

Case Study



U.S. Department of Transportation
Federal Highway Administration

BACKGROUND

Arguably, the most valuable part of building information modeling (BIM) for infrastructure is the information delivered in each three-dimensional (3D) model. The information carried by each element informs every part of design, construction, and asset management. However, the data are only useful if structured in a way to be handled predictably by the agency programs that use and interface with the data. For any state agency to get the full value of the BIM for infrastructure process, a complete understanding of the data and the data schemas are essential.

FDOT DATA GOVERNANCE INITIATIVE

MANAGING VITAL DATA ASSETS

The process of organizing internal data is called data governance (see Figure 1). This case study is a review of how the Florida Department of Transportation (FDOT) decided to create and implement a data governance program and the benefits that have been realized from that program to date.



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Figure 1. Data governance concept

THE PROBLEM

In the fall of 2014, FDOT began to develop an enterprise-wide information technology strategy. Its review identified five problems that should be addressed:

- 1. It was difficult to know which data were available**—Information was organized around applications instead of being organized around end-user perspectives.
- 2. Data were difficult to access**—Security controls were scattered across many different tools and processes throughout 170-plus centralized and local systems.
- 3. Lack of standardized approach**—Many FDOT districts were moving toward the adoption of the geographical information system (GIS) as the entry point for information searches; however, the approach had not been standardized across the districts.
- 4. No enterprise-level view of data**—A majority of the district data efforts appeared to focus on singular business issues without the added benefit of looking at the data from an overall business view to improve performance or reduce risk.
- 5. Teams wanted a “one-stop shop”**—Teams consistently stated they would like a one-stop shop to access all of the information that they needed in one place with a robust search capacity.

THE SOLUTION

As a response to the problems discovered, FDOT created an initiative to improve data reliability, simplify data sharing, and make accurate data readily available for the purpose of making informed decisions. This initiative was called Reliable, Organized, Accurate Data Sharing, or ROADS.

The first step for ROADS was to evaluate FDOT's needs. This was achieved through employee surveys and district interviews. The employee survey included 70 questions and took about an hour to complete. FDOT received more than 230 responses. The employee interviews were two hours long. Staff were able to conduct 24 interviews in the central office and the 7 districts, with a total of more than 270 participants.

The results from the assessment showed 63 distinct information gaps. These gaps were organized into 12 key enterprise information management areas.

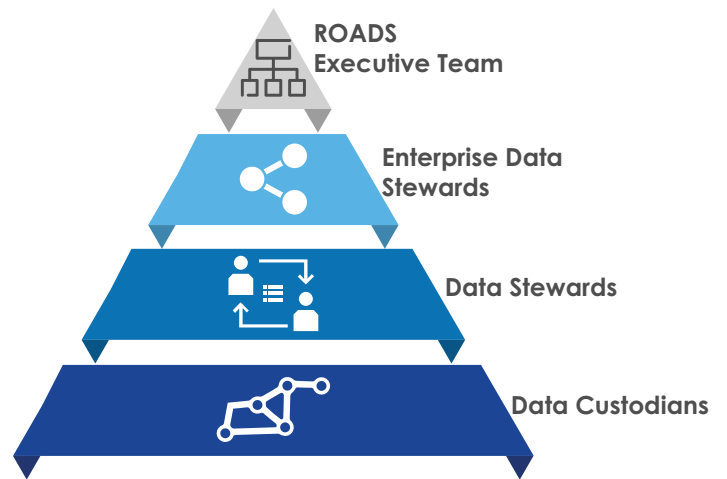
To address the gaps, the FDOT team documented the solutions that needed to be implemented:

- Implement new system architecture
- Move and synchronize data
- Implement solution management
- Address bandwidth issues
- Enable data consistency and accountability
- Implement change management
- Establish data awareness
- Institute enhanced reporting capabilities
- Implement organizational alignment
- Streamline data security
- Implement data governance

With its issues identified, as well as solutions, FDOT created an executive team and a data governance structure to implement the plan (Figure 2). The executive team consisted of technical and business members from the central office, turnpike, and district offices. The data governance structure broke the team into four distinct groups with different responsibilities.

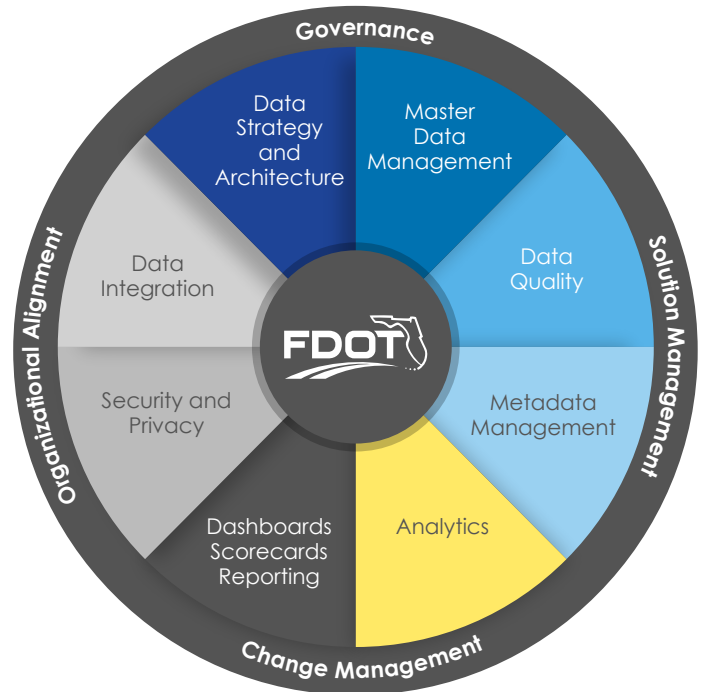
ROADS Executive Team

The executive team provides leadership from across the district, turnpike, and central office to support the ROADS initiative. The ROADS executive team members are responsible for overall data governance and provide decision-making, oversight, and strategic direction to the organization. High-level responsibilities include the following:



