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Accelerating ITS Deployment

ICMA 82nd Annual Conference
WASHINGTON DC
October 6–9, 1996

Implications For Local Traffic Management

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The trouble with the future is that you never get there. Many local government professionals who are faced with issues of whether there is money to plow snow and fix potholes see the intelligent transportation system (ITS) vision of vehicles that "sense" lane markers, warn drivers of danger, display personalized traffic information, and even drive as a distant promise that will not be fulfilled in this lifetime. ITS does not seem to solve the problems of today and in the face of budget cuts, a brand new transportation system seems hard to justify. So for some professionals, an intelligent transportation system might seem like the transportation equivalent of "Star Wars."

What ITS Is and Is Not

The fact is, ITS is here today. It is affordable, and it is being applied to some of today's thorniest transportation problems—safety, capacity, and environmental impact:

- Integrated traffic control systems with bus priority systems.
- Freeway management systems, including ramp metering and traffic monitoring.
- Transit fleet management systems using automatic vehicle location (AVL) and in-vehicle monitoring.
- Incident response systems.
- Electronic toll and fare collection.
- High-speed commercial vehicle identification and weigh in motion.
- Travel information systems.

Each of these systems rely on core ommunications, computer, and ensing technologies that form the ıeart of the intelligent transportaion system of tomorrow. These techıologies are being deployed today—ıot as components of an ITS but ›ften as stand-alone solutions to current transportation problems. And hey are yielding the desired results: mproved freeway speeds and greater rterial throughput, faster accident esponse, greater security and proluctivity for transit fleets, and treamlining of safety regulatory unctions.

Several private sector ITS prodıcts also are being introduced into he marketplace. Avis and Hertz ›ffer in-vehicle global positioning atellite (GPS) based navigation :quipment. Ford will introduce a ⁄AAYDAY service on its new Lincoln Continentals, also based on in-vehi:le GPS and cellular telephone. Companies such as Metro Traffic and ›martRoutes offer sophisticated trafic reporting through increasingly :ustomized distribution channels. In ›ther areas, citizens retrieve local raffic information from the Internet ›r local cable networks. For public ransportation, software is being leveloped for such innovative ser-ices as route deviation of fixed-route ›perations.

ITS is not science fiction. It is ›eing implemented in our lifetime.

Deploying ITS Components Today to Build Tomorrow's ITS Platform

Many ITS components will not be mplemented as "new" budget line tems. Today, most county, city, and tate budgets include traffic signal :xpenditures. Most transit properies periodically upgrade their bus communications systems. Many tates are investing in freeway conrol and incident response systems. How these systems, system exten-ions, and system upgrades are purchased determines whether they become powerful components of a first-generation ITS travel management system and an integrated platform for evolving the next generation of ITS, or the Betamax of transportation that locks jurisdictions into the technological past. Few ITS systems will be purchased and built from the ground up as new budget items. Most of them will evolve from the incremental decisions that professionals make in their daily routines today.

An intelligent transportation system is not science fiction. It is being implemented in our lifetime.

Will today's procurements become the stumbling blocks or the enabling platforms of tomorrow? The key is whether individuals will "buy smart" by buying components of an integrated system or will they simply replace the stand-alone systems of the past. As purchases are made, people need to ask whether traffic control, freeway, and transit management systems have the capacity to one day be integrated. They also need to ask whether the data map-referencing systems and communications networks will be compatible, or whether they will be next year's technological barriers?

Core Infrastructure for Metropolitan Travel Management

Operational test results and early ITS system deployment to date indicate ITS will rely on a communications infrastructure and a traffic and transit movement information base. Many of the systems components described above involve developing a communications infrastructure and information databases. These systems can be deployed so that each contributes to the development of a larger, more robust communications infrastructure and information base. Such foresight will yield two beneficial results.

1. The performance of the stand-alone system is substantially enhanced today. For example, a transit property whose AVL system can "talk" to the local traffic control center can adjust transit schedules based on current real-time traffic conditions. A traffic and freeway control center linked electronically to an emergency response center can substantially reduce response times, saving lives and minimizing congestion. An automatic toll collection system linked to a traffic operations center can provide additional traffic flow information at a fraction of the usual cost for surveillance.

