

AUTOMATED EMERGENCY MANAGEMENT: A PROPOSAL FOR A STANDARDIZED SYSTEM

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ABSTRACT

The failure to adequately prepare for and respond to disasters has taken an unprecedented toll in recent years. However, two trends present important opportunities to improve this situation. The first is the development of the profession of emergency management, which will benefit from the application of standardized strategies and practices. The second is automation, where microcomputers and software are now both affordable and user-friendly.

We can now develop and implement a nationwide automated framework. This can ameliorate a wide range of deficiencies and inconsistencies in emergency management programs across the country. Recent developments in microcomputer hardware and software allow exhaustive background information to be presented through CD-ROM and critical guidance to be provided through decision support systems. The proposed project will apply these technologies in building an automated framework. Additionally, it will provide standardized interfaces to incorporate existing software and facilitate future innovations in automation for emergency managers.

INTRODUCTION

The profession of emergency management stands to gain much by fully integrating the use of microcomputers. Automation has transformed most endeavors. Expanded capabilities for information storage, word processing, communications, and artificial intelligence have lead many emergency managers to believe that this is the most significant innovation during the

last decade. With qualified leadership extensive implementation can be anticipated during the 1990's.

Considerable progress has been made in advancing emergency management. However, at the local level there remains a lack of continuity among the elements which comprise this broad field, as well as a need for standardized practices and expectations. Perhaps more importantly, those on the front line often find themselves confronted with a bewildering array of information to sort out and decisions to be made when planning, responding, and attempting to recover from a disaster.

The key to emergency management is placing effective systems where they need to be. Emergency management is ultimately practiced at the local level. Our national "de facto" system places the onus of responsibility on the local jurisdiction, with higher levels of government supposedly in support roles. Moreover, the impact of disasters tends to be localized, though as the recent floods illustrated, this can be a string of localized impacts tied together. It would follow that automated systems should be oriented around the needs of local level emergency managers and should be realistic about the constraints under which they operate.

The problem is that local jurisdictions' efforts in emergency management are largely inconsistent and unstructured. Certainly there are exemplary programs in place, but for the system to be effective, implementation must be widespread. Disasters can strike anywhere. They tend to have the most impact on smaller

jurisdictions which are not fully prepared. We need only look at the sites of recent disasters: hurricane damage in Homestead, earthquakes in Santa Cruz and Landers, conflagration in Laguna and Malibu. Emergency management is complex, expensive and time consuming. Developing an effective system is difficult, particularly for smaller jurisdictions that do not receive adequate support.

The National Academy of Public Administration (NAPA), at the request of Congress, conducted a study of the nation's emergency management. NAPA concluded that,

...cooperation is necessary to achieve effective emergency management from the beginning to end in any stage...The intergovernmental system as a whole is only as effective as its weakest part. The Federal Emergency Management Agency (FEMA) must strategically allocate resources to improve the system; where capacities are low they need to be raised and where inconsistencies exist they need to be reduced. (p. 88)

The role of higher levels of government should be shaping and coordinating the overall direction of what is ultimately implemented at lower levels. The NAPA report indicated a role for FEMA in improving the nation's emergency management system. Widespread and consistent use of automation is the obvious means of accomplishing this. The questions are what will such a system look like and how can this be accomplished.

OBJECTIVES

There are two primary objectives to this project: standardization of practices and an automated framework. This project should be viewed as a catalyst, bringing together the best in practice and automation. The end product will be microcomputer based software which serves as a self-contained resource sufficient to guide emergency managers at any stage in the

development of their program. Well proven practices and the most promising technologies can be applied in developing a truly integrated and comprehensive approach to emergency management. This can serve as a demonstration project and the basis for standardization, displaying in one location the best in emergency management. With this as a practical basis, the entire program can be automated, thereby streamlining the flow of information.

AN OPTIMAL SYSTEM

The key is to provide the foundational work upon which others can develop new projects or integrate existing systems. Inherent in this is establishing standard interfaces for software to communicate. Furthermore, it will be critical to utilize appropriate forums and networks to stimulate further innovation.

