STATE OF MICHIGAN

TRAFFIC RECORDS ASSESSMENT

October 26-30, 2009

National Highway Traffic
Safety Administration
Technical Assessment Team

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EXECUTIVE SUMMARY

Upon request by the Office of Highway Safety Planning (OHSP) within the Michigan State Police (MSP), the National Highway Traffic Safety Administration (NHTSA) assembled a team to conduct a traffic records assessment. Concurrently the OHSP carried out the necessary logistical and administrative steps in preparation for the onsite assessment. A team of professionals with backgrounds and expertise in the several component areas of traffic records data systems (crash, driver, vehicle, roadway, citation and adjudication, and injury surveillance) conducted the assessment October 26 to 30, 2009.

The scope of this assessment covered all of the components of a traffic records system. The purpose was to determine whether the traffic records system in Michigan is capable of supporting management's needs to identify the State's safety problems, to manage the countermeasures applied to reduce or eliminate those problems, and to evaluate those programs for their effectiveness.

Background

A similar assessment was conducted in 2004 that offered a number of recommendations to improve the State's traffic records system. The State has made considerable progress since that time, some of which is briefly acknowledged below.

In 2004, the State had begun an electronic crash data collection initiative; as of this report about 17 percent of the crash reports are sent electronically, with 25 percent expected by the end of 2009. The 2004 report noted that the State had established a web-based query tool for retrieval and analysis of crash data, but was available for law enforcement agency access only; access has now been extended to the broader highway safety community and includes the ability to generate crash-, vehicle-, and person-specific data tables – this has received high praise from many users encountered during the assessment.

The State has made progress in its development of a statewide repository for citation data. Until recently, collection of statewide data on citations was inhibited by the number of non-standard case management systems (CMSs) throughout the courts; the State has since created a Judicial Data Warehouse (JDW) and is working with each of the State's CMSs to allow uploading data to the JDW.

Over the past five years the State has developed a uniform EMS run report form and a central repository for the electronic submission of pre-hospital data; the State is now receiving data from nearly half of the 800 EMS agencies.

The Department of State (DOS) is currently testing a new driver and vehicle system in a Business Application Modernization (BAM) project and expects to become operational in June 2010.

However, some issues still remain regarding the ability of the present traffic records system to support Michigan's management of its highway safety programs. These are included in the summary below and the full report that follows.

Crash Records

The Michigan State Police (MSP), Criminal Justice Information Center (CJIC) is statutorily responsible for maintaining the State central repository for crash records, the Traffic Crash Reporting System (TCRS). Over 600 Michigan law enforcement agencies submit crash reports, both on paper forms and electronically, resulting in more than 300,000 crash reports annually.

In the past five years the entire crash system has been updated via a project called Crash Process Redesign (CPR). System changes have included but are not limited to: ability to accept crash reports electronically, development of a web-based crash reporting tool, improved processing efficiencies at CJIC, and improvements in crash locating.

MSP created a Vendor/Agency certification guide and testing criteria to assist vendors and agencies in developing the edits and criteria required for submitting data electronically regardless of the field data collection tool or an agency's records management system.

The State began a project to "Encourage and Assist Other Records Management System (RMS) Vendors to Develop an Electronic Crash Reporting Mechanism that will Interface with the State System." The first Electronic Crash Collection and Submission Initiative (ECCS 1) brought on the 43 agencies that were regularly submitting crashes and had met the certification requirements.

ECCS 2 followed in late 2008 with five local agencies and five county consortiums. ECCS 2 anticipates an additional 124 agencies will be submitting electronic crash data by late 2009. As of this report, 196 law enforcement agencies are sending crash reports electronically, comprising about 17 percent of all crash reports. By the end of 2009, the State expects that percentage to reach 25 percent, and 50 percent by the end of 2010.

It must be noted that the State's crash data quality control process is the most comprehensive that the team has encountered anywhere. It measures all of the standard attributes of quality data such as timeliness, completeness, and accuracy. The system routinely and automatically produces tables showing these measurements. This allows the database managers to constantly monitor the quality of crash reporting by the law enforcement agencies and to take corrective action immediately, resulting in better quality data for users throughout the highway safety community. Users have almost universally praised the improvement in the accuracy and timeliness of the crash data. It truly is a model for other States to copy.

Citation and Adjudication Records

In 2005, the Judicial Data Warehouse (JDW) was created to be a centralized repository of court records to allow sharing of information and the collection of statistical data. However, this effort was complicated by the use of many different case management systems throughout Michigan's 255 trial courts. These systems did not enable courts to share or access case information from other courts or State agencies or to interface with the JDW.

The State Court Administrative Office (SCAO) consequently began to work with each of the State's case management systems to allow uploading data to the JDW. The JDW extracts case

data from the courts' case management systems and places it on one common platform. Court personnel have the ability to search the JDW to find a person known to the Michigan Judicial System and all cases in which he/she is involved. In the JDW, data from the various court systems are transformed to a standard format allowing all users to understand the data without regard to a specific county or court system.

By the end of 2008, 81 of 83 counties and 219 of 255 trial courts were uploading information/citations weekly to the JDW. The remaining 36 courts are now in the process of being 'certified' to be able to upload data to the JDW. Some of the courts are in the midst of an entire conversion to JIS and intend to send information to the JDW once that project is complete. The data warehouse project is scheduled for completion in 2010.

Regarding the citation tracking system recommended in 2004, no progress was made in this area. However, with the continued implementation of the Judicial Data Warehouse, coupled with the analysis provided by those that support other components of the traffic record systems, the requirements and ability to develop the citation tracking system will become better defined. A citation tracking system cannot be completed without a centralized source of data based on the citation issuance as will be provided by the completion of the JDW.

Driver and Vehicle Records

The Department of State (DOS) is currently testing a new driver and vehicle system in a Business Application Modernization (BAM) project and expects to become operational in June 2010. A new non-significant driver license number will be phased in, and the new driver license and ID cards will include a bar code in addition to the magnetic stripe that is on the cards now. Conviction reporting from the courts is almost totally electronic. Driver histories from prior States of licensing are maintained for both non-commercial drivers and commercial drivers.

DOS will become a full participant in the National Motor Vehicle Title Information System (NMVTIS) when the BAM is completed.

Injury Surveillance System Components

Michigan's Injury Surveillance System (ISS) consists of data collected under the direction of the following agencies:

Michigan Department of Community Health	Prehospital Data Death Certificate Data Trauma Registry Data (future)
Michigan Health and Hospital Association	Hospital Discharge Data

The inclusion of prehospital data to the State's ISS demonstrates significant progress since the previous assessment. Over the past five years, with the support of the TRCC, the Department of Community Health (MDCH) has developed a uniform EMS run report and a central repository for the electronic submission of prehospital data. The data collection system developed by ImageTrend went live on May 15, 2009 and is currently receiving data from nearly half of the State's 800 EMS agencies. Additionally, the MDCH is developing a statewide trauma registry

data system using the same vendor. Administrative Rules establishing trauma system guidelines have been put in place and await a funding source for full implementation.

The MDCH is the primary agency responsible for compiling ISS information on persons injured or killed as the result of a motor vehicle crash. With the exception of the new EMS and trauma registry, information from these databases is currently available through standardized reports, ad-hoc data requests, specialized reports and fact sheets.

There is currently little integration between the ISS and other components of the Traffic Records System. The addition of crash report number to the EMS patient care report and the development of compatible EMS and trauma registry data systems provide the opportunities for future data integration efforts.

Roadway Information

The Transportation Management System (TMS) is the legacy roadway information database maintained by the Michigan Department of Transportation (MDOT) on an Oracle-based platform. In addition the MDOT uses a statewide geographic information system (GIS), the Michigan Geographic Framework (MGF), which contains information on all public roads. These systems are used as an aid in the management of the State's roadway assets.

The TMS has a major shortcoming in how the road features are stored in the Sufficiency file. A notable weakness in the area of roadway information is the lack of updating selected road feature data. In addition the way road features are maintained in the Sufficiency file is questionable. The Sufficiency file prorates changes in features along a segment rather than creating a new segment when a major change occurs.

The 83 County Road Commissions use a software product called RoadSoft, an asset management tool, to help manage the 89,000 mile county-road system. RoadSoft is provided by the Local Technical Assistance Program (LTAP) and is based upon the MGF and the PR location referencing method. RoadSoft is a graphically designed, integrated roadway management system developed for Michigan's local agency engineers and managers to use in the analysis and reporting of roadway inventory, safety, and conditions data.

RoadSoft has the potential to collect data for all public roads. With MDOT's concurrence county road employees can collect road features on the State system roads in their counties. This will remove the burden from MDOT to update road features data in the Sufficiency file. These data can be housed in the MGF for use by all safety stakeholders.

Strategic Planning

The current 2009 Strategic Plan for Traffic Records is an up-dated/revised version of the 2005 Strategic Plan, which used the findings of the Traffic Records Assessment conducted in October of 2004 to identify deficiencies to be addressed. The changes in the Strategic Plan were prompted by the annual submission of the federal 408 grant application for traffic records improvement funds.

The projects in the current Plan demonstrate an attention to emerging technology and best practices in the field of crash data collection and storage. But outside of crash file issues the Plan appears lacking in state-of-the-art initiatives in the other traffic records components. To ensure continuous planning a more formal process should be adopted that forces periodic reviews of not only the ongoing projects but of emerging technology in traffic records development in other States and at the national level.

The inclusion of new projects or system modifications, revisions, or adoption of new technology should be viewed as long term needs of the Michigan highway safety community and therefore the State should be committed to their implementation and continuous operation regardless of the funding source. Consideration should be given to the long term maintenance of systems and the budget implications implicit in the continuous operation.

Traffic Records Coordinating Committee (TRCC)

The State does not strictly follow the typical makeup of a State TRCC with a discreet hierarchical structure consisting of Executive and Technical levels. The Michigan TRCC is an umbrella group that lists all of the members, with certain individuals designated as forming the Executive level. This group has the authority to approve projects and funding as recommended in the NHTSA *Advisory*. The remaining individuals combined with the Executive level are considered the full TRCC.

However, what is usually referred to as the working or technical level members has become the Crash Data Users Group (CDUG). Despite the atypical organizational structure, the TRCC has been very involved in the many traffic records improvements described in this report. The one obvious omission is the lack of formally designated local representatives. While they are listed as members of the CDUG and have been major contributors to the TRCC initiatives, that group does not have the official recognition that would be accorded if listed in the formal TRCC membership.

There is a close relationship between the TRCC and the Governor's Traffic Safety Advisory Commission that meets every other month. The TRCC chair attends and gives reports of the traffic records activities and their status.

Following are the major recommendations for improvements to the State's traffic records system. The references indicate the sections of the report from which the recommendations are drawn.

MAJOR RECOMMENDATIONS

Crash Records

- ❑ Develop a formal plan for the spread of electronic crash data reporting implementations throughout the local law enforcement agencies. **(Section 2-A)**

- ❑ Develop a comprehensive formal plan for implementing a field data collection capability for crashes, citations and other reports in the Michigan State Police addressing the following needs:

    - Laptop computers in all MSP units with a traffic enforcement role.
    - Software licenses for electronic crash and citation, if not a complete suite of field reporting software.
    - A replacement of the legacy RMS.
    - Replacement or upgrade of the communication system. **(Section 2-A)**

- ❑ Add a first-pass check at MSP CJIC to ensure that all crash reports include a narrative and diagram. Continue to stress the need for the narrative and diagram in all crash reporting training provided to law enforcement. **(Section 2-A)**

- ❑ Add the capability to access relevant additional files – such as an image of the crash, crash scene photos, additional narratives, etc. – into a future release of TCRS. **(Section 2-A)**

Data Integration

- ❑ Develop additional linked data sets including merged data for crashes and injury surveillance information and merged data for crashes and citations. **(Section 1-C)**

Access Analytic Resources

- ❑ Create public use data utilities for components of the traffic records system akin to the Michigan Traffic Crash Facts website and data repository. **(Section 1-D)**

Injury Surveillance System Components

- ❑ Invite a representative from the Michigan Health and Hospital Association to become a member of the TRCC. **(Section 2-F)**

- ❑ Establish a data set through the integration of crash, EMS and hospital discharge data to enhance problem identification and program analysis efforts. **(Section 2-F)**

- ❑ Develop a data sharing agreement between OHSP and MDCH to facilitate collection of death certificate data needed for inclusion in FARS. **(Section 2-F)**

Driver and Vehicle Records

- ❑ System Upgrade

Citation and Adjudication Records

- ❑ Determine, through the TRCC, how best to develop the information available in the Judicial Data Warehouse into a citation tracking system and a DUI tracking system. **(Section 2-E)**

TRCC

- ❑ Include local law enforcement and traffic engineers, and potentially private sector interests in the full TRCC membership, to ensure that all stakeholders are adequately represented in the State's traffic record decision-making. **(Section 1-A)**

Roadway Information

- ❑ Design and commit to a consistent and complete data collection procedure for road features on the State system, including more discrete roadway data segmentation. **(Section 2-B)**

Strategic Planning

- ❑ Acquire and maintain a project management system and continually monitor and report on project activities including the 408 grant program. **(Section 1-B)**

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INTRODUCTION

A complete traffic records system is necessary for planning (problem identification), operational management or control, and evaluation of a State's highway safety activities. Each State, in cooperation with its political subdivisions, should establish and implement a complete traffic records system. The statewide program should include, or provide for, information for the entire State. This type of program is basic to the implementation of all highway safety countermeasures and is the key ingredient to their effective and efficient management.

As stated in the *National Agenda for the Improvement of Highway Safety Information Systems*, a product of the National Safety Council's Association of Transportation Safety Information Professionals (formerly the Traffic Records Committee):

> "Highway safety information systems provide the information which is critical to the development of policies and programs that maintain the safety and the operation of the nation's roadway transportation network."

A traffic records system is generally defined as a virtual system of independent real systems which collectively form the information base for the management of the highway and traffic safety activities of a State and its local subdivisions.

Assessment Background

The Traffic Records Assessment is a technical assistance tool that the National Highway Traffic Safety Administration (NHTSA), the Federal Motor Carrier Safety Administration (FMCSA) and the Federal Highway Administration (FHWA) offer to State offices of highway safety to allow management to review the State's traffic records program. NHTSA has published a *Traffic Records Program Assessment Advisory* which establishes criteria to guide State development and use of its highway safety information resources. The Traffic Records Assessment is a process for giving the State a snapshot of its status relative to that *Advisory*.

This assessment report documents the State's traffic records activities as compared to the provisions in the *Advisory*, notes a State's traffic records strengths and accomplishments, and offers suggestions where improvements can be made.

Report Contents

In this report, the text following the "*Advisory*" excerpt heading was drawn from the *Traffic Records Program Assessment Advisory*. The "*Advisory*" excerpt portion is in italics to distinguish it from the "Status and Recommendations" related to that section which immediately follows. The status and recommendations represent the assessment team's understanding of the State's traffic records system and their suggestions for improvement. The findings are based entirely on the documents provided prior to and during the assessment, together with the information gathered through the face-to-face discussions with the listed State officials. Recommendations for improvements in the State's records program are based on the assessment team's judgment.

SECTION 1: TRAFFIC RECORDS SYSTEM MANAGEMENT

Advisory Excerpt: *Management of a State TRS requires coordination and cooperation. The data that make up a TRS reside in a variety of operational systems that are created and maintained to meet primary needs in areas other than highway safety. Ownership of these databases usually resides with multiple agencies, and the collectors and users of the data span the entire State and beyond.*

The development and management of traffic safety programs should be a systematic process with the goal of reducing the number and severity of traffic crashes. This data-driven process should ensure that all opportunities to improve highway safety are identified and considered for implementation. Furthermore, the effectiveness of highway safety programs should be evaluated. These evaluation results should be used to facilitate the implementation of the most effective highway safety strategies and programs. This process should be achieved through the following initiatives.

1-A: Traffic Records Coordinating Committee

Advisory Excerpt: *The National Highway Traffic Safety Administration's (NHTSA) 2004 Initiatives to Address Improving Traffic Safety Data Integrated Project Team report (hereafter referred to as the Data IPT Report) includes guidance on establishing a successful Traffic Records Coordinating Committee (TRCC). The following include recommendations from the Data IPT Report and additional items of an advisory nature:*

- *Establish a two-tiered TRCC.*
  There should be an executive and a working-level TRCC. The executive-level TRCC should be composed of agency directors who set the vision and mission for the working-level TRCC. The Executive TRCC should review and approve actions proposed by the Working TRCC. The Working TRCC should be composed of representatives for all stakeholders and have responsibilities, defined by the Executive TRCC, for oversight and coordination of the TRS. Together, the two tiers of the TRCC should be responsible for developing, maintaining, and tracking accomplishments related to the State's Strategic Plan for Traffic Records Improvement.

- *Ensure Membership is Representative.*
  TRCCs should be representative of all stakeholders, and each stakeholder representative must have support from their top management. When departments are considering changes to their systems, all TRCC members should be notified and departments should consider how to accommodate the needs of all the TRCC agencies.

- *Authorize Members.*
  The Working TRCC should have formal standing, recognition, and support of the administrators of participating agencies. This support will help the TRCC succeed in overcoming the institutional barriers, lack of focus, and lack of resources that prevent collaboration and progress in integrating highway safety data. The exact role and powers of the TRCC should be made explicit in its charter. Legislators, the governor, and top management of participating agencies should give authority to the TRCC members to make policy decisions and commit their agencies' resources to solve problems and approve the State's strategic plan for traffic records. The most important responsibility of the TRCC should be to provide the leadership necessary to ensure that available funds are sufficient to match stated needs. Despite challenges stemming from collective decision making by members from different agencies with competing priorities, TRCC members should speak with "one voice." The TRCC should have guidelines to determine who speaks for the TRCC and how its recommendations should be communicated.

- *Appoint an Administrator/Manager.*
  A single point of contact for managing a data improvement project is necessary to ensure leadership. The TRCC should designate a traffic records administrator or manager and provide sufficient time and resources to do the job. This person should be responsible for coordinating and scheduling the TRCC, in addition to tracking the progress of implementing the State's traffic records strategic plan. Uniform criteria should be established for monitoring progress. NHTSA can facilitate training for the TRCC administrator/manager regarding traffic record systems, program management, and data analysis.

- *Schedule Regular Meetings.*
  The TRCC should establish a schedule of regular meetings, not only to discuss data coordination issues and make progress on the strategic plan, but also to share success stories to aid in overcoming fears of implementation. The meetings should take place as required to deal with the State's traffic records issues and to provide meaningful coordination among the stakeholders. The TRCC should gain broader support by marketing the benefits of improved highway safety data. An example to provide data and analytical expertise to local government officials, legislators, decision makers, community groups, and all other stakeholders. TRCC meetings should include strategy sessions for such marketing plans.

- *Oversee Quality Control/Improvement.*
  The TRCC should have oversight responsibility for quality control and quality improvement programs affecting all traffic records data. Regularly scheduled presentations of quality control metrics should be part of the TRCC meeting agenda and the TRCC should promote projects to address the data quality problems that are presented.

- *Oversee Training for TRS Data Improvement.*
  The TRCC should have oversight responsibility for encouraging and monitoring the success of training programs implemented specifically to improve TRS data quality. Regularly scheduled presentations of training needs and training participation should be part of the TRCC meeting agenda, and the TRCC should promote projects to conduct training needs assessments and address the identified training needs.

1-A: Traffic Records Coordinating Committee Status

Establish a two-tiered TRCC

Michigan's TRCC has two levels, an executive level and a larger working level group. Executive level members represent agency heads from the Transportation Department, the State Police, the Secretary of State's Office, the Department of Community Health and the State Court Administrative Office. The membership list includes representatives of these agencies and others from local planning and engineering organizations, from the University of Michigan Transportation Research Institute, and locally-based federal partners from the Federal Motor Carrier Safety Administration, National Highway Traffic Safety Administration and the Federal Highway Administration. The TRCC Charter also calls for a Crash Data Users Group (CDUG) whose job is to "review and document current or future crash data issues and identify potential solutions to these issues."

The TRCC acts as one of 12 action teams, representing Traffic Records and Information, for the Governor's Traffic Safety Advisory Commission (GTSAC). The GTSAC is responsible for updating the State's Strategic Highway Safety Plan and seeks to improve traffic safety analysis, planning and assessment of safety programs and to leverage resources to protect public safety and promote safety awareness.

Authorize Members

The Michigan TRCC has a charter which has been endorsed by executive management in the following State Departments: Michigan State Police, Michigan Department of State, Michigan Department of Transportation, Michigan Department of Community Health, Michigan State Court Administrative Office, and the Michigan Office of Highway Safety Planning. The charter lists the membership of the entire TRCC and specifies which are members of the Executive Level of the Committee.

The TRCC plans for traffic records improvements and the expenditures that support those improvements. Funding may derive from federal grant moneys, such as 402 and 408 funds or from the various State department budgets that are responsible for the components of the system. The executive committee members have the ability to authorize such expenditures.

