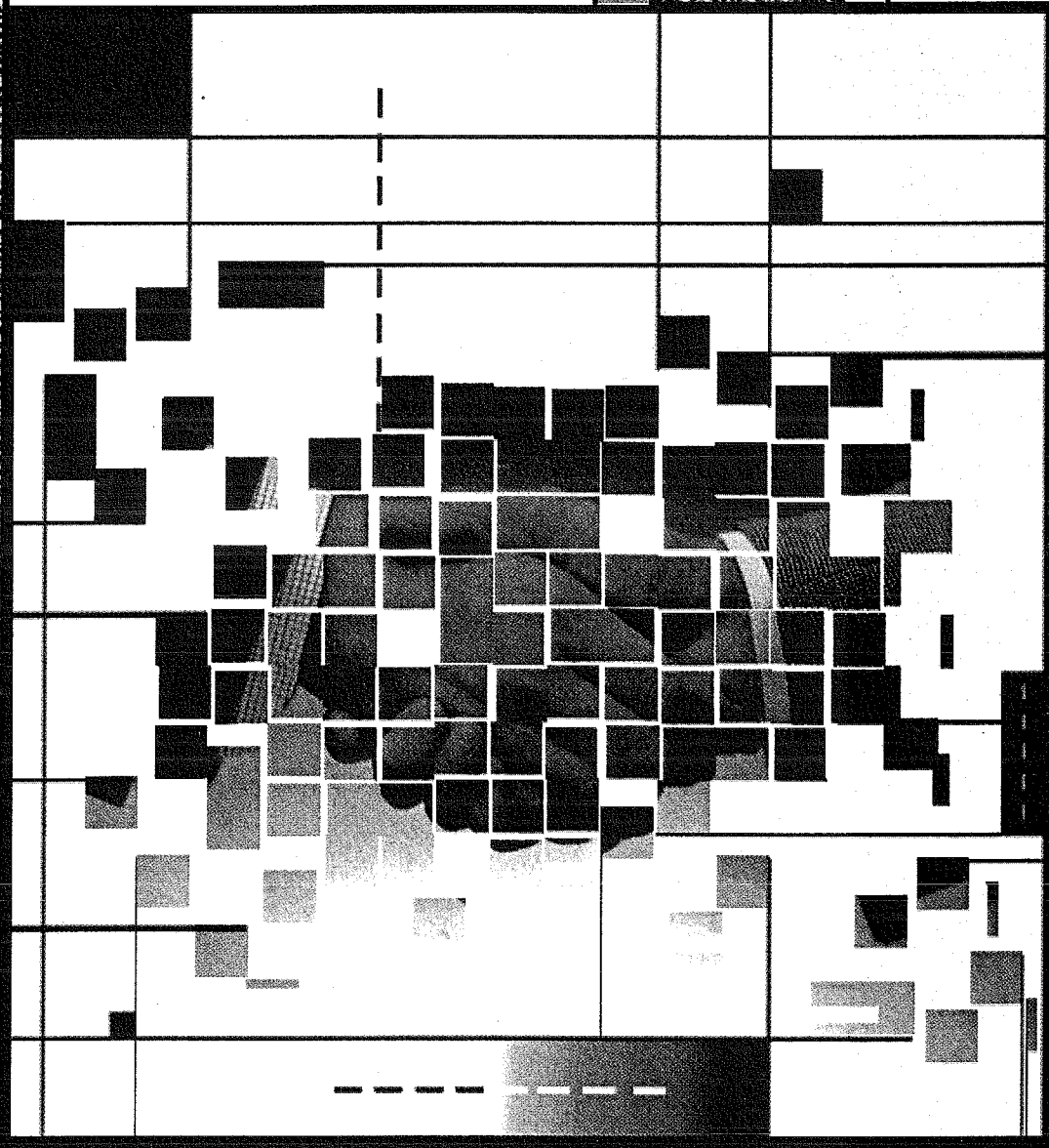


Interstate Cooperation for Implementing ITS in Commercial Vehicle Operations: Institutional Opportunities and Barriers

EXECUTIVE SUMMARY March 1, 1996



Prepared by
Iowa State University
Center for Transportation Research and Education

Funded by
Midwest Transportation Center
Iowa Department of Transportation

Interstate Cooperation for Implementing ITS in Commercial Vehicle Operations: Institutional Opportunities and Barriers

Executive Summary

March 1, 1996

Prepared by

Tom Maze

Michael L. Hancock

Kathleen M. Waggoner

Bill M. McCall

James Hunt

IOWA STATE UNIVERSITY

The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the information presented herein. This document is disseminated under the sponsorship of the U. S. Department of Transportation, University Transportation Centers Program, in the interest of information exchange. The U.S. government assumes no liability for the contents or the use thereof.



This executive summary of "Interstate Cooperation for Implementing ITS in Commercial Vehicle Operations: Institutional Opportunities and Barriers" was prepared by the Midwest Transportation Center and the Center for Transportation Research and Education at Iowa State University. Printing of this publication was funded by the Midwest Transportation Center and the Iowa Department of Transportation.

For more information contact the Midwest Transportation Center at 515-294-8103 or fax requests for information to 515-294-0467. The mailing address is 2625 N. Loop Drive, Suite 2100, Ames, Iowa 50010-8615.

