2019 NASCIO State IT Recognition Award Nomination

Title: JobNet – Road to the Future

Category: Business Process Innovations

State: Michigan

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Project Initiation: January 2013

Project End: January 2017

JobNet has revolutionized core transportation-related business processes for MDOT and for partners at all levels, providing true value to Michigan citizens and all who travel within our state.

Executive Summary

The Michigan Department of Transportation (MDOT) was faced with a huge and multi-faceted challenge. MPINS (MPINS is "MAP Project Information System" and MAP equals "MDOT Architectural Project"), a critical tool central to the business processes for planning and programming jobs and projects accounting for billions of dollars in annual road and bridge work, had become increasingly inadequate, unwieldy, and expensive. It had not been significantly modernized in more than 20 years. MPINS was a main contributor to a database intricately bound to more than 40 other applications and any changes carried risk of downstream damage to the department's operations as a whole. Since the legacy tool was not web-based, access was limited and communication or collaboration with MDOT partners (including federal and local levels of government, metropolitan and regional transportation advisory groups) was severely restricted.

JobNet is transforming the way we do business. It introduces innovative, streamlined, and technically up-to-date functionality, including a dynamic Geographic Information System (GIS)-based map to locate jobs. Significant accomplishments include **allowing our local partners to directly participate in the job programming process, eliminating other IT systems, allowing data to be entered from the source, and eliminating errors associated with re-entry of data**. JobNet assists the transportation professionals at MDOT in making the best decisions possible, while optimizing limited funding and keeping Michigan's transportation system running smoothly. JobNet electronically facilitates the Statewide Transportation Improvement Program (STIP) required by federal agencies. At MDOT a project must be identified with a specific job number and programmed through JobNet in order to be considered for inclusion in the Five-Year Transportation Program. Jobs are scoped and precisely located in Michigan's Geographic Framework (MGF), attached to a typical process template, and provided with preliminary designations of state, local, and federal funding sources, to name a few. The creation of JobNet was a very complex project. Using a tailored variation of Lean Process Improvement (LPI), MDOT staff met over several years to understand and suggest improvements to the entire project scoping and design process. JobNet is a major contributor to a centralized database integrated with a very large number of other key MDOT applications, exponentially increasing project difficulty. The system interacts via interfaces and applications with the newly implemented financial tool, the Statewide Integrated Governmental Management Application (SIGMA).

With an in-house development cost of $5.5 million, this was **the largest IT project using an agile approach thus far at the State of Michigan** and is a model for future projects. Agile Scrum methodology involved the business staff throughout the project life-cycle, ensuring the system meets the business needs and allowing the business to re-prioritize throughout the project as initial functionality became available for testing. Collaboration among MDOT, DTMB, local and federal governments and advisory groups, was essential for project success. **More than just a software upgrade, JobNet has transformed and improved the business processes used by each of these entities.**

Former MDOT Director said, "In creating this complex, modern system, JobNet is an example of what superior vision, leadership, teamwork, and collaboration can lead to. This project supports all of MDOT's Values: Quality, Teamwork, Customer Orientation, Integrity, and Pride."

Concept

Replacing the MPINS legacy application, which was one of MDOT's cornerstone applications, was an immense undertaking. The replacement had impacts to all of the 40-plus underlying/related systems that rely on MDOT's corporate data. The JobNet web application is built using Java EE (Enterprise Edition) infrastructure with Enterprise Frameworks (Spring, Apache) and JavaBeans Open Source Software (JBOSS) Service Oriented Architecture (SOA) Enterprise Application Server. It utilizes technology such as business rules engine (Drools), Object Relational Mapping tools (Java Persistence API (JPA), Hibernate), GIS mapping (Esri), and document management (ProjectWise).