The group is also responsible for the State strategic plan for traffic records improvement and reviews progress on funded projects. The process for determining priorities of projects is described as collaborative and based on consensus.

Ensure Membership is Representative

All aspects of a comprehensive traffic records system are represented by the membership of the TRCC, which has been active since 2001. Owners and users of the various data and systems are part of the Committee. While the formal membership list for the TRCC only includes State employees, local officials with interest in traffic safety and data participate in the CDUG, which is currently addressing needed changes in the crash form.

It is important to have consistent involvement and participation from the entire traffic records community in the TRCC. Offering membership on the full committee to local law enforcement,

traffic engineers, planners, the prevention community, and private entities, including, perhaps, the alcohol beverage industry and MADD or SADD will serve to broaden the dialogue. Each brings a unique perspective that will need to be addressed, no matter what determinations are eventually made about traffic records system improvements. Legislative and policy issues tend to be given more attention and are viewed as more compelling when they are backed by the broad range of viewpoints represented by these various traffic safety interests and entities.

Oversee Quality Improvement
Michigan provides an excellent example of the potential for quality improvement when quality control activities are overseen and reviewed by the TRCC and the members of the user community. The Committee Chair indicates that data quality has improved a great deal, to the point that fewer people attend the committee meetings to complain about data quality.

Appoint an Administrator
The TRCC is chaired by a member of the Executive Committee. Committee chairmanship is a responsibility maintained for one year and then rotated. This is an excellent means by which to achieve participation by the executive level of the Committee. Chairing the committee requires personal time and resource commitment, which tends to generate ideological commitment. The staff also has a dedicated Traffic Records Coordinator.

Schedule Regular Meetings
Regular meetings of the TRCC and the CDUG are held and have reportedly generated a number of suggestions and a great deal of interest. Participation has tended to wane somewhat with the improvement of the data quality, but positive outcomes have proven to participants that involvement, interest, and participation elicit results. This tends to generate continued participation in the effort.

Oversee Training for Traffic Records System Data Improvement
Review of crash data by the TRCC elicited concerns about data integrity and accuracy and resulted in efforts to provide better initial and remedial training to law enforcement officers on the appropriate completion of the crash report. The Michigan State Police (MSP) created a training position that took direct responsibility for improvement in crash reporting. Not only was the training provided to MSP personnel, but was offered to law enforcement agencies statewide, both to officers and their supervisors. While officer training resulted in a greater degree of error reduction than did supervisor training, both improved the quality and accuracy of the reports overall.

The Michigan Traffic Records Coordinating Committee is an effective forum for communication of traffic safety and traffic records issues and has done a great deal to improve data quality within the State. At this point, their efforts can and should be directed toward promotion of data use and accessibility. A pamphlet entitled “Michigan Traffic Crash Data and Information” has been made available, which outlines the State’s free data resources. It lists statistics and web-based systems that are available publicly.

A complete index of traffic records data should be developed, to include the names and contact information for record system custodians, the available data elements and data dictionaries. This

information could be available to regular users of the data, to improve analysis of transportation issues throughout the State. Such an inventory must include privacy laws and regulations and be available for use to State and local TRCC members, who could use and share the information without overburdening those who provide the data and analyses thereof.

Recommendations

- ❑ Develop an inventory of available data to include platforms, data elements, and data dictionaries.

- ❑ Include local law enforcement and traffic engineers, and potentially private sector interests in the full TRCC membership, to ensure that all stakeholders are adequately represented in the State's traffic record decision-making.

1-B: Strategic Planning

Advisory Excerpt: *The TRS should operate in a fashion that supports the traffic safety planning process. The planning process should be driven by a strategic plan that helps State and local data owners identify and support their overall traffic safety program needs and addresses the changing needs for information over time. Detailed guidance for strategic planning is included in the NHTSA Strategic Planning Guide and the FHWA Strategic Highway Safety Plan documents. The strategic plan should address activities such as:*

- ❑ *Assign Responsibility for the Strategic Plan.*
  The strategic plan should be created and approved under the direction of the TRCC. The TRCC should continuously monitor and update the plan, to address any deficiencies in its highway traffic records system.

- ❑ *Ensure Continuous Planning.*
  The application of new technology in all data operational phases (i.e., data collection, linkage, processing, retrieval, and analysis) should be continuously reviewed and assessed. The strategic plan should address the adoption and integration of new technology as this facilitates improving TRS components.

- ❑ *Move to Sustainable Systems.*
  The strategic plan should include consideration of the budget for lifecycle maintenance and self-sufficiency to ensure that the TRS continues to function even in the absence of grant funds.

- ❑ *Meet Local Needs.*
  The strategic plan should encourage the development of local and statewide data systems that are responsive to the needs of all stakeholders.

- ❑ *Promote Data Sharing.*
  The strategic plan should promote identification of data sharing opportunities and the integration among federal, State, and local data systems. This will help to eliminate duplication of data and data entry, assuring timely, accurate, and complete traffic safety information.

- ❑ *Promote Data Linkage.*
  Data should be integrated to provide linkage between components of the TRS. Examples of valuable linkages for highway and traffic safety decision making include crash data with roadway characteristics, location, and traffic counts; crash data with driver and vehicle data; and crash data with adjudication data, healthcare treatment and outcome data (e.g., Crash Outcome Data Evaluation System [CODES]).

- ❑ *Coordinate with Federal Partners.*
  The strategic plan's budget-related items should include coordination between the State and the various federal programs available to fund system improvements. The data collection, management, and analysis items in the strategic plan should include coordination of the State's systems with various federal systems (e.g., the Fatality Analysis Reporting System [FARS], the Problem Driver Pointer System [PDPS] of the National Driver Registry [NDR], the Motor Carrier Management Information System [MCMIS], and the Commercial Driver License Information System [CDLIS]).

- ❑ *Incorporate Uniform Data Standards.*
  The strategic plan should include elements that recognize and schedule incorporation of uniform data elements, definitions, and design standards in accordance with national standards and guidelines. Current examples of these standards and guidelines include:

  - *Model Minimum Uniform Crash Criteria (MMUCC)*
  - *American National Standards Institute (ANSI) -D20.1 and ANSI-D16.1*
  - *National Governors Association (NGA)*
  - *Global Justice XML Data Model (GJXDM)*

- *National Center for State Courts, Technology Services, Traffic Court Case Management Systems Functional Requirement Standards*

- *Guidelines for Impaired Driving Records Information Systems*

- *National Emergency Medical Service Information System (NEMSIS) Data Dictionary.*

❑ *Plan to Meet Changing Requirements.*
To help the State meet future highway safety challenges, the strategic plan should include a periodic review of data needs at the local, State, and federal levels. It should be updated to include tasks to meet those needs as they are identified.

❑ *Support Strategic Highway Safety Planning and Program Management.*
The strategic plan should include elements designed to ensure that the State captures program baseline, performance, and evaluation data in response to changing traffic safety program initiatives. Additional elements should be present for establishing and updating countermeasure activities (e.g., crash reduction factors used in project selection and evaluation).

❑ *Strategic Planning of Training and Quality Control.*
The strategic plan should incorporate activities for identifying and addressing data quality problems, especially as these relate to training needs assessments and training implementation.

1-B: Strategic Planning Status

The current 2009 Strategic Plan for Traffic Records is an updated/revised version of the 2005 Strategic Plan, which used the findings of the Traffic Records Assessment conducted in October of 2004 to identify deficiencies to be addressed. The changes in the Strategic Plan were prompted by the annual submission of the federal 408 grant application for traffic records improvement funds.

Michigan's Traffic Records Coordinating Committee (TRCC) is comprised of an executive and working group level that represent the major safety stakeholders at the State and local levels of government. The Executive TRCC has oversight responsibility for the Strategic Plan for Traffic Records System Improvements. The TRCC coordinates their activities with the Governor's Traffic Safety Advisory Commission (GTSAC). The GTSAC was formed by an Executive Order of the Governor in 2002 to serve as the State's major forum for identifying key traffic safety issues and is charged with developing and implementing action plans to address those issues. The GTSAC developed and administers the Strategic Highway Safety Plan (SHSP). Program action committees were established by the GTSAC to implement the emphasis area programs identified in the SHSP, traffic records being one of the emphasis areas. The TRCC is an action committee under the umbrella of the GTSAC and is responsible for the traffic records action plans.

The Office of Highway Safety Planning (OHSP) provides staff support for traffic records coordination. The OHSP, through the Traffic Records Coordinator, takes the initiative in developing the Strategic Plan and the 408 application submission. The OHSP intends to make a fresh start in developing the 2010 Strategic Plan using the findings of this assessment as the source for identified deficiencies.

Assign Responsibility for the Strategic Plan

The TRCC charter clearly places the responsibility for the development and implementation of the Strategic Plan for Traffic Records Improvement and the submission of the 408 grant application with the TRCC. This is in keeping with the provisions of the federal safety legislation, SAFETEA-LU. Projects are submitted to the TRCC for review and approval. A priority ranking method is used by the TRCC to determine the projects to be included in the 408 application and in the Strategic Plan.

However, the certifying statements in the 408 grant submission indicate that the TRCC ***does not*** have the authority to review any of the State's highway safety data and traffic record systems and to review changes to such systems before the changes are implemented.

The Crash Data Users Group (CDUG), the most active subcommittee of the TRCC, appears to be the driving force for most initiatives included in the Strategic Plan.

Ensure Continuous Planning
The projects in the current Plan demonstrate an attention to emerging technology and best practices in the field of data collection and storage. But outside of crash file issues the Plan appears lacking in state-of-the-art initiatives in the other traffic records components. To ensure continuous planning, a more formal process should be adopted that forces periodic reviews of not only the ongoing projects but of emerging technology in traffic records development in other States and at the national level.

Project management methods should be adopted to track project progress and assure the projects are on time and within budget. This method should allow for determinations to modify or abandon projects when necessary. A separate subcommittee may be required for this function. Revisions to the Plan and/or the program and projects in the Plan should be ongoing and changes or modifications documented in action plans or project progress reporting mechanisms. Since by definition strategic planning is a dynamic process, the process itself should be reviewed to determine if it is a viable and effective process for traffic records improvement initiatives.

Move to Sustainable Systems
There is evidence that many of the programs identified in the Strategic Plan exist and are sustained only by federal funds. The inclusion of new projects or system modifications, revisions, or adoption of new technology should be viewed as long term needs of the Michigan highway safety community, therefore the State should be committed to their implementation and continuous operation regardless of the funding source. Consideration should be given to the long term maintenance of systems and the budget implications implicit in the continuous operation. Most federal grant programs are incentives to create or develop initiatives, and the long term operation becomes the grantee's responsibility.

Meet Local Needs
The Plan provides grants targeted to local police agencies regarding electronic crash report collection and to the State Court Administrative Office's Judicial Data Warehouse (JDW) to upload data from the State's Trial Courts,

Crash data are available to local safety agencies for their problem identification and safety analysis programs.

Promote Data Sharing
The projects mentioned above regarding electronic crash reporting and the JDW are examples of data sharing.

Promote Data Linkage
Through the CDUG the TRCC is made aware of data linkage issues. There has been some testing done with the crash system and the courts system to determine linkage applicability, and these issues are under consideration. When the injury surveillance system is fully developed and becomes operational, this will also require consideration of data linkages to be identified and established.

Coordinate with Federal Partners
The working groups of the TRCC, in particular the CDUG, coordinate with their federal partners at NHTSA, FMCSA and FHWA.

Incorporate Uniform Data Standards
The Strategic Plan adequately addresses the pending revisions to the crash form to increase MMUCC compliance.

Plan to Meet Changing Requirements
The requirements of traffic records components other than crash seem to address long term or emerging needs.

Support Strategic Highway Safety Planning and Program Management
The TRCC uses the performance measures worked out for the Section 408 grant application and the TRIPRS website to track and inform NHTSA of progress towards the overall traffic records improvements noted in the Strategic Plan.

Quality control metrics should be developed for all projects included in the Strategic Plan. Two types of quality control should be considered: a performance measure for the ultimate project goal and metrics for the measurement of quality improvement in the traffic records system component impacted by the project.

Finally, quality control methods and/or processes should be developed for each traffic records component to assure acceptable levels of quality for data in each component. These should be in addition to the automated edits incorporated in the system software. These methods should be the responsibility of the official custodian of the component. However, a requirement of any project selection in the Strategic Plan should include a quality control method and identification of metrics both for the project and the component that is affected by the project.

Strategic Planning of Training and Quality Control
The CDUG has developed quality control metrics for the crash file that are used in crash report training for law enforcement (UD-10 Trainer, virtual training).

Recommendations

- ❑ Charge the TRCC with the development of a new Strategic Plan for Traffic Records Improvement addressing the deficiencies and recommendations in this Traffic Records Assessment.

- ❑ Acquire and maintain a project management system and continually monitor and report on project activities including the 408 grant program.

- ❑ Develop a formal quality control program addressing all components of the traffic records system.

1-C: Data Integration

Advisory Excerpt: *The Data IPT Report recommends that States integrate data and expand their linkage opportunities to track traffic safety events among data files. Integrated data should enable driver license and vehicle registration files to be updated with current violations, prevent the wrong driver from being licensed, or keep an unsafe vehicle from being registered. Integration should ensure that all administrative actions are available at the time of the driver's sentencing. Data linkage is an efficient strategy for expanding the data available, while avoiding the expense and delay of new data collection.*

State TRCCs should develop working relationships with the health care community to ensure that the causation, crash, emergency medical services, hospital, and other injury-related data linked during the event can be merged statewide. They should also link to other data such as vehicle insurance, death certificates, medical examiner reports, etc., to support analysis of State-specific public health needs.

Linkage with location-based information such as roadway inventory databases and traffic volume databases at the State level can help identify the kinds of roadway features that experience problems, allowing States to better address these needs through their various maintenance and capital improvement programs. Data integration should be addressed through the following:

- *Create and Maintain a Traffic Records System Inventory.*
  The TRS documentation should show the data elements and their definitions and locations within the various component systems. Ancillary documentation should be available that gives details of the data collection methods, edit/error checking related to each data element, and any known problems or limitations with use of a particular data element. The system inventory should be maintained centrally, ideally in a data clearinghouse, and kept up-to-date through periodic reviews with the custodial agencies. Funding for system development and improvement should include a review of existing systems' contents and capabilities.

- *Support Centralized Access to Linked Data.*
  The traffic records user community should be able to access the major component data files of the TRS through a single portal. To support this access, the State should promote an enterprise architecture and database, and develop a traffic records clearinghouse to serve as the gateway for users. The databases in the clearinghouse should be linked in ways that support highway safety analysis. At a minimum, this would include linkage by location, involved persons, and events.

- *Meet Federal Reporting Requirements.*
  The TRS, where possible, should link to or provide electronic upload files to federal data systems such as FARS, MCMIS/SafetyNet, Highway Performance Monitoring System (HPMS), and others.

- *Support Electronic Data Sharing.*
  The TRS should support standard methods for transporting data between systems. At a minimum, these should include a documented file structure and data definitions for information to be transferred to statewide databases. Standard information transfer formats and protocols, such as XML format and FTP, should be supported.

- *Adhere to State and Federal Privacy and Security Standards.*
  The TRS should make linked data as accessible as possible while safeguarding private information in accordance with State and federal laws. This includes security of information transferred via the Internet or other means.

1-C: Data Integration Status

Create and Maintain a Traffic Records System Inventory

The Traffic Records System Inventory does not exist. Some partial inventories exist in the form of resource listings that may be found on various websites related to the Traffic Records Coordinating Committee (TRCC), the Michigan Traffic Crash Facts, the Governor's Traffic Safety Advisory Commission Action Teams, the Office of Highway Safety Planning (OHSP), and others. The Strategic Prevention Framework/State Incentive Grant program in the Michigan Department of Community Health (MDCH) is planning to develop a safety data source inventory as part of their efforts.

Support Centralized Access to Linked Data

There are few current examples of centralized access to linked data. There are, however, some efforts underway that may result in creation of linked data that may become accessible to users. Many users have access to a merged dataset containing both crash and roadway inventory information. This dataset is made possible through the highly accurate location coding process for crashes that is managed jointly by the Criminal Justice Information Center (CJIC) at the Michigan State Police and the Michigan Department of Transportation (MDOT).

At least two attempts have aimed at obtaining a grant to establish a Crash Outcome Data Evaluation System (CODES) project. These efforts have failed in the past because of a lack of pre-hospital data. With the creation of the EMS run report system at MDCH interest in the CODES program has been rekindled.

The OHSP and the State Court Administrative Office have collaborated on creating and using the Judicial Data Warehouse (JDW). The JDW contains citation/adjudication data on the vast majority of traffic cases. Unfortunately, linkage with crash data is limited because some key variables are not present on the crash report and/or the citation. It is possible to link the two data sources as they exist now, but the process is extremely time consuming and uncertain. With planned revisions to the crash report form it should become much simpler to perform a data merger using automated processes.

Meet Federal Reporting Requirements

All federal reporting requirements for the Highway Performance Monitoring System, Federal Aid System, Fatality Analysis Reporting System (FARS), SAFETYNET, and others are being met. For the systems with data quality performance measurements in place Michigan is consistently meeting or exceeding the data quality standards for timeliness, accuracy and completeness.

Support Electronic Data Sharing

There are numerous examples of electronic data sharing. The Traffic Crash Reporting System (TCRS) managed by CJIC is currently accepting about 17 percent of crash reports electronically. The plan is to achieve about 50 percent electronic reporting by the end of 2010. The new EMS run reporting system at MDCH relies entirely on electronic reporting by providers. Courts forward the record of convictions on traffic violations electronically to the JDW and to the Michigan Department of State (MDOS) for uploading to the driver history.

Additional opportunities for improved electronic data transfer exist. One major source of data – local roadway inventory files maintained by city, county or regional engineering agencies – is not shared electronically with any other agency at present. These files could form the basis for local roadway data entries into the roadway Sufficiency file at MDOT.

Adhere to State and Federal Privacy and Security Standards

Michigan has implemented data security procedures in line with state privacy laws as well as the Driver Privacy Protection Act (DPPA) and the Health Insurance Portability and Accountability Act (HIPAA). Privacy and security were reported as major concerns during the development of the public access files available through the Michigan Traffic Crash Facts website. These issues were addressed by the executive committee of the TRCC as well as the site's developers at the University of Michigan Transportation Research Institute (UMTRI).

Recommendations

- ❑ Develop a statewide traffic records system inventory.
- ❑ Develop additional linked data sets including merged data for crashes and injury surveillance information and merged data for crashes and citations.
- ❑ Develop a public-use version of all linked data sets and provide a centralized access point for these resources.

1-D: Data Uses and Program Management

Advisory Excerpt: *Data availability and quality directly affect the effectiveness of informed decision making about sound research, programs, and policies. Accurate, comprehensive, and standardized data should be provided in a timely manner to allow the agency or decision-making entities at the State or local levels to:*

- *Conduct Problem Identification.*
  Problem identification is the process of determining the locations and causes of crashes and their outcomes and of selecting those sites and issues that represent the best opportunity for highway safety improvements. States should be able to conduct problem identification activities with their traffic records system.

- *Develop Countermeasure Programs and Program Management Procedures.*
  States select and evaluate strategies for preventing crashes and improving crash outcomes. This requires that decision makers can select cost-effective countermeasures and that safety improvement programs and funds should be managed based on data-driven decision making.

- *Perform Program Evaluation.*
  States should be capable of measuring progress in reducing crash frequency and severity. Ideally, the effectiveness of individual programs and countermeasures should be evaluated and the results used to refine development and management processes.

- *Support Safety-Related Policies and Planning.*
  The States are responsible for developing SHSPs. These data should be available to support this and other policy and planning efforts such as development of agency-specific traffic safety policies, traffic records strategic planning, safety conscious planning, and others.

- *Access Analytic Resources.*
  Data users, and decision makers in particular, should have access to resources including skilled analytic personnel and easy to use software tools to support their needs. These tools should be specifically designed to meet needs such as addressing legislative issues (barriers as well as new initiatives), program and countermeasure development, management, and evaluation, as well as meeting all reporting requirements.

- *Provide Public Access to Data.*
  The TRS should be designed to give the public or general non-government user reasonable access to data files, analytic results, and resources, but still meet State and federal privacy and security standards.

- *Promote Data Use and Improvement.*
  The TRS should be viewed as more than just a collection of data repositories, and rather as a set of processes, methods, and component systems. Knowledge of how these data should be collected and managed, along with where the bottlenecks and quality problems arise, is critical to users understanding proper ways to apply the data. This knowledge should also aid in identifying areas where improvement is possible.

1-D: Data Uses and Program Management Status

Conduct Problem Identification

The Office of Highway Safety Planning (OHSP) in the Michigan State Police is the focal point for conducting problem identification. Twelve of the staff positions are dedicated to the management of the various highway safety programs, and they interact with the analysts in the problem identification process. Two lead specialists are a Roadway Safety Program Coordinator and a Planning and Evaluation Coordinator who are each capable of and active in conducting all aspects of data manipulation and analysis. The OHSP development of its Performance Plan begins with problem identification as quoted below from the Performance Plan document.

