NASCIO Award Nomination
Cross-Boundary Collaboration & Partnerships

Michigan's Investment Reporting Tool (IRT) for Road Asset Management

Project Initiation – October 2016
Project Completion - August 2017

Product Owner – Mark Holmes

Prepared by Michigan Department of Technology, Management & Budget

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EXEMPLAR SUMMARY-20%

Michigan's Transportation Asset Management Council (TAMC) monitors and reports the condition of the 40,000 most heavily travelled miles of the state's 122,000-mile state and local road system. The State of Michigan maintains a complete road network so that the Investment Reporting Tool, or IRT model currently supports asset data collection on all roads. The TAMC had been seeing that the project reporting into the old IRT system was cumbersome, dated, inaccurate and lacking the tools needed for agencies to report road projects in conjunction with state financial reporting requirements or the ACT 51 process.

The Michigan Department of Transportation (MDOT), 83 counties, and 533 villages and cities share responsibility for this system. These agencies conduct condition surveys annually and must report on the location, schedule, cost, and completion date of construction projects that reinvest in the road system. This is the primary mechanism in which the agencies receive their source of funding from the State of Michigan. The state's asset management system uses the condition surveys and project reports from the Investment Reporting Tool to summarize whether the road system is improving or declining in condition.

Completed and planned road and bridge projects are reported to TAMC on the *Investment Reporting Tool*, or IRT. This on-line data-entry interface was re-engineered in 2017 for greater ease of use, data validation, design principles, data management and greater utility in producing information for TAMC and especially for local road-owning agencies.
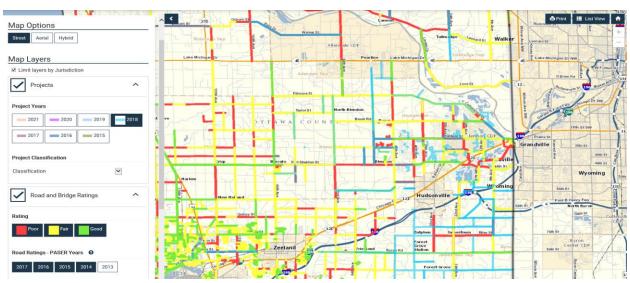
The IRT is replacing informal and paper systems as the repository of pavement-project data, which is especially useful as some smaller agencies cannot build their own GIS-centric data bases. This re-engineered and visionary system allows agencies to submit and prepare their annual road projects in real time fashion allowing total turn around time to decrease by half. This newly re-engineered system enables analytical use of project records to evaluate the performance of pavement maintenance strategies. It has proven convenient and fast to use, even by untrained users at small agencies with sparse resources to file reports.

PROJECT NARRATIVE

Concept – 20%

Michigan's 122,000-mile road system is managed by the Michigan Department of Transportation (MDOT) and 83 counties and 533 villages and cities. These 617 agencies range from large to minuscule; sophisticated to simple. All are required to report financial data to MDOT, and road-condition data to the Transportation Asset Management Council (TAMC), a legislatively-mandated organization representing all road agencies. Obtaining accurate, comparable data requires attention to ease and efficiency of data collection, and the Investment Reporting Tool (IRT) is a principle source of data.

Asset management is a merging of planning, engineering and accounting to yield information on the performance of Michigan's public roads and bridges and forecast conditions into the near

future and is the central performance-management tool for road agencies. Its main goal is to let road owners know whether the system condition is improving or declining, to avoid disinvestment through deferred maintenance.

Screen Shot: IRT Map depicting road surface conditions and planned projects for 2018.

Its purposes are to—
- extract maximum life from pavements and bridges
- select the right rehabilitation strategies
- smooth the rate of expenditure
- minimize total cost

Asset management requires rich, accurate and standardized data on the true state of each mile of road, and each bridge. Surveys of condition are made at least biennially on 40,000 miles of state highways and the most important local roads. Trained surveyors rate each mile of local road as on a scale of 1 to 10. Those ratings are grouped into 3 categories, "good", "fair" or "poor". Over time, the surveys yield the rate at which roads are transiting from "good" or "fair" to "poor" due to age and wear. Reinvestment in pavement and bridges restores their condition. A key ingredient in the accounting/engineering system is updating the inventory of rehabilitated roads and bridges as projects are accomplished. This provides a centralized collection of projects whose performance can be analyzed over time.

The Investment Reporting Tool (IRT) is the means by which road agencies report projects that improve the condition of their inventory of road-miles.

The IRT was created in 2006 to enable entry of road- and bridge-project data (location, treatment type, cost, schedule, date completed) through a public web interface. This initially required repetitive entry of data already being submitted to other state agencies. In September 2014 for the fiscal year beginning October 1, 2015, the IRT was synchronized with MDOT's reporting requirements avoiding repetitive work by 616 local units of government. However, the system

was still somewhat clumsy, and it was possible to make erroneous entries or omit required data and certifications. On the average the TAMC council was notifying X number of agencies for inaccurate reporting which took time from the TAMC councils part as well as the submitting agencies available time. Today there are only limited numbers of agencies that the TAMC council must review data.

