



MICHIGAN DEPARTMENT OF TRANSPORTATION SAFETY DATA PROCESSES AND GOVERNANCE PRACTICES

CASE STUDY
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ACRONYMS

Acronym	Description
AASHTO	American Association of State Highway and Transportation Officials
DOT	Department of Transportation
FHWA	Federal Highway Administration
GIS	Geographic Information System
IT	Information Technology
LRS	Linear Referencing System
MIRE	Module Inventory of Roadway Elements
NCHRP	National Cooperative Highway Research Program
MDOT	Michigan Department of Transportation
NCHRP	National Cooperative Highway Research Program

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INTRODUCTION

The Michigan Department of Transportation (MDOT) is a leading State DOT in the implementation of formal data governance policies and practices. Benefits for States adopting data governance from a policy, practical and technical perspective are described in the National Cooperative Highway Research Program ([*NCHRP Report 666: Target-Setting Methods and Data Management to Support Performance-Based Resource Allocation by Transportation Agencies*](#) (2010):

From a policy standpoint, data governance promotes the understanding of data as a valuable asset to the organization and encourages the management of data from both a technical and business perspective.

On a practical level, the use of a data governance model provides for access to data standards, policies, and procedures on an enterprise basis. It provides a central focus for identifying and establishing rules for the collection, storage, and use of data in the organization.

From the technical perspective, use of data governance results in reducing the need to maintain duplicate data systems, improves data quality, and provides new opportunities to implement better tools for managing and integrating data.

The purpose of this case study is to summarize how the MDOT incorporates a data governance structure into their standard business operations and how it has helped them to improve their safety data systems and processes. “Data governance can be defined as the execution and enforcement of authority over the management of data assets and the performance of data functions” (NCHRP Report 666, 2010) and is an integral component used to facilitate management of data systems as part of an agency’s data business plan.

In the case of MDOT, a set of data governance practices provides the foundation needed to develop a comprehensive Data Business Plan, to support MDOT’s Strategic Highway Safety Plan Highway Safety Improvement Program, and improve information systems that manage data needed for safety analysis, planning, and decision-making.

DATA GOVERNANCE PRACTICES AT THE MICHIGAN DEPARTMENT OF TRANSPORTATION

The State of Michigan Governor's office issued an Executive Directive in 2013 (Snyder, 2013) that substantially supports the data governance practices at MDOT and other state departments. This provides a top-down data governance structure that formalizes many years of data management practices in Michigan and helps the DOT continue to evolve their data governance framework.

This case study explores MDOT's data governance practices according to policy, practical and technical perspectives.

Policy

MDOT began to implement policies targeting management of their data systems in the 1990's as part of their asset management program. The goal of these policies was to establish methods and procedures to collect data once for multiple uses. Recently, there is a national demand for quality data for planning, analysis, reporting, and decision-making. Because of this demand, many states are adopting strategies to better manage their data. This has resulted in an effort to collect data once and use it for multiple applications and has been formalized in several states through data improvement strategies and strategic plans. Michigan's utilization of their data management practices has yielded a return on investment by eliminating duplicate data collection, which has reduced costs associated with maintaining the same data in multiple application systems. Policies regarding data management practices at Michigan DOT are supported by the office of Governor Snyder, Executive Directive No. 2013-1, *Data and Information Sharing, Management and Governance*.

In response to Michigan's Executive Directive (Snyder, 2013) the MDOT established: (1) a Data Governance Council, whose purpose is to implement data management within the Department (2) the role of Chief Data Steward, and (3) identified several data stewardship roles throughout the Department. Established roles that support data governance prepare states to launch a Data Business Plan that ensures quality data to support safety programs including the Strategic Highway Safety Plan and Highway Safety Improvement Program.

MDOT uses a data governance model that includes oversight of the data management function by a Data Governance Council that meet monthly. Membership on the council includes representation from major business process areas, as well as representation from the Information Technology (IT) department. The Council developed a charter to better align their responsibilities with the direction of the Enterprise Information Management program

established by the governor (Snyder, 2013). They also help to establish policies for data governance and will participate in development of data dictionaries and metadata for all major systems and data sources.

