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HELP/CRESENT CASE STUDY

John A. Volpe National
Transportation Systems Center
Economic Analysis Division
Cambridge, Massachusetts

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HELP/Crescent Case Study Report

Contract DTRS-57-89-D-0090

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Prepared by
Science Applications International Corporation
1710 Goodridge Drive
McLean, Virginia 22102

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Preface

This case study on the HELP/Crescent operational field test is one of six performed in response to a Volpe National Transportation Systems Center technical task directive (TTD) to Science Applications International Corporation (SAIC) entitled, "IVHS Institutional Issues and Case Studies." Other case studies were performed on the following projects: ADVANCE; Advantage I-75; TRANSCOM/TRANSMIT; TRAVTEK; and the Westchester Commuter Central. SAIC conducted interviews and case studies of the ADVANCE, HELP/Crescent, TRANSCOM/TRANSMIT, and Westchester Commuter Central projects, and is leading the production of a separate "Analysis and Lessons Learned" report that synthesizes results from all six case studies. Cambridge Systematics, Incorporated (CSI), SAIC's primary subcontractor for this TTD, assisted with interviews of ADVANCE personnel and independently conducted interviews and case studies for the Advantage I-75 and TRAVTEK programs. CSI is also assisting with production of the Analysis and Lessons Learned Report.

"Intelligent Vehicle-Highway Systems" (IVHS) is part of the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 that formed the basis for the Department of Transportation's (DOT) initiative to solicit proposals for operational field tests of IVHS products and services. The goals of the DOT IVHS Program are:

1. To improve the safety of surface transportation.
2. To increase the capacity and operational efficiency of the surface transportation system.
3. To enhance personal mobility and the convenience and comfort of the surface transportation system.
4. To reduce the environmental and energy impacts of surface transportation.
5. To enhance the present and future productivity of individuals, organizations, and the economy as a whole.
6. To create an environment in which the development and deployment of IVHS can flourish. (DOT, 1992)

In response to the ISTEA's emphasis upon meeting both the technical and non-technical challenges toward achieving the above goals, the Federal Highway Administration developed the, "1992 Intelligent Vehicle Highway Systems Institutional Issues (Non-technical Constraints) Program." As part of this program, the Volpe Center TTD has initiated the performance of six case studies with the primary purpose of answering four questions:

1. What institutional and legal impediments were encountered establishing partnerships and deploying IVHS services and products during the operational test?
2. Where in the life cycle of the operational test did these impediments occur?
3. How were these impediments overcome?
4. What lessons were learned in dealing with these impediments that can be applied to future deployments of IVHS products and services?

The secondary purpose of the case studies is to describe the operational test and document its history.

Information to support the development of the case studies included available documents on each program as well as interview notes and summaries based on an interview protocol especially created for this contract. A detailed description of the standardized procedures and methods followed during the conduct of the interviews is documented within a "Detailed Field Guide," produced as a separate deliverable of this TTD. A list of agencies interviewed is provided as Appendix A, and a bibliography of key references to the project being studied is provided as Appendix B.

Unlike many case studies where projects have been deployed and positive and negative lessons were learned after the total success of the system could be assessed, this case study report is on a project that was still under evaluation. Therefore, interviews represented a snapshot in time during the progress of the project, and issues identified at the time of the interviews may only be temporary.

Interviews for this case study were performed during the summer of 1993 and attempted to provide a balanced presentation of the issues as portrayed by those interviewed. An attempt was made to use corroborating stories as evidence of the accuracy and/or significance of issues raised. However, as with any report heavily dependent upon interviews, the accuracy and completeness are only as good as the accuracy and completeness of personal accounts told to and recorded by the interviewers. To help ensure accuracy and a balanced view of the issues, the HELP/Crescent program manager received a draft of the case study report for his project and was given the opportunity to comment. These comments were received and the author has responded to them in this version. Nevertheless, the author takes sole responsibility for the accounts portrayed in the case study reports.

As with any case study or lessons learned report, authors are subject to criticism that their evaluations either seek out the negative aspects with little emphasis on positive lessons, or are incorrect, biased, or lay blame. It is with great sensitivity to these issues that this case study report was written. Postured to identify issues, the authors acknowledge the fact that interviews were oriented toward finding problems; however, some attempt to identify positive lessons was

also made, and so reported. The intent of the authors was to avoid inaccuracies, bias, or blame, and to provide helpful hints to others who are about to embark on similar initiatives.

Separate from this case study, the "Analysis and Lessons Learned Report" will provide conclusions and observations about the institutional issues identified across the six case studies.

It will also provide lessons that can be applied to the deployment of IVHS products and services and recommendations regarding: new procedures and programs; the relative magnitude of barriers and respective priorities for their amelioration; and, training requirements for those entering into IVHS programs.

