



NASCIO 2008 Recognition Awards Nomination

Michigan

Title of Nomination: Wildland Fire Application

Category: Digital Government: Government to Government (G to G)

Nomination Information

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B. Wildland Fire Application: Executive Summary

According to the Michigan Department of Natural Resources (MDNR) an estimated 8,000 to 10,000 wildfires occur every year in the state of Michigan. These fires range from under 50 acres to thousands of acres. A single large fire in Upper Peninsula in 2007, the Sleeper Lake Fire, cost approximately \$7.5 million to suppress. To suppress many of the fires in Michigan it becomes absolutely critical to cooperate across jurisdiction and governmental lines through the sharing of human and equipment resources. Traditional ground and air resources needed for larger fire often include Michigan DNR, Michigan National Guard, natural resource agencies from neighboring states, U.S. Fish and Wildlife Service, U.S. Forest Service (USFS), the Nature Conservancy, Michigan State Police, Michigan Department of Transportation, Michigan Department of Corrections and local volunteer fire departments. Because the state of Michigan has the 2nd largest amount of *state-owned* land in the country (after Alaska) at about 4.2 million acres and it has legal responsibility for fire suppression and fire management on over 20 million acres of forest and wildlands, the MDNR frequently takes the lead in fire suppression and management. In the leadership role, the MDNR has the responsibility to coordinate with all other government cooperators, particularly local fire departments, in times of fire events. Traditionally, all of these organizations have had to work from a very limited and manual process in coordinating and mobilizing available resources. Hence, the MDNR authorized the development of the Wildland Fire Application to modernize the process and address these and many other needs in the fire management and protection program.

The Wildland Fire Application exemplifies important innovative “Government to Government” best practices as a wildland fire management and wildfire suppression solution while at the same time taking advantage of existing state enterprise IT investments. What separates this application from many others around the country is that it is a 24/7/365 application used for non-event wildland fire management in addition to assisting in wildfire suppression activities. Many state and local fire suppression Internet mapping applications are activated only during large fire events with cooperators pushing data in an ad-hoc manner to the central mapping service. In this solution, all information is maintained through the course of using the application for daily business functions. Creation of this application has modernized the MDNR’s business practices, moving them from a paper process to utilizing GIS for planning and analysis. This in itself has resulted in dramatic benefits to the department’s daily business by reducing staff costs, making the communication process among divisions more responsive and thus more enjoyable, and reducing logistics errors by having up-to-date information available. However, it is more important to note that this application doubles as a real-time planning tool during wildland fire emergency response situations and prescribed burn planning, giving fire staff the ability to reach critical decisions faster, to better anticipate fire behavior, and to communicate with other agencies involved in fire response. Wildland fire cooperators, including the USFS, local fire departments and dispatch centers, rely on this application to provide them with the same critical information that the MDNR has access to during emergency or prescribed burn situations. The development of this application has ensured coordination among the various government entities involved in these fire response situations. Above all, the Wildland Fire Application directly supports the Michigan Governor’s 2008-1010 strategic policy goal of protecting Michigan families and quality of life by allowing innovative “government to government” collaboration in time of emergency.

C. Description of Business Problem and Solution

Problem - MDNR's Forest Mineral and Fire Management (FMFM) division has two primary goals: (1) to keep all wildfires under 10 acres in size and (2) to conduct carefully planned prescribed burns on lands under control of the department. In order for FMFM staff to meet these goals and provide the needed resources to manage the wildfire and prescribed burn programs, accurate and timely planning tools and an efficient means of sharing information with other fire agencies (cooperators) are required.

In the past, FMFM staff relied predominantly on paper resources and manual processes. Large amounts of data were maintained at various levels of accuracy, by a number of different staff housed in separate locations. FMFM staff continually faced the overwhelming responsibility of compiling and sharing the information they held with other fire and emergency agencies, in a timely and effective manner. This was especially challenging during emergency fire responses.