TABLE OF CONTENTS

BACKGROUND	1
PROJECT SCOPE	1
METHODOLOGY	2
PHASE 1 FINDINGS	3
Fundamental Differences Between Development of ITS-CVO and Development of Traditional Highway Infrastructure	4
Institutional Barriers and Opportunities	6
Phase 1 Conclusions	7
PHASE 2 FINDINGS	8
Importance of the Findings	8
Issue Identification and Prioritization	8
General Issues	9
Electronic Verification and Electronic Clearance	9
Legislative and administrative policy issues	10
Safety issues (associated with electronic clearance only)	11
System policy issues	11
Operating policy issues	11
Marketing and education issues	11
Privacy and data ownership issues	12
Financial issues	12
CVO Administrative Processes	12
Database and system management issues	13
System operating policy issues	13
Data integrity and security issues	13
Safety	13
Financial issues	15
Database/data issues	15
Operating policy issues	15
System issues	15
Phase 2 Conclusions: Next Steps for ITS-CVO Implementation in the Midwest	16
Initial actions by individual states	16
Cooperative actions among midwestern states	17
CONCLUSIONS	18
REFERENCES	19

ACKNOWLEDGMENTS

Many individuals and organizations made this study possible. We would especially like to thank the state agency and private industry representatives who assisted in providing information and insights to the research. These people include Joe Ligas, Illinois Department of Transportation; Ruth Skluzacek, Iowa Department of Transportation; Cathy Erickson, Minnesota Department of Transportation; Bill Wilson, Missouri Highway and Transportation Department; Jim Pearson, Nebraska Department of Roads; Myron Rau, South Dakota Highway Patrol; Phil DeCabooter and Andy Richards, Wisconsin Department of Transportation; Russ Cerniglia, Ruan Transportation Systems Management; Vince Pierce and Sue Klus, AlliedSignal; Charlie Morgan, Rockwell International; Bob Moore and Bob Neely, Amtech; and Tasos Zagafos, Lockheed IMS.

We would also like to thank the Project Advisory Committee for its guidance and assistance during the course of the project. Special thanks to Joe Mickes, Missouri Highway and Transportation Department, who served as chair of the committee.

Bill McCall assisted in both phases of the research. Jim Hunt assisted in the first phase as a research assistant. Marcia Brink edited the phase 1, phase 2, and executive summary reports and prepared the final publications. Jennifer Reed designed the cover and layout for the executive summary and assisted in preparation of the final publications. Jan Graham administered the project budget. Program coordination was provided by Sharon Prochnow, and clerical support was provided by Vicki Gray and Margaret Hammer.

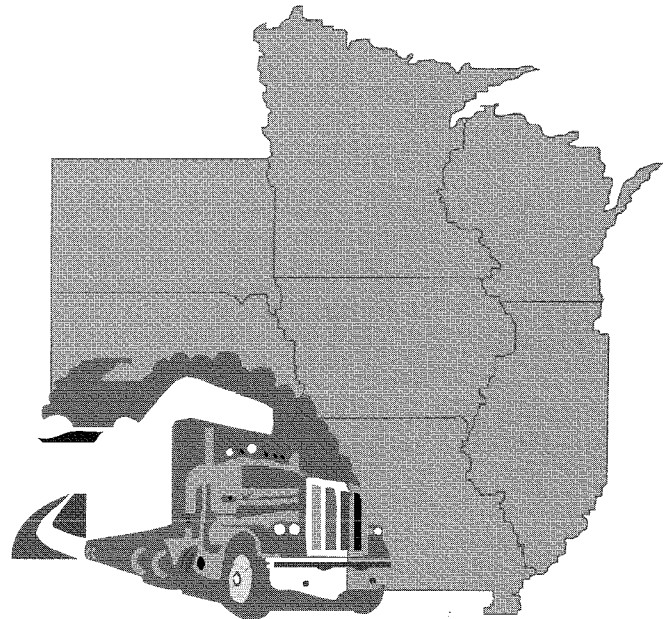
Lastly, special thanks go to the Midwest Transportation Center and the Iowa Department of Transportation for funding the research. Midwest Transportation Center funds were received from the U.S. Department of Transportation, University Transportation Centers Program, and Iowa State University. Without this financial support, the project would not have been possible.

BACKGROUND

Departments of transportation and the motor carrier industry are looking toward Intelligent Transportation Systems (ITS) to increase highway transportation safety and efficiency through streamlining and automating current processes and improving regulatory enforcement and infrastructure and fleet management. Many of these possible benefits can only be realized through large-scale, regional or even national implementations of ITS for commercial vehicle operations (ITS-CVO).

These large-scale deployments will, at a minimum, require some cooperation among states. Current state business practices and the legacy systems developed to support them may, however, stand as significant impediments to such cooperation for ITS-CVO development and implementation. Prior research and experience have shown that institutional barriers to ITS-CVO can be significant. The FHWA-funded state studies of intrastate institutional barriers to ITS-CVO have shown there are a number of significant issues that can impede ITS-CVO implementation. These issues range from a lack of communication and cooperation among state agencies with commercial vehicle regulatory or taxation duties to business practices and legal codes that do not accommodate the new practices and technologies of ITS-CVO. Similarly, research and demonstration projects have been stymied by problematic barriers resulting from such institutional issues.

