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**EDUCATION NEEDS FOR INTELLIGENT TRANSPORTATION SYSTEM
IMPLEMENTATION IN THE UNITED STATES**

Michael S. Bronzini
Energy Division
Center for Transportation Analysis
Oak Ridge National Laboratory
Knoxville, Tennessee 37831

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**Education Needs for
Intelligent Transportation System Implementation in the United States**

**Michael L. Patten and John M. Mason, Jr.
The Pennsylvania Transportation Institute, The Pennsylvania State University
and
Michael Bronzini
Center for Transportation Analysis, Oak Ridge National Laboratory**

Abstract

Intelligent transportation systems (ITS) are being promoted as potential solutions to a wide variety of today's transportation problems. To facilitate successful implementation of these technological solutions, it may be useful to define an integrated program to educate the various stakeholder groups about the many aspects of ITS. Generally, an ITS educational program should include the following components: general awareness of ITS concepts, the benefits of ITS, the costs of ITS, specialized knowledge about ITS, and specific skills required to operate and maintain the systems. The amount and depth of education about each component will vary depending on the stakeholder group.

Introduction

Intelligent transportation systems (ITS) involve the application of advanced information, electronic, communications, and other technologies to enhance surface transportation. ITS are being promoted as technological solutions to a variety of today's transportation problems. It is anticipated that properly implemented ITS programs can "improve safety, reduce congestion, enhance mobility, minimize environmental impact, save energy, and promote economic productivity in [the] transportation system." (Euler & Robertson, 1995, ITS America, 1992).

Before ITS can be successfully implemented, it will be necessary to educate the various stakeholders about this relatively new and very dynamic field. Initially, it may be useful to direct the ITS educational program at the following four broad stakeholder groups:

- Transportation department personnel (federal, state, and local);
- Personnel from other government agencies;
- Elected officials; and
- The general public.

This paper begins with a presentation of several of the topic areas that should be included in the ITS education program. Following this discussion, the specific needs of each of the stakeholder groups listed above will be discussed along with potential mechanisms for providing the necessary information.

Discussion

Although the elements of an educational program can cover a wide variety of areas as well as various levels of depth this paper will discuss an ITS education program within the following five broad areas:

- **General awareness**—A general awareness of what ITS is and what the anticipated utility of these technologies will be.
- **Benefits**—The potential benefits to ITS implementation.
- **Costs**—The probable costs involved in ITS implementation both fiscally and socially.
- **Specialized knowledge**—The cognitive "book" knowledge required to work with ITS on a daily basis. This information would be primarily for planners, engineers, and technicians.
- **Technical skills**—The "applied" hands-on skills required to install, operate, and maintain ITS equipment.

As a starting point for the discussion, figure 1 displays the relative amount of education in each of these areas required by each of the stakeholder groups.

Figure 1. Relative ITS education requirements by stakeholder group.

Educational Program Component	Stakeholder Groups			
	DOT Personnel	Other Government Agencies	Elected Officials	General Public
Awareness	✓✓✓	✓✓	✓✓	✓✓
Benefits	✓✓✓	✓✓	✓✓✓	✓
Costs	✓✓✓	✓	✓✓✓	✓
Knowledge	✓✓✓	✓		
Technical Skills	✓✓✓	✓		

Note: Number of check marks indicates the relative importance of the component to the stakeholder group.

ITS Education Requirements for Department of Transportation Personnel

Department of transportation (DOT) personnel at all levels of government will have the primary responsibility for overseeing the implementation of ITS. The DOT personnel involved will require a wide variety of knowledge and skills to successfully operate in the dynamic ITS environment. Dependent on their duties, DOT staff will require knowledge levels ranging from the basics of ITS to highly detailed knowledge of specific technologies and equipment.

Ideally, every member of the DOT who works in the operations, maintenance, design, safety, transit, planning, and information systems areas would have at least a basic awareness of what ITS is. The level of awareness could vary from highly detailed for those involved with ITS on a day-to-day basis to moderate for those who have minimal ITS activity within their area.

DOT personnel will be in the forefront of promoting ITS solutions to transportation issues. As such it is critical that these individuals understand the many potential benefits and costs associated with ITS. DOT staff will have to be able to explain these issues to decision makers, especially during the budget process, to justify the large fiscal cost of ITS implementation. Additionally, the DOT's will have to provide information on these issues to the general population as ITS projects are developed and deployed.

Obviously, DOT personnel will require a strong knowledge base about ITS. In general, it will be beneficial for all upper management within DOT's to have a good general knowledge of ITS possibilities as well as specific information relevant to their functional areas. The operations staff will require a much more detailed level of knowledge as well as specific technical skills for those involved in the installation, operations and maintenance of ITS equipment.

