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**2008 Michigan NASCIO Award Nomination DRAFT
MI Drive Web Site Project**

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Category:

Information Communications Technology Innovations

Previous NASCIO Nomination:

None

Previous Recognition:

Nominated for 2008 American Association of State Highway & Transportation Officials (AASHTO)
President's Transportation Award

B. EXECUTIVE SUMMARY

North America's busiest cross-border trade artery pulses through the heart of Michigan's largest city, carrying nearly a quarter of the nation's \$500 billion international commerce with Canada. All too often, severe Detroit-area traffic congestion threatens the economic life and development of not only the state, but also the entire region. Constant roadway expansion is impractical in terms of both cost and space, yet few alternatives exist. As transportation leaders struggle to squeeze maximum capacity from existing infrastructure, a critical communication tool is now providing travelers with information that is targeted with pacemaker precision toward meeting their needs and increasing the smooth flow of Michigan's surging commercial lifeblood.

Today, many Michigan drivers can anticipate traffic delays and avoid traffic incidents that happened just minutes before, through focused and near-instantaneous communication. In July of 2007, the Michigan Department of Transportation (MDOT) launched its new "MI Drive" Web site (<http://www.michigan.gov/drive>) that provides not only lane closure and construction alerts, but also information about wait times at border crossings, local gas prices, ride sharing, transportation alternatives, traffic laws, *and* real-time traffic speeds and views from traffic cameras along major routes in the state's two largest cities.

Through the unique use of current technology, MI Drive combines highly-tuned interface improvements with a condensed and simplified geographic information platform to:

- Produce a specialized customer information delivery system
- Promote regional economic development and improved quality of life
- Provide enhanced communications abilities regardless of geographic location
- Offer innovative, responsive, and personalized services to travelers
- Encourage broader use with both a cost-free internet site and statewide wireless connectivity at rest areas, state parks, marinas, and welcome centers

Communication via MI Drive provides a customer-oriented alternative to expensive road expansion by encouraging informed driving decisions that relieve congestion through route optimization, incident avoidance, and off-peak travel. MI Drive's major "greening" effect expects to lower carbon emissions by traffic reduction and to lessen construction-related environmental intrusions of dirt, concrete, steel, and noise. This solution supports the Governor's Cabinet Action Plan of streamlining government by promoting innovative cross-boundary partnerships, prioritizing decisions on the basis of shared cross-governmental themes, and reinventing the delivery of State government services.

The project also pioneered the innovative government application of objective consumer testing and product development procedures previously reserved for businesses. The resulting easy and effective communication tool promises safer, more efficient travel on state highways and potential savings exponential to cost. MI Drive's innovative partnerships and processes are equally-important and powerful achievements that can propel a wide array of finely-focused IT communication projects in Michigan—and elsewhere:

- Leveraging the state's centralized geospatial data framework
- Creating a map-based presentation layer that will be adaptable to future projects
- Setting new standards of objectivity and responsiveness through direct customer involvement
- Pinpointing customer needs and wants with unprecedented accuracy
- Communicating information in a way that is most understandable to users

MI Drive is a product of MDOT's continuing commitment to formal yet flexible practices that ensure consistent and predictable success. However, this is the first time focus groups, card sorting, cluster analysis, and external usability testing and validation have been applied to a state IT project. It's also MDOT's first use of a geospatial mapping web service—providing a broad foundation for future development and transferability.

The benefits of MI Drive's methods carry easily to other projects or agencies. Every new MDOT application now undergoes similar objective analysis. Test results drive new design standards bringing further reductions in risks and rework, with increases in performance, usability, and user satisfaction for a wide range of state services. Meanwhile, Web page hits have jumped six to tenfold as the cycle of evaluation and development continues to improve the MI Drive site and the safety and efficiency of Michigan's highways.

C. BUSINESS PROBLEM & SOLUTION

Travel Problem: A report based on 2005 data showed Metro Detroit ranked eighth among the most congested places for spending time stuck in traffic, with drivers losing an average of 54 hours a year. That figure was up three hours from about a decade ago and more than twice the 25 hour average from 1982. Nationwide, drivers lose an average of 38 hours a year by comparison. It is predicted that Detroit commuters will take 50 percent longer still to get to work by 2030, unless more or bigger roads are built.

