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Crisis Control at NASA

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“Danger is a strange thing,” says Ches Looney, an engineer and information technology specialist working at NASA’s Goddard Space Flight Center (GSFC) in Greenbelt, Md. “The chemical hazards we have today weren’t considered dangerous when I was a beginning engineer. Back then we’d play with mercury in the lab like it was a toy. Now it’s considered extremely hazardous. Fortunately, we know more about what is and isn’t dangerous today. Inhaling just a small amount of hydrogen sulfide, for example, can sometimes be fatal.”

Not knowing where your employees and inventories of hazardous materials are in

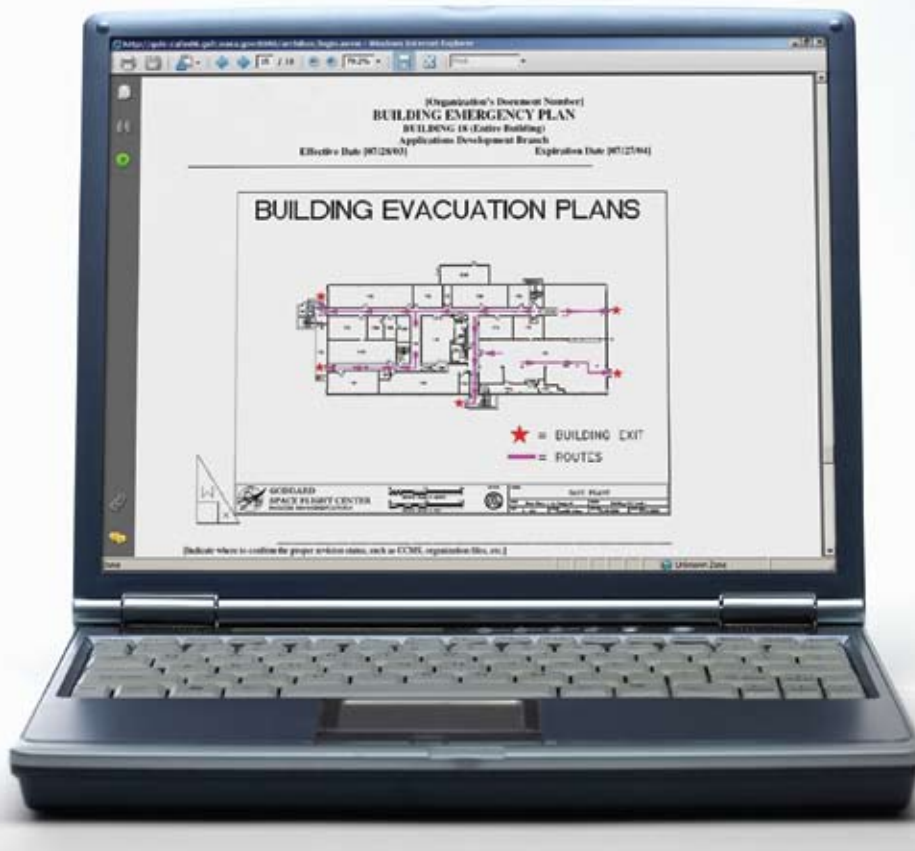
the event of a natural or man-made disaster can also pose serious problems.

Fortunately, terrorism has not presented a problem for GSFC. Today the facility has a robust plan in place for dealing with that possibility at such a high-profile government research lab.

Chemical spills and their human and environmental consequences, on the other hand, are the more common and persistent issues that Goddard must deal with as an outcome of the research it conducts in the development and operation of unmanned scientific spacecrafts.

With hundreds of often highly toxic chemicals used for its space physics and rocket propulsion projects, spills and the occasional explosion or fire are unfortunate, if not inevitable, events that can threaten Goddard’s more than 10,000 onsite workers in over 100 buildings on 1,200+ acres of land.

That made it imperative to develop a comprehensive first responder system—



one more effective than what existed—to protect public safety and the environment under any circumstance.

Sept. 11 changed everything

Although it has become a post-Twin Tower cliché, the U.S. tragedies of Sept. 11, 2001 changed everything at GSFC from a crisis preparedness standpoint. Starting in 2001, efforts were made to upgrade its emergency response capabilities. A key goal was improving access by local first responders to information on the type and location of its chemical inventories. But the agency soon realized it didn't have all the information it needed—or the means to conveniently access it—for optimal protection of the health and safety of NASA/Goddard personnel and the surrounding community.

For example, GSFC's chemical inventory tracking was largely a decentralized activity with each building manager keeping his or her own tally of which hazardous materials were onsite and where. Making matters even riskier, the mostly paper-based information wasn't always up-to-date and easy to retrieve in the event of an emergency.

It was decided in 2004 by Goddard's then Emergency Preparedness Officer (EPO) Bill Lowry, that a centralized repository of

building and chemical data was needed to adequately deal with potential crises.

According to Chuck Lombard, NASA director of security management and assigned to GSFC as part of the initial planning team, Goddard experiences approximately one major incident every couple of years and six to eight minor ones on an annual basis.

When such events occurred, first responders from nearby fire, police and EMT units were typically given a handful of material safety data sheet (MSDS) printouts, a diagram of the building and the best wishes of Goddard staffers who couldn't provide much more than moral support beyond that point.

What was needed, says Lombard, was a completely online, intuitive and most importantly, a comprehensive computer-based system with all necessary information easily accessible by first responders.

