning capability including real-time on-line route and schedule information. Major rail and bus transfer points will be equipped with informational kiosks.

LOCATION	Metropolitan Dade County, Florida
START DATE	July 1995
END DATE	July 1997
CONTACT:	
Ron Boenau	FTA - TRI-11 (202) 366 0195

MAYDAY PLUS

The objective of this project is to reduce the time taken to reach victims of rural motor vehicle accidents by improving the quality of information to emergency service providers. All of which should consist of reducing response times, improving safety and saving lives.

LOCATION:	Statewide throughout Minnesota
START DATE:	January 1991
END DATE:	January 1996
CONTACT:	☛ *www.itsa.org/public/project.minnesota.html*

Jerry Crowson	Minnesota DOT	(612) 296 3000

RAILROAD CROSSING VEHICLE ALERT SYSTEM

This system via an in-vehicle audio/visual warning alerts drivers of priority vehicles about the presence of approaching trains at junctions between roads and rail. The first phase of VPAS is the testing and evaluation of some prototypes at the FRA test track facilities in Colorado. The second phase is the installation of the systems under various environmental, physical and operational conditions.

LOCATION: Phase 1: Pueblo, Colorado and
Phase 2 Testing: TBD

START DATE: June 1995

END DATE: May 1997

CONTACT:

- *www.itsa.org/public/project/railroad.html*

Joseph Lasek	FHWA Headquarters, HHS-10	(202) 366 2174
James Smailes	FRA Headquarters, RDV-11	(202) 632 3260
Ron Boenau	FTA Headquarters	(202) 366 0195

THE SMART SIGN PROJECT

The changeable message sign and the remote sensing device have been combined to create a remote sensing information system (RSIS) that aims to inform drivers about their car's health. The emissions analysis starts when a car passes through an infrared beam that the analyzer shots across the roadway at tailpipe level. When a car breaks the beam, the sensor reads the tailpipe emissions, the analyzer measures the amount of carbon monoxide using an analytical chemistry technique called absorption spectroscopy, and the sign flashes the result. If the health's car is good, the message will be *Good! Saving you money!* Cars with fair ratings will have *Fair! Costing you money!* Cars with very bad ratings will read *Poor! Costing you money!*

LOCATION: Denver, Colorado

START DATE: Late 1980's

END DATE: 1997

CONTACT:

Neil J. Lacey	Denver DOT	(303) 757 9971
Lenora Bohren	NCVES Colorado	(970) 491 7240
R. Bruce Hutton	University of Denver	(303) 871 2273

ITS FOR VOLUNTARY EMISSIONS REDUCTIONS

This project consists of giving real-time vehicle emissions readings to passing motorists by using an active infrared roadside emissions sensor and a variable message sign at a freeway exit ramps. By telephone and brochures, motorists will be given additional information provided they keep their vehicle tuned. The success of this program will be assessed through surveys and measurements of identified high emitters at the site over time. The basic objective of the test is to evaluate impacts on public's behavior regarding real-time information to drivers and education material about the fuel savings and pollution; but also to assess the effectiveness of vehicle tune-ups if they were free or subsidized.

LOCATION: Denver, Colorado.

START DATE: January 1995

END DATE: October 1997

CONTACT ☛ *www.itsa.org/public/project/itsfor.html*

Neil Lacey	Colorado DOT	(303) 757 9971
Lloyd Rue	FHWA Region 8, HPD-08	(303) 969 5772 ext. 326
Scott Sands	FHWA Colorado Division, HFO-CO	(303) 969 6730 ext. 362

DENVER COLORADO RAPID TRANSIT DISTRICT PASSENGER INFORMATION DISPLAY SYSTEM

Information is collected from AVL system comprised in all RTD buses and they are provided to video monitors at specific locations throughout the district and at specific companies. Waiting passengers are provided with estimated bus departures.

LOCATION: Denver, Colorado

START DATE: September 1993

END DATE: September 1997

CONTACT: ☛*www.itsa.org/public/project/denver.html*

Dennis Symes	FTA Headquarters, TRI-11	(202) 366 0232
Lloyd Rue	FHWA Region 8, HPD-08	(303) 969 5772
Dave Shelley	Denver Rapid Transit	(303) 299 2408

LYNX PASSENGER TRAVEL PLANNING SYSTEM

The central Florida regional authority aims to implement a transit component for their Passenger Travel Planning System. It consists of installing electronic bus stop displays and a vehicle location system integrated with an existing signal pre-emption system. Transit buses will be equipped with electronic emitters to be read by existing electronic detectors at signaled intersections. Data transferred from the intersection will enable the Transportation Management Center and the Transit Operator to provide next bus-stop information to customers through bus-stop displays but also, to monitor transit fleet performance and to improve service.