This executive summary reports the results of a two-phase research project involving seven midwestern states—Iowa, Illinois, Minnesota, Missouri, Nebraska, South Dakota, and Wisconsin. The research identifies long-range institutional issues that could impede multi-state cooperation for development and deployment of ITS-CVO and offers possible approaches for mitigating such issues. The study was funded by the Iowa Department of Transportation and the Midwest Transportation Center at Iowa State University.



PROJECT SCOPE

The research utilized a case study of issues involving the state of Iowa and the six states adjacent to Iowa. Because of the number of states and agencies involved in the study, a number of approaches were used to identify potential barriers to interstate cooperation in ITS-CVO and possible methods for mitigating these barriers. The

METHODOLOGY

research was split into two phases—Phase 1 encompassed those tasks necessary to identify issues and barriers in interstate cooperation for ITS-CVO, and Phase 2 focused on identifying and prioritizing possible efforts to mitigate the barriers revealed in Phase 1.

Phase 1 efforts to identify opportunities and barriers in multi-state cooperation for ITS-CVO included:

- Contact with state trucking associations, motor carriers, and state agencies to determine the agencies involved in CVO activities in each state;
- Discussions with transportation agencies in each state to ascertain the lead agency and contact person for ITS-CVO efforts in each state;
- Review of FHWA ITS program plans, minutes of meetings with motor carriers and state agencies and discussions with identified ITS-CVO lead agencies to identify likely ITS-CVO functions and relative timing of implementation; and
- Identification and analysis of barriers to multi-state cooperation in ITS-CVO including a review of each state's laws and rules governing procurement by lead agencies for ITS-CVO and interviews with these lead agencies regarding their procurement and management philosophies.

The combination of these efforts resulted in a comprehensive examination of practices and requirements that could present barriers to interstate cooperation in ITS-CVO. Once opportunities and barriers to multi-state efforts in ITS-CVO were identified, possible options for mitigating these barriers were also developed.

While the Phase 1 study identified long-range issues related to multi-state cooperation in procurement and management of ITS-CVO implementation,¹ the Phase 2 effort focused on identifying and prioritizing those issues that states face in evaluating the need for and focus of both individual state and multi-state cooperative ITS-CVO efforts. These near-term issues that states face must be identified and addressed before state efforts can progress to the point where cooperative issues in ITS-CVO implementation become a priority.

To identify these near-term issues and formulate an action plan for states to move forward, a workshop involving representatives from the seven states involved in the study, motor carrier representatives, and private sector ITS industry representatives was held.

The purpose of the workshop was to identify issues, prioritize issues, and identify steps which will lead to multi-state implementation of ITS-CVO functions. Individuals representing the motor carrier industry, state regulatory agencies, manufacturers of ITS hardware, ITS service providers, and ITS America were present at the workshop. Researchers from the Center for Transportation Research and Education served as facilitators. These individuals formed the focus group to identify issues, formulate priorities, and structure steps leading toward implementation.

The workshop lasted one and one-half days. The first part of the meeting involved the presentation of the Phase I findings. Next the group identified and defined the ITS-CVO function/user services to be considered by the focus group. For each user service, the group next identified the issues which may act as impediments to implementation, and prioritized these issues with regards to their importance and their ability to impede implementation of ITS-CVO functions. Lastly, the group identified steps states in the Midwest should take if they wish to move toward multi-state implementation of ITS-CVO user services. The first steps identified were state-level activities which have clearly identified objectives and include input from the motor carrier industry. The next step is to identify regional goals and develop a regional forum for multi-state collaboration.

The Phase 1 research was guided by three assumptions:

- (1) Deployment of ITS-CVO will be administered through routine highway development, operation, and maintenance channels;
- (2) significant differences exist between the development of ITS-CVO systems and the development of traditional highway infrastructure; and
- (3) these differences may impact the ability of current practices and processes for highway development to accommodate the development and deployment of ITS-CVO. Thus, the characteristics differentiating the development and operation of ITS-CVO systems and the development and operation of standard highway projects were the crux of the research. The primary research question was whether the institutions established to support routine highway development can support the deployment and operation of ITS systems.

To answer this question, the research identified and analyzed the attributes of ITS-CVO development that differentiate it from traditional highway development and that will present difficulties for public agencies implementing ITS-CVO infrastructure. Once

PHASE 1 FINDINGS

Fundamental Differences Between Development of ITS-CVO and Development of Traditional Highway Infrastructure

these attributes and their corresponding challenges were identified, the resulting institutional issues were identified for each state and the region in general. The following two sections summarize these differences between traditional highway development and development of ITS-CVO and the resulting institutional issues that will be encountered by the study states or any public agencies implementing ITS-CVO infrastructure.

Differences between the development of ITS-CVO systems and the development of traditional highway infrastructure can be placed into four broad categories:

1) The High-technology Nature and Cost Structure of ITS-CVO. The ability to build a vast network of highways is possible because highways can be built using inexpensive materials and standard construction technology, and minimal technical and capital investments are required for entry into the highway construction industry. Costs of highway construction are largely a function of the variable units produced (e.g., miles paved and cubic yards of earth moved), and fixed costs are a small portion of the costs of highway construction. ITS-CVO systems, on the other hand, are highly technical, require high fixed-cost investments, and follow fast upwardly migrating technology paths. Because of these differences, efficient development of each type of infrastructure (i.e., traditional highway infrastructure and ITS-CVO infrastructure) may require different relationships with the infrastructure developer. Highways have traditionally been developed through arms-length relationships with contractors where procurements are made through competitive sealed bids based on technical specifications. This system of development may be contradictory to efficient development of ITS-CVO systems.

