

TP 14033E

# STARS Quality Assurance Study

## SUMMARY REPORT

*Prepared for*

Transportation Development Centre of Transport Canada  
Alberta Transportation  
Manitoba Department of Transportation and Government Services

*by*

James R. King

March 2003



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16. Abstract <p>The objectives of the Quality Assurance Study project were to perform a quality audit and evaluation of two reports that assessed the ability of the System for Technological Applications in Road Safety (STARS) to meet traffic data collection requirements of Alberta and Manitoba; to perform an independent assessment of STARS; and to identify and assess similar systems.</p> <p>The study included a review of the documentation from the STARS Feasibility Project; a review of forms used in Canadian jurisdictions; demonstrations of STARS, Iowa's Traffic and Criminal Software (TraCS) and the RCMP's Remote Office and Dispatch System (ROADS); and a review of similar systems available.</p> <p>STARS requires a significant number of changes before it can be deployed in Alberta and Manitoba. The adaptation effort and associated costs are considerable. The RCMP and some police agencies already use systems that duplicate some of STARS' functions.</p> <p>TraCS collects accident report, traffic ticket, and Commercial Vehicle Safety Alliance vehicle inspection data. The system, which is available royalty-free, is used in multiple jurisdictions and employs a software development kit that provides the tools required to modify system inputs, outputs and edits. Many officers in Alberta and the RCMP have in-vehicle access to provincial database information via mobile computer applications. An interface between these systems and TraCS would need to be developed.</p> <p>Two other systems (PoliceWorks and Report Writer-2000) collect traffic ticket and collision report data. Licensing fees and modification costs are very significant. Neither was available for a demonstration.</p> <p>Partner jurisdictions will make recommendations that determine the future course of action.</p>						
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16. Résumé <p>Le projet d'étude d'assurance de la qualité visait à vérifier la qualité de deux rapports axés sur l'évaluation de la capacité du système d'applications technologiques en sécurité routière (ATSR) de répondre aux exigences de l'Alberta et du Manitoba en matière de collecte de données sur le trafic, l'évaluation indépendante du projet ATSR et l'identification et l'évaluation de systèmes similaires.</p> <p>La documentation élaborée dans le cadre de l'étude de faisabilité du projet ATSR a été examinée, tout comme les formulaires utilisés dans les différentes provinces et territoires canadiens. L'étude prévoyait également la démonstration du système ATSR, du logiciel TraCS (pour Traffic and Criminal Software) utilisé en Iowa, et du système ROADS (pour Remote Office and Dispatch System) utilisé par la GRC, ainsi qu'un examen des autres systèmes présentement utilisés.</p> <p>Le système ATSR devra toutefois subir un certain nombre de modifications avant de pouvoir être mis en application en Alberta et au Manitoba. Les travaux d'adaptation nécessaires, et les coûts qui s'y rattachent, sont assez considérables. La GRC et certains services de police utilisent déjà des systèmes qui possèdent certaines fonctions propres au système ATSR.</p> <p>Pour sa part, le système TraCS sert à colliger les rapports de collisions routières, les contraventions et les données d'inspection des véhicules de la Commercial Vehicle Safety Alliance. Ce système, dont la licence est gratuite et qui est utilisé dans plusieurs provinces et territoires, exploite une trousse de développement de logiciels comprenant les outils nécessaires à la modification des intrants, des extrants et des révisions du système. De nombreux agents de l'Alberta et de la GRC ont un accès aux bases de données provinciales depuis leur véhicule grâce à des applications installées sur un ordinateur portable. Il serait utile de mettre au point un interface reliant ces systèmes et le logiciel TraCS.</p> <p>Deux autres systèmes (PoliceWorks et Report Writer-2000) servent à colliger les données relatives aux contraventions et aux rapports de collisions routières. Les droits de permis et les coûts liés aux modifications sont très importants. Aucun de ces systèmes n'était disponible pour une démonstration.</p> <p>Les provinces et les territoires qui participent à ce projet feront des recommandations concernant un plan d'action éventuel.</p>					
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# 1 INTRODUCTION

## 1.1 BACKGROUND

On October 10, 1996, federal, provincial, and territorial ministers responsible for transportation and highway safety approved the vision of making Canada's roads the safest in the world.

One initiative within this vision committed all provinces and territories to improving the collection and quality of collision data, which would permit appropriate and effective road safety programs to be developed and evaluated.

Automated on-site collision data collection and reporting by police officers would achieve substantial gains in data quality and availability and also lead to substantial productivity gains in the collection, reporting, and distribution of data.