In 2016 and 2017, the IRT was completely re-engineered for easier operation by local officials and greater value for analytic purposes. The improved IRT became available for use in August of 2017. This nomination covers this latest improvement in IRT.

The IRT revision was conceived by the TAMC with staff from the Michigan Department of Transportation (MDOT) and developed jointly with the Center for Shared Solutions (CSS) within Michigan's Department of Technology, Management and Budget (DTMB). Michigan Technological University's Center for Technology and Training contributed to the final solution with the integration of the RoadSoft tool. The TAMC Data Committee oversaw the development work and provided the voice of the users of the system; representing several counties, cities and villages. All of these agencies were invited to conduct IRT user testing.

System-development work used the agile approach within the Sprint framework requiring to be performed in phases allowing testing and customer sign-off before development could continue into the next phase.
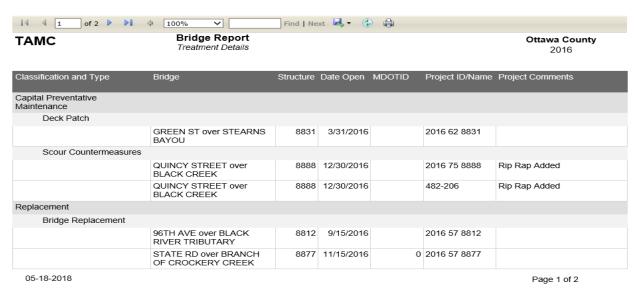
The work was initially expected to consume 4,970 hours at a cost of almost half a million dollars, but the final cost totaled $260,000. The new system has been in use for 10 months.

The IRT program provides training in the form of videos, seminars, conferences, as well as YouTube videos as part of TAMC's continuing education programs. However, many users report that the revised IRT is usable without training. TAMC communication is assisted by the Center for Technology and Training at Michigan Technological University, through the Federal Highway Administration's Local Technical Assistance Program (LTAP).

Further refinement of the system is being guided by the comments of users. The regular communication between TAMC and all 617 road agencies provides a ready means for users to comment directly to system managers at MDOT and DTMB.

The IRT is utilized by the entire range of institutions making up Michigan's 617 road agencies. For villages and small cities, the IRT can be the agency's data source for its road-project records. For the many local agencies using the RoadSoft program for storing and analyzing pavement-condition records, this obtained data can be exported directly from the IRT with report options so that no manual intervention is needed.

Data can be entered at the user's convenience, annually or in any increments. Users control the submissions for their agencies, and they are able to submit data for their own roads only. (In Michigan, three levels of road agencies may be responsible for roads within city limits—state, county, and city—and ownership can be confusing.)

TAMC **Bridge Report** Ottawa County
Treatment Details 2016

Classification and Type	Bridge	Structure	Date Open	MDOTID	Project ID/Name	Project Comments
Capital Preventative Maintenance						
Deck Patch						
	GREEN ST over STEARNS BAYOU	8831	3/31/2016		2016 62 8831	
Scour Countermeasures						
	QUINCY STREET over BLACK CREEK	8888	12/30/2016		2016 75 8888	Rip Rap Added
	QUINCY STREET over BLACK CREEK	8888	12/30/2016		482-206	Rip Rap Added
Replacement						
Bridge Replacement						
	96TH AVE over BLACK RIVER TRIBUTARY	8812	9/15/2016		2016 57 8812	
	STATE RD over BRANCH OF CROCKERY CREEK	8877	11/15/2016	0	2016 57 8877	

05-18-2018 Page 1 of 2

Screen Shot: Sample Report generated from IRT report web interface for bridge projects in 2016 for Ottawa County.

Significance-20%

The revised IRT system is part of the "asset management approach" that has been developed by MDOT over the past 20 years and is also part of the Governor's 21st Century Infrastructure Pilot project. Like other state highway agencies, MDOT has changed its focus away from new roads, to preservation of an asset inventory of inestimable value. The goal of asset management is to know when the condition of the system is worsening—when we are disinvesting in the system through deferred maintenance. Correct and complete inventorying of changes to the network is crucial to this asset accounting.

Easy and fast entry of new data is the route to good information, especially where hundreds of respondents are involved; many of them with severely-limited time and skills for intense analysis of information. A return on the investment of time and effort necessary to satisfy the reporting requirements ensures a high level of compliance and accuracy. Agency specific reports and graphic presentations can be generated. With the old IRT agencies were at an average rate of 22% non-compliant and with the new IRT that has dropped to only 10% non-compliant. This is a large statistical drop in those agencies that weren't being compliant with their reporting.

The IRT also provides an opportunity to coordinate with neighboring road owning agencies and local utilities which has been demonstrated in the 21st Century pilot project.

Michigan's constitution prohibits "unfunded mandates" by the state on local units of government. New reporting requirements could constitute such a mandate, but redundant and inconvenient reporting should be abolished in any case. The revised IRT not only increased the speed and ease of reporting, it generates new information of value to users.