2) Lack of Standards for ITS-CVO System Design, Communications, Operation, and Maintenance. Without standards for ITS, investors will be making investments without the guidance on technology and functionality provided by standards, and thus they face the risk of investing in systems which may be incompatible with systems operated by other organizations, and the possible high cost of developing custom systems.

In addition, the lack of standards in ITS-CVO creates a different set of investment parameters than those for standard highway infrastructure investments. Highway construction and highway geometry have long-standing, established design standards. When

two states each plan segments of a highway that meet at their borders, standards have already been established to provide consistent, functioning facilities from one jurisdiction to the next. There are no standards to ensure interoperability of ITS-CVO systems across state borders. In fact, a hallmark of commercial vehicle administrative and safety regulatory systems has been their lack of uniformity from state to state.

3) Private-Public Development and Funding Approaches.

Unlike traditional highway infrastructure development, which relies on tax dollars for its development and operation, the development and operation of ITS-CVO is expected to combine both public and private investment. Since its inception, ITS has been planned as an initiative in which private industry is expected to be a major investor in both the development and deployment of ITS functions.^{2,3} This private sector role as active investor in bringing about ITS development and deployment is quite different from the private sector's role in traditional highway development as a supplier of products and services.

4) The Interstate Nature of ITS-CVO Functions.

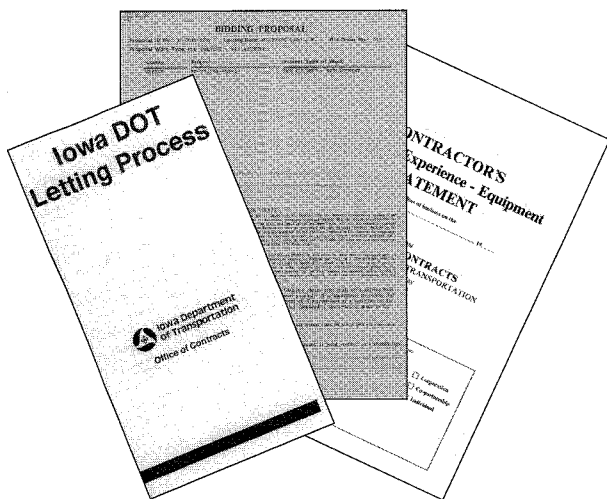
Commercial vehicle traffic is predominantly interstate and is highly regional. For example, for the state of Iowa, intrastate truck traffic accounts for only 20 percent of the truck traffic freight tonnage, while interstate and bridge traffic account for approximately 80 percent of total truck traffic freight tonnage in and through Iowa.⁴ Clearly, the majority of truck traffic in the Midwest travels through two or more states. In addition, truck traffic is likely to be regional. For the state of Iowa, roughly 60 percent of interstate truck traffic originating in Iowa is destined for one of the states adjacent to Iowa (Illinois, Minnesota, Missouri, Nebraska, South Dakota, and Wisconsin).⁴ Similarly, approximately 56 percent of interstate truck traffic destined for Iowa originates in one of the study states. Bridge traffic through Iowa is also highly regional, with nearly 57 percent of bridge traffic through Iowa originating in one of the study states.

This interstate nature of commercial vehicle operations and, therefore, ITS-CVO creates the most significant difference between the development and operation of ITS-CVO functions and the development and operation of traditional highway infrastructure. The development and operation of highways, bridges, and other highway infrastructure are governed by common standards, and these standards ensure compatibility across states and regions. Similar standards do not currently exist for ITS. In addition, the

Institutional Barriers and Opportunities

development and operation of traditional highway infrastructure require very little interaction between states. Conversely, the interaction between states needed for the development and operation of ITS-CVO will require aggressive interstate cooperation due to the need for interoperability and coordination of functions, operation, and maintenance among a number of states or, in some instances such as safety, across the entire nation.

To provide a common point of reference for identification and analysis of institutional barriers in each state, Iowa and the six adjacent states were asked to identify a lead agency in the state for the deployment of ITS-CVO functions. The administrative rules and laws governing these agencies were studied, and representatives of each lead agency and related motor carrier service organizations were interviewed in each state. From the research conducted for each state, barriers and opportunities were identified that relate to regional, multi-state deployment of ITS-CVO functions. Potential barriers and opportunities related to intrastate issues were ignored. Although many issues were identified, they can be divided into two general categories: 1) procurement laws, rules, and practices and 2) lead agency management issues.



1) Procurement Laws, Rules, and Practices.

Transportation agencies have established rules for procurement which are intended to foster competition. Most state-level procurement focuses on the purchase of transportation infrastructure based on technical specifications and through competitive sealed bids. Selection is often based on low bid, and bid documents of the selected contractor often become public information. These procurement practices are intended to support the purchase of standard highway facilities while ensuring competition among several satisfactory producers. This may not be the case with ITS-CVO facilities and services where the

number of providers is extremely limited, high fixed costs cause barriers to market entry, and procurements may be more complex because of a lack of standards.

