chapter 8

WHAT HAVE WE LEARNED ABOUT CROSS-CUTTING INSTITUTIONAL ISSUES?

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EXECUTIVE SUMMARY

In 1991, the U.S. Congress initiated the Intelligent Vehicle Highway Systems (IVHS) program, now called the Intelligent Transportation Systems (ITS) program. While Congress was enthusiastic about the potential benefits of using advanced technologies in the surface transportation system, it was also concerned that nontechnical barriers and constraints would impede the progress of the program. Therefore, it instructed the Secretary of the U.S. Department of Transportation (U.S. DOT) to identify significant institutional issues and to study their potential effects on the program. To fulfill this mandate, the U.S. DOT commissioned extensive studies of institutional and legal issues. These activities included evaluations of ITS field operational tests, demonstration projects, and model deployment activities.

In addition to the work of U.S. DOT, representatives of state, regional, and local governments, private sector firms, and academia investigated the impacts of institutional and legal issues. U.S. DOT, Intelligent Transportation Society of America (ITS America), and other professional organizations also sponsored conferences and workshops addressing the impacts of institutional issues.

The major finding of these activities is that no nontechnical or institutional issue has completely halted deployment of an ITS project. While institutional and legal impediments do exist, they either have been or can be overcome. Some areas, such as privacy, public-private partnerships, and government procurement regulations, required legislative change. Other areas, including attracting and retaining staff and dealing with liability issues, require outreach, technical training, and education.

Investigation of barriers showed that the key to overcoming most constraints is realizing that certain problems will arise and must be addressed early in project planning. It should be noted, however, that success did not always come easily. Often, implementors of ITS products and services spent a considerable amount of time and other resources addressing these issues. It was only through their perseverance and commitment that they were able to overcome these barriers.

INTRODUCTION

Since the inception of the IVHS program nearly a decade ago and its continuation as the National ITS Program, the U.S. Congress, other public policymakers, and the transportation community have recognized that nontechnical and institutional issues can adversely affect the implementation of ITS products and services. To address this concern, Congress requested, through the Intermodal Surface Transportation Efficiency Act of 1991, that the Secretary of U.S. DOT prepare two special reports on ITS nontechnical and institutional constraints and barriers.

The Secretary, through his staff, also commissioned other studies to address potential obstructions to ITS implementation. In particular, the ITS Joint Program Office (JPO) oversaw the evaluation of a number of field operational tests and Metropolitan Model Deployment Initiative (MMDI) sites. Furthermore, representatives of state, regional, and local governments, private sector firms, and academia analyzed the potential and real effects of these issues as they deployed ITS. U.S. DOT, ITS

America, and other professional organizations also sponsored conferences and workshops addressing the impacts of institutional issues.

This paper brings together the findings from these activities, addressing the question, "What have we learned about cross-cutting institutional issues?" It discusses how the planning and deployment of ITS projects differ from procedures required by traditional transportation projects, the challenges presented to the transportation community, the issues that may be encountered in the future, and how these issues may already have been addressed.

A NEW AND DIFFERENT ALTERNATIVE

The National ITS Program provided the transportation community with a new alternative for solving transportation problems, offering another tool to better manage the transportation system. In the early days of the program, however, the concept of ITS was not clearly defined and left transportation officials uncertain about the program's direction. Also, the transportation community felt that ITS technologies focused more on highways than transit and was more conducive to freeways than to arterials.

The implementation of ITS products and services also differed from the implementation of traditional construction projects. ITS planning and deployment required coordination among jurisdictions, data sharing, unique technical knowledge, and involvement of nontraditional players. These differences meant that several barriers had to be overcome. Coalitions had to be built where none existed before, and new communication channels had to be created among agencies within a region. Employees with new skills had to be found, and current employees needed to receive new training. Public works personnel had to work with public safety personnel and representatives of private sector firms.

The newness and difference of ITS also caused the creation of additional stumbling blocks. Because public officials were more familiar with traditional, more "tangible" projects and because the benefits of ITS were not readily available, ITS projects required a greater proof of value than traditional projects. Furthermore, staff apathy and/or skepticism had to be overcome.

Other differences were also noticeable. First, ITS involved larger operations and maintenance components than previously experienced in "build and ignore" construction projects. Second, procurement of ITS technologies required a different process than that used for construction projects. Finally and on the positive side, ITS projects were eligible for nontraditional sources of funding, such as funding from the Congestion Mitigation and Air Quality program.