The goal for JobNet was not just to re-platform MPINS, but to accomplish a complete re-write into a modern web-based application with more efficiency, improved statewide connectivity and partnering. **Revisiting and improving business processes and including the needs of local governmental agencies and federal agencies were crucial to project objectives, along with accessibility and information security.** This was a major enhancement to the existing application and included making the STIP process electronic. The team had the vision for including an integrated GIS mapping with transportation asset data. A **comprehensive communication plan was developed and executed, in order to address all needs of internal and external stakeholders.**

MDOT dedicated full-time business experts (product owners) to this project who surveyed departments of transportation in all 49 other states to determine if any had an in-house or Commercial Off-The-Shelf (COTS) application similar to MPINS and that would meet the vision for the new application. When there were no promising leads, it was determined to build a system in-house. The product owners met with all business areas within MDOT, local governments, Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) to gather requirements. **Every business process related to managing scope, schedule, and budget of jobs, and creation, review, and approval of the STIP was reviewed and efficiencies recommended**. The JobNet project started in January 2013 with readiness, lean process improvement sessions, and initial requirements gathering. The in-house application development started in March 2014 and ended in January 2017 with a total cost of $5.5 million.

Significance

JobNet is one of MDOT's most widely used IT systems, being brought up to date in a phased manner to use current technology. Just as importantly, the implementation of JobNet represents a **significant modernization of business processes, which led to significantly improved government operations.**

MDOT and federal and local government personnel (including Metropolitan Planning Organizations (MPO) and Regional Planning Agencies (RPA)) use JobNet to manage scope, schedule, budget, and proposed funding for road, bridge, and multi-modal projects as well as the STIP. This web-based system enables both users in the field and executives in offices or at meetings to access the system using mobile devices. JobNet also provides data to facilitate obligation of funds in three other centralized and integrated applications. In July of 2018 the MDOT STIP was approved by federal agencies via JobNet. JobNet has automated the draft job

and change request approval process. For example, local jobs were previously entered in a two-step process in which local entities sent spreadsheets that MDOT staff used to enter the needed information. **Now locals enter their own information, increasing data integrity and accuracy, and shortening the overall timeline.** Previously, it could take up to two months and sometimes longer to process one amendment for one MPO. With JobNet, this amount of time is greatly shortened. JobNet also allows locals to view their jobs along the way to approval. This improves communication among MDOT and their partners in a very efficient and effective way. Resource reallocation enables cost avoidance and strategic assignment to tasks with more value added.

The JobNet team had the **innovative vision to move to a dynamic map interface to display project information along with transportation related asset features**. In order to do this the team employed standardized GIS map services that are built from MDOT data and ultimately serve as decision support tools which allow for the planning and programming of transportation jobs. The GIS map services are produced through a collaboration between the MDOT GIS Unit and the DTMB Center for Shared Solutions (CSS). These services can be used by other MDOT applications.

Communication and collaboration within the agency and especially with MDOT's business partners was greatly improved. JobNet facilitates the electronic STIP which is a federally mandated document and was approved by FHWA and FTA partners electronically via JobNet. Very few state DOTs currently have this capability. This part of the system was created in close partnership with local governments, FHWA, and FTA, to ensure all parties would receive benefit. As with other partners listed above, these federal business partners now can enter their own data in a shared repository, further eliminating chances for data errors. They are also able to view the data as it progresses through the system. JobNet considered the needs of various business areas across MDOT and local governments to add functionality that would support their business processes. This was a great collaboration between MDOT, DTMB, and local and federal government partners including MPOs, RPAs, FHWA, and FTA.

JobNet provides data to financial applications such as Phase Initiator (PI) to facilitate obligation of funds in SIGMA and the Financial Management Information System (FMIS). This allows MDOT and its partners to create reports and answer questions using data from many systems, increasing transparency, better decisions and improved confidence at all levels.

Project management and process innovations were tightly woven into the JobNet project. DTMB implemented this project using an Agile approach. This was a first for MDOT on a project of this magnitude. The development team used Scrum methodology including daily stand-ups, sprint planning, story board, backlog, and sprint retrospectives. Application demonstrations were shared as functionality became available. This allowed stakeholders to see the new functions and provide suggested changes to improve the application. As part of the re-write, extensive restructuring of MDOT's Planning database was made to improve efficiency and access.