> Crash data is the foundation of problem identification. Data analysis continues year-round, with intensified efforts early in the HSP and GDP development processes. There were two primary sources for crash analysis in this year's planning cycle:
>
> Michigan Traffic Crash Facts: Through a partnership with the University of Michigan Transportation Research Institute (UMTRI), a compilation of Michigan's traffic crash data is completed annually and published as the Michigan Traffic Crash Facts. Crash Facts back to 1992 are available at http://www.michigantrafficcrashfacts.org web site.
>
> Direct Data Analysis: With improvements in the quality and availability of electronic crash data, OHSP can go directly to the crash database, running queries of the updated data without intermediaries. Having reached the last year of the previous Highway Safety Plan's goals, FY2009's planning started with a *tabula rasa* look at the crash data, leading to the goals listed below. In addition to statewide analysis, OHSP provides Safe Communities and partners with information and tools for local problem identification.
>
> The problem identification process incorporates previous years' analyses along with updated data, staff expertise, outside research, and State and national priorities, including the statewide Strategic Highway Safety Plan.

The Michigan Department of Transportation (MDOT) performs the analyses that enable the completion and submission of the Highway Safety Improvement Program. The OHSP is capable of supporting those efforts and extends the analytic application to human behavioral factors.

The analyses conducted in OHSP extend beyond the use of the crash and roadway files by using the driver file, conviction and citation data, and available medical data. The analyses are not only responsive to requests received and the traditional tables that characterize established problem identification efforts; they explore options of data comparisons that have the potential of identifying aspects of highway safety problems not otherwise recognized.

Local road commissions have the ability to use the *RoadSoft* program to analyze crash and roadway data. *RoadSoft* was developed by the Michigan Technological University to extend analysis capabilities for localities and to establish compatibility amongst the analysis efforts of multiple users.

Michigan is one of few States broadening its data resource usage beyond crash and roadway data described as follows: "Judicial Data is being tested in relation to crash data. A statewide EMS data capture system was introduced in May 2009. Once all EMS First providers are using this system, we will start to test how to 'link' this data to crash and other data sets."

The crash data are current: by mid-March the previous year's crash data are available for analysis. Typically, three to five years of data are used to identify data trends and details by localities.

Beyond the impressive in-house resources, OHSP has provided access to the crash file to any user through Internet access to the file information and the tools needed to extract and array information from the file—for list displays, tables, map presentations, charts, and file downloads.

Although most of the data users receive guidance for accessing and using the data, the access by other users has the potential that some user may detect some factor or anomaly and draw attention to it by asking questions that engage the OHSP analysts.

Develop Countermeasure Programs and Program Management Procedures

Countermeasure programs and the management of them are complete and formalized in accordance with the guidance from the National Highway Traffic Safety Administration. The OHSP staff structure accommodates the primary focus areas in addition to issues that may be detected by the experienced and capable staff. The scope and types of the countermeasure programs and their management is reflected in the OHSP staff.

A Planning and Administration Section includes a Senior Section Chief, a Safe Communities Program Coordinator, a Roadway Safety Program Coordinator, a Planning and Evaluation Coordinator, and a Secretary. A Program Management Section includes a Section Chief, an Upper Peninsula Traffic Safety Coordinator, a Police Traffic Services Coordinator, a Law Enforcement Liaison Coordinator, an Impaired Driving Program Coordinator, a Youth Programs Coordinator, a Grants Technician, an Occupant Protection Coordinator, and a Corporate Outreach Program Coordinator.

Perform Program Evaluation

OHSP has used the services of two universities with established reputations for expertise in highway safety issues, development, and research. UMTRI and Wayne State University are the two principal facilities that may be used by OHSP to evaluate the highway safety programs. However, the in-house capabilities enable OHSP to conduct the evaluations at less cost and with results that are immediate in most cases.

Support Safety-Related Policies and Planning
The OHSP attempts to base all highway and safety policies and priorities on traffic records data. This includes all OHSP activities and programs such as the Seat Belt and Alcohol mobilizations, Child Passenger Safety, Pedestrians, Motorcycles, etc.

Policy makers are made aware of the availability of traffic records data through meetings such as the Governor's Traffic Safety Advisory Commission.

OHSP occasionally receives legislative requests on the impact of proposed changes. Same-day turn around is almost always achieved.

Access Analytic Resources
Since the 2004 Traffic Records Assessment, there have been major improvements in access to analytic resources in Michigan. The Traffic Crash Reporting System (TCRS) at the Michigan State Police (MSP) has become the central analytic resource for law enforcement agencies and engineering agencies throughout the State. With few exceptions, crash data analyses and data extracts are created by these agencies directly from the official crash database. Access to the file is controlled so that only authorized users are able to retrieve records or conduct analyses.

For other users, crash data are readily accessible through the Michigan Traffic Crash Facts (MTCF) website. On that site a series of predefined analyses are available for immediate download and review. In addition, the site provides a state-of-the-art query tool giving users access to multiple years of crash data and the ability to filter records and produce data tables, graphs, and maps. The mapping feature is particularly powerful, giving users the ability to open individual records to view pdfs of the crash report pages.

Many users obtain extracts or complete copies of the TCRS data. Among the more sophisticated users of the data, the Southeast Michigan Council of Governments (SEMCOG) and UMTRI receive complete copies of the crash database for their engineering and research use, respectively. UMTRI, in particular, makes extensive use of the data and supports the traffic records community by maintaining the annual close-out crash database files and report images on the MTCF website. UMTRI also receives a copy of the driver history database from the Michigan Department of State (MDOS) twice per year. Access to that file, however, is strictly limited to approved research projects conducted by the University of Michigan.

Restricted access is available to users with legitimate needs for driver and injury surveillance data. These records are covered under a variety of State and federal privacy protection laws and policies. In most cases, any use of the data will be restricted to redacted files that do not contain personal identifiers. Users of the data must submit a formal request to the department(s) and undergo a rigorous approval process before being granted access.

Summary data from most databases are readily available, often through publicly accessible web sites. Examples of freely available summary data were found for driver records, pre-adjudication citation records (e.g., court case management records), and some injury surveillance records.

Access to analytic assistance is much improved since the prior assessment, especially in the area of crash data analysis. With the development of strong analytic resources within the Office of Highway Safety Planning in the MSP, users have access to timely, accurate, and expert-level assistance. In particular, the staff reported answering most queries in minutes, and all but a handful of the most technically complex queries in a matter of hours. The staff have served as a resource for legislators, journalists, State and local government, safety advocates, and the general public.

Outside of crash data analysis, however, the ability to obtain expert-level assistance in conducting a safety analysis is inconsistent. The lack of linked datasets in some cases means that desired analyses are not possible without a large manual effort, if at all. In other cases, the lack of a system inventory and list of contacts presents a barrier to all but the most persistent or connected users. In still other cases, the resources do not exist within State agencies to assist users in performing analyses so they must either conduct their own, or pay for services. The frequency of such complete failures of the analytic support "framework" within Michigan appears low, however. Most users reported being able to find the resources and assistance they needed eventually.

Provide Public Access to Data

There are a variety of resources available to the public to access Michigan crash, injury, mortality, and public health data. A wealth of crash data is provided on the web by the Office of Highway Safety Planning at http://www.michigantrafficcrashfacts.org/. This website provides a wide variety of fact sheets encompassing historical data, crash trends, and highway safety program areas. Summary information on licensed drivers, registered vehicles, and vehicle miles traveled are also provided along with a one-page 'quick facts' summary. Most notable is the availability of a data querying tool (http://www.michigantrafficcrashfacts.org/datatool/build) that allows users to generate crash, vehicle, and person specific data tables using five years of Michigan crash information. The data resulting from the query can be displayed in table form, downloaded into an Excel spreadsheet or be represented as pin points on an interactive map. Further, individual crash reports are available by clicking on each crash location represented on the map. The crash reports, in sanitized form, may be printed or downloaded as PDF files. The website offers online help pages, a tutorial in the use of the querying tool and links to other State, regional and national resources related to motor vehicle crashes. This utility is a major resource for the State's highway safety community. Ad-hoc queries for additional reports and information can also be made directly to the data analysts at the Office of Highway Safety Planning.

The newly established Michigan EMS database (MI-EMSIS) can be queried by the individual EMS agencies that may provide the data for local use. Otherwise ad-hoc queries for standard reports will be made to the Michigan Department of Community Health (MDCH).

Morbidity, mortality, and other public health data are available in the form of standardized reports and fact sheets through the MDCH (http://www.michigan.gov/mdch). Specific queries may be directed to the Injury and Violence Prevention Section whose staff has access to statewide vital statistics and hospital discharge data. Also through the MDCH website, the State Prevention Framework/State Incentive Grant (SPF/SIG) program provides a useful list of available data sources for community needs assessment of alcohol related crashes and fatalities.

Promote Data Use and Improvement

The Traffic Records Coordinating Committee has provided a very effective forum for data improvement within the State of Michigan. By gathering data users to discuss deficiencies, problems were discovered and solutions devised, training developed and provided and processes changed, all in an effort to improve the accuracy, timeliness and completeness of the data.

Numerous quality control reports show proof positive of incremental improvements in data quality, particularly for the crash data, which is the most often used data set. Crash data quality is no longer a great concern among data users in the State. At this point, with timely and accurate data widely available, it is imperative that the successful efforts to improve the data are rewarded by effective use of the data to improve traffic safety in Michigan.

The OHSP has developed and distributed a booklet entitled *Michigan Traffic Crash Data and Information* that outlines the various data that are available for use in the State. The fact that this booklet enumerates a variety of web-based data sets is testament to promotion and availability of traffic crash data from a variety of systems. The development of both canned and *ad hoc* reporting from many data systems also provides information about and evidence of the wide availability of data, which can in turn help researchers, the legislature and the media to recognize the value of these data. The booklet also provides suggested uses for the available data and provides contact information and web links.

The Judicial Data Warehouse contains millions of records and reportedly currently has 1,400 registered users. It will provide opportunity for courts and prosecutors to ascertain whether the defendant they are trying has other pending cases and will provide up to date information for enhanced sentencing where appropriate.

Recommendations

- ❑ Create public use data utilities for components of the traffic records system akin to the Michigan Traffic Crash Facts website and data repository.

- ❑ Develop the capability to serve users who need access to redacted, merged data of crash, driver history, citation/adjudication, and injury surveillance data.

SECTION 2: TRAFFIC RECORDS SYSTEM COMPONENTS

Advisory Excerpt: *At the time of passage of the Highway Safety Act of 1966, State centralized TRS generally contained basic files on crashes, drivers, vehicles, and roadways. Some States added data on traffic safety-related education, either as a separate file or as a subset of the Driver File. As traffic safety programs matured, many States incorporated EMS and Citation/Conviction Files for use in safety programs. Additionally, some States and localities maintain a Safety Management File that consists of summary data from the central files that can be used for problem identification and safety planning.*

As the capabilities of computer hardware and software systems increased and the availability of powerful systems has expanded to the local level, many States have adopted a more distributed model of data processing. For this reason, the model of a TRS needs to incorporate a view of information and information flow, as opposed to focusing only on the files in which that information resides.

Under this more distributed model, it does not matter whether data for a given system component are housed in a single database on a single computer or spread throughout the State on multiple local systems. What matters is whether the information is available to users, in a form they can use, and that these data are of sufficient quality to support its intended uses. Thus, it is important to look at information sources. These information sources have been grouped to form the major components of a TRS:

- ❑ *Crash Information*
- ❑ *Roadway Information*
- ❑ *Driver Information*
- ❑ *Vehicle Information*
- ❑ *Citation/Adjudication Information*
- ❑ *Statewide Injury Surveillance Information*

Together, these components provide information about places, property, and people involved in crashes and about the factors that may have contributed to the crash or traffic stop. The system should also contain information that may be used to judge the relative magnitude of problems identified through analysis of data in the TRS. This includes demographic data (social statistics about the general population such as geographic area of residence, age, gender, ethnicity, etc.) to account for differences in exposure (normalization) and data for benefit/cost and cost effectiveness determinations. Performance level data should be included to support countermeasure management.

A frequently used overview of the contents of a TRS is the Haddon Matrix, named after its developer, William Haddon, the first NHTSA Administrator. It provides a valuable framework for viewing the primary effects of Human, Vehicle, and Environmental factors and their influence before, during, and after a crash event. Table 1 is based on the Haddon Matrix.

Table 1: Expanded Haddon Matrix
With Example Highway Safety Categories

	Human	***Vehicle***	***Environment***
Pre-Crash	· *Age* · *Gender* · *Experience* · *Alcohol/Drugs* · *Physiological Condition* · *Psychological Condition* · *Familiarity with Road & Vehicle* · *Distraction* · *Conviction & Crash History* · *License Status* · *Speed*	· *Crash Avoidance* · *Vehicle Type* · *Size & Weight* · *Safety Condition, Defects* · *Brakes* · *Tires* · *Vehicle Age* · *Safety Features Installed* · *Registration*	· *Visibility* · *Weather/Season* · *Lighting* · *Divided Highways* · *Signalization* · *Geographic Location* · *Roadway Class, Surface, Cross-Section, Alignment, etc.* · *Structures* · *Traffic Control Devices, Signs, Delineations, and Markings* · *Roadside Appurtenances, Buildups, Driveways, etc.* · *Volume of Traffic* · *Work Zone* ·

			· *Animal Range Land & Seasonal Movements*
Crash	· *Belt Use* · *Human Tolerance* · *Size* · *Seating Position* · *Helmet Use*	· *Crash-Worthiness* · *Passenger Restraints* · *Airbags and Airbag Shutoff*	· *Guardrails* · *Median Barriers* · *Breakaway Posts* · *Rumble Strips and Other Safety Devices* · *Maintenance Status of Roadway and Devices*
Post-Crash	· *Age* · *Physical Condition* · *Insurance Status* · *Access to Health Care* · *Driver Control Actions* · *Court Actions* · *Probation*	· *Post Crash Fires* · *Fuel Leakage* · *Power Cell Securement* · *Hazardous Materials* · *Title*	· *Traffic Management* · *Bystander Care* · *EMS System* · *First Responders* · *Hospital Treatment* · *Long-Term Rehabilitation*

The Haddon Matrix has proven to be a meaningful way to examine primary effects of contributing factors on crash frequency and severity. It helps decision makers to consider countermeasures designed to address specific contributing factors. In recent years, with availability of more detailed data analyses, awareness has grown about the interactions among contributing factors. A good example of such interactions would be weather and drivers' skill or experience levels. To make the contribution of interaction effects more obvious, the matrix in Table 2 can be used to supplement the Haddon Matrix.

Table 1: Examples of the Interactions among Crash Characteristics

	Human	***Vehicle***	***Environment***
Human	· *Road Rage* · *Ped/Bike Behavior & Driver Behavior* · *Driver Age & Passenger Age & Number*	· *Familiarity with Vehicle & Training* · *License Class & Vehicle Type* · *Rollover Propensity & Driver Actions* · *Vehicle Ergonomics & Person Size*	· *Crash Avoidance* · *Vehicle Type* · *Familiarity with Roadway* · *Experience with Weather Conditions*
Vehicle		· *Vehicle Size Weight Mismatch* · *Under-Ride/Over-Ride* · *Shared Roads, No-Zone* · *Tire Inflation & Rollover Propensity*	· *Rollover Propensity & Road Configuration* · *Roadway Debris & Vehicle Size Weight* · *Vehicle Type & Weather Conditions* · *Vehicle Condition & Weather Conditions*
Environment			· *Congestion Interaction with Road Type* · *Congestion & Vehicle Mix & Lane Width* · *Animal Management Policies & Roadway Access & Seasons*

Taken together, these views of traffic safety factors offer a way of thinking about highway safety issues that is both conceptually robust and practical. For the purposes of this Advisory, the most important aspect of the TRS is that it

supports high-quality decision making to improve highway safety. The remainder of this section of the Advisory presents details about the various components of the TRS.

2-A: Crash Data Component

Advisory Excerpt:

- ❑ *Description and Contents*
  The Crash Data Component should document the time, location, environment, and characteristics (e.g., sequence of events, rollover, etc.) of a crash. Through links to other TRS components, the Crash Data Component should identify the roadways, vehicles, and people (e.g., drivers, occupants, pedestrians) involved in the crash. These data should help to document the consequences of the crash (e.g., fatalities, injuries, property damage, and violations charged), support the analysis of crashes in general, and the analysis of crashes within specific categories defined by:

  - *person characteristics (e.g., age or gender)*
  - *location characteristics (e.g., roadway type or specific intersections)*
  - *vehicle characteristics (e.g., condition and legal status)*
  - *the interaction of various components (e.g., time of day, day of week, weather, driver actions, pedestrian actions, etc.)*

  The Crash Data Component of the TRS contains basic information about every reportable (as defined by State statute) motor vehicle crash on any public roadway in the State.

- ❑ *Applicable Guidelines*
  Details of various data elements to be collected are described in a number of publications. The MMUCC provides a guideline for a suggested minimum set of data elements to be collected for each crash. Additional information should be collected for crashes involving an injury or fatality to meet the tracking and analysis requirements for the State and other systems (e.g., the FARS, SafetyNet).

- ❑ *Data Dictionary*
  Crash data should be collected using a uniform crash report form that, where applicable, has been designed and implemented to support electronic field data collection. Law enforcement personnel should receive adequate training at the academy and during periodic refreshers, to ensure that they know the purpose and uses for the data as well as how to complete each field on the form accurately.

  Information from the quality control program should be used to develop and improve the content of training. The training manual on crash reporting should be available to all law enforcement personnel. The instructions in the manual should match the edit checks that are performed on the crash data prior to its being added to the statewide crash database. The edit checks should be documented and sufficient to flag common and serious errors in the data. For example, these errors include missing or out of range values in single fields and logical inconsistencies between the data recorded in multiple fields (e.g., time of day is midnight and the lighting condition is coded as daylight). All data element definitions and all system edits should be shared with collectors, managers, and users in the form of a data dictionary that is consistent with the training manual and the crash report form.

- ❑ *Process Flow*
  The steps from initial crash event to final entry into the statewide crash data system should be documented in process flow diagrams. The diagram should be annotated to show the time required to complete each step and to show alternate flows and timelines depending on whether the reports are submitted in hardcopy or electronically to the statewide system. The process flow diagram should include procedures for error correction and error handling (i.e., returning reports to the originating officer/department, correction, resubmission, etc.). Process flow diagrams should show all major steps whether accomplished by staff or automated systems and should clearly distinguish between the two.

- ❑ *Interface with Other Components*
  The Crash Data Component has interfaces, using common linking variables shown in Table 3, to other TRS components to support the following functions:

- *Driver and vehicle data should be used to verify and validate the person and vehicle information during data entry and to flag records for possible updating in the driver or vehicle files when a discrepancy is identified. Key variables such as driver license number, vehicle identification number (VIN), license plate number, name, address, and date of birth should be available to support matching of records among the files. The Driver Data Component should also enable access to drivers' histories of crashes and convictions for traffic violations.*

- *Crash data should be linked to roadway inventory and other roadway characteristics based upon location information and other automated and manual coding methods. This linkage supports location-based analysis of crash frequency and severity as well as crash rate calculations based on location-specific traffic counts.*

- *Law enforcement personnel should be able to link crash, contact, incident, citation, and alcohol/drug test results through their own department's records and/or a secure law enforcement information network. For agencies with computer-aided dispatch and/or a records management system, the crash data should be linked to other data through incident, dispatch, and/or crash numbers and by names and locations to support analysis at the local level.*

- *Linkage to injury surveillance data should be possible either directly or through probabilistic linkage in order to support analysis of crash outcomes and overall costs of treatment. Key variables for direct linkage include names of injured persons or EMS run report number. Key variables for probabilistic linkage include the crash date and time, crash location, person characteristics such as date of birth and gender, EMS run report number, and other particulars of the crash.*

Table 3: Common Linking Variables between Crash And Other Data Components of a Traffic Records System

Crash Linkages to Other Law Enforcement and Court Files	- *Incident Number* - *Location (street address, description, coordinates, etc.)* - *Personal ID (name, address, DL number, etc.)*
Crash Linkages to Roadway Information	- *Location Coding (linear referencing system, reference post, coordinates, local street codes)*
Crash Linkages to Driver and Vehicle Information	- *Driver License Number* - *Vehicle Identification Number* - *Personal Identifiers (name, address, date of birth, etc.)*
Crash Linkages to Statewide Injury Surveillance System Information	- *Personal Identifiers (where allowed by law)* - *Crash Date, Time, Location* - *EMS Run Report Number* - *Unique Patient ID Number*

Furthermore, there should be data transfer and sharing linkages between State and local crash databases. The State crash data system should support the electronic transfer of crash data from a variety of law enforcement agencies' (LEAs) records management systems. The State's crash data system management should publish the specifications and editing requirements for generating the outputs from the various agency systems that can be processed into the official State crash data system.