A NEW ENVIRONMENT

Creation of the National ITS Program produced a new work environment for the transportation community. This new framework anticipated the emergence of different emphasis areas within U.S. DOT. It also required the formation of new relationships leading to new alliances among an area's public sector agencies, along

with collaboration of public and private sectors. This environment involves a different portioning of project costs as well.

New Federal Transportation Emphasis Areas

For the past four decades, the Federal Highway Administration (FHWA) emphasized the construction and maintenance of the National Highway System and other roads on the Federal-aid highway system. With that job largely completed, FHWA needed to turn its attention to better operating and managing the assets already in place. Partly in response to the National ITS Program, FHWA management now places a greater emphasis on the management and operation of the Nation's highway system, evidenced by the creation of a core business unit for operations within the agency. The Federal Transit Administration (FTA) increased its emphasis on advanced public transportation systems and services innovations. The planning offices of both agencies now promote ITS solutions within the statewide and metropolitan transportation planning processes.

The most significant change within U.S. DOT caused by the National ITS Program was the creation of the ITS JPO. This office serves as the U.S. DOT's advocate and national leader for ITS research and deployment, establishes strategic direction, and provides cross-departmental coordination of ITS activities.

JPO staff are engaged in many activities new to U.S. DOT. These activities include creating the National ITS Architecture, accelerating the development of standards, and ensuring consistency of federally funded ITS projects with the architecture and standards. JPO staff are also active in developing a program to increase ITS knowledge and skills among transportation professionals; conducting outreach and communications activities that include showcasing benefits of ITS products and services; and evaluating ITS activities, including the tracking of ITS deployments across the United States. Furthermore, the National ITS Program has also led the JPO staff to consider the traveling public as a user of ITS services and to engage in market research to understand user acceptance of ITS products and services and user willingness to pay for them.

New Regional Organizations

Before the inception of the National ITS Program, extensive interactions among transportation agencies were not necessary. The planning and deployment of ITS projects, however, require more in-depth cooperation, coordination, and communications among these agencies. Strong relationships are needed to ensure development of a regional perspective, integration of individual products and services, and effective operation and maintenance of installed systems. Use of a regional organization has proven to foster and maintain the close relationships needed to successfully deploy ITS.

Sometimes an existing organization can be used as the central agency. For example, in the New York-New Jersey-Connecticut metropolitan area, TRANSCOM℠ (Transportation Operations Coordinating Committee), a coalition of representatives from 15 traffic, transit, and law enforcement agencies in the tri-state area, came to coordinate construction and regional incident management. The agency's role later

broadened to include coordinating the region's ITS activities, including leading the ITS model deployment initiative.

Sometimes new organizations are created. The E-ZPass Interagency Group, which now comprises representatives from 16 toll agencies in seven eastern states (Delaware, Maryland, Massachusetts, New Jersey, New York, Pennsylvania, and West Virginia), was created when executives from the region's transportation agencies and toll authorities determined that the successful implementation of a regional electronic toll collection system required a regional management structure. In either case, the concept of a regional transportation body to oversee transportation projects is another facet of the new environment in which transportation professionals must work.

New Public and Private Sector Collaboration

The advent of the National ITS Program brought the public and private sectors together in a new way. The dissemination of data, for instance, necessitated the interaction of public and private sectors. For while the public sector operated the physical infrastructure that collected the data, the private sector operated the media that disseminated them. Often, large bureaucracies and small entrepreneurial firms started working together for the first time. For this collaboration to work, participants had to learn to overcome biases toward the other sector, understand each other's cultures and responsibilities, and establish strong cooperative relationships. Working with representatives of another sector was an adjustment for all participants.

Implementing new ITS technologies brought together as partners several governmental agencies and private firms, which had previously worked together only in a customer-vendor role. All parties had to adjust to a new business style and working environment. The newness of this type of collaboration also made public sector officials aware that representatives from private firms were entitled to provide input into the decision-making process. Likewise, private sector management had to learn about local, state, and federal procedures and contracting requirements.

The public and private sectors also have different business cultures and biases toward each other. Sometimes representatives from the private sector were not totally aware of the political realities faced by public agencies, and focused only on business issues. Similarly, some public agency staff were unreceptive to innovation and, in the eyes of the private sector, made decisions too slowly. Conflicts also occurred over the public and private sector's differing expectations about proprietary interests and intellectual property rights.