JobNet aligns to Michigan gubernatorial priorities, policies and strategies.

NASCIO 2019 priorities supported by JobNet include:

- ✓ Fortifying security and lowering risk through MILogin, Michigan's single-sign-on tool, and the use of Michigan's Virtual Datacenter secure cloud services
- ✓ Strengthening the role of centralized data
- ✓ Using internet/cloud technologies to provide scalable capabilities as a service
- ✓ Centralizing, consolidating, and optimizing services, operations, and business processes
- ✓ Cross-agency collaboration and shared services between MDOT and DTMB
- ✓ Introducing statewide connectivity using internet and mobile-accessible technology
- ✓ Data management and analytics through data architecture restructuring improving efficiency and access
- ✓ Facilitating strategy and business intelligence through greatly-improved reporting
- ✓ Improving partnering and inter-jurisdictional collaboration among stakeholders at levels from local advisory groups and governments, to state agencies, and federal entities
- ✓ Enhancing customer relations and collaboration using Agile and incremental software delivery to provide iterative designs and solutions, allow for flexible and responsive modifications, and incorporate business-owner feedback as an ongoing and integral part of the development process.

Impact

The vision for JobNet was far larger than just to re-platform the legacy MPINS application. New functionality was introduced based on a hard-won in-depth understanding of previous business processes used by all stakeholders, and how they could be improved. Foundational business process improvements for delivering MDOT's transportation program were the basis for building a web-based application with more efficiency, improved statewide transparency, and better partnering with local and federal agencies. This was a major re-write of the previous application. Making the STIP and MPO Transportation Improvement Program (TIP) process electronic, streamlining and redistributing data entry, broadening access, restructuring storage, and eliminating redundancies, all contribute to a much-improved JobNet tool bearing little resemblance to its MPINS predecessor.

With a budget of $5.5 million, JobNet is the largest IT project using an Agile development approach thus far at the State of Michigan and there were many lessons learned that will be used in future development projects. In the course of development over 1,000 user stories were identified by product owners, resulting in 4,800 user story points. These were addressed by a technical team of 11 different developers, a business analyst, a tech writer, and a testing coordinator.

JobNet transforms business processes by introducing innovative, streamlined and technically up-to-date functionality, including a dynamic GIS-based map to locate jobs, and cloud-based internet-accessible mobile functionality. JobNet also replaces the manual process of the creation, review and approval of the STIP document by federal partners, FHWA and FTA. **Data can now be collected at the source, saving time and improving data accuracy and integrity by eliminating re-entry. Local partners directly participate in the job programming process using JobNet.** This includes staff members from all 14 metropolitan planning organizations, and all 22 of the regional planning agencies throughout Michigan. These local agencies can now enter their own jobs into

JobNet during the assembly and amendment phases of the TIP/STIP development. With the regional planners doing the initial programing, there is considerable time savings for MDOT staff. In turn, local partners gain a greater sense of ownership in the programming and tracking process. They also benefit from the improved transparency of seeing and monitoring their jobs at all points in the process, versus waiting for periodic reports. Data entry is put in the hands of the agency responsible for the implementation of the project, and which is the most knowledgeable regarding project details. This includes the corridor, project limits, work type, funding levels, funding source, project phase, and fiscal year. Regional planners can be more efficient because they are familiar with the jobs in their area and they will not have to communicate job information to MDOT for programing. Previously, miscommunication of job information often required extra time for verification of facts in the Excel e-files.

