A Proposed Framework for Developing a National Crisis Management Information System

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ABSTRACT

A conceptual design representing basic modules of National Crisis Management Information System NCMIS is developed. The conceptual design provides a general foundation that can be transferred to a detailed design and implementation of an application. The concept of NCMIS meets the initial specifications that are validated using a case scenario. The relative percentage of the total score that each module contributes to the design is evaluated using the Analytical Hierarchy Process AHP and the Quality Function Deployment QFD technique.

Keywords: Analytical Hierarchy Process (AHP), Crisis Management, Decision Support Systems (DSS), Management Information Systems (MIS), Quality Function Deployment (QFD)

INTRODUCTION

The performance of somebody facing danger is far different from his performance in the normal life, whatever the normal life challenges. A man avoiding bomb explosion is faster than himself in racetrack, no matter what prize of the race would be. At crisis situation the secretions of the pituitary gland stimulate the other endocrine glands, which activate the body subsystems to perform at full throttle with extraordinary effectiveness (Lewis, 2005). A measure of survivability of a living system is its flexibility to switch from maximum efficiency mode to maximum effectiveness mode according to the environmental dynamics (Miller, 1978).

Countries like human beings need some functioning system that can stimulate and leverage the relevant subsystems to perform at maximum effectiveness in crisis situation. Developing a National Crisis Management Center (NCMC) that can carry this responsibility has been an attractive idea on both governmental and corporate levels in many countries. “In times of crisis, communities and members of organizations expect their leaders to minimize the impact of the crisis at hand, while critics and bureaucratic competitors try to seize the moment to blame incumbent rulers and their policies” (Boin et al., 2006: p.151).

A measure of merit of a NCMC is its ability to allocate all relevant capabilities to be the most effective on the right points at the right times over all crisis phases. The most critical
factor in NCM processes is the high pace of events relative to the corresponding decision cycles (Schafer & Crichlow, 2002). However, if we record a crisis scenario on a video tape and replay it in slow motion, we will see it as a regular problem. On the other side, if the NCMIS can provide the crisis management team with the capabilities that make them feel, recognize, comprehend, analyze, structure, and decide faster, the NCM processes will be as manageable as the regular problem management processes. “Crisis management is all about the functional adaptation of communities, administrative agency, and political decision-making processes to the extreme conditions of crisis,” (Hart & Boin, 2001: p. 30).

In most countries, crisis management is handled by a national security council consisting of key leaders of the country. Each member of the council has a different perspective based upon his own functioning MIS. There is no centralized NCMIS that can support integrating the different perspectives of the different members of the council in one comprehensive decision structure. A National Center for Crisis Management is developed in some countries as an educational resource and advising body rather than an operational command center (Aini, 2001; Crisis-Navigator, 2008; ISSCM, 2008; NCCM, 2008; NCCMRT, 2008).

The NCMIS is more complex than regular systems because the solution sets are dynamic and reflect the changing nature of domains in crisis situations (Tiwana & Ramesh, 2001). Data requirements of NCMIS are different from regular MIS in several aspects: (1) data comes from different sources in different formats with different levels of timeliness; (2) the content of a data set is usually encountered in a mass of similar material relating to a variety of both relevant and irrelevant subjects; (3) critical data items need efficient methods of filtering, validating, referencing, cataloging, storing, and updating in limited time frame; (4) significant items of data when separated from other material surrounding it are often found to be fragmentary and incomplete; (5) detection of an important data item is usually followed by an intensive search for further complementary material; (6) much of the information is non-quantitative in nature and needs special techniques to incorporate it in the decision structure; (7) information is frequently highly subjective and consists of opinions and assessments rather than factual data; (8) information interpretation is often inseparable from that of acquisition of information; and (9) much of the work of information processing is concentrated on the search for clues from which assessment of present and potential future environmental conditions can be made (Radford, 1978).

The objective of this study is to develop a conceptual design of NCMIS that can be implemented into a specific detailed design for each particular application. A case scenario is used for testing the validity of NCMIS concept in meeting the initial requirements. A set of integrated requirements of expected crises is defined using the Analytical Hierarchy Process (AHP) and used as input to the Quality Function Deployment (QFD) technique for evaluating the design modules (Akao, 1990).

The article is structured in seven sections. After this introduction, are discussed the levels of processing in a decision making cycle, which serve as a guide for addressing relevant modules of the conceptual design and workflow in the succeeding two sections. Next, design validation and a proof of concept (March & Smith, 1995) are presented in its application to a specific crisis scenario. In section six, the relative weight of each design module is evaluated. Finