



North Carolina Division of Public Health

Mobile GIS Speeds Disaster Relief

Problem/Solution

The North Carolina Division of Public Health uses mobile GIS to create a more efficient and quicker process to complete needs assessment surveys following hurricanes.

Goals

- Complete a needs assessment following a disaster more efficiently.
- Navigate with driving directions and GPS to survey locations.
- Streamline data capture in the field with improved accuracy.
- Train personnel quickly on the new system.

Results

- Assessments can be completed in fewer man-hours.
- Mapping and reporting is improved.
- Accuracy of data is increased.
- ArcPad use is expanded to other disaster response scenarios.

“ArcPad made sample selection, mapping, data collection, and reporting simpler and less time-consuming.”

Will Service, Industrial Hygiene
Coordinator With the North Carolina
Division of Public Health



Natural disasters pose serious risk not only at initial impact but also in their aftermath. Outbreaks of disease and damage to infrastructure can quickly affect public health and the local economy. Armed with experience responding to disasters and knowledge of geographic information system (GIS) technology, the North Carolina Division of Public Health developed a mobile GIS application that improved its ability to collect information and mobilize aid following natural disasters.

The Challenge

In 2004, an active hurricane season was ushered in on the southeastern seaboard of the United States. Hurricane Charley roared into North Carolina at midday on August 14 with sustained winds of 75 mph and gusts to more than 80 mph. The storm brought heavy rain and wind to the state, where three people died in a tornado spawned by the double punch of Charley and Tropical Storm Bonnie.

How do states respond to the health needs of citizens after a disaster of this kind? Normally, a state public health system would request the Centers for Disease Control (CDC) to conduct a rapid needs assessment (RNA) to estimate the nature and magnitude of aid necessary following a disaster.

The Solution

The North Carolina Division of Public Health set up a special team tasked with conducting needs assessments following hurricanes without the support of the CDC. The state contacted ESRI business partner, Bradshaw Consulting, based in Aiken, South Carolina, to assist in the creation of a solution for streamlining needs assessments following a disaster. ArcPad® software was selected based on its ability to share data with other ESRI® software products and its compatibility with many global positioning system (GPS) receivers. ArcPad is a mobile GIS software product used for taking GIS data into the field for editing. With ArcPad, members of the assessment team are able to identify an affected area, mark its location on a map, and fill in electronic forms that are associated with the location, all in the field. Once collected, information from a needs assessment survey can then be used to update data back in the office.

ArcPad Application Builder, a development framework for creating custom mobile GIS applications, was used to produce electronic versions of paper needs assessment forms. Tools were also created to automate work flow in the field and aid the completion of forms. For example, a tool was built that automatically fills in census information on the form.

The assessment team was outfitted with 10 Hewlett-Packard iPAQs running ArcPad and the ArcPad StreetMap™ extension, which provides a street data network for routing with driving directions. Training with ArcPad was minimal, taking less than three hours.



ArcPad is mobile GIS software designed to take data into the field for updating.

To learn more about ArcPad and mobile GIS, visit www.esri.com/arcpad.

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ESRI Software Used

ArcPad
ArcPad Application Builder
ArcPad StreetMap Extension

Hardware Used

Hewlett-Packard iPAQ 5550, 5450
Teletype World Navigator 1653 GPS

"ArcPad was a quantum leap of improvement over the paper system we used last year."

Pat Fugate, Disease Investigation Specialist
With the Buncombe County Health Center

For More Information



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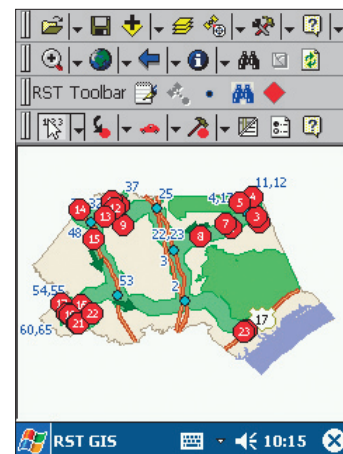
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Working in the Field

Once deployed, the rapid needs assessment (RNA) team calculated routes to the survey locations using ArcPad StreetMap. With a connected GPS receiver, the team is able to see their current position on the map display and follow driving directions to survey locations.

When the team reaches the survey location, a member clicks an ArcPad button and a custom data entry form with drop-down boxes and pick lists is displayed. Survey responses are entered into the form as interviews are administered. The use of an electronic form improves survey accuracy through verification processes and eliminates the step of reentering paper-based information into a database. Once all the surveys are completed, the teams return to the staging area and upload the data into Microsoft Access for analysis with EPI Info. EPI Info is analytical software designed by the CDC for public health departments.

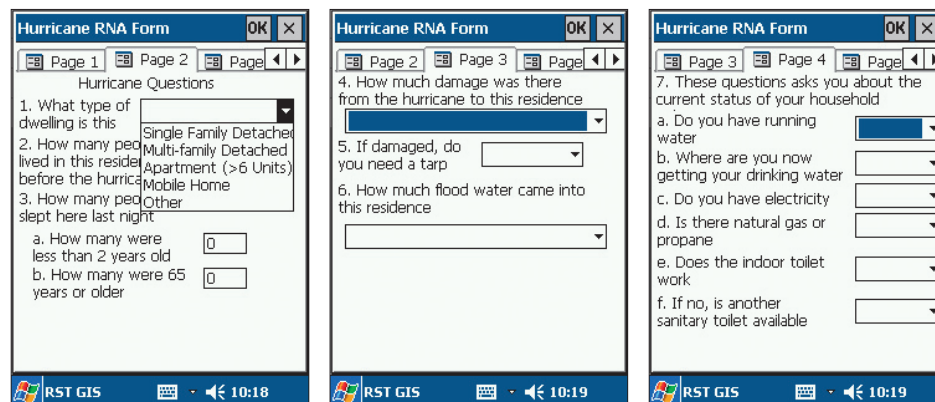
Mark Smith, Ph.D., epidemiologist with Guilford County Department of Public Health, states, "A number of design features are built into the Rapid Needs Assessment ArcPad form that made the process easier for users and reduced the chance of mistakes. As a result, an examination of the resulting data set revealed that nearly all the cases had complete data."



The North Carolina ArcPad project enables routing to survey locations, GPS integration, mapping, and data entry, all within a single application.

Results

In less than 72 hours after Hurricane Charley hit landfall, 10 teams interviewed 203 randomly selected households (spanning three counties), processed the resulting data, and completed their analysis. North Carolina benefited by a more streamlined assessment process, improved mapping, and more accurate data. Due to the success of the RNA, North Carolina is developing more ArcPad applications to assist with disaster response including flooding in mountainous regions and disease outbreak investigations. "The applications seem endless," says Pat Fugate, disease investigation specialist, Buncombe County Health Center. "ArcPad was a quantum leap of improvement over the paper system we used last year. The handheld concept for completion of public health RNA and rapid transfer of data and mapping is pretty awesome. Everyone who hears about the technology and the capability is interested, whether it be for emergency management, public health, or other uses."



Field data entry using ArcPad improves data collection accuracy and speed over paper-based methods.

To learn more about ArcPad and mobile GIS, visit www.esri.com/arcpad.