FHWA Roadway Safety Data Partnership

State Roadway Safety Data Capability Assessment

Oregon Safety Data Action Plan

ROADWAY SAFETY
DATA PARTNERSHIP
COLLECTING • ANALYZING • MANAGING • EXPANDING

March 5, 2012

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The assessor would like to thank the participants listed below for their time and valued input into improving their roadway safety data. We envision that action steps taken through this document will ultimately lead to a reduction in highway fatalities and serious injuries.

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Introduction

Purpose of project

Saving lives and preventing serious injuries on all public roads is an important cornerstone of the Department of Transportation's mission. The FHWA Office of Safety understands that the face of safety analysis is changing, and the need for high quality safety data has never been more apparent. The foundation for effective highway safety decisions is great data. Much of the effort in the past decades has concentrated on crash data; however, crash data are only part of the picture. Roadway and traffic data are also essential. By incorporating roadway and traffic data into network screening analysis, prioritization, and countermeasure selection, decision makers can better identify safety problems, prescribe solutions to improve safety, and make more efficient and effective use of safety resources.

The roadway data capability assessment is one element of the Roadway Safety Data Partnership (RSDP). The RSDP is designed to be a collaborative effort between FHWA and States to ensure that they are best able to develop robust data-driven safety capabilities. It includes initiatives and programs in the areas of assessment, standardization, guides, and technical assistance. The objectives of the capability assessment are the following:

- Develop and carry out a consistent, repeatable, and systematic process for working with the States to assess their roadway data capabilities;
- Understand what States' capability goals are, and help them to identify critical gaps, potential solutions, and available funding sources to achieve their data goals; and
- Set future research, development, and programmatic goals to further the evolving state of practice for data-driven highway safety planning based on the information gathered during the assessment process.

All of the information collected has been used for the purpose of assisting the States to understand where they currently are with their roadway data. The assessment results are for the benefit of the States to chart their progress. The States can, at their discretion, choose to share their results. At no

point will the FHWA Office of Safety, an FHWA Division Office, or the partnership Website, release a State's results without prior written approval. In addition, FHWA will use information gathered from the States to identify common themes and critical gaps to develop a national gap analysis and action plan. Specific States will not be identified in the national gap analysis.

Assessment Process

FHWA has created a consistent, repeatable, and systematic process for assessing State roadway data capabilities. Using a Capability Maturity Model (CMM) process described in Appendix A, Oregon was assessed using an objective review of their current capabilities on February 23, 2012. This report is a follow-up to that assessment; it provides a framework for a roadway safety data action plan and outlines what steps can be taken to help move Oregon forward to its self-identified goal capability level. Participants, including State safety data experts and decision makers, have provided key input to the process. The lead assessor also reviewed existing resources and compiled them with State experts' input. This combined process was designed to ensure the most accurate description of Oregon's current roadway data capabilities. The result is a baseline assessment for the State and the foundation for this roadway safety data action plan.

Purpose of the Action Plan Template

This action plan template outlines Oregon's current capability level for data-driven safety decision-making on a spectrum of five levels. These levels are described in Appendix A. This plan also includes a preliminary State-identified goal for either retaining current capability or reaching a higher capability level. This process will allow for a gap analysis to be conducted between where Oregon currently is and where they want to be. This action planning template is a roadmap to assist Oregon in furthering their roadway safety data initiatives. The combined assessments will also provide information necessary for FHWA to identify national gaps where they can focus national data leadership and resources.

Summary Results

Table 1. Results of State RSDP – Capabilities Assessment.

Area / Element (pg #)	Capability Level - Assessment Results	Capability Level - State-Identified Goal
Area 1: Roadway Data Collection/Technical Standards		
Element 1A: Completeness (#5)	Repeatable (2)	Managed (4)
Element 1B: Timeliness (#6)	Managed (4)	Managed (4)
Element 1C: Accuracy (#6)	Optimizing (5)	Optimizing (5)
Element 1D: Uniformity/Consistency (#7)	Defined (3)	Managed (4)
Area 2: Data Analysis Tools and Uses		
Element 2A: Network Screening (Data) (#8)	Defined (3)	Managed (4)
Element 2A: Network Screening (Method) (#9)	Defined (3)	Optimizing (5)
Element 2A: Network Screening (Coverage) (#9)	Managed (4)	Optimizing (5)
Element 2B: Diagnosis (#10)	Defined (3)	Managed (4)
Element 2C: Countermeasure Selection (#11)	Repeatable (2)	Defined (3)
Element 2D: Evaluation (#12)	Managed (4)	Optimizing (5)
Element 2E: Accessibility (#13)	Optimizing (5)	Optimizing (5)
Area 3: Data Management and Governance		
Element 3A: People (#14)	Managed (4)	Optimizing (5)
Element 3B: Policies (#15)	Defined (3)	Managed (4)
Element 3C: Technology (#16)	Defined (3)	Managed (4)
Area 4: Data Interoperability and Expandability		
Element 4A: Data Interoperability (#17)	Defined (3)	Managed (4)
Element 4B: Expandability (#18)	Managed (4)	Optimizing (5)
Element 4C: Linkage (#18)	Managed (4)	Optimizing (5)

Area 1: Roadway Data Collection/Technical Standards

This area of the assessment emphasized what data are collected, how, and on what roadways. Supplemental information was also collected on roadside fixed object inventories, sign inventories, speed data inventories, and safety improvement inventories. For each element, the assessment emphasized each *category* of roadway inventory data in order to develop more specific information on each type of data. The primary categories used were those in MIRE, Version 1 (www.mireinfo.org), and include the following:

- Roadway segments.
- Intersections.
- Interchanges.
- Ramps.
- Curves.
- Grades.

Element 1A: Completeness

Assessment Level: Repeatable (2)

State-Identified Goal: Managed (4)

Recommendations:

- In general, states have two major concerns to address in developing a complete roadway inventory: coverage of all public roads and a sufficient level of detail for all data categories in the inventory. As a state identifies a deficiency in either area it can achieve a higher maturity level by increasing either the number of roadways included in the inventory, or the number of data elements captured within a broader range of categories (intersections, curves, grades, interchange/ramps, etc.).

- Throughout, it is also important to reduce the amount of missing data below a reasonable threshold (5% missing/blank or less in the model).

- Ultimately, at the optimal maturity level (level 5), states should ensure that the system does not decay. A cycle of data collection should be established and maintained that effectively adds new roadways (and adjusts records of existing locations). Data quality metrics should be maintained and/or established to ensure completeness.

- To move from repeatable to defined:

    - Reduce the frequency of missing or blank data fields on state-maintained roadways in the inventory to less than 5%.

    - Pursue high level of detail on all segments as well as either intersections or curves on state-maintained roadways.

- To move from defined to managed:
    - Develop a local roads inventory database with at least a moderate level of detail on the local roadways.

Notes:

- Oregon would like to achieve a Level 4, including additional data for state-maintained roads and some data for local roads. There is not a need for the entire MIRE list of elements on State roads.
- Oregon indicated the following potential challenges:
    - Receiving information and data from local agencies to complete the roadway network for non-State roads.
    - Resources – primarily related to people (rather than $).
    - Communicating importance of data to decision-makers (senior mgmt).

Element 1B: Timeliness

Assessment Level: Managed (4)

State-Identified Goal: Managed (4)

Recommendations:

- None – the State is comfortable with their current level.

Element 1C: Accuracy

Assessment Level: Optimizing (5)

State-Identified Goal: Optimizing (5)

Recommendations:

- The measurement of accuracy includes checks of internal validity (logical agreement among data fields—do the data "make sense?") as well as the more costly and time-consuming external validity checks comparing database entries to actual field data. It is likely that states will have an easier time developing the checks for internal validity, but to achieve the optimal level of performance, both types of checks are needed.

- To maintain the current level:
    - Ensure that the external verification process cycle is maintained and expanded where necessary to meet users' needs for validated accuracy levels.

Element 1D: Uniformity/Consistency

Assessment Level: Defined (3)

State-Identified Goal: Managed (4)

Recommendations:

- States can ensure uniformity and consistency of roadway data by developing measurements of uniformity/consistency and supplying data collectors/coders with explicit guidance in the form of data dictionaries, instruction manuals, training, edit checks, and feedback based on periodic analysis of the data. As states move up the levels from level 1 (ad-hoc) to level 5 (optimizing), it is expected that they will develop procedures for tracking uniformity/consistency as well as metrics that measure the level of uniformity achieved. Where relevant, these metrics should be reportable at a level of specificity sufficient to identify particular data submission sources (agencies, portions of the DOT) that are having difficulties adhering to the established standards. Feedback at a general level is also useful, but a system that fails to identify specific sources of inconsistency will present difficulties for those trying to address the problems.
- To move from defined to managed:
    - Develop procedures to ensure that data elements are coded consistently across multiple years.

Notes:

- Oregon indicated the following potential challenges:
    - May require system updates and additional data.
    - Legislative actions may hinder the process.

AREA 2: DATA ANALYSIS TOOLS AND USES

This area emphasized the importance of the safety planning process, including network screening, diagnosis, countermeasure selection, and evaluation. This section also included data accessibility, which identified the various users who have access to the data files and their level of accessibility.

Element 2A: Network Screening (Data)

Assessment Level: Defined (3)

State-Identified Goal: Managed (4)

Recommendations:

- In an optimal system, analysts have access to multiple linked data resources exploiting linking opportunities among crash, traffic, detailed roadway inventory, citation, driver, vehicle, and injury surveillance system data. These linked data serve as a resource to enhance and correct the component sources (for example, the injury surveillance data provide a more accurate picture of crash consequences than the crash data alone). States that lack data, or use only a portion of the data for network screening should work towards a fully linked traffic records system by ensuring that the crash data are complete, that they link well with a complete roadway inventory (covering all public roads) and relevant traffic count data. States that achieve this level of linkage (levels 3 and 4) should strive to incorporate more linked data into their analyses in order to develop a more detailed picture of the crash experience in their state.

- To move from defined to managed:
    - Ensure linkage of crashes with *both* traffic and roadway inventory data.
    - Ensure sufficient linked database coverage to include locations with zero crash frequency.

Notes:

- Oregon indicated that the software is currently available to support the analysis, but they need to obtain the data required to employ the software.

- Level 5 may be available at some point in the future, but the DOT is just getting started and needs to with the other agencies that maintain these data.