- ❑ *Quality Control Program*

The crash data should be timely, accurate, complete, and consistent and these attributes should be tracked based on a set of established quality control metrics. The overall quality of the information in the Crash Data Component should be assured based on a formal program of error/edit checking as the data are entered into the statewide system. In addition, the custodial agency and the TRCC frequently work together to establish and review the sufficiency of the quality control program and to review the results of the quality control measurements. The crash data managers should receive periodic data quality reports. There should be procedures for sharing the information with data collectors through individual and agency-level feedback, as well as training and changes to the crash report instruction manual, edit checks, and data dictionary. Example measurements are presented in Table 4

Table 2: Examples of Quality Control Measurements for Crash Data

Timeliness	- *# days from crash event to receipt for data entry on statewide database* - *# days for manual data entry* - *# days for upload of electronic data* - *Average # of days to enter crashes into the system* - *Average # of days of backlogged crash reports to be entered*
Accuracy	- *% of crashes "locatable" using roadway location coding method* - *% VINs that are valid (e.g., match to vehicle records that are validated with VIN checking software)* - *% of interstate motor carriers "matched" in MCMIS* - *% crash reports with uncorrected errors* - *% crash reports returned to local agency for correction*
Completeness	- *% LEAs with an unexplained drop in reporting one year to the next* - *% LEAs with expected number of crashes each month* - *% FARS/MCMIS match* - *% FARS/State Crash fatality match*
Consistency	- *% time that an unknown code is used in fields with that possible value* - *% logical error checks that fail* - *% compliance with MMUCC guidelines*

The measures in Table 4 are examples of high-level management indicators of quality. The crash file managers should have access to a greater number of measures and be prepared to present a standard set of summary measures to the TRCC on a periodic schedule, such as monthly or quarterly.

2-A: Crash Data Component Status

Description and Contents

Crash data are collected by law enforcement officers using a paper or electronic version of the official crash report form – the UD-10, last revised in 2004. The form is used to document the time, location, environment, and characteristics of individual crashes. It is designed to capture data describing the roadways, vehicles, and people involved in crashes. State law (MCL Section 657.622) defines the requirements for law enforcement to report crashes to the Michigan State Police (MSP). In 2008, 316,057 crashes were reported, while over the past decade, the average number of crashes reported has been above 350,000.

The crash data component managed by the MSP supports the analysis of crash experience in general, and the analysis of crashes in specific categories defined by:

- Person characteristics
- Location characteristics
- Vehicle characteristics
- The interaction of various factors

The crash data component is designed to include data on every traffic-related crash involving a fatality, injury, or property damage in excess of $1,000. The form is also used to collect data on traffic and non-traffic related accidents involving off-road vehicles, with a reporting threshold of $100 damage or any injury/fatality.

Applicable Guidelines

Responsibility for the design and content of the UD-10 resides with the MSP. The current version of the form was implemented in 2004. It is a mark-sense (bubble) form with a mix of free-text and coded fields. The form was designed with reference to the Model Minimum Uniform Crash Criteria (MMUCC) guideline and the ANSI D-16.1 standard. The current form was reported to be approximately 75 percent MMUCC compliant as determined by a NHTSA-contractor review. The data available on the Traffic Records Improvement Program Reporting System (TRIPRS) website shows that the form's data fields are 92 percent compliant, but that the values within the data fields are less-so – depending on the measure used, the compliance may be below 30 percent or above 60 percent.

The Crash Data Users Group (CDUG) – a subcommittee of the Traffic Records Coordinating Committee (TRCC) - recently completed review of the crash report form. The CDUG examined over 1,000 differences between the current form and the MMUCC guideline with a stated goal of accepting as many of the MMUCC data elements and individual field values as reasonable. The resulting recommendations are being submitted to the TRCC and will ultimately be open for comment by data collectors and managers. There is some concern that adoption of the new contents would result in an increase in the length of the paper form from the current two-pages –

a step that is likely to meet with resistance from the law enforcement community, despite the general agreement of the law enforcement members serving on the CDUG.

Data Dictionary
The Michigan Department of Information Technology (MDIT) maintains a data dictionary for the crash records system. This document is available to users of the full crash database. A redacted version of the data dictionary is provided to users of the public-use version of the crash data – an extract of the file with personal identifiers removed. Additionally, a UD-10 manual provides a field-by-field description of the UD-10 form for use as a reference for data collectors in law enforcement. This manual may also serve as a valuable resource for data users interested in the data collection guidelines for specific fields on the form.

Process Flow
The crash data component is comprised of police-reported crashes entered into the Traffic Crash Reporting System (TCRS) at the MSP Criminal Justice Information Center (CJIC) through a mix of manual and automated processes. The processing of crash data has improved dramatically since the 2004 Traffic Records Assessment. In that time, the entire crash system has been updated through a project called Crash Process Redesign (CPR). System changes have included but are not limited to: ability to accept crash reports electronically, development of a web-based crash reporting tool, improved processing efficiencies at CJIC, and improvements in crash locating.

The processes differ somewhat depending on whether the crash report was submitted to MSP on the paper form or electronically (approximately 17 percent of crash report submissions). The two processes are described as follows:

Paper report handling process:

1. Receive mailed-in reports
2. Review codes in upper-right corner of forms to separate for special handling those marked as fatal crashes, corrections/replacements/deletions of prior reports, and non-traffic or off-road-vehicle reports
3. Separate the multi-page reports from the standard two page (one sheet) reports
4. Separate reports from prior years
5. Verify that number of units is completed and sort by number of units in the crash
6. Check for truck/bus bubble and pull out for separate handling
7. Check 2nd page of forms to verify number of units
8. Separate the non-traffic and private property reports

9. Bundle into batches of 50 reports

10. Ensure multi-page reports (two or more sheets) are coded as continuation forms

11. Run bundles through the scanner

12. Correct scan error "kick-outs" until the batch scans successfully

13. Release the scanned batch for processing into the database

From this point forward, processing is identical for electronic and paper-based reports. Data are processed overnight through a series of 400 edit checks and the report data and images are "committed" to the database and added to a queue for post-processing as follows:

All reports:

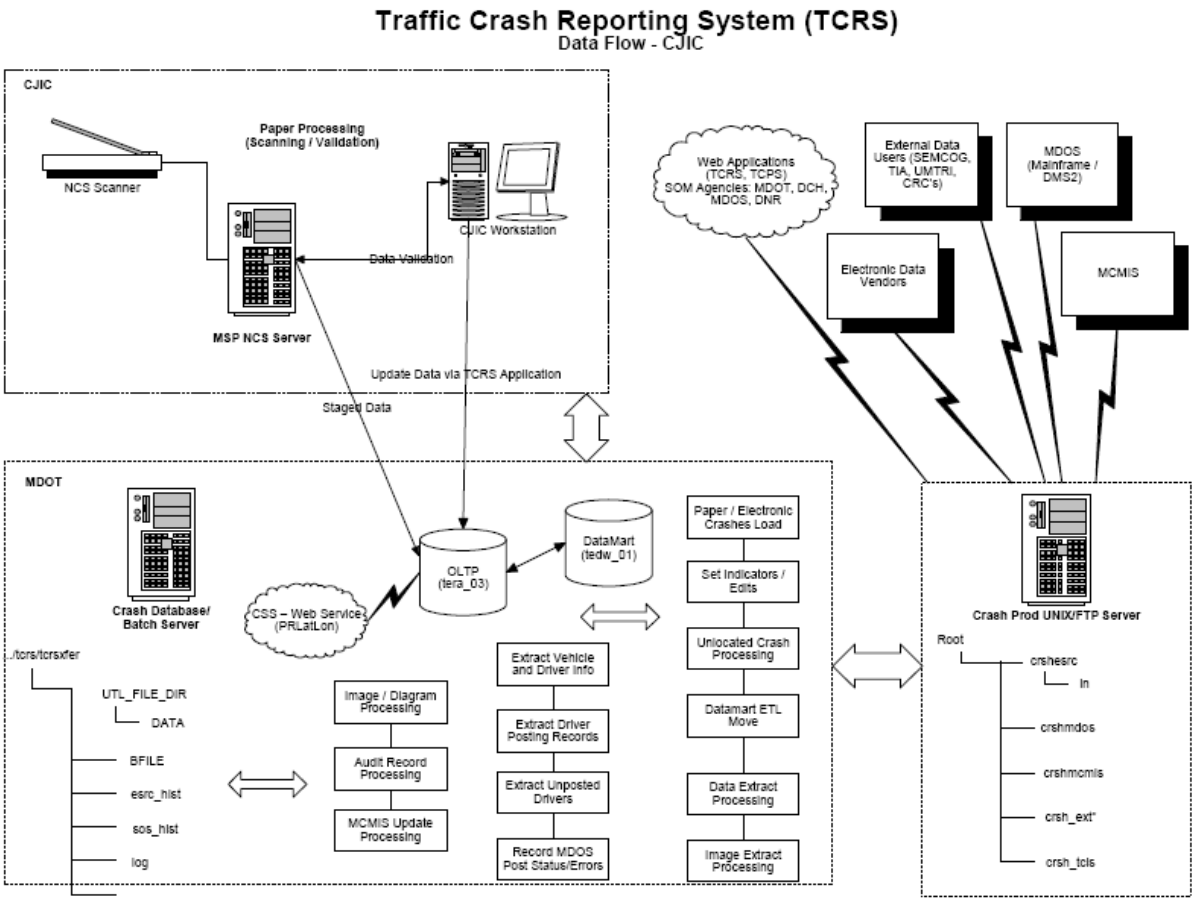
14. A handwriting/recognition tool (Intelligent Character Recognition – ICR) interprets free-form fields and flags those that do not meet the accuracy criteria or cannot be ICR interpreted.

15. Personal Identifiers are validated against the Michigan Department of State Driver License and Vehicle Registration databases

16. Commit to the database once for the bubbles and serial number, then once for each page image

Once the data are committed to the database, staff in CJIC and Michigan Department of Transportation (MDOT) work to validate and verify the data and add location codes. These steps are accomplished using side-by-side displays of the scanned images and the data recorded in the database. The system has mandatory verification steps for selected fields and, for each crash report, adds a verification for any field flagged during the ICR or error checking processes. Reports with serious errors are placed in a separate queue for special handling by senior staff.

The diagram below shows the data flows for the TCRS.



At individual law enforcement agencies the process flows also differ depending on whether or not the agency has implemented electronic field data collection for crashes. Most agencies enter at least a portion of the data from each crash report into their own records management system (RMS). The agencies using the paper form typically enter only enough information to support their needs to perform basic analyses and to index reports for easy retrieval from the hard-copy files. Those agencies using field data collection software may enter the entire crash report into their RMS through an automated process, however, it was reported that some agencies are not taking advantage of this capability. In some cases the electronic reports are being manually processed into the agency RMS by central records staff. In at least two agencies, error checking of crash reports is only being done by the central records staff as part of the process of entering data into the agency RMS. The edits available during field data collection have been turned off. All agencies are encouraged to ensure a supervisory review occurs before data are forwarded to MSP for entry into the TCRS.

Interface with Other Components

The data in TCRS are linked with the following components of the traffic records system:

- Driver License: This link is used in field data collection software and during the overnight batch processing of crash records to ensure that valid information is entered for drivers licensed in Michigan.

- Vehicle Registration: This link is used in field data collection software and during the overnight batch processing of crash records to ensure that valid information is entered for vehicle owners, plates and VINs.

- Location Codes: This link is created during the crash data post-processing at MSP and MDOT to ensure that crashes may be assigned to specific locations defined in the MDOT roadway inventory. This link also ensures that the crash data may be accurately placed on maps based on the Michigan Geographic Framework – the GIS. In theory placement of crashes in the GIS results in a wide array of linkage possibilities to any other dataset that can be represented as a layer in the GIS.

Recently, an EMS run report database was created in hopes of supporting linkage of crash and pre-hospital data. Some attempts have been made to link crash and citation data (as recorded in the Judicial Data Warehouse), but this required a large manual effort.

Another aspect of crash data integration is at the individual law enforcement agencies. Those agencies that have implemented an RMS have at least the possibility of jointly analyzing crashes and other enforcement activities (notably traffic citation issuance). We saw some small evidence of this capability being used. In part this may be because law enforcement automation is not widespread in Michigan. The State began a project to "Encourage and Assist Other Records Management System (RMS) Vendors to Develop an Electronic Crash Reporting Mechanism that will Interface with the State System." The first Electronic Crash Collection and Submission Initiative (ECCS 1) brought on the 43 agencies that were regularly submitting crashes and had met the certification requirements. ECCS 2 followed in late 2008 with five local agencies and five county consortiums. ECCS 2 anticipates an additional 124 agencies will be submitting electronic crash data by late 2009. As of the end of 2008, 12 percent of agencies (87 of 724) were using electronic field data collection systems for crashes. These agencies' crash reports represent only about six percent of all crashes received by MSP (19,155 out of 301,282). As of this report, 196 law enforcement agencies are sending crash reports electronically, comprising about 17 percent of all crash reports. By the end of 2009, the State expects that percentage to reach 25 percent and 50 percent by the end of 2010.

Not all of the agencies that have electronic crash reporting systems are using a full field data collection suite of software. In some cases, the crash reporting software is a stand-alone implementation with no other automation in the vehicle. While many agencies are using Computer Aided Dispatch (CAD) systems, most of their field automation systems for crash and citation reporting do not appear to link with their CAD systems to share data.

Most notably, the level of field automation in the MSP is inadequate and behind the times. The only field automation in the MSP is supplied by grants from other partners – local law enforcement agencies including MSP in their own automation efforts, or some use of federal money such as for motor carrier enforcement. The result is a patchwork of software that cannot

be easily integrated into the existing mainframe RMS maintained by the MSP. In addition, the MSP's communications system may not handle the data transfers required in order to reap the full benefits of field data collection software. The MSP does not have funding or plan for equipping its officers with even the most basic of automated tools common to a growing majority of law enforcement agencies in the US. These deficiencies are in part due to poor economic conditions, but their effects on the traffic records system must be recognized and given appropriate priority and attention. The needs include:

- Laptop computers in all MSP units with a traffic enforcement role.
- Software licenses for electronic crash and citation, if not a complete suite of field reporting software.
- A replacement of the legacy RMS.
- Replacement or upgrade of the communication system.

As reported in the interviews, one-time grants from the Departments of Justice or Homeland Security are being pursued by the MSP. Other options may also need to be explored, including additional funds from USDOT, investment by stakeholders agencies and perhaps even use of equipment put into surplus by other State agencies. In discussions with members of the Governor's Traffic Safety Advisory Commission it was clear that the needs in MSP and local law enforcement agencies for resources to implement electronic field data collection were well understood, but budget constraints make it unlikely that State funds will be found to meet these needs.

Quality Control Program

Michigan has a complete, formal quality control program for crash report data. Features of this program include:

- A strong organizational culture that stresses commitment to high quality data. This includes repurposing of expert-level staff formerly devoted to data entry into full-time data validation and quality improvement roles.
- Robust edit/error checking for crash reports as part of the process of entry into the centralized crash database (TCRS).
- Thorough certification of electronic crash reporting systems ensuring that vendor and law enforcement agency processes meet the quality standards set by MSP.
- A two-tier error correction process defining serious (fatal) errors and warnings, with the possibility of follow-up with originating officers to resolve fatal errors.
- Manual review/correction by expert staff of key fields on all reports, including electronic crash reports.

- Post-processing and data cleansing as part of the creation of an annual "close-out" file for use in safety analyses.

- Collateral efforts by major users to review data during the closeout. These efforts include analyses by the University of Michigan Transportation Research Institute (UMTRI) and the Southeast Michigan Council of Governments (SEMCOG).

- Frequent (more than a dozen per year) form-level audits of crash reports ensuring internal consistency of information from the coded portions of the forms (the bubbles) and the information contained in the narrative and diagram. These audits are not only performed by CJIC staff but also by various major data users.

- A complete set of data quality performance measures (see representative table below) incorporating the following features:

-
    - Operational relevance: Continuous measurement and reporting for use in day-to-day management of the crash data entry and storage processes.

    - Continuity: Roll-up (weekly and monthly averages) of the same quality indicators for presentation in oversight by the TRCC and other key users such that these advisors see the same set of measures used by the system managers in their day-to-day operations.

    - Detailed: Specific indicators of quality that are designed to help managers detect when known quality problems occur. This includes the ability to create additional quality measurements whenever a new problem is noticed or suspected by managers.

    - Feedback to Collectors: Ability to calculate measures for each law enforcement agency and to use the data quality measures to generate content for training programs designed specifically for law enforcement.

The table below presents the data quality metrics supplied in answer to the pre-assessment questionnaire. There were dozens of other crash data quality measurements presented during the interview process. Because of the ability and willingness to create ad hoc quality metrics to examine the prevalence of any potential problem with the data, it is fair to say that it would be impossible to accurately count the number and extent of the data quality measurements available in Michigan. The number reported here could be an undercounting by the close of the next business day.

Quality Control Measurements for Crash Data

Timeliness	# days from crash event to posting for analysis on statewide database	21.6 days
	# days for manual data entry	19.94 to receipt + 4.02 for processing = 23.96 total
	# days for upload of electronic data	7.49
	% reports entered into the system within 30 days of the crash	79%
	% reports aged more than 60 days	3%
Accuracy	% of crashes "locatable" using roadway location coding method	99.8% (2008)
	% VINs that are valid (i.e., match to vehicle record and decode)	92% (Michigan vehicles decoded through VINDICATOR)
	% of interstate motor carriers "matched" in MCMIS	99%
	% crash reports with 1 or more uncorrected "fatal" errors	.01% (23) *(TCRS Severe Errors (23) were compared to total number of crashes on 08/28/09)*
	% crash reports with 2 or more uncorrected "serious, non-fatal" errors	*23%* *(TCRS Informational Errors were compared to total number of crashes on 08/28/09)*
	% crash reports with 5 or more uncorrected "minor" errors	6% (TCRS Informational Errors were compared to total number of crashes on 08/28/09)
Completeness	% LEAs with > 10% unexplained drop in reporting one year to the next	8% (2009 expected reporting level compared to 2008 reporting level)
	% LEAs within 5% of "expected" number of crashes each month	65%
	% FARS/MCMIS match	103% (per current MCMIS report–medicals need to be considered)
Consistency	% of time "unknown" code is used in fields with that possible value	IN PROCESS
	% logical error checks that fail	20% (current errors/crash) – logical errors = errors that have a logical dependency
	% compliance with MMUCC guidelines	85%

As a result of the Quality Control program, the managers and stakeholders in the crash data are able to accomplish the following management and oversight tasks:

- Early detection (often immediate, but certainly overnight) of system performance degradation by those charged with day-to-day management.

- Specific detection of reporting problems with individual law enforcement agencies – including sudden drops in the number of crash report submissions.

- Meaningful oversight by the TRCC and other key users so that unsatisfactory performance (from a user perspective) can be communicated in terms that data managers and collectors recognize as relevant and true indicators of performance.

- Precision in estimating the effects of data quality improvement programs and in the effects of new implementations of electronic crash reporting.

- Detailed analyses of the bottlenecks in processing, including measured durations for each step in the central processing of crash reports.

To our knowledge, Michigan is the only State in the US with a complete, formal Quality Control process for crashes.

It should be noted that there is a valid recognition that the data are not "perfect." Regular users of the data still report common errors in completion, coding, and in some of the automated processes. For example, the crash type code showing direction of travel for two crash-involved vehicles is reported incorrectly and "distance from intersection" is often found to be inaccurate when compared against the location of a known roadway feature depicted in the officer's diagram. Some concern was expressed over the accuracy of automated location coding, however, this has evidently been addressed in recent years. One recent sample-based study showed that crashes were located correctly over 95 percent of the time for data from Washtenaw County. There may remain some major quality and completeness differences between reports from different parts of the State and different police departments. For example, one county reported having complete narratives and diagrams in over ¾ of all crash reports, whereas another county reported that as many as half of all reports lack *both* the narrative and diagram. It was suggested that the lack of a diagram or narrative may be the result of current partial implementations of field data collection systems or that the diagrams might be stored in a separate file at the law enforcement agency, especially in the case of serious crashes which may have been investigated by a crash reconstructionist. These additional files are not supplied to MSP as part of the crash report submission and are not currently being added to the image archive maintained in TCRS. TCRS does not incorporate images from photos or additional officers notes/diagrams. Only the information recorded on the UD-10 is brought into TCRS.

Recommendations

- ❑ Develop a formal plan for the spread of electronic crash data reporting implementations throughout the local law enforcement agencies.

- ❑ Develop a comprehensive formal plan for implementing a field data collection capability for crashes, citations and other reports in the Michigan State Police addressing the following needs:

    - Laptop computers in all MSP units with a traffic enforcement role.

    - Software licenses for electronic crash and citation, if not a complete suite of field reporting software.