LOCATION: Central, Florida

START DATE: January 1996

END DATE: February 1997

CONTACT: ☛HYPERLINK *http://www.golynx.com*
☛*www.golynx.com*

Ron Boenau FTA Headquarters, TRI-11 (202) 366 0195

ST-PAUL ADVANCED PARKING INFORMATION SYSTEMS

This APIS will provide real-time information to motorists about parking facilities and directions for the best routes to open parking facilities. Automated variable message signs and static signs will be used.

LOCATION: Statewide throughout Minnesota

START DATE: January 1991

END DATE: February 1996

CONTACT: ☛ *www.dot.state.mn.us/main/mndot.html*

Samuel Boyd Minnesota DOT (612) 296 0838

BLACKSBURG RURAL TRAVELER INFORMATION SYSTEM

This project tends to make the transit system easier to use and more reliable for the traveler by using a system-wide AVL which consists of providing a real-time traveler information system through kiosks, way-side stops, and an existing *electronic village*. Twenty-seven buses on fixed routes, 8,500 daily riderships during the academic year and 642,000 annual miles are operated by Blacksburg Transit.

LOCATION: Blacksburg, Virginia

START DATE: July 1996

END DATE: Jan 1998

CONTACT: Ron Boenau FTA Headquarters, TRI-11 (202) 366 0195

ATLANTA DRIVER ADVISORY SYSTEM (ADAS)

This test tends to evaluate the effectiveness of en-route traveler information and traveler services information provided by FM subcarrier wide area communications systems and applications of the 220 MHZ frequency pairs. All of which is integrated in the Atlanta's ATMS.

LOCATION:	Atlanta, Georgia
START DATE	March 1995
END DATE	March 1997
CONTACT:	☛ *www.itsa.org/public/project/atlantadriver.html*

Susan Bruce	FHWA Division	(404) 562 3630
Dave Hancharik	Scientific Atlanta	(770) 903 5000

DELAWARE COUNTY RIDETRACKING

The automated identification and billing system (AIBS) which has already been tested should be able to automate existing processes using advanced technology for the identification of passengers, the accounting and billing of each passenger trip, the reporting required for coordination with various transportation suppliers and internal transportation monitoring. All of which should result in cost saving and system efficiency by eliminating manual processes.

LOCATION:	Delaware County, Pennsylvania
START DATE:	September 1992
END DATE:	January 1997
CONTACT:	☛ *www.itsa.org/public/project/deleware.html*

Sean Ricketson	FTA Headquarters, TRI-11	(202) 366 6678
Judy McGrane	Community Transit	(202) 532 2900

Appendix B
Intelligent Transportation Systems

Conference Survey Findings

ITS PLANNERS
SURVEY FINDINGS

QUESTION 1

100% of the respondents are familiar with the term Intelligent Transportation Systems.

QUESTION 2

100% of the respondents provided an answer and gave their concept of ITS.

QUESTION 3

A. 27.2% disagree that they are frustrated with the traffic they experience everyday; and the remaining 72.8% consider traffic congestion as a very frustrating experience.

B. 50% are not happy with their commute; conversely, the other 50% are pretty satisfied with it.

C. 22.6% of the respondents completely disagree that people should use mass transit more than they do; and another 77.4% completely agree that mass transit is still useful to people.

D. Almost 65% disagree about safety being their major concern when they get into their car, while only 35% consider safety a priority and completely agree that they care about it.

E. 68% of the respondents do not really worry about the cost of getting to and from work; and 32% completely agree that cost is an important criteria.

F. 13.6% completely disagree that there are too many cars on the road. The remaining 86.4% completely agree that there are too many cars on the road.

G. 50% think the traffic would be fine if there were more roads; and the other 50% are completely opposed to this statement.

H. Is technological advancement a solution to traffic congestion? 9% completely disagree; 91% completely agree.

QUESTION 4

A. Only 4.5% did not think the cost of commuting was important and 95.% rated the cost of commuting from fairly important to extremely important.

B. 9% of the respondents do not give much attention to the time it takes them to commute; 91% rate the question of commuting time as fairly to extremely important.