2. The ITS electronic communications and information platform enables a number of new public and private services, including a cable TV traveler channel, in-vehicle messaging, travel information delivered via kiosks, personal digital assistants known as PDAs, cellular phones, interactive television, and other distribution media.

Based on these observations, the U.S. Department of Transportation (DOT) has defined a core set of first-level ITS components that if deployed as an integrated system (albeit a component at a time) can form the platform for launching numerous public and private services and products, some envisioned and many unimaginable today. We are encouraging deployment of the appropriate set of each of these components in an integrated system in metropolitan areas. Appropriateness and integration are important themes.

Figure 1. ITS Core Infrastructure and Benefits

Traffic Signal Control Systems
Optimize traffice flow by adjusting signal timing and patterns in response to real-time traffic data. Coordinated, computerized traffic signals in Lexington, Kentucky, reduced stop-and-go traffic delays by about 40 percent and reduced accidents by 31 percent.

Freeway Management Systems
A formal program for improving traffic flow on high-volume roadway segments via adjustments to ramp metering rates, variable message signs, and highway advisory radio messages based on real-time traffic surveillance. Ramp metering in Minneapolis, Minnesota, increased freeway speeds by 35 percent and freeway capacity by 22 percent, and reduced accident rates by 25 percent.

Transit Management Systems
A program for managing bus operations based on real-time bus location information. Using automatic vehicle location data to optimize bus routes and reduce run times allowed Kansas City, Missouri, to eliminate seven buses from its fleet of 200. The savings paid for the system in two years.

Incident Management Programs
A program to identify and respond to vehicle accidents or breakdowns with appropriate emergency services; restore roadway to full service. The Incident Management Program in Chicago, Illinois, has reduced the time to clear incidents by 50 percent.

Electronic Fare Payment Systems
A system to consolidate all transit and parking transactions onto one card to add convenience for users and provide centralized information to transit agency managers. In Los Angeles, California, the benefits of Smart Cards were shown to exceed the costs by more than double.

Electronic Toll Collection Systems
A system to allow nonstop toll payment. The Oklahoma Turnpike's electronic toll collection system minimizes driver delays and has cut the state's operational cost per lane for toll collection by 91 percent.

Regional Multimodal Traveler Information Centers
Collect, analyze, and distribute accurate, reliable, and timely travel information to travelers and commercial carriers when and where they want it. Montgomery County, Maryland, broadcasts traffic conditions on major roadways to 180,000 homes via cable television.

Appropriateness. Each metropolitan area will design its own system, tailored to its specific needs (for instance, only areas with toll roads will deploy automatic toll collection). Some areas will choose to electronically link individual control centers; others will consolidate multiple functions. The interstate highway system in the United States applied one design to the entire country, but an intelligent transportation system will be designed to fit the metropolitan area it serves. Decisions will be made locally to address specific regional needs.

Integration. Jurisdictional authority still would exist: localities would run their own traffic control systems, and transit properties would manage their own fleets. Traffic flow and transit data, however, would be available to other agencies and could be used for cooperative response in emergency situations and regular distribution to the traveling public. The system interfaces also would follow a minimum set of national standards to ensure the motoring public a base level of interoperability. Coordinated, multiagency responses to various situations could be established and in some cases, control could be delegated when a traffic center istemporarily disabled or wants to conserve resources by delegating specific traffic control authority to another site to reduce its off-hour staffing.

Figure 1 defines the components of this core infrastructure. Each is both a stand-alone system and a component of a larger ITS platform. Each component can and is being deployed on its own merits, and each yields its own set of benefits.

Cost Is the Driving Force for Deployment

In the face of shrinking budgets, some view ITS as an unaffordable luxury. No one expects that an entire intelligent transportation system will be purchased all at once as a brand new system. Most of it will be built over time from system upgrades, expansions, and replacements.

For the sake of argument, however, the estimated price tag to deploy "from scratch" a complete set of the core infrastructure (listed in Figure 1) in a medium-sized metropolitan area is $277 million. That seems high. But weigh that cost against the alternatives: $277 million could purchase seven or eight miles of urban freeway or a few miles of light rail. Either investment would reduce congestion and improve safety, but in only that corridor; the rest of the metropolitan area would remain largely unaffected.