New Cost Flows

With traditional highway projects, costs are weighed more for construction than for operations and maintenance. This scenario is reversed with ITS projects. Very often, the construction costs to deploy ITS products and services are low compared to the costs to operate and maintain them over the system's life cycle. This situation requires transportation officials to present the funding need for operations and maintenance to elected officials and upper management.

Also in this new ITS environment, operations costs can be offset by the generation of revenues. Placing a value on an ITS product or service and determining the distribution of revenues among project participants are activities previously unfamiliar to public sector transportation personnel. Furthermore, providing the funds to construct, operate, and maintain ITS infrastructure is no longer the sole responsibility of the public sector. The National ITS Program created the opportunity for the private sector to be involved in providing services and sharing the costs and revenues to do so.

CURRENT AND FUTURE ISSUES

Implementors of ITS products and services will continue to be confronted by nontechnical issues. Analysts from the U.S. DOT's John A. Volpe National Transportation Systems Center identified areas in which issues have arisen and may continue to arise. They identified these areas through evaluation of model deployment initiative projects;[1] review of nontechnical barrier studies; and discussions with program managers, evaluators, and others involved in the ITS community. These areas were subjectively ranked using responses to an informal survey of ITS program managers and voting results obtained from participants at a roundtable discussion on ITS cross-cutting institutional issues convened during a conference sponsored by the Institute of Transportation Engineers.[2] The following discussion of the issues includes comments from participants of the roundtable session. Ten issues were identified, with the most prominent listed first:

- Awareness and perception of ITS.
- Long-term operations and maintenance.
- Regional deployment.
- Human resources.
- Multi-organizational relationship.
- Ownership and use of resources.
- Procurement.
- Intellectual property.
- Privacy.
- Liability.

These issues are not mutually exclusive. Often an action taken to address one issue may help overcome another.

[1] On February 26, 1996, U.S. DOT issued a request for participation in the Metropolitan Model Deployment Initiative. The sites to be selected were envisioned as demonstrations and showcases of the measurable benefits resulting from application of an integrated, regionwide approach to transportation management and provision of traveler information services.

[2] The Institute of Transportation Engineers held their 2000 International Conference in April 2000, in Irvine, California. During this conference, U.S. DOT's ITS JPO sponsored seven roundtable discussions. In the session that covered cross-cutting institutional issues, 19 participants representing federal, state, and regional transportation and planning agencies; private firms; and transit properties identified, discussed, and ranked nontechnical issues that have arisen or may occur in the future. This paper incorporates their input.

Awareness and Perception of ITS

Although ITS activities have been under way for approximately 10 years, numerous elected and appointed officials are still not familiar with the concept. Also, some see ITS technologies as "gizmos" looking for a problem to solve. For ITS programs to achieve widespread acceptance, ITS proponents must garner explicit public awareness and support for them. Failure to do so means a lack of financial resources and other support for ITS projects.

Public officials must understand the transportation needs in their area. They must be shown how improving the transportation system will help achieve the goals set for the community, such as those addressing economic development and quality of life. Once the problems and goals have been identified, then the officials can be shown the solutions available to them, which, naturally, would include ITS products and services.

The effective management of the transportation system will always be a goal of the public sector. The operations and maintenance of this system have become increasingly more difficult because of decreasing opportunities for new construction and because of reductions in staff, funding, and other resources. Again, in this context, ITS solutions can be promoted as one way to improve management of the system.

Safety is another area of visible need and concern for public officials. Whenever ITS products and services can help improve safety, they should be touted toward that end.

Often, there is a lack of solid evidence that ITS solutions are effective. The ITS community must continue to develop tools to measure effectiveness and move from empirical and anecdotal knowledge to quantifiable, explicit benefits. Evaluations of deployed ITS must continue, and the findings from these evaluations must be widely publicized.

Lack of awareness continues to be an intra-agency problem in some agencies. Coordination of personnel performing different functions (e.g., planners, ITS personnel, and maintenance staff) may also be limited. Agency management must continue to show how ITS solutions can improve both the effectiveness of the agency as well as the effectiveness of the transportation system.