C. All the respondents considered the safety question was of great concern and the rated it fair, very, and extremely important. Safety was rated from 6 and 10 respectively; the percentages were: 9.1%, 13.6%, 18.2%, 18.2%, and 40.9%.

D. Comfort during the commute was important for 100% of the respondents and was rated from 6 to 10, which means fairly to extremely important.

E. The question of *commuting* convenience was rated 8 to 10. It was then very to extremely important for almost all of the respondents. In fact, of all the respondents, 45.5% gave an 8; 27.3% responded with a 9; and 22.7% gave a 10. Only 4.5% did not provide an answer.

F. 4.5% of the respondents seemed bothered by frustrations during their commute; the remaining 95.5% rated this matter from fairly to extremely important.

G. Regarding having up-to-the-minute information: all the respondents were very concerned about getting such information and rated the service from 6 to 10.

H. 9.1% do not think consistency is particularly important; however, 90.0% expect to have consistent commuting service and expect the same experience with it every time they commute. They rated consistence from 5 to 10.

I. For 27.3%, the impact of commuting on the environment was not important; while 68.2% rated the question from fairly to extremely important.

J. The question of energy consumption was not important at all for 31.8% of the respondents; while the same question was rated 5 to 50 by the remaining 60.2%, who believe energy consumption is a fairly to extremely important concern.

QUESTION 5

A. In-vehicle devices: 63.6% have heard of them; only 9.1% have used them; and 27.3% have both used and experienced them.

B. Crash avoidance systems: 72.7% have heard of them; 9.1% have used them; and 18.2% have both used and experienced them.

C. Automatic or electronic toll collection at toll booths: 27.3% have heard of them; 45.5% have used them; and 27.3% have both used them and heard of them.

D. Variable message signs: 13.6% have heard of them; 45.5% have used them; and 40.9% have used them and heard of them.

QUESTION 6

A. 9.1% of the respondents think in-vehicle devices are not useful at all; and all the other respondents rated those devices from 5 to 10--which means they are fairly to extremely useful for 90.9% of the respondents.

B. 100% of the respondents rated crash avoidance systems from fairly to extremely important.

C. Electronic toll collection at toll booths are fairly to extremely important to all of the respondents. (100%)

D. All the respondents consider variable message signs that indicate roadway concerns while driving are very to extremely important. (100%)

STATISTICS

Question 1 had 22 valid answers out of 22 respondents surveyed in the workshop.
Question 2 had zero valid answers out of 22 respondents surveyed in the workshop.
Question 3 had 22 valid answers collected from surveys in the workshop.
Question 4 had 22 valid answers for A,B,C, and D from surveys collected in the workshop.
There were 21 valid answers for E. The remaining response was missing.
There were 22 valid answers for F,G, and H collected in the workshop.
There were 21 valid answers for I. The remaining response was missing.
There were 22 valid answers for J collected in the workshop.
Question 5 and **6** both have 22 valid answers for A, B, C, and D collected in the surveys from the workshop.

ITS TECHNICIANS SURVEY FINDINGS

QUESTION 1

The results show that 100% of all the respondents have heard of ITS.

QUESTION 2

There were no answers at all to the question "What does the term Intelligent Transportation Systems mean to you?"

QUESTION 3

A. Only 15% consider that traffic congestion is not a big deal; however the other 85% completely agree that they are frustrated with the traffic they experience everyday.

B. Nearly 45% are happy with their commute while 55% completely agree that they are not happy with their commute.

C. Only 3.7% completely disagree that people should use mass transit more than they do; while 96.7% think mass transit is a great necessity for them.

D Regarding safety, some 37% did not think it was a priority, and 63 percent agree that they are concerned about getting into a car accident every time they get into their car.

E. Approximately 38% care do not seem to care about the cost of getting to and from work; as for the other remaining percentage (62%), they completely agree that the cost of travel to and from is an important factor.

F. Are there too many cars on the road? A small 3.7% slightly agreed to that question, and the other respondents (97.3%) completely agreed that traffic congestion is a very serious matter.

G. If there were more roads, nearly 30% would be happy and think driving on highways will be more enjoyable, while the other 70% do not see news roads as an ultimate solution to the problem of congestion.

H. Technological advancements to alleviate traffic congestion is certainly a good idea that is received positively by most of the respondents (more than 95%), and only 3.7% seem to disagree that such measures would be efficient enough.

