Redding Responder Field Test - UTC

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EXECUTIVE SUMMARY

This UTC project facilitated field testing and evaluation of the "Responder" system between Phases 1 and 2 of the Redding Responder Project, sponsored by the California Department of Transportation. A pilot system, with hardware purchased by Caltrans, was developed and subsequently tested by personnel in five Caltrans districts. A survey was administered to personnel following their use of the system and response was quite favorable. The survey addressed general system functionality, ease of use, cost and potential application. A number of specific issues or enhancements were identified and these issues are being addressed in Phase 2. Caltrans continues to use and test the pilot system.

1. INTRODUCTION

The Responder system was developed as a component of the Redding Incident Management Enhancement (RIME) program, which consists of technology initiatives designed to improve public safety in the Redding, California area. RIME organizations include: Caltrans Division of Research and Innovation, Caltrans District 2, Caltrans Redding Transportation Management Center, California Department of Forestry & Fire Protection, California Highway Patrol, Shasta Area Safety Communications Agency, and NorCal Emergency Medical Services.

The Responder system was developed to provide a mechanism for collecting, tracking and sharing incident information with at-scene responders, the Redding Traffic Management Center (TMC) and secondary incident responders, facilitating management of the incident scene and improving the effectiveness of response activities, particularly in rural areas. Responder (Phase 1) consisted of the following three components:

- Incident Information Collection System – facilitates collection of information at the scene and centered on the information needs of District 2 field units and Redding TMC for transportation management and incident response/clearance, and of relevance to other emergency response organizations.
- Incident Support Information System – facilitates delivery of information such as weather and maps provided to responders and based on the needs of District 2 field units, Redding TMC, and other emergency response organizations.
- Hardware and Communications Infrastructure – the necessary infrastructure for the exchange of at-scene information collected via the information collection system and the distribution of incident support information to responders as described above. The communications system provides the means to exchange information between District 2 field personnel at the scene and Redding TMC.

Unique features of Responder include the ability for users to capture, annotate and transmit incident images. Location-based weather information, maps and aerial photos are automatically loaded for the user. Ease of use is a key feature of the system and a Tablet PC is used as a mobile data terminal.

1.1. Project Description

The Responder project consists of two development phases under contract with the California Department of Transportation (Caltrans). Phase 1 developed the data elements, performance and functional requirements for the pilot deployment of an at-scene incident data collection system with the capacity to transmit the data to the necessary personnel and/or location. Phase 2 of the project seeks to evaluate and prepare the Responder system for full corporate deployment. Phase 1 of the project has been completed and Phase 2 is currently in progress.

This UTC project was a natural means of field testing the unit after the completion of Phase 1 and before initiation of Phase 2. It allowed the Western Transportation Institute (WTI) to ready the Phase 1 proof-of-concept model for field testing by finalizing software to accommodate hardware updates and to increase usability and durability of the system. When ready for pilot deployment, a Responder unit was distributed to Caltrans for test use under normal operating conditions.

Phase 1 of the Redding Responder Study was initiated on June 1st, 2003 and ended on December 31st, 2005. Phase 2 of the Redding Responder Study was initiated on June 15th, 2006 and is scheduled to end on June 30th, 2008. An extension to Phase 2 has been requested and granted, moving the end date to December 31, 2009.

1.2. Purpose and Goals

The Responder system shows promise for increasing the efficiency of situation assessments for a variety of purposes including incident management, highway maintenance, emergency medical services and homeland security applications.

As Phase 1 was completed, Caltrans expressed interest in testing the Responder system throughout the year, especially during a winter with high precipitation levels. Of particular interest for testing purposes was the ability of the Responder system to help document road damage due to storms. This UTC project was considered a field test with the primary purpose of preparing a workable test system for Caltrans.