From a broader statewide perspective, one study found that 39 percent of Michigan's urban highways were congested in 2006. This corroborates earlier data showing that 44 percent of urban interstates were congested along with 30 percent of the state's other urban freeways (compared to 33 and 20 percent levels nationally).

Congestion's impact is more than mere frustration. Experts warn congestion will reach levels that will harm economic development prospects and could tremendously hamper the state's and the region's ability to conduct cross-border trade. According to the Federal Highway Administration (FHWA), "The Detroit/Windsor international border crossing is the busiest commercial crossing in the United States. In FY2006, it had 26 percent of all the northern border truck inspections. The corridor it is in accounts for 20 percent of the more than \$500 billion annual trade between the United States and Canada."

Congestion is already sapping productivity, polluting the environment, and costing lives. Those stuck in congestion are needlessly spewing pollutants into the air, delaying emergency response, and slowing the transport of critical products and supplies. Congestion-related wastes of time and fuel, along with traffic crashes and increased vehicle maintenance, contribute to a \$7 billion annual loss for Michigan's drivers. Even before the recent sharp increases in fuel prices, congestion was costing Detroit drivers over \$2 billion a year, or over \$1000 per peak hour traveler. Nationally, reports estimate the time lost in traffic creates a \$78-billion annual drain on the U.S. economy and wastes 2.9 billion gallons of fuel.

Proposed solutions include adding capacity to roadways, improving public transit, encouraging more carpooling, and wider use of computerized intelligent transportation systems (ITS). But Michigan, like many states, is facing record fiscal shortfalls and budget reductions restrict or eliminate many of these options.

Communication Solution: Accordingly, the original emphasis of this project was to improve the communication of ITS data available from the Michigan Intelligent Transportation Systems Center (MITSC) in order to cost-effectively increase the safety and efficiency of urban highways. As one of the nation's first and largest ITS deployments, the MITSC's advanced computer and communications technologies constantly monitor Detroit-area traffic with an array of cameras and traffic sensors. The MI Drive Web site began by presenting this real-time traffic data along with text-based lane closure information for Detroit. Across the state, similar data and video were soon added for Grand Rapids along with lane closure mapping for all.

Alternatives do exist. The demand for this kind of real-time information is so great that travelers in some areas of the country have begun taking matters into their own hands by establishing fledgling commuter networks where members can inform one another of conditions they meet (e.g. clevercommute.com and commuterfeed.com.). So far, the information available is extremely limited and unreliable, depending on the whims and fluctuations of the social network membership. Since they must rely on in-traffic use of text or voice messages for any updates resembling "real-time," these groups also carry safety concerns.

Several other states and cities, alone or with Google Maps, have also implemented traffic-monitoring Web sites with varying capabilities. Many of these provide only video while most track simple speed, and a few have both. GPS units can provide traffic information but this is often based on historical average speeds rather than real-time data. Such predictions have limited value due to weather variations, highway incidents, special events, construction, etc. On the other hand, those which do offer some form of real-time information require the continuing expense of paid subscriptions and can raise privacy issues with the way that data is gathered.

By contrast, the Michigan model is a front-runner in the integration of information regarding speeds, video, incidents (active and clearing), lane closures, the current messages from changeable roadside signs, and even construction planned for the future. Checkboxes in the map's legend let users easily and quickly customize

their view to display any or all of these to suit their needs. Links for information about wait times at border crossings, local gas prices, ride sharing, transportation alternatives, traffic laws, licensing, permits, weight restrictions, and so on—all combine to make the MI Drive site the most complete, yet coherent, site of its kind.

Innovative Design Process: MDOT recognized the benefits of delivering “one-stop” customer-convenience for public motorists by consolidating all traffic and travel-related information. But since another major goal was to achieve a design based on **actual** versus perceived commuter needs, developers obtained continuous feedback and design input from users themselves. To ensure optimum objectivity and maximum public benefit, an innovative partnership was established with the Michigan State University (MSU) Usability and Accessibility Center to conduct focus groups for helping with needs assessment, usability testing, and design validation.

Web Survey Analysis: First, a survey was implemented on MDOT's web site where 2000+ current web users provided crucial input. The respondents indicated why they came to the site, how well it met their expectations, and what they would like to see in the future. The team used that survey along with analysis of usage logs and available traffic and travel data to objectively develop both an inventory of proposed content and an easily-understood navigational structure.

