

: How can computerized decision support help in crisis situations?

It seems that more crises are occurring in both business and public domains and the magnitude of them is also sometimes much larger than any previously encountered. The good news is that managers and politicians seem to want more computerized decision support to help in both crisis planning and response. Checklists, vague contingency plans, and informal, ad hoc coordination are no longer adequate. The bad news is that we still have many unanswered questions about the "what?" and "how?" of disaster readiness and crisis and emergency decision support that need to be investigated and resolved.

This Ask Dan! has been in the works for months. In April 2003, my research focus turned to advanced decision support for command and control in military crises. My summer research focused on what was possible. Recent events have brought new urgency to the topic of crisis and emergency decision support.

On Thursday, August 14, 2003, the Eastern United States and Canada experienced the largest electric power outage in history. Officials are still in an assessment mode about "what happened and why?" and "what worked well and what could be improved?", but some control and decision support capabilities worked better than others. Computerized decision support systems helped manage the crisis, but the automated systems and human operators were not able to prevent the power grid system failure. Apparently one or more of the "Control Area Operators", the computerized centers that dispatch electric power generators as needed to maintain balance in the electric power grid, was ineffective (cf., CNN.com). The automated decision and control systems will likely be updated and new real-time, data-driven decision support systems will be developed to support human decision makers monitoring the grid. The grid technology will be updated. The likelihood that such a crisis will reoccur will decrease. But other potential crisis situations of various magnitudes still confront private and public sector planners and decision makers.

Improved infrastructure and systems can reduce the chance of a failure like the power grid shutdown, but more generalized decision support capabilities need to be available for emergency response to a wide variety of possible business and public crises, disasters and catastrophes. This Ask Dan! focuses broadly on the need for deployed "decision support environments" for emergency response, crisis decision making and crisis management. These capabilities are also often called command centers.

The recent blackout in New York City showcased the operation of a number of command centers and computerized decision support environments (CDSE). A command center or decision support center is much more than a single, integrated computerized decision support system, rather it is a complex, planned environment for computing, communications and decision support. A variety of computerized decision support tools and systems should be accessible and deployed for use in a computerized decision support environment.

New York City Transit apparently had a new command center with train location (using Global Positioning System technology) and control systems that allowed trains to communicate with each other electronically. This system probably helped in locating stopped trains for emergency evacuation. The U.S. Federal Aviation Administration (FAA) Air Traffic Command Center was certainly a busy facility. In February 2002, New York City had opened a "new" temporary USD \$3.8 million Emergency Operations Center (EOC). The "new" center replaced the EOC that former Mayor Giuliani had built at a cost of more than \$13 million. It was located on the 23rd Floor of 7 World Trade Center. That 40 story building collapsed about 7 hours after the Twin Towers. Giuliani's EOC

: How can computerized decision support help in crisis situations?

was criticized as lavish and ornate and that is possible, but more importantly it was poorly located. Technology obsolescence is a major problem with EOCs. On September 11, 2001, E Team (www.eteam.com) restored New York City command capabilities for emergency operations in less than 12 hours in temporary facilities. The E Team "NYC 9/11 Emergency Operations" case provides the details and it is scheduled for publication at DSSResources.COM on 9/11/2003.

The NYC Office of Emergency Management (OEM) has another, smaller scale command capability and Interagency Command Center, known as the command bus (cf., www.ci.nyc.ny.us). It is a "specially designed, self-contained emergency response vehicle that acts as an on-site command center for incidents requiring multiple agency response. The command bus is equipped with a state-of-the-art communication system, on-board electrical generation, and external lighting capabilities, and it can accommodate several agency heads and/or representatives during an emergency". How useful a command bus was in such a widespread emergency as the recent blackout is difficult to assess, but if it was located strategically (for example at the Ferry docks) it could have made a significant difference. Deploying command and decision support capabilities in Crises and Emergency situations will always be challenging.

Recently, Terence Hinds and I had an ongoing email discussion about creating a group decision support capability for a crude oil and natural gas production operation. Business crisis situations don't usually reach the magnitude of the NYC Blackout or the World Trade Center Terrorist Attacks, but oil and chemical spills can create major human and environmental disasters (e.g. 1984 Union Carbide accident in Bhopal, India; the Exxon Valdez oil spill in Alaska).

Terence identified the perceived need as providing more integrated decision support for Incident Management. He noted an Incident Management Team makes the decisions in crises. This team comprises an Incident Commander, Section Chiefs, Marine and Logistics personnel, and various specialists. Some incidents might include: ruptured pipelines (land and sea), failure of critical equipment, and well or reservoir failure. The company had many technologies in place, but they were not integrated. Terence wrote the company had HIVE (with an electronic whiteboard), a data warehouse, teleconferencing equipment, meeting rooms with breakout areas, a number of databases in different departments and SCADA systems that provide online, real time and historical data in different formats. What was the result? Well ... Terence conducted a needs assessment and prepared his final year project for his university degree. Actually figuring out how to provide integrated group support and collaboration for Incident Management is an ongoing issue and debate.

Creating integrated decision support environments for command and control and emergency response is increasingly recognized as an important topic. What are the problems? The historic problems are only getting worse. Departments and partner organizations purchase different software packages that supposedly serve the same function but can not share data. Communication and information technologies continue to breakdown in crisis. Stress is high and leads to poor decisions. Inter-agency rivalry creates problems. There is often a lack of common terminology among responders. Authority among decision units is fragmented and decision makers have limited means to coordinate actions (cf., Smart and Vertinsky, 1977, 1984; Janis, 1989).

Bill McQuay, Technical Advisor, Information Directorate, Air Force Research Laboratory, contributed a relevant article that is now at DSSResources.COM. McQuay's paper is titled "Distributed Collaborative Environments for Decision Support". The goal is "advanced collaboration with distributed information across multiple domains, simultaneous interactions, and shared data and

: *How can computerized decision support help in crisis situations?*

applications." Creating such an integrated decision support environment or capability for crisis decision making is the challenge. I recommend Bill's article to everyone interested in computerized decision support in crisis situations.

In New York City, the Management Consulting firm McKinsey & Company prepared reports on the New York Police and Fire Department responses to the 9/11 crisis. The NYPD report mentioned improving communications and information flows. The report on the New York Fire Department response stressed the need for more inter-agency cooperation, improved communication and technology capabilities, and the use of the Incident Command System (ICS). I am only vaguely familiar with ICS and its procedures, but it is a broad approach for managing crisis situations and perhaps I can find an article about ICS for DSSResources.COM. Decision support integration is clearly much more than improved computerized decision support -- it also involves command roles, procedures, policies, preparation, practice and cultural changes.

Much more needs to be done.

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