QUESTION 4

A. The cost of the commute is not important to 37% of the commuters, while 63% of the respondents attach significant interest to the cost of their commute.

B. To the question of time, most of the commuters all the respondents think time is a stimulating factor in their decision to commute.

C. Basically, safety attracts all the respondents. Nearly most of them consider it is extremely important.

D. Comfort during the commute is also important to all of the respondents.

E. Convenience of the commute attracted a big proportion of positive responses. In fact, all the group made comfort one of their priorities.

F. It appears in the surveys that 3.7% of the respondents do not experience frustration at all when they commute; however, a big 97.3% state it is extremely important for them to not experience any frustration during their commute.

G. Having up-to-the-minute information was an important question to most of the respondents. Only 15% were not interested in receiving real-time information on traffic conditions.

H. Slightly more than 11% would not bother if the commuting service was not consistent. The rest of the commuters think consistency is extremely important in the service.

I. Regarding the impact of commuting on the environment, the response went to fairly important to extremely important. Basically 100% of the respondent were concerned about the question.

J. Energy consumption also is a great concern for most of the respondents. Basically, all the responses went to fairly important to extremely important.

QUESTION 5

A. Concerning in-vehicle devices that give directions, 85.2% have heard of them, 3.7% have experienced them; and only 11.1% have both heard and used them.

B. Crash avoidance systems: 92.6% have heard of crash avoidance systems; 3.7% have both heard and used the system, 3.7% were neutral about the question.

C. As for electronic toll collections, 51.9% have heard of them, 33.3% have already used them, and only 14.8% have both heard and used electronic toll collections.

D. Variable message signs: 37% have heard, 29.6% have experienced, and 33.3% have both heard and used.

QUESTION 6

A. In-vehicle devices appear to be fairly to extremely useful. The rate of response went from 3.7% (fair), to a high 96.3% who estimate those devices as a must.

B. Crash avoidance systems are rated fairly useful (7.4%) to extremely useful (88.9%), and some 3.7% were neutral about the question.

C. Only 3.7% did not attach importance to electronic toll collection, 11.1% thought electronic toll collections are fairly useful; and, the remaining percentage consider ET as extremely useful.

D. Variable message signs which inform drivers on roadway traffic conditions are rated fairly useful by 3.7% of the respondents, and very to extremely useful by the rest of the respondents.

STATISTICS

Question 1 had 27 valid answers out of 27 surveys collected in workshop.

Question 2 had no valid answers out of the 27 surveys collected in workshop.

Question 3 had 27 valid answers on surveys collected in workshop

Question 4 had 25 valid responses out of 27 for A & B--the remaining responses were missing.
There were 26 valid responses for C--the remaining response was missing.
There were 25 valid responses for D & E--the remaining responses were missing.
There were 26 valid responses for F, G, H, I & J--the remaining response was missing.

Question 5 had 27 valid responses for A.
There were 26 valid responses for B--the remaing response was missing.
There were 27 valid responses for C & D.

Question 6 had 26 valid responses counted out of the total 27. Remaining response was missing from surveys collected in workshop.

MEDIA / CONSUMERS
ITS SURVEY FINDINGS

QUESTION 1

75% (9:12) of the persons answered "yes" to the question, "have you ever heard of the term Intelligent Transportation Systems?" The remaining 25% answered "no."

QUESTION 2

100% of the survey participants provided an answer to this point and gave their understanding of ITS.

QUESTION 3

A. Nearly 60% of the participants completely disagreed that they are frustrated with the traffic they encounter on a daily basis. Another 40% agreed completely that they were frustrated with the traffic situation.

B. Slightly more than 90% were happy with their commuting arrangements and only a small 10% indicated complete opposition due to the inconvenience of commuting.

C. Response was split 50% and 50% regarding the question of mass transit and whether people should use it more than they do. Some agreed it was useful, others were skeptical.

D. Most of the people, or more than 65%, completely agreed that safety is their major concern when they get into their car. Some 33.3% did not give much value to safety concerns.

E. More than 30% thought the cost of getting to and from work was not a significant factor in transportation; however, 66.7% considered cost as a major factor in their trip decision-making to and from work.

F. Only a few respondents did not seem to bother about congestion but, in fact, 75% of them completely agreed that there are too many cars on the road and that the problem of congestion should be alleviated.

G. 33.3% agreed that building more roads would make driving more comfortable, and slightly more than 65% considered building more roads was not the solution to congestion; in fact, they felt the more roads are built, the more drivers get on them.

