

The Basics First: Baltimore Regional Information Exchange System (IES)

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Many transportation planners and facility operators across the country face the same problem – the inability to access information about real-time conditions, planned events, and historical data in neighboring jurisdictions or other agencies. This common problem is being addressed in a recent project initiated by the Baltimore Metropolitan Council (BMC, staff to Baltimore's Metropolitan Planning Organization) and participating member agencies. In order for agencies to share relevant recurring and non-recurring incident information and other transportation-related information, procedures for sharing data and information must first be established. Initially, these procedures will be based on using existing forms of communication. A plan is being developed to gradually add electronic sophistication as time and budget allow. The first step in developing information sharing procedures was to conduct a survey to identify available and desired information, and data needs (electronic and non-electronic descriptions of equipment, procedures and events [recurring and non-recurring]). The survey results have been used to match data needs with existing data exchange methodologies. In the near term, these methodologies include telephone, fax, electronic mail, and scheduled mailings, while mid- to long-term approaches include more automated systems (i.e., integrated computer exchange systems). Determining methodologies that allow tying these future high-tech systems into the architecture defined within the Maryland Statewide CHART II program is a major goal of the project. Key words: ITS, information exchange, implementation, interagency.

INTRODUCTION

Many transportation planners and facility operators across the country face the same problem – the inability to access information about real-time conditions, planned events, and historical data in neighboring jurisdictions or other agencies. The problem includes not only the actual lack of data, but also the lack of procedures to exchange available data (i.e., contacts within neighboring agencies and jurisdictions, the format of the data, and knowledge of the types of data that may be available from other agencies). Often, there is also a lack of knowledge of data and data formats among the different departments within an agency or jurisdiction.

The resolution of this issue arose as a high priority during work on Phase I of the Metropolitan Baltimore Intelligent Transportation Systems (ITS) Early Deployment Plan (EDP). This common problem is being addressed in a project initiated in Phase II of the EDP by the Baltimore Metropolitan Council (BMC, staff to Baltimore's Metropolitan Planning Organization) and participating member agencies. This project involves the development

and initial deployment of the Baltimore Regional Information Exchange System (IES). In order for agencies to share relevant recurring and non-recurring incident information and other transportation-related information, procedures for sharing data and information must first be established. Initially, these procedures will be based on using existing forms of communication. As part of this project, an attempt has been made to include steps and procedures to allow the gradual addition of electronic sophistication as time and budget allow.

This project seeks participation of all regional stakeholders, including those that may not typically be included, but who could benefit from the system, such as emergency responders, school bus operators, and mass transit and para-transit operators. The project may be somewhat unique in that it starts as a "low-tech" solution by establishing information-sharing procedures using existing technologies. The long-term goal of the project is to develop an electronic information clearinghouse that contains transportation information or information that will assist transportation professionals including planners and facility operators.

PURPOSE / PROJECT DESCRIPTION

Since 1996, the Baltimore region has been working on the ITS EDP effort made possible through a grant from the Federal Highway Administration. BMC has been the lead agency, and Transportation Corridor Consultants (TCC) has provided consultant support. There has also been participation from:

- transportation planning and public works departments of the local jurisdictions in the region which includes Baltimore City and Anne Arundel, Baltimore, Carroll, Harford, and Howard Counties
- Maryland Department of Transportation and its modal administrations (State Highway Administration, Maryland Transportation Authority, Mass Transit Administration, Maryland Aviation Administration, Maryland Port Administration, Motor Vehicle Administration)
- Federal Highway Administration
- Maryland State Police
- local emergency responders

Phase I of the EDP revealed that there is a great need in the Baltimore region for the establishment of procedures to enable agencies to share real-time, non real-time and historic transportation-related information. In Phase II, the Baltimore Regional IES is being developed to address this need. The primary purposes of this project are to identify information that is desired by, and available from, participating agencies, and to identify appropriate methodologies to share information among participating agencies. These methodologies will include low-tech meth-

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ods in the near-term and high-tech methods in the mid- to long-term. Additionally, steps will be provided to guide agencies to connect to other advanced systems such as the new Maryland statewide CHART II system and the I-95 Corridor Coalition Information Exchange Network (IEN).

This project will focus resources on plans and projects that can be implemented in the near-term, while laying a strong foundation to support future projects. TCC's involvement with the development of the CHART II architecture as well as the IEN will help to ensure consistency with the regional ITS architecture defined in the EDP and with other proposed and existing statewide systems. The knowledge of these and other projects will benefit the Baltimore metropolitan area agencies by applying previous experiences and preventing similar mistakes.