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Of special note is the expert consultation and review provided to this effort by a specially formed, "Institutional Barriers Advisory Group." This group, chaired by Mr. John Mason of SAIC, consisted of Dr. Christopher J. Hill of Castle Rock Consultants, Mr. Lance Grenzeback of Cambridge Systematics, and Mr. Kenneth Orski of Urban Mobility Corporation. The contributions of this group added greatly to the insight of the interviewers and writers.

The authors would gratefully like to acknowledge the assistance rendered by the HELP/Crescent field test program manager and the HELP/Crescent public and private sector partners. Also, special thanks go to all of those who participated in the interview process and contributed such thoughtful insights that can be valued by others facing similar tasks. Finally, many thanks go to Mr. Allan DeBlasio from the Volpe Center for his guidance, understanding, and support.

1.0 Summary

The Heavy Vehicle Electronic License Plate Program (HELP) project is a multi-state, multi-national research effort to design and test an integrated heavy vehicle monitoring system using automated vehicle identification (AVI), automated vehicle classification (AVC), and weigh-in-motion (WIM) technologies. The operational field test of the HELP program is known as the Crescent project. Its goal is to demonstrate the various technologies that would comprise a system whereby a truck entering in British Columbia, can drive through the entire crescent-shaped network, from British Columbia to Texas, without having to stop at other weigh stations or ports-of-entry.

In order to understand the institutional issues encountered in HELP/Crescent as well as the project's history, milestones, and accomplishments, interviews with a number of key personnel were conducted. In order to select the interviewees, a list of key persons who would be knowledgeable about the program was developed. Each person was contacted and told of this project's goals and asked to recommend interviewees. Candidate interviewees were those identified most often by the initial key informants. Final selection of the twelve interviewees was made to gain a representative sample of interviewees across dimensions such as public vs. private sector, length of involvement in the program, role in the program, etc.

Interviewees were contacted and one-on-one interviews were scheduled and conducted. The interviews followed a structured protocol and the collected data were summarized, integrated, and interpreted. Therefore, the body of this report consists of the opinions, perceptions, and views of those interviewed. A separate analysis and lessons learned report will correlate HELP/Crescent interview responses with those of participants in a similar IVHS project and will make recommendations for improving IVHS operational tests and increasing the probability for successful commercial deployments of IVHS technologies.

For the most part, the interviewees were the leaders, initiators, and champions of the HELP/Crescent project. Most have been with the project since its inception and are very knowledgeable about the issues that have been encountered, overcome, or accommodated since the planning phase. Their various roles have included serving as the program manager, trucking association representatives, policy committee chairmen, and executive director.

These interviewees saw a number of organizational issues as having been early barriers to the project with their major impacts causing (sometimes significant) delays in the project. Briefly, the major issues and corresponding strategies used to address them are summarized as follows:

- ? Lack of trust between the states and the trucking industry
- Issue: Early in the project, the trucking industry felt it didn't have an equal voice in the project and perceived the new technology as a threat to privacy.
- Strategy: Trucker representatives were given leadership positions on committees and helped shape the project's direction, strategy, and goals.
- ? Communication within and between the states was variable
- Issue: A number of states have multiple agencies responsible for truck regulation, inspection, fee collection, and other functions. Sometimes coordinating these agencies was difficult which made coordination between states very problematic.
- Strategy: Attempts were made to form alliances and foster relationships to improve communication. Attempts were also made to ensure those chosen for the project were committed and had decision-making authority.
- ? Unclear project goals and responsibilities
- Issue: As the project evolved, the goals changed to reflect new technologies, ideas, and applications. These new goals were not always agreed upon which led to confusion not only about what the project was trying to accomplish but also who was responsible for accomplishing the goals.
- Strategy: The project goals are still unclear. Some interviewees perceive the project goals as a demonstration of a technology or technologies; some as a set of applications; and others as a system. While this issue could be seen positively, in that this diversity of goals allowed the states and the industry latitude in developing technologies, the lack of an overall goal stymied the development of common goals.
- ? Lack of full-time leadership and staff
- Issue: While the program is seen as a success, all members were volunteers who had to perform their regular duties as well as the HELP/Crescent functions. Since no full-time director or support staff existed, sometimes the program was delayed.
- Strategy: A change in the chairmanship occurred; but since all positions were voluntary, it was difficult for each member to devote the needed amount of time to HELP/Crescent.

? Lack of standardized technology

Issue: A high proportion of trucks travels from state-to-state and there was a lack of uniformity in how the states interfaced with the trucking industry. Each state requires different information, registration, etc. A standard technology that will meet all state requirements and not overly burden trucking firms is needed.

Strategy: The specific requirements and specifications for the AVI technology have still not been agreed upon. Therefore, testing continues to develop a technology to meet all members' needs. To help integrate technologies considered for other applications, a contractor was hired to integrate the system and manage the data collection efforts.