Management at the San Antonio District of the Texas Department of Transportation (DOT) understood well the need to make ITS visible to decision-makers and the general public. Their public relations staff reached out to the general public through radio and television commercials, printed pamphlets and newsletters, and real-time video images and traffic information on local radio and television news. District management also championed ITS and went before the Texas Transportation Commission to promote it. Furthermore, the San Antonio District approached their management at headquarters and helped them understand the concepts and terms of ITS. They also sponsored tours and demonstrations of their ITS facilities for state and federal elected officials.

The staff of the San Antonio-Bexar County Metropolitan Transportation Planning Organization brought ITS to elected officials through its board and to the general public through citizen task force meetings featuring discussion of the 20-year regional transportation plan. The planning staff discussed ITS before groups and transportation agencies at public hearings for the region's transportation improvement plan.

Long-term Operations and Maintenance

As more and more ITS technologies are deployed, the issue of continued operations and maintenance of these systems becomes more prominent. As previously noted, ITS projects are unlike most typical construction projects in that they are designed for continuous operations. Transportation professionals need to approach planning for ITS projects differently than they have for capital projects. The lack of long-term planning could result in a poor transition from project deployment to day-to-day system operation.

The cost of a project's operation and maintenance must be identified in the project planning stage, and the impacts of these costs addressed. The life cycle of each operational improvement must be considered. Procedures similar to those used in the private sector should be developed to examine capital costs as well as costs for operations, maintenance, and repair. These procedures must be flexible, for sometimes public staff do not know the full cost of operations and maintenance until the technology is installed and operating. In other cases, ITS use is expanded to include new functions. The procedures should be easy to change based on feedback and expanded uses.

Working in a new environment, transportation professionals must address operations and maintenance costs earlier than before in the project timeline, as doing so will bring the need for continued funding before elected and appointed officials—a need often overlooked. Up-front costs for ITS projects are usually less than those for conventional infrastructure projects; however, continuing costs are usually greater than conventional maintenance costs.

Considering operations and maintenance activities early in the project development process will also ensure that the designed system operates as expected, is used as planned, and can be easily maintained. Staff responsible for different functional areas should be encouraged to provide input during the different phases of the project—including, for example, those responsible for operations and maintenance functions in the system design and construction phases. This action will reduce the risk of having to modify the system after it is installed.

Although they did not always start planning for long-term operations and management at a project's initiation, participants in several ITS deployments recognized that this planning should be addressed early in the project's life. They learned that knowing what would happen at a later step might prompt them to change what they did at an earlier step.

To ensure continuation of its ITS activities, Washington DOT staff developed a business plan addressing long-term operations and management of their advanced traveler information system. This plan helped them to understand the direction the project would take once it was deployed. The plan also covered the transfer of control of existing systems and defined public sector and private sector roles.

Management personnel at the Road Commission for Oakland County in Michigan were also concerned about the long-term operation and maintenance of its FAST-TRAC (Faster And Safer Travel through Traffic Routing and Advanced Controls) system. During the field operational test, management wanted to ensure that the advanced traffic management system would be maintained. Given the amount of hardware involved, contractors performed most of the installation. Commission management, however, retained some of the installation work for its technicians, feeling that the new technology would challenge and motivate its staff. Because of their involvement, the staff developed an appreciation of the system and a sense of pride and satisfaction, which helped to ensure its long-term maintenance.

Regional Deployment

So many perceptions exist of what constitutes a region. Metropolitan planning organizations (MPOs) look at the metropolitan area, while politicians look at where their electorate resides. The media looks at its market. In contrast, an ITS program must not be imprisoned by jurisdictional boundaries. Because there are various ways to get people to act regionally, participants of any ITS program should thoughtfully consider how to group the region, identifying the scale of the transportation system serving the region and bringing varied people together.

The adoption of a regional perspective for ITS use is one of the most important strategies for success. A regional perspective means that project participants view projects from the standpoint of other project participants in their region as well as from their own. This outlook, which fosters a more cohesive and integrated project vision for all involved, is key to facilitating development of ITS products and services. Failure to craft such a vision leads to confusion among project participants and often to severe delays. Unfortunately, developing a regional perspective and bringing the necessary players together will continue to be a challenge. Differing agendas of public agencies and differences between public and private sectors will continue to be impediments.

Often within transportation planning and design processes, ITS projects are considered to be in competition with capital projects for a region's transportation funds. In reality, ITS projects should be developed in concert with capital projects. Project planners and designers should routinely consider ITS technologies that could complement the capital project and help to operate it more effectively.