FMFM's Incident Coordination Centers (ICC) located in Roscommon and Marquette, each coordinate wildfire response for over 50 FMFM field offices. These field offices house the FMFM staff and fire equipment that respond to wildfire emergencies for all private and state land. Each field office maintains fire plans and GIS information pertaining to their response areas, which in most cases, consist of multiple counties. In addition, they need to retain fire plan information for the entire peninsula within which their response area resides, in the event an emergency is located in another response area, but near enough to warrant their response. As mentioned earlier, this information was often stored in paper format. A fire plan consisted of a three-ring binder storing the following information: paper maps of response areas, locations of equipment, phone numbers of fire cooperators (USFS and locals agencies), and other emergency resources. Normally, the ICC's would produce paper copies of each office's fire plan, to share with the other field offices within the residing peninsula. Obvious downfalls associated with this practice include, but are not limited to: out of date or inaccurate information, lost or misplaced binders, and cost of reproducing copies.

FMFM's Incident Coordination Centers also coordinate the movement of FMFM staff and equipment to provide emergency response based on weather and fuel conditions, and must coordinate their activities with other fire and emergency agencies. During a wildfire emergency, ICC and field staff must quickly determine what is threatened, what additional resources are needed, and what type of cooperators should be called upon. In the past, decision-making was typically based on the spatial information maintained by each ICC, which included the following: aerial photos, fuel data, hazards, weather, response capability, and improvements such as homes and communities. Often, individual field offices maintained their own response capability information and had to somehow communicate back to the ICC anytime that information changed or an emergency situation arose. Clearly, maintaining information in this fashion was a labor-intensive practice, subject to inaccuracies and miscommunication.

Another responsibility of the FMFM staff is the planning of prescribed burns. Each year, FMFM is tasked with planning and carrying out over 100 prescribed burns. Field office staff must coordinate with ICC and other fire planning agencies that will review and approve these burns. For several years, FMFM staff in the Lower Peninsula utilized an ArcIMS software application

that was housed in Roscommon and made accessible through the DNR intranet, which provided many of the GIS layers needed for prescribed burn planning. Staff found it to be very helpful in the decision making process during incident dispatch and coordination of prescribed burns. Unfortunately, it was not available for use by the ICC in the Upper Peninsula, or by any other local agency or cooperator. Based on a needs assessment, it was determined that an expansion of this system to a statewide level for use by the Marquette ICC, local field offices, and all cooperators, would be beneficial. This in part, led to the development of the Wildland Fire Application.

Solution - As displayed above, the development of the Wildland Fire Application came in response to needed improvements in FMFM's fire response and coordination efforts with other agencies and review of best practices around the country. This application has been operational for **8 months (one fire season)**, has modernized FMFM's business processes and has created efficiencies that benefit all agencies involved, along with the general public. This product is an immediate response tool used to identify location of fires and equipment, ownership of land, fuels, hazards, weather, and travel (routing) during a fire emergency. Various geographic layers and fire management themes can be displayed as reference images for particular areas of interest. In addition, a context sensitive menu of Weather / Climatology and Fire Management information directs users to web based displays. Most importantly, the Wildland Fire Application provides functionality that allows fire professionals to carry out their above defined responsibilities with improved efficiency and effectiveness. In the 8 months since its rollout, the application has served as a solution for the following:

- (1) *Determining Office / Equipment Locations* - It is the ICC's responsibility to determine the best location for fire offices, staff and equipment on a permanent basis, based on fire response needs that can be analyzed through this application.
- (2) *Annual Fire Plan* - Information previously stored in paper format is now managed in a database accessible by MDNR, local fire agencies, and cooperators through this application. This provides for consistency in the format and quality of information, and improved sharing and access compared to past distribution methods.
- (3) *Emergency Fire Response* - Efficient access to GIS data for faster decision-making during incidents and less time involved in gathering and preparing maps, photos, and various GIS data currently being used; also, local fire agencies and cooperators now have access to the same GIS information as DNR staff, which will allow for better communications and understanding of incident management and reduce the time needed for incident management preparation
- (4) *Prescribed Burn Planning* - The field office staff have less time involved in prescribed burn planning by using maps within the application as opposed to developing individual ArcView projects for each burn site; in addition, the time needed for approval of the burns is reduced by simply allowing local cooperators access to the information within this application
- (5) *Innovative Characteristics ----Utilizing existing enterprise web mapping architecture and external systems* - The technical architecture of the Wildland Fire application was created with ArcIMS on multiple servers pointing to map data stored in ArcSDE (spatial database engine), both of which are ESRI products. Multiple Internet Information Servers (IIS) are used to host the ASP.NET application. The Wildland Fire application also integrates data from stored procedures and custom views that are established and maintained by the cooperators from multiple SQL servers. This data is used to generate the map display, support the info tool, to