Based on the findings of this effort, three broad and general lessons learned were identified. Discussed more fully in Section V., they include:

? Early stakeholder identification and full participation by all members

- In order to ensure a collaborative and participative process, it is important to identify all affected parties and understand the needs of all partners and members. Furthermore, all members and their organizations should have an equal voice in decision making.

? Early development of a project plan to include an evaluation strategy and methodology with a clear statement of project goals and measures of effectiveness

- Clear goals, timelines, and objectives must be developed early to help guide the project and provide strategic direction. Inevitably, changes occur as projects progress and as new ideas and technologies are introduced, flexibility is needed. However, without a clear plan or a road map, the project and its goals can deviate to such an extent as to be nonrepresentative of the original intent.

? Creation of a full-time leadership/managerial position with support staff to monitor and coordinate all the activities and ensure project success

- Leadership is essential to keep the project on track and to ensure that information flows between partners and members to reach the intended goals. Due to the magnitude of these responsibilities, these functions can only be adequately performed by someone who can devote full time attention to the project.

2.0 PROJECT DESCRIPTION

A 2.1 Project Background

HELP/Crescent, a project to assess the feasibility of advanced technologies for commercial vehicle operations (CVO) was initiated, as reported by interviewees, by Louis Schmitt (formerly with the Arizona DOT) and Loyd Henion (Oregon DOT). The initial issues encountered in HELP/Crescent focused on generating participation from the states and the motor carriers, as well as securing funding to continue the development of specific technologies to demonstrate their feasibility and applicability to the trucking industry and the states. Information collection for carriers helps to provide data for tracking activity levels and to support financial and strategic planning. For the states, information is needed for supporting tax administration, safety monitoring, and enforcement. Since activities for both entities can be a substantial burden, an electronic means was envisioned to help make the process more efficient and effective. HELP/Crescent was seen, therefore, as a system to help solve these problems by introducing and implementing a system to integrate technology that would identify, weigh, and classify heavy vehicles at selected locations.

Project Development

First discussed as a joint effort between Arizona and Oregon, the project concept is documented in 1981 with the submission and presentation of a paper to the Society of Automotive Engineers. The project formally began in 1983 with a two year feasibility study. Testing and development took place from 1985-1988 followed by the Crescent Demonstration from 1988 to 1993. The specific technologies assessed included Automated Vehicle Identification (AVI), Weigh-in Motion (WIM), and Automated Vehicle Classification (AVC).

AVI is a term used for the techniques that identify vehicles as they pass specific points on the highway. A number of different technologies exist, and the multi-state and multi-user nature of HELP/Crescent necessitates the meeting of different user requirements. Early on in the project, analyses were conducted to assess devices that would meet these requirements. However, even today a single solution has not yet been recommended.

WIM is an established technology used world-wide and is used to obtain vehicle axle and gross weights from in-pavement sensors. Unlike AVI, standardization of the technology design is not a requirement, though HELP/Crescent did establish minimum performance specifications to meet user needs.

AVC collects traffic data that provide basic information used in the design, maintenance, and management of the highway network. Normally a roadside installation, this technology

provides the opportunity for collecting these data reliably, continuously, and cost-effectively. Assessment of current technology has resulted in a set of minimum standards of classification accuracy, counting accuracy, reliability, and durability.

Goals and Objectives

As the program progressed, the perception of its goals and objectives has evolved. Originally conceived as a project to test the feasibility of combining WIM and AVI, the goals grew to be perceived by some members as the development of an entire system that would permit mainline bypass, one-stop-shopping, and other applications. As originally conceived, the documented goals of HELP/Crescent are to:

- ? Improve institutional arrangements
- ? Assess the viability of the technology in the highway environment
- ? Measure efficiency and productivity changes
- ? Identify additional applications for technology

The HELP/Crescent Partners

There are four primary partners in the HELP/Crescent program: the Federal Highway Administration; the Arizona Department of Transportation; Members representing State Governments; and Members representing Motor Carriers.

The FHWA provides funding and technical assistance to the program and has been instrumental in instituting the overall program evaluation. These responsibilities are especially evident at the regional and division offices of the FHWA, where staff are seen as the "bastion" of technical expertise. At the headquarters level, the FHWA role is primarily to ensure the project meets the goals of the national IVHS program and to help coordinate the activities of this project with similar projects/applications across the country.

The Arizona Department of Transportation has been a partner since the inception of HELP. As the lead state, its role has been one of coordination and recruitment to enlist members from the other states. Currently, Arizona has primary responsibilities for administrative, budget, and contractual matters.

Representatives from State Governments are responsible for their respective states' funding as well as the implementation, operation, and maintenance of the application technologies.