5

Legislation is likely to be enacted in 2018 that will extend the asset management approach from roads to water and sewer utilities in Michigan. The TAMC, including the Investment Reporting Tool, is the model for asset inventorying and analysis for all other Michigan utilities. The law will require asset management plans for all public utilities and provide a template for reporting progress toward quantified condition goals.

The Investment Reporting Tool is modelled in a way to be replicated for reporting projects on water supply, sewer, drain, and other utilities in the future. Many local governments have made progress on inventorying their assets, and automated systems will enable many hundreds of small agencies to inventory their assets in the future. All data are stored in a statewide integrated GIS, the Michigan Geographic Framework, with a common linear referencing system used by all.

Impact 40%

Nationally only a half a dozen states own all their roads. Michigan is not one of these states. Like many other states, ownership of roads in Michigan is very de-centralized with multiple sources of funding. Historically, there was no single place to document both the condition of the roads with the corresponding investment (past and future). Therefore, there was no ability to understand total cost of investment over the life of the road for every community. While accounting processes tracked money spent, but there was no tie to the specific geographic location of the road. Today with the IRT a direct correlation is established between engineering practices and the corresponding financial investment, so communities can maximize their investment dollars. The term that is used in the state is making the "right fix, at the right time, in the right place! The goal is to maximize the investment dollars to the right solution to promote asset management Best Practices through the Transportation Asset Management Council.

Additionally, the shortage of funds for road maintenance in Michigan gives road asset management enormous importance. Information about the condition and performance of the system is crucial to extracting the maximum life out of each bridge and mile of pavement. A goal of the Transportation Asset Management Council is to give hundreds of small road agencies access to analytical tools that untrained or part-time street supervisors can easily use to assess the condition of their system. This new system enables the TAMC council and the agencies the view of current projects, past projects and future projects and the ability to analyze the data to the degree required. Most small road agencies do not have the budget, systems or man power to easily generate good investment reporting.

Rebekkah Ausbury, a project engineer for the Road Commission of Kalamazoo county, calls the latest version of the IRT 'user-friendly'. Rebekkah states that the use of the new IRT has cut their project reporting and funding process in half. It takes half the time to do this work as it did in the years before. Now she enters the information, sees what is accurate, modifies and generates reports for her accountant at the Road Commission all in half the time it used to take.

The TAMC council sees this improvement as instrumental in allowing agencies an easier way of submitting their investment accounting and reporting. The agencies can report their projects

easier, more accurately and quicker than before which in turn allows them to receive their ACT 51 funding sooner. As stated by Joanna Johnson, TAMC Chair, "The Investment Reporting Tool (IRT) allows public road agencies to report road and bridge projects to the TAMC, however it also provides a database for local agencies to track their current projects and future 3-year projects. This excellent use of technology provides a sustainable application used consistently throughout the State."

Since upgrading the IRT, local agencies report to TAMC that they can easily generate several new styles of useful reports. Information that formerly existed only on paper or in spreadsheets of limited utility, can now be translated into easily-understood maps or other displays. Users no longer spend endless hours crafting reports and maps for their local agency or citizens to understand the investments they are requesting. Users can tabulate their record of projects by work type (resurfacing, crack sealing, chip sealing, etc.) and evaluate the performance of each over time. Maps can show citizens and elected officials the state of the system jurisdiction-wide, or in their neighborhoods. The year-by-year record of reinvestment projects can also be presented on maps or in tables making the data easy to understand.

The condition of a segment of road as small as a city block can be accessed in real time with a history of investments, planned projects and changes in condition over time. Questions from the public, local officials can be easily answered.

Jim Murphy, city engineer for Norton Shores, explained that "rather than using spreadsheets as we've done in the past, we went straight to using the IRT". The IRT allows him to create a repository of the City's projects along with basic geo-referencing data. Murphy has been able to build a simple inventory of the City's projects in the IRT, complete with project-specific comments that he has used with his elected officials.

Instead of being an additional reporting requirement, the IRT is replacing paper systems. One small city reports, "The IRT was very simple and provided a means for us to record our work with comments and cost information that normally would be put on paper and filed away." Retrieval of project information is now much easier. At the smallest villages and cities, a single worker was frequently the sole source of knowledge for road-project records. IRT users now have simple, accessible help.

Larger and more sophisticated cities and counties can use their IRT records as the basis of predictive tools for forecasting pavement performance. Significantly, some agencies are using IRT to enter data from prior years, not just for currently-required reporting. The ease of entry allows speedy creation of historic data that can help evaluate project performance. Statistics can be generated on the effectiveness of different maintenance strategies, frequencies, materials, suppliers, contractors, or other variables. These statistics are very helpful because it can assist the local agency in determining what maintenance they should focus on in the future.

The statewide inventory of projects allows easy exchange of performance data among agencies. TAMC's program of education and conferences provides a forum for sharing results and techniques, encouraging cross-collaboration among road-owning agencies and others with expertise in asset management.