A complete set of ITS core infrastructure, however, will improve efficiency and productivity measurably for all transportation systems—freeways, arterials, and transit—across the entire metropolitan area. As decisionmakers search for new ways to spend less to do more, an intelligent transportation system can be a political lifesaver.

Next Steps

In today's climate of fast-paced technological change, inaction is a de facto decision. Certain simple actions taken now can increase the productivity of systems already in place, attract investment partners to share in larger systems, and ultimately offer more services to the customer—citizens in the local area.

Look at your jurisdiction's budget. Are you making core infrastructure purchases? If so, are you purchasing expandable systems capable of linking to others? Do your current systems have "linking" capacity; are they intercompatible? Involve your metropolitan planning organization; find out what projects are being considered: could they be coordinated?

Look at long-term communications needs relative to those likely in other transportation jurisdictions in the region, and consider the economic benefits of working together. Talk to communications companies as they explore means to "wire" regions for the information highway. Many highway and transit rights-of-way will have barter value over the next two to three years; exchange them for the communications capacity needed for ITS infrastructure. In Missouri, a private communications company is laying fiber-optic cable along 1,250 miles of a state right-of-way. The state transportation department will have access to a complete communications backbone for its ITS system. The state is responsible for all system components it interconnects to the main fiber network, which the private company will wholly own, operate, and maintain. The company's total cost for deployment is expected to be about $45 million; Missouri will pay nothing.

Ask some tough questions about the compatibility of databases and geographic references. Many state and local agencies are developing numerous databases, most with geographic references. Some databases support ISTEA management systems, others are for real-time operations management, but they all represent tremendous effort and expense. Are your local databases designed to be shared electronically, in real time? Do they have common geographic references?

Convene the players. Technological integration is only as good as institutional willingness to work collaboratively. Are the agencies making individual purchases of electronic equipment talking to each other about the potential of integration? What can private sector organizations contribute. Are they at the table? If not, it is time to include them in the conversation. Do not limit coordination to one mode or just the public sector. Ultimately, ITS is an intermodal partnership.

Get smart and train others. Individuals tend to make decisions within the range of their comfort zones, but technology is moving so fast that the comfort zones they created for themselves during professional training may have become limiting. Decisions will have to be made on system procurement, integration, and communications design that may exceed their professional backgrounds; ways need to be found to expand the skills of all members of the workforce.

Develop an evolutionary vision. Each geographical region must share a vision of an integrated "end state" that has "buy-in" from a majority of the region's public and private sector players. The final integrated system will not be purchased or acquired all at one time; it will be pieced together bit by bit, with each agency or company contributing components, data and infrastructure. To avoid building a hodgepodge, everyone must work with roughly the same end vision in mind and think total travel options—not just highway travel, not just transit travel.

Share travel information with the public. Each component used data for control and management purposes; this data can be reformatted easily by a variety of private sector companies and distributed to the public as travel information. This step is important; it is the only way that citizens will experience firsthand the reality of the investment that has been made. Citizen support for the Montgomery County (Maryland) County Transportation Operations

ICMA Adds Special Session on Traffic Management And Intelligent Transportation Systems to 1996 Conference Agenda

Local governments are spending millions of dollars on intelligent transportation system (ITS) technologies for traffic signal controls; transit, freeway, and incident management; electronic toll collection; transit fare payment; and multimodal traveler information. These systems are yielding the desired results of improved local freeway speeds, faster accident response, and greater security and productivity for transit fleets. Few local governments, however, have designed and implemented these systems with an eye toward integration with future systems.

A special conference session on "Managing Traffic into the Next Century: Put Your Community in the Fast Lane" will educate local government managers about these technologies and the ways in which they can be integrated between their community's public safety, traffic, and transit agencies to improve management, communication, and cooperation and to advance local economic development initiatives.

Attendees will hear practitioner perspectives on ITS planning and implementation successes and challenges, costs, citizen involvement, performance measurement, and public-private partnerships. The session will be held on Sunday, October 6, from 8:30 a.m. to 3:30 p.m., and it will be moderated by U.S. Strategies Corporation President John Kenny. Invited speakers include U.S. Department of Transportation Secretary Federico Pena, local government managers from ITS communities, and ITS and traffic management experts from local governments and the federal government.