    - A replacement of the legacy RMS.

    - Replacement or upgrade of the communication system.

- ❑ Add a first-pass check at MSP CJIC to ensure that all crash reports include a narrative and diagram. Continue to stress the need for the narrative and diagram in all crash reporting training provided to law enforcement.

- ❑ Add the capability to access relevant additional files – such as an image of the crash, crash scene photos, additional narratives, etc. – into a future release of TCRS.

2-B: Roadway Data Component

Advisory Excerpt:

- ❑ *Description and Contents.*
  Roadway information includes roadway location, identification, and classification, as well as a description of a road's total physical characteristics and usage. These attributes should be tied to a location reference system. Linked safety and roadway information are valuable components that support a State's construction and maintenance program development. This roadway information should be available for all public roadways, including local roads.

  The State Department of Transportation (DOT) typically has custodial responsibility for the Roadway Data Component. This component should include various enterprise-related files such as:

  - *Roadway Inventories*
    - *Pavement*
    - *Bridges*
    - *Intersections*
  - *Roadside Appurtenances*
    - *Traffic Control Devices (TCD)*
    - *Guard Rails*
    - *Barriers*
  - *Traffic*
    - *Vehicle Miles Traveled (VMT)*
    - *Travel by Vehicle Type*
  - *Other*
    - *Geographic Information Systems (GIS)*
    - *Location Reference System (LRS)*
    - *Project Inventories*

- ❑ *Applicable Guidelines*
  The major guideline that pertains to the Roadway Data Component is the HPMS. This provides guidance to the States on standards for sample data collection and reporting for traffic volume counts, inventory, capacity, delay, and pavement management data elements. Guidelines and tools that address roadway data, as well as identifying which of these are expected to have the greatest correlation with crash incidences, should be considered part of this advisory. Examples of these resources are the Highway Safety Manual, Safety Analyst, and the Interactive Highway Safety Design Model. In addition, the American Association of State Highway and Transportation Officials (AASHTO) is developing a series of guides for its Strategic Highway Safety Plan. This multi-year cooperative effort includes guidelines relevant to several TRS components.

- ❑ *Data Dictionary*
  Roadway information should be available for all public roads in the State whether under State or local jurisdiction. The contents of the Roadway Data Component should be well documented, including data definitions for each field, edit checks, and data collection guidelines that match the data definitions. Procedures for collection of traffic data and calculation of vehicle miles traveled (VMT) should be documented as well.

- ❑ *Process Flow*
  The steps from initial event to final entry onto the statewide roadway data system should be documented in process flow diagrams for each file that are part of the Roadway Data Component. The diagrams should be annotated to show the time required to complete each step and to show alternate flows and timelines depending on whether data are submitted in hardcopy or electronically to the statewide system. The process flow diagram should include processes for error correction and error handling (i.e., returning reports to the original source for correction, resubmission, etc.). Process flow diagrams should show all major steps whether accomplished by staff or with automated systems and clearly distinguish between the two.

- *Interface with Other Traffic Records System Components*
  A location reference system should be used to link the various components of roadway information as well as other TRS information sources, especially crash information, for analytical purposes. Compatible location coding methodologies should apply to all roadways, whether State or locally maintained. When using a GIS, translations should be automatic between legacy location codes and geographic coordinates. This process should be well established and documented. Compatible levels of resolution for location coding for crashes and various roadway characteristics should support meaningful analysis of these data.

- *Quality Control Program*
  The roadway data should be timely, accurate, complete, and consistent and these attributes should be tracked based on a set of established quality control metrics. The overall quality of the roadway data should be assured based on a formal program of error and edit checking as the data are entered into the statewide system and procedures should be in place for addressing the detected errors. In addition, the custodial agency and the TRCC should frequently work together to establish and review the sufficiency of the quality control program and to review the results of the quality control measurements. The roadway data managers should receive periodic data quality reports. There should be procedures in place for sharing the information with data collectors through individual and agency-level feedback, as well as training and changes to the applicable instruction manuals, edit checks, and roadway data dictionary. Audits and validation checks should be conducted as part of the quality control program to assure the accuracy of specific critical data elements. Example measurements are shown in Table 5.

Table 3: Examples of Quality Control Measurements for Roadway Data

Timeliness	- *% of traffic counts conducted each year* - *# days from crash event to location coding of crashes* - *# days from construction completion to roadway file update*
Accuracy	- *% of crashes locatable using roadway location coding method* - *% errors found during data audits of critical data elements*
Completeness	- *% traffic data based on actual counts no more than 3 years old* - *% public roadways listed in the inventory*

The measures in Table 5 are examples of high-level management indicators of quality. The managers of individual roadway files should have access to a greater number of measures. The custodial agency should be prepared to present a standard set of summary measures to the TRCC monthly or quarterly.

2-B: Roadway Data Component Status

Description and Contents

The Transportation Management System (TMS) is the legacy roadway information database maintained by the Michigan Department of Transportation (MDOT) on an Oracle-based platform. In addition the MDOT uses a statewide geographic information system (GIS), the Michigan Geographic Framework (MGF), which contains information on all public roads. This file is continually updated with an annual version snap-shot release. These systems are used as an aid in the management of the State's roadway assets. The MDOT is responsible for approximately 9,700 miles of the major roads in the State which comprise the Interstate, and U.S. and Michigan number routes. All public roads use the same linear referencing system called the physical road (PR) milepoint system.

The TMS conforms with and provides data to the Highway Performance Monitoring System (HPMS) maintained by the Federal Highway Administration. Traffic counts and classifications counts are stored for locations both on and off the State-maintained road system. Manual classifications counts are also conducted. These counts and classifications can be in hourly or 15 minute increments. Turning movements reports (PDF) and excel table results are also archived in the TMS.

MDOT is able to merge data from the TMS with crash data to provide the safety analysis necessary for their major safety programs especially those identified in the Strategic Highway Safety Plan. The foundation of safety analysis at MDOT is the Safety Management System (SMS). The SMS tools are used to conduct the detailed analysis of locations identified as part of the high crash location process. SMS tools allow for the sorting, summary, and reporting of crash data in many formats. The crash report image, including the narrative and sketch, can be accessed directly by the analyst.

The TMS has a major shortcoming in how the road features are stored in the Sufficiency file. The shortcoming was described in the 2004 Traffic Records Assessment as follows:

> A notable weakness in the area of roadway information is the lack of updating selected road feature data. In addition the way road features are maintained in the Sufficiency file is questionable. The Sufficiency file prorates changes in features along a segment rather than creating a new segment when a major change occurs. For example a segment of road that is 10 miles in length may be 2 lanes for 8 of those miles and 4-lane divided for the remaining 2. This segment would display a prorated percent of the different features for the complete 10 mile segment. This would be problematic if crashes occurring on the four-lane portion are dramatically disproportionate to the crash experience on the two-lane portion.

The shortcoming may be difficult to resolve in the current resource limitation environment; however, the problem severely limits the identification of suspect problem crash locations. Partnering with local transportation officials to resolve this problem may have potential and is discussed below.

The current State trunk-line roadway features data are incomplete and out-of-date. The primary features that are currently being used for engineering safety analyses need to be updated and a program needs to be developed to ensure future periodic updates are completed in a timely manner. No statewide roadway features inventory exists on the local roadway system.

The 83 County Road Commissions use a common software called RoadSoft, an asset management tool, to help manage the 89,000-mile county road system. RoadSoft is provided by the Local Technical Assistance Program (LTAP) and is based upon the MGF and the PR location referencing method. RoadSoft is a graphically designed, integrated roadway management system developed for Michigan's local agency engineers and managers to use in the analysis and reporting of roadway inventory, safety, and conditions data. The RoadSoft software uses the State PR location reference system that could allow sharing of road data between the counties and the State. All inventory files that use the PR/mile point referencing system can be linked to the MGF and can be translated into GPS coordinates. Several of the 533 cities also use RoadSoft to collect and store discrete roadway features for the roads under their jurisdiction. At this time this information is not shared with the State or the other local jurisdictions.

Michigan's Transportation Asset Management Council was established to monitor the State's transportation system through, ".an ongoing process of monitoring, upgrading and operating physical assets cost-effectively, based on a continuous physical inventory and condition assessment." The Council's vision is to expand the practice of asset management statewide to enhance the productivity of investing in Michigan's roads and bridges through coordination and collaboration among State and local transportation agencies by surveying and reporting the condition of roads and bridges by functional classification categories for the State and Regional Planning areas. RoadSoft will aid in collecting the roadway inventory to meet this objective.

RoadSoft has the potential to collect data for all public roads. With MDOT's concurrence county road employees can collect road features on the State system roads in their counties. This will remove the burden from MDOT to update road features data in the Sufficiency file. These data can be housed in the MGF for use by all safety stakeholders.

Applicable Guidelines

A major guideline for roadway data is the Highway Performance Monitoring System (HPMS). The HPMS data are used extensively in the analysis of highway system condition, performance, and investment needs that make up the biennial Condition and Performance Reports to Congress. For the most part, MDOT conforms to the provisions of this guideline. Another is the Model Inventory of Roadway Elements (MIRE). The goal of MIRE is to define *critical safety data inventory elements*—those elements needed by State and local agencies to conduct their internal analyses, and those elements required by existing safety analysis tools and resources. MDOT staff has attended MIRE learning sessions and intends to implement changes when possible.

MIRE complements the Model Minimum Uniform Crash Criteria (MMUCC) which is the major guideline for crash data elements. MMUCC provides a dataset for describing crashes of motor vehicles in transport that will generate the information necessary to improve highway safety within each State and nationally. A subset of roadway data elements is part of MMUCC.

An audit of the crash reporting process is currently under review and the MMUCC and MIRE elements could be incorporated into the MDOT road inventory system depending on the findings.

Data Dictionary
The Sufficiency file in the TMS has an extensive data dictionary of road elements. The governing criterion for the Sufficiency file was the HPMS.

Process Flow
The TMS database has process flow diagrams for some of its files; others are in the process of being developed.

Interface with Other Traffic Records System Components
The MDOT currently has the capability to link road and crash data. The ability to link roadway and crash files is available with RoadSoft and the PR/milepoint system for the jurisdictions using this tool. Local data are not shared with the State.

Quality Control Program
Some quality control procedures are performed on roadway inventories, but they are not consistent. Edit check processes for the PR/mile point referencing system, AADT, Axle Weight and Traffic Monitoring Guidelines utilize database programs to check for accuracy. Files are updated using as-built plans, windshield surveys, GPS and video log but are not performed on a consistent, periodic basis.

Recommendations

- ❑ Design and commit to a consistent and complete data collection procedure for road features on the State system, including more discrete roadway data segmentation.

- ❑ Establish partnerships through the Asset Management Council with county and city transportation officials to:

    1. Pursue the use of the RoadSoft software to link local and State roadway inventories.

    2. Pursue using the RoadSoft software to upload road features from State and local roads to a statewide roadway features file.

- ❑ Develop a formal quality control program for roadway data.

2-C: Driver Data Component

Advisory Excerpt:

- *Description and Contents*
  Driver information should include data about the State's population of licensed drivers, as well as data about convicted traffic violators who are not licensed in that State. Information about persons licensed by the State should include: personal identification, driver license number, type of license, license status, driver restrictions, convictions for traffic violations in this State and the history of convictions for critical violations in prior States, crash history whether or not cited for a violation, driver improvement or control actions, and driver education data.

  Custodial responsibility for the Driver Data Component usually resides in a State Department or Division of Motor Vehicles. Some commercial vehicle operator-related functions may be handled separately from the primary custodial responsibility for driver data. The structure of driver databases should be typically oriented to individual customers.

- *Applicable Guidelines*
  The ANSI D-20 standard should be used to develop data definitions for traffic records-related information in the driver and vehicle files. Driver information should be maintained to accommodate information obtained through interaction with the NDR via the PDPS and the CDLIS. This enables the State to maintain complete driving histories and prevent drivers from circumventing driver control actions and obtaining multiple licenses. Data exchange for PDPS and CDLIS should be accomplished using the American Association of Motor Vehicle Administrators (AAMVA) Code Dictionary. Security and personal information verification should be in accordance with the provisions of the Real ID act.

- *Data Dictionary*
  At a minimum, driver information should be available for all licensed drivers in the State and for all drivers convicted of a serious traffic violation (regardless of where or whether the person is licensed). The contents of the driver data files should be well documented with data definitions for each field, and where applicable, edit checks and data collection guidelines that match the data definitions. Procedures for collecting, reporting and posting of license, conviction, and license sanction information should be documented.

- *Process Flow*
  The steps, from initial event (licensure, traffic violation, etc.) to final entry onto the statewide driver and vehicle data files, should be documented in process flow diagrams for each file that is part of the Driver Data Component. The diagram should be annotated to show the time required to complete each step and to show alternate flows and timelines depending on whether the data are submitted in hardcopy or electronically to the statewide system. The process flow diagram should include processes for error correction and error handling (i.e., returning reports to the original source for correction, resubmission, etc.). The process flow should also document the timing, conditions, and procedures for purging records from the driver files. Process flow diagrams should show all major steps whether accomplished by staff or automated systems and clearly distinguish between the two. The steps also should be documented in those States that have administrative authority to suspend licenses based on a DUI arrest independent of the judicial processing of those cases.

- *Interface with Other Traffic Records System Components*
  The Driver Data Component should have interfaces (using common linking variables shown in Table 6) to other TRS components such that the following functions can be supported:

  - *Driver component data should be used to verify/validate the person information during data entry in the crash data system and to flag records for possible updating in the driver or vehicle files when a discrepancy is identified. Key variables such as driver license number, name, address, and date of birth should be available to support matching of records among the files. Social Security Numbers should be validated for interstate records exchange.*

  - *Driver and vehicle owner addresses are useful for geographic analyses in conjunction with crash and roadway data components. Linkage in these cases should be based on conversions of addresses to location codes and/or geographic coordinates in order to match the location coding method used in the roadway data component and in the GIS.*

  - *Links between driver convictions and citation/adjudication histories are useful in citation tracking, as well as in systems for tracking specific types of violators (DUI [Driving Under the Influence] tracking systems, for example). Even if a citation tracking system is lacking, there is value in being able to link to data from enforcement or court*

records on the initial charges in traffic cases. These linkages should be based usually on driver name and driver license number but other identifiers may be used as well. The National Center for State Courts (NCSC) is looking for these identifiers in addition to methods to improve data sharing. "NCSC offers solutions that enhance court operations with the latest technology; collects and interprets the latest data on court operations nationwide; and provides information on proven best practices for improving court operations." (http://www.ncsconline.org/)

- *Linkage to injury surveillance data should be possible either directly or through probabilistic linkage in order to support analysis of crash outcomes and crash risk associated with specific driver characteristics (e.g., the driver's history of violations or crash involvement). Key variables should include names, date of birth, dates, times, and locations of crashes and citations.*

Table 6: Common Linking Variables between Driver And Other Data Components of a Traffic Records System

Driver Linkages to Other Law Enforcement & Court Files	- *Citation Number & Case Number* - *Location (street address, description, coordinates, etc.)* - *Personal ID (name, address, DL number, date of birth, etc.)*
Driver Linkages to Roadway Information	- *Driver Addresses (location code, coordinates)*
Driver Linkages to Crash Information	- *Driver License Number* - *Personal Identifiers (name, address, date of birth, etc.)*
Driver Linkages to Statewide Injury Surveillance System Information	- *Personal Identifiers (where allowed by law)* - *Crash Date, Time, Location*

- ❑ *Quality Control Program*

The driver data should be timely, accurate, complete, and consistent and these attributes should be tracked based on a set of established quality control metrics. The overall quality of the information in the Driver Data Component should be assured based on a formal program of error/edit checking as data are entered into the statewide system and procedures should be in place for addressing the detected errors. In addition, the custodial agency (or agencies) and the TRCC should work together frequently to establish and review the sufficiency of the quality control program and to review the results of the quality control measurements. The driver data managers should receive periodic data quality reports. There should be procedures in place for sharing the information with data collectors through individual and agency-level feedback, as well as through training and changes to the applicable instruction manuals, edit checks, and the driver and vehicle data dictionaries. Audits and validation checks to assure the accuracy of specific critical data elements should be conducted as part of the formal quality control program. Example measurements are presented in Table 7.

Table 3: Examples of Quality Control Measurements for Driver Data

Timeliness	- *Average time to post driver licenses* - *Average time to post convictions after receipt at DMV* - *Average time to forward dispositions from court to DMV*
Accuracy	- *% of duplicate records for individuals* - *% "errors" found during data audits of critical data elements*
Completeness	- *% drivers records checked for drivers moving into the State* - *% of driver records transferred from prior State*
Consistency	- *% of SSN verified online* - *% of immigration documents verified online* - *% violations reported from other States added to driver history*

The measures in Table 7 are examples of high-level management indicators of quality. The managers of individual driver files should have access to a greater number of measures. The custodial agency should be prepared to present a standard set of summary measures to the TRCC monthly or quarterly.

2-C: Driver Data Component Status

Description and Contents

The Department of State (DOS) maintains over seven million driver license records of which over three hundred thousand are commercial driver licenses (CDLs). These records are stored on the legacy data system. The CDLs are maintained in the same database. A new platform, Business Application Modernization (BAM), is planned for implementation in June 2010.

Basic Characteristics

DOS offices located throughout the State process driver and vehicle transactions. Some transactions such as renewals may be processed at self-serve stations, by mail, or by Internet. DOS is not using fingerprints, retinal scans, or facial recognition software.

A new customer number will become the driver license or personal identification number and will be an access and linkage key. New license numbers are now being generated using the Soundex coding system; in the future the license number will have a letter prefix and 12 assigned, non-significant numerals. The driver license now has a magnetic stripe, and a bar code will be included on the new license card.

Records on learner and provisional licenses are maintained, and driver education school numbers for minors and skill test numbers are maintained. Michigan has a graduated driver licensing law. The graduated driver license information contains the school identification and certificate number.

DOS has the administrative authority to suspend licenses based on a DUI arrest independent of the judicial processing of those cases.

Convictions from all levels of courts are entered into the driver history, 99 percent of which are now submitted electronically. There are edits that the convictions have to meet. Conviction records that do not meet the edits are returned to the courts. The adjudicated case record includes the original offense for which the citation was issued *for Mandatory Offenses.*

Courts can obtain driver histories electronically that can serve as certified records.

There is no way to verify whether all convictions are sent because the Department has no authority over these adjudicating agencies. Courts have authority to suppress sanctions for a first Minor in Possession offense while the conditions of probation are satisfied. These cases are monitored by the DOS to assure that a repeat offense is not treated as a first offense.

All crash involvements are posted regardless of whether a citation was issued. If a BAC is taken, it is recorded in the driver file but not linked with the crash citation, and citations issued in connection with a crash are not connected. Driver histories from previous states of licensure are included in the driver file.

Applicable Guidelines
The file contains the information necessary to participate in the National Driver Register Problem Driver Pointer System and the Commercial Driver License Information System (CDLIS). Each system is queried as appropriate for the applicant. The driver data meet the recommendations of the Advisory and the functional requirements of the American Association of Motor Vehicle Administrators applications. The AAMVA Code Dictionary (ACD) is used for CDLIS transactions and for manual look-ups. SSOLV and SAVE are checked for all applicants (SAVE as appropriate), including renewals.

Data Dictionary
There is a data dictionary document for the driver file that defines each data field and specifies the values for each field. Edit checks are not documented in the data dictionary. The licensing personnel are employees of the Department and have the Driver License Procedural Manual and Other Work Unit Manuals for training and reference. Department personnel conduct the training, and examiners are trained for fraudulent document recognition.

Process Flow
Process flow diagrams, including error identification and corrections, were reported as follows for the following functions:

a. License application to license issuance. *No.*

b. Receipt of conviction information to posting on the correct record. *No.*

c. License suspension based on a DUI arrest. *Yes.*

d. Request for non-routine statistics from the driver file. *No.*

e. Production of periodic management reports and summaries. *No.*

Interface (Integration) with Other Traffic Records System Components
Vehicle Component**:** The vehicle component cannot now extract data from the driver file electronically but will when the BAM is implemented. The driver file can automatically generate input for the vehicle component for Original Titles and Original Registrations. Information from the driver file is not now available for a query initiated within the vehicle file but will when the BAM is implemented.

Citation and Crash Components**:** The DOS provides the ability for enforcement to retrieve driver descriptive information for crash reports and citations being written and for crash reports being processed for the crash database. Citations are not interactive with the driver database. Crash reports are reported to the DOS electronically.

Adjudication Component**:** Ninety-nine percent of convictions are reported to DOS electronically.

Statewide Injury Surveillance System Information (SWISS)**:** There is no direct interface. The file is not generally used for statistical reports, but monthly and annual reports are produced as management tools for administration of the system. Monthly Reports, Quarterly Audits, and periodic data quality reports are prepared for management. Information is extracted upon request from other State agencies and those requesting data. Some users have the ability to access the driver records directly. The driver file is made available for research. Records are available to other authorized users within the constraints of the Driver Privacy Protection Act.

