MNCrash Technology Drives Toward Zero Traffic Deaths

State of Minnesota — Minnesota IT Services

CATEGORY:
Business Process Innovations

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MINNESOTA IT SERVICES

EXECUTIVE SUMMARY

Minnesota IT Services (MNIT) partnered with public safety and transportation state agencies to replace the state's aging system with a new, modern crash data records system. This innovative project, called MNCrash, is helping drive Minnesota toward **zero traffic deaths**.

Imagine you are a police officer at the site of a crash on the side of a busy highway during rush hour traffic. Your goal is to get the essential crash, driver, and insurance information as quickly as possible to clear the scene. Every second you remain on the scene, you risk the safety of yourself, all crash participants, emergency personnel, and other drivers. Now imagine that scenario, but using a 30-year-old outdated system that was way past its expiration date. Modernizing the system would require 10 years-worth of updates. That was not feasible on any terms — cost-wise or security-wise. There was no way to make the legacy system intuitive for today's modern needs.

The new MNCrash system now provides a quick capture feature for precisely these circumstances. Only essential information is required to quickly print driver exchange reports. We significantly improved the safety of our officers and crash participants by including this feature in our application.

Accurate, timely, complete, and accessible data is now more quickly available. The system also adds business rules to improve the quality of the data captured. The configurable system presents data using built-in analytical tools. It enables users to make timely, data-centered decisions concerning the allocation of limited resources, projects, and programs.

This project is an example of the changes underway throughout Minnesota state government, as all agencies move towards more cross-agency collaboration. MNCrash was a broad, collaborative effort between the Office of Traffic Safety (project sponsor), the Department of Public Safety, the Minnesota State Patrol, Driver and Vehicle Services, the Bureau of Criminal Apprehension, the Minnesota Department of Transportation (MnDOT), Statewide Law Enforcement, Minnesota IT Services, and the Minnesota Office of Geospatial Information. The project partners engaged the private sector to bring a world-class application tailored for users: HumanFIRST (Human Factors Interdisciplinary Research in Simulation and Transportation), and Appriss, the application vendor.

This improved crash data is used to allocate traffic safety funding to reduce traffic deaths and serious injuries for all Minnesotans. It identifies engineering issues, human behavior issues, and is used at the national level to identify vehicle issues.

The importance of timely, accurate, and accessible data cannot be overstated. The MNCrash system provides traffic and safety agencies with new data that help analysts create targeted preventive measures that help improve safe transit for all Minnesotans.

EXEMPLAR

The user interface for MNCrash implemented human factors engineering[1], including law enforcement input. MNCrash combined the strengths of University of Minnesota's HumanFIRST Laboratory and an experienced vendor.

The team had an opportunity to showcase MNCrash to Mark Rosekind, who was recently in Minnesota. Dr. Rosekind, then Administrator of the National Highway Traffic Safety Administration, was impressed with Minnesota's model, which used a human factors approach to make the user interface work for law enforcement, coupled with an experienced crash records system vendor. Adding in the fact that so many state agencies worked together on the project was an even bigger win.

CONCEPT

The legacy crash system was in dire need of replacement. The Office of Traffic Safety sought to align this solution with close collaboration from Minnesota law enforcement at all levels. State, local, sheriff, and tribal law enforcement offices collaborated with HumanFIRST and MnDOT. We established a steering committee to coordinate, manage and align the influence of the various constituents. The project team also consisted of representatives from each agency and division that would provide existing and new data, those that would be the primary end-users of the system, and those that would use the tool for analysis. The partnerships we created provided the foundation and guidance for a successful project from inception through production deployment.

The previous crash records database was based on a 30-year-old system that could not keep up with needed changes. Minnesota needed to move forward in the information that was captured, system efficiencies, and accuracy. The Model Minimum Uniform Crash Criteria (MMUCC), a national model of crash data elements, has established a way for state data to become national data. One paramount factor that helped to shape the solution was officer safety — collecting data and clearing the scene quickly was a top priority. Old manual processes and business rules were sources of error that could be eliminated through technology.

This was the best solution due to the incorporation of:

- An experienced vendor
- An effort to gather clear requirements for the various input methods
- Engagement with a usability expert, HumanFIRST, which worked closely with law enforcement officers

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1. Human factors engineering is also known as usability engineering, cognitive ergonomics, or user-centered design. It blends scientific knowledge about human strengths and weaknesses with the design of technology.