Representatives from the Motor Carrier industry have primarily been involved in the testing phase of the project through their cooperation in applying the various technologies to their vehicles. In addition, since this industry is the primary user of the services, they serve a major role in ensuring the technologies and their applications meet user requirements.

Participants were essentially recruited with the proviso that there would be a state representative and a motor carrier representative from each state. Other participants included motor carrier associations and trucking agencies, state law enforcement agencies, and state public service commissions. The federal and state DOTs were perceived as being involved in the operational and the deployment phases. However, when projecting into deployment, the law enforcement agencies, the trucking associations, and motor carriers were perceived to become the most involved organizations. Other specialized knowledge was contributed by consultants, who were singled out by a number of interviewees as having been instrumental in the continuance of the program.

Management Structure

The organizational structure for HELP/Crescent has evolved since the project's inception in 1985. Originally, the project was managed by the Policy Committee and the Executive Committee with a number of subcommittees formed to study system technologies, components, and other areas of interest. The Policy Committee's role was to develop the program's budget, approve the overall work program, and appoint the Executive Committee. The Policy Committee had a voting membership consisting of: the Chief Administrative Officers or their designees from all contributing states or authorities in the program; a representative from the motor carrier industry in each of these states; and representatives from the FHWA, Transport Canada, and the Canadian motor carrier industry. The Executive Committee's original purpose was to approve requests for proposals and consultant selection, approve technical consultant contracting products, update the project's budget and work program, and make recommendations to the Policy Committee. All contributing states or agencies and their associated motor carrier representatives were eligible for membership.

The operational field test is being carried out with the cooperation of the Arizona Department of Transportation, the California Department of Transportation, the New Mexico State Highway and Transportation Department, the Oregon Department of Transportation, the Texas Department of Highways and Public Transportation, the Washington Department of Transportation, and the Federal Highway Administration. Sponsoring states include the Nevada, Utah, Minnesota, Iowa, Pennsylvania, Alaska, and Virginia Departments of Transportation, the Idaho Transportation Department, and the Port Authorities of New York and New Jersey.

In 1989, as the program changed from a technical research project to an operational field test, a revised organizational structure developed. The Crescent Implementation Group (CIG) was formed to manage the test phase of the program. In addition, while the Arizona Department of Transportation was the original lead state, its role was changed to direct the administrative, budget, and contractual matters. The California Department of Transportation had the responsibility to lead the field test, and the Policy Coordination role remained at the Oregon Department of Transportation.

A cooperative, public-public agreement exists between the FHWA and the Arizona Department of Transportation. As the lead state, Arizona is responsible for the expenditure of the federal

funds, especially as applied to the evaluation process. The total funding for the project has been estimated at \$21 million. Of this total, the FHWA has contributed \$5 million with the balance of the funding pool having been contributed by the states either as committed funds or in-kind contributions.

HELP, Inc. was formed in October, 1993 with the intent of facilitating the accomplishment of the Crescent vision, mission, goals, and objectives. This organization is controlled by a Board of Directors, to which each participating state will appoint a government representative and a motor carrier representative. Furthermore, states could elect to rotate Board membership between different agencies if desired. The Board has the responsibility electing the Chair, Vice-Chair, and Secretary/Treasurer from the official representatives.

Day-to-day control of HELP, Inc. would be the responsibility of a full-time Executive Director supported by a full-time Technical Program Manager, and part-time administrative, legal, and financial support. Maintenance and operation of the Crescent network will be undertaken by a single, prime contractor, working under contract to HELP, Inc.

Funding to cover HELP, Inc.'s expenses will be made by the states to HELP, Inc. and would be commensurate with the degree of services received by each state, based on individual state business plans. Federal funds may also be solicited to assist HELP, Inc.

Risks/Benefits

Most of the risks and benefits mentioned by interviewees focused on the states and the trucking industry. For the states, most benefits were perceived as revolving around efficiency and a reduction of administrative burden. By having a standard system, resources could be better allocated. Congestion avoidance, especially at the most heavily utilized ports of entry and weigh stations, with an assumed increase in safety was also seen as positive. In addition, a streamlined system was seen as very beneficial in tax collection as well as helping in the area of enforcement. This latter issue was, however, also raised as a concern or a risk. Law enforcement personnel still don't trust the technology and fear missing unsafe trucks, a process now done through eyeballing the vehicles at the weigh stations. One other risk mentioned was the selection of the wrong technology. With advances in electronics, having to trade up or change to different technologies would be costly.

The trucking industry's benefits were mostly in the areas of efficiency and productivity. By monitoring truck location and speed, interviewees felt the industry would be improved. Other benefits included time savings and keeping up with technology. The technology, in fact, was seen as creating a level playing field, especially for the smaller carriers. As with the states, a fear of choosing the wrong technology was seen as a risk.