Quality Control Program

There is a formal program of error/edit checking as data are entered into the driver file. Data quality reports are used for training and for changes to instruction manuals and edit checks but not for the data dictionary.

The following description was provided by the DOS.

Quality Control Measurements for Driver Data

Timeliness	Average time from accepted application to create driver record	*Next Day*
	Average time to mail license to driver from time of application	*10 days to 2 weeks for regular D/Ls and IDs and 2 to 3 weeks for Enhanced D/Ls and Enhanced IDs*
	Average time to post convictions after receipt at DMV	*1 day*
	Average time from court disposition to receipt at the DMV	*5 days*
Accuracy	% of duplicate records for individuals requiring correction	*N/A, upfront edits eliminate duplicates.*
	Frequency of audits to assure data validity	*Upfront edits to prevent bad data.*
	% of errors found during audits of critical data elements	*N/A*
Completeness	% of records checked for drivers moving into the State	*100%*
	% of driver records requested from prior State	*100%*
	% of driver records received from prior State	*N/A*
Consistency	% of SSN verified online	*100%*
	% of immigration documents verified online	*100%*
	% non-CDL violations reported from other states added to driver history	*100%*

Recommendation

- ❑ None

2-D: Vehicle Data Component

Advisory Excerpt:

- *Description and Contents*
  Vehicle information includes information on the identification and ownership of vehicles registered in the State. Data should be available regarding vehicle make, model, year of manufacture, body type, and vehicle history (including odometer readings) in order to produce the information needed to support analysis of vehicle-related factors that may contribute to a State's crash experience. Such analyses would be necessarily restricted to crashes involving in-State registered vehicles only.

  Custodial responsibility for the vehicle data usually resides in a State Department or Division of Motor Vehicles. Some commercial vehicle -related functions may be handled separately from the primary custodial responsibility for all other vehicle data. The structure of vehicle databases is typically oriented to individual "customers."

- *Applicable Guidelines*
  Title and registration information, including stolen and salvage indicators, should be available and shared with other States. The National Motor Vehicle Title Information System (NMVTIS) facilitates such exchanges. In addition, some States empower auto dealers to transact vehicle registrations and title applications following the Business Partner Electronic Vehicle Registration (BPEVR) guidelines from AAMVA. The International Registration Plan (IRP), a reciprocity agreement among U.S States and Canadian provinces, administers the registration processes for interstate commercial vehicles.

- *Data Dictionary*
  Vehicle information should be available for all vehicles registered in the State. The contents of the Vehicle Data Component's files should be well documented, including data definitions for each field, and where applicable, edit checks and data collection guidelines that match the data definitions. Procedures for collection, reporting and posting of registration, title, and title brand information should be documented.

- *Process Flow*
  The steps from initial event (registration, title, etc.) to final entry onto the statewide vehicle data files should be documented in process flow diagrams for each file that is part of this component. The diagram should be annotated to show the time required to complete each step and to show alternate flows and timelines depending on whether the data are submitted in hardcopy or electronically to the statewide system. The process flow diagram should include processes for error correction and error handling (i.e., returning reports to the original source for correction, resubmission, etc.). The process flow should also document the timing, conditions, and procedures for purging records from the vehicle files. Process flow diagrams should show all major steps whether accomplished by staff or automated systems and should clearly distinguish between the two.

- *Interface with Other Traffic Records System Components*
  The Vehicle Data Component has interfaces (using common linking variables shown in Table 8) to other TRS components such that the following functions should be supported:

  - *Vehicle data should be used to verify/validate the vehicle information during data entry in the crash data system, and to flag records for possible updating in the vehicle files when a discrepancy is identified. Key variables such as VIN, license plate number, names, and addresses should be available to support matching of records among the files.*

  - *Vehicle owner addresses are useful in geographic analyses in conjunction with crash and roadway data. Linkage in these cases should be based on conversions of addresses to location codes and/or geographic coordinates in order to match the location coding method used in the Roadway Data Component and in the GIS.*

  - *As with crash data, linkage to injury surveillance data should be possible either directly or through probabilistic linkage in order to support analysis of crash outcomes and crash risk associated with specific driver characteristics (e.g., the driver's history of violations or crash involvement). Key variables should include names and dates, date of birth, times, and locations of crashes.*

Table 8: Common Linking Variables between Vehicle And Other Data Components of a Traffic Records System

Vehicle Linkages to Other Law Enforcement & Court Files	- *Location (street address, description, coordinates, etc.)* - *Personal ID (name, address, DL number, etc.)*
Vehicle Linkages to Roadway Information	- *Owner Addresses (location code, coordinates)*
Vehicle Linkages to Crash Information	- *Vehicle Identification Number* - *Personal Identifiers (name, address, date of birth, etc.)*
Vehicle Linkages to Statewide Injury Surveillance System Information	- *Personal Identifiers (where allowed by law)* - *Crash Date, Time, Location*

- *Quality Control Program*

The vehicle data should be timely, accurate, complete, and consistent and these attributes should be tracked based on a set of established quality control metrics. The overall quality of the vehicle data should be assured based on a formal program of error/edit checking as the data are entered into the statewide system and procedures should be in place for addressing the detected errors. In addition, the custodial agency (or agencies) and the TRCC should work together frequently to establish and review the sufficiency of the quality control program and to review the results of the quality control measurements. The vehicle data managers should receive periodic data quality reports. There should be procedures in place for sharing the information with data collectors through individual and agency-level feedback, as well as training and changes to the applicable instruction manuals, edit checks, and the driver and vehicle data dictionaries. Audits and validation checks should be conducted to assure the accuracy of specific critical data elements as part of the formal Quality Control Program. Example measurements are presented in Table 9.

Table 9: Examples of Quality Control Measurements for Vehicle Data

Timeliness	- *Average time for DMV to post title transactions* - *% title transactions posted within a day of receipt*
Accuracy	- *% of duplicate records for individuals* - *% errors found during data audits of critical data elements* - *% VINs successfully validated with VIN checking software*
Completeness	- *% of records with complete owner name and address*

The measures in Table 9 are examples of high-level management indicators of quality. The managers of individual vehicle files should have access to a greater number of measures. The custodial agency should be prepared to present a standard set of summary measures to the TRCC monthly or quarterly.

2-D: Vehicle Data Component Status

Description and Contents
The Department of State (DOS) maintains records on over eight million vehicle registrations. These records are stored on the legacy data system. The CDLs are maintained in the same database. A new platform, Business Application Modernization (BAM), is planned for implementation in June 2010.

Basic Characteristics
Vehicle characteristics and descriptive data meet the requirements of the Advisory. DOS offices located throughout the State process driver and vehicle transactions. Some transactions such as renewals may be processed at self-serve stations, by mail, or by Internet. Body style is the basis for the vehicle classifications.

The Department's IRP program uses the COVERS application for commercial vehicle registrations. The IRP program sends information to the vehicle database where it is kept.

For new vehicles, Michigan receives electronic Manufacturers' Certificates of Origin from the major U.S. manufacturers as has been done for over 10 years. The data are input by keystroke, but after passing through the POLK VINA program it is cleansed and validated. Registration documents have the Code 39 bar code (encoding upper case letters).

Odometer readings are captured when issuing titles. Presence of vehicle insurance is required at the time of original registration or registration renewal.

Applicable Guidelines
NCIC codes and makes, and Polk VINA terminology are the guidelines used in the classification and description of vehicles. Michigan expects to participate in the online National Motor Vehicle Title Information System (NMVTIS) in June 2010 when the BAM becomes operational.

Data Dictionary
There is a data dictionary document for the vehicle file that defines each data field and specifies values for each field. Edit checks are not documented in the data dictionary but are elsewhere.

Most registration and title personnel are employees of the Department, and the Department trains the personnel. Work procedure manuals are available for the examiners who process registrations and titles.

Process Flow
The process flows for the functions are documented. However, flow charts are not centralized. The file is primarily used for maintaining the information necessary for the vehicle registration and title functions. Calendar year reports are produced including registrations by vehicle type and by plate type, transaction volumes and funds collected for the various vehicle classifications.

A *Vehicle Statistics Report* is produced documenting the makeup of the State's vehicle population. The State can normalize crash experience with respect to type of vehicle. There are

various commercial users of the system who can access the file electronically. File users must comply with the DPPA.

Interface with Other Traffic Records System Components
The vehicle file is not integrated in the existing legacy system but will be with the new system under development (implementation anticipated for June 2010). Currently the vehicle file is linked to the driver file through the driver license number.

Vehicle data can be linked to crash data with the registration number. It is not linked with the other traffic records system components. Since registrations are suspended for repeat offenders, a repeat offender database was developed for direct linkage with the vehicle file.

Notices of stolen vehicles are entered and withdrawn as needed. Stolen and abandoned vehicle information is updated in real time.

Quality Control Program
Currently the file is updated daily, but in the new system it will be updated in real time. Temporary registration information is updated daily. Error reports are produced from the record update process and reviewed daily. DOS provided the following information:

Quality Control Measurements for Vehicle Data

Timeliness	Average time to post registrations	*1 day*
	Average time to process title documents	*1 day*
	Average time to produce completed titles	*5 days*
	% title brands posted with 24 hours of receipt	*100%*
	% registrations and title brands posted within 24 hours	*100%*
Accuracy	% of duplicate records for individuals	*data element not tracked*
	% "errors" found during data audits of critical data elements	*see above*
	% VINs successfully validated with VIN checking software	*see above*
Completeness	% of records with complete owner name and address	*see above*

Recommendation

❑ None

2-E: Citation/Adjudication Data Component

Advisory Excerpt:

- ❑ *Description and Contents*
  Information, which identifies arrest and adjudication activity of the State, should be available, including information that tracks a citation from the time of its distribution to a law enforcement officer, through its issuance to an offender, its disposition, and the posting of conviction in the driver history database. Case management systems, law enforcement records systems, and DMV driver history systems should share information to support:
  - *citation tracking*
  - *case tracking*
  - *disposition reporting*
  - *specialized tracking systems for specific types of violators (e.g., DUI tracking systems)*

  Information should be available to identify the type of violation, location, date and time, the enforcement agency, court of jurisdiction, and final disposition. Similar information for warnings and other motor vehicle incidents that would reflect enforcement activity are also useful for highway safety purposes and should be available at the local level.

  The information should be used in determining the level of enforcement activity in the State, for accounting and controlling of citation forms, and for detailed monitoring of court activity regarding the disposition of traffic cases.

  Custodial responsibility for the multiple systems that make up the Citation/ Adjudication Data Component should be shared among local and State agencies, with law enforcement, courts, and the Department of Motor Vehicles (DMV) sharing responsibility for some files (e.g., portions of the citation tracking system). State-level agencies should have responsibility for managing the law enforcement information network (e.g., a criminal justice information agency), for coordinating and promoting court case management technology (e.g., an administrative arm of the State Supreme Court), and for assuring that convictions are forwarded to the DMV and actually posted to the drivers' histories (e.g., the court records custodian and the DMV).

- ❑ *Applicable Guidelines*
  Data definitions should meet the standards for national law enforcement and court systems. Applicable guidelines are defined for law enforcement data in:
  - *National Crime Information Center (NCIC)*
  - *Uniform Crime Reporting (UCR)*
  - *National Incident-Based Reporting System (NIBRS)*
  - *National Law Enforcement Telecommunication System (NLETS)*
  - *Law Enforcement Information Network (LEIN)*
  - *Traffic Court Case Management Systems Functional Requirement Standards*

  Applicable guidelines should be defined for court records in the National Center for State Courts (NCSC), and jointly for courts and law enforcement in the GJXDM (with specific Traffic Processing Standards created through a national committee). Tracking systems for citations (i.e., a citation tracking system) and for specific classes of violators (e.g., a DUI tracking system) should meet the specifications for such systems published by NHTSA.

- ❑ *Data Dictionary*
  The citation/adjudication data files should be well documented, including data definitions for each field and where applicable, edit checks and data collection guidelines that match the data definitions. Procedures for collection, reporting and posting of license, registration, conviction, and title brand information should be documented.

Law enforcement personnel should receive adequate training at the academy and during periodic refreshers to ensure they know the purpose and uses for the data. Training also should ensure that officers know how to access information on violators and process citations and arrests properly. The training manual should be available to all law enforcement personnel and the instructions should match, as appropriate, the edit checks that are performed on the data prior to its being added to the local records management system and statewide databases. The edit checks should be documented and both common and serious errors in the data should be flagged, including missing or out-of-range values and logical inconsistencies. The data element definitions and system edits should be shared with all collectors, managers, and users in the form of a data dictionary that is consistent with the training manual and the crash report form. Court case management systems and tracking systems (citation tracking and DUI tracking) should be well documented to include definitions of all data elements and corresponding edit checks to ensure accuracy.

- *Process Flow*
  The processing of traffic violations, citations, arrests, and court cases should be documented in a series of flow diagrams showing the typical procedures and their average time to completion for each step. The administrative handling of payment in lieu of court appearance should be shown separately from those violations that are not handled administratively. The processes for detecting drugs or collecting blood alcohol concentration (BAC) values through various methods (breath test, blood or urine tests) should also be documented. The processes for tracking DUI cases in a DUI tracking system should also be included in the set of process flow diagrams. Processes for paper and electronic filing and reporting should be shown separately. Process flow diagrams should show all major steps whether accomplished by staff or automated systems and clearly distinguish between the two.

- *Interface with other traffic records system components*
  NCIC, GJXDM, NIBRS, LEIN, and NLETS guidelines all define methods and data standards for information transfer and sharing at the State and national level. Typically, there are State-level equivalents of the various networks and standards governing the sharing of law enforcement and court-related data. For the purposes of safety analysis at a State and local level, linkage between the Citation/Adjudication Data Component and other components of the TRS is important because it is useful for analyzing the geographic distribution of traffic violations and incidents, as well as monitoring the effectiveness of countermeasures that involve enforcement or court processes. It also enables the creation and updating of adverse driver histories for the purpose of driver control. Key linkages within the TRS for citation/adjudication information are listed in Table 10.

Table 10: Common Linking Variables between Citation/Adjudication and Other Data Components of a Traffic Records System

Citation/Adjudication Linkages to Other Law Enforcement Files and Tracking Systems	- *Computer Aided Dispatch (CAD) Record Number* - *Citation/Arrest/Incident Number, Court Case Number* - *Location (street address, description, coordinates, etc.)* - *Personal ID (name, address, DL number, etc.)*
Citation/Adjudication Linkages to Driver/Vehicle Files	- *Driver and Owner Names, Driver License Number* - *Driver & Owner Addresses (location code, coordinates)* - *Vehicle Plate Number, VIN*
Citation/Adjudication Linkages to Statewide Injury Surveillance System Information	- *Personal Identifiers (where allowed by law)* - *Crash-Related Citation/Arrest Date, Time, Location*

- *Quality Control Program*
  The citation/adjudication data should be timely, accurate, complete, and consistent and these attributes should be tracked based on a set of established quality control metrics. The overall quality of the citation/adjudication data should be assured based on a formal program of error/edit checking as the data are entered into the statewide system, and procedures should be in place for addressing the detected errors. In addition, the custodial agency (agencies) and the TRCC should frequently work together to establish and review the sufficiency of the quality control program and to review the results of the quality control measurements. The data managers receive regular, periodic data quality reports. There should be procedures in place for sharing the information with data collectors through individual and agency-level feedback as well as training and changes to the applicable instruction manuals, edit checks, and the driver and vehicle data dictionaries. Audits and validation checks should be conducted to assure the accuracy of specific critical data elements as part of the formal Quality Control Program. Example measurements are presented in Table 11.

Table 11: Examples of Quality Control Measurements for Citation/Adjudication Data

Timeliness	- *Average time for citations to be sent from LEAs to courts* - *Average time for convictions to be sent to DMV*
Accuracy	- *% errors found during data audits of critical data elements* - *% violations narratives that match the proper State statute*
Completeness	- *% of cases with both original charges and dispositions in citation tracking system*
Consistency	- *% traffic citations statewide written on a single uniform citation*

The measures in Table 11 are examples of high-level management indicators of quality. The managers of individual citation/adjudication files should have access to a greater number of measures. The custodial agency should be prepared to present a standard set of summary measures to the TRCC monthly or quarterly.

2-E: Citation/Adjudication Data Component Status

Description and Contents

Michigan enjoys a unified court system, which provides for consistent handling of cases throughout the State. The courts that generally hear traffic cases are the circuit courts, which handle felony cases, and district courts, which handle traffic, civil and misdemeanor criminal cases. In a few locations, municipalities have chosen to maintain municipal courts rather than create district courts, and they, too, hear traffic cases.

The State Court Administrative Office has made commendable effort and progress toward standardizing Case Management Systems, which were many and diverse at the time of the State's last assessment. By the end of calendar year 2008, 75 percent of courts were using a single case management system, Judicial Information Systems. This effort has allowed for the development of a Judicial Data Warehouse (JDW), which houses information about cases from 81 of 83 counties within the State.

This single source of adjudication data allows judges and prosecutors to query pending cases throughout the State. The warehouse is a person-centric system, which collects and aggregates data on name, date of birth, address and other indicators to assure that the query locates the correct individual. The benefit of this standardization of data is also felt by the Secretary of State's Driver and Vehicle Records Division, in that dispositions of 99 percent of court cases are electronically transmitted to the driver history file, preventing errors resulting from duplicate data-entry at multiple locations. Only 12 courts continue to send paper-based dispositions at this time.

Law enforcement agencies throughout the State use a uniform citation form, which has been modified into several versions, all of which contain the same data. Some agencies have begun using electronic citation systems, which save time for both officers and court personnel. Electronic citations are a natural outgrowth of electronic crash reporting, and use of a single electronic system for both promotes linkages between the crash and citation systems.

A statewide uniform paper citation lends itself to more efficient tracking when such documents are centrally printed, numbered and distributed. Currently, once tickets are distributed to officers, most departments report little further tracking and accountability, with the exception of the responsibility of officers to report voided tickets to supervisors. With centralized inventory control, it is possible to assure that all tickets issued to officers are followed through the court system until disposed and then to the driver history file. Such tracking and auditing help assure that driver records are complete and accurate. Electronic citations will also provide similar tracking capabilities.

The adoption of e-citations has been slowed somewhat by lack of resources to purchase printers for police vehicles. However, most officers enthusiastically embrace the concept of electronic citations and the time savings afforded by the ability to capture driver data from the magnetic stripe on the drivers' licenses. One officer indicated that the savings amounts to several hundred key strokes.

The vehicle registration documents reportedly contain a barcode with vehicle and owner information that would further enhance data integrity and time savings for officers, if that data could be captured on the citation electronically as well. Addition of a barcode to the drivers' licenses at some point will negate the need for separate electronic readers for license and registration documents.

Enforcement data usage overall is hampered by the fact that it remains difficult to aggregate the data in meaningful ways. While the JDW contains valuable information on original charges, statutory citations may not be consistent, due to the fact that either a local ordinance number or a State statute number may be used for substantially similar violations. A law table is not being used to provide a common identifier for such violations. Reportedly, such coding is available and used in the driver history file. Adoption of the same law table with common codes would make it more efficient for data users to analyze enforcement and adjudication records from the JDW.

Michigan laws provide for administrative driver license sanctions, which are administered by the Department of State, Driver and Vehicle Records Division. Immediate and uniform sanctions for unsafe driving provide the State with a means by which to efficiently impact traffic safety concerns. Over 54,000 criminal convictions for alcohol-related violations were processed in 2008 statewide. The ability of the licensing authority to immediately suspend or revoke the involved drivers' licenses results in safer roadways for the State's citizens. Administrative sanctions provide a means by which to assure that alcohol violations immediately reach the driver history records.

In lean economic times, it is imperative to efficiently use scarce law enforcement resources. While the incidence of crashes appears to be dropping somewhat, it is even more important to carefully evaluate the impact of various countermeasures on the remaining crash experience.

In the same light, linkage of citation and crash data would be helpful and possible if the citation number were captured on the crash form. When the crash form is next revised, the citation number should be added as a required element.

At this time, the JDW is the most complete compilation of traffic enforcement data in the State. Combined with ticket inventory control, it could be developed into a comprehensive citation tracking system. Due to the fact that the JDW contains data from the State's Trial Courts, there is opportunity to enhance the citation tracking system into a DUI tracking system as well. The State's recognized successful use of Drug and Alcohol Courts provides an opportunity to evaluate the impacts of this approach on recidivism for such violators.

Applicable Guidelines

Due to the development of the JDW and concurrent development of electronic citation systems, data definitions are available and up-to-date. Applicable standards for law enforcement and court systems are being met at this time. The Traffic Records Coordinating Committee (TRCC) can become the custodian of the various data definitions and standards to ensure that new system development conforms to currently established systems and guidelines, in order to make linkages and integration more seamless and fluid.