Advancing the routine consideration of ITS solutions in the metropolitan transportation planning process will help foster a regional vision for ITS. Moreover, this action may increase support from elected officials who sit on the MPO's governing board. The MPO structure can also be used to heighten communications among public agencies and the private sector.

Implementers of successful ITS projects have used four strategies to develop a regional perspective: (1) they built on existing relationships, (2) they developed a shared vision, (3) they involved nontraditional players, and (4) they augmented existing systems.

A regional ITS perspective was developed within the New York-New Jersey-Connecticut metropolitan area by following the four strategies outlined above. First, Trips123 project participants built on existing relationships and promoted an existing organization of transportation agencies, TRANSCOM,SM as the lead agency. They then reviewed the ITS plans and activities of the member agencies and selected a course of action best suited for the region. They brought in private sector firms previously not affiliated with TRANSCOM.SM They also augmented existing systems, which included a traffic management and accident detection system, a transit information system, a regional architecture, and the incident and construction data already collected by the agency's operations information center.

Most importantly, participants realized that in order to ensure success, they would have to adjust their priorities or possibly give up some autonomy or control. This event occurred when a request was made to move the implementation of the first phase of the traffic management system from the southern portion of the region to the northern portion. TRANSCOMSM members unanimously decided to accept this request, easily making the decision because they had already developed a regional perspective for traffic management.

Human Resources

Problems in this area may be manifested in several ways. First, public agencies may lack the staff needed to develop, install, and operate ITS. Second, the staff may lack the expertise required. Third, talented public sector staff may be lured to the private sector.

These conditions will occur when a public sector agency has limited resources to hire and train staff, and to provide salaries and benefits comparable to the private sector. This issue intensifies when resources become less available. Project administrators must clearly identify the resources required and bring their needs before management. They must also identify areas in which the private sector can contribute its expertise.

An inflexible agency culture and organizational structure may also lead to problems. Agency personnel may not accept new technologies or develop new ways of doing business, such as modifying the procurement process to accommodate ITS products and services. Activities that promote the benefits of ITS technologies need to continue.

Labor issues may also arise. Installing new technologies will definitely affect the way jobs are performed. Agency managers get concerned that union members may perceive these technologies as increasing their workloads or forcing them to change the ways they do their jobs. The perception may be that ITS will reduce the number of employees needed by an agency or within a particular job category. Project developers should invite union representatives into the ITS development process at an early

stage, not only to explain the project and assuage fears, but also to receive labor's input into the design and operation of the system.

There are several examples of MMDI project participants overcoming possible staff reluctance and insufficient training. In San Antonio, the Ambulance Committee solicited feedback from emergency medical technicians and firefighters concerning the placement of video equipment in ambulances. VIA Metropolitan Transit Authority bus drivers were asked to provide input on the placement of cameras within buses. Operators of the traffic management center were involved in designing the upgrade and expanding the TransGuide center.

The training of San Antonio firefighters and emergency medical technicians on new equipment occurs through a phased program in which a small group is selected and trained and, in turn, trains others. This system works well for the San Antonio Fire Department because the units are geographically dispersed. Fire department management preferred to conduct in-house training, as outside trainers lack familiarity with personnel concerns and with San Antonio Fire Department procedures.

In Indianapolis, Indiana, the Metropolitan Emergency Communications Agency (MECA) was formed to develop a regional emergency communications system. In response to elected and appointed officials' concerns that potential users were adequately trained to use the system, agency staff successfully launched a pilot project. They installed seven mobile data terminals in cars used by the sheriff's department. After a small number of sheriff's deputies used the outfitted cars for a short period of time, MECA staff formally trained them. Following their training and further use of the units, these deputies wrote the user's manual. As additional units were installed, the deputies were able to train their fellow deputies on the equipment, thereby contributing to the system's acceptance and effective use.

Multi-organizational Relationships

The establishment of strong working relationships will continue to be a challenge to the ITS community. As previously mentioned, differing agendas between public sector agencies and between the public and private sectors must be addressed. Public sector personnel must look at the traveling public as their customer and provide a seamless and efficient transportation system. To best serve their customers, managers of public agencies must be willing to give up some of their autonomy and develop a regional perspective when establishing coalitions with other public agencies.