2. METHODOLOGY

A Tablet PC and a cellular communication card were purchased by Caltrans who then installed their standard image on the hardware. After receiving the unit from Caltrans, WTI installed the Responder software and completed testing to ensure that the software was compatible with the Caltrans image. At the same time, WTI tested the hardware, a Panasonic Toughbook with integrated GPS, for usability with the Responder system. EV-DO and 1XRTT Verizon communications were also evaluated.

Ferdinand Milanes of Caltrans Office of Radio Communications, Division of Maintenance, purchased the cellular only prototype unit for field testing. The unit has subsequently been tested in Districts 2, 3, 4, 6, and 10. See Table 1.

Table 1: Responder Prototype Evaluators and Evaluation Schedule

District:	Date:	Personnel:
District 2	2005	Bill Stein
District 10	September – November 2006	Dan Eckles Chris Jensen Dave Mcpeak Laurie Jurgens
District 3	November 2006 – February 2007	Jeff Waters Joe Allen Mike Chappell John O'Connor
District 4	March – August 2007	Tim Lowe Michael Mosier David Despain Usen Inyang
District 6	September 2007 -	Stanley Bates John Liu Diana Gomez

In order to evaluate the Responder system, a comprehensive survey evaluation form was prepared by the project team. The evaluation was divided into seven sections and allowed room at the end for additional comments or suggestions. The section headings were: the incident organizer, incident email, communications, general utility, hardware deployment in vehicles,

cost, and ease of use. In order to encourage more complete and more descriptive responses, the evaluation was freeform versus yes/no questions or a rating system. Refer to Appendix A for the complete form. The survey was administered to personnel after they used the system and collected electronically. In several cases, the survey was administered verbally with the assistance of Caltrans Division of Research and Administration staff, with responses recorded on the survey form.

3. EVALUATION RESULTS

The feedback and comments received after field testing the Responder unit have been generally positive with many excellent suggestions. This section is organized according to the evaluation form that was distributed (See Appendix A). A brief narrative summarizes the comments and feedback received concerning each category of the evaluation.

3.1. Responses to Survey Section 1: The Incident Organizer

The first section of the evaluation survey addressed the overall Incident Organizer and its components. Evaluators were asked to comment on the mapping, photo, sketch, and summary components as well as any road or weather information that would be of use to responders using the program. The messaging utility was also considered. Questions about the necessity of a "help" section, form availability, and the type of manuals that would be beneficial to include were part of the Incident Organizer section of the survey.

The following observations were made concerning the Incident Organizer of the Responder system:

- Generally, the system was easy to use with very minimal training.
- The maps must be as up-to-date and relevant as can be incorporated. One group of evaluators suggested GIS maps similar to what is used in their area-wide database/asset management/traffic management system for urban applications.
- Mileposts must be included.
- Photos should show the exact location of an incident.
- Details verifying specific equipment needs could be included with the photos.
- Detours could be clearly marked on the pictures.
- "Sketches are one of the best features of the Responder System. They are very useful because you can cut down a lot of narratives by drawing information directly on the photos/ sketches. They provide a quick and easy way to convey information. Here are 2 examples where sketches were essential during our testing:
    - Responding to a broken slab emergency – the supervisor drew the cracks directly on the photos to convey the exact locations of the cracks that needed repair. Also, photos alone couldn't tell you that the roadway has a 5% grade, but the sketch can help to convey this information.
    - Overturned truck on the Carquinez Bridge – the pictures and sketches helped to convey the exact situation and decisions made to recover from the incident. The Responder System also helped to give clear instructions of detour roads."
- Road and weather information is "an invaluable tool"—knowledge of a pending storm helps to more accurately determine a necessary clean-up period. It can also provide good documentation, especially when managing incidents related to hazardous materials.
- The Caltrans Headquarters future chain control map would be a helpful addition.