Interface with other Components of the Traffic Records System
The development of the JDW has drawn attention to the need for linkage of variables between the Citation/Adjudication System and other applicable traffic records system components. Linkage to the driver, vehicle, injury surveillance and crash systems are needed. Where linkages do not currently exist, TRCC planning should include development of such links when and where possible.

Quality Control Program
The JDW has been developed with built-in edits in order to ensure quality control and accurate matching of individuals' records. Similarly, common coding has been developed by the Secretary of State so that violations of various State and local laws are consistently entered onto driver records.

Most data quality issues in the citation data result from the fact that officers' handwriting can be difficult to decipher and, as a result, is often transcribed incorrectly. Electronic citations will ultimately address that problem, as courts receiving e-citations indicate that typewritten information makes tickets 100 percent readable and drop-down menus for statutory citations improve the matching of the charge description with the statutory citation (violation code). Further, capture of driver data from the magnetic stripe will improve the accuracy of driver information on the citations as well.

Quality is further enhanced by the fact that prosecutors indicated that they regularly report back to individual officers or departments when errors occur. Such reporting facilitates remedial training in the most efficient and expedient manner.

Quality Control Measurements for Citation/Adjudication Data

Timeliness	% citations sent to courts within 10 days	*unknown*
	% cases (excluding failure to appear) scheduled within 90 days of receipt of citation by court	*100%*
	% convictions sent to DMV within 10 days of conviction	*100%*
	# days from citation to case appearance on "pending case" system	*<14 days*
Accuracy	% locations that match statewide location coding	*N/A*
	% "errors" found during data audits of critical data elements	*N/A*
	% violations narratives that match the common code	*N/A*
Completeness	% of cases older than 90 days with a disposition record in the system	*>95%*
	% cases older than 1 year with a disposition record	*>95%*
Consistency	% traffic citations statewide written on a uniform citation	*100% (UD-8)*
	% of cases under State court jurisdiction that have proper State violation codes	*100%*

Recommendations

- ❑ Determine, through the TRCC, how best to develop the information available in the Judicial Data Warehouse into a citation tracking system and a DUI tracking system.
- ❑ Continue to plan for and encourage the use of electronic citation systems throughout the State, for time and resource savings and data accuracy improvements.
- ❑ Promote the use of the abundant citation/adjudication data to analyze the impact of countermeasures on crash experience.
- ❑ Include the citation number on the crash repot form when next revised.

2-F: Statewide Injury Surveillance System (SWISS) Data Component

Advisory Excerpt:

- *Description and Contents*

  With the growing interest in injury control programs within the traffic safety, public health, and enforcement communities, there are a number of local, State, and federal initiatives that drive the development of a SWISS. These systems typically incorporate pre-hospital (EMS), trauma, emergency department (ED), hospital in-patient/discharge, rehabilitation and morbidity databases to track injury causes, magnitude, costs, and outcomes. Often, these systems rely upon other components of the TRS to provide information on injury mechanisms or events (e.g., traffic crash reports). The custodial responsibility for various files within the SWISS typically is distributed among several agencies and/or offices within a State Department of Health.

  This system should allow the documentation of information that tracks magnitude, severity, and types of injuries sustained by persons in motor vehicle related crashes. Although traffic crashes cause only a portion of the injuries within any population, they often represent one of the more significant causes of injuries in terms of frequency and cost to the community. The SWISS should support integration of the injury data with police reported traffic crashes and make this information available for analysis to support research, public policy, and decision making.

  The use of these data should be supported through the provision of technical resources to analyze and interpret these data in terms of both the traditional traffic safety data relationships and the specific data relationships unique to the health care community. In turn, the use of the SWISS should be integrated into the injury control programs within traffic safety, and other safety-related programs at the State and local levels.

- *Applicable Guidelines*

  NHTSA has produced the National Emergency Medical Service Information System (NEMSIS) to serve as a guideline for a uniform pre-hospital dataset. It applies to all EMS runs, not just those related to traffic crashes. The American College of Surgeons (ACS) certifies trauma centers and provides guidelines for trauma registry databases and for a National Trauma Databank. Emergency Department and in-patient data guidelines (UB-92) are available from the US Department of Health and Human Services. The National Center for Health Statistics, within the Centers for Disease Control (CDC), sets ICD-9 codes and E-codes for injury morbidity/mortality. These codes are updated as needed and the ICD-10 codes are expected by the fall of 2007. The CDC also sets standards for reporting to their injury database and for use of the Public Health Information Network for data sharing.

- *Data Dictionary*

  The contents of the SWISS Data Component's files should be well documented to include data definitions for each field, and where applicable, edit checks and data collection guidelines that match the data definitions. Procedures should be documented in instruction manuals for collection, reporting, and posting of EMS run data on a uniform run report, uniform data in various hospital and trauma databases, and for tracking morbidity and mortality for each system.

  Training should include (where applicable) data collection, data entry, use of various injury coding systems (ICD and E-codes) as well as injury and trauma severity scoring systems such as the Injury Severity Score (ISS), Revised Trauma Score (RTS), and Abbreviated Injury Score (AIS) scales.

- *Process Flow*

  The information and processes involved in transport and treatment of victims of crash-related injuries should be documented in a series of flow diagrams showing the typical data collection and management processes and their average time to completion for each step in the data flow process. Processes for paper and electronic filing and reporting should be shown separately. Process flow diagrams should show all major steps whether accomplished by staff or automated systems and clearly distinguish between the two.

- *Interface with other Traffic Records System Components*

  Data transfer and sharing between local systems and the SWISS should be governed by data definitions, quality control requirements, and data transfer protocols defined by the custodial agencies. Transfer and sharing between SWISS files and the relevant national databases are governed by the data definitions, quality control requirements, and data transfer protocols for those systems (e.g., National Trauma Database).

The CODES project is the primary example of data sharing and integration between SWISS and the other components of a TRS. It can take the form of direct linkage using personal identifiers or probabilistic linkage using other data elements such as incident time, date, date of birth, and locations, responding officer/agency, and others. Key linkages within the TRS for SWISS information are listed in Table 12.

Table 12: Common Linking Variables between SWISS And Other Data Components of a Traffic Records System

Linkages Internal to the SWISS data on injury and healthcare treatments/outcomes	- *Patient name* - *Patient ID number* - *EMS run report number* - *Social Security Number*
Linkages between SWISS data and Crash Data	- *Personal Identifiers: Name, address, date of birth (direct linkage)* - *CODES linking variables (probabilistic linkage)* - *EMS run report number* - *Crash Report Number*
Linkages between SWISS data and other (non-Crash) components of the traffic records system	- *Name & SSN linked to driver file (direct linkage)* - *Location/address* - *Event & treatment date and time*

- *Quality Control Program*

The SWISS data should be timely, accurate, complete, and consistent and these attributes should be tracked based on a set of established quality control metrics. The overall quality of the information in the SWISS Data Component should be assured based on a formal program of error/edit checking as the data are entered into the statewide system and procedures should be in place for addressing the detected errors. In addition, the custodial agency (or agencies) and the TRCC should work together frequently to establish and review the sufficiency of the quality control program and to review the results of the quality control measurements. The data managers should receive periodic data quality reports. There should be procedures in place for sharing the information with data collectors through individual and agency-level feedback, as well as to provide modifications to applicable training and instruction manuals, edit checks, and the SWISS data dictionaries. Audits and validation checks to assure the accuracy of specific critical data elements should be conducted as part of the formal Quality Control Program. Example measurements are presented in Table 13.

Table 13: Examples of Quality Control Measurements for the Statewide Injury Surveillance System

Timeliness	- *Average time for EMS run reports to be sent to governing agency* - *% EMS run repots sent to governing agency in the prescribed time* - *Average time from treatment & discharge from ED to record availability in the ED discharge database* - *Average time from patient discharge to record availability in the hospital discharge database* - *Average time from date of incident to record appearing in the trauma registry* - *# days from death to appearance of record on mortality database*
Accuracy	- *% EMS run locations that match statewide location coding* - *% correct ICD-9 and E-codes* - *% "errors" found during data audits of critical data elements in EMS, ED, trauma registry, hospital discharge, & mortality databases*
Completeness	- *% of traffic crash-related EMS runs in the EMS database* - *% of ED visits for crash-related injuries recorded in ED discharge database.* - *% of trauma cases represented in the trauma registry* - *% of SCI/TBI cases represented in the SCI/TBI registries*
Consistency	- *% correct ICD-9 and E-codes (see also accuracy)* - *CODES match rate (where applicable)* - *% crash-related deaths with motor vehicle crash in cause of death field on death certificate*

The measures in Table 13 are examples of high-level management indicators of quality. The managers of individual medical data files should have access to a greater number of measures. The custodial agencies should be prepared to present standard sets of summary measures to the TRCC monthly or quarterly.

2-F: Statewide Injury Surveillance System (SWISS) Data Component Status

A successful statewide injury surveillance system uses several key components to monitor the incidence of, risk factors for, and costs of fatal and non-fatal injuries. These components are: emergency medical services, acute care, trauma and rehabilitation facilities, and vital records. Oversight for these entities' activities may be governed by local, State, and regional authorities. Data collected by these agencies provide a wealth of patient care, intervention, and prevention information that can be used to evaluate current treatment modalities and injury prevention activities. A comprehensive surveillance system provides crucial healthcare and injury prevention information to local, State, and regional health agencies, providers, and planners.

Integrating injury surveillance with other State traffic records system components benefits all entities. Motor vehicle crash data can supply many of the pre-event and event information for the Haddon Matrix to be used for injury prevention program planning initiated by the public health professionals. Alternatively, providing traffic safety programs and engineers with medical outcomes for motor vehicle crashes enables them to augment their understanding of crash severity beyond the typical five-point KABCO scale utilized by most crash reports.

Current Status

There are several components of a statewide injury surveillance system in place within Michigan. These components include a prehospital data collection system managed by the Department of Community Health (MDCH), hospital discharge data collected by the Michigan Health and Hospital Association (MHA), and vital records data managed by the MDCH's Vital Records Office. Additionally, most of the State's designated trauma centers maintain an in-house trauma registry system.

Michigan's injury surveillance activities are conducted largely by the MDCH. Data obtained from the MHA and vital records are the primary data sources used to analyze the State's morbidity and mortality trends and have also been used in the development of the State's Injury Prevention and Safe Kids Strategic Plans. Since the previous assessment, significant progress has been made in the area of EMS and Trauma System development. Specifically, the State established a statewide EMS system, a uniform run report, and a central repository for EMS data that is collected throughout the State. Funding provided to the MDCH through the TRCC has been instrumental in the State's ability to obtain these goals. Additionally, Administrative Rules were placed into effect in the fall of 2007 that will establish coordination of the State's 21 designated trauma centers. A funding mechanism has yet to be identified to move the Trauma System plan forward.

Details of each system component are presented below.

Emergency Medical Services

Applicable Guidelines

The State legislation (Part 209 of Public Health Code 368), which established Michigan's EMS system has been amended (Section 20910(1)(i)) to require the MDCH to collect data to assess the need for, and quality of, emergency medical services throughout the State. The current

Administrative Rules (114, 211, and 213) require each of the State's 65 regional Medical Control Authorities (MCA) to collect data from each life support agency within their jurisdiction. The rules also require the MCAs to establish a quality review and improvement program for the agencies under their purview.

With financial support from the TRCC, the State has contracted with ImageTrend for the development of an electronic patient care report. Individual agencies may use the software developed by the State or may contract with a third party vendor provided that the data elements collected are compatible. The data collection system went live on April 1, 2009 and data submission began on May 15, 2009. Currently 551 (67 percent) of the State's 881 EMS agencies are set up to provide data directly to the data system and 380 (46 percent) have begun submitting patient care reports.

Data Dictionary

The patient care report developed by the State meets the gold compliance standards of NEMSIS 2.2.1 and includes a total of 365 data elements. Additional data elements may be captured at the discretion of each individual agency.

Quality Control

Each MCA is required to develop and implement quality control programs for the agencies in their region. Online training is available through the Michigan Emergency Medical Services Information System (MI-EMSIS) and a number of train-the-trainer sessions were held during the spring of 2009 in anticipation of the May 15 implementation date.

Process Flow

Information on EMS calls is collected by individual agencies either electronically or on a paper form. Agencies are required to submit the previous month's data by the 15th of the following month. The ImageTrend software provides a web-based system for data entry that can be accessed from the local agency, hospital, or through any system with an Internet connection. It also provides the mechanism for individual EMS agencies to submit their data through existing third party vendors. At this time, each EMS agency has access to their own data, and the MCAs are in the process of establishing protocols on the use and confidentiality of data. In addition, the State EMS Office and State Data Manager within the MDCH also have access to the data. Statewide data is expected to be included in the MDCH's injury surveillance reports after a year of data collection has been completed. Due to the recent implementation of the data collection process, a time frame for data availability has not been established.

Interface with other Traffic Records System Components

There is no integration between the EMS data system and other traffic records data at this time. The patient care report is capable of capturing the crash report number, and there is great interest in the eventual linkage of these data systems. The opportunity to integrate the EMS data with hospital inpatient and trauma registry data is also present.

Emergency Department Data

In 2001 the Michigan Emergency Department Community Injury Information Network (MEDCIIN) began to collect data from a sample of 23 hospitals. The information was used to describe the injury type, mechanism, payor source, and number of persons seeking treatment at one of the participating Emergency Departments. Data collection was discontinued in 2005 due to a loss of funding.

At this time, there is no statewide Emergency Department data being reported to the MDCH.

Hospital Discharge Data

Applicable Guidelines

The Michigan Inpatient Data Base (MIDB), maintained by the Michigan Health and Hospital Administration (MHA) is an annual all-payor database with utilization, diagnostic, and patient demographic and geographic information collected on all hospitalizations within Michigan. Hospitalizations of Michigan residents in neighboring states and in the state of Florida are also included. Analysis of the MIDB must be reported in such a way as to prevent identification of individuals and hospitals.

Data Dictionary

A data dictionary for the MIDB is available through the MHA.

Quality Control

Quality control measures are conducted by the MHA. These include identification of missing or invalid data. Such cases are sent back to the originating hospital for correction. Audits performed by the MDCH reveal that E-Codes are currently available for 82 percent of the injury records.

Process Flow

Medical records staff in each participating hospital abstract information from the discharge summary and other areas of the medical record to enter a standard set of information into the MIDB system. Each hospital is asked to submit data to the MHA on a quarterly basis. The MDCH purchases the MIDB data directly from the MHA at significant cost and may not provide the information to a third party without prior authorization. MDCH staff who are provided access to the MIDB must attend an annual training session and may only have access to the data file containing hospital identifiers if they are specifically required for their project. Quarterly data are available with an approximate 8-9 month lag time.

Interface with other Traffic Records System Components

At this time the MIDB data has not been integrated with any other component of the traffic records system.

Trauma Registry

Applicable Guidelines

Through a recently passed set of Administrative Rules, Michigan is developing a statewide trauma system that is comprised of 21 adult and pediatric trauma centers (11 Level I and 10 Level II). The trauma centers are designated according to the guidelines established by the American College of Surgeons. Many of these trauma centers maintain a trauma registry for entering patient care data. The data are used to monitor and evaluate trauma patient care within each trauma facility and are submitted regularly to the National Trauma Data Bank. The proposed trauma system includes the development of a statewide registry and the MDCH is working with ImageTrend to develop a data collection system for the trauma centers that would be compatible with the EMS data collection system.

Several trauma centers are participating in the Michigan Trauma Quality Improvement Program (MTQIP) under the direction of University of Michigan Trauma Center and BCBS Foundation. The MTQIP is a regional collaboration designed to provide risk-adjusted measurement of patient outcomes to the participating centers with the goal of improving the quality of patient care. Currently, the University of Michigan, Henry Ford Hospital and William Beaumont Hospital are participating in the program.

Data Dictionary

The Trauma Registry data dictionary adheres to the National Trauma Data Standard established by the National Trauma Data Bank (NTDB, Version 2.2). Detailed injury outcome information is available in the Trauma Registry, including many measures correlated with mortality risk. Among these measures are Glasgow Coma Score (GCS), Revised Trauma Score (RTS), Abbreviated Injury Severity (AIS) scores, Injury Severity Score (ISS), and the Trauma Injury Severity Score (TRISS).

Quality Control

Initial evaluation of the data collected will take place at the regional level and will include a review for errors, incomplete records, and conflicting data.

Process Flow

Participating hospitals collect and maintain their own trauma registry databases. With the development of the statewide system, trauma registry data will flow to the MDCH in a similar manner to the EMS data system.

Interface with other Traffic Records System Components

At this time the trauma registries of the individual hospitals have not been integrated with any other component of the traffic records system; however, the inclusion of the destination medical record number and patient care report number will facilitate future integration efforts with hospital and EMS data systems.

Office of Vital Records and Statistics

Applicable Guidelines
Michigan Public Health Code (Act 368 of 1978, Sec. 2833) provides the statutory authority for the collection of vital statistics data. The State's Vital Records Office gathers information about each birth and death that occurs in Michigan and on all deaths to residents of the State that occur in other States or countries.

Data Dictionary
Death certificate data are coded according to national guidelines set by the National Center for Health Statistics (NCHS) for collecting death data. Cause-of-death information is classified in accordance with the ICD-10 standard.

Process Flow
Upon death, the medical examiner or decedent's physician specifies the cause and manner of death on a death certificate. Demographic information on each decedent is collected by the local funeral director. Upon completion, the funeral director files the death certificate with the local registrar of the district where the death occurred within 72 hours. Registrars check certificates for obvious errors and send them to the State Vital Records Office. The data are aggregated and maintained by the MDCH Vital Records and Health Data Development Section. Annual death certificate data are available in October of the subsequent year. As with the MIDB, data sets created for analysis may only include the specific variables required for the project.

Quality Control
Death certificates that are missing required information are sent back to the person responsible for providing that piece of information (e.g., funeral director, physician, medical examiner, registrar). A sample of computerized data is checked against original death certificates.

Interface with other Traffic Records System Components
At this time the vital records data have not been integrated with any other component of the traffic records system. However, there is interest in obtaining vital records data for inclusion in the FARS reports.

Crash Outcome Data Evaluation System

Michigan has not previously been eligible for CODES funding due to the lack of statewide EMS or Emergency Department data. With the recent introduction of the EMS data collection system there is an opportunity to integrate this information with hospital and crash data to provide a more complete picture of the effect of motor vehicle collisions within the State.

Recommendations

- ❑ Invite a representative from the Michigan Health and Hospital Association to become a member of the TRCC.

- ❑ Establish a data set through the integration of crash, EMS and hospital discharge data to enhance problem identification and program analysis efforts.

- ❑ Develop a data sharing agreement between OHSP and MDCH to facilitate collection of data needed for inclusion in FARS.

- ❑ Continue efforts to establish a statewide trauma registry data collection system.

- ❑ Continue to expand the number of agencies participating in the MI-EMSIS electronic system.

APPENDFIX A

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APPENDIX B

Abbreviations and Acronyms

AAAM	Association for the Advancement of Automotive Medicine
AAMVA	American Association of Motor Vehicle Administrators
AASHTO	American Association of State Highway and Transportation Officials
ACS	American College of Surgeons
AIS	Abbreviated Injury Score
ANSI	American National Standards Institute
ATSIP	Association of Transportation Safety Information Professionals
BAC	Blood Alcohol Concentration
BPEVR	Business Partner Electronic Vehicle Registration
CDC	Center for Disease Control
CDLIS	Commercial Driver License Information System
CODES	Crash Outcome Data Evaluation System
DMV	Department of Motor Vehicles
DOT	Department of Transportation
DUI	Driving Under the Influence
ED	Emergency Department
EMS	Emergency Medical Service
FARS	Fatality Analysis Reporting System
FHWA	Federal Highway Administration
GES	General Estimates System
GIS	Geographic Information System
GJXDM	Global Justice XML Data Model
GPS	Global Positioning System
HPMS	Highway Performance Monitoring System
ICD	Injury Coding System
IRP	International Registration Plan
ISS	Injury Surveillance Score
LEIN	Law Enforcement Information Network

MCMIS	Motor Carrier Management Information System
MMUCC	Model Minimum Uniform Crash Criteria
NCIC	National Crime Information Center
NCSC	National Center for State Courts
NDR	National Driver Registry
NEMSIS	National Emergency Medical Service Information System
NGA	National Governor's Association
NHTSA	National Highway Traffic Safety Administration
NIBRS	National Incident-Based Reporting System
NLETS	National Law Enforcement Telecommunication System
NMVTIS	National Motor Vehicle Title Information System
PDPS	Problem Driver Pointer System
RTS	Revised Trauma Score
SHSP	Strategic Highway Safety Plan
SWISS	Statewide Injury Surveillance System
TCD	Traffic Control Devices
TRCC	Traffic Records Coordinating Committee
TRS	Traffic Records System
UCR	Uniform Crime Reporting
VIN	Vehicle Identification Number
VMT	Vehicle Miles Traveled

TEAM CREDENTIALS

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Professional Experience

Mr. Kerns has been a database engineer at the University of Maryland's National Study Center for Trauma and EMS since 1990. During this time he has gained considerable experience in the manipulation and use of large datasets relating to motor vehicle crashes and injury. He has co-authored a number of journal articles on highway safety and has presented results from independent research projects at local and national health and injury conferences. He is currently the project director for the Crash Outcome Data Evaluation System (CODES) and the Crash Injury Research and Engineering Network (CIREN) projects funded by the National Highway Traffic Safety Administration (NHTSA).