In-vehicle computer and communications-based technologies to support on-site collision data collection would also provide the basis for automating other work conducted by police officers-dispatching, reporting, ticketing, etc.

A number of provinces are at different stages in the development and implementation of automated, computer-based systems for collecting and reporting data on road incidents. Quebec has developed STARS (System for Technological Applications in Road Safety), a suite of applications that includes a road incident data collection and reporting system, and the automatic preparation and issue of collision reports, violation tickets, and court-related documents.

Transport Canada and the provinces of Alberta, Manitoba and Quebec agreed to collaborate on a feasibility study, coordinated by Transport Canada, to determine whether STARS could be transferred to other jurisdictions.

The feasibility study involved three separate but interrelated studies, each performed by a separate team, as follows:

- Technical and Cost Study (TCS): by CGI Inc., of Montreal, Quebec.
- Cost/Benefit and Business Case (CBBC) Study: by the Société de l'assurance automobile du Québec (SAAQ), of Quebec City, Quebec.
- Quality Audit (QA): by 834391 Alberta Ltd., of Edmonton, Alberta

Two reports were completed in February 2001, presenting the results of the TCS and CBBC studies, respectively:

- *STARS Inter-Jurisdictional Feasibility Study*
- *STARS Cost / Benefit Analysis*

Four documents were developed during the STARS Quality Assurance Study:

- *STARS Quality Assurance Study Phase 1 – Evaluation*, which was an evaluation of the two reports from the TCS and CBBC studies, and identified areas needing further clarification.
- *STARS Quality Assurance Study Phase 2 – Independent Assessment*, which provided an independent assessment of STARS for meeting the collision data collection and traffic ticketing business requirements of Alberta and Manitoba. It also identified similar systems that could potentially meet the needs of Canadian jurisdictions.
- *STARS Quality Assurance Study Phase 3 – Technical Working Paper, Assessment of Similar Systems*, which assessed systems similar to STARS to the business requirements of Alberta, Manitoba and Transport Canada.
- *STARS Quality Assurance Study Phase 4 – Summary Report*, which provides an overview of the entire project. This document completes the STARS Quality Assurance Study.

## 1.2 OBJECTIVES

The purposes of the Quality Assurance Study project were as follows:

1. To perform a quality audit and evaluation of information and data available from the two reports prepared on behalf of Transport Canada, Alberta Transportation and Manitoba Department of Highways and Government Services.

- *STARS Technical and Cost Study (TCS)*
- *STARS Cost / Benefit and Business Case (CBBC)*

The objective was to identify areas that may not have been included in the reports and others that may need further clarification in order to present a complete picture of the functionality and costs associated with the potential transfer and adaptation of STARS to meet Alberta's and Manitoba's needs.

2. To perform an independent assessment of the ability of STARS to meet the collision data collection and traffic ticketing business requirements of Alberta and Manitoba.
3. To determine the availability of similar systems to meet the needs of Canadian jurisdictions.
4. To assess systems similar to STARS in light of the business requirements of Alberta, Manitoba and Transport Canada.

### **1.3 SCOPE AND METHODOLOGY**

The study included the following:

1. Review of the documentation and findings collected and developed during the STARS Feasibility Project.
2. Review and analysis of the set of collision report forms that are currently being used in each Canadian jurisdiction.
3. Review and analysis of the set of violation ticket forms that are currently being used in each jurisdiction participating in this project.
4. Review of responses to three sets of questions that were developed for CGI, SAAQ and each of the participating jurisdictions.
5. On-site demonstrations of the STARS application suite, TraCS and ROADS.
6. Review of available information about PoliceWorks and the Report Writer-2000.

## **2 PROJECT SUMMARY**

In 1992, the Société d'assurance automobile du Québec in collaboration with key representatives from a number of stakeholder groups began the design and development of STARS (System for Technological Applications in Road Safety).

In 1996, police officers in Sherbrooke and Terrebonne, Quebec, started using STARS to issue violations. Since then, the system has been implemented in 12 other municipalities in Quebec. In November 2001, officers in St. Lambert also started using STARS to collect accident report data. Currently, officers in approximately 150 police cruisers in the province are using the STARS application suite.

Police officers use STARS to access data from central databases. The information is used to automatically populate violation and collision reports, thereby reducing data entry requirements. Additional violation and collision data can be recorded by the officers and verified at the roadside, thereby improving data quality. Finally, officers can wirelessly transmit the violation and collision reports to their local police stations, thereby making the information more readily available to other stakeholders.

### **2.1 STARS**

STARS is available from computer-equipped police cruisers as well as from desktop workstations in the local police station.