Element 2A: Network Screening (Method)

Assessment Level: Defined (3)

State-Identified Goal: Optimizing (5)

Recommendations:

- Traditional methods, as represented by Levels 1-4, do not support the same level of certainty and analytic validity as the state of the art methods as presented in the Highway Safety Manual and elsewhere. States that have not yet achieved level 5 should strive to attain that level. Incremental improvements to a "traditional" method are valid and can add value; however they do not serve the ultimate goal of achieving level 5's optimum.
- To move from defined to optimizing:
    - Ensure that the state validates and calibrates modern methods of network screening for local (state) use.
    - Ensure currency with evolving methods by staying up-to-date with new releases of analytic tools, processes, and methodologies.

Notes:

- Oregon indicated that plans are in place to move from defined to optimizing; it is simply a matter of executing plans.
- Oregon indicated the following potential challenges:
    - Having enough data to use these advanced tools.
    - Need multiple years of data and additional elements.
    - Training-related issues (time and investment).

Element 2A: Network Screening (Coverage)

Assessment Level: Managed (4)

State-Identified Goal: Optimizing (5)

Recommendations:

- States have an interest in monitoring the safety of travel on all roadways. The databases used for network screening should support the state's ability to quantitatively describe the crash experience on all roads by including every roadway type and location. The critical

three data systems of roadway inventory, traffic, and crash may each have limitations in coverage. Linkage among these limited data will result in a file that shares the limitations of all the component pieces. The optimal solution is to develop databases for roadway inventory, traffic, and crash data that cover all roadways in the state. In priority order, however, it is clearly most important that all public roadways be included in the databases (level 4). States at or below level 3 should strive develop databases that include all public roads regardless of jurisdiction. A common location coding method applicable to all public roads is essential to ensuring that the databases can be linked efficiently.

- To move from managed to optimizing:
    - Include non-publicly owned roads (toll roads, military bases, tribal lands, etc) in the roadway inventory, traffic, and crash databases.

Notes:

- Oregon indicated the following potential challenges:
    - Receiving the information and data from the local agencies to complete the roadway network for non-State roads.
    - The Tribal road network is existing, but there is a lack of details. Crash data are reported for Tribal lands, but these data are incomplete.

Element 2B: Diagnosis

Assessment Level: Defined (3)

State-Identified Goal: Managed (4)

Recommendations:

- Data-based diagnosis of safety issues can be done on a macro- and micro-level. At the macro level, states can generally perform aggregate analyses for all roadways and for roadways grouped by descriptive attributes (roadway type, usage, specific features present, etc.). At the micro level, states have the further ability to associate crash experience with particular roadway features and attributes and to develop estimates of expected crash frequencies associated with the presence of various features or attributes.

- As states increase the sophistication of their diagnostic analyses, data to support those analyses will be needed in a readily accessible form, preferably a linked database of crash, roadway inventory, traffic count, and other data. The roadway datasets will ideally include all necessary information, sufficiently up-to-date and detailed, such that it supports collision and condition diagramming at a work station rather than requiring a field visit.

- The data needs shift as one advances in maturity levels. In general, moving from Level 1 to Level 3, requires having a robust and current roadway inventory where all classes of roadway are diagnosed to be successful. Success in Level 4 and 5 relies on having current data on specific features of the roadway. At the highest level, maintenance of the system's capabilities and a guaranteed refresh-cycle of data is paramount. Data need to be continuously updated to retain a high level in the Diagnosis element.

- To move from defined to managed:

    - Develop reports for all public roadways.

Notes:

- Oregon still needs to collect additional data for off-state roadways. They would also like to collect additional data (from Level 5) for state-maintained roads (to facilitate analyses such as over-representation of crashes…similar to SafetyAnalyst).

Element 2C: Countermeasure Selection

Assessment Level: Repeatable (2)

State-Identified Goal: Defined (3)

Recommendations:

- As states increase the sophistication of their countermeasure selection analyses, data to support those analyses will be needed in a readily accessible form, preferably to include detailed data elements describing safety-related infrastructure attributes of the roadway and peripheral database information such as signs, lighting, pavement condition and markings, etc. The roadway datasets will ideally include all necessary information, sufficiently up-to-date and detailed, such that it supports countermeasure selection or design analysis at a work station rather than requiring a field visit.

- The data needs shift as one advances in maturity levels. Since countermeasure selection relies heavily on the diagnosis element, moving from Level 1 to Level 3, requires having a robust and current roadway inventory where all classes of roadway are diagnosed to be successful. Success in Level 4 and 5 relies on having current data on specific features of the roadway. States at levels 3 or 4 should move directly to level 5. At the highest level, maintenance of the system's capabilities and a guaranteed refresh-cycle of data is paramount. Data need to be continuously updated to retain a high level in the Diagnosis element.

- To move from repeatable to defined:
    - Enhance the roadway inventory to include a full data element list of all safety-related infrastructure attributes.

Notes:

- Oregon has some data for Access Management, Pedestrian and Bicycle Facilities, Roadside Fixed Objects, and Safety Improvements. Oregon has all data for Pavement Condition, Signs, Speed Data, and Traffic Barriers. These data are mainly available for state-owned roads and not for local roads.

- Oregon still needs to collect most of the supplemental data, including lighting, access control, driveway presence, etc.

- Oregon identified the following potential challenges:
    - Time and $ (general resources). Current efforts are underway to collect the data, but there may be issues connecting the information once it's available.
    - Need coordination among these data collection efforts to capture all users' needs.
    - Need common LRS to tie together.

Element 2D: Evaluation

Assessment Level: Managed (4)

State-Identified Goal: Optimizing (5)

Recommendations:

- As with other Section 2 elements, movement to higher levels centers on addressing data gaps. Data are needed on all public roadways such that analysts can examine the features and attributes of all roadways in order to develop reasonable comparison groups for use in evaluation of project success at treatment sites. In addition, to support state-of-the-art analytic methods (e.g., empirical Bayes), historical data for at least 5 years are required. States can move from low levels (1-3) to higher levels (4-5) by ensuring that all safety-related countermeasure installation dates are tracked, by building a 5+ year history of crash and traffic volume data, and by ensuring that the databases are sufficiently complete in terms of roadway coverage (all public roads) and data elements (roadway features and attributes are recorded for all locations).

- For program evaluation, optimal systems include data on specific projects under each safety-related program. States move up from lower levels (1-2) by ensuring the ability to track individual projects and by maintaining 5+ year histories of crash and traffic volume data.

- To move from managed to optimizing:
    - Develop a complete inventory and safety-project tracking mechanism for all public roads.
    - Ensure that a 5+ year history is available for all locations in the database.
    - Develop *both* traffic volume and crash data history for all public roadways.

Notes:

- Oregon just needs to complete existing efforts to obtain data for non-State roads.
- Oregon identified the following potential challenges:
    - The capabilities are there, but people/time/resources are needed to complete the work.
    - There is a disconnect between the regions and state about what improvements are actually implemented. This makes it difficult to identify the specific changes for a given location.
    - It is also difficult to identify other changes that may occur at a given location (e.g., maintenance activities related to signing and striping).

Element 2E: Accessibility

Assessment Level: Optimizing (5)

State-Identified Goal: Optimizing (5)

Recommendations:

- To maintain the current level:
    - Ensure that the needs of new/infrequent users are addressed by agency policies and procedures.

AREA 3: DATA MANAGEMENT AND GOVERNANCE

This area of the assessment emphasized how policies, procedures, and personnel affect the overall collection, maintenance, usage and updating of roadway safety data.

Element 3A: People

Assessment Level: Managed (4)

State-Identified Goal: Optimizing (5)

Recommendations:

- Data governance is a formal process dependent on executive level support and input to guide the overall development of systems and their improvement. States can achieve a moderate level of data management (level 3) by using the Traffic Records Coordinating Committee (TRCC) as a resource to discuss and plan data improvement strategies coordinated among all the traffic records system components. To achieve higher levels (4-5) a state must establish a formal data governance board charged with setting policies for all system development (not solely traffic records). The data governance group, composed of agency executives and upper management, would also be responsible to ensure that data custodians and IT staff are aware of the data governance policies and have the resources to carry out systems improvements in a manner that is consistent with those policies. The data governance group also needs to be aware of the impact that IT limitations may have on traffic records.

- To move from managed to optimizing:
    - Implement "zero defects" data quality management policies.
    - Establish liaison relationships between the data governance group and the state TRCC.
    - Establish feedback mechanisms among users, collectors, and data managers.

Notes:

- There is awareness at the executive level of the need to support data governance. There is not a data governance board, but there is executive level support from the agencies involved in the TRCC and they are responsible for data other than Traffic Records. The Executive TRCC Group must approve all changes (including those that effect data) for all projects in the TRSP (Traffic Records Strategic Plan).

- Oregon indicated the following potential challenge:
    - Coordinating efforts across ODOT and developing agreements.

Element 3B: Policies

Assessment Level: Defined (3)

State-Identified Goal: Managed (4)

Recommendations:

- States should have formal policies arising from the activities of a Data Governance Group applicable to all system development or improvement efforts. These policies should arise from Data Business Plans developed in each custodial agency (those agencies managing key data resources). States move from low levels of data management policy (1-2) to higher levels by changing from reactive to proactive modes of data quality management and by implementing formal data management policies and procedures. IT professionals need to provide guidance throughout the process and apply advanced technology tools as identified in Element 3C.

- To move from defined to managed:
    - Develop problem prevention strategies.
    - Benchmark data quality against industry standards.
    - Publish a Data Governance manual/handbook.
    - Develop a data catalog.

Notes:

- The State is currently between Level 3 and 4.

- The goal shifted to problem correction and prevention with the new system. Real-time activities and preventive data quality rules and processes emerge. A service-oriented architecture (SOA) encapsulates business rules for data quality and identity management. There is great potential to increase maturity levels with the new system.

- Oregon indicated the following potential challenges:
    - Need to maintain motivation and funding/resources to complete the ongoing efforts.
    - Some local jurisdictions prefer to keep their data for various reasons.

Element 3C: Technology

Assessment Level: Defined (3)

State-Identified Goal: Managed (4)

Recommendations:

- Optimal systems include technology that aids in monitoring performance (data quality such as coverage, timeliness, accuracy, accessibility, uniformity, etc.) and aids system administrators, owners, etc. in implementing standards for data quality management. States can move from lower levels (1-2) to high levels by implementing standard tools statewide among all agencies. The goal of continuous monitoring of data quality is often achieved first at a system level, then within a single agency before it is adopted statewide.
- To move from defined to managed:
    - Develop and maintain data definitions and business rules.
    - Standardize all data quality and data integration tools statewide.
    - Adopt Service Oriented Architecture and Open Database Connectivity as standards.