A high wireless act

A desktop system could have been networked live to the main MSDS data to provide real-time data access. On the other hand, a desktop system in a building on fire—filled with toxic fumes or other disincentives to entry—would be part of the problem and not the solution.

Instead, a laptop-based system strategy was adopted for its portability and easier hand-off of critical information to responders who could access current data from a safe distance over a wireless Web connection. Because the existing GSFC communications tower produced a weak signal in some campus locations, the security team also convinced its phone service provider to install (at no cost to GSFC) a new cell phone tower on campus to improve signal strength.

The initial first responder system the team produced was good as far as it went. But it lacked the ability to integrate its existing MSDS information with key missing data sets—employee, building floor plan, GIS information, etc.—that would give Goddard and its first responders a comprehensive view of everything and everyone that was at risk.

Merging first responder and facility data

As the plan for the first responder system evolved, Lowry and Lombard were also informed of the range of invaluable personnel and property information already stored on GSFC's ARCHIBUS facility management software implementation. They immediately saw the possibilities in integrating that information with the organization's chemicals inventory data. The result was an open system platform that made it easy to incorporate

other emergency applications. It quickly became the core of the first responder system.

Working with an Integrated Workplace Management System (IWMS) consultant, the emergency preparedness team developed a more user-friendly Web portal through which a first responder could more easily access important information including floor plans, site plans, images, heating, ventilation and air conditioning systems, uninterrupted power supply locations, personnel names/locations/phone numbers, chemical storage areas and more.

To make the relatively unstructured, current MSDS data more useful, GSFC's emergency preparedness team implemented TEAMS environmental software from ARCHIBUS Solution Center – Environment + Sustainability Services. Chemical inventory and MSDS information were imported from Goddard's old MSDS software, residing on an Oracle database, and into TEAMS so it could be mapped to building and room data for greater material and location specificity in an emergency. The laptop is then able to access the needed and most up-to-date information from the Oracle main production database over the wireless network.

The first responder system also incorporates a geographic information system software for an even more global approach to emergency response. In the event of a release of toxic fumes from a spill, fire or explosion, the plume trajectory can be projected on a map by using wind direction and other weather information so that communities in its path can be identified, alerted and possibly evacuated along prescribed routes.

"There are some extremely volatile chemicals there and Goddard is in a residential area. Apartment buildings are right across the street," says Bill Lowry.

Completing the job also required an extensive effort to visually document all of the structures on the campus so that first responders could see at a glance the full dimensions and details of the buildings that they were about to approach.

To accomplish that, a base photographer was assigned to take what turned out to be

approximately 750 high-resolution digital photos of every building, auxiliary building, trailer and storage shed. Starting at the front and moving clockwise, photos were taken of all sides of a structure to show window locations and heights, entrances, exits and other details.

Building photos were uploaded into the first responder system, which also stores photos of all NASA GSFC personnel as well as contact and vehicle information.

"If we couldn't account for people during an emergency evacuation, the first responder could pull up their photos, office locations, cell numbers and even vehicle information and parking lot location to track them down," Lowry points out. "One day someone went into diabetic shock and we couldn't find the insulin that was kept in his office, but we knew he also kept some in his car. We were able to find the vehicle and retrieve the insulin as a result of the information kept in the first responder system."



Passing the stress test

"A series of exercises was instituted on a monthly basis at different campus buildings to stress test the new system and ensure both system reliability and responder familiarity with the features and functions," Lombard explains.

If a mock fire drill evacuation was triggered, for example, first responders from Goddard's on-campus security team were given the laptop and tested to see how fast they could locate information.

Since its completion, GSFC hasn't had to deal with a major crisis impacting life or property. Should one occur, there is now

an information system for dealing with it and a methodology that Lowry has used in his past life as a lieutenant in the Prince George's County police department.

"Whether it's a terrorist attack, a lone shooter, a chemical incident or other situation, first responders follow the LIEEE principle—locate, isolate, evaluate, evacuate, eliminate—in addressing problems," explains Lowry. "Complementing that is an approach we call C3I: command, control, communications and intelligence. How much intelligence you have at your fingertips is where a first responder system with real-time information like this is so valuable. It is really worth its weight in gold."

But it's only as valuable as users make it, adds Chuck Lombard. One needs to determine the right kind of data that is required and make sure it's current. In addition, such a project needs to bring in end users from the beginning to get their buy-in and input for making the final system as easy as possible to navigate.

"It should be an application that our 30 or so onsite GSFC first responders can use on a daily basis and become so familiar with that they don't have to think twice about how to use it and where to look for information," Lombard notes. "That's because our everyday incidents last only five or 10 minutes, so you have to be able to use that laptop right away before the situation is over."

Now that all of those conditions have been met, it has become apparent to everyone at NASA's Goddard Space Flight Center what a capable first responder system is—an indispensable emergency intelligence resource.

Although the NASA Goddard Space Flight Center was successful in its first responder system implementation, anyone contemplating a similar undertaking should rest assured knowing that it's not rocket science. **FMJ**

(below) Photograph by Kirk Wynter



Gary Craig is a Parsons senior programmer/analyst on contract with NASA's Goddard Space Flight Center (GSFC). He has supported GSFC for more than four years and has more than 20 years experience in the IT field and with ARCHIBUS systems development and implementation.