In addition to establishing a Data Governance Council, MDOT established a Chief Data Steward. The Chief Data Steward has two primary roles in data management. The first is to implement the statewide Enterprise Information Management within MDOT. The second is to chair the Data Governance Council. Although identification of all specific job duties remains to be completed, it is generally understood that the Chief Data Steward can and does have influence regarding the design of databases and determining how projects are developed. The Chief Data Steward also ensures the DOT's and the State's Enterprise Information Management efforts are mutually reinforcing.

MDOT is establishing data stewardship models to identify governance ownership for specific data systems. Data stewards will ultimately be responsible for establishing and using business rules that govern data in each business area. Stewards for safety-related data systems, will be established in areas such as traffic, crash, and roadway inventory data.

MDOT's current data management activities center on migrating and continuing to develop their data dictionaries and metadata. Prior to the directive, the dictionary tools, that underlie capital programming and asset management process definitions, were obsolete. MDOT is migrating these definitions and metadata into a single tool maintained by IT staff. Once migrated, the Department will review current data stewardship assignments, and expand these assignments to include systems not previously governed. Many of these are safety systems or management of data that support safety programs.

Joint Application Development sessions in Michigan will likely be used to support the continued development of the dictionaries and glossaries, and help better define stewardship responsibilities. A common definition for Joint Application Development is:

A development methodology system originally used to designing a computer-based system, but can be applied to any development process. It involves continuous interaction with the users and designers of the system in development. Joint Application Development utilize a workshop session that is structured and focused. Participants of

these sessions would typically include a facilitator, end users, developers, observers, mediators and experts.¹

Development of similar business terms, dictionaries and business terms glossaries is recommended in NCHRP 666 as a method to support implementation of a data governance framework.

Technical

From a technical perspective, MDOT uses an integrated Linear Reference System (LRS) to maintain location data, as well as, an integrated web-based enterprise base map to disseminate data. New data collection tools, such as use of Light Detection and Ranging (LIDAR), are under investigation and will reinforce the policy of collecting data once and using it many times.

MDOT is using AASHTOWare Safety Analyst™ and the Highway Safety Manual, in addition to GIS tools, to support analysis of safety-related data. A certain level of data accuracy and data quality is required to use these analytical tools, MDOT's commitment to use standardized roadway and crash data found in the Model Inventory of Roadway Elements (MIRE) and Model Minimum Uniform Crash Criteria data standards help maintain the required data quality levels.

MDOT is starting to develop and plans to implement a work-order-based maintenance management system. While it will take several years for full implementation, eventually this system will allow MDOT to capture and maintain data about roadway safety features not previously available. The Department will identify a steward for this system and anticipates significantly increased data quality for safety programs with its implementation.

MDOT is in a strong position to use IT to support and improve all segments of its business operations, especially in the area of safety. A partnership and communication exists between the IT office and other business areas (including safety), and their formalized data governance structure supports data business planning. Within their current structure MDOT is working to provide hardware and software that meet the agency's business needs. When developed, their data business plan will continue to improve communication and collaboration between the safety business areas and IT offices to ensure the design of system applications that meets the needs of multiple users across the organization.

¹ http://www.webopedia.com/TERM/Joint_Application_Development.html

MDOT's data governance practices continue to improve management of data throughout the department by using data in multiple applications. At MDOT, the implementation of data governance has a purpose: to put data in a form that can maximize business intelligence and data sharing. In addition to making more data readily accessible by using web- and GIS-based applications, the Department has made significant investment in identifying the roles and responsibilities necessary to oversee and support their data governance structure.

Michigan Safety Data Management Benefits

Many of the benefits Michigan has received from data management efforts have resulted from statewide adoption of a common LRS. The Michigan State Police originally developed the data management efforts; it has directly led to the integration of crash data and road data all public roads, regardless of ownership or jurisdiction. There have been several positive “externalities” made possible by the integration, such as the integration of MDOT's management systems, including the Safety Management System.