With MPINS, MDOT's Statewide Planning Section (SPS) was responsible for programming the MPO local projects. There are about 500 local projects a year and it took 30 minutes to program one job. This was mostly because looking up the Physical Roadway (PR) number, a reference used to pinpoint locations in the Michigan Geographic Framework, was very time consuming. Users usually had to use a PR table. A few limited users had license to use a very basic map tool as an add-on in the application, or they had to access PR Finder (a separate application) and search manually. Then if there were any changes to the project, MDOT's SPS was again responsible for making that change. A change to location or project boundaries is quite common and would require re-referencing one of the above labor-intensive tools. Regardless of type, there were many changes and it would take at least another 5-10 minutes to process each one. With JobNet, the MPOs are now responsible for programming their own projects and changes. It only takes 5-10 minutes to program a job in JobNet and finding the PR number is very efficient since it is done on an accurate interactive map with layers displaying existing assets for easy selection. MDOT is no longer responsible for programming these 500+ local projects from the start.

JobNet provides data to reporting applications that provide the most current information related to MDOT's transportation program. Since the JobNet Planning database houses more data in one system than ever before, the reporting options are extensive. The implementation of shared services provides consistency and reduces the cost of system maintenance. Reporting and data retrieval is another area where noteworthy time savings are being realized. The reports below are only three good examples of information that is now instantly available in the JobNet application, saving the amount time indicated:

- **Data extracts for MPO amendments** (100 hours/year): A full-time employee previously spent about 5% of their time writing Infomaker queries, Excel macros, and troubleshooting MPO TIP Excel documents whenever the equations/macros did not work.
- **Snapshot reports for all MPOs** (240 hours/year plus lengthy reviews): Snapshot reports compared what was on the database with the current Excel E-file TIP. The snapshot reports were produced 6 times a year with a laborious manual process. It took a week just

to run all the comparisons and compile them into one report. Then SPS would take these snapshot reports to all 14 MPOs and they would spend hours going over all the changes. Now MPOs can quickly and easily run their own snapshot reports without Infomaker or Excel macros or waiting for a report from SPS. The cost savings in the overall process for each MPO is quite substantial.

- **Financial constraint reports** (120 hours/year): Three times a year the largest MPO, the Southeast Michigan Council of Governments, does their amendment. Each time another week was spent preparing the financial constraint report for FHWA. JobNet now does it.

JobNet absorbed the functionalities from the Electronic-STIP (ESTIP) application and eliminated some redundant interfaces, making future maintenance more efficient. It used to take several programs to do what JobNet does. ESTIP to program a job (enter the information into the data base) and generate a job number; MPINS to review job information in the data base and edit it (through change requests) if necessary; Administrative Customizable Reporting System (ACRS) to review aggregate data and produce reports on various programs and to review which jobs have been programed into the database verifying any that need to be added to the S/TIP. MAP Financial Obligation System (MFOS) was used to obligate jobs but now Phase Initiator (PI), linked to JobNet, fulfills that function.

JobNet assists MDOT staff in making the best decisions possible, while optimizing limited funding, and keeping Michigan's transportation system running smoothly. The system automates federal approvals, manages and tracks approx. $10 billion in federal-aid and matching funds over a 5-year span, invested on trunkline, local road, bridge and other transportation asset projects, passenger transportation, freight and passenger rail projects. Mistakes and inaccuracies could put large sums of those dollars at risk; JobNet significantly safeguards against loss of this revenue.

The transition to JobNet has been very successful. When JobNet went live at the end of January in 2017, 3100 existing jobs were converted to the new system. Since then, 7,109 new jobs have been added, proving a smooth and productive tool. JobNet's expanded access for MDOT business partners is demonstrated by the number of users. There were 217 users in MPINS, mostly MDOT staff, who had ability to create or modify jobs. Today, there are nearly 1,000 users, including local and federal personnel, with ability to create or modify jobs in the JobNet application, plus many others with read-only access. System scalability ensures there is no practical limit.

Users were involved throughout the development process, resulting in exceptional system usability. This also minimized the amount of training required and led to a high degree of user satisfaction and engagement. A post-implementation survey showed 87% overall satisfaction and included positive comments.