There are 4 primary business functions available in the police vehicle:

1. Access information on central databases
2. Collect data for issuing violation tickets, warnings and accident reports
3. Print violation tickets
4. Transmit violation tickets and accident reports to the local police station; transmit warnings to the Quebec Police Information Centre (CRPQ)

In addition to these functions, desktop workstations in the local police station can also:

- Complete violations (i.e. documented and supplementary offence reports) and accident reports that were not completed in the vehicles
- Re-print violation tickets
- Print accident reports
- Approve violation and accident reports
- Transmit violations to municipal courts and accident reports to provincial databases
- Perform system administration functions

System administrators are assigned to each implementation of STARS and are equipped with functions used to maintain offence codes and descriptions (highway safety code offences and local municipal by-laws) as well as access and security tables. In addition, system administrators can perform high-level modifications to STARS functions by modifying edit rules.

The system was developed using an open, modular architecture in which support for in-car devices is independent of the STARS application. This approach provides flexibility and the opportunity to use other types of devices in the future.

The workstations in vehicles and in police stations are standard Intel PCs (laptops for vehicles, desktops for offices). In-vehicle computers use an EPSON TM 295 printer to print tickets and a device for reading bar codes or magnetic stripes from licences or other documents. The vehicular computer is linked to the station via a police radio network, a commercial or private packet radio service, or a cellular data communication system. CGI estimated that the typical cost of in-car equipment is in the range of CAN\$12,000 to \$15,000.

Server hardware is also “industry standard”.

STARS uses standard Windows desktop operating systems in vehicles and in office PCs. The server component of STARS is designed to work with any standard version of UNIX.

Systems like STARS that collect data using mobile units and wirelessly transmit the data to stationary servers demand very reliable and resilient data transmission processes, since hardcopy documents are not available in the event of a communication failure.

STARS uses a combination of techniques to satisfy this business requirement:

- For data transmission between different systems (car to server, server to OTSS, server or OTSS to provincial, back-end systems), STARS uses the TCP/IP protocol, which is regarded as being one of the most reliable standard communication protocols within the industry.
- In case of communication failure, any non-transmitted document will remain on the vehicle computer and can be transmitted at any later time when communication is available.
- A specialized component of STARS called the Communication Manager manages communication between vehicles and servers.
- In its normal mode of operation, STARS issues its own ticket numbers. When an officer logs onto the system in his vehicle, a (virtual) “book” of tickets is requested from the server. The Communication Manager then tracks the number that it has allocated in order to ensure that tickets issued by the officer are neither lost nor duplicated.
- After completing a ticket and before printing it, the officer must digitally sign the ticket. Digital signatures provide legally acceptable authenticity and proof that the data on the ticket has not been changed once it has been signed. Digital signatures provide a broadly applicable mechanism for ensuring the integrity and authenticity of documents, and could be applied to any STARS documents, in addition to violation tickets.

One of the primary purposes of this phase of the project was to conduct an independent assessment of the STARS system to meet the collision data collection and traffic ticketing business requirements of Alberta, Manitoba and Transport Canada.

Two types of business requirements were compared:

1. Data requirements

A detailed comparison of violation tickets, accident reports and warnings used by Alberta, Manitoba and Quebec, as well as the data requirements identified in the National Collision Database was performed.

It was determined that STARS does not currently capture all the data fields identified on the forms. Each province needs to assess the “missing data elements” to determine the significance of the differences.

2. Process requirements

Although there are some differences in process requirements, STARS could be modified to support the requirements in each province.

A significant number of changes are required to modify STARS to collect violations and accident reports in Alberta and Manitoba:

- “Common system” changes that would be incurred only once no matter how many provinces eventually adopt STARS. These changes include:
  - development of a multi-language system
  - development of an interface with the Canadian Police Information Centre (CPIC)
  - modification of the violation ticket form
  - modification of the accident report form
  - integration of provincial laws and municipal by-laws
  - development of a transfer management application
  - modifications for the system console
  - development of an interface to share requests
  
- Specific changes for each province that include:
  - development of an interface to access the provincial motor vehicle database
  - customization of the violation ticket
  - customization of the accident report form



The adaptation effort and associated costs are considerable. Further, given the significant changes required, there is an associated risk since the end result will not be a proven system (i.e. one that has been in production for at least one year).

In addition, depending on provincial business data and process requirements, a unique version of the STARS software may need to be implemented in each jurisdiction. This approach increases development costs as well as long-term maintenance costs.

It may be possible to reduce some of the costs if data and procedural differences between provinces are minimized, unnecessary data fields are deleted, and STARS is able to support “generic data fields” that each province could use for its own purpose.

