Photo by Marty Bahamonde/FEMA

The Use of RFID in Emergency Management Planning

By EDWARD MINYARD

Just hours before Hurricane Katrina reached land along the Gulf Coast on Aug. 28, 2005, New Orleans Mayor Ray Nagin declared a state of emergency and ordered a mandatory evacuation. For many reasons, but mostly for lack of means, approximately 25,000 city residents did not evacuate. In the end, an estimated 1,600 to 1,800 lives were lost. Had the entire population in the affected area been properly evacuated, a majority of these individuals would be alive today.

Relocating citizens in a safe, orderly, and efficient manner requires the implementation of a comprehensive and well-tested emergency evacuation plan. However, as we experienced with Hurricane Katrina, executing this plan is a massive undertaking. Besides the obvious challenges associated with the evacuation of an entire population, there are logistical issues to overcome such as the tagging, tracking, transporting, and sheltering of those who have no means to evacuate, including the elderly, the infirm, and pets.

A critical component of evacuation planning is an all-encompassing information system that can track people, pets, and assets from the planning stage through registration, evacuation, sheltering, and the repopulation phases. An information system of such reach most likely would rely on various technologies such as wireless communications, untethered field devices, relational databases, Geospatial Information Systems (GIS), simulation engines, and asset tracking systems linked to radio frequency identification (RFID) tags/readers and bar code scanners.

RFID, in particular, has proven to be a very effective technology for these purposes. The ability to "read" the information regarding a given individual, without requiring physical contact, can help to streamline the processing and accounting activities, expediting the overall process.

Improvements to the CAEP

To avoid similar tragedies, human suffering and civil unrest experienced by those stranded during Hurricane Katrina, the New Orleans government set out to develop an evacuation plan for the upcoming hurricane season. In the spring of 2006, the city initiated an effort to enhance the City Assisted Evacuation Plan (CAEP), the main objectives of which are to evacuate all city residents and their pets in an orderly manner before tropical storm-force winds associated with a hurricane reach land and to keep family units together throughout the entire evacuation process.

The updated plan consists of seven steps:

1. New Orleans residents, including those with special needs, are urged to pre-register by calling the 3-1-1 Public Information Emergency Hotline and provide their personal and vital medical information.

2. The formal evacuation of citizens will begin 54 hours before tropical storm-force winds reach land. The city will issue a mandatory evacuation order to the general population at this time.

3. Once activated, the Emergency Operation Center (EOC) will coordinate with the Regional Transit Authority (RTA) to deploy buses to make runs through routes with pre-determined evacuee pick up stops. At these pick-up points, medical technicians will make quick health assessments of each evacuee before boarding the buses. These buses will then drop off the evacuees at a city designated exit point or evacuation centers.

4. In parallel with the RTA effort the EOC will pick up infirmed and elderly residents at senior centers throughout the city. These evacuees will be taken to the train station, the designated exit point for the special needs population.

5. Once at the evacuation centers, evacuees and their pets will be tagged with barcode and/or RFID-encoded wristbands and registered into the Evacuation Tracking System (ETS).

6. The evacuees will then be directed to state provided buses or trains. Before boarding the trains or buses evacuees' wristbands are scanned once again. This creates a human manifest within the ETS.

7. Once on the trains or buses the evacuees and pets are taken to shelters operated by the state of Louisiana. The CAEP is limited to gathering evacuees, transporting them to the evacuation centers, registering them into the ETS, and boarding them on state buses or trains. The data captured during the process will be forwarded to the state of Louisiana Department of Social Services. Once these tasks are performed, the CAEP's responsibilities will haven been satisfied.