H. Technological advancements as a solution to traffic congestion is welcomed by most of the respondents; and is rated from fairly to extremely important (16.7%, 8.3%, 25%, and 50% are the successive percentages for the grade 7 to 10 which determine the level of importance.)

QUESTION 4

A. 25% did not take the cost of their commute as a primary criteria, while 75% thought it was a factor of major importance.

B. Only 16.7% do not think time is important in their decision to commute, and 83.3% consider time as a significant criterion.

C. The question of safety rated from 6 to 10, which means all of the respondents agreed that it is of great importance.

D. Comfort during the commute indicated similar responses: all agreed it was of great importance.

E. Convenience of the commute attracted ratings from 6 to 10, with respondents agreeing that commuting convenience was important with 8.3%, 16.7% 33.3% 8.3% and 91.7% respectively. Another 8.3% were missing and did not give an opinion.

F. Only 8.3% did not experience frustration with their commute; while 96.3% estimated frustration as one of their major concerns when they take the freeway.

G. Obtaining real-time information is slightly important for 8.3% and a larger 96.7% consider real-time information as a great advantage while driving.

H. The question of consistency of the commuting service was rated from fairly, very, and extremely important by respondents.

I. As for the impact of commuting on the environment, all of the respondents seemed to be fairly, very, and extremely concerned about the issue (91.7%), while 8.3% did not provide an answer.

J. Energy consumption was a great concern for 91.7% of the respondents, 8.3% did not give much consideration to it, and the remaining 8.3% did not respond.

QUESTION 5

A. Concerning in-vehicle devices that give directions--66.7 % have heard of such devices, 25% have experienced them, and the remaining 8.3% are neutral on the subject of in-vehicle devices.

B. 83.3% have heard of crash-avoidance systems; 8.3% have used them, and 8.3% are neutral regarding such systems.

C. 33.3% of respondents have heard of Electronic Toll Collections (ETC), 41.7% have used ETC, and 16.7% have both heard and used ETC. The remaining 8.3% are neutral regarding ETC.

D. 58.3% have used Variable Message Signs (VMS), 33.3% have both heard of and used VMS. 8.3% did not answer this question.

QUESTION 6

A. In-vehicle devices are considered fairly, very, and extremely useful for all of the respondents. 8.3% did not provide an answer to this question.

B. Crash-avoidance systems rate 6 to 10, which means fairly to extremely useful, with findings of 8.3%, 8.3%, 16.7% and 53.8% respectively. The remaining 8.3% did not provide opinions.

C. All of the respondents attached a significant interest to Electronic Toll Collections and 8.3% were neutral.

D. Variable message signs are also considered fairly to extremely important for all of the respondents. 8.3% did not provide an answer.

STATISTICS

Question 1, "Have you ever heard of the term Intelligent Transportation Systems?" there were 12 valid question out of 12 persons surveyed were collected in workshop.

No one answered the **Question 2** regarding the meaning of ITS. Therefore, 0 out of 12 respondents replied on surveys collected in workshop.

Question 3 from "a" to "h" had 12 valid answers on surveys collected in workshop.

Questions 4 through **Question 6** had 11 valid answers on surveys collected in workshop. 1 remaining answer was missing.

Appendix C

Survey Comparison

CTTR Conference Instrument and ITS America Market Research Bureau

The ITS America Market Research Bureau Survey Instrument was distributed to conference participants at initial break sessions

Market Research Bureau

ITS OMNIBUS QUESTIONNAIRE

1. Have you ever heard the term "intelligent transportation systems?"

   [ ] Yes
   [ ] No

2. What does the term "intelligent transportation systems" mean to you?

   [ ] Nothing

   RECORD ALL OTHER RESPONSES VERBATIM

   _____

   _____

   _____

Market Research Bureau

3. I have a list of statements about transportation. For each one, I'd like for you to tell me whether or not you agree with that statement. The scale I'd like for you to use is from 1 to 10, where 1 means that you disagree completely with the statement and 10 means that you agree completely.