Organizations

American Trauma Society – Maryland Division
Association of Traffic Safety Information Professionals

ROBERT A. SCOPATZ, Ph.D.

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SUMMARY

Dr. Scopatz has over 25 years of experience in the design and analysis of research studies using statistical and operations techniques. Over 20 years of his experience has been in traffic safety, traffic records systems, and safety analyses in support of motor carriers, pavement, bridge, and traffic management programs. His expertise includes data analysis methodology, user-interface design, strategic planning, human factors, human/computer interaction, group performance improvement, learning, motivation, customer service evaluation, system performance improvement, and organizational change Recent work includes development of web-based training in traffic records systems, revision of the NHTSA Traffic Records Program Advisory and Assessment, and research on crash data quality and process improvement. Dr. Scopatz has served as a media expert on issues related to safety impact of unlicensed drivers and other traffic safety issues.

EXPERIENCE

1996 to Present **Data Nexus, Inc.**

Director of Research and Government Services

- Maintains responsibility for strategic planning, data base development, survey design, and data analysis projects
- Participates in design and development of software modules for public safety management and data analysis/reporting, user interface design, and evaluation from a human factors perspective
- Conducts training needs assessments and training course development
- Participates in state-level strategic planning efforts and was recently a panel member for a NHTSA Assessment of Traffic Records in Idaho and Delaware

Recent projects include: revision of the NHTSA Traffic Records Advisory, development of web-based training in Traffic Records data and analysis, Traffic Records Audits and Strategic Plans for Oregon, Wyoming, and Missouri, participation in numerous NHTSA state Traffic Records Assessments, development and implementation of a method for auditing crash report quality used for Federal Motor Carrier Safety Administration (FMCSA) and AAA Foundation for Traffic Safety projects; support for FMCSA's Commercial Vehicle Analysis & Reporting project (CVARS); and the *Unlicensed to Kill: The Sequel* project examining driving without a valid license for the AAA Foundation for Traffic Safety.

1991 to 1996 **Star Mountain, Inc**

Research Scientist

- Maintained responsibility for data analysis, data base development, training evaluation and design, literature reviews, employee knowledge and attitude assessment,

experimental design and technical reporting in support of system performance improvement, Human Factors, and training projects
- Designed and developed a course module on Applied Statistics for the US Air Force School of Aerospace Medicine
- Researched and wrote guidelines for the user interface and online data presentation chapters of a Human Factors Handbook for Advanced Traffic Management System's control center design
- Performed data collection and analysis evaluating employees' knowledge of IRS modernization programs
- Researched Human Factors Guidelines for online aiding of computer use
- Conducted a Technical Analysis of the Quality Assurance and Revalidation Program for Navy pilot physiological training devices

Projects included development and evaluation of a model court records system to meet the needs of judges and prosecutors for the National Highway Traffic Safety Administration (NHTSA), development of a NHTSA traffic records analysis training course, strategic planning for Safety Management Systems in several states, and development of a career development system in the Defense Information Systems Agency (DISA).

1985 to 1990 **New York City Department of Transportation**

Acting Assistant Commissioner
- Directed the agency's central analytic office
- Automated field data collection for the Pavement Management System by creating a laptop-based condition assessment procedure and geo-coded street index
- Standardized data collection methodologies based on accepted principles of statistical data analysis and valid research techniques
- Revised and published training protocols for the complete array of traffic field surveys
- Developed and managed the agency's customer service evaluation and improvement program
- Implemented quality control procedures for numeric information
- Developed automated, paperless reporting systems for all agency monthly indicators
- Performed mathematical and statistical analyses to model traffic flow and infrastructure condition over time in support of policy-making for capital expenditures and traffic enforcement programs

Projects included: implementation of an annual condition assessments for surface streets; research and production of a policy statement comparing bridge infrastructure spending strategies' effects on traffic flow, air quality, and economic vitality; a simulation study of parking enforcement's effect on midtown traffic speeds in support of congestion pricing initiatives; and a field video study of intersection traffic control effects on traffic flow.

EDUCATION

Ph.D.	Experimental Psychology	Columbia University	1992
M.A.	Experimental Psychology	Columbia University	1982
B.S.	Psychobiology	University of Southern California	1980

AFFILIATIONS/PROFESSIONAL ASSOCIATIONS

- National Safety Council - Traffic Records Committee; Association of Transportation Information Professionals (ATSIP) (Executive Board and President 2005-2006)
- AASHTO/TRB – Highway Safety Manual content review panel.
- TRB/USDOT – Data Needs for SAFETEA-LU ad-hoc outreach panel.
- Transportation Research Board; Committee on Statistical Methodologies, Statistical Computer Software in Transportation Research (A5011 past member)
- Transportation Research Board; Committee on Safety Data, Analysis and Evaluation (ANB20 – current member)
- State of Florida Safety Management System Committee (past member) and co-developer of the SMS Truck/Bus Subcommittee's Research Agenda
- NCHRP Panel Member: Project 20-05, Synthesis Topic 31-02 "Statistical Methods For Highway Safety Analysis"

SELECTED PUBLICATIONS

Illinois Department of Transportation Crash Data Process Audit: Current Practices and Recommendations for Improvement. Prepared for Illinois Department of Transportation, with B.H. DeLucia (2006).

Final Traffic Records Assessment Report and Strategic Plan for Traffic Records Improvements, Prepared for Oregon Department of Transportation, Transportation Safety Division, with B.H. DeLucia, L.C. Holestine, and H.T. Thompson (2006).

Final Traffic Records Assessment Report and Strategic Plan for Traffic Records Improvements, Prepared for Missouri Department of Transportation, Highway Safety Division, with B.H. DeLucia, L.C. Holestine, and H.T. Thompson (2006).

Strategic Plan for Traffic Records Improvements, Prepared for the Highway Safety Program, Wyoming Department of Transportation, with B.H. DeLucia and L.C. Holestine (2006).

Strategic Plan for Traffic Records Improvements, Prepared for the Illinois Department of Transportation, Division of Traffic Safety, with B.H. DeLucia and L.C. Holestine (2006).

Traffic Records Advisory and Traffic Records Assessment Workbook – 2006 update. Prepared for the National Highway Traffic Safety Administration, U.S. Department of Transportation with B.H. DeLucia, C.E. Hatch, et al., (2006 – in review).

NCHRP Synthesis 305. Crash Records Systems, Prepared for the National Cooperative Highway Research Program, TRB, with B.H. DeLucia as lead author (2006).

Ohio OVI Tracking System Plan. Prepared for the Ohio Department of Public Safety:

Governor's Highway Safety Office, with B.H. DeLucia and L.C. Holestine (2006).

Timeliness of Crash Data Uploads into SafetyNet in Ohio. Prepared for the Ohio Department of Public Safety and FMCSA Ohio Division Office, with B.H. DeLucia (2005).

Final Traffic Records Assessment Report and Strategic Plan for Traffic Records Improvements, Prepared for the Commonwealth of Massachusetts, Governor's Highway Safety Bureau with B.H. DeLucia and L.C. Holestine (2005).

NHTSA Traffic Records Assessment for the states of Colorado, Delaware, Georgia, Idaho, Indiana, Kansas, Kentucky, Massachusetts, Minnesota, Michigan, New Jersey, Ohio, Tennessee, and Virginia with various team members.

Criminal Justice Institute: Crash Systems Audit. Prepared for State of Indiana Governor's Council on Impaired & Dangerous Driving, with B.H. DeLucia and M.R. Crouse, (2004).

Unlicensed to Kill: The Sequel, Prepared for the AAA Foundation for Traffic Safety, with B.H. DeLucia, C.E. Hatch, and K.A. Tays (2003).

Traffic Crash Report Audit, Prepared for the Massachusetts Governor's Highway Safety Bureau, with L. Holestine (2001).

Florida Truck Crash Report Audit, Prepared for the Florida Division Office of the Federal Motor Carrier Safety Administration, with L. Holestine (2000).

Long Commercial Vehicle: Data Collection. Prepared for the AAA Foundation for Traffic Safety, with B.H. DeLucia (2000).

Top Ten Program: Evaluation of Program Effectiveness. Prepared for the Federal Highway Administration, Office of Motor Carrier, and Highway Safety (1999).

Traffic Records Advisory and Traffic Records Assessment Workbook. Prepared for the National Highway Traffic Safety Administration, U.S. Department of Transportation with B.H. DeLucia, C.E. Hatch, et al., (1998).

Methodological Study of Between-States Comparisons with Particular Application to .08% BAC Law Evaluation. Presented at 77th Annual Meeting of the Transportation Research Board, Washington D.C. Available on TRB Pre-print CD-ROM (1998).

Traffic Records Training: Traffic Records Systems Audit and Strategic Data Improvement Plan. Prepare for the Louisiana Department of Public Safety, Office of Highway Safety and Planning with B.H. DeLucia, R.Q. Brackett, M.L. Edwards, and M.R. Crouse (1997).

Use of Driver and Criminal Records for Judges and Prosecutors. Prepared for publication by the Transportation Research Board with B.H. DeLucia and M.L. Edwards.

Transportation Research Record (No. 1581, Safety and Human Performance). Transportation Research Board, Washington, D.C., (1997).

Use of Driver and Criminal Records for Judges and Prosecutors. Presented at the Transportation Research Board, Washington, D.C. with B.H. DeLucia and M.L. Edwards (1997).

Traffic Records Training: Traffic Records Systems Audit and Strategic Data Improvement Plan. Prepared for the Massachusetts Governor's Highway Safety Bureau with B.H. DeLucia (1997).

Instructor's Guide and Participants' Manual for Traffic Records Data Analysis Training Course. Prepared for the National Highway Traffic Safety Administration with M.L. Edwards and B.H. DeLucia (1996).

Action Plan for the State Traffic Records Advisory Council. Prepared for the Colorado Department of Transportation, Office of Transportation Safety with B.H. DeLucia (1996).

Traffic Records Training: Traffic Records Systems Audit and Strategic Data Improvement Plan. Prepared for the Commonwealth of Virginia, Department of Motor Vehicles with B.H. DeLucia (1996).

Final Report: Use of Driver and Criminal Records for Judges and Prosecutors. Prepared for the National Highway Traffic Safety Administration with B.H. DeLucia and M.L. Edwards (1996).

Customer Service in Government. Seminar conducted in the Current Topics course for Industrial/Organizational Psychology graduate program, University of Central Florida.

Customer Service: The Bottom Line. Paper presented at the 21st International Forum for Traffic Records and 4th NHTSA Conference on Collection and Analysis of State Highway Safety Data. Milwaukee, WI. August 7, 1995.

Traffic Records Training: Traffic Records Systems Audit and Strategic Data Improvement Plan. Prepared for the Minnesota Department of Public Safety, Office of Traffic Safety with B.H. DeLucia, R.Q. Brackett, and M.L. Edwards (1995).

Traffic Records Training: Traffic Records Systems Audit and Strategic Data Improvement Plan. Prepared for the Wisconsin Department of Transportation, Office of Transportation Safety with B.H. DeLucia, R.Q. Brackett, M.R. Crouse, and M.L. Edwards (1995).

Traffic Records Training: Traffic Records Systems Audit and Strategic Data Improvement Plan. Prepared for the Michigan Department of Public Safety, Office of Highway Safety Planning with B.H. DeLucia, R.Q. Brackett, M.R. Crouse, and M.L. Edwards (1995).

Strategic Traffic Records Training: Traffic Records Systems Audit and Strategic Data Improvement Plan. Prepared for the Colorado Department of Transportation, Office of Transportation Safety with B.H. DeLucia, R.Q. Brackett, M.R. Crouse, and M.L. Edwards (1995).

Strategic Traffic Records Improvements: Traffic Records Systems Audit and Strategic Data Improvement Plan. Prepared for the Arkansas Highways and Transportation Department, Traffic Safety Section with B.H. DeLucia, R.Q. Brackett, M.R. Crouse, and M.L. Edwards (1995).

Applied Statistics. US Air Force School of Aerospace Medicine with J.F. Greear, R.M. Baker, and C.B. Galante (1995).

Use of Driver and Criminal Records for Judges and Prosecutors. Paper presented at the 20th International Forum for Traffic Records and 3rd NHTSA Conference on Collection and Analysis of State Highway Safety Data. Based on a National Highway Traffic Safety Administration project with B.H. DeLucia, Tucson, AZ. (1994).

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Professional Experience

Mr. Spell entered his professional career in traffic records systems and data exchange over 50 years ago. He is nationally recognized for his work in development of traffic records systems, especially interchange (NDR and CDL) of information amongst various users and the development and promulgation of data standards in information processing.

He served as a member of D16.1 committee. He developed the AAMVA Violations Exchange Code or "ANSI" code (predecessor of the AAMVAnet Code Dictionary or ACD which he also co-developed) while employed with AAMVA and later served as the Accident (Crash) Subcommittee Chairman for the ANSI D-20 Standard, A States Model Motorist Data Base, while employed with the National Highway Traffic Safety Administration.

While employed with NHTSA he created the original reporting forms and file structure for the Fatality Analysis File which was renamed in 1975 as the Fatal Accident Reporting System (FARS) and later renamed again, the Fatality Analysis Reporting System (FARS). He and his staff conducted the training for all of the original analysts.

As an independent consultant, he conducted the NHTSA Uniform Traffic Ticket Study to determine the extent and details of emerging Citation Tracking Systems. He conducted all aspects of the study including on-site State visits and assessments to determine the extent of control being exercised in citation issuance, processing of conviction information through the courts, and recording conviction dispositions in driver history files.

In the private sector, he developed numerous Crash Report forms, instruction manuals for crash reporting, data input procedures, all edits to assure data quality, and reporting and analysis procedures for problem identification. He also developed the EMS Run Report for Kentucky.

He designed the graphical user interface for the Highway Traffic Records Information System for the Virginia Department of Transportation (VDOT) and provided training in the use of the system to the district offices of VDOT.

He was involved in the design and developmental efforts for the Commercial Driver Licensing Information System (CDLIS) and its AAMVAnet environment and was a member of the AAMVAnet "Tiger Team" that made the assessments of selected states to become pilots and eventual founding states in the National Motor Vehicle Title Information System. His background, experience and interested cover the entire spectrum of traffic records systems.

History

1992 – "present"	Independent Consultant (now essentially retired)
1977 – 1992	Senior Traffic Records Analyst National ConServ, Inc. (but 1980 to 1983: Independent Consultant)
1974 – 1977	Vice President GENASYS (Systems Division) (now Keane, Inc.)
1968 – 1974	Chief, Information Systems, NHTSA, US Department of Transportation
1966 – 1968	Director of Data Systems for the AAMVA
1958 – 1966	Staff Specialist in MVRs (driver histories) for Retail Credit Co. (now Equifax) Atlanta, GA

Memberships in Professional Associations (former)

- ❑ Traffic Records Committee, Transportation Research Board
- ❑ American National Standards Institute, D-16, D-20, and X3L8 Committees
- ❑ Executive Board, Traffic Records Committee, National Safety Council
- ❑ Society of Automotive Engineers Committee on Standardization of Vehicle Identification Numbers

Education

Boston University ..... S.T.B., 1956
Duke University ..... A.B., 1953

JOAN VECCHI

Senior Director
Motor Vehicle Division, Colorado Department of Revenue
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Professional Experience

Joan Vecchi is the Senior Director of the Colorado Motor Vehicle Division, which houses the Driver's Licensing, Driver Control, Traffic Records, Emissions, Titling & Registrations, Ports of Entry, IRP, Motor Carrier Services, and Motor Vehicle Investigations Sections. She has held the position for 3 years.

Her prior experience includes twelve years as a Police Officer/Sergeant in Denver. During that period, Joan worked as a technician responsible for Department policy and procedures and design of forms and citations. In this capacity, she acted as liaison between the Department and the County Court to assure that citations met the needs of both entities. Joan left the City of Denver to work at the Colorado Department of Revenue in the Office of Program Analysis as a policy/budget analyst. In that capacity, Joan was responsible for developing budget requests and justifications, analyzing the efficiency and effectiveness of various state programs, auditing the performance of existing programs, and implementing new programs. Later, she was assigned to the Liquor Enforcement Division as Enforcement Manager, where she worked with the industry and law enforcement to assure a fair regulatory system while targeting underage consumption and over-service of alcohol. During her tenure with Liquor Enforcement, Joan was acting Director of the Division for a period of eleven months and implemented the tobacco enforcement program in Colorado.

She was co-chair of the Identity Fraud Working Group, which crafted legislation that allowed the use of facial recognition technology on applicants for driver licenses or identification cards. Investigations using facial recognition prevent issuance of more than 100 fraudulent documents each year. Vecchi is currently a member of a national panel seeking to develop identity security standards.

Currently, Joan is involved with a broad-based group study of aging drivers, in an effort to develop a program that addresses the needs of the older driver population, thereby improving highway safety for all the state's citizens. She has also been the chair of the Colorado State Traffic Records Advisory Committee (STRAC).

Education

Bachelor of Science, Majors in Law Enforcement and Psychology 1977
Master of Arts, Management
emphasis in Human Relations and Organizational Behavior 1984
Numerous professional training courses in law enforcement and management subjects

JOHN J. ZOGBY, PRESIDENT

Transportation Safety Management Systems
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Duncannon, PA 17020
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Summary of Experience

Mr. Zogby has over 40 years experience in highway safety engineering and management and motor vehicle and driver licensing administration.

Mr. Zogby's transportation career began in the Bureau of Traffic Engineering in the Pennsylvania Department of Highways, where he was responsible for statewide application of highway signs and markings. He was instrumental in developing the State's first automated accident record system in 1966. In the late 1960's, he helped initiate and was project director for the statewide safety improvement program and the State's in-depth accident investigation function.
Mr. Zogby worked in the private sector in traffic safety research for several years before returning to public service as the Director of the Bureau of Accident Analysis in the Pennsylvania Department of Transportation. He was appointed Deputy Secretary of Transportation for Safety Administration in February of 1979, a position he held for 13 years, until his retirement from public service in December 1991.

Since his retirement from State government, Mr. Zogby has been engaged as a consultant on management and policy issues for federal, State and local government agencies in the area of transportation safety and motor vehicle/driver licensing services.

Professional and Business Experience

Subcontract with GeoDecisions Consulting on a Safety Analysis Management System (SAMS) for the state of Mississippi.

Subcontract with iTRANS Consulting Inc. on NCHRP project 17-18 (05), Integrated Management Process to Reduce Highway Injuries and Fatalities Statewide for the Transportation Research Board.

Contract with the National Academy of Sciences (NAS) to provide AASHTO Strategic Highway Safety Plan - Case Studies (17-18(06)) for the Transportation Research Board.

Subcontractor with ISG, a systems integration consulting company, conducting a reengineering contract with the Pennsylvania Department of Transportation in the area of motor vehicle processes.
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Subcontractor with the Pennsylvania State University to research the impact of an education provision in State law governing novice drivers.

Conducted a three-week course on safety management for the Ministry of Communications in the Kingdom of Saudi Arabia.

Subcontractor with a Moroccan Engineering firm to develop a national highway safety plan for the Country of Morocco.

Completed a study for the State of Mississippi, Department of Public Safety, to develop a Strategic Plan for Highway Safety Information.

Contracted by the Federal Highway Administration, Office of Motor Carrier Safety, to help in the final implementation phase of the Commercial Driver License (CDL) program.

Consulted with several States in assessing their Traffic Records capabilities to address highway safety program management needs. In addition, completed Traffic Records Assessments for three Indian Nations in Arizona.

Project director and principal instructor for a Federal Highway Administration (FHWA) contract to develop, implement, and instruct a training program for the Highway Safety Management System.

Professional Societies and National Committees

Member Institute of Transportation Engineers (ITE).

Member Emeritus of the Transportation Research Board (TRB) Committee on Transportation Safety Management.

Chair TRB task force on Safety Management status.

Member of the National Safety Council's Association of Transportation Safety Information Professionals.

Past President of the Mid-Atlantic Section of ITE.

Past Chair of the National Safety Council's Traffic Records Committee.

Past President of Region 1 of the American Association of Motor Vehicle Administrators.

Chaired the Governing Board of the International Registration Plan.

Chaired a subcommittee of the NGA Working Group on State Motor Carrier Taxation and Regulation.

Completed six-year tenure as Chair of the TRB committee on Planning and Administration for Transportation Safety.

Community

President, Duncannon Area Revitalization, Inc.

Pastoral Associate, St. Bernadette Church, Duncannon, PA

Education

B.S., Economics, Villanova University

MPA, Penn State University