User-Directed Design: Later, one hundred thirty-five actual users participated directly in the design process through on-line card sorting and cluster analysis exercises. Participants otherwise unaffiliated with the project were invited to log on to a web site containing a list of the proposed content, which they could group into folders and name as they wished. Following this activity, designers examined a software-generated cluster diagram showing which content items belonged together in users' minds; then analyzed user-suggested folder names to determine navigational group titles. Using these results, the team created a site prototype and designed several potential icon sets for later usability testing and final use on the map site.

Objective Focus Group Input: The MSU Usability and Accessibility Center was engaged to conduct focus group activities due to their ability to recruit actual commuters not associated with any state agencies. The state project team observed the focus groups remotely, and then studied their findings to understand how commuters would use the information. These insights guided the final design and gave direction to the work. Users' comments on prototype options also helped the project team select the site's visual presentation style.

Cooperative Technical Solution: To create the map interface, the Michigan Department of Information Technology (MDIT) and MDOT partnered with the Center for Geographical Information (CGI), the state's centralized collector and repository of geospatial data. CGI capabilities and platform were important to the development of a web service presenting real-time traffic data from the Detroit MITS Center in an easily-understood map format. But developers soon recognized that this site would ultimately become the consolidated public presentation layer for data and services across the entire state, providing a foundation for the subsequent mapping of lane closings, sensor information, and traffic incidents throughout other regions as MDOT's ITS program expands. Map prototypes were jointly developed, checked during usability testing, and then refined. For example, interactive sessions helped determine the final solution's format and color pallet.

Objective User Testing: Recently, MDOT's usability testing has been performed in a specially-designed facility within its Lansing headquarters. There, an unbiased potential user is sequestered in a room with a computer, a test facilitator, and a prepared list of tasks to perform. In a remote room, the development team and business owners watch a projected image of the testing PC screen accompanied by live audio and video of the user. Observers can glean information from both the user's computer actions and from concurrent comments or even facial expressions. The entire session is recorded so it can be replayed for later study. An instant messenger link allows discrete communication between observers and the facilitator. The facilitator is careful not to provide direct aid, but is available to ask probing questions whenever difficulties arise. Participants are never told how to perform a task unless the test cannot otherwise continue.

For this project, the web team partnered with MSU's Usability and Accessibility Center to ensure the utmost objectivity and to validate MDOT's usability test procedure. MSU was again able to obtain actual commuters (non-state employees) to serve as testers. The tests were performed at MSU facilities where the state team

observed from a remote room to identify difficulties, user preferences, and potential usability improvements.

User Education: Although the MI Drive team certainly achieved its goal of creating a site that is intuitive and self-explanatory, the MDOT Communications Department has nearly completed a video-enhanced tutorial that, along with a frequently asked questions link, will help educate users and make the site even friendlier. News releases have attracted statewide newspaper and electronic media attention and informed travelers of the informational opportunities MI Drive offers. Transportation leaders have been abuzz over MI Drive presentations at industry forums such as the 2008 ITS Michigan Annual Meeting and Exposition on May 13-14.

D. SIGNIFICANCE TO IMPROVED GOVERNMENT OPERATION

MI Drive gives direct assistance to federal anti-congestion efforts. The USDOT Congestion Initiative says in part, “USDOT is working to advance low-cost operational and technological improvements aimed at congestion reduction. USDOT is encouraging and supporting State efforts to provide real-time traffic information to all users...”

Further, the MI Drive site exemplifies Michigan’s determination to develop superior broad-based solutions through partnerships that focus on community involvement, strategic collaboration, and customer priorities instead of the traditional bailiwicks of a segmented state structure. This project supports the Michigan Governor’s Cabinet Action Plan of promoting innovative cross-boundary partnerships and sharing efforts around common themes in order maximize resources and streamline the delivery of government services. The project is also aligned with the goals of the state’s technology plan to:

- **Expand Michigan’s services to reach anyone, at anytime, from anywhere.**
Real-time travel information is accessible from any desktop or laptop computer with an Internet connection—around the clock and around the world.
- **Transform Michigan’s services through sharing and collaboration**
The Department of Information Technology (MDIT) Web Services Team, the MDOT Office of Communications, the Center for Geographical Information (CGI), Michigan State University (MSU) Usability and Accessibility Center, and others, jointly produced a successful transformation of information delivery for improved transportation efficiency, greater customer satisfaction, and easier internal operation.
- **Manage technology to provide better service and faster delivery**
Skillful management of an amalgam of web and geospatial technologies vastly improved the quality of service to the traveling public.
- **Create a statewide community of partnerships.**
Early and meaningful involvement of real users created an increased sense of shared purpose among all project participants—including various entities within state government and special-purpose university groups. This united partnership promoted progress and produced lasting relationships contributing to continued collaboration.