The Baltimore Regional IES will build on what is currently available, in terms of information and communication systems, while preparing the agencies for more sophisticated systems in the future. In terms of this project, information is defined as electronic and non-electronic descriptions of equipment, procedures, and events (recurring and non-recurring).

The project began with the determination of the currently available information and data that each participating agency and jurisdiction could provide. Additionally, the project sought to determine the desired data and information that an agency or jurisdiction ("entity") would like to receive from other entities. In terms of communications, the existing conditions of both communications media and existing procedures also needed to be determined. At the onset of the project, a decision was made to develop and distribute a sophisticated survey rather than conducting interviews. It was thought that by having participants complete the survey, they would learn more about what information exists and is needed by the entity. Each participating jurisdiction or agency selected one person to oversee completion of the survey for their entity. The return rate was over 90% indicating the strong support of the participants and their understanding that a data exchange system can only work with sufficient input information.

The major project tasks include: survey development and completion, survey analysis, implementation plan development, implementation, and evaluation. The first two major tasks have been completed, and the implementation plan development is currently underway. The tasks are described in detail in the following paragraphs.

Survey Development and Completion

The first step in this project included the preparation of a comprehensive survey that inquired about the anticipated information needs and information provisions of each participating agency. The survey was developed with the help of the project's consultant team and the participating jurisdictions and agencies. In order to facilitate a high return and due to the lengthy format, the survey was structured in sections that could be answered by different departments and agencies within a jurisdiction. Completed surveys were returned to the BMC, checked for completeness, and forwarded to the consultant, who analyzed the responses.

The following information was collected for each jurisdiction/agency and department:

- Types of information available (traffic data such as volume/occupancy/speed/classification, upcoming events, construction activities, incidents, messages from variable message signs and highway advisory radio, closed-circuit television images, main-

tenance activities, etc.)

- Current information sharing practices (procedures that are in place to contact other agencies about the types of information as well as frequency of data exchange practices)
- Communication systems/technologies available (to implement the procedures)

This part of the inventory was used to establish the basis for the development of the Baltimore Regional IES. Naturally, the communications systems and technologies available could and should not be limited to the currently utilized means. Thus, private entities, such as Internet Service Providers (ISPs) and communication service providers (i.e., Bell Atlantic), have been considered in the analysis/inventory because these entities could provide missing links to enable a more complete Information Exchange System.

In addition to the information and data that could be provided by each agency, each entity was also asked to provide indications for information needs as well as the entity from which they expect to receive this information.

A coverage area map is also being prepared as part of the project. This map includes information such as

- which roads are operated by which agencies,
- locations of transportation facilities (such as traffic operations centers, toll facilities, and airports),
- locations of police barracks,
- locations of public works maintenance facilities, and
- relevant information.

The map is being prepared using geographic information system software. When the map is completed, the electronic map file will be distributed to all participants.

Survey Analysis

The results of the survey responses were reviewed for completeness and compiled into a comprehensive report. This report was structured to include an overview section and the general findings, as well as participant-tailored sections. These participant-relevant sections included listings of the existing conditions, equipment (both field and center), and data exchange procedures. Additionally, an attempt was made to identify desired exchanges with respect to the agency/jurisdiction that would provide the desired data, the types of desired data, and the update frequencies.

While the survey responses did indicate the data types, the formats of those data types, and the data type update frequencies, they did not match these items, i.e., indicate which data type is updated at what frequency and then stored in what format. As a result, several assumptions were made about formats and update frequencies for some data types. Additionally, many of the survey responses did not indicate the agencies, jurisdictions and departments from which a particular entity would like to receive data. Therefore, it was assumed that an entity would like to receive data from its neighboring agencies as well as from state-level agencies that could provide relevant data.

The existing conditions were exhibited in a large matrix that allowed viewing the currently existing data exchange procedures and the data types between entities.

The survey analysis report was presented to all participants asking for a detailed review and the provision of comments that would verify the exhibited contents and especially the assumptions made.

Parallel to this request, the participants were informed about the need to match the data formats and update frequencies with the data types without which the data exchange procedures could not be developed effectively. Comments were incorporated into the final Survey Analysis Report.

Implementation Plan Development

Based on the survey analysis results, the project team developed a draft Implementation Plan that addressed issues such as communications requirements, equipment needs, and estimated operations and maintenance (O&M) costs. The Implementation Plan also repeated several of the assumptions already stated in the survey analysis to emphasize that the verification of those items are of high importance.