This will be a stand-alone, user-friendly, interactive system containing the following elements:

- Artificial intelligence will be utilized to assist decision makers in the process of program development, as well as response and recovery operations.
- Comprehensive background materials will be provided through CD-ROM. Strategies will be presented, together with in-depth information, which can be accessed as required.
- Periodically updated guidance will be available through CD-ROM and networks.
- Standardized documents will be presented for meeting planning requirements. The system will be able to reproduce in hard copy all essential guidance materials for response and recovery operations, providing a backup in the event of a catastrophic failure of the automated systems.
- Realistic training and exercises will be presented, integrating specific information on the jurisdiction's capabilities and hazards.
- Options will exist for integrating the graphic display of information through existing mapping systems.
- Communications platforms for both local area and wide area networks will be provided.

- Resource and expenditure information extracted from response data will be linked with guidance on FEMA financial reporting requirements. This will ensure accurate, timely, and complete reporting for reimbursement.

- The system will establish standards by which peripheral software can communicate with this core system.

- This will be a heuristic system which can adapt itself to the needs and capabilities of the user.

If properly designed with a forum for feedback and innovation, a host of other practical applications will emerge as the project matures.

THE HUMAN ELEMENT

It is important from the very start to realize that automation is not a substitute for the human element in emergency management. Rather, it should be viewed as a tool to expand human capabilities by enhancing the ability to communicate and process huge amounts of information during stressful events. The proper use of automation is often overlooked as the advocates of this powerful new technology promise more than is appropriate.

Emergency management is a human endeavor. No amount of automation will replace the requirements for informed exercise of sound judgment. Effective decision making during disasters seems to stem from the ability elicit the essence of the situation which is developing and intercede based upon what is projected to emerge as the scene unfolds. Dr. Jacques Vallee states:

Crises, by their very nature, are irrational processes. People who are good at managing crises tend to be people who have gotten very, very good at making decisions in almost the total absence of information, making gut decisions based on who they could trust and couldn't trust. (cited in Chartrand, p.205)

The ability to improvise is essential. Automation

should focus and enhance the human element in emergency management without stifling the process.

In disasters a tremendous number of minor events, all linked sequentially to one triggering event, are unfolding at varying rates. Accurate monitoring of the situation is essential for decision making. There are limitations to the amount of information one individual is able to effectively assimilate. Automated systems are the only practical means for managing this information. Systems must identify essential elements of information, present it logically, and remove unimportant information. Another way of viewing this is that two levels of information must be managed simultaneously. The emergency manager must maintain the "macro" view of the entire event, while at the same time being able to take a "micro" view of the details of specific parts of the event.

Much of the literature surrounding the application of automation in general tends to present it as a panacea. Technology is not going to offer the solution to the complex problems inherent in disasters. However, technology does present an effective means for managing information. This, in turn, leads to more effective decision making at the human level.

UNDERSTANDING THE ADOPTION OF INNOVATION

Clearly, emergency management will benefit from an automated framework. The fundamental question is how to implement such a system. The work of Drabek on the adoption of new technology offers important insights in this area.

Of particular concern are the use of "pull" factors and incentives. In this area, Drabek draws upon the work of Abernathy and Chakravarty, who identified the role of the federal government as the primary influence in the adoption of innovation. Their investigations focused on the impact of the federal government on the adoption of a wide range of new technologies. They found that government has essentially two options: (1)

"push" innovation by creating a new technology or (2) "pull" innovation along by altering standards so that the technology or market must change, making new technology necessary. Push strategies are characterized by government funded research and development or demonstration programs. Pull strategies can include such incentives such as persuasion campaigns or the heavy handed use of regulatory intervention. The conclusion was that the "push" strategy was less effective and more likely to fail than a "pull" strategy. (Abernathy and Chakravarthy, p.3-18)

It is preferable to gain adoption of new technology by more passive means, rather than by government development of the product. Drabek cautioned that no research was located which would indicate if this general principle is applicable in the field of emergency management (p.32).