MI Drive’s unique use of current technology integrates finely-calibrated interface improvements with a condensed and simplified geographic information platform to produce a specialized customer information delivery system. This new system promotes regional economic development and improved quality of life, provides enhanced communications abilities regardless of geographic location, offers innovative, responsive, and personalized services to travelers, and encourages broader use of the technology with both a cost-free internet site and statewide wireless connectivity at rest areas, state parks, marinas, and welcome centers.

The MI Drive site demonstrates MDOT’s ongoing dedication to refining its customized project management model for generating highly successful customer-driven projects through a reproducible and predictable process. This team has led the way for many others by applying focus groups, card sorting, cluster analysis, and external usability testing and validation to a state IT project for the first time. MDOT’s first use of an online geospatial web service provides an infrastructure for the future development of other map-based communication tools that can be integrated into a variety of IT solutions.

This project’s extensive technology-driven qualitative and quantitative market research is unprecedented in state government service delivery. This innovative application of established commercial-industry techniques

has allowed MDOT to tap into the pulse of Michigan travelers and provide them with critical communications in a format that is intuitively understood and accurately targets their needs.

Similar techniques can be valuable for developing public service programs nationwide. A speech by Federal Reserve Governor Randall S. Kroszner at a recent university forum mentioned, "The Federal Reserve Board has recently undertaken an innovative approach to improve the effectiveness of disclosure--namely, surveying and responding to consumers through consumer testing. Having taught at a business school for many years, I am well aware of the types of consumer testing that firms have long employed... Systematically using such techniques to improve the effectiveness of disclosure requirements..., is, however, relatively novel."

In Michigan, as these methods continue to increase knowledge, awareness and understanding of transportation customers, demand for this kind of analysis is also rising. All MDOT applications are now being tested in this way. That in turn improves the entire process as broader experience is gained and test results feed the development of enhanced design standards for applications that provide on-line services such as roadway permits, purchasing of crash data, public transportation administration, grant distribution, and construction bids, to name just a few. Clearly, continuing these cycles of examination, evaluation, and advancement will foster rising levels of performance, usability, and user satisfaction for a broad range of Michigan transportation services.

E. PUBLIC VALUE OF THE PROJECT

Low-Budget Congestion Relief: A safe and efficient transportation system is a critical component of Michigan's economy and quality of life. The movement of people and goods has a direct bearing on employment, shopping, entertainment; industry and economic development.

Growing transportation needs and scarce financial resources require a new approach to transportation problem-solving. Alternative fuel vehicles and rising gas prices are reducing traditional sources of transportation revenue. In the face of shrinking budgets, increasing demand and straining infrastructures, one important step in the evolution of the overall transportation system is the application of innovative information technologies to improve the efficiency of current highways.

The state has followed a Governor-led policy which negotiated the delay of new road projects to finance improvement of current roads. By broadening its focus from new road construction to more effective management of existing assets, MDOT is working to sustain the mobility of Michigan travelers. Encouraging informed decisions that relieve congestion by route optimization, incident avoidance, off-peak travel, and options such as carpooling or public transit, tools like MI Drive provide powerful and cost-effective alternatives to infrastructure expansion.

Comparing the MI Drive price of under \$180 thousand with costs for the recent M-6 bypass in Grand Rapids at \$4 million per lane mile, MI Drive has the potential to save millions in Michigan over the coming years. For example, estimates say 1095 lane-miles of new roads (costing \$4.3 billion at M-6 prices) are needed in the next 5 years just to maintain current levels of congestion in Detroit. If MI Drive helps avoid construction of even one of those multi-million-dollar miles, the ROI will be outstanding. Since even higher construction costs exist in many urban areas of the country, targeted travel-demand management strategies, including communication channels such as MI Drive, could help save billions nationwide.