- The ability to send weather information along with the incident record for documentation and legal purposes would be useful. At the least, all weather data that is downloaded within the incident record on the Tablet should be archived.
- Users would like more email options, especially having the choice of number and identity of recipients (people/entities). One group of evaluators mentioned that multiple addresses would be preferred and being able to select email addresses from Lotus Notes would be best.
- No interest was expressed for including a "Help" section, although a laminated, operation reference booklet for quick reference in the field was suggested.
- Access to forms such as Caltrans E-forms or the Integrated Maintenance Management System (IMMS) was requested. Also, having the ability to import forms and then send them as part of the "package" would be considered helpful.
- Having Lotus Notes available would also be a useful addition.
- There should be more room for the incident description so that users can document an incident with a timeline or diary, including new tabs and time-coding for subsequent diary entries.
- Users also suggested having certain checkboxes, or similar denotation, to help describe the incident more accurately and in more detail (e.g. lane, side of road, direction).
- No manuals were requested for inclusion within the system.
- In regards to information or capability that has not been included in the system, evaluators suggested adding a complete list of email addresses and contractor lists, in addition to having the system linked to IMMS and having all of their tools (IMMS, time reporting system, BAIRS) on the same computer.

While most users were comfortable with the incident organizer and its functions, several ways to enhance the application were mentioned. Having connections or similarities to some of the tools and forms that responders are familiar with or are required to use, in addition to having a little more flexibility with factors such as email addresses, were items consistently included in the evaluations. Providing the most up to date maps and aerial photographs, transferable weather information, and more room for describing incidents were specifically mentioned.

Though no interest was shown in including a "help" section or manuals, evaluators did suggest a quick reference guide to go with the unit. Some comments indicated that minimal user training would also be valuable. For example, training might include how to take the most informative pictures or what information needs to be placed on a sketch to make it useful for coordinated incident response. This type of user training is outside the scope of the technological development of the Responder system. However, it is certainly worth noting for business case development and future deployments of the fully developed system.

3.2. Responses to Survey Section 2: Incident Email

A critical component of the Responder system is the capability to send an "incident email" with a Microsoft Word document as an attachment to a designated individual such as the TMC or another responder. To evaluate this component, users were asked about the text and photos

included in the email in addition to the utility of Microsoft Word for this application. Users were also questioned about the possible need to "chunk" information to facilitate transmission and the general effectiveness of email for reporting and providing information about incidents.

The following observations were made concerning the Incident Email of the Responder system:

- The initial email was considered redundant and unnecessary.
- Generally, the photos and sketches were described as "visually adequate."
- Microsoft Word appears to be a "viable means for assembling and distributing the incident information to TMC staff."
- The Microsoft Word document seemed to be sufficiently organized for its purpose, although there were some remarks about formatting issues and excessive "blank space" in the document when it is received.
- "Satellite phone availability [sic] would be better than e-mail and faster."
- "Email with a phone call will be effective."
- Occasionally, the text email would arrive after the full-bodied email.
- "Chunking" information to facilitate transmission would be acceptable.

The reference to "initial email" addresses system functionality which sends a small, text-only, email to precede the larger email including imagery, sketches, etc. This email could be made optional. Its inclusion was intended to address situations in which connectivity is brief. The chances of this smaller email being successfully transmitted are greater than that of the larger email, and its transmission increases the likelihood that at least some general information will be successfully transmitted from the incident scene. "Chunking" was discussed as possible further mitigation to the problem of sporadic connectivity, primarily when using satellite service. Photos, etc. could be sent in separate, smaller messages, again increasing the likelihood of successful transmission. This would come at the cost of more messages received by the recipient. It was noted that such redundancy can have a negative perception.

One of the features of the Responder system is the ability to sketch on photos and maps. Because of availability, aerial photographs and topographical maps are somewhat outdated. Subsequent development will incorporate new imagery, when available.

In regard to "phone" capability, it was assumed that Responders would already have separate cellular phones and voice communication via radio. This system did not include satellite capability, but the satellite system tested in Phase 1 and 2 did include capability for voice-only use of the phone.