Collaborations between public sector agencies and private sector firms will also continue to confront stumbling blocks. The cultural differences between the two sectors must be considered. The public sector must understand the profit motive and how to work it into a partnership agreement with the private sector. The private sector must understand the public sector's charge to be vigilant for the welfare of all citizens, regardless of their ability to pay more for a product or service.

There are other factors that will hinder the creation of public-private partnerships. For instance, the roles of the public and private sectors still remain unclear in many locations. Often no clear incentives for private sector involvement are evident, and uncertainty still exists about the commercial market and user willingness to pay for

ITS products and services. Project participants must ensure that these vague areas become better defined.

To address the issue of partnering, staff at the Washington DOT developed a business plan for its advanced traveler information system that identifies public and private sector roles. In the Smart Trek MMDI, private sector representatives were included from the inception of the project and involved in developing the project proposal. They have a role in every aspect of the project's development. The Smart Trek decision-making structure includes two deputy project managers and four bundle managers (similar to committee chairmen) from the private sector.

Furthermore, to encourage private sector involvement, public sector participants are trying to develop a market for the private sector. Smart Trek project participants are encouraging private sector information service providers to disseminate traveler and traffic information by making it widely available and free of charge.

The Minnesota DOT developed an innovative process that involved the private sector in the initial identification of ITS partnering opportunities. Rather than issuing a request for contract proposals for specific projects already defined by the public sector, the agency's staff issued a request for proposed partners. This request contains a broad strategic plan presenting many possible ITS applications. Private firms responded with specific project partnering approaches and technologies to meet the state's overall objectives.

Ownership, Sharing, and Use of Resources

Issues in this area may compound as more systems are implemented and as more private sector firms become involved in dissemination of traveler information. These issues include who owns the data generated, whether there should be a charge for the data, how this information will be shared among the partners, and to whom the information will be released.

Complicating this scenario is the recent development by private firms to gather traffic data using cellular phones as traffic probes. It is uncertain whether this new dataset will complement or substitute for the data being collected by public agencies. Should this new approach prove reliable, it will change relationships between existing traffic information providers and traffic data collectors.

Many public sector agencies release data free of charge. Some public agencies, however, are hesitant to release information to the private sector for fear that it will obtain revenues from data collected with public resources. Similarly, some private firms are hesitant to share data for fear the public agency will release proprietary information. Policies covering data issues should be established early in the project.

Because of the media's ability to quickly reach a wide audience, the Washington DOT policy actually gives the media priority over other users. The agency's staff provide video images to the media, but the media outlet has to make the connection. Currently, there are no charges for the connection and none are anticipated. There is, however, no existing policy that would preclude implementing a charge.

In the New York-New Jersey-Connecticut metropolitan area, TRANSCOM℠ staff developed a regional information policy that is applied to numerous projects, including Trips123 and the I-95 Corridor Coalition's Traveler Information project. The policy sets out the information deemed to be "TRANSCOM℠ information" and, therefore, the property of TRANSCOM.℠ The policy further presents who may have access to the information, the level of compensation required for the information, and how compensation will be established. Briefly, the policy states that any public or private organization using the information to generate revenues must compensate TRANSCOM℠ for this use.

Ownership of equipment purchased within the project may be another problem. Questions will arise as to who owns the equipment provided as an in-kind match and who owns the equipment purchased with project funds. A related question is who is responsible for the maintenance of the equipment.

The Texas DOT has a policy stating that Texas DOT staff own and must maintain any equipment they purchase. This policy raised a question of maintenance liability within the Bus Incident Management System project in San Antonio. If the cameras for this system, to be placed on buses owned by the VIA Metropolitan Transit Authority, were bought by the Texas DOT, then according to policy, the cameras would be considered Texas DOT property, and their maintenance would become the responsibility of the Texas DOT. Agency officials felt that maintaining equipment on buses they do not operate would be impractical, so transit authority staff purchased the equipment and assumed maintenance responsibility.

Another related question is who will be responsible for the eventual replacement of the technology purchased during an ITS project. The City of Bellevue, Washington, provides an example of how public agencies can successfully address this concern. City staff developed an equipment rental fund that is used to replace outdated computers and other equipment. Three independent sub-funds are included within the main rental fund: the electrical equipment rental fund, the mechanical equipment rental fund, and the information services replacement fund. The equipment rental fund was created as an internal process designed to rent equipment to other funds, maintain and repair equipment administered by the fund, and provide equipment replacement through establishment of replacement services. These services are grouped into different functions, each with a separate revenue stream. Although Washington legislation allows all cities within the state to develop equipment replacement funds, the City of Bellevue has developed the most sophisticated procedure.

