UTC Spotlight

University Transportation Centers Program

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U.S. Department of Transportation, Research and Innovative Technology Administration

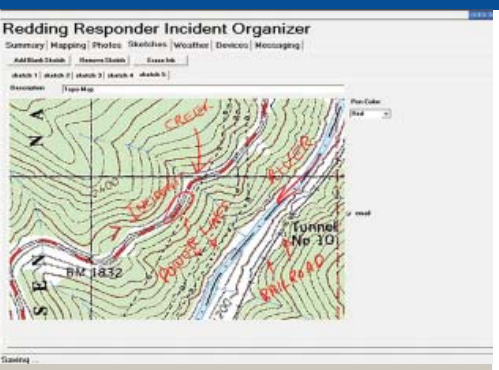

Photo credit: WTI/Caltrans

This monthly report from the University Transportation Centers Program highlights some of the recent accomplishments and products from one of the University Transportation Centers (UTCs) managed by the U.S. Department of Transportation's Research and Innovative Technology Administration.

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Integrating Technologies = New Transportation Solutions

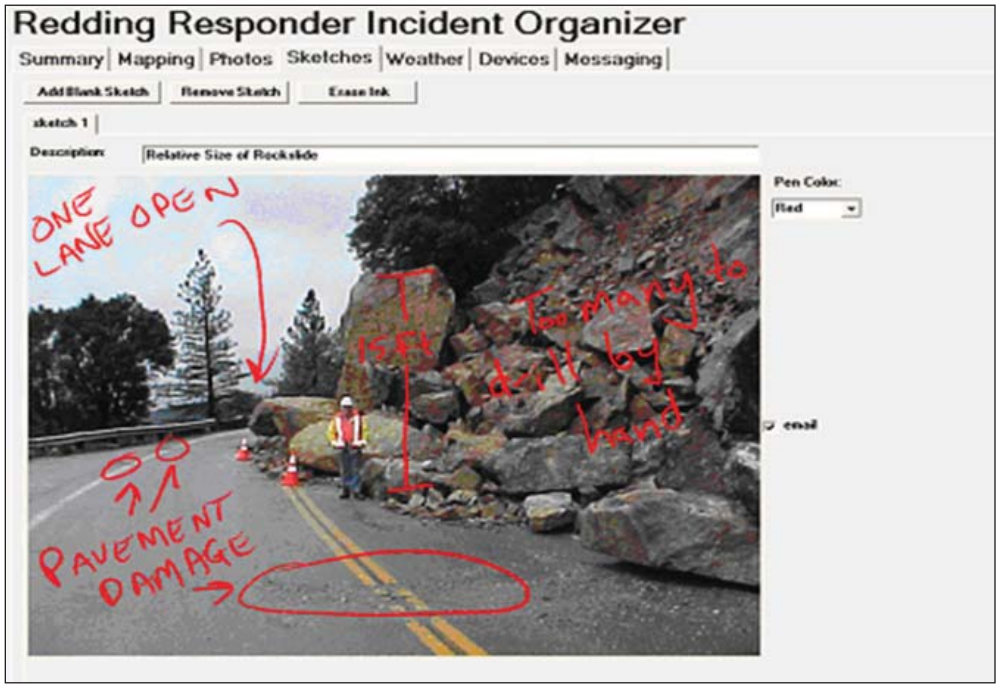
For more than 15 years, researchers at the Western Transportation Institute (WTI) at Montana State University (MSU) have focused on using technology to address the unique transportation challenges in rural areas. In particular, WTI's Systems Engineering Development and Integration program has found success by merging multiple transportation, information, and communication technologies to create innovative solutions.

WTI has two inhouse laboratories where researchers can develop and test hardware, software, and the integrated systems they create. These facilities have space and equipment for many steps in the development process, including component fabrication, system assembly, software design and integration, prototype testing, and traffic management center simulation.

Recently, WTI has expanded these laboratory facilities to meet the growing interest in integrated systems. The Systems researchers exemplify the multidisciplinary research approach of the University Transportation Centers by creating tools for all of WTI's focus areas, from safety to winter maintenance to road ecology.