In addition, although each state has the same fundamental objective for developing procurement practices (e.g., promoting free and open competition), not all states have developed similar procedures. For example, some states may encourage the use of life-cycle costing as a basis for selecting an equipment supplier, while

other states may require selection based on low purchase price. Some states may allow the purchase of equipment and services through competitive negotiation, while others may require competitive sealed bids. Some states may allow multi-year contracts without annual rebidding, while others may require annual competitive procurements. Further, almost all states have preferences for vendors located in their own jurisdiction. These conflicts in procedures and rules create significant barriers to multi-state deployments.

2) Lead Agency Management Issues. Although there are a myriad of issues involving the lead agency in each state, ranging from a lack of lead agency commitment to ITS-CVO to the inability to commit staff to develop and promote ITS-CVO, the primary barriers to multi-state cooperation for ITS-CVO relate to management philosophies. Most state agencies indicated an unwillingness to allow other states or a multi-state organization to perform or control its own commercial motor vehicle safety and administrative regulatory services. In other words, each state wants to continue to control all its own motor carrier services, although some states indicated a willingness to assume the responsibilities of other states. The issue of each state wanting to maintain absolute control over its own motor carrier services is antithetical to multi-state cooperation and diametric to the predominant trend of interstate and even global commerce and truck transportation.

As ITS-CVO applications move from research and operational test phases to deployment and become subject to traditional highway infrastructure funding processes, significant barriers will be encountered. Traditional highway infrastructure has been developed at the local or state level using standard methods and constructed by a large pool of qualified highway contractors. This environment is very different from the environment facing ITS-CVO in four general aspects: 1) the high-technology nature and cost structure of ITS-CVO; 2) the lack of standards for system design, communication, operation, and maintenance; 3) the need for private-public development and funding approaches; and 4) the interstate nature of ITS-CVO functions. Because of these differences, and without significant incentives and funding from the federal level, deployment of ITS-CVO functions is likely to face significant barriers.

Phase 1 Conclusions

PHASE 2 FINDINGS

The Phase 1 research into the traditional highway infrastructure development process in seven midwestern states revealed that established procurement and development processes are incompatible with efficient processes for deploying ITS-CVO functions. Further, the processes designed by each state are inconsistent and incompatible with other states, making multi-state cooperation difficult. Also, several states expressed the need to control regulatory processes at the state level. Interstate cooperation for the operation of ITS-CVO administrative and safety regulatory systems will be much more difficult to develop when each participating state must control operating processes. State-level control of processes is antithetical to current trends towards commerce operating in an interstate and international environment.

Importance of the Findings

The findings of the Phase 2 workshop provide value in two regards. First the findings identify issues that states and multi-state regions should address to allow for the successful implementation of ITS-CVO user services. It may not be necessary that all identified issues be resolved to allow implementation; however, all issues should at least be considered. Thus, the identification of issues provides focus for what states and groups of states can and should consider to facilitate implementation.

Issue Identification and Prioritization

Second, the steps for successful regional implementation of ITS-CVO user services define the need for strong agreement within relevant policy making and administrative agencies at the state level and the need for motor carrier involvement. Once a sense of purpose and proper authority has been generated at the state level, states can begin to form a multi-state organization to pursue common goals and regional implementation of ITS-CVO user services.

To identify and prioritize near-term issues, the Phase 2 inquiry focused on four general areas of ITS-CVO user services:

- Electronic Verification
- Electronic Clearance
- CVO Administrative Processes
- Safety

User services related to hazardous materials were not included due to the contentiousness of the issues associated with this area.

Fleet management services were also not discussed since these services are already being implemented through the private sector.

During the course of near-term issues identification, two issues that apply to all of ITS-CVO were raised. These issues are discussed in the following General Issues section. Following the General Issues section are sections detailing the definition of each function discussed and the issues associated with them as identified by state, ITS industry, and motor carrier representatives involved in the study.

Motor carrier representatives identified four criteria that are central to motor carrier acceptance of any ITS-CVO functions. The criteria set by motor carriers are that ITS-CVO functions and/or related equipment be:

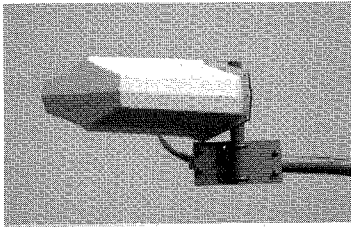
- Voluntary—participation in ITS-CVO must be an option not a requirement
- Cost-effective—functions should provide motor carriers with tangible cost savings
- Durable—functions and equipment must perform reliably in harsh conditions
- Interoperable—must function with all ITS-CVO systems available across the country

A general issue identified by states was related to ITS development and demonstration activities. With budgets and staff shrinking while responsibilities expand, states see a need to limit the number of processes being tested in operational tests or other development activities in which states have active roles in developing and testing the systems/processes involved. This would minimize the cost and risk to states for ITS experimentation and make state involvement in such projects more likely. The more processes being developed or demonstrated, the more difficult it is for states to participate due to the greater time commitments, responsibilities, and other related costs.

Discussion of electronic verification and electronic clearance are included together in the following section due to the similarity of these functions. However, it should be noted that states draw a distinct line between these two functions due mainly to perceived

General Issues

Electronic Verification and Electronic Clearance



safety and policy issues related to electronically clearing vehicles past weigh/inspection facilities.