Procurement

Even when procurement issues have been addressed, they can still impede the progress of some ITS deployments. The lack of flexibility in the procurement process and the public sector's aversion to taking risks contribute to this problem.

ITS participants have found that the traditional approach to procurement is often too restrictive when contracting for the rapidly evolving technologies and systems

that constitute ITS. Changes to legislation, policies, or procedures may be necessary to allow the parties flexibility to use the most appropriate procurement method, as determined by project needs. Failure to be flexible in the procurement process means that acquisition procedures used for construction projects are the only tools available for procurement of advanced technologies.

Because the Maricopa County DOT in Arizona had a flexible procurement process and was able to work with the local stakeholders, AZTech™ Model Deployment Initiative participants determined that it was more efficient to use the county for the official procurement agency than to use the Arizona DOT. Other agencies involved in the project, however, were given the flexibility to use the county as the procuring agency for their selected technologies, or to procure products and services themselves through existing or new contracts and be reimbursed by the AZTech™ project.

Project participants can use a variety of procurement mechanisms, and must choose those best suited to meet their needs:

- Federal competitive process.[3]
- State catalog.
- Multiparty agreements.
- Competitive contracts.
- Sole-source contracts.
- Phased contracts.
- On-call and other existing contracts.
- Design/build contracts.
- Joint, interjurisdictional procurements.
- Turnkey procurements.

ITS project administrators have learned that they also must build flexibility into their contracts. Many felt that contracts based on "cost-plus" payments, lump-sum payments, or "best efforts" and labor hours payments would not ensure tangible results or acceptable products. While the Trips123 project administrators in the New York-New Jersey-Connecticut metropolitan area allowed compensation for design work on a cost-plus-fixed-fee basis, they scheduled deployment compensation on a firm fixed price based on approved designs, and provided operations and management compensation on a firm fixed-price basis.

In San Antonio, Texas, City of San Antonio DOT officials executed a fixed-price contract with their systems integrator, with variations available on each task. Under this contract, the systems integrator offered different options that could be completed under different funding levels. The Texas DOT administrators allowed the task cost variation provisions to be incorporated into the contract, transferring funds among the tasks when necessary.

[3] Staff at the Washington State Department of Transportation used the U.S. DOT process to select Metropolitan Model Deployment Initiative sites as their competitive process for procuring project participants from the private sector.

Intellectual Property

The proper assignment of intellectual property rights presents a continual challenge to ITS projects. Applications of ITS raise vexing new questions regarding patentable inventions, copyrights, and trade secrets, as well as compilations of data derived from the operation of ITS technologies. The private sector, in particular, has a vested interest in maintaining intellectual property rights to those technologies and services they help develop. These issues must be addressed early in the life of an ITS project to promote the involvement of private sector representatives. Failure to do so will delay entry of private sector firms, along with access to their expertise.

Also, failure to address this issue early may lead to contentious situations. Project participants may be misled by ambiguous contracting language into thinking their rights will be covered. Drafting the proper language into the contract guards against misunderstandings.

Participants in the AZTech™ MMDI struggled with and overcame the issue of assigning intellectual property rights. As a starting point to resolving their concerns, administrators from the AZTech™ project requested clarification of the FHWA's policy on intellectual property rights. A letter[4] from FHWA's associate chief counsel clarified the Federal Government's policy. This letter was then included in all contracts between the public and private sectors.

Following the FHWA's policy, the AZTech™ public officials developed two licensing agreements: one for pre-existing products and privately funded developments and one for products developed with Federal funds during the course of the MMDI. The license for pre-existing products allows public sector participants to make limited use of pre-existing products. The license for products developed during the course of the project allows public sector participants to receive a royalty-free, nonexclusive, and irrevocable license to reproduce, publish, or otherwise use—and to authorize others to use—the publicly funded software, data, and documentation solely for official governmental purposes. The private sector partner similarly retains all ownership rights, including copyrights.

Privacy

To date, ITS professionals have addressed most of the privacy concerns surrounding ITS, including concerns that traffic surveillance cameras would be used for purposes other than monitoring traffic and that information on trucking firms collected by preclearance systems would be released to competitors. With more and different technologies being deployed, however, concerns about privacy may grow.