3.3. Responses to Survey Section 3: Communications

The underlying function of the Responder system is to facilitate incident information collection and then effectively and efficiently communicate that information to people that need it, such as the TMC or other incident responders. This section was intended to evaluate how the Responder system would fit in and operate with existing communication systems.

The following observations were made concerning the Communications of the Responder system:

- Evaluators commented that the Responder system could be a viable means of communication between responders and the TMC, as well as hazardous materials personnel, maintenance support for storm damage, or executive staff for major disasters. Although, one group of evaluators said that this system could be viable assuming that radios and cell phones were still available.
- The Responder system could be used in addition to voice communications for every incident. The Responder system could be used as an alternative to voice communications if it had satellite capability and if or when cell phones didn't work.
- In reference to the maximum amount of time for the information to reach the TMC from the field, one evaluation stated only that it needed to be "fast." Another evaluation stated that it would depend on the type of incident, the protocol and the TMC, and then added that reporting back every 15 to 30 minutes would be sufficient.
- Some areas have voice communications available at all locations, but others have gaps where cellular communication is not available.
- No one was aware of any plans by Caltrans or other state agencies in their respective districts to "implement digital voice and/or data communications networks for mobile use." However, an evaluation did mention that questions had been asked about this within the last three months.
- Some respondents answered that cellular and satellite service was a viable option in the absence of a private radio data network because they "always will work." Other respondents answered yes, but only in selected areas.
- A group of respondents indicated that each unit should have both cellular and satellite communication capability, but added that additional costs would be a factor.

These responses were generally favorable and supported the system design. Implications of the maximum reporting delay include addressing the amount of information transmitted and fine-tuning the method in which it is transmitted when service is sporadic – i.e., when satellite service is sporadic or when on the fringe of cellular service. The comment about cellular and satellite "always will work" needs to be qualified – there are many areas in California in which digital cellular service is not available. And, satellite service is less reliable than cellular, although it may be available anywhere that has a "clear view of the sky."

3.4. Responses to Survey Section 4: General Utility

As the title indicates, this section questioned the overall utility of the Responder system. Evaluators considered the end-users of the system, varying uses according to rural versus urban applications, information sharing between agencies, and other possible applications such as incident documentation or those external to the department of transportation.

- One respondent commented that superintendents and managers would be most likely to use this system, although this person didn't think that it would be used that often. Other respondents indicated that maintenance supervisors and bridge crews would use the system.

- In answer to the question of when and how often the system might be used, respondents indicated that it would depend on the area. "For incidents, some may use it twice a week, and some may use it twice a month."
- The evaluators identified the following potential uses in rural areas:
    - major incidents;
    - job planning;
    - areas that lack major landmarks and/or post mile markers;
    - urgent requests for materials;
    - alert notifications; and
    - establishing Right of Way
- Potential uses in urban areas would be the same as described above.
- Rural area uses could be satellite phone with camera, while use in urban areas could be just a (cellular) phone with a camera.
- In response to what non-DOT applications the system could be used for, one group of evaluators stated the following: "It would be beneficial if all agencies (California Highway Patrol, California Department of Forestry and Fire Protection, Emergency Medical Services, etc.) are using the same system. It can eliminate much duplication and confusion if everyone is on the same page." They added further that this system would be an effective tool for collecting and sharing information between agencies.
- One evaluator indicated that the amount of a time a responder could devote to using the Responder system at an incident would depend on whether the responder was actually involved in the incident. Another group of evaluators clarified by saying that it would depend on the type of incident and the responding crew, specifically having "the right number of crew and equipment."

These responses generally indicate that the system has utility in both urban and rural settings, and that there are multiple prospective uses. An important related consideration is that system use may be sporadic, so no assumptions can be made about routine use. As a result, ease of use is a key to success of the system – users cannot be expected to retrain themselves periodically. Furthermore, management of batteries, particularly for the camera is important. If the unit sits for an extended period of time, the batteries may become discharged and render the camera unusable when needed.