For the Federal Government, no risks were mentioned, except that the perception of the demonstration of the system would make HELP/Crescent appear to be a failure to some. On the positive side, the project was seen as helping to provide the Federal Government with more timely and standardized commercial vehicle data.

A 2.2 Operational Field Test Description

The operational field test is being carried out along the I-5 and I-10 corridors from British Columbia to Texas and includes British Columbia, Washington, Oregon, California, Arizona, New Mexico, and Texas. The test is being conducted to prove that new technologies can be used to more efficiently collect data between parties, improve the institutional arrangements between the states and the motor carrier industry, and improve the effectiveness of the public and private parties involved in the trucking industry.

Thirty-three sites are functioning along the Crescent route and include mainline data collection sites, weigh stations, and ports-of-entry. Access terminals used for data collection to the regional facility and operated by the system integration contractor are located in the capital of each Crescent state. The regional facility in Santa Clara, California, receives data from each state host system. In addition to having responsibility for data collection, the contractor serving as the Crescent Demonstration Operator is responsible for the system operation, motor carrier recruitment and enrollment, database updating, and data summary report production.

3.0 Past and Present Institutional Issues

A 3.1 Organizational Issues and Findings

Organizational issues were mentioned most frequently by HELP/Crescent interviewees. In fact, virtually everyone contacted on this project discussed topics in this area. Specific issues ranged from organizational commitment, to communication, to goal clarity.

Lack of Trust

The one issue that emerged strongly from a number of people was that of trust, or as one interviewee stated, "us versus them." This conflict between the states and the trucking industry was most noticeable at the beginning of the project though a number of interviewees also stated it is still not resolved. In fact, interviewees stated that one of the big problems resulting from this issue was a delay in the operational test due to a lack of drivers recruited into the program. As one respondent stated, "Half the truckers aren't against us anymore while the other half are just waiting to see." However, early on in the project, this issue so predominated the test that, as several interviewees described it, a "truckers caucus" took place at an annual meeting. The motor carrier industry representatives met in one room to decide their future involvement and to seek solutions to their perception that they had no voice in the project. The result was a "motor carrier charter" resulting in more participation by motor carrier representatives in the various committees and subcommittees. This issue of trust revolved around a number of concerns the trucking industry perceived as more regulation into their industry. However, even within the trucking industry, it appears the relationship between the national association and the state associations is weak.

Concerns About "Big Brother"

The issue of "big brother" surfaced early in the project when truckers thought the idea of AVI was just a way for the federal government to initiate a national weight/distance tax (which currently exists in Arizona and Oregon) and is not popular with truckers. Just as the issue of trust, this issue severely affected the ability to recruit carriers to participate and delayed the program. Although more of an issue with trucking company management, the "big brother" issue also affected individual truck drivers. One interviewee pointed out that many drivers felt the transponders would allow the companies the ability to track all their movements and could be used against them by their companies. In fact, one trucker had recently been denied a safety award due to logs showing excessive speed, and another was fired due to a discrepancy between

is log and that of the tracking system. While these were the only cases reported during the interviews (and was mentioned by more than one interviewee), it appears the truckers may have a valid concern. As more people become aware of this incident, the issue may intensify.

Concerns Over Data Confidentiality and Security

Related to the big brother concern was industry's and the states' concern over data security. Some truckers and trucking firms feared that information concerning their routes, times, etc. would be available to competitors, thereby weakening their competitive positions. Most interviewees felt this was more of a concern to the intermediate size carriers. Some states, however, also voiced some hesitancy about sharing their data. After some delay, this issue was resolved with the selection of a third party contractor responsible for data collection, storage, and reporting requirements.

Lack of Commitment

Another issue was the perceived lack of commitment by some states to the project and some states' inability to coordinate their agencies. A number of causes were cited for this, including a lack of representation by industry champions from certain states, poor selection of members, and poor assigning of responsibilities. In order to accomplish the HELP/Crescent goals, each state had to have the "movers and shakers" from the state involved, not necessarily the people in the trenches. Decision-makers were needed who knew how to get things done, but this wasn't always the case. In fact, some interviewees stated that, at least early on and for some states, members were selected who were not the "best or brightest." In fact, it was perceived that inclusion on the project, for some states, was almost a dumping ground to involve people who were inappropriate for their assigned jobs. During the operational test phase, this issue had moderate impact since the different states were responsible for the implementation of the equipment and technologies. As their involvement in the project and their commitment fluctuated, schedules had to be readjusted for the sites to become operational.

Lack of Clarity in Roles and Goals

The clarification of roles, responsibilities, and goals for HELP/Crescent was a major issue. During the life of the project, although Arizona always maintained the related HELP/Crescent contracts, different states took the technical lead for the project. While this was a positive accomplishment as champions emerged to keep the project going, it created voids in the project and hampered its progress. Early on, Arizona, Oregon, and California were the leaders. As the project continued, California's leadership waned (though this state is now emerging as the present leader) and, therefore, other states such as Washington were forced to assume greater responsibilities to carry the project.