Each new ITS application may require a database or the collection of additional data. Users of these applications must be informed as to the data being collected and how they will be stored and used. Users may not accept data for non-traffic-management purposes or for identification of individual travel patterns. Agencies must develop strategies to inform their customers about the collection and use of data and to protect their privacy. One strategy should be to use the media to explain the application to the public.

[4] A copy of this letter is included in the cross-cutting study, *What's Yours, Mine, and Ours: Overcoming Intellectual Property Rights*, EDL No. 11486.

This issue may also intensify if ITS technologies are used for law enforcement, especially automated law enforcement. To reach their full potential for improving traffic safety, applications that both detect and identify traffic law violators, such as red light runners, require the release of identifying driver information to law enforcement personnel. In some instances, this information leads to issuance of a citation or other legal action against the violating driver. The integration of law enforcement and traffic safety technology applications is both highly sensitive and extremely promising. Addressing privacy concerns related to collecting individual driver identifiers is key to public acceptance and success in this area. The Intelligent Transportation Society of America (ITS America) has drafted privacy principles that promote such practices. ITS America expects to finalize and approve the principles by the close of 2000.

Because staff at the University of Washington are developing the traveler information backbone for the Seattle area, a large amount of data is passed through its operations. To protect the privacy of individuals, staff have developed procedures to remove personal information from the data. Each data source linked to the backbone has a computer, or "firewall," to strip out any private data before they go onto the backbone. The stripped data always reside at the source agency. For example, the computer residing at the King County DOT Transit Division extracts bus driver identification before vehicle identification data are passed to the communications backbone.

In Phoenix, transportation officials have tried to counteract concerns about camera use. First, Arizona DOT officials made a linguistic change, replacing the intrusive-sounding "video surveillance" with "video monitoring." This change helped to allay some of the "Big Brother" fears and negative connotations associated with the word "surveillance." Second, in keeping with the limited and defined role of the cameras, agency administrators agreed that this technology should not play a law enforcement role, even when an officer is stationed in the traffic operations center. Third, the AZTech™ participants provide open access to the camera feeds by means of local television. Finally, the AZTech™ managers enacted an informal policy of not retaining any tapes from the camera feeds, thus avoiding the tapes being subpoenaed and used in lawsuits.

Both New Jersey and New York passed laws governing the use of photo-monitoring systems to enforce automated toll collection. These laws specify restrictions on the use of images captured by these systems.

Liability

Although liability concerns were discussed during the early stages of many ITS deployments, liability has not been a major issue to date; however, as with the area of privacy, these concerns may grow over time.

Some ITS applications may require the use of an in-vehicle device, which could create liability issues if drivers claim that such devices distracted them, leading to an incident. Also, the emergence of anti-collision applications may give rise to liability questions if these technologies transfer control of the car from the driver to the technology, and an incident occurs. Also, the failure of a technology or the provision of

inaccurate information by a technology may lead to liability problems, especially with increased use of automated collision notification technologies.

Another area of potential concern is the sharing of system control by more than a single jurisdiction, such as a traffic signal control system. Good planning and engineering practices must be exercised when establishing procedures to share control. Good practices help demonstrate that appropriate standards were used.

Some public sector partners in the Phoenix metropolitan area note that liability issues in their area have already been resolved through discussions in the Signals Working Group, a regional group resulting from a study that looked at coordinating traffic signals along corridors running through several jurisdictions. Through their involvement in the study and working group, participants are confident that only appropriate actions will be taken when representatives of one jurisdiction assume temporary control of another jurisdiction's traffic signal system. One method the group employed was to define and document a series of thresholds under which signal plans can be altered (e.g., in the event of a freeway closure). Representatives of some adjacent municipalities and the Maricopa County DOT have drafted coordination policies and plans to cover signalized corridors bordering two jurisdictions and other multijurisdictional corridors.

CONCLUSION

Original proponents of IVHS and the current ITS community have long stated that institutional issues pose more of a challenge than technical ones. The good news is that these nontechnical barriers can be overcome. The bad news is that they will always be present in one form or another. As discussion of these issues shows, some previously addressed barriers will reoccur throughout ITS deployment. The key to overcoming any constraint is to acknowledge its likelihood and address it early. Project participants should anticipate these obstacles and come to the table prepared to discuss them. They should also look to successes in other areas that demonstrate how nontechnical barriers can be overcome.

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