3.5. Responses to Survey Section 5: Hardware Deployment in Vehicles

This section addressed the issues of how the actual hardware should be deployed and considered options involving mobility, size, and accessories.

- Evaluators unanimously asked for both a pen and a keyboard for accessing and utilizing the system. However, the current keyboard was considered too small and evaluators would prefer bigger keys.
- Additionally, a wireless mouse/trackball would be helpful.

- A docking station or adjustable PC mount similar to those in highway patrol vehicles would be helpful. Evaluators thought it best that the system be fixed in a docking station so that it can be taken out of the vehicle if needed. "Just don't block the cup holders!" Specifically, "Adjustable PC mounts, similar to the CHP's, for the supervisors' trucks would also be helpful as balancing it on the knee is not exactly ergonomic, and would keep it [from] being damaged sliding around the truck when switching locations at an incident."
- When asked about mobility of the system, evaluators reiterated the concept of having the system fixed within the vehicle but with easy mobility outside the vehicle if necessary.

The challenge of addressing fixed deployment in vehicles is non-trivial. For ease in deployment and testing, the project team has focused on a "briefcase" deployment. Subsequent discussion will be necessary to determine how to best address fixed vehicle deployment.

3.6. Responses to Survey Section 6: Cost

This section asked two questions: 1) Is it viable to deploy the system given the current, estimated cost of production and use; and 2) How many units could you anticipate deploying?

- In response to the first question, one respondent answered: "A laptop with a [*sic*] phone card could do the same thing. The $6000.00 would [*sic*] be duplication of existing equipment. Now saying this, I have a laptop but many individuals do not."
- This same respondent anticipated deploying two units.
- Another group of evaluators said simply that the cost would be viable and that the number of units to be deployed would depend on the area and the crew.

It is important to note here that the unit is not intended to be a single use device. It is a general purpose PC, and other software can be run on it. With that said, care must be taken so other software does not interfere with the Responder software. And, while the Responder software will run a regular laptop, Tablet functionality is considered essential to system use. The issues of cost go hand-in-hand with facilitating other uses. Given this qualification, the cost of the system does not appear to be problematic.

3.7. Responses to Survey Section 7: Ease of Use

Section 7 asked whether the system was easy or difficult to use and whether the user had encountered any specific difficulties while testing the Responder system. Explanations and descriptions were requested including how the user resolved any challenges.

- Evaluators unanimously agreed that the system was generally easy to use.
- Some difficulties were encountered when sending pictures.
- "Pictures in the camera should be automatically removed or dumped to another folder once they are downloaded to Responder System. This will alleviate the need to uncheck all previously sent pictures." "New incident pictures should be placed in folders after each report is completed to alleviate having to uncheck so many boxes before sending."

- Some evaluators had difficulty getting the GPS to uplink. The system had to be restarted to get it to read coordinates. It was suggested that a simple refresh button for the GPS would save time and battery power.

The GPS problems may be attributable to using the integrated GPS on the ToughBook. It is plausible that when used inside a vehicle, the signal was not sufficient to gain an accurate fix. The research team experienced similar problems when the GPS was held adjacent to the user's body. This problem could be corrected with better guidelines for use or by using an external GPS. However, an external GPS would require additional effort on the part of the user (power, placement, etc.) Other usability issues are planned for investigation and mitigation. In general, ease of use was rated very high.

3.8. Responses to Survey: Other Comments

This question asked the user to add any other comments that he/she thought might be useful for future development and deployment of the Responder system.