The RCMP and police agencies in Alberta clarified the need for the ticketing and accident reporting software to function *in conjunction* with existing applications on their mobile computers. For example, the RCMP and Edmonton Police Services use a mobile computer application called ROADS.

ROADS is integrated with their computer-aided dispatch systems and record management systems, which already provide some of the functions that STARS offers (e.g. access to provincial motor vehicle databases, access to CPIC, upload data to communication server). Future projects plan to continue this pattern of integration and build upon the functions already available.

It may therefore be appropriate to consider the feasibility of implementing a portion of the STARS application (i.e. the data collection portion) to work alongside existing mobile applications rather than the entire STARS application.

Several other police agencies throughout North America have developed applications that simplify the data collection tasks performed by police officers in the field and, coincidentally, improve the quality of the data and speed up the entire process.

## 2.2 TraCS

The project steering committee requested a closer look at the Traffic and Criminal Software (TraCS) system that has been developed by the state of Iowa. The following information was collected:

- The system has been in production for a number of years and currently runs on 600+ mobile workstations.
- The system supports:
  - accident reports
  - traffic tickets
  - Commercial Vehicle Safety Alliance (CVSA) vehicle inspections
- The system is intended to be used in multiple jurisdictions and has a unique level of flexibility made available through a software development kit (SDK) that provides each agency with the tools required to modify and develop new input and output forms, modify and develop new edits, and change business procedures. This approach enables a single version of the system to be installed in each jurisdiction.
- The system is operational in Iowa and New York; many other states have licensing agreements with TraCS and are planning development projects.
- The system is available royalty-free to interested jurisdictions (including Canadian provinces).
- The system purposely does not include wireless data communications; instead, TraCS runs alongside an application supplied by a third party wireless company.
- The most recent version of TraCS enables access to information downloaded from state databases by a third party wireless application for the purpose of automatic population of forms. As previously stated, many officers in Alberta and the RCMP already have in-vehicle access to up-to-date provincial database information via mobile computer applications like ROADS. An interface between these systems and TraCS, therefore, is all that should be required to enable these officers to use provincial database information to populate data fields on input screens in TraCS.
- The system does not appear to provide the robust control and audit-ability functions necessary for a large-scale implementation. New York State has

built an adjunct system to ensure that data collected is received at the local police station. This function needs further examination.

## 2.3 POLICEWORKS

Another system that was reviewed was PoliceWorks, which is a data collection system developed by HTE Inc. with the cooperation of law enforcement agencies across the U.S.

The system consists of the following components that can be used in various combinations:

- Mobile Data Terminal
- Mobile Data Browser
- Traffic Crash / Accident
- Citation
- Field Interview
- Arrest Booking
- Tow Slip

The following agencies are currently using PoliceWorks:

- City of Akron, Ohio  
Police Department
- Alexandria, Virginia  
Police Department
- Arlington, Virginia  
Police Department
- Atlanta, Georgia Police Department
- Kissimmee, Florida  
Police Department
- Florida Highway State Patrol
- Local agencies in Arizona,  
California, Connecticut, Florida and  
Texas

PoliceWorks meets most of the requirements identified by Alberta and Manitoba. However, there is a reluctance to provide bilingual reporting, which has been an identified as requirement for Manitoba and will likely be required in other provinces as well.

In October 1998 Alberta Transportation conducted a successful demonstration of the PoliceWorks application in Edmonton. Cellular digital packet data (CDPD) was used to download driver and vehicle information from Alberta's MOVES "test" database and upload accident reports and citations to a local server. The GPS function was also demonstrated.

Licensing fees for PoliceWorks are more expensive than fees for STARS and TraCS.

In addition, it is not clear how significant the adaptation changes would be. HTE Inc. needs to undertake a requirements confirmation project and develop an estimate.

It was difficult to obtain information from the vendor during the project.

## **2.4 REPORT WRITER-2000**

The final system that was reviewed was Mobile-Tec's Report Writer-2000, which also appears to meet most of the business requirements identified by Alberta and Manitoba.

It is not clear, however, how well the system controls the data that is collected or how audit-able the transmission process is.

Further, it is not clear what the adaptation costs would be. Mobile-Tec would need to undertake an in-depth requirements confirmation project and develop an estimate.

Although the licensing fees are less expensive than PoliceWorks, they are more expensive than STARS and TraCS.

And like HTE Inc., it was difficult to obtain information from Mobile-Tec.

### **3 CONCLUSION**

This document completes the STARS Quality Assurance Study.

The partner jurisdictions will make recommendations that determine the future course of action for this initiative based on the information collected and reported during the course of the Quality Assurance phase and direction from the participating provinces.