validate user credentials and the creation of status and resource reports. In addition, the application integrates weather information from the Eastern Area Modeling Consortium as part of a State and Federal collaboration effort. The data is pulled from the EAMC using ActiveX scripting and HTTP protocol within an SQL Distributed Transaction Service to download the data and update the attributes of an SDE layer that represents the four kilometer grid used in the EAMC model. Finally, this application provides for 24 hour coverage of the management and maintenance of DNR's fire related data. Serving this application through the internet allows local fire agencies and cooperators 24 hour access to this same valuable information. In the future, there is potential to expand on the functionality provided, and the application may be integrated with the other fire management tools.

(6) *Communication Plan* --- The MDNR is currently implementing an awareness and adoption plan to promote the application to local fire departments and other cooperators throughout the state of Michigan who have not yet participated. The response has been very positive for those who have recently started to use the system (first impression) and those who have been using it.

D. Significance to the Improvement of the Operations of Government

Improved information and communication translate to improved decision and a more enjoyable work environment. Beyond the day-to-day uses, the Wildland Fire application provides FMFM staff, local fire agencies, and cooperators with the “government to government” tools necessary to make immediate emergency response, as well as long term planning decisions. These decisions ultimately affect suppression efforts and determine long-term fire plans for state lands, parks and game areas. The application also provides fire staff with valuable information to assist in making fire suppression decisions that affect communities, private property, homes, citizens, visitors and fire program cooperators such as local fire, police and emergency service providers. In the midst of a fire event a matter of minutes with more complete information can mean the difference between saving life and property or not.

In the past, the MDNR handled all of its fire and response planning in a format or with procedures that required a significant amount of staff time and effort due to the manual and paper process. In fact, the staff time to complete many tasks in the process was at least **96.7%** more than what it is today with the new application. The management of fire-related data is now centralized so that maintenance and upkeep of the information are handled at a statewide level and in a timely manner. The fire planning tools are now available to staff located in all field offices, Division offices, as well as local fire agencies and other cooperators. This marks a vital improvement to the overall fire response process, as all users now access and utilize the same information when communicating. In the past, some of the information was just not available or not accurate to all cooperators. While not being easily able to measure lost opportunities in the old process, it is clear that the new process is able to utilize and respond to situations more quickly in an emergency.

Improved leverage of existing IT investments. It is important to note that GIS applications, including the Wildland Fire application, play a strategic role in implementing public policies at the state, local and federal levels. This application in particular represents the State of Michigan's efforts to improve government by leveraging its IT investments to support collaboration and partnership goals, and to enhance state Internet-based service capabilities. The

Wildland Fire Application is using infrastructure already paid for and currently maintained under the existing enterprise GIS program. The application also takes advantage of existing IT systems inside and outside of state government in order to reduce duplication, provide more timely data updates and provide a more sustainable environment. The bottom line is the MDNR does not have to fund or maintain all aspects of the system since it is distributed among the various contributors and stakeholders.

Transferrability – Most of the time when you hear of fire management and suppression it relates to the events in the western U.S. But many states in the Eastern U.S. could also benefit from the components of this application and approach. This application has been developed on a standard architecture using ESRI products using SQL server database. Fire management programs from state to state use many of the same data sources. Since many of the data layers are maintained by staff directly in the application and either call national data stores or are consistent from state to state, this application contains components that could be made available to other states. In fact, it is estimated that 80% of the application development could be borrowed by another state and finish the customization for the last 20%. Other datasets could be gathered from national data stores or from State GIS offices. States can contact Michigan if interested.

Aligns with the Governor’s 2008-2010 Strategic Cabinet Action Plan-- Two major strategy goals of the Governor’s strategic plan are addressed with this application.