Since this project attempts to provide an introduction of ITS and information sharing protocols to the participating entities, the implementation plan provided two main aspects:

- 1) Steps and procedures to implement an initial IES and
- 2) Steps and procedures to advance to an expanded IES.

The initial IES will be based on low-tech communication devices such as fax, phone, scheduled mailings and e-mail. For the purpose of data exchanges, a set of spreadsheet-software based forms have been developed that allow each entity to decide what its preferred communications mode is for each data type (i.e., fax, voice, mailing or e-mail attachment). The forms have been kept simple so only the most important information is transmitted; however, the forms can be modified by users to suit their needs.

For each communications mode, communications requirements, equipment needs, and estimated O&M costs have been provided.

The establishment of the communications requirements included the determination of 'lowest common denominator' to establish a common basis for data exchange. For each data type that is proposed to be exchanged between entities, a communications media was proposed, i.e., incident information should be transmitted via phone, construction schedules should be transmitted via e-mail, fax, or mailings.

The equipment needs for each agency were based on the inventory and the communications needs previously identified. Since this project is designed to introduce an initial information sharing system, the emphasis was on defining the requirements for a low-cost, low-tech near-term implementation. Where the appropriate communication equipment for this near-term implementation was not available, a detailed list of the information sharing equipment needed for implementation was developed. The list contained equipment type, function, example make/model and the associated estimated cost. Additionally, an outline of the equipment needs and a description of the anticipated steps to achieve a smooth transition to middle- to long-term high-tech technologies was included.

Operation and maintenance requirements have been identified and annual cost estimates were provided to inform the agencies about the ongoing O&M costs of the system.

The expanded IES will be based on an automated system, which may also use the above-mentioned forms. Since it was a declared goal to determine the feasibility of connecting the IES with the Maryland CHART II system (currently under development), the

Expanded IES implementation aspects were comprised of investigating and estimating costs for three different scenarios:

1. CHART II workstation limited to viewing and querying features
2. CHART II server and workstation to allow viewing and querying as well as providing field device data to other interested parties. This would involve development of system interface software.
3. A separate system.

The third alternative was determined to be cost prohibitive. Option 1 could be used for agencies that do not operate and maintain field equipment, while Option 2 should be used for all other entities. Further implementation recommendations could not be made because the CHART II system development is not at the point to provide detailed connection requirements. For example, while CHART II will allow local jurisdictions to access state data, it is not yet known if CHART II will allow local jurisdictions to access data from other local jurisdictions. In order to facilitate integration of the Expanded IES with CHART II, the project team recommended that the IES participants get involved in the CHART II effort that seeks to establish the requirements for an archive server. This archive server feature of the CHART II system could serve as the basis to exchange data among the entities (especially since many of the participants are highly interested in archived data).

NEXT STEPS

Once the Implementation Plan has been finalized and accepted by all participants, each entity will deploy the IES according to the procedures established for that agency or jurisdiction. The project consultant will provide help to agencies requesting assistance with implementing the procedures and setting up the hardware.

Evaluation Plan Development and Effort

Parallel to these efforts, an evaluation plan will be created to identify a method for organizing the key findings into a concise format that can be read by a variety of audiences to form judgments on the overall merits of the project. Using previously developed performance criteria, a plan for evaluating the effectiveness of the deployment will be developed. The plan will include specification of performance objectives, data to be collected, a data collection schedule, analysis techniques, and evaluation criteria. The evaluation will likely be highly qualitative and will define the effect of the IES on each agency's performance.

CONCLUSION

The purpose of this project is to introduce agencies, jurisdictions, and departments (and their staff) to the concepts of ITS and information sharing protocols. One of the main problems associated with ITS implementations is that many agencies dive headfirst into an implementation that involves technologies and concepts that are new to the implementing agency. This introduces a lot of stress and confusion for the personnel responsible for this implementation.

Another problem to be addressed in ITS implementations is the interagency cooperation required to implement and maintain the ITS project. In many implementations, institutional issues pose a problem that has to be addressed right at the beginning of a project.

The approach taken by this project sought to minimize institutional problems by inviting all of the stakeholders to participate in the development of the Baltimore Regional IES. Additionally, system users will learn about the most important aspects of ITS projects by relating solutions to familiar technologies and procedures.

One lesson learned from this project is that even a very comprehensive and detailed survey cannot replace personal interviews because only one-to-one interview settings allow participants to convey additional information and background information about the purpose of certain questions. Additionally, setting appointments for interviews elevates the importance of the survey and the responses. The downside of this approach is that it is very labor intensive, especially when numerous participants are involved, and therefore, may be cost prohibitive.