- In general, the current method of using time and agency for incident naming and ordering was confusing, particularly the sort order. A suggestion was made to add a manually-completed, incident number field. However, this would raise the concern of possibly inconsistent numbering conventions used by different districts.
- "There is no easy way to "close"/erase an incident." A recommendation was made to add a flag to close the incident and keep it from appearing in the list.
- It was suggested to include the means to save the incident in a folder.
- The three comments above are related to each other as well as to the topic of archiving incident data, which needs to be discussed and addressed.
- Evaluators requested a minimize button to minimize the Responder application.
- Consider that during an incident many responders are taking pictures with separate cameras which in turn may be different from the one supplied as part of the Responder system.
- Comments were made that implied Cingular had better communication services.
- Having a one password set-up to get into the system would be beneficial.
- A lighted keyboard or another source of light for the system would help facilitate nighttime use.
- Evaluators also requested training for what pictures should be taken and included. "This falls outside our domain, but might be included in a help section if done."
- A group of evaluators liked the system as a whole, but specifically suggested that it should be incorporated into their regular computer equipment, as well as their timekeeping system and the incident response system they were currently using – Bay Area Incident Response System (BAIRS).
- "More formal/ written training should be considered for users to fall back on, especially if the system is not used very often. When the system is implemented, annual training should be provided."

Many of these responses were anticipated and will be addressed in subsequent development. Incident naming conventions may be a matter of policy in some jurisdictions while a matter of preference in others. Attempts were made with this functionality to make the system be of most general use, and these results are attributed to the challenges of trying to please the widest possible audience. Further comments allude to the fact that the system does not include a centralized mechanism for managing collected incident information. All incident information is retained on the Tablet, but no technical or procedural method has been identified for management and use beyond that of email notification. This is a top priority for subsequent research and development.

4. CONCLUSIONS

One evaluator that tested the Responder system announced, "The system is so easy a Caveman can do it!" Another evaluator wrote the following testimonial:

> … I think this a very good tool for us in the field; it … is a very valuable tool to communicate with our dispatch and beyond. I had a recent incident in which a canal near our Right of Way was leaking water down a bank and running into the travelway. I used the Responder to send photos and maps to our dispatch after hours and our dispatcher forwarded the info. in an email to the water district to give them an exact location to pinpoint the location. To try and explain the location over the phone or radio would have been difficult at best. The machine is a very useful tool; as a matter of fact can I keep it?

Yet another testimonial from a group of evaluators emphasized the value of being able to communicate incident information via a picture:

> "In responding to and clearing incidents, it is essential for field personnel to convey incident information back to secondary responders who don't know the details and locations of the incident. Conveying even simple information such as eastbound/ westbound via voice can be confusing. Photos are very useful because a picture is worth a thousand words."

This project provided the opportunity to more extensively field-test the Responder system after completion of Phase 1 and the successful field demonstration of the "proof-of-concept" prototype. In general, the Responder system performed as anticipated and in keeping with the project expectations. Several pertinent suggestions were put forth by users over the duration of the project.

The feedback received and mentioned above is currently being addressed in Phase 2 of the Responder project, which is ongoing and includes further comprehensive field testing and evaluation of the system. The final report for the Responder project will incorporate the feedback gathered during this project and the subsequent solutions developed during Phase 2.

The Responder unit developed and deployed in this project continues to be tested by Caltrans in the context of Phase 2 of the Responder project. Software on the system will be updated in the summer of 2008, and the system will be tested further in 2008 and 2009. In general, the system has been quite reliable and effective.

5. APPENDIX - REDDING RESPONDER FIELD TEST EVALUATION

Redding Responder Field Test Evaluation

Fall/Winter 2006

Name _____

Title/Responsibility _____

Organization _____

Location _____

Date _____

Please answer the following questions in as much detail as time allows.

Section 1: The Incident Organizer

In general, does the program appear to be user-friendly? Please explain the good and the bad.

What changes, additions, or deletions would you make to the **Summary** section?

What maps would you include in the **Mapping** section? Please consider Caltrans-specific maps as well as non-Caltrans maps.

Please identify several different scenarios in which incident **photos** would be of use with this system. What information would be conveyed?

Please identify several scenarios in which **sketches** might be used. (Include photo sketches and blank sketches.) What information would be conveyed?

Please identify **road and weather information** that would be of use to a responder using the program. (Point Forecasts, Warnings/Alerts, and Nearby Conditions have been implemented.) Other examples might include RWIS, chain control, etc. Please indicate preferences: text or graphic.