1. Better Government – making government more cost-effective and efficient
2. Communities – protecting our families and quality of life

In order to clearly show the relationship between the Governor’s strategic vision and the benefit outcomes in Section E below, each entry is tagged with a "BG" for meeting the Better Government goal or a "C" for meeting the Communities goal.

E. Benefits Realized by Service Recipients, Taxpayers, Agency or State

MDNR Staff Cost Savings (BG)- During the first 8 months of application production, the MDNR has seen a reduction of staff time to perform the same functions reduce by approximately **96.7%**. The difference is being made up in overall increased productivity and performance of tasks that just were not possible before the system was operational. For example, much of FMFM staff time in a fire event was involved with tracking down the latest information, making paper copies of plans, faxing reports, creating the state fire plan, responding to inquiries, revising statistics that were in error and so forth. The application has eliminated much of this work where they can work on coordination and planning. A comparison of staff time and costs before and after the Wildland Fire Application was conducted for a sample set of tasks involving 10 staff members. The information collected was based on 8 months of using the application during the previous fire season. Staff costs were based on current staff salary rates.

Staff	Sample Tasks	Staff time before application	Staff cost	Staff time after application	Staff Cost	Savings
10 MDNR staff	Locating equip, data sources, personnel, completing fire plan, creating incidents, answering public questions	386 hours	\$34,740	9 hours	\$270	\$33,930

MDNR Staff Work Environment Improved (BG) (C) –Many MDNR staff that work with the system directly have indicated that it has made their work process much more enjoyable. They are not fighting as many “fires” in the office so they can better fight the “fires” that are on the ground. They also enjoy a greater credibility with the public and cooperators due to the fact that they can respond with information and answers more quickly in times of an event. Finally, they feel that they are not a part of the technology backwater while other areas of the state are moving forward. They now feel that are on the leading edge of the use of technology to address such an important management and suppression program.

Improved Information translates to better and more timely decision-making (BG) (C) - During a fire event seconds and minutes count. Decisions are required regularly that can affect life and property. Communication between the field and the central coordination team must be fluid and accurate. Prior to the Wildland Fire Application, decisions were made with inconsistent information and often took hours not minutes. During the 8 months, many decisions that would have taken several hours have been made in a matter of minutes. These translate into critical on the ground results of natural resources, property or lives that are priceless.

Better coordination among cooperators and more enjoyable communication process (BG) (C) Before this application became operational, fire suppression coordination was mainly conducted by the “seat of the pants.” Not having up-to-date information or information when you need it can make for stressful operating and communication environments during a crisis. It also creates a credibility issue for the MDNR in the eyes of local and other fire cooperators when information is not current or available. This application has addressed both aspects of coordination frustration in the past. For example, the Sleeper Lake Fire in 2007 had hundreds of cooperators involved and the Wildland Fire tool was an important coordination tool in the MDNR used to mobilize resources, manage the teams and respond to inquiries.

Reducing costs / Cost avoidance by utilizing existing IT investments (BG) – Because the application used enterprise shared services, the overall cost of developing (done) and maintaining (projected 5 years) the application was 12.3% of the cost it would have been if MDNR had to develop it entirely with their resources-- **\$1,134,000 versus \$140,000**. It also ensures the MDNR a greater probability of sustaining the system for the long-term even in tight budget times. The project costs# are as follows:

Item	Cost# (w/o Shared IT)	Projected 5 yr maint Cost# (w/o shared IT)	Actual Project Cost # (w/ Shared IT)	Projected ongoing 5 yr maint Cost# (shared IT)
Servers purchase	\$203,000	N/A	None	N/A
Database purchase	\$124,000	N/A	None	N/A
Application development	\$64,000	\$25,000	\$64,000	\$25,000
Project Mgmt	\$16,000	\$5,000	\$16,000	\$5,000
Data Conversion/ maintenance	\$20,000	\$5,000	\$20,000	\$5,000
Hardware/software maintenance	\$12,000	\$60,000	\$5,000	\$25,000
Data Hosting	\$100,000	\$500,000	None	N/A
Totals	\$539,000	\$595,000	\$105,000	\$35,000

#Costs are calculated based on project costs as recorded in the staff reporting, project management records and current ongoing maintenance rates to the nearest \$1K.