The project was initiated in July 2012 by hiring an analyst to establish a baseline of requirements. An architect and a project manager were added to the team to create a request for information, followed by a request for proposal. Solid vendor selection criteria led to selecting a preferred candidate. With clear requirements in hand, the project team switched to an agile development approach. The RFP for the project was a fixed bid of $1.6M with the total project costs equaling $2.9M. The work by the vendor began in September 2014. The system went live on January 1, 2016, and all constituents assess it as a success.

The Minnesota Traffic Records Coordinating Committee (TRCC) works to improve data quality and integration. Of the six core data systems (crash, vehicle registration, driver license, roadway, citation/adjudication, and injury surveillance), Crash is the one system that ties them all together. The TRCC chose the replacement of the crash system as its top priority, and part of a larger strategic plan.

The state is fully responsible for the oversight and outcome of the MNCrash project. The project team worked closely with the vendor to prioritize and review delivered work. This ensured that we received the most important things first. Lower priority items were delayed or omitted based on their value.

The project partners implemented a statewide training program alongside the vendor. The approach was to host local training across the state and train trainers for their local law enforcement offices. Online training was also available. The state used multiple channels of communication to get the message out.

SIGNIFICANCE

This project not only benefits transportation and public safety organizations, it also benefits all Minnesota citizens because the data collected is more meaningful and accurate, resulting in targeted improvements to roads and traffic safety. The crash data is used to develop programs to reduce Minnesota's death and serious injuries due to traffic crashes, and it is the driving force for data-driven distribution of federal funds.

Many large initiatives struggle due to a lack of guidance or vision, especially one like this with a confluence of staff, consultants, other agencies, law enforcement and a vendor. The insistence on establishing a steering committee, having a customer with a clear vision, and an experienced vendor, all aligned to bring the vision to reality.

The go-live goal was a hard delivery date of January 1, 2016. We established the date to have a clear annual boundary for legacy and new data sets. Some big impacts include getting additional data items and better crash location information.

The top priority of both NASCIO and Minnesota's Governor Mark Dayton was, and is, security. Implementing this solution in a CJIS production environment met this objective. Federal requirements for new crash data items were included and implemented. We also implemented agile software delivery and legacy modernization, meeting other 2017 NASCIO State CIO priorities (Security and Risk Management, Legacy Modernization, Enterprise Vision and Roadmap for IT, Data Management and

Analytics). Governor Dayton's plain language initiative was also incorporated in redesigning the crash report that is generated for distribution to citizens.

IMPACT

MNCrash provides a quick capture feature that significantly improved the safety of our officers and crash participants. Only essential information is required to quickly print driver exchange reports, clearing crash sites safely and quickly.

For MnDOT, one of the highest risk areas is a work zone. An immediate impact of the new application is our work zone notification feature. The officer flags the crash as occurring in a work zone and an email notifies MnDOT of the crash. MnDOT uses these notifications to determine if alternative or earlier signage is required to reduce crash risk.

MNCrash provides traffic safety with new data fields that assist analysts in creating targeted preventive measures, as well as added business rules to improve data quality. An example is the variable of safety equipment. In the old system, any of the codes could apply to any person in the crash. In the new system, no longer can a pedestrian be wearing a seatbelt, or an airbag deploy for a bicyclist by an officer keying a wrong number—only the choices applicable to the person type are shown to the user. The user interface incorporated the supplemental form that is required for fatal crashes. This had the effect of decreasing the unknowns for this information. One example is the EMS times required for crashes involving a fatality. The "EMS time arrived at hospital" variable went from "unknown" in 33.7 percent of entries in 2015 to 9.6 percent in 2016. Timeliness has also improved from an average of data being available five days after crash occurrence to two days. The MNCrash system lets officers pinpoint the crash location on an image and map. The accurate location gives MnDOT quantitative data to determine where and how to apply their financial resources to road and highway improvements and modifications.

A non-monetary benefit is the usability of the application. Officers are able to proceed logically through the crash data entry. HumanFIRST worked with officers to identify the way an officer thinks and processes the crash information. This guided the layout of the screens and forms in the application.

In terms of finance, millions of dollars in federal funding are allocated based on crash data. To use the resources effectively, high quality data is imperative.

Due to job requirements of officers, data entry screens were not mandated to be digitally accessible. However, in contrast to the legacy application, the back office and administrative screens are accessible. We host the application alongside other law enforcement applications. The environment is CJIS compliant, ensuring security of our application and data. This is a significant improvement over the security of the legacy hosting environment.