ctre

Center for Transportation Research and Education

Iowa Work Zone Data Hub

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The mission of the Center for Transportation
Research and Education (CTRE) at Iowa State
University is to conduct basic and applied
transportation research to help our partners
improve safety, facilitate traffic operations, and
enhance the management of infrastructure assets.

IOWA STATE UNIVERSITY

Institute for Transportation

> This project developed and rolled out the initial implementation of the statewide Iowa Work Zone Data Hub.

Problem Statement

While the Iowa Department of Transportation (DOT) places a high priority on both the safety and efficiency of travel for motorists within work zones across the state, work zone projects can be complex, taking years to plan and design with multiple phases and degrees of traffic disruption. The data associated with a specific work zone can originate in multiple offices and entities, such as planning, design, construction, and operations and also with consultants and contractors.

Project Background

The Iowa DOT Work Zone Management Service Layer Committee identified the essential need for a common platform to identify, integrate, and access all of the available work zone data from a central hub.

Previous research by this project team identified challenges, established the work zone database (WZDB) without any additional undue burden on field staff or contractors, and developed the database structure by gaining an understanding of the relationships between all of the data frames and data elements (Knickerbocker et al. 2020).

The project team also established a foundation to simplify the efforts to integrate data sources by associating Iowa crash data to the Iowa DOT linear referencing system (LRS) (Knickerbocker et al. 2021). This research demonstrated a simple proof-of-concept architecture that addressed some of the constraints on decision makers and also opened up additional data sets for the Iowa DOT or other researchers to explore without the additional time and effort needed to integrate the data.

Parts of the efforts leading up to the rollout of the work zone data hub were implemented on a limited basis, but not statewide.
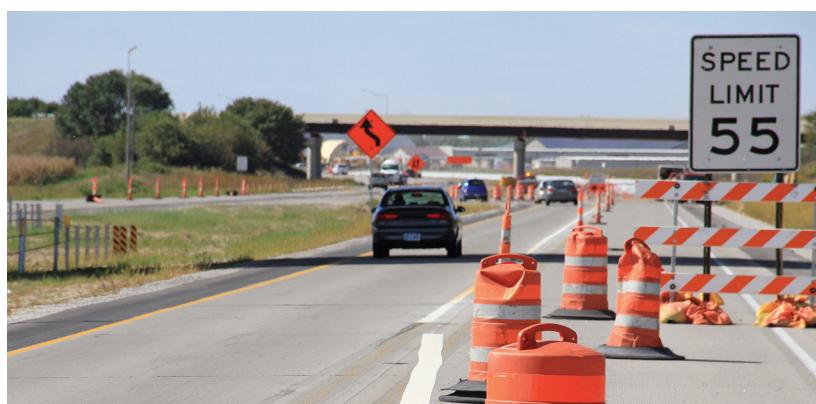
Neal Hawkins, Institute for Transportation

The Iowa Work Zone Data Hub aims to address the essential need for a common platform to identify, integrate, and access all of the available work zone data from a central hub

Project Goal

The primary goal of this project was to develop and roll out the initial implementation of a statewide system, the Iowa Work Zone Data Hub, that integrates data from various sources utilizing the Federal Highway Administration (FHWA) Work Zone Activity Data (WZAD) framework and dictionary.

Project Objectives

- Develop a method of evaluating use cases in the FHWA WZAD and prioritize use cases for the Iowa DOT

- Evaluate the prioritized use cases on the feasibility to implement

- Begin implementation of the selected case studies, identify the needs to collect the data if they are not currently available, and define the needs to be implemented if the data are not currently available

Project Description

After a literature review to gain a comprehensive understanding of the FHWA framework use cases as well as the associated data, the first step for this project was to identify essential use cases for implementation in Iowa.

The WZAD framework identified 50 different use cases, which involved 27 different stakeholders. Then, all of the use cases within the framework and data elements from the data dictionary were simplified and organized in an interactive Excel file.

The intention of prioritizing all of these use cases was to get some effort started to begin collecting or identifying a method of data collection due to the priority of the use case. In addition to containing the use cases, the interactive Excel file contained Iowa-specific information including data availability and perceived importance of the use case in Iowa. Using the interactive Excel file, the 50 use cases were reduced down to 12 use cases.

With a smaller number of use cases, a more detailed summary was developed and presented to the Iowa DOT. The summary included the description of the use case, an example of how the use case could be implemented, a summary of the data available, and the research team's analysis of the outcomes and effort to achieve the data needs for each use case.

Upon completion of the summaries, a survey was sent to the relevant Iowa DOT staff for them to prioritize the use cases individually. The survey results were combined, which resulted in the prioritized list of use cases, as shown in the table.

Final prioritized use cases after survey

Rank	Use Case
1	Work Zone Mobility Performance Analysis
2	Agency Project Initiation and Planning Temporary Traffic Control (TTC) Coordination
3	Work Zone Plan Dissemination to Third-Party Data Providers
4	Work Zone Safety Performance Analysis
5	Corridor Mobility Impact Assessment
6	Work Zone Mitigation Strategy Effectiveness Assessment
7	Weather Impacts Assessment
8	Agency Maintenance Contract Coordination
9	Advanced and Real-Time Intelligent Transportation System (ITS) and Dynamic Message Sign (DMS) Detour Traveler Information
10	Oversize/Overweight Vehicle Route Coordination
11	Adjustment to Smart Work Zone Deployment
12	Monitor Law Enforcement Use on Projects

From there, the approach was to identify a select number of use cases that could be initially implemented or further explored. By focusing on a small number of use cases, the amount of data needed and the number of relevant stakeholders were reduced, making the initial implementation of the statewide data hub more manageable.

Key Findings and Project Results

Because the top use cases for implementation all varied in their level of maturation within the Iowa DOT, each use case had different requirements and levels of completion.

The first two of the top five use cases, Work Zone Mobility Performance Analysis and Agency Project Initiation and Planning TTC Coordination, could be fully implemented and stored according to the WZAD dictionary in this initial rollout of the statewide data hub. These two use cases aligned with processes that currently existed within the Iowa DOT but had only been completed for a small percentage of the work zones statewide before this project.

The third top priority use case, Work Zone Plan Dissemination to Third-Party Data Providers, was being completed by Iowa's Advanced Traffic Management System (ATMS).

The fourth priority use case, Work Zone Safety Performance Analysis, could only work toward making the needed data available.

The fifth priority use case, Corridor Mobility Impact Assessment, was placed on hold based on subsequent agency priorities.

Implementation Readiness and Benefits

The Iowa Work Zone Data Hub will provide a connection to work zone activity data serving as documentation and an integration layer that provides access and use of the wide-ranging data sources. The full initial implementation for two of the use cases expanded the current effort to include all work zones that are currently archived statewide based on Iowa's current work zone data.

In the end, the third and last use case for completion of this project, which the project team could only explore, was an initial implementation of collecting TTC data before a work zone is deployed so that the data can be more readily available for future work zone analysis and planning. The project team recommends that the Iowa DOT continue to explore methods of collecting the data for that use case and put these data in a database for future analysis.

The remaining short listed prioritized use cases can also be used in future work plans for the Iowa DOT. The expectation is that the data hub will continue to be refined as additional use cases are added to the system. The project team expects that a cyclical effort can be done based on priority use cases for the Iowa DOT to continue to grow and expand their work zone data hub.

References

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