Ohio Department of Transportation Research Project Fact Sheet

District Highway Maintenance Research On-Call (ROC) – Task#3 ODOT Maintenance Workflow

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Report Date	August 2023
Project Number	115889

The Problem

This project investigated Ohio DOT's (ODOT) existing workflow and needs for scheduling maintenance activities. ODOT conducts biweekly inspections and records roadway defects using ArcGIS Field Maps. Sources of maintenance work items also include periodic maintenance work, other collector apps for different asset types (i.e., culverts) and phone calls/verbal communication. ODOT uses manual processes to plan day to day work items, which varies by district and county. Existing practices may include using pen and paper, post-it notes, dry erase boards, Agile Assets EIMS, and Excel spreadsheets to track and plan work. ODOT funded this study to investigate existing maintenance scheduling systems in the US, and search for potential software systems that are capable of alleviating related challenges and addressing the specific needs of ODOT.

Research Approach

To evaluate needs and opportunities, the research team conducted internal meetings with ODOT Central Office and District staff to understand ODOT's current practices. The research then organized peer group meetings with district representatives to understand current practices and variations across districts. To understand practices across the US, the research reviewed existing documents from organizations, such as the Federal Highway Administration, and conducted an agency outreach with other state DOTs. The research team assessed available scheduling systems through research and conversations with vendors, referencing ODOT needs and criteria. Finally, the research team arranged on-screen demonstrations from three vendors to understand product functionalities and fit and arrive at a recommendation for ODOT. The approach is summarized in Figure 1.
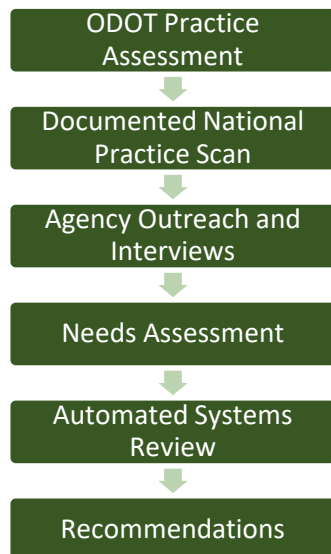

Figure 1. Flowchart of Project Approach

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This research was sponsored by the Ohio Department of Transportation and the Federal Highway Administration.

Findings

The document scan and agency outreach illustrated a gap in documentation of existing maintenance scheduling practices across the US. The research also confirmed the need for ODOT to bring efficiency and consistency to maintenance work planning processes, as district and county practices varied significantly.

A search for off-the-shelf automated systems determined that software capable of maintenance scheduling were available, and that several products appear to meet the requirements of ODOT. These systems were distributed as a software as-a-service, resulting in an annual fee to run the product and/or a one-time implementation fee. Three vendors were invited to provide software demos with ODOT staff and the project team: Smartsheet, ArcGIS Workforce (Esri), and Agile Assets. A summary of desired and observed functionalities by vendor is summarized in Table 1.

Table 1. Functionality Matrix of Vendors

Functionality	Smartsheet	ArcGIS Workforce	Agile Assets
Can schedule daily work plans	✓	✓	✓
Tracks priorities and ensure lower priority items are not forgotten	✓	✓	
Has mobile capabilities	✓	✓	
Sends reminder notifications if items are overdue	✓	✓	
Sends notifications to managers when incidents are added	✓	✓	
Integrates with and pulls work item information from the Collector App	✓*	✓*	
Interfaces with EIMS	✓**	✓**	✓**
Sorts work items by priority	✓	✓	
Has the ability to take pictures and store the GPS coordinates on a map.		✓	

* Smartsheet would pull the information in as a .csv while ArcGIS would work off the feature service that holds the information.
** The details of an interface between each vendor and Agile Assets will depend on further coordination and conversation with Agile Assets.

Conclusions

Based on the results of the research conducted in this study, the following conclusions are made:

➢ Off-the-shelf solutions to alleviate maintenance scheduling challenges for ODOT are available with several vendors meeting all or the majority of ODOT's needs.
➢ Potential systems need to integrate with existing processes (e.g., Collector App and Agile Assets EIMS) and be simple to encourage use.
➢ Of these vendors, Esri was identified as an off-the-shelf solution that could meet all the criteria and could provide the easiest transition, as ArcGIS Field Maps is used for collection of maintenance work items.
➢ Smartsheet was another potential solution that could meet the criteria, but it would require more work upfront to build an appropriate solution.
➢ The existing version of Agile Assets met some criteria, and its functionalities will depend on both the outcomes of the ongoing update and whether work planning-related features are enabled.
➢ For a potential solution, the level of user, such as office and/or field staff, needs to be assessed as it might have an impact on the number and type of devices needed to support the solution.

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- Additional studies should be conducted to assess the cost and savings of potential systems. There may be opportunities among different groups or divisions within ODOT, who have purchased relevant software systems.
- Potential solutions need to be accompanied by consistent and complete training to be effective and fully utilized by different users across the state. This may require coordination between Transportation Managers, Transportation Administrators, and Highway Technicians across districts and/or counties. Training will need to be coordinated with ODOT IT staff.
- Consideration for developing a custom in-house system should be assessed, acknowledging the pros and cons of an in-house vs. off-the-shelf system.