FDOT, used with permission

Figure 2. FDOT data governance structure



FDOT, used with permission

Figure 3. FDOT ROADS component model

- Approve actions, resolve issues, and provide advice/feedback to the enterprise data stewards (EDS) and data stewards/data custodians (DS/DC)
- Adopt the ROADS Component Model (Figure 3) and ensure data governance compliance
- Establish overall data governance rules, processes, and procedures

- Drive cultural changes needed to communicate data as an asset and manage this asset effectively across business functional area boundaries
- Balance business priorities with operational needs across the enterprise
- Review and evaluate current data governance performance and effectiveness
- Encourage active participation from both the business and information technology (IT) areas

Enterprise Data Stewards

The enterprise data stewards are business-focused individuals from across the district, turnpike, and central office supporting the ROADS initiative. The enterprise data stewards are responsible for managing their functional area working groups. They report directly to the ROADS executive team. High-level responsibilities for this group include the following:

- Lead the data stewards working group for their functional area/office
- Ensure data governance compliance
- Advocate for future data initiatives for the department
- Operate in alignment with functional managers
- Adopt the ROADS Component Model
- Work with data stewards and data custodians regularly to provide leadership and guidance
- Act as a liaison between the ROADS executive team and the data stewards and data custodians

Data Stewards

The data stewards are business functional experts supporting the ROADS initiative and ideally the functional application coordinators or other delegates within the business functional areas that are responsible for the business aspects of data management and governance, including data element definition, control, and accountability for their data sources, such as applications or purchased/collected data. Individuals that are selected as data stewards are typically already doing many of the activities of a data steward, just in an informal manner.

A data steward works with business personnel to define data needs for their particular functional area. High-level responsibilities for these stewards include the following:

- Understand strategic priorities of the business (enterprise, central office, district, and/or turnpike) related to their functional area along with the processes and data that support the business
- Participate in defining rules, processes, and quality metrics
- Act as a strong communicator and champion of data quality within their functional area
- Help in gathering requirements for tools used in the transformation of data into meaningful and useful information for business analysis purposes, including reporting

Data Custodians

Data custodians are technical functional experts supporting the ROADS initiative, ideally from a business office. They are responsible for supporting and implementing data governance and best practices for data elements within their data sources, such as applications or purchased/collected data.

Data custodians may work with other technical resources within the business functional area, or Office of Information Technology (OIT) resources may be relied on to support their responsibilities. Individuals that are selected as data custodians are typically already doing some or many of the activities of a data custodian, but in an informal manner. High-level responsibilities of data custodians include the following:

- Respond to research and information requests of the data stewards
- Escalate any items that have an impact on data quality requirements for reporting tools
- Implement data transformations, resolve data issues, and collaborate on system changes
- Maintain the quality of the data that they manage

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DISTRIBUTION AND AVAILABILITY

This case study can be found at <https://www.fhwa.dot.gov/construction/technologies.cfm>.

KEY WORDS

BIM case study, building information modeling, enterprise-wide information technology, FDOT ROADS, Florida DOT data sharing

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RESULTS

Since 2014, FDOT's ROADS initiative has come a long way. The following timeline highlights some of the more important milestones:

- **March 2015**—ROADS initiative begins
- **Spring 2015**—Employee survey and interview results determined
- **Summer/Fall 2015**—Establishment of data governance structure
- **Fall/Winter 2015**—Determination of tool requirements completed
- **Spring/Summer 2016**—Invitation to Negotiate (ITN) completed with more than 45 vendors responding
- **Summer 2016**—Applications and Reporting Inventory assessments
- **Summer/Fall 2016**—Charters created to define responsibilities and the path forward
- **Fall 2016**—ROADS Town Hall and Knowledge Sharing sessions occurred to educate stakeholders
- **Fall 2016**—Three shortlisted vendors performed test cases and oral presentations for ITN
- **Winter 2017**—ROADS initiative aligned under the Civil Integrated Management Office
- **Spring 2017**—SAS announced as intended award vendor for business intelligence/data warehouse ITN
- **Summer/Fall 2017**—SAS contract executed and pilot of data governance project kicks off with the Safety Office
- **Fall/Winter of 2017**—Knowledge sharing sessions begin on select data sets
- **Present Day to Summer 2021**—Data governance continues to roll out to other parts of FDOT with continued knowledge-sharing sessions

To date, the data warehouse includes safety data, asset (roadway characteristics) inventory, Highway Performance Monitoring System (HPMS) reporting, and pavement condition data.

LESSONS LEARNED

Through this process, FDOT learned more than just a new way to organize its information. Participants in the process also learned more about the value of data along the way and, in particular, the idea that the true value of data is not realized until it becomes meaning information. The distinction between data and information is that data are like a book on a shelf: a book does not provide you with any value until you read it. The implementation of ROADS is helping FDOT move from a culture that collects data to a culture that makes data-informed decisions.