Notes:

- The current level will change as the DOT completes current projects and moves forward with other projects during this Federal Fiscal Year (e.g., move forward with plans for GIS and data sharing).
- There are several efforts to address existing issues, but several of these efforts may be able to be coordinated (enterprise communication).

AREA 4: DATA INTEROPERABILITY AND EXPANDABILITY

This area of the assessment emphasized how roadway safety data relates to other data including, but not limited to, crash data, infrastructure data, etc. In addition, it examined whether existing datasets/systems should be expanded as new technologies and tools are developed.

Element 4A: Data Interoperability

Assessment Level: Defined (3)

State-Identified Goal: Managed (4)

Recommendations:

- Development and use of linked data is crucial to understanding the crash experience of a state. The basic linkage between crash and roadway (inventory and traffic) data is a necessary precursor to achieving higher levels in almost all of the elements of the Maturity Model. To achieve higher levels of interoperability, linkages must be established with other traffic records data sources to support analyses of the consequences of crashes (e.g., by linking crash, roadway, and injury surveillance data) and data-driven decision making in countermeasure selection (e.g., by linking crash, roadway, and citation data to examine the link between enforcement activity and safety outcomes).

- To move from defined to managed:

    - Create linked datasets including crash, roadway, and at least one other traffic records data source (e.g., injury surveillance data).

Notes:

- Oregon's strategic plan identifies a project to merge "other" traffic records data, but the following are potential challenges:

    - Funding has been the limiting factor.

    - Coordination with other agencies.

    - Data warehousing tools are needed (current computer systems may be a potential challenge).

    - Appropriate standards are needed to allow the systems to be integrated.

Element 4B: Expandability

Assessment Level: Managed (4)

State-Identified Goal: Optimizing (5)

Recommendations:

- The optimum level describes fully integrated systems that serve all business needs (at least all needs within the safety stakeholder community). Systems are designed to a single set of documented standards and are easily able to share data electronically with a minimum of human intervention. States can move from lower levels of expandability to levels 4-5 by developing and implementing strategic plans that call for implementation of enterprise-wide standards and solutions. At the same time, analytic tools (such as GIS) should be implemented that increase the users' access to state-of-the-art reporting utilities. Ultimately, states that achieve level 5 must also have plans in place to maintain optimum performance. This includes lifecycle planning and ongoing maintenance.

- To move from managed to optimizing:

    - Implement enterprise-wide systems.

    - Create fully-automated linkages among system modules/databases.

    - Support electronic data transfer between local agencies and the DOT.

Notes:

- Currently, the State's data systems are not at the level needed to support analyses using such tools as SafetyAnalyst and the methods in the HSM, but efforts are underway to achieve this capability. The major systems were recently rewritten.

Element 4C: Linkage

Assessment Level: Managed (4)

State-Identified Goal: Optimizing (5)

Recommendations:

- Optimal systems support electronic, automated linkage among data sources. In a DOT setting, most of the linkages are based on location. The states have generally started with a location coding system designed to meet the state DOT's needs for data on the roadways they maintain, and not for locally maintained roads. As states progress from lower levels (1-

2) to high levels of data linkage, the process is facilitated by adoption of a single location coding scheme for all public roadways. This is often a GIS, coordinate-based system; however, states typically also maintain some form of linear referencing system in order to define routes in order to support aggregate data analyses. At the highest level of linkage (level 5), the state has a single location coding system that applies to all public roads, and that is compatible with the statewide (or at least the agency-level) base map in the GIS.

- To move from managed to optimizing:
    - Establish a single standard location coding method.
    - Implement electronic automated linkage among key databases.

Notes:

- Oregon identified the following as a potential challenge:
    - Various methods are used to reference supplemental datasets.

Conclusion

Data represent a critical component in the decision-making process and provide a foundation for the safety management process. Oregon currently has strong safety data capabilities and high aspirations for the future. There are only two elements currently at the repeatable level (1A: Completeness and 2C: Countermeasure Selection). All other elements are at least defined, and many are managed or optimizing. The self-identified goal in nearly all cases is managed or optimizing and it appears that efforts are well underway to achieve that capability level. While the State is highly capable and comfortable with their existing capabilities in many areas, it should be recognized that these areas will require continued support to maintain the existing level. This document can serve as a baseline for measuring progress and to help guide future efforts to enhance safety data capabilities.

Appendix A: Overview of Capability Maturity Levels

This assessment process is based on the principles of the "Capability Maturity Model" – CMM. The CMM originated in the information technology arena to track the development of computer systems. CMMs are now seeing a wider application as a means for identifying phases of growth and development from a combined qualitative and quantitative perspective. This approach provides the project team the ability to subjectively assess the States. The principles of the CMM place each State into "capability categories." These categories are based on a five-point scale from less to more mature. The five maturity levels used in this analysis are listed:

- **Initial / Ad hoc:** The organization does not possess a stable implementation environment and the safety data collection, management (entering/coding, processing, and evaluating) and maintenance process is 'ad hoc' with no interconnection within the organization. Interoperability and expandability are not planned.
- **Repeatable:** Activities are based on the results of previous projects and the demands of the current one. Decisions are considered during individual projects.
- **Defined:** The process is documented throughout the organization rather than on a per-project basis. Projects are carried out under guidance of the organization's standards and are tied to an adopted strategy.
- **Managed:** Projects are started and supervised by process management. Through performance management, processes are predictable and the organization is able to develop rules and conditions regarding the quality of the products and processes.
- **Optimizing:** The whole organization is focusing on the continuous improvement. The organization possesses the means to detect weaknesses and to strengthen areas of concern proactively.

Appendix B: Action Item Template included for future State use

The following table could be populated and used for tracking and reporting individual action items.

ACTION ITEM TABLE					
Item #	**Action Item**	**Responsible Department**	**Dependency (prior action)**	**Completion Date**	**Status**
STRATEGY LEVEL ONE: Roadway Data Collection/Technical Standards					
Element 1A: *Data Collection (Completeness)*					
Current: The State maintains low-level detail (i.e., limited elements) for roadway segments for some or all State-owned roads. No other data categories are maintained (e.g., intersections, curves, etc.) The inventory files have a moderate to large amount of missing or blank fields.					
State-identified goal:					
1.1A.1	Ensure that the inventory includes all state-maintained roads		None	mm/dd/yyyy	Xxx
1.1A.2	Ensure that the inventory includes all state and local-maintained roads.			mm/dd/yyyy	xxx
1.1A.3	---etc.--				
*Element **1B***: *Data Collection (Timeliness)*					
Current: The State has no standardized procedure for updating the inventory files. Changes to the files are only made when they come to the attention of the file maintainer.					
State-identified goal:					
1.1B.1	Develop a standard method for updating roadway inventory files.		1.1A.1	mm/dd/yyyy	xxx
1.1B.2	Develop a voluntary notification method so that the field can alert the inventory file maintainer of changes.			*Projected:* mm/dd/yyyy	xxx

*Element **1C**: Data Collection (Accuracy)*
Current: The State has no measure of the accuracy of their inventory data and the accuracy of the data is felt to be low. There is no external verification with field data and no internal verification with checks for reasonableness.
State-identified goal:

Appendix C: Description of Capability Maturity Level and Actions by Area and Element

Area 1: Roadway Data Collection/Technical Standards

Element 1A: Completeness

Maturity Level	Maturity Level Description (Completeness)
Optimizing (5)	The State maintains high level detail (maximum inventory elements) for all categories (segments, intersections, curves, grades, and interchange/ramps) for all public roads in the State. The inventory files have very few missing or blank fields (i.e., less than 5%).
Managed (4)	The State maintains high level detail (maximum inventory elements) for all categories (segments, intersections, curves, etc.) for all State-owned roads and moderate level of detail for some categories (segments, intersections, curves, etc.) for some non-State road mileage. The inventory files have very few missing or blank fields (i.e., less than 5%).
Defined (3)	The State maintains high level detail (maximum inventory elements) for at least segments, and for either intersections or curves for all State-owned roads. The inventory files have very few missing or blank fields (i.e., less than 5%).
Repeatable (2)	The State maintains either a high level of detail on roadway segments or a moderate level detail for roadway segments and at least one other data category (intersections, curves, etc.) for all State-owned roads. The inventory files have no more than a moderate amount of missing or blank fields.
Initial (1)	The State maintains low level detail (i.e., limited elements) for roadway segments for some or all State-owned roads. No other data categories are maintained (e.g., intersections, curves, etc.) The inventory files have a moderate to large amount of missing or blank fields.

Maturity Level	Actions to Increase Levels (Completeness)
Optimizing (5)	Continue maintenance of the data collection cycle for all roadways. Continue and/or develop new data quality metrics
Managed (4)	Pursue a complete inventory for all public roads by collecting data for local roads and increase the level of detail for all roadways (state and local) to include high level of detail for all roads, not just state-maintained)
Defined (3)	Develop a local roads inventory database with at least a moderate level of detail on the local roadways.
Repeatable (2)	Reduce the frequency of missing or blank data fields on state-maintained roadways in the inventory to less than 5%. Pursue high level of detail on all segments as well as either intersections or curves on state-maintained roadways.
Initial (1)	Ensure that the inventory includes all state-maintained roads. Increase the level of detail to at least the moderate level for segments plus at least one other data category (intersections, curves, etc.). Moderate level would include most of the Fundamental Data Elements.

Element 1B: Timeliness

Maturity Level	Maturity Level Description (Timeliness)
Optimizing (5)	The State continually updates all roadway inventory files for both new and modified roadways with a process in which descriptions or "as built" plans are submitted to the file maintainer each time a change is made or a new road is opened. The data for the affected section or locations are then updated to the computerized file within one month of completion of the change.
Managed (4)	The State continually updates all roadway inventory files for both new and modified roadways with a process in which descriptions or "as built" plans are submitted to the file maintainer each time a change is made or a new road is opened. The data for the affected section or locations are then updated to the computerized file within two - three months of completion of the change.
Defined (3)	The State updates the inventory information with an annual (or less often) survey of the entire system (e.g., the roadway system is re-inventoried over a five-year period). The new data are entered into all computerized files within three months of the inventory.
Repeatable (2)	The State's process for updating is based on volunteer reporting by field personnel. This leads to a moderate number of cases where no report is made. For changes reported, the updates made to the computer file normally take six months or longer.
Initial (1)	The State has no standardized procedure for updating the inventory files. Changes to the files are only made when they come to the attention of the file maintainer.