To facilitate discussion, the following definitions of electronic clearance and electronic verification were developed:

Electronic verification—The ability to verify vehicle and driver credentials and permits at the roadside by electronic means of vehicle and driver identification and data retrieval.

Focus is to allow fast, accurate verification that the vehicle and the driver have all the necessary credentials and permits for operation of that particular vehicle and transportation of the freight on board in the traveled jurisdictions. Can also include verification

of vehicle and axle weights via weigh-in-motion scales and verification of safety inspection information and history. Does not imply any sort of bypass function.

Electronic clearance—Electronic verification with the additional function that participating in-compliance vehicles can (and will) be allowed to bypass weigh and inspection facilities but may be subject to random stops for inspection.

The state governments involved in the study sharply distinguish between these two functions because the bypassing of vehicles/drivers with in-compliance credentials and permits through electronic clearance raises safety and liability issues for the study states. Specifically, states are concerned that electronic clearance creates the expectation among motor carriers that in-compliance vehicles will be bypassed, does not bring the vehicle and driver slowly enough and near enough to an enforcement officer for a visual inspection, and may place additional liabilities on the state if the system malfunctions and a bypassed vehicle/driver is involved in an accident.

State, motor carrier, and industry representatives identified a number of issues affecting electronic verification and electronic clearance, then grouped the issues into a number of categories. The identified issues are summarized by category below.

Legislative and administrative policy issues

- Liability of preclearing trucks that are later involved in accidents

- Determining ITS-CVO needs and priorities
- Building the administrative and legislative support necessary to bring about enabling changes in practices and policies

Safety issues (associated with electronic clearance only)

- Ensuring adequate vehicle/driver inspection targeting and methods
- Coordinating ITS-CVO functions, enforcement efforts, and safety information, particularly when a state has multiple agencies involved in highway safety enforcement
- Losing opportunity to visually inspect vehicles and drivers

System policy issues

- Providing interoperability between systems
- Developing a standard for the process and information used to make bypass decisions
- Determining the lead state or agency in cooperative system management/procurement
- Obtaining the statutory changes necessary to support changes in processes

Operating policy issues

- Developing the necessary architecture and data structures that allow migration to ITS-CVO while supporting the needs of their legacy data systems
- Developing data structures for providing operational information to motor carriers
- Determining who should manage ITS-CVO systems and databases
- Determining and maintaining accountability for system errors
- Developing suitable state and motor carrier process requirements for motor carrier enrollment, electronic bypass, and roadside equipment
- Developing standards for facility designs that can incorporate ITS-CVO

Marketing and education issues

- Creating support for ITS-CVO among policy makers and motor carriers
- Gaining the knowledge necessary to successfully implement and operate ITS-CVO

CVO Administrative Processes

Privacy and data ownership issues

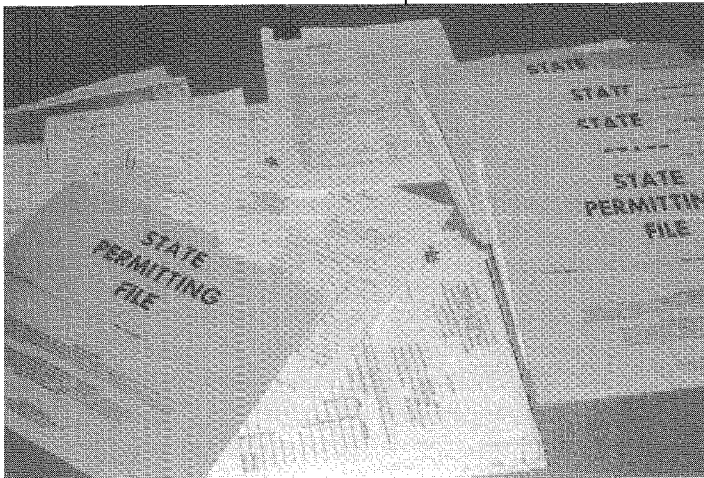
- Ensuring states have access to the necessary data whenever needed, particularly if the database or system is managed by another organization (public or private)
- Ensuring data security and information privacy to protect competitive information, avoid fraudulent applications, and avoid use for new taxation or enforcement efforts

Financial issues

- Estimating the capital costs and operating costs for both states and motor carriers
- Identifying the revenue streams necessary to pay for these costs
- Identifying cost-benefit ratios for ITS-CVO functions

For electronic verification and electronic clearance, legislative and administrative policy, system policy, and operating policy issues were given higher priorities than other issues. Safety issues related to electronic clearance were also included in this higher priority category. Financial and marketing and education issues followed the top-rated issues closely.

For discussion purposes, states, motor carriers, and ITS vendors defined commercial vehicle administrative processes as those paperwork requirements motor carriers are required to fulfill to operate legally in a state and across the country. Processes related to transporting hazardous materials were not included in this definition. Processes included are:



- Fuel tax license application, quarterly reporting, and yearly renewal
- Registration application and yearly reporting/renewal
- Interstate and intrastate authority application and renewal
- Oversize/overweight credential and permit application
- ICC filing and number
- U.S. DOT application and number

The issues identified for applying ITS to CVO administrative processes were grouped into three categories: database and system

management, system operating policies, and data integrity and security. Following is a summary of these issues by category.