Poor Coordination

A related issue was the coordination, or lack of coordination, that was evident within different states' agencies. Several interviewees explained the difficulties involved in trying to bring disparate agencies such as law enforcement, the department of motor vehicles, tax and revenue collection agencies, and other departments together. Each of these agencies has responsibilities for states' trucking industries, but internally they are not coordinated. In fact, in California, the Highway Patrol was opposed to the concept because they believed that the concept of mainline bypass would deprive the officers the opportunity to "look the drivers in the eye" and assess their condition and ability to drive safely. Without this coordination *within* the states, it was sometimes impossible to get coordination *between* the states.

Part of the reason for the lack of coordination among states was the lack of clarity of HELP/Crescent's goals. The evolution and articulation of the goals was seen as a major impediment and involved not only the states and industry, but also the federal government. Initially, HELP/Crescent was formed to demonstrate the feasibility of different technologies (AVI, AVC, and WIM). However, as the project proceeded and as the federal government became involved, the goals were perceived as becoming more global and comprehensive in that a *system* was being created. One interviewee stated the acronym HELP, "stands for 'Have Electronics Looking for a Program'."

A number of interviewees stated that as the federal government became involved, there was a tendency to oversell the goals of the program, possibly to justify the government's contribution to the project or to "tell the government what it wanted to hear." Although FHWA thought the operational field test was focused on the concept of fielding a full-up, mainline bypass system, most interviewees said that this was never the case. Instead, each type of technology was to be tested individually.

Some interviewees felt the federal government helped to foster misperceptions about the goals of HELP/Crescent because FHWA never really understood it. FHWA didn't get involved until near the end of the project, and even then, played a minor role (except for the very early championing of the project by one federal official). These disagreements over the goals has caused a great deal of confusion, apprehension, and distrust between the Crescent states and the federal government.

When viewing these issues historically, it appears most have been resolved, at least into the present evaluation phase, with the biggest impact being delay in schedule. Early on in the project, the development of public/private partnerships was seen to be one of the most hindering issues. However, and as might be expected, this issue has become less severe. Other issues that have, and appear to continue to be minor irritants in the project, are intra-agency coordination and definition of goals and responsibilities. Closely linked to the definition of responsibilities is some confusion over who is responsible for completing the project's mission, especially as it shifts from the evaluation to the deployment phase.

A 3.2 Regulatory Issues and Findings

Lack of a Standard

To those who perceived that the goals of HELP/Crescent were to allow states to advance and test new technologies – and **not** an interstate mainline bypass system – the lack of a standard was not seen as a big issue. Instead, these people viewed the lack of a standard as an issue for bureaucracies to handle, without significant impact on advancing the state-of-the-art. Most interviewees, however, saw this as a major concern during the HELP/Crescent test phase because the different states were using different technologies and had different regulatory requirements. It was especially apparent in California where motor carriers have to "shuffle a lot of paper," and at least for this state, many saw this issue as having impacts both within and between states.

The more global issue in this area was the development of a technology that could be compatible across all HELP/Crescent states and ultimately on a national level. This was perceived as a problem early on since some motor carriers were reluctant to commit and invest in any one technology and then have to buy new equipment in the future. One interviewee mentioned that if a nationwide IVHS architecture did not accommodate such equipment differences, the problem could be severe.

Again, it appears that some of the confusion in this area stems from a lack of clarity regarding the nature of CVO data collection and its use. Since each state has different regulatory requirements, there is concern over how the states will share the data and how the data will be used for auditing, enforcement, and tax purposes.

A number of interviewees stated that since the systems integration contractor has been involved and has the responsibility for system development, some of these issues have become less critical. Interviewees from the trucking industry expressed more trust with a third party having responsibility for data collection, though some problems still persist. These problems focus mainly on the sharing of the data among the states and the states' commitment to cooperate in a timely manner with the process. Oregon, specifically, was cited by some as being slightly less cooperative than other states in this area. Since Oregon has its own data collection system, it collects its data and performs some processing and auditing functions, and then after a delay, sends it to the central data base. This causes delays typically of three to five days in collecting current data from Oregon and hampers timely HELP/Crescent data collection.

Except for the development of standards and protocols, issues in the regulatory area were seen by interviewees as never really having been a major problem in any phase of the project. However, the development of a standard technology has caused some delay to the project from the design phase up through the present evaluation phase. It was perceived this will never be fully resolved until the federal government steps in and defines the standard. As one interviewee stated, "If you take only one message back, we need more competitors to create one set of standards, one system, with multiple manufacturers to bring the cost down for industry."