Maturity Level	Actions to Increase Levels (Timeliness)
Optimizing (5)	Ensure that the maintenance cycle for data is continuous and fully addresses user needs. Continue and/or develop new data quality metrics.
Managed (4)	Reduce the amount of time required for submission of as-built plans and/or for updating the database to achieve a goal of one month from completion of the roadway change.
Defined (3)	Move from annual review to continuous updating. Require submittal of as-built plans in a timely manner.
Repeatable (2)	Ensure that all changes are reviewed and reported at least annually. Ensure that roadway changes are reflected in the database within three months after completion of the annual review.
Initial (1)	Develop a standard method for updating roadway inventory files. Develop a voluntary notification method so that the field can alert the inventory file maintainer of changes.

Element 1C: Accuracy

Maturity Level	Maturity Level Description (Accuracy)
Optimizing (5)	The State has a high level of accuracy in their inventory data across all categories that they maintain (segments, intersections, curves, etc.). The existing values are very accurate as determined by a frequent systematic external verification process involving field data collection (e.g., surveys, field visits, and aerial photos). The State also has developed and uses a computerized set of internal verification checks for data reasonableness.
Managed (4)	The State has a moderate to high level of accuracy in their inventory data across all categories that they maintain (segments, intersections, curves, etc.). The level of existing accuracy is verified by infrequent external verification with field data collection. The State also has developed and uses a computerized set of internal verification checks for data reasonableness.
Defined (3)	The State has a moderate level of accuracy in their inventory data across all categories that they maintain (segments, intersections, curves, etc.). The data are believed to be moderately accurate, but the State does not conduct any kind of external verification process. The State also has developed and uses a computerized set of internal verification checks for data reasonableness.
Repeatable (2)	The State has some subjective judgment of accuracy indicating a moderate level of accuracy across all categories that they maintain (segments, intersections, curves, etc.). The measure of accuracy is generally judgment based on maintainer/user familiarity with the data. There is no external verification with field data collection and no internal verification with checks for reasonableness.
Initial (1)	The State has no measure of the accuracy of their inventory data and the accuracy of the data is felt to be low. There is no external verification with field data and no internal verification with checks for reasonableness.

Maturity Level	Actions to Increase Levels (Accuracy)
Optimizing (5)	Ensure that the external verification process cycle is maintained and expanded where necessary to meet users' needs for validated accuracy levels.
Managed (4)	Increase the frequency and breadth of external verifications such that more data elements are validated more often based on data collected in the field.
Defined (3)	Establish external verification processes to compare the data in the database against data collected via field observations.
Repeatable (2)	Develop some measures of accuracy. At a minimum, the State should develop a set of internal verification checks that compare data among many fields to ensure logical consistency.
Initial (1)	Develop some measures of accuracy. At this point, it is not recommended that a state strive to achieve Level 2, as it is only marginally better than level 1. States should attempt to attain at least level 3 by developing internal validity checks for logical agreement among data fields.

Element 1D: Uniformity/Consistency

Maturity Level	Maturity Level Description (Uniformity/Consistency)
Optimizing (5)	The State has a high level of uniformity and consistency in element definitions and codes. Data coding is consistent across all State and non-State files. Procedures are in place to ensure that coding is consistent across multiple years and to ensure that particular locations on roadways can be tracked across multiple years.
Managed (4)	The State has a moderate to high level of uniformity and consistency. Data coding is consistent across all State files but not non-State files. Procedures are in place to ensure that coding is consistent for all elements across multiple years and to ensure that particular locations on roadways can be tracked across multiple years.
Defined (3)	The State has a moderate level of uniformity and consistency. Data coding is consistent across all State files but not non-State files. While procedures are in place to ensure that particular locations on roadways can be tracked across multiple years, procedures are not in place to ensure that coding for all elements is consistent across multiple years.
Repeatable (2)	The State has a moderate level of uniformity and consistency. Data coding is consistent across all State files but not non-State files. Procedures are in place to ensure that coding for most elements is consistent across multiple years, but procedures are not in place to ensure that particular locations on roadways can be tracked across multiple years.
Initial (1)	The State has a low level of uniformity and consistency. Data coding is not consistent across all State files or non-State files. There are no procedures are in place to ensure that coding is consistent across multiple years or to ensure that particular locations on roadways can be tracked across multiple years.

Maturity Level	Actions to Increase Levels (Uniformity/Consistency)
Optimizing (5)	Ensure that updates to the data collection forms and/or the database are reflected in standard data collection protocols and instruction manuals.
Managed (4)	Ensure that data coding is consistent for all public roadways (not just state-maintained roadways).
Defined (3)	Develop procedures to ensure that data elements are coded consistently across multiple years.
Repeatable (2)	Develop procedures for tracking roadway locations across multiple years in the database.
Initial (1)	Develop data coding standards and share them with all who submit or enter data. Conduct validation checks to assess uniformity/consistency across years.

Area 2: Data Analysis Tools and Uses

Element 2A: Network Screening

Element 2A: Network Screening (Method)

Maturity Level	Maturity Level Description (Network Screening – Method)
Optimizing (5)	Advanced Methods – ability to employ state-of-the-art methods for network screening. Accounts for regression-to-the-mean, exposure, and sets a performance threshold (e.g., uses an SPF to determine the "expected" level of safety). Compares the relative safety of sites with similar characteristics (i.e., need to be able to identify specific groups of sites for screening).
Managed (4)	Traditional Methods Plus – ability to use traditional screening tools such as crash rate or crash severity indices. Accounts for mean exposure and sets a performance threshold. **Does not** account for regression-to-the-mean and is misled by the non-linearity of rate (crash and traffic volume).
Defined (3)	Traditional Methods– ability to use traditional screening tools such as crash rate or crash severity indices. Accounts for mean exposure. **Does not** set a performance threshold or account for regression-to-the-mean and is misled by the non-linearity of rate (crash and traffic volume).
Repeatable (2)	Simple Methods – ability to use traditional screening tools such as crash frequency, crash rate, or crash severity indices. Does not account for regression-to-the-mean and **does not** set a performance threshold.
Initial (1)	Judgment – relies solely on input and judgment of State and local transportation staff.

Maturity Level	Actions to Increase Levels (Network Screening – Method)
Optimizing (5)	Ensure that the state validates and calibrates modern methods of network screening for local (state) use. Ensure currency with evolving methods by staying up-to-date with new releases of analytic tools, processes, and methodologies.
Managed (4)	Adoption of optimal methods is recommended. Traditional methods are prone to error and require similar levels of data as the optimal methods. The level of analytic capabilities required to adopt optimal methods is higher than for traditional methods, but the payoff in improved validity leads to their recommendation as superior.
Defined (3)	Adoption of optimal methods is recommended. Traditional methods are prone to error and require similar levels of data as the optimal methods. The level of analytic capabilities required to adopt the optimal methods is higher than for traditional methods, but the payoff in improved validity leads to their recommendation as superior. At this point, it is not recommended that a state strive to achieve Level 4, as these levels are only marginally better than level 2 or 3. States should attempt to attain level 5 by adopting optimal screening methods.
Repeatable (2)	Adoption of optimal methods is recommended. Traditional methods are prone to error and require similar levels of data as the optimal methods. The level of analytic capabilities required to adopt the optimal methods is higher than for traditional methods, but the payoff in improved validity leads to their recommendation as superior. At this point, it is not recommended that a state strive to achieve Level 3, or 4, as these levels are only marginally better than level 2. States should attempt to attain level 5 by adopting optimal screening methods.
Initial (1)	Adoption of optimal methods is recommended. Traditional methods are prone to error and require similar levels of data as the optimal methods. The level of analytic capabilities required to adopt the optimal methods is higher than for traditional methods, but the payoff in improved validity leads to their recommendation as superior.

Element 2A: Network Screening (Data)

Maturity Level	Maturity Level Description (Network Screening – Data)
Optimizing (5)	System Plus Analysis – based on roadway inventory data (e.g., ability to screen all curves or intersections of a certain type to determine sites with most promise), incorporating traffic volume data and crash data along with citation, driver, or injury outcome data.
Managed (4)	System Analysis – based on roadway inventory data (e.g., ability to screen all curves or intersections of a certain type to determine sites with most promise), incorporating traffic volume data and crash data (e.g., use of SafetyAnalyst).
Defined (3)	Crash-Based Plus – based on crash data with traffic or roadway inventory linked. Difficult to identify "zero-crash" locations.
Repeatable (2)	Crash-Based – based on crash data only (or fatal crash only). Does not link traffic or roadway inventory data.
Initial (1)	Solicited Input – severe lack of crash data. Must rely on input from district/county/local staff or citizen complaints to identify sites for improvement.

Maturity Level	Actions to Increase Levels (Network Screening – Data)
Optimizing (5)	Ensure ongoing availability and use of linked data from multiple traffic records data sources.
Managed (4)	Develop additional linkages between crash and other relevant traffic records databases (citation, driver, vehicle, injury surveillance, etc.)
Defined (3)	Ensure linkage of crashes with *both* traffic and roadway inventory data. Ensure sufficient linked database coverage to include locations with zero crash frequency.
Repeatable (2)	If only fatal crash data are used, work to ensure that data at all levels of crash severity are obtained and used. Develop linkages between crash and roadway data (traffic and inventory).
Initial (1)	Work to obtain sufficient crash data to support safety analysis. The data should include all levels of severity and cover all public roads.

Element 2A: Network Screening (Coverage)

Maturity Level	Maturity Level Description (Network Screening – Coverage)
Optimizing (5)	Public Plus – ability to include all public roads in the network screening process plus other roadways that are not publicly owned (toll-roads, military bases, Indian reservations, etc).
Managed (4)	Public – ability to include all public roads in the network screening process.
Defined (3)	State Plus – ability to include all State-maintained roads in the network screening process plus some non-State-maintained roads.
Repeatable (2)	State – ability to include all State-maintained roads in the network screening process.
Initial (1)	Less than State – ability to include only a portion of State-maintained roads in the network screening process.