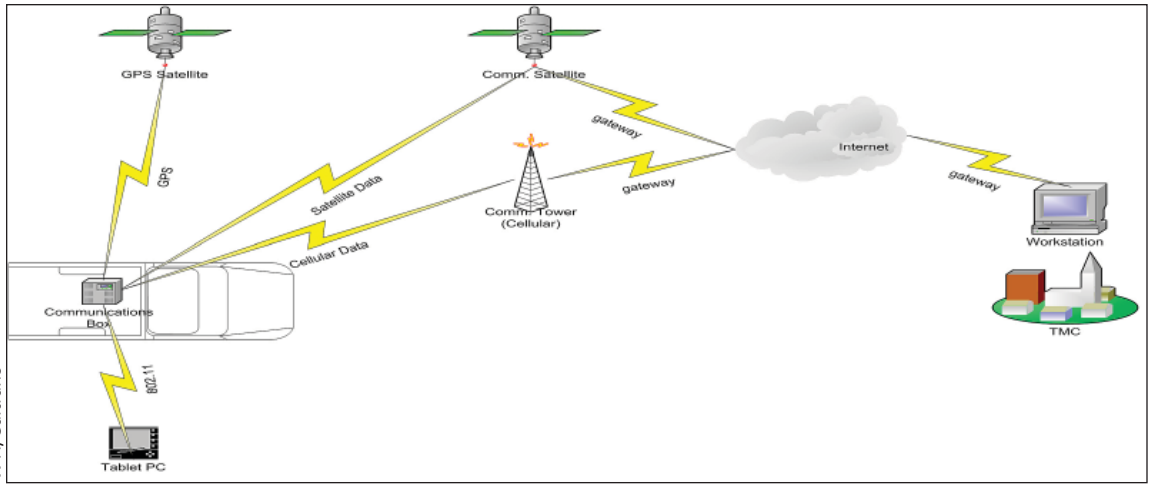
"Just *how* big is that rock in the road?"

When a crash, flood, landslide, toxic spill, or other incident happens on a two-lane rural road, traffic can come to a standstill. If the first responders on the scene can't quickly and accurately describe the extent of the situation, they may not get the help or equipment they need from other agencies, causing further delays and potential safety risks.



WTI/Caltrans

Rockslide on California SR-70 – Annotated in Responder Incident Organizer



WTI/Caltrans

Responder System Diagram

The California Department of Transportation (Caltrans) District 2 – Redding covers a large rural and mountainous region where communications coverage can be sparse, making incident response coordination challenging. Working with multiple regional agencies, Caltrans District 2 personnel conceived an idea for a communication tool that would make it easier for responders to collect and share information from the field.

WTI and Caltrans are developing the RESPONDER system, a mobile data terminal that includes and *integrates* several components:

- a system that collects at-scene information, including photos and sketches;
- a system that provides responders with site specific weather and maps, and
- hardware and communications systems that save and distribute the information.

As an example, a Caltrans maintenance worker discovers that a large boulder is blocking traffic on a narrow canyon road where his cell phone and radio don't work. He turns on RESPONDER, which automatically finds and connects to the most efficient and available communication system, in this case, satellite. RESPONDER's global positioning system (GPS) capabilities pinpoint the user's exact location and provide him with maps and weather information. He takes pictures with the digital camera, using the tablet pen application to highlight important details on the photos or maps. Clicking the "send e-mail" button, he automatically transmits all of the information to the Traffic Management Center, where staff can immediately mobilize a response.

WTI researchers worked closely with Caltrans users at every stage to ensure that RESPONDER was helpful, reliable and, most importantly, simple. "We wanted to create a system that allows responders to concentrate on the incident itself—not the technology being used to report it," said WTI Principal Investigator Doug Galarus. Caltrans officials agreed. "First responders told us again and again that if the system was not easy to use, they simply would not use it," said Ian Turnbull, Caltrans District 2 Chief of ITS Engineering and Support.

The collaborative development process has worked—several RESPONDER units have been produced and deployed as prototypes throughout the state, which Caltrans personnel have used on actual incidents, including landslides, wildfires, collisions, and truck rollovers. The overwhelming consensus is that RESPONDER is a very valuable system that allows a better, more timely, and effective response to all types of incidents. One of the first pilot users said, "I used the RESPONDER to send photos and maps to our dispatch after hours.... The machine is a very useful tool. As a matter of fact, can I keep it?"

Based on the initial success, Caltrans and WTI continue to work together to refine the system and expand deployment. Pilot testing has been conducted throughout the state, extending beyond rural areas to include urban regions such as District 4—San Francisco Bay Area, which will soon deploy 10 RESPONDER systems. In fact, Caltrans recently polled most of its districts and discovered that there may be demand for at least 80 systems statewide.

Summary

Advancements in information technologies and communications systems offer new pathways to improving the national transportation system. When researchers integrate multiple technologies, they can create innovative systems that solve very specific challenges faced by transportation agencies on a daily basis. WTI's leadership in the field of systems integration demonstrates how partnerships to develop creative prototypes can yield models with potential applications throughout the country.

About This Project

Steve Albert (stevea@coe.montana.edu) is the Director of the Western Transportation Institute at Montana State University in Bozeman. **Doug Galarus** is the Principal Investigator of the Responder Project, and the Program Manager for Systems Engineering, Development and Integration at the Western Transportation Institute at Montana State University. **Ian Turnbull** is the Chief of ITS Engineering and Support at the California Department of Transportation, District 2, and is the Caltrans' project champion. **Mandy Chu** is the Senior Transportation Engineer in the Division of Research and Innovation at the California Department of Transportation, and is the Caltrans' project manager. More details can be found on the WTI website at http://www.westerntransportationinstitute.org/research/systems/