3.3 Human Resources Issues and Findings

Lack of Member Continuity and Commitment

The human resource issues revolved around the continuity and commitment of the HELP/Crescent committee members. An issue mentioned by a few interviewees was the lack of full-time, dedicated staff or leaders, both at the state and the project level. Since participation was voluntary, members also had their own jobs to perform and HELP/Crescent responsibilities were sometimes "back-burnered." In addition, as discussed above in Section 3.1, some interviewees felt that not all states were committed to the project and, as a result, didn't appoint the right people to the project. Early on, some states did not involve people who had the authority to make decisions, and this caused delays in the project, especially in the operational test phase.

Insufficient Staff Expertise and Authority

The issue of expertise also surfaced, especially in relation to equipment installation and maintenance. Essentially, the states have little resident expertise in sensor technologies and there wasn't always coordination between engineers and the end-users. An example was cited of the installation of a WIM sensor too close to the station to have any practical use. By the time weight readings were taken, the truck was too close to the station to be able to bypass. Another issue concerned the maintenance of the equipment and related confusion over the authority to keep it operational. If problems arose, the states usually didn't have the expertise or resources to fix the problems, but they also didn't have the authority across agencies to mandate the problem be resolved. One interviewee felt that the problem also occurred as a result of vendors' being more interested in only selling and not maintaining the equipment and keeping it operational.

The result of these problems was that, especially in the implementation phase, not all equipment could be counted on to be operational. This hampered participants' credibility in the technologies and delayed the project. As might be expected with the introduction of new technologies, this occurred primarily in the implementation phase with little effect in the other phases as the vendors and the users worked jointly to improve the technology.

A 3.4 Financial Issues and Findings

Funding Source Sufficiency

Financial issues were not seen by interviewees as having been a major issue in HELP/Crescent, at least through the evaluation phase. As one interviewee stated, "We always seemed to be able to find funds we needed." However, finding the funds was associated with a state's or an organization's "savvy" in knowing where to look for the funds. For the most part, participants were committed to finding funds since it was perceived from the start that benefits would be forthcoming. One major source, federal money, was cited by interviewees as having given the project new impetus. While some conceded it cost some autonomy, it also eased the pressure to search continually for money. In fact, a few interviewees stated that there is an overabundance of funds for the evaluation.

It was also generally perceived by interviewees that the system integration contractor has invested its own funds in order to complete the evaluation. While this contribution is looked upon as an investment on their part, the contractor is seen as, "doing what it had to do to get the job done." However, while having the contractor perform the data collection and storage function was effective, there was some disagreement between participants. The trucking industry felt it was a good solution to the data-privacy issue while states felt some of their control of data was taken away. As one interviewee stated, this solution was, "The lesser of two evils."

The major issues concerning funding seem to focus on the uncertainty HELP, Inc. faces as it proceeds to deployment. Issues in this area are discussed in Section 4.0.

A 3.5 Other Issues and Findings

Not discussed in sections 3.1 through 3.4 above was the issue of environmental concerns. For HELP/Crescent interviewees, this was seen, if anything, as a positive outcome of the project. Since one of the major goals of the project is to decrease congestion around ports of entry, HELP/Crescent is seen by those interviewed as having positive impacts on the environment by reducing pollutants and fuel usage. It is clear, however, that the environmental community will look very closely at evaluation data and conclusions before agreeing with HELP/Crescent personnel on this issue.

4.0 ISSUES PROJECTED FOR FUTURE PROGRAM PHASES

HELP/Crescent no longer officially exists and has been replaced by HELP, Inc., the non-profit organization formed to oversee the deployment of the CVO technologies. As HELP, Inc. progresses, the major issues seen by most interviewees revolve around recruitment and organizational cooperation, financial stability, and technology standardization.

A 4.1 Organizational Issues

Recruitment Concerns

Interviewees viewed the continued support and recruitment of the motor carriers as crucial to HELP, Inc.'s success. While the demonstration project supported the technology's application and benefits, not all carriers or drivers are fully convinced of the value.

Lack of Intragency and Interagency Cooperation

Turf protection between states and state agencies could be an impediment for deployment. Since each state has a number of agencies involved in regulation, revenue collection, safety and enforcement, the notion of a system that integrates information from these agencies could be a threatening prospect. Cooperation and buy-in from the law enforcement agencies is also crucial since safety inspections are conducted by the highway patrol in many states. Their current practices and biases are to be able to visually inspect the vehicle and the driver. While attitudes are changing, until they are convinced of the system's reliability, their cooperation cannot be assured.

A 4.2 Financial Issues

Market Uncertainty

As HELP/Crescent evolves into HELP, Inc., there is some concern of the system's viability. A number of interviewees stated that truckers are still not convinced of the technology's benefits. Efforts have been, and are ongoing, to publicize the demonstration's success and win over the trucking industry.