Maturity Level	Actions to Increase Levels (Network Screening – Coverage)
Optimizing (5)	Ensure ongoing support for inclusion of all accessible trafficways and maintain a common location coding mechanism so that inventory, traffic, and crash data may continue to be linked.
Managed (4)	Include non-publicly owned roads (toll roads, military bases, tribal lands, etc) in the roadway inventory, traffic, and crash databases.
Defined (3)	Ensure that all public roads are included in the roadway inventory, traffic, and crash databases. This will generally require a means of assigning location codes based on a common standard.
Repeatable (2)	Add critical local (non-state-maintained) roads to the databases. Many states that lack full local road coverage in their inventory have added all HPMS sample segments to their roadway inventory, for example.
Initial (1)	Identify gaps in the current databases and enhance the systems to include all state-maintained roads.

Element 2B: Diagnosis

Maturity Level	Maturity Level Description (Diagnosis)
Optimizing (5)	Ability to generate relevant statistics and summaries for any specific site or corridor (includes all public roads). Statistics include total crashes for a given study period by type, severity, time of day, day of week, date, road condition (dry, wet, etc), lighting condition (light, dark-lit, dark-unlit, etc), weather condition (clear, rain, snow), and driver impairment. Summaries include the ability to generate a condition diagram (shows roadway and roadside characteristics) and a collision diagram (shows locations of crashes relative to the study section and vehicle movements and other elements found in the crash report). Can calculate over-representation of crashes – similar to SafetyAnalyst. Roadway data should be sufficient to generate a reliable condition diagram without site-specific field measurements. Roadway data for the condition diagram may include lane width, shoulder width, lighting presence, traffic control, signal phasing, posted speed, etc.
Managed (4)	Ability to generate a portion of the relevant statistics listed above for any specific site or corridor (includes all public roads). State has the ability to generate a collision and a condition diagram, although some of the data for the condition diagram may have to be measured in the field or obtained from aerial imagery (i.e., are not available as electronic database).
Defined (3)	Ability to generate relevant statistics and summaries for a portion of the network. Statistics include total crashes for a given study period by type, severity, time of day, day of week, date, road condition (dry, wet, etc), lighting condition (light, dark-lit, dark-unlit, etc), weather condition (clear, rain, snow), and driver impairment. Summaries include the ability to generate a condition diagram (shows roadway and roadside characteristics) and a collision diagram (shows locations of crashes relative to the study section). Some of the data for the condition diagram may have to be measured in the field or obtained from aerial imagery (i.e., are not available as electronic database).
Repeatable (2)	Ability to generate a portion of the relevant statistics listed above for a portion of the network. State also has the ability to generate a collision or condition diagram.
Ad-hoc (1)	Very limited ability to generate statistics for any portion of the network. State may have difficulty generating a collision or condition diagram. Must rely heavily on site visits to assess potential safety issues.

Maturity Level	Actions to Increase Levels (Diagnosis)
Optimizing (5)	Ensure that detailed data on roadway features/attributes are maintained on a sufficient schedule to meet users' needs.
Managed (4)	Develop feature-specific reports of over-representation in crashes. Enhance the roadway data to support generation of condition diagrams solely from database contents.
Defined (3)	Develop reports for all public roadways.
Repeatable (2)	Develop comprehensive summary reports describing site-specific crash experience. Ensure that both collision and condition diagrams can be generated for any site of interest.
Ad-hoc (1)	Develop analytic reports to summarize crash experience at specific sites of interest.

Element 2C: Countermeasure Selection

Maturity Level	Maturity Level Description (Countermeasure Selection)
Optimizing (5)	State has the ability to determine all existing safety-related infrastructure attributes for any specific site or corridor (includes all public roads) without a site visit. Includes complete roadway data for intersections, curves, tangents, interchanges, and at-grade rail crossings. Also includes peripheral safety databases such as sign inventory, lighting presence and condition, pavement condition, presence and condition of pavement markings, etc.
Managed (4)	State has the ability to determine a portion of the existing safety-related infrastructure attributes for any specific site or corridor (includes all public roads). May require a site visit or use of aerial imagery to determine certain attributes.
Defined (3)	State has the ability to determine all existing safety-related infrastructure attributes for a portion of the network. Includes peripheral safety databases such as sign inventory, lighting presence and condition, pavement condition, presence and condition of pavement markings, etc. for that portion of the network.
Repeatable (2)	State has the ability to determine a portion of the existing safety-related infrastructure attributes for a portion of the network. May require a site visit or use of aerial imagery to determine certain attributes.
Initial (1)	Very limited ability to determine existing safety-related infrastructure attributes for any portion of the network. Must rely heavily on site visits to assess potential safety issues.

Maturity Level	Actions to Increase Levels (Countermeasure Selection)
Optimizing (5)	Maintain the data on roadway safety-related infrastructure attributes on a cycle that meets the needs of users.
Managed (4)	Include all public roads in the inventory at the same high level of detailed safety-related infrastructure attributes.
Defined (3)	Include all public roads in the inventory at the same high level of detailed safety-related infrastructure attributes.
Repeatable (2)	Enhance the roadway inventory to include a full data element list of all safety-related infrastructure attributes.
Initial (1)	Develop/enhance the roadway inventory database to expand coverage of the network and features (safety-related infrastructure).

Element 2D: Evaluation

Element 2D: Evaluation

Maturity Level	Maturity Level Description (Evaluation)
Optimizing (5)	Project Level: Ability to conduct a rigorous before-after project-level evaluation, accounting for regression-to-the-mean, traffic volume trends, and temporal trends (i.e., changes over time other than the treatment or project of interest). State has the ability to perform this type of evaluation for **any** project (i.e., requires data on all roads in the State). This type of evaluation is carried out by applying the empirical Bayes before-after observational study. Requires installation data and 5+ years of historical crash and respective annual traffic volume data for treatment and non-treatment sites, and will develop SPFs for the evaluation study. Program Level: Ability to evaluate the effectiveness of **specific** programs, including the cost and potential benefit. Requires project level data to identify the number of projects by type (so projects can be associated with a specific program), the cost of projects by type, and the relative timeframe of installation. Also requires crash data on a statewide basis with information on specific crash types and contributing factors. Exposure data (e.g., VMT) are available to account for changes over time and 5+ years of crash data are available to account for other time trends.
Managed (4)	Project Level: Ability to conduct a rigorous before-after project-level evaluation, accounting for regression-to-the-mean, traffic volume trends, and temporal trends (i.e., changes over time other than the treatment or project of interest). State has the ability to perform this type of evaluation for **some** projects (i.e., requires data on a subset of roads in the state). This type of evaluation is carried out by applying the empirical Bayes before-after observational study. Requires installation data and 5+ years of historical crash and respective annual traffic volume data for treatment and non-treatment sites, and will develop SPFs for the evaluation study. Program Level: Ability to evaluate the effectiveness of **specific** programs, including the cost and potential benefit. Requires project level data to identify the number of projects by type (so projects can be associated with a specific program), the cost of projects by type, and the relative timeframe of installation. Also requires crash data on a statewide basis with information on specific crash types and contributing factors. **One** of the following is also available: 1. Exposure data (e.g., VMT) are available to account for changes over time. 2. 5+ years of crash data are available to account for other time trends (5+ years of data helps to establish trends versus 4 or fewer years).
Defined (3)	Project Level: Ability to conduct cross-sectional project-level evaluations. The State has crash, traffic volume, and roadway data for specific projects. An empirical Bayes analysis is not possible because either the State does not track the specific installation date **OR** there are fewer than 5 years of historical data available for analysis (not enough years to develop stable estimates of expected crashes in the before and after period). Program Level: Project-level data are available, but incomplete. May not include cost data, exposure data, or may not have 5+ years of crash data available for analysis.
Repeatable (2)	Project Level: Ability to conduct a simple before-after project-level evaluation. Accounts for traffic volume changes, but **does not** account for regression-to-the-mean or temporal trends (i.e., changes over time other than the treatment/project of interest). Installation, crash, and traffic volume data are available for the treatment site(s) of interest, but not for a reference/comparison group (i.e., non-treatment sites). Program Level: Crash data are available for at least all State-maintained roads to evaluate the **overall performance** of the State, but **not at the project level** to determine the effectiveness of a specific program.
Initial (1)	Project Level: Ability to conduct a simple before-after or anecdotal project-level evaluation. **Does not** account for regression-to-the-mean, traffic volume trends, or temporal trends (i.e., changes over time other than the treatment/project of interest). Installation and crash data are available for the treatment site(s) of interest, but not for a reference/comparison group (i.e., non-treatment sites). Program Level: Anecdotal program-level evaluation. Data are not available to support specific program evaluations.

Maturity Level	Actions to Increase Levels (Evaluation)
Optimizing (5)	Ensure that the data refresh cycle is maintained and meets the needs of users. Ensure that the refresh cycle for data is sufficient to meet users' needs.
Managed (4)	Develop a complete inventory and safety-project tracking mechanism for all public roads. Ensure that a 5+ year history is available for all locations in the database. Develop *both* traffic volume and crash data history for all public roadways.
Defined (3)	Ensure that installation dates are tracked for all safety-related countermeasures. Develop a five-year minimum historical database for crashes and traffic volume data. Ideally, the databases would cover all public roads, but could be accomplished by collecting data for a specific subset of roadway locations. Develop methods of analyzing cost/benefit of projects/programs. Ensure that all safety-related programs are tracked by installation date, location, and relevant program. Move toward collection of statewide data for crash and traffic volume. Maintain historical data for at least one of these.
Repeatable (2)	Develop a comprehensive dataset to include non-treatment sites as a reference/comparison group. Ideally, this would include data on all public roads, but could be accomplished by collecting evaluation data on selected sites, some of which remain untreated. Develop the ability to track project/program-level outcomes. Ideally, project-level data will include 5+ years of crash data, project implementation dates and cost, and project-specific traffic volume estimates.
Initial (1)	Develop datasets supporting analyses that can account for changes in travel volume over time. Develop data resources to support statewide safety evaluation. This should include crash, statewide traffic volume estimates.

Element 2E: Accessibility

Maturity Level	Maturity Level Description (Accessibility)
Optimizing (5)	State has a formal process for requesting data and the ability to provide data to all safety partners, **including** the public, within a defined timeline.
Managed (4)	State has an informal process for requesting data and the ability to provide data to all safety partners.
Defined (3)	State has a formal process for requesting data and the ability to provide data to some safety partners within a defined timeline.
Repeatable (2)	State has an informal process for requesting data and the ability to provide data to some safety partners.
Initial (1)	Few individuals within the DOT are granted access to the data.