Database and system management issues

- Developing standards for data fields, data structures, and data formats for electronic data interchange between states and between the states and motor carriers
- Ensuring accurate and valid data to eliminate redundant data entry
- Eliminating duplicate state and federal data requirements through data sharing

System operating policy issues

- Providing real-time response to states and motor carriers with human intervention only when exceptions arise
- Ensuring the system has logic to cross-check information to deter fraudulent practices (i.e., evasion by base-state shopping, name changes, etc.)
- Defining the roles of participating states in the operation of an ITS system

Data integrity and security issues

Data integrity and security issues were similar to those identified for electronic verification and electronic clearance, focusing on ensuring adequate controls for access to the system and system data and eliminating the possibility of duplicate records.

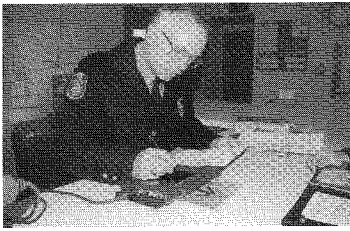
For commercial vehicle administrative processes functions of ITS, system operating policy and data integrity and security issues were given a slightly higher priority than database and system management issues, which were seen as relatively straightforward to address.

Discussion of possible safety functions of ITS-CVO identified a wide range of activities and factors perceived to be part of commercial vehicle safety and potential or current areas for ITS applications. These activities and factors can be categorized into inspection activities; compliance and enforcement enhancement; and commercial traveler facilities, information, and mayday messaging (i.e., rest facilities, road information, emergency notification).

Following are short descriptions of each category.

- Inspection activities include manual and automated roadside vehicle, cargo, and driver safety inspection and onboard

Safety



vehicle, cargo, and driver safety monitoring. These activities relate directly to identifying potential safety problems during the course of commercial vehicle travel.

- Safety compliance and enforcement enhancement efforts consist of methods to enable or enhance performance-based selection by vehicle, driver, and motor carrier for safety enforcement and methods of ensuring out-of-service order compliance. The focus of these applications would be to better identify those vehicles, drivers, and motor carriers with records of safety problems and direct the necessary resources to their problems.

- Commercial traveler facilities, information, and mayday messaging ser-

services were identified as safety functions because of their potential to enhance motor carrier safety indirectly.

- Commercial traveler facilities are rest areas and equipment check areas. These facilities can enhance commercial vehicle and driver safety by providing safe opportunities for drivers to rest and/or check their vehicle.

- Commercial traveler information and mayday messaging includes road and weather information and emergency notification in case of an accident or other incident. Commercial traveler information functions could impact highway safety by ensuring availability of accurate and timely information on road conditions such as traffic, construction, unique conditions (grade, intersection, etc.), and weather conditions in the area and farther down the road. The mayday messaging function could impact safety by providing immediate notification of an emergency situation and location, thus speeding response to accidents and other incidents.

As might be expected, safety applications of ITS-CVO resulted in the most lively discussion and identified the most troublesome issues of the applications discussed. The issues related to safety applications of ITS-CVO can be categorized into financial, database, operating policy, and system issues. For commercial vehicle safety applications of ITS-CVO, financial, operating policy, and system issues were given equally high priority, with data/database issues following closely.

Financial issues

- Need for credible cost/benefit analyses to ensure rational and effective implementation of safety functions
- Funding of high cost, technology intensive safety functions
- Likely unfavorable cost-to-benefit ratio
- Competition for funding with other safety needs
- Limited opportunity for private sector development
- High level of federal funding needed to be feasible

Database/data issues

- Ensuring data timeliness and accuracy
- Providing real-time access to data
- Developing uniform safety criteria and data among states

Operating policy issues

- Creating consistency in safety policy and enforcement
- Ensuring that system operating policies focus on compliance enhancement rather than on revenue enhancement
- Developing carrier education/compliance strategies to encourage safe practices
- Determining motor carrier and driver compliance and compliance history easily and quickly
- Resolving enforcement targeting issues related to whether or not driver history could be used in making decisions to stop vehicles/drivers

System issues

- Preserving the opportunity for visual inspection of the vehicle, driver, and cargo
- Ensuring system design is compatible with current safety inspection practices where necessary
- Reviewing the current safety inspection paradigm for possible improvements
- Minimizing the impacts of in-vehicle equipment on driver attention demands
- Providing and maintaining near real-time database information
- Providing road/weather advisories that are useful to long-distance travelers

Phase 2 Conclusions: Next Steps for ITS-CVO Implementation in the Midwest

To help states move ahead in dealing with the identified near-term issues for implementation of ITS-CVO in the Midwest, next-step actions were also identified as part of the Phase 2 workshop. To set the direction for this discussion, state, motor carrier, and ITS industry representatives participating were asked if cooperation among states would be necessary to address the identified issues or if states could address these issues and implement ITS-CVO with little interstate interaction.

State, motor carrier, and ITS industry participants overwhelmingly agreed that interstate cooperation would be necessary for addressing a majority of the issues identified. Prior to the need for high levels of interstate cooperation, however, are a number of issues that need to be addressed within each state, such as creating a forum for ITS-CVO discussion and development, determining the state's CVO direction, and identifying where cooperation with other states is beneficial and possible. After states have satisfied these issues, interstate cooperation could begin at a basic level. With these two needs in mind, study participants identified the following next steps.