Cost Sharing

One of the major issues is the pricing strategy that needs to be implemented. One solution offered is to have each truck charged a dollar each time it bypasses a station ("a buck a click"). However, there is no unanimity on this approach, either from the states or the industry. Also, states are still in the process of completing their business plans and deciding their level of involvement.

Related to the financial issue, is the question of what technologies will be supported, what the standard will be, and the cost to the carriers. Again, interviewees voiced concern over (1) buying into a technology now that may become obsolete and have to be replaced soon at a possibly high cost, and (2) being unsure how these technologies will benefit their firms. And, without a national standard, larger companies that operate on a national basis, voiced some frustration over possibly having to equip and maintain different technologies around the country.

A 4.3 Legal/Regulatory Issues

Finally, the question of technology standardization needs to be resolved. Concerns center over which technologies will be supported, what the standard will be, and what the ultimate cost to the industry will be. Interviewees perceived problems with buying into a technology that might soon be obsolete or not supported. It was also felt that larger carriers operating on a national basis might have to equip and maintain different technologies for different regions or corridors.

5.0 LESSONS LEARNED

A 5.1 Findings

Interviewees reported that the concept of HELP/Crescent worked well and was generally successful in demonstrating several technology applications for CVO.

Based on the interviews, a number of findings emerged:

Clear communications are essential for maintaining operational focus. As HELP/Crescent progressed, the number of participants and technology development and applications increased. With growth in these areas, the goals of the project evolved as did each party's roles and responsibilities. This was especially apparent when the FHWA became involved and the goal of the demonstration seemed to expand from an assessment of technology applications to a "system" evaluation. All parties need to be kept informed, reminded, or updated as to what the goals are to ensure that daily operations do not diverge from the stated goals.

Full-time involvement and leadership in the project is necessary to monitor and coordinate activities. There is no doubt that the participants were dedicated to HELP/Crescent – the success of the demonstration attests to this. However, participants felt that time was lost on all phases of the project since project's participation was voluntary. Trying to handle this project's demands in conjunction with one's career responsibilities sometimes lead to the HELP/Crescent business being postponed until there was time. In addition, the project also needed leadership and decision-making. While consensus building and communication coordination were seen as vital managerial responsibilities, some interviewees felt that a stronger presence would have been more effective in resolving differences.

Early stakeholder identification, participation, and involvement could have helped build trust. Early disputes between the states and the trucking industry severely hampered the project in all stages. These disputes and distrust constrained early trucker recruitment efforts and may constrain full deployment since truckers are still not convinced of the technology benefits. These issues may stem from perceptions early on that truckers were treated as second class citizens and were being told what was expected of them without their input. Only after gaining leadership roles and participation on committees did the industry become involved in the project.

Project plans and activities should be developed to help guide the project from inception to completion. While interviewees stated that a project plan was developed, due to the dynamic nature of the project, it was difficult to adhere to the plan. It

appears that while a plan was developed, it was seldom re-visited for updates or for checking where the project was. This type of activity or document would have helped in planning resource allocations and operations and eliminating confusion surrounding the project's focus.

A 5.2 Recommendations Based on Interviews

Based on the interview process, a number of recommendations emerged and included:

Full-time Staffing

Maintain a realistic managerial, technical, and administrative staff. Ensure that full-time managers and staff are available to handle the project's day-to-day operations. The amount of time that needs to be devoted to the operational tests and demonstration projects seems to be underestimated. The amount of communication and coordination that is required, especially when there are so many participants across states and sectors is too much to be handled part-time. In addition, many of the IVHS technologies have not been part of state transportation agencies, who have little experience or expertise with them. Having this expertise accountable to project management would help define this responsibility.

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Broad Participation

Ensure involvement/input from all participants. From the beginning of the project, one shouldn't make assumptions about an individual's or group's opinions or requirements. If the project is going to be a success, it requires commitment from everyone involved and the project should look to all members of its partnership for ideas.

Evaluation Planning

Develop an evaluation plan as early in the project as is feasible. An evaluation plan can be used as a roadmap to guide the development process and support the success of the project. The plan can ensure that measures are developed early so that processes are in place to test the

technology's effectiveness. An evaluation plan that is developed too far into the implementation phase (as happened with HELP/Crescent) may be incomplete or unrealistic.

Public Relations

Articulate and promote the project benefits. Participation by all users is needed to make the project a success. But users, or potential users, may not be aware of a technology's benefits. Ensure that benefits are documented and disseminated through a number of channels to "get the word out."

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APPENDIX A

Organizations Interviewed

Arizona DOT

CALTRANS

CA Trucking Assoc.

Federal Highway Administration

 ? Headquarters

 ? Region Nine

HELP, Inc.

System Integration Contractor

New Mexico Taxation and Revenue Department, Motor Vehicle Department

New Mexico Trucking Association

Oregon DOT

Western Highway Institute

APPENDIX B

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