Maturity Level	Actions to Increase Levels (Accessibility)
Optimizing (5)	Ensure that the needs of new/infrequent users are addressed by agency policies and procedures.
Managed (4)	Formalize the data request process.
Defined (3)	Develop policies and procedures to meet the data needs of all safety partners.
Repeatable (2)	Develop data access policies to broaden the list of who may have direct access to the data, and how others may make requests for data. The policies should address any requirements to review requests and collect signatures on release statements.
Initial (1)	Develop data access policies to broaden the list of who may have direct access to the data, and how others may make requests for data. The policies should address any requirements to review requests and collect signatures on release statements.

Area 3: Data Management and Governance

Element 3A: People

Maturity Level	Maturity Level Description (People)
Optimizing (5)	A data governance council or data governance board exists at the State to direct the data management activities of the State (This is in addition to a TRCC – the TRCC would report to this governance council/board). Data champions have been identified in each business area of the State. Organization has "zero defect" (i.e. corrected immediately) policies for data collection, use, and management. People in the state are fully engaged in continuous improvement related to data management and performance measures. Staff across the State are actively involved in recommending changes for data management policies, standards, and procedures, as business needs change and new performance management goals are identified. Communities of interest, which are comprised of internal and external users and stakeholders for core data programs, have been defined.
Managed (4)	The State has strong executive and senior management support for data governance. Data governance has executive-level sponsorship with direct CEO support. Business users take an active role in data strategy and delivery. A data quality or data governance group works directly with data stewards, application developers and database administrators.
Defined (3)	Data stewards emerge as the primary implementers of data management strategy and work directly with cross-functional teams to enact data quality standards. Some personnel in the information technology (or similar) office of an agency currently participate in the development and implementation of a data management program for the State. Staff across the State are aware of the data management program and use the program routinely for the collection and use of data within the State. Executive-level decision-makers begin to view data as a strategic asset. Management understands and appreciates the role of data governance – and commits personnel and resources.
Repeatable (2)	Success depends on a group of database administrators or other employees. Individuals create useful processes for data quality initiatives, but no standard procedures exist across functional areas. Some personnel in the State are aware of the need for a formal data management program and/or processes to support performance management but are not involved in developing such a program. Business analysts are removed from development of data quality rules. Work teams have been identified in several offices across State agencies to participate in the development and implementation of a data management program. Little corporate management buy-in to the value of data or to an enterprise-wide approach to data quality or data integration
Initial (1)	The State is not aware of the need for an institutional arrangement or organizational structure to support data governance. Management and staff across the State do not recognize a specific need for a data management program to support performance management. The State does not have strong executive level support for data governance. No management input or buy-in on data quality problems Executives are unaware of data problems or blame IT entirely. Success depends on the competence of a few individuals Organization relies on personnel who may follow different paths within each effort to reconcile and correct data.

Cambridge Systematics et al., *NCHRP Report 666:* Target-Setting Methods and Data Management to Support Performance-Based Resource Allocation by Transportation Agencies. Transportation Research Board of the National Academies. Washington, DC. 2010.
Dataflux Corporation. The Data Governance Maturity Model: Establishing the People, Policies and Technology That Manage Enterprise Data. http://www.fstech.co.uk/fst/whitepapers/The_Data_Governance_Maturity_Model.pdf, 2007.

Maturity Level	Actions to Increase Levels (People)
Optimizing (5)	Periodically assess users' needs to ensure that emerging concerns are addressed and that the system evolves along with the changes in users' needs and expectations.
Managed (4)	Implement "zero defects" data quality management policies. Establish liaison relationships between the data governance group and the state TRCC. Establish feedback mechanisms among users, collectors, and data managers.
Defined (3)	Create a data governance group composed of agency executives and senior management. Ensure cross-functional user input into data improvement decision-making. Establish liaison between the data governance group and data improvement project managers.
Repeatable (2)	Create or use existing cross-functional teams (e.g., the state Traffic Records Coordinating Committee, executive panels, etc.) to develop data quality standards and data improvement project review and coordination.
Initial (1)	Ensure that data custodians and IT support staff are filling necessary roles with respect to managing data quality and system improvement projects.

Element 3B: Policies

Maturity Level	Maturity Level Description (Policies)
Optimizing (5)	New initiatives are only approved after careful consideration of how the initiatives will impact the existing data infrastructure. Automated policies are in place to ensure that data remains consistent, accurate and reliable throughout the enterprise.
Managed (4)	Goals shift from problem correction to prevention. Real-time activities and preventive data quality rules and processes emerge. A service oriented architecture (SOA) encapsulates business rules for data quality and identity management. Data metrics are measured against industry standards to provide insight into areas needing improvement. An enterprise Data Business Plan has been developed to support management of core data programs across the agency and has been incorporated into the overall State strategic plan. The State has developed and published a Data Governance manual or handbook which identifies the roles and responsibilities of staff in the state to support data governance operations. It has developed a data catalog with data definitions, standards, policies, and procedures for the collection and use of data in the organization. The catalog is available on an enterprise basis electronically.
Defined (3)	Rules for data governance emerge, but the emphasis remains on correcting data issues as they occur. Within groups and departments, tasks and roles are standardized. Data governance processes are built. A number of State agencies have implemented a Data Business Plan to manage the core data programs for their area. Data metrics are sometimes measured against industry standards to provide insight into areas needing improvement
Repeatable (2)	Data quality is project focused only, with limited defined data quality processes. "Firefighting mode." Address problems as they occur through manually-driven processes. Most data management processes are short-range and focus on recently discovered problems. Data and data processing is siloed – systems operate independently. Resources are not optimized due to redundant, outdated data. State senior management recognizes the need for a Data Business Plan to manage critical data programs; however, a plan has not yet been developed or the State is developing a Data Business Plan to support management of strategic data programs.
Initial (1)	The State does not have a Data Business Plan in place to support management of core data programs. The State does not have defined roles, such as data stewards, stakeholders, business owners (of data), and communities of interest, to support a data governance framework. Data quality is non-existent, with no defined data quality processes

Cambridge Systematics et al., *NCHRP Report 666:* Target-Setting Methods and Data Management to Support Performance-Based Resource Allocation by Transportation Agencies. Transportation Research Board of the National Academies. Washington, DC. 2010.
Dataflux Corporation. The Data Governance Maturity Model: Establishing the People, Policies and Technology That Manage Enterprise Data. http://www.fstech.co.uk/fst/whitepapers/The_Data_Governance_Maturity_Model.pdf, 2007.

Maturity Level	Actions to Increase Levels (Policies)
Optimizing (5)	Adjust policies to ensure that they help, and do not hinder, legitimate progress in system development or enhancement.
Managed (4)	Establish formal policies for approval of all new data management initiatives.
Defined (3)	Develop problem prevention strategies. Benchmark data quality against industry standards. Publish a Data Governance manual/handbook. Develop a data catalog.
Repeatable (2)	Develop a Data Business Plan for managing core data programs in each agency. Empanel a data governance group charged with developing data governance processes.
Initial (1)	Develop defined roles for data stewards (custodians of data resource), business owners of the data, communities of interest, stakeholders, and others.

Element 3C: Technology

Maturity Level	Maturity Level Description (Technology)
Optimizing (5)	Data are continuously inspected – and any deviations from standards are resolved immediately. Ongoing data monitoring helps the data stewards maintain data integrity. The use of technology and tools in the State improves the overall management of programs in the State, in accordance with the strategic mission, goals, and targets. Data models capture the business meaning and technical details of all corporate data elements. Performance management tools, such as dashboards and scorecards, are used in every involved office of the State to monitor the progress of State programs in meeting the State mission and goals. Performance measures and targets are adjusted as needed and displayed on the State dashboard, or similar mechanism, to maintain peak program performance across the State.
Managed (4)	A data stewardship group maintains corporate data definitions and business rules. Data quality and data integration tools are standardized across the organization. All aspects of the organization use standard business rules created and maintained by designated data stewards. More real-time processing is available and data quality functionality is shared across different operation modes. The State uses Service Oriented Architecture (SOA) as the enterprise standard and Open Database Connectivity (ODBC) in the development of new applications to support future integration of applications.
Defined (3)	Database administration tactics emerge. Tactical data quality tools are often available. Applications utilize data quality technology. The State uses information technology tools on a widespread basis, including such applications as an enterprise data warehouse, GIS systems which integrate business data from various offices, and dashboards and scorecards delivered through a web-enabled interface for access state-wide.
Repeatable (2)	Data cleansing and standardization occurs only in isolated data sources. Data improvement is focused on single applications. Agencies have delegated the responsibility to a specific office, such as Information Technology, to determine what IT tools are needed to support data management across the agency. Most data are not integrated across business units; some departments attempt isolated integration efforts. Agencies have implemented some information technology tools, including GIS, data models, data repositories, data dictionaries, etc., to support data management in certain offices of the agency.
Initial (1)	The State does not have any information technology tools in place to support data management. No data profiling, analysis or auditing is used

Cambridge Systematics et al., *NCHRP Report 666: Target-Setting Methods and Data Management to Support Performance-Based Resource Allocation by Transportation Agencies.* Transportation Research Board of the National Academies. Washington, DC. 2010.
Dataflux Corporation. The Data Governance Maturity Model: Establishing the People, Policies and Technology That Manage Enterprise Data. http://www.fstech.co.uk/fst/whitepapers/The_Data_Governance_Maturity_Model.pdf, 2007.

Maturity Level	Actions to Increase Levels (Technology)
Optimizing (5)	Review policies, standards, goals, and targets periodically to ensure that user' needs are addressed sufficiently and that the state's standards evolve in response to changing needs.
Managed (4)	Implement continuous monitoring. Develop a statewide data quality dashboard. Develop data models covering all systems' data elements.
Defined (3)	Develop and maintain data definitions and business rules. Standardize all data quality and data integration tools statewide. Adopt Service Oriented Architecture and Open Database Connectivity as standards.
Repeatable (2)	Develop multi-agency strategies for standardization and coordination of system improvements. Adopt statewide (or multi-agency) standards for IT tools related to data management support.
Initial (1)	Ensure that IT staff within any particular agency is aware of agency standards and have access to a standard set of tools.