Avoiding wasted time and fuel and reducing pollutant emissions bring further quality-of-life benefits to drivers, economic benefits to the region, and environmental benefits to the planet. A report shows that in 2005, the average Detroit commuter lost more than a work week (54 hours) of time that could have been spent vacationing or in productive activities. Congestion cost drivers \$1,010 each, or over \$2 billion total. [Travel delay value estimated at \$14.60/hr. per person and \$77.10/hr. of truck time with excess fuel at state average \$2.33/gal.] At the same time, they wasted over 76 million gallons of fuel and produced about 1.5 billion pounds of carbon dioxide plus clouds of other environment-impacting exhaust emissions such as nitrogen oxides, particulates, hydrocarbons, and carbon monoxide. Offsetting the carbon footprint alone could cost up to \$34.5 million by some accounts. [76 million gal. x 19.6 lbs. CO₂ = about 1.5 billion lbs. at \$50 per metric ton offset.]

Over 5 years, the project will bring direct gains of \$600 thousand by saving the approximately \$120 thousand annual fee formerly paid to an independent company for camera-caching and Web-hosting services. More immediate control of site content and greater reliability are auxiliary benefits. The MI Drive project also gave MDOT employees a streamlined interface to enter lane closures, so investment in the public site carries time-saving and morale-boosting returns for internal customers as well.

Lifesaving Emergency Support: Communicating timely and accurate information to emergency personnel shortens response intervals and enhances highway and overall safety. The ability of first responders to plan the fastest route based on current conditions can easily mean life or death to victims of crashes, fires, accidents, or crime. As described in a National Highway Transportation Safety Administration document:

"Trauma is a time-dependent disease. 'The Golden Hour' of trauma care is a concept that emphasizes this time dependency...the first hour of care is crucial, and the patient must come under restorative care during that first hour.... Pre-hospital immediate care seeks to apply supportive measures, and it must do so quickly, within what has been called the 'Golden Ten Minutes.'"

The same document states that two of the five critical components of the "time/life race of the 'Golden Hour'" consist of travel time to the crash scene by EMS, and transport time to a trauma center. Both lengths of time are directly related to the degree of traffic congestion and the information available to responders.

Ease of Use & Agency Image Enhancement: Public response has been extremely positive. The site has drawn spontaneous praise from many users, of whom the following are only a few representatives:

- "MDOT has revamped its MI Drive Web site, and the upgrade is terrific. I visited the site and found it very easy to use, including the MDOT legend and the ability to zoom in on roads and road projects throughout the state. Access to the hundreds of freeway cameras is also very handy, especially if you're heading into morning or afternoon rush hour traffic." - Tom Greenwood, "Detroit News," April 23, 2008
- "I just wanted to say that these cameras are great. I am an amateur radio operator and also a dispatcher for a company that pages out EMS runs and fires. I really like the cameras." - Eric Chambers
- "Thanks for the interactive map. It's a lot more helpful." - Mary Ann Adams
- "The interactive map traffic portion of the Web site is very helpful." - Brigette Clements

Site statistics are also impressive. Hit counts started at about 2,280 in both May and June of 2007, multiplied by six to 13,655 in July (following the July 9 rollout), and increased tenfold to 23,146 in February of 2008!

A Legacy of Excellence: One of the most lasting benefits of this project will be the ongoing use of consumer testing and design involvement to produce solutions that truly satisfy users of state services as both customers and owners of government. The benefits of consumer testing are significant and their impact can last long after the results are analyzed. Following the lead of MI Drive, consumer surveys and testing can be used to:

- Explore service opportunities
- Identify user requirements
- Obtain unbiased design input
- Improve the state "brand" perception
- Increase loyalty to and use of state tools and services
- Identify areas that need improvement
- Identify upgrade opportunities
- Provide more effective educational communications
- Test new programs, services, offers and pricing

In the future, the application of similar methods to other projects will continue to save an untold amount by reducing the risk of rework while at the same time enhancing public image and helping state agencies to be more responsive to the communication requirements of constituents. Applying proven consumer-based techniques to find out what state customers want and need—and also the best way to deliver—makes sense for the state and for users alike. The innovations of the MI Drive project demonstrate that "communication is a two-way street" carrying real benefits at reduced cost.