	Disagree Completely									Agree Completely
a. I'm frustrated with the traffic I experience everyday.	1	2	3	4	5	6	7	8	9	10
b. I'm NOT very happy with my commute.	1	2	3	4	5	6	7	8	9	10
c. People should use mass transit more than they do.	1	2	3	4	5	6	7	8	9	10
d. Every time I get into my car I'm concerned about getting into an accident.	1	2	3	4	5	6	7	8	9	10
e. The cost of getting to and from work is something that I really worry about.	1	2	3	4	5	6	7	8	9	10
f. There are too many cars on the road.	1	2	3	4	5	6	7	8	9	10
g. The traffic would be fine, if only there were more roads.	1	2	3	4	5	6	7	8	9	10
h. There are ways that the traffic situation can be improved through technological advancements.	1	2	3	4	5	6	7	8	9	10

4. I have a list of factors that might or might not be important to you regarding your commute. For each one, I'd like for you to rate the level of importance to you. Again, the scale is from 1 to 10, where 1 means that it is not at all important to you and 10 means that it is extremely important to you.

The first/next item is _____. How important is _____ to you.

	Not at all Important									Extremely Important
a. The cost of the commute	1	2	3	4	5	6	7	8	9	10
b. The time it takes to commute	1	2	3	4	5	6	7	8	9	10
c. Safety	1	2	3	4	5	6	7	8	9	10
d. Comfort during the commute	1	2	3	4	5	6	7	8	9	10
e. Convenience of the commute	1	2	3	4	5	6	7	8	9	10
f. Having no frustrations in the commute	1	2	3	4	5	6	7	8	9	10
g. Having up to the minute information on the traffic conditions	1	2	3	4	5	6	7	8	9	10
h. Consistency – that is having the same experience during the commute every day	1	2	3	4	5	6	7	8	9	10
i. The impact on the environment of my commute	1	2	3	4	5	6	7	8	9	10
j. The energy consumption	1	2	3	4	5	6	7	8	9	10

5. Now, I have a list of some new things that are being done in transportation. For each one, please tell me if you have heard anything about it, and if so, if you have used it or had any experience with it.

A. Have you ever heard anything about _____?

B. Have you ever used or had experience with _____?

	Heard	Used/Experienced
a. Devices in cars that give you directions to your destination.	[ ]	[ ]
b. Systems on cars or roads that would help avoid collisions.	[ ]	[ ]
c. Automatic or electronic toll collection at toll booths	[ ]	[ ]
d. Signs on roads that provide up to the minute information on traffic conditions.	[ ]	[ ]

6. For each of these, I'd like you to rate how useful you think it would be. Again, the scale is from 1 to 10, where 1 means that it is not at all useful and 10 means that it is extremely useful.

The first/next item is _____. How useful is _____.

	Not at all Useful									Extremely Useful
a. Devices in cars that give you directions to your destination	1	2	3	4	5	6	7	8	9	10
b. Systems on cars or roads that would help avoid collisions	1	2	3	4	5	6	7	8	9	10
c. Automatic or electronic toll collection at toll booths	1	2	3	4	5	6	7	8	9	10
d. Signs on roads that provide up to the minute information on traffic conditions	1	2	3	4	5	6	7	8	9	10

Survey Comparison

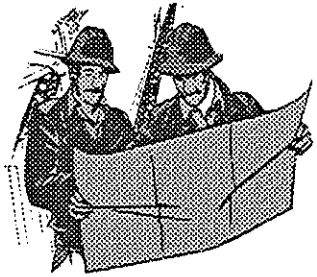
Familiar with "ITS" term

8 %

ITS Market Research Bureau

100 %

Planners



100 %

ITS Professionals

75 %

Consumers

Survey Comparison

Survey Inquiry	ITS Market Research Bureau	ITS Professionals	Planners	Consumers
• Traffic improvements through technology	**7.07**	**8.45**	**8.6**	**9.08**
• Importance of:				
Safety	**7.61**	**8.68**	**8.44**	**8.17**
Convenience	**7.35**	**3.86**	**7.67**	**7.42**
Environmental impact	**6.86**	**6.09**	**7.19**	**7.08**
Up to minute information	**6.56**	**8.41**	**6.67**	**6.91**
Consistency	**6.41**	**7.86**	**6.81**	**7.00**
Time	**6.44**	**8.36**	**7.85**	**6.58**
Cost	**6.23**	**6.09**	**6.22**	**5.83**

Survey Comparison

Usefulness of:	ITS Market Research Bureau	ITS Professionals	Planners	Consumers
Collision avoidance	**8.61**	**7.55**	**8.50**	**8.50**
Dynamic message signs	**8.31**	**9.00**	**8.63**	**8.42**
Obtaining directions	**7.23**	**7.55**	**8.15**	**8.17**
Electronic toll collection	**6.51**	**8.86**	**7.81**	**8.08**