Area 4: Data Interoperability and Expandability

Element 4A: Interoperability

Maturity Level	Maturity Level Description (Interoperability)
Optimizing (5)	Safety analysis uses linked data sets from sources including roadway, crash, injury surveillance, citation, and/or others. The linked data sets are considered reliable for supporting decision making. Analysis of merged data is a regular feature of safety analysis
Managed (4)	Safety analyses using linked datasets from roadway, crash and at least one other traffic records data source are supported. Though not a standard feature of all safety analyses in the State, such analyses of merged data are not uncommon or difficult to find
Defined (3)	Safety analysis using merged data from roadway and crash records is common, but other analyses (for example, using injury surveillance data) are rare.
Repeatable (2)	Safety analysis using merged roadway and crash data is the performed for some, but not all roadway/roadway types. Other examples of analyses using merged datasets are rare and not well used in support of safety decision making
Initial (1)	There are few or no examples of safety analysis using merged datasets. The reliability of the linkage between roadway and crash data is considered to be problematic.

Maturity Level	Actions to Increase Levels (Interoperability)
Optimizing (5)	Identify new opportunities to merge datasets. Continue to encourage use of linked data in safety analysis.
Managed (4)	Encourage use of linked data in analyses, especially those related to crash consequences, crash/injury severity associated with various crash and roadway contributing factors, and others.
Defined (3)	Create linked datasets including crash, roadway, and at least one other traffic records data source (e.g., injury surveillance data).
Repeatable (2)	Encourage use of linked crash and roadway data for safety analyses.
Initial (1)	Create linked datasets of crash and roadway (inventory and traffic) data.

Element 4B: Expandability

Maturity Level	Maturity Level Description (Expandability)
Optimizing (5)	Within the State DOT, modern database design and enterprise-wide planning mean that adding coverage or data elements is built in to systems and thinking about systems improvements. Data transfers among agencies (especially local and State) are primarily electronic and automated as fully as possible. Linkage among systems is accomplished primarily in an automated fashion. Analytic tools are fully integrated and "seamless" access is provided to users. Full spatial analysis capabilities are available.
Managed (4)	Within the State DOT Systems are written in modern languages with modern database structures/designs. Adding new data elements or additional roadway miles/segments is generally easy, but may have been done separately for some system components. There are common platforms, but not a single system for enterprise-wide databases or software. Data linkage is generally automated among the DOT's main systems, but some data sources require manual effort to convert to a common location coding scheme. Analytic tools (including GIS) exist and some capability for spatial analysis exists. Expansion of systems would be difficult, but not impossible to coordinate.
Defined (3)	Within the State DOT system components are of mixed vintage, built to different standards and are separately maintained. Adding new data elements or additional roadway miles/segments is possible, but will have been done separately for some system components. Movement is toward a common standard for software and database, but the implementation of full integration, enterprise-wide solutions is several years in the future. Some data linkage is automated, but some is manual and labor intensive. Expansion of the older systems is considered too expensive and not worth the effort given their eventual replacement is planned. For critical expansions, a minimal design to get the job done is the standard. Newer systems are easily expandable. Spatial data are really just used in visualization of layers in the GIS – no (or very limited) spatial analysis capabilities.
Repeatable (2)	Within the State DOT, a small number of systems are modern, and the rest are considered legacy. Adding new data elements or additional roadway miles/segments is difficult and piecemeal. The plans for replacement of older components are "long term", not currently funded, or stalled. Data linkage is difficult requiring many different "mappings" among location coding schemes and system designs. Much of the work is manual or simply not performed. Spatial display of data is limited and not well-integrated into safety analysis efforts.
Initial (1)	Within the State DOT, the majority of data sources are stand-alone systems, of varying vintage, design, and software. Adding new data elements or additional roadway miles/segments is usually not done. Data linkage is either difficult or impossible, depending on the system components in question. Linkage to external (outside the DOT) sources is not generally possible. Use of GIS in safety analysis is limited, not covering a significant portion of the public roads, crashes, or other key data.

Maturity Level	Actions to Increase Levels (Expandability)
Optimizing (5)	Plan for system lifecycle and maintenance to ensure that systems remain up-to-date. Aid local agencies in maintaining compatibility with evolving statewide systems.
Managed (4)	Implement enterprise-wide systems. Create fully automated linkages among system modules/databases. Support electronic data transfer between local agencies and the DOT.
Defined (3)	Plan for enterprise-wide system architecture. Implement GIS standard tools for visualization and spatial analysis.
Repeatable (2)	Develop a “near term” plan for system modernization, including funding for the effort. Ideally, the plan will incorporate standardized systems, moving toward an enterprise-wide solution. Develop automated linkages among the new/updated systems.
Initial (1)	Plan for the development of modern systems using a single standard. It is recommended that the plan be designed for achievement of at least level 4, but recognizing that the state may pass through levels 2 and 3 on the way to achieving higher levels.

Element 4C: Linkage

Maturity Level	Maturity Level Description (Linkage)
Optimizing (5)	All of the key roadway inventory and supplemental data bases are linked. A single method of location coding is used.
Managed (4)	The major inventory and supplemental databases are linked. While more than one location coding method is used, the translation among methods is automated and works well.
Defined (3)	Some key safety data sources are not linked. More than one location coding method is used and there are some incompatibilities among them.
Repeatable (2)	Most of the data sources are not linked. Multiple incompatible location coding methods are used.
Initial (1)	There is little or no linkage. Location coding is not standardized or accurate

Maturity Level	Actions to Increase Levels (Linkage)
Optimizing (5)	Maintain the location coding system to be compatible with the statewide (or State DOT) GIS base map.
Managed (4)	Establish a single standard location coding method. Implement electronic automated linkage among key databases.
Defined (3)	Develop accurate translations among all the location codes in use. Link all location-based data using the standard location coding method.
Repeatable (2)	Develop standard location coding for all public roads. Develop methods of cross-referencing locations in the varied location coding methods that are in use, especially with regard to state-maintained roads and HPMS sample segments.
Initial (1)	Develop standard location coding for state-maintained roads. Implement linkage for state-maintained roads

Appendix D: Potential Funding Sources (link to website)

Rank	Funding Pools	Description/Objectives	Specific Data Types	Annual Funding	Federal Share
+++	State Traffic Safety Information System Improvement Grants (Sec 408) National Highway Traffic Safety Administration (NHTSA)	Encourage States to adopt and implement effective programs to improve the timeliness, accuracy, completeness, uniformity, integration and accessibility of State data; to evaluate the effectiveness of efforts to make such improvements; to link these State data systems, including traffic records, with other data systems within the State; and to improve the compatibility of the State data systems with national data systems and data systems of other States to enhance the ability to observe and analyze national trends in crash occurrences, rates, outcomes, and circumstances.	Any	Varies per state: $500,000 to $2,344,000. The amount available for each state in 2010: http://www.ghsa.org/html/stateinfo/programs/funding10.html	80%
+++	Highway Research and Development Program Federal Highway Administration (FHWA)	To carry out the highway research and development program as authorized by SAFETEA-LU. To conduct research needed to maintain and grow our vital transportation infrastructure. SAFETEA-LU addresses the many challenges facing our transportation system today challenges such as improving safety, reducing traffic congestion, improving efficiency in freight movement, increasing intermodal connectivity, and protecting the environment as well as laying the groundwork for addressing future challenges.	Any (ASSUMPTION based in "improving safety" objective))	$14 M (total for FY 2010) Range and Average of Financial Assistance: varies by project	100%

+++	Highway Planning and Construction Federal Highway Administration (FHWA)	To assist State transportation agencies in the planning and development of an integrated, interconnected transportation system important to interstate commerce and travel by constructing and rehabilitating the National Highway System (NHS), including the Eisenhower Interstate System; and for transportation improvements to most other public roads; to provide aid for the repair of Federal-aid highways following disasters; to foster safe highway design; to replace or rehabilitate deficient or obsolete bridges; and to provide for other special purposes.	Any (ASSUMPTION based on "foster safe highway design, and planning / development of an integrated system)	2011 Estimate: Grants $43,163,321; Highway Infrastructure Investment $13,000.	100%
+++	State and Community Highway Safety Grants (Sec 402) National Highway Traffic Safety Administration (NHTSA)	The program is intended to assist states and communities in the development and implementation of highway safety programs designed to reduce traffic crashes, deaths, injuries and property damage. 402 funds can be spent in nine national priority areas: Alcohol countermeasures | Occupant protection | Police traffic services (e.g. enforcement) | Emergency medical services | Traffic records | Motorcycle safety | Pedestrian and bicycle safety (jointly administered by FHWA and NHTSA) | Non-construction aspects of roadway safety (administered by FHWA) | Speed control (jointly administered by NHTSA and FHWA)	Any data supporting highway safety programs (ASSUMPTION based on description referring to traffic records and non-construction aspects of roadway safety)	Varies per state: $587,175 to $21,376,394 Values for FY 2010	80%

+++	National Highway Transportation Safety Administration (NHTSA) Discretionary Safety Grants National Highway Traffic Safety Administration (NHTSA)	Conduct research on all phases of highway safety and traffic conditions, including accident causation, highway or driver characteristics, communications , and emergency care; Conduct ongoing research into driver behavior and its effect on traffic safety; Conduct research on, launch initiatives to counter, and conduct demonstration projects on fatigued driving by drivers of motor vehicles and distracted driving in such vehicles, including the effect of electronic devices and other factors have on driving; etc...	Any roadway/ traffic/safety / medical data (ASSUMPTION based on the description referring to research on highway safety and traffic conditions.)	$40 M (total estimated for FY 2011)	100%
+++	Highway Safety Improvement Funds (Sec 130, 149) Federal Highway Administration (FHWA)	The overall purpose of this program is to achieve a significant reduction in traffic fatalities and serious injuries on all public roads through the implementation of infrastructure-related highway safety improvements.	data to evaluate infrastructure programs (ASSUMPTION based on the fact that reliable data systems play an important role in the safety improvement process, any infrastructure-related data (Including crash data) could be addressed.)	$1,296 M Total funding for FY 2009 Each State will receive at least ½ of 1 percent of the funds apportioned for the HSIP (see comments).	90% 100% for certain safety improvements listed in 23 USC 120(c)