The **Messaging** capability automatically sends email to a previously identified address. Will this work, or should the user be given the choice of an address or multiple addresses? (Note that the message could be forwarded from the TMC elsewhere.)

A **Help** section has been omitted. Do you think a help section is needed? Please explain.

Forms were identified as being very useful for inclusion in the program. Assuming that technical issues could be resolved to make the completion of forms easy via the system, what forms would you include in the system?

Manuals were identified as being very useful for inclusion in the program. What manuals would you include in the system?

What information or capability is missing from the incident organizer that you would like to see? (For instance, phone numbers for nearby public safety officials could be included.)

Section 2: Incident Email

Please refer to the incident email that you sent/received in testing the unit to answer these questions.

Is the text information in the initial incident email useful? Please explain.

Is the quality of the photos and sketches adequate to convey the incident information? Please explain. (Note that photos were compressed to expedite transmission.)

Is the Microsoft Word document organized sufficiently for easily reading and locating incident information? Please explain.

Does a Microsoft Word document, as an attachment, appear to be a viable means for assembling and distributing the incident information to TMC staff? Please explain. (For instance, do TMC staff have access to Microsoft Word and use it regularly?)

Do you think email, as used in the example, is / could be an effective means for communication between responders and the TMC? Please explain. (For instance, do TMC staff have access to email and will they notice these messages when they come in?)

In certain cases, it may be necessary to chunk the information to facilitate transmission. In other words, individual emails might be sent containing one photo attachment each. Would this be acceptable, if it helped to assure that information could be sent more quickly or without requiring the responder to move to another location? Please explain.

Section 3: Communications

Do you see this system as a potentially viable means for communication between responders and the TMC? Please explain.

Under what circumstances would the system be used as an alternative to voice communications?

Under what circumstances would the system be used in addition to voice communications?

What's the maximum amount of time that it could take for the information from the system to reach the TMC and be useful? Please explain.

Are there any places in your District where you have no voice communication capabilities? Please explain.

Are you aware of plans to implement digital voice and/or data communications networks for mobile use by Caltrans or other state agencies in your District? If yes, please explain.

In the absence of a private radio data network, do you consider cellular and satellite service to be a viable option for service on an application such as this? Please explain.

Should both cellular and satellite be incorporated into every unit, or should units have one or the other, dependent on their typical service areas? Please explain. (This could reduce the size and complexity of the system.)

Section 4: General Utility

Who would use this system?

When and how often would they use it?

What uses would you consider in rural areas?

What uses would you consider in urban areas?

Do you see this tool being useful for other purposes? For instance, documenting incidents?

What non-DOT applications could the system be used for?

Do you see this as an effective tool for collecting and sharing information between agencies? Please explain.

How much time could a responder devote to using a system like this while at an incident? Please specify details if it varies by the type of incident and/or responder.

Section 5: Hardware Deployment in Vehicles

Is it best for the computer to be fixed in the vehicle, mobile outside the vehicle, or mobile within the vehicle?

Should users have access to a keyboard only, a tablet with pen only, or both a pen and keyboard?

Is a tablet too large for reasonable use? (Versus a PDA, for instance.)

Would it be best for the entire system to be permanently fixed in a vehicle or should it be mobile, such as in a briefcase? (Note that if in a briefcase, setup of antennas, connection to power, etc. would be required prior to use.)

Section 6: Cost

The cost of the system, as configured, is approximately $6000 for the hardware and software, and $50/mo for cellular service (unlimited data service for the month.) This does not include maintenance and support. Is this viable?

How many units could you anticipate deploying?

Section 7: Ease of Use

Did you find the system (hardware and software) easy to use or difficult to use? Please explain.

Did you encounter any specific difficulties in using the system? Please describe in detail, including how you resolved these difficulties.

Please add any other comments you think will be useful for future development and deployment of this system.