IOWA STATE UNIVERSITY
Institute for Transportation

Electronic Construction Collaboration System— Final Phase

tech transfer summary

A web-based project management system can help manage workflows for large, complex construction projects as well as smaller projects.

Objectives

• Continue evaluating the implementation of AEC-Sync, a web-based project management system (WPMS), for complex bridge projects

• Document the workflows for shop/working drawings for smaller projects (under $10 million)

• Document the development and implementation of Microsoft SharePoint pages to manage the workflows for shop/working drawings

Problem Statement

Construction projects have been growing more complex in terms of project team composition, design aspects, and construction processes. To help manage the shop/working drawings and requests for information (RFIs) for its large, complex projects, the Iowa Department of Transportation (DOT) sought to identify and implement a WPMS as part of its construction administration system.

Background

This research represents the fourth phase of an ongoing project. In the first two phases, various WPMS solutions for managing complex bridge projects were identified and tested. AEC-Sync was selected and provided for the Iowa DOT in a software service agreement. The research team helped implement the WPMS, and pre- and post-project survey results from the Broadway Viaduct project team members indicated satisfaction with the performance of AEC-Sync.

Because of these initial positive results, the research team recommended to the Iowa DOT that a similar solution could also benefit smaller highway projects (i.e., under $10 million). In the third project phase, several WPMS solutions were evaluated for smaller projects, specifically to facilitate the shop/working drawing approval process. The research team and the Iowa DOT selected Microsoft SharePoint, a web-based document management system. In addition, the research team continued implementing AEC-Sync and collected and analyzed pre-project surveys for the Iowa Falls Arch Bridge project.

Research Description

To continue evaluating AEC-Sync, post-project surveys were distributed to the Iowa Falls Arch Bridge project team members. The results were compared to the pre-project survey results to indicate how the WPMS affected performance and the team members' opinions of the system.

To begin developing and implementing Microsoft SharePoint pages, the workflows for shop/ working drawings, outlined in Section 1105 of the Iowa DOT Specifications, were documented.
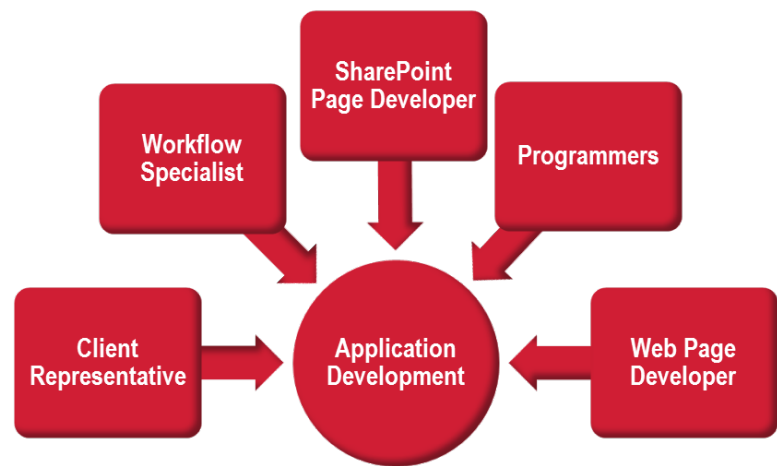
While the SharePoint pages were not tested by users for this research, the research team documented the implementation process. This task involved identifying the development and implementation personnel:

- Client representatives, who assemble the SharePoint development team
- Workflow specialists, who document the workflows SharePoint will manage
- SharePoint page developers, who set the required rules and specifications for the workflows
- Programmers, who help integrate the SharePoint pages into the clients' other electronic systems
- Web page developers, who develop the SharePoint portal, the page with which users interact

The research team also examined ways to initiate SharePoint pages automatically when a new project contract is signed. Using project data in the Iowa DOT Project Letting Table, a SharePoint page would be created via an executable procedure that runs nightly on the Iowa DOT servers. At project completion, the project documents could also be archived in the Iowa DOT Electronic Record Management System.

Key Findings

- While automated initiation of SharePoint pages was not implemented in this research, test programs were developed and executed that show that executable code developed in-house could trigger initiation. SharePoint can be integrated with other programs, including executable processes that are developed in-house. This can be a way of automating the creation and initiation of SharePoint pages.

- While SharePoint pages were not tested by actual users, documenting the workflows was valuable. Documenting workflows allowed the SharePoint implementation team to identify the features required for managing the documents involved in the shop/working drawings approval process.

SharePoint application development team

- For successful WPMS development and implementation, a capable and integrated team needs to be created. The project team should integrate various specializations. In the case of this research project, a team was formed that included information technologists, engineers, and academic researchers.

Implementation Readiness and Benefits

The post-project surveys from implementing AEC-Sync for the Iowa Arch Bridge project were generally positive, suggesting that other Iowa DOT projects can benefit from a similar WPMS implementation.

Work on the SharePoint pages was suspended due to the considerable time that the development effort required and a change in priorities for the information technology staff. The Iowa DOT Office of Construction and Materials is currently developing a solution with the functionality required by this project based on the software application Doc Express from Info Tech, Inc. of Gainesville, Florida. The workflows and development approach that were created under this project will be transferred to that project.

The findings of this project are also transferable to current Federal Highway Administration (FHWA) and National Cooperative Highway Research Program (NCHRP) initiatives. Document management is an important part of the current FHWA Every Day Counts (EDC) e-Construction initiative (FHWA EDC-3). Also, document management systems are required for implementation of the current FHWA Civil Integrated Management (CIM) concept that is currently under investigation by Domestic Scan 13-02 Advances in Civil Integrated Management (CIM), which is funded under the NCHRP 20-68A US Domestic Scan Program and NCHRP project 10-96, Guide for Civil Integrated Management in Departments of Transportation.