Initial actions by individual states

- **Report on Meeting to Stakeholders.** Reporting the findings of the study and the possible interest of other states in cooperating for ITS-CVO implementation was identified as the first next-step action. Stakeholders included in this effort would be state agencies involved in CVO administration and regulation and motor carrier advisory groups. These groups should be informed of the findings and be involved in discussions about whether or not the state sees a need for and wants to actively pursue ITS-CVO and multi-state meetings for cooperation in ITS-CVO in the Midwest. If a motor carrier advisory group is not in place, one should be formed before proceeding with further action.
- **Develop CVO Needs and Strategic Action Plan.** For states that have not recently identified agency and motor carrier needs in CVO administration and regulation and developed a strategic action plan, identifying and communicating a strategic direction and plan is necessary. This will enable states to involve the motor carrier and policy-maker communities in the ITS-CVO development process and provide a springboard for ITS-CVO development both singularly and, when necessary, in cooperation with other states. This action plan should include provisions for establishing some means for sharing information about ITS-CVO interests and

initiatives with other midwestern states.

Cooperative actions among midwestern states

- **Determine Regional Goals.** Once each state has identified its direction in CVO administration and regulation and its goals and possible functions for ITS-CVO, states need to share this information with the other midwestern states. This will give states the opportunity to identify those areas where their interests and direction correspond with other midwestern states. States then need to formally collaborate on identifying those areas where they might work together for successful implementation of ITS-CVO.

- **Establish and Validate a Forum for Multi-State Cooperation in the Midwest.** With the general need and direction of collaborative efforts identified, states will need to develop an accepted forum for collaboration on ITS-CVO. This forum should be formed with the buy-in of the respective stakeholders in each state and, if possible, formally recognized by policy makers. Such a high level of acceptance for this forum would enable states to move with the recommendations or directional cues developed by the forum without second guessing by policy makers and others involved.

- **Engage Motor Carriers.** With general needs and direction identified and a forum for multi-state collaboration in place, the midwestern states cooperating in ITS-CVO will need to actively engage motor carriers in the development and implementation planning process. These efforts could parallel those done at the state level with motor carrier advisory groups. However, this motor carrier input should, if possible, also involve motor carriers whose operations are based outside the midwestern region. This would ensure that the interests of motor carriers are represented on a state, regional, and multi-regional basis, and thus build a stronger foundation for ITS-CVO implementation and use.

These next steps are intended to enable midwestern states to move toward ITS-CVO implementation in an organized, goal-oriented, and collaborative manner that engages stakeholders and others (legislators, policy makers, etc.) in the process. Once these next steps have been achieved, states will be better able to address the long-term issues identified in Phase 1 of this study as well as other issues related to interstate cooperation for the development and implementation of ITS-CVO functions.



Photo courtesy of
Rockwell International Corporation

CONCLUSIONS

Multi-state cooperation in the implementation and operation of ITS-CVO is necessary to achieve seamless integration and operation of ITS-CVO functions across regions and the country. Research in seven midwestern states has found, however, that a number of near-term and long-term institutional barriers will make such cooperation among states difficult or impossible. Near-term institutional issues include system operation and policy issues, financial issues, data and data privacy issues, and marketing and education issues. Long-term issues include, for example, procurement practices and requirements that impede or do not allow multi-state cooperation and state and state agency philosophies that insist on maintaining tight control over CVO administrative and enforcement activities. While the combination of issues and the specifics of each issue are likely to be different for other states, similar issues are likely to impede cooperation in ITS-CVO implementation and operation among other states as well.

Fortunately, the participating midwestern states were able to identify a number of efforts that would begin to address the short-term issues and put in place general methods and channels of communication for addressing long-term issues as well. These approaches for mitigating the barriers, like the barriers themselves, are generally applicable to other states attempting to clear the way for cooperation in ITS-CVO. Clearly, multi-state cooperation in ITS-CVO implementation and operation is possible, but states must recognize the need for such cooperation and put in place processes and channels of communication for identifying and removing institutional barriers and exploiting opportunities that arise.



REFERENCES

1. The Phase I report (T.H. Maze, Michael L. Hancock, Kathleen M. Waggoner, Bill M. McCall, and James Hunt, "Intelligent Transportation Systems (ITS) in Commercial Vehicle Operations (CVO), Interstate Cooperation for Implementation of ITS-CVO Functions: Institutional Opportunities and Barriers." Prepared for the Midwest Transportation Center, Iowa State University, 1995) may be obtained from the Center for Transportation Research and Education at Iowa State University.

2. M. Hallenbeck, J. Koehne, and D. Rosen, "Identifying and Surmounting Barriers to Implementing IVHS Commercial Vehicle Operations Systems." *Proceedings of the IVHS America 1994 Annual Meeting*, Vol. 1, pp. 55-61, 1994.

3. "The Crescent Project: An Evaluation of an Element of the HELP Program." Prepared by WHM Transportation Engineering Consultants, Inc., Castle Rock Consultants, and the Western Highway Institute/ATA Foundation, 1994.

4. T. H. Maze, C. Walter, and A. G. Smadi, "Policy Issues of an Iowa Longer Combination Vehicle Network." Prepared for the Midwest Transportation Center, Iowa State University, 1994, pp. 86-101.