Training for DOT personnel can be provided in a variety of forms. Perhaps the most beneficial in the early stages of ITS deployment is general training geared for all DOT employees. This training will provide a base-line of knowledge that will allow personnel to discuss ITS with colleagues and allow informed decision making. As deployment progresses, more advanced and specialized training can be provided to personnel actively involved in ITS activities. This training will enable DOT staff to oversee the installation and operation of sophisticated ITS equipment as well as making decisions on equipment specifications.

Alternatives exist for agencies to acquire the necessary skills. They can retrain existing personnel. While this may be a viable short-term solution, long-term it may not. Existing personnel already have other duties. By requiring them to take on other, and perhaps more complex duties, overall work quality may be compromised. A more appropriate solution may be to create new positions, staffed by individuals with the required skills. The personnel could either be internal DOT staff or contracted from private service providers.

There are a wide variety of mechanisms available for providing the necessary information and training to DOT personnel. Some possible methods are: special classed, short courses, reports and manuals, on-the-job training, conferences, seminars, workshops, newsletters, and brochures.

ITS Education Requirements for Other Government Agencies

The DOT will not implement ITS in isolation. Many other government agencies will, to some degree, be involved in the process. The level of involvement can range from highly involved agencies such as transit, turnpikes, and police to others with minimal involvement. Unencumbered ITS deployment requires that each involved agency understand its role within the process and assist in meeting the program's overall goals. Uninvolved agencies may view the large financial requirements of ITS as threats to their own budgets and programs. The decision makers at these agencies also need to understand the great potential of ITS.

A program to educate personnel in non-DOT agencies about ITS is critical to the success of the statewide program. At a minimum the education program should provide information about the various ITS technologies and how they will impact on the missions of the other agencies. It would also be beneficial for the staffs of the non-DOT agencies to be well versed in the benefits and costs of ITS deployment so that they understand the utility of these systems. Additionally, this knowledge can help these agencies promote ITS to their constituents. Knowledge and technical training would be tailored to the requirements of the individual agencies and provide information so the agency personnel can adequately interact with ITS technologies and DOT personnel.

Personnel from agencies that already work extensively with the DOT's could gain the necessary ITS-related knowledge by attending the same training sessions as their DOT colleagues. As well as helping to assure that everyone receives the same level of knowledge, this method could also help to promote a more cooperative atmosphere between the agencies. Staff from the other agencies could be informed about ITS via other mechanisms such as workshops, meetings, and newsletters.

ITS Education Requirements for Elected Officials

Elected officials at all levels of government control the fiscal resources for implementing programs such as are envisioned for ITS. Additionally, these officials have significant input into transportation-related decisions and project definition.

In order to adequately assess ITS projects and determine their importance within overall transportation plans, elected officials at all levels of government must have a baseline level of knowledge about ITS. At a minimum the officials should be informed about the various ITS technologies and the potential benefits of each. This knowledge need not be technical in nature, but rather, should provide easily understood basics. Additionally, and perhaps more importantly, these officials need to receive candid assessments of the fiscal requirements of ITS and the many non-technical, institutional issues surrounding ITS deployment.

Traditionally, information is provided directly to elected officials via formal reports and testimony from the agencies they oversee. A more expedient method may be to involve the officials' staffs in many of the information dissemination activities noted above. The staff members could in turn provide this information to the elected officials.

ITS Education Requirements for the General Public

Major programs, such as ITS deployment, can have thousands of interactions with the public each day as deployment moves from the exploration of potential applications to implementation of the selected program through long-term operations. Each of these transactions either helps or hinders the public's image a project. To earn the trust of the public, the implementing agency must spend a significant amount of time and effort informing the public about the program and its impact on other aspects of their lives.

The public, while not requiring detailed knowledge about ITS does need to know the basics of the technologies and what impact they may have. It would also be beneficial to inform the public about the relative benefits and costs associated with ITS usage.

Providing the necessary information to the public could be accomplished in a variety of ways. Information could be disseminated via the media in news reports and stories; DOT staff could meet with community and constituent groups to present ITS and discuss its ramifications; upper-level transportation and elected officials could speak about ITS at the many functions they attend, and ITS information could be presented as part of school and college curricula.

Conclusion

Intelligent transportation systems can provide solutions to a variety of today's transportation problems. Before ITS can be successfully implemented, it will be necessary to educate the various stakeholder groups about this relatively new and very dynamic field. This paper has presented a preliminary outline of an educational program to meet this goal could be designed. The paper defined four broad stakeholder groups to be educated: DOT personnel, personnel from other government agencies, elected officials, and the general public. Also presented was an outline of the subject areas (general awareness, benefits, costs, specialized knowledge, and technical skills) to be included in the program as well as a few methods for disseminating the information.

Reference List

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