This session fulfills ICMA University Practice Group 5: Service Delivery Management. Attendance is limited to 100 persons. The registration fee is $15 and includes lunch. An optional field demonstration of the Montgomery County, Maryland, state-of-the-art integrated traffic and transit system will take place on Monday, October 7, from 9:30 a.m. to 12:30 p.m., and Tuesday, October 8, from 1 to 4 p.m. The cost is $10. To register, contact Anthony Crowell, municipal law and policy analyst at ICMA, 202/962-3674; e-mail, acrowell@icma.org.

Center (TOC) swayed from passive to positive after the TOC began transmitting video from three traffic cameras via cable television.

Next Steps for the Federal Government

When the goal to build the interstate system was set, the federal government assumed multiple leadership roles primarily by creating a special category of funding and paying 90 percent of the system's costs. The federal government also facilitated setting standards for everything from geometric design to signing in order to achieve a nationally compatible system. The federal government also supported a national training effort under the 1970 Highway Act by creating the National Highway Institute.

As construction of the next generation of transportation in the United States begins, the federal government again will assume a leadership role, but tailored to today's conditions. People are no longer linking a nation; they now are underpinning an existing infrastructure with an electronic infrastructure to expand the original's (whether transit or highway) efficiency and service to the community that has grown up around it. A one-size-fits-all design was appropriate for the interstate system but not for an ITS infrastructure. This technological underpinning must be designed by individuals who will use it based on the needs of their particular region, but within a framework that provides for interconnectivity and the free flow of information and a minimum level of national interoperability.

Funding. The Intermodal Surface Transportation Efficiency Act (ISTEA) allows for most core infrastructure components to be paid for with federal-aid funding, usually at an 80 percent federal participation ratio. These same funds can be used for reimbursement of up to 100 percent of certain ITS projects related to traffic control. ISTEA permits federal-aid funds to support operating and maintenance expenses of traffic management systems.

Extending these flexibilities will surely be an issue in the renewal of the ISTEA legislation. Nevertheless, while ISTEA greatly expanded the flexibility with which the funds it authorized could be spent, overall transportation needs still exceed the available resources. How these funds are used—whether for investment in ITS technologies or simply to pay for restoring deteriorating pavements—remains a state or local decision.

Architecture. Just as the federal government drew the broad outlines of the interstate system to ensure interconnectivity, U.S. DOT has invested in developing a national architecture to define minimum requirements for information exchange and allow for standards development.

Standards. U.S. DOT also will facilitate consensus among industry and public investors of key standards to ensure interoperability of certain components and functions. Perhaps more important, standards will allow component interchangeability, pronote developer confidence that the various components will "fit," and ensure competition in the marketplace.

Training. The planning, design, implementation, operation, and maintenance of ITS requires a cadre of well-trained professionals at the federal, state, and local levels; however, sufficient numbers of these professionals currently do not exist to enable effective delivery of these transportation systems.

Building on the recommendations of a Professional Capacity Building Task Force that met in April 1995, and the ITS America Education and Training Strategic Planning Workshop in June 1995, a strategic plan for meeting ITS training needs has been developed. The plan's goals are to assure that all transportation professionals, elected officials, and the general public are aware of the ITS program; to identify federal, state, and local ITS technical training needs and develop programs to meet those needs; and to provide for the continuing advancement of the profession through university programs designed to advance not only the state-of-the-art but also the state-of-the-practice of ITS.

In the coming months, federal, state and local partners; professional societies such as ITE, ITS America, and AASHTO; colleges and universities; and the ITS industry will be working to fund and implement this strategic plan.

Model Deployment. Within each region, the ITS platform will be created from hundreds of independent decisions in dozens of public and private agencies. The federal government has proposed funding two or three model deployments of the core infrastructure to provide local decisionmakers with real "touch and see" examples of the value of integration and how it can be done without losing institutional autonomy.

Closing Comments

Phase I of the ITS revolution is upon us. And ITS components now are in the budgets of hundreds of local agencies. In our changing society, the issue at hand is recognizing the local potential for ITS procurements and ensuring that decisions made today will serve us tomorrow. PM

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This article is adapted with permission from the ITE Journal, *published by the Institute of Transportation Engineers, Washington, D.C. It originally appeared in the December 1995 issue under the title "Accelerating ITS Deployment: A Report from the U.S. Department of Transportation."*