More recently, Michigan's Transportation Asset Management Council has assessed federal aid road conditions using software used by public road agencies, based on the statewide linear referencing system. This activity has leveraged the development of software, “RoadSoft,” a GIS based roadway management system, including road crashes and safety analysis. While “Roadsoft” predates the MIRE, many of the elements are in Roadsoft because they are usefully in everyday management of assets.

APPLICABILITY TO OTHER STATES

Other states may learn from the MDOT experience in data governance to develop and implement similar data governance practices for their safety programs. This comprehensive effort includes the participation of people, business processes, and information technology tools. Establishing roles and responsibilities for data governance help to embed these practices into the culture and day-to-day business operations, which supports the overall Safety Program at an enterprise level. Information technology is an important component to support data governance initiatives. Whenever possible, it is particularly important to use tools associated with GIS and a common LRS for integration of data. The GIS/LRS component not only facilitates data integration but it also provides a means to improve data quality through analysis using data visual platforms such as mapping.

Data governance is most successful when business offices and IT offices work as partners to ensure that (1) business offices define their IT related needs, and (2) the IT offices procure the appropriate hardware and software to meet the agency's business needs. MDOT has successfully utilized the IT services provided by Michigan's Department of Technology, Management and Budget to support the needs of the Safety Program.

Some examples of the practical benefits realized by MDOT using data governance to strengthen data management practices (especially those needed for safety data systems) include the following:

- The “collect once, (store once), use many times” policy discourages use of independent databases and **encourages the use of processes to reduce redundancy** in collecting and maintaining data.
- A Data Governance Council is valuable to establish and enforce data governance policies at the enterprise level, which results in **clear identification of data governance policies, procedures, and responsibilities** at the agency.
- The Chief Data Steward role provides perspective for database design and application development **across an entire enterprise, not just for a specific business area.**
- Data stewardship roles throughout the organization help define business rules for governing data in each business area, which **eliminates confusion** over which office is primarily responsible for which data system(s).

Other states can derive similar benefits by implementing the following data governance practices:

- Establish a Data Governance Council via a charter to define the authority of the Board to oversee data management practices, policies, and procedures that support the Safety Program.
- Determine the roles and responsibilities for data governance. This clarification eliminates confusion over which offices or business areas are responsible for what aspect of the agency's data governance structure. Roles that should be defined and assigned, include the data steward, data custodian, business owner, and data stakeholder Communities of Interest for the data systems used to support the Safety Program.
- Develop a glossary or dictionary of commonly used business terms to help others (including IT staff) understand how commonly used terms (e.g., location data) are handled by business units. This lexicon will assist IT staff design database models with data dictionary definitions that more closely reflect the common use of data across the organization.
- Involve the data stewards in the review of bids and purchases related to IT, software, and data management that support the applications managed by those stewards.
- Capture user needs, within the organization, and ensure their understanding across the agency. This effort will translate into the implementation of business practices and data systems that support user needs, especially needs related to the safety program.
- Update job descriptions and classifications to include the roles of data stewardship and relate this concept to employee performance plans or job duties.
- Begin implementing data governance by using information technology and analytical tools that are available and easy to understand. It may not be necessary to purchase new tools to implement data governance policies, procedures, and standards.
- Highway safety is a great starting point to implement data governance initiatives. There is widespread interest in highway safety and therefore, this area offers an ideal opportunity to reach consensus among groups in respect to the need to improve safety and to improve the management of underlying data systems that support the Safety Program.

RESOURCES

The position of Chief Data Steward at Michigan DOT is one-hundred percent (100%) state funded. This helps ensure the position's duties are within the scope of all program areas and not limited to specific activities based on the funding type.

REFERENCES

The following sources aided in developing this case study.

- Phone interviews and email conversations with:
 - Ron Vibbert, Chief Data Steward, Michigan DOT
 - Dean Kanitz, Safety Data Analysis Engineer, Michigan DOT
 - Rob Surber, Office Director of Department of Technology, Management and Budget (Enterprise Management Solutions)
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