+++	Crash Data Improvement Program (CDIP) Federal Highway Administration (FHWA)	The CDIP is intended to provide states with a means to measure the quality of the information within their crash database. It is intended to provide the states with metrics that can be used to establish measures of where their crash data stands in terms of its timeliness, the accuracy and completeness of the data, the consistency of all reporting agencies reporting the information in the same way, the ability to integrate crash data with other safety databases and how the state makes the crash data accessible to users. Additionally, the CDIP was established to help familiarize the collectors, processors, maintainers and users with the concepts of data quality and how quality data helps to improve safety decisions.	Crash data	Up to $50,000 (one-time assistance)	80%
++	State Planning and Research Federal Transit Administration (FTA)	To assist in the development of cost effective multimodal transportation improvement programs which include the planning, engineering, and designing of Federal Transit projects, and other technical studies in a program for a unified and officially coordinated Statewide Transportation system.	Any data that can be used to improve effectiveness of transportation programs (ASSUMPTION based on the description of the grant)	$45,000 to $1,000,000 plus per State based on a statutory formula.	80%

++	Safety Data Improvement Program Federal Motor Carrier Safety Administration (FMCSA)	The objectives are to fund State programs designed to improve the overall quality of commercial motor vehicle (CMV) data, specifically to increase the timeliness, efficiency, accuracy and completeness of processes and systems related to the collection and analysis of large truck and bus crash and inspection data. Examples of uses for funding include: hire staff to manage data quality improvement programs, revise outdated crash report forms, hire staff to code and enter safety data, train law enforcement officers in collecting crash data, develop software to transfer data from the State repository SAFETYNET and purchase software for field data collection and data transfer.	CMV crash and inspection data	$5,000 - $500,000 (Total of $3M anticipated for FY 2011)	80%
++	Motor Carrier Research And Technology Programs Federal Motor Carrier Safety Administration (FMCSA)	Through the R&T program, FMCSA seeks to reduce the number and severity of crashes to reduce injuries and fatalities contributing to a safe and secure commercial transportation network. The R&T program is targeting crashes involving CMVs and the efficiency of CMV operations through conducting systematic studies directed toward fuller scientific discovery, knowledge, or understanding, adopting, testing, and deploying innovative driver, carrier, vehicle, and roadside best practices and technologies, and expanding the knowledge and portfolio of deployable technology.	CMV-related crash, vehicle, driver, carrier, roadside data contributing to safety in commercial transportation	$8.5 M (total for FY 2011) Varies between $100 k and $3 M	100%

++	National Highway Systems (NHS) Federal Highway Administration (FHWA)	The program provides funding for improvements to rural and urban roads that are part of the NHS, including the Interstate System and designated connections to major intermodal terminals. Under certain circumstances, NHS funds may also be used to fund transit improvements in NHS corridors.	data to evaluate infrastructure programs (ASSUMPTION based on the fact that reliable data systems play an important role in the safety improvement process, any infrastructure-related data (Including crash data) could be addressed.)	$6,307 M Total funding for FY 2009 Each State is to receive a minimum of ½% of combined NHS and Interstate Maintenance apportionments.	80% May be 90% for interstate projects adding HOV or auxiliary lanes 100% for certain safety improvements listed in 23 USC 120(c) Subject to the sliding scale adjustment

++	Surface Transportation Program (STP) Federal Highway Administration (FHWA)	The Surface Transportation Program provides flexible funding that may be used by States and localities for projects on any Federal-aid highway, including the NHS, bridge projects on any public road, transit capital projects, and intracity and intercity bus terminals and facilities.	data to evaluate infrastructure programs (ASSUMPTION based on the fact that reliable data systems play an important role in the safety improvement process, any infrastructure-related data (Including crash data) could be addressed.)	$6,577 M Total funding for FY 2009 Each State is to receive a minimum of ½% of the funds apportioned for STP.	80% May be 90% for interstate projects adding HOV or auxiliary lanes 100% for certain safety improvements listed in 23 USC 120(c) Subject to the sliding scale adjustment

++	Performance and Registration Information Systems Management (PRISM) Federal Motor Carrier Safety Administration (FMCSA)	The Performance and Registration Information Systems Management (PRISM) program was developed to meet the challenge of reducing the number of commercial vehicle crashes of a rapidly expanding interstate carrier population. It has increased the efficiency and effectiveness of Federal and State safety efforts through a more accurate process for targeting the highest-risk carriers, which allows for a more efficient allocation of scarce resources for compliance reviews and roadside inspections. The PRISM program requires that motor carriers improve their identified safety deficiencies or face progressively more stringent sanctions up to the ultimate sanction of a Federal Out-of-Service order and concurrent State registration suspensions. The PRISM program has proven to be an effective means of motivating motor carriers to improve their compliance and performance deficiencies.	CMV driver, vehicle and crash data (ASSUMPTION based on the description referring to reducing the number of commercial vehicle crashes)	$5,000,000 (total per year 2005-2009)	100%

++	Motor Carrier Safety Assistance Program (MCSAP) Federal Motor Carrier Safety Administration (FMCSA)	To reduce the number and severity of accidents and hazardous material incidents involving commercial motor vehicles by substantially increasing the level and effectiveness of enforcement activity and the likelihood that safety defects, driver deficiencies, and unsafe carrier practices will be detected and corrected.	Any data that can be used for CMV safety improvement (ASSUMPTION based on the description referring to reduce the number and severity of accidents and hazardous material incidents involving commercial motor vehicles)	$215 M for FY 2011 Not less than 0.44 percent or more than 4.94 percent of available funds for basic program grants. U.S. Territories may receive a fixed amount of $350,000.	80%
++	Commercial Vehicle Information Systems and Networks Federal Motor Carrier Safety Administration (FMCSA)	The Commercial Vehicle Information Systems and Networks (CVISN) Program is a key component of the Federal Motor Carrier Safety Administration's (FMCSA) drive to improve commercial motor vehicle safety. The goals and objectives for the CVISN program include improvement of highway safety by enabling safety inspectors to target resources on the high risk carriers, drivers, and vehicles. These changes are expected to reduce the frequency and severity of accidents that involve commercial vehicles.	CMV driver, carrier and vehicle data (number of axles, load weight, etc.)	$100,000 to $2,500,000	50%

++	Occupant Protection Incentive Grants (Sec 405) National Highway Traffic Safety Administration (NHTSA)	To encourage States to adopt effective programs to reduce highway deaths and injuries resulting from individuals riding unrestrained or improperly restrained in motor vehicles.	Seat belt/restraints usage data Medical data related to seat belt/restraints (ASSUMPTION based on the description/objectives)	Varies per State: $156,643 to $3,011,640	75% - 1st and 2nd years 50% 3rd and 4th years 25% 5th and subsequent years
++	Safety Belt Performance Grants (Sec 406) National Highway Traffic Safety Administration (NHTSA)	Increase safety belt use by encouraging States to enact and enforce primary safety belt laws. A primary safety belt law permits law enforcement officers to stop and cite motorists for failing to wear safety belts without requiring that some other motor vehicle violation first be observed.	Seat belt/restraints usage data Medical data related to seat belt/restraints (ASSUMPTION based on the fact that safety program needs data to support the diagnosis and evaluation of treatment)	Varies per State: $165,441 to 38,504,000	100%

++	Alcohol Traffic Safety and Drunk Driving Prevention Incentive Grants (Sec 410) National Highway Traffic Safety Administration (NHTSA)	The purpose of this program is to provide incentive grants to states that implement effective programs to reduce traffic safety problems resulting from impaired driving.	Enforcement/offenses data re: alcohol Medical data (More: see Eligibility and Requirements) ASSUMPTION based on the fact that safety program needs data to support the diagnosis and evaluation of treatment)	Varies per state: $972,388 to $17,973,219 Values for FY 2010	100%
++	Motorcyclist Safety Grants (Sec 2010) National Highway Traffic Safety Administration (NHTSA)	The purpose of this program is to provide grants to states that adopt and implement effective programs to reduce the number of crashes involving motorcyclists.	Any data that can be used for motorcycle safety improvement (ASSUMPTION that any data that support reduction of motorcycle crashes)	$100,000 - $483,000	100%

++	Border Enforcement Grants Federal Motor Carrier Safety Administration (FMCSA)	To ensure motor carriers operating commercial vehicles entering the United States from a foreign country are in compliance with commercial vehicle safety standards and regulations, financial responsibility regulations and registration requirements of the United States, and to ensure drivers of those vehicles are qualified and properly licenses to operate the commercial vehicle.	CMV driver and vehicle data (ASSUMPTION based on the description referring to drivers qualified and properly licensed)	$32,000,000 (total per year)	100%
++	Commercial Driver License State Programs Federal Motor Carrier Safety Administration (FMCSA)	To achieve the goals of SAFETEA-LU and the FMCSA mission of reducing the number and severity of crashes, fatalities, and injuries involving large trucks and buses by ensuring that States comply with the Federal Motor Carrier Safety Regulations related to commercial driver's license testing, issuance, and disqualification.	CMV and Bus driver, crash, vehicle and road data (ASSUMPTION based on the description referring to reducing the number and severity of crashes, fatalities, and injuries involving large trucks and buses)	$15,000 - $1,500,000	100%

++	Commercial Drivers License Information System Federal Motor Carrier Safety Administration (FMCSA)	To modernize the Commercial Driver's License Information System (CDLIS). Following modernization CDLIS will: (1) comply with applicable Federal information technology security standards; (2) provide for the electronic exchange of all information including the posting of convictions; (3) contain self auditing features to ensure that data is being posted correctly and consistently by the States; and (4) integrate the commercial driver's license and the medical certificate.	CMV driver , conviction, medical data	$15,000 - $1,500,000	80%
+	Child Safety and Child Booster Seats Incentive Grants (Sec 2011) National Highway Traffic Safety Administration (NHTSA)	The purpose of this grant program is to encourage states to enact and enforce booster seat laws.	Child restraint usage data Medical data related to Child restraint (ASSUMPTION based on the description as there is a need for data to assess and enforce seat belts)	Varies per state: $81,337 to $1,157,552 Values for FY 2010	100%

+	Racial Profiling Prohibition (Sec 1906) National Highway Traffic Safety Administration (NHTSA)	Encourage States to enact and enforce laws that prohibit the use of racial profiling in the enforcement of traffic laws on Federal-aid highways, and to maintain and allow public inspection of statistics on motor vehicle stops. Eligible states may use grant funds to: - Collect and maintain data on traffic stops - Evaluate the results of the data - Develop and implement programs to reduce racial profiling (including law enforcement training programs) - Undertake activities to comply with the basic requirements of the grant program - Undertake any activities relating to enacting and enforcing a law and collecting data on traffic stops	Driver- and vehicle-related data on traffic stops	Varies per year: $454,570 to $885,460	100%