The tracking system database was designed around a "head-of-household" concept. All registered evacuees and pets are documented by a record within the ETS. All database records contain a head-of-household field. In the unfortunate event where an evacuee or pet is separated from the rest of the family unit, the system can be used to quickly reunite the lost member by tracking the head of household at its current location. It should be noted that the "head-of-household" is simply a key field, designated by the evacuee.
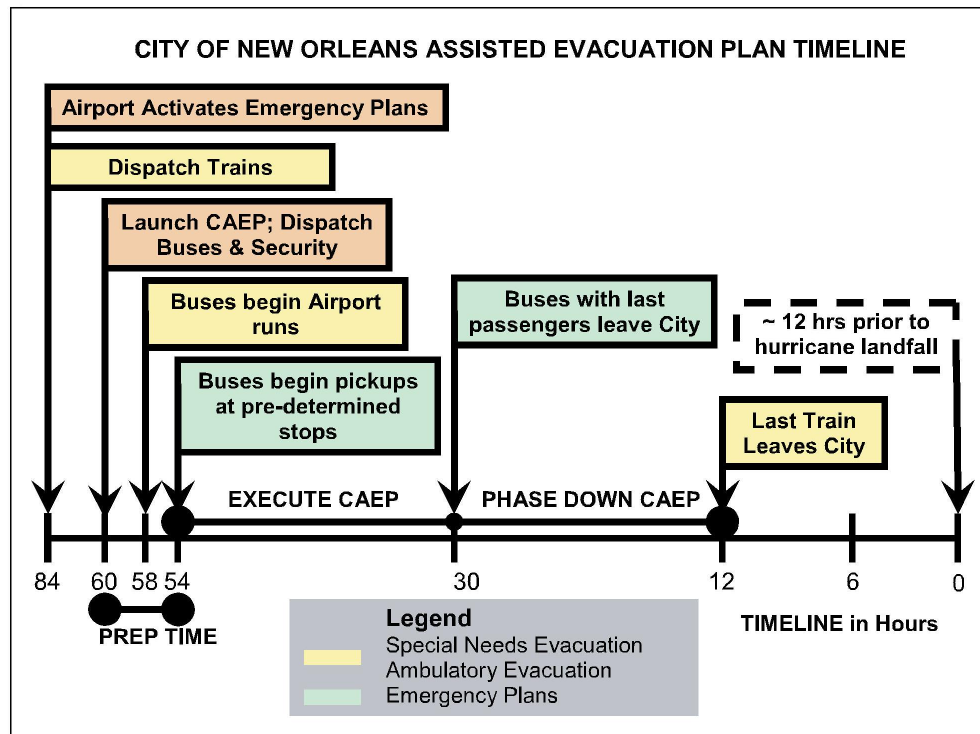
Live Field Exercise

A fundamental aspect in developing a successful evacuation plan is to make sure it is tested through a realistic simulation. On May 23, 2006, the U.S. Department of Homeland Security, in conjunction with the state of Louisiana and the city of New Orleans, conducted a two-day live field exercise – dubbed "Hurricane Alicia" – of the updated CAEP.

A major lesson of Hurricane Katrina was that many residents refused to evacuate because they did not want to leave their pets alone. During the Hurricane Alicia simulation, if the evacuee(s) brought their pets, the entire family was directed to a special tagging station, where both people and pets were registered. The pet registration process consisted of placing the animal in a carrier that had been pre-tagged on the outside. The scanned tag data and the pet's information were entered into the ETS. The family unit was then directed to a bus boarding station. Family unit members and pet carriers were scanned as they were boarded. Pets were not always transported via the same bus as the rest of the

family. Because of the ETS database and the RFID tags, however, reuniting them was assured. Once the buses were full, the encoded tag on each bus was scanned. A manifest was created from the data captured at the boarding station of people, pets, and buses.

The evacuation of special needs citizens was also given careful consideration. The special needs evacuees were tagged with encoded wristbands and registered into the ETS at the senior centers before being transported to the train station. Once at the train stations the evacuees were taken to a boarding station. The identical procedure was followed at this boarding station as the one described for the convention center. Once the railcars were full the train transported the evacuees to a state provided shelter. The city allocated 28 hours for the evacuation of the special needs residents.

Through this successful simulation, the exercise planners concluded that the CAEP and ETS could handle volume of about 20,000 evacuees in a 24-hour period, as long as the appropriate staffing of volunteers at evacuation stations is available to aid the city. By adding more registration stations, the solution is scalable, thanks to the technologies and processes employed.

Privacy Issue

Even with RFID's proven value in assisting in emergency management planning, it is important to note that, as is the case with all identification technology, government and advocacy groups have voiced privacy concerns related to deploying RFID technology for human identification. A recent paper submitted by the Data Privacy and Integrity Advisory Committee to the secretary and the chief privacy officer of the Department of Homeland Security (DHS), recommends that "if the department determines to deploy an RFID-enabled system to identify individuals, it should build in, from the design stage, sufficient privacy and security safeguards to ensure that the use of RFID-enabled systems meet the department's objectives while respecting and protecting the privacy and security of information collected about individuals throughout the lifetime of the system and, in the case of the information, beyond."

The use of such emergency evacuation systems helps to identify victims' locations for rescue, unite evacuated families, identify and prioritize urgent healthcare needs and optimize available resources throughout the evacuation, sheltering and repopulation phases of a disaster management life cycle. This all leads to the bottom-line objective of ensuring that no lives are lost due to a mismanaged or poorly planned evacuation management plan.

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CITY OF NEW ORLEANS ASSISTED EVACUATION PLAN TIMELINE

Airport Activates Emergency Plans

Dispatch Trains

Launch CAEP; Dispatch Buses & Security

Buses begin Airport runs

Buses begin pickups at pre-determined stops

Buses with last passengers leave City

~ 12 hrs prior to hurricane landfall

Last Train Leaves City

EXECUTE CAEP   PHASE DOWN CAEP

84 60 58 54   30   12   6   0

PREP TIME

TIMELINE in Hours

Legend
Special Needs Evacuation
Ambulatory Evacuation
Emergency Plans