A combination of pull strategies and pushing through direct involvement in the development of a core system might provide the most effective means for gaining widespread use of this technology. FEMA should develop the core of a program for automation and establish standards by which other elements will interface. By the use of "pull" strategies, FEMA can gain acceptance for automation at the local level.

FEMA has an opportunity for developing incentives. Emergency management is accomplished relatively independently at the local level, yet the federal level through FEMA bears the financial burden for the failure of these programs in the unfortunate event of a disaster. It would follow that FEMA should be able to dictate how programs are structured at the local level, if they hold ultimate financial responsibility for their success or failure. Inherent in this is the opportunity for FEMA to provide an incentive for participation in an automated system at the local level. This approach is being utilized in a similar undertaking in California.

CALIFORNIA, SEMS, AND AN OPPORTUNITY

California is engaged in the development

of an exciting and promising approach to emergency management. Called the Standardized Emergency Management System (SEMS), this common-sense approach is an outgrowth of the 1991 conflagration in Oakland. Problems encountered in fighting these blazes highlighted deficiencies in emergency management. As a result of the this fire, State Senator Petris introduced SB 1841 directing the Governor's Office of Emergency Services and other agencies to develop the Standardized Emergency Management System (SEMS). It is to be used by all disciplines and all levels of government. The framework of SEMS is the Incident Command System, the Multi-Agency Coordination System, the Master Mutual Aid Agreement and related mutual aid systems, and the operational area concept.

The caveat is that the State will not require local jurisdictions to follow SEMS. However, the State will withhold financial reimbursement following a disaster for a jurisdiction not meeting the requirements of SEMS. It remains to be seen if the State is actually capable of such a measure following a disaster. The financial implications are considerable, not to mention the political repercussions. However, the essential principle is sound: if a local jurisdiction expects post-disaster financial assistance from a higher level of government, it is only reasonable that certain requirements be made of that jurisdiction's ability to respond to disasters.

FEMA is carefully watching SEMS in California and considering how a similar type of system can be implemented nationally. The principles of SEMS dovetail with the proposed automated framework. Moreover, automation provides the most efficient means for widespread implementation of a standardized system.

A STRATEGY

The key is to develop the foundational program and provide nationwide distribution to the local level once reasonably well refined. Such a system is beyond the financial means of the jurisdictions which need it most. Therefore, it

follows that the system should be developed and implemented with federal funding.

A partnership between agencies at the federal and local level can provide the synergy necessary for developing a project of this type. Since this is a tool ultimately to be used to enhance frontline emergency management, it is best developed in the field by people intimately familiar with the real problems faced.

Two approaches are appropriate for developing this project: High Performance Work Teams and Delphi studies. Using a High Performance Work Team approach, various disciplines can be brought together to work on specific aspects of the overall plan. Using a modified Delphi study through the Internet, a wide range of experts can be consulted on specific aspects and their feedback synthesized. The synthesized work can then be returned to the experts for their modification, with a final synthesis being the outcome. This approach allows us to develop consensus among key players while gaining clear direction in program development at various stages.

After development, the project should shift focus so that it can be injected into the mainstream. Distribution can be done throughout the United States. As an incentive for participation, the project can be tied to recovery funds or to other opportunities. Eventually such a project can be used world-wide through an entity willing to provide global leadership.

The International Decade for Natural Disaster Reduction (IDNDR) can provide the context for developing this system. This project can offer focus and energy to the United States' contribution to the IDNDR, bringing together many worthwhile and imaginative efforts in a unified system. It presents a cost-effective approach which can be universally applied, and easily adapted to specific locales. The application of this standardized approach world-wide can improve international cooperation and effectiveness in all phases of emergency management.

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BIOGRAPHICAL NOTES

Steven Jensen is the Disaster Preparedness Specialist for the City of Long Beach, California. He is responsible for developing the emergency management program for this highly urbanized city of approximately one-half million people.

Mr. Jensen presents a broad background in emergency management; past assignments include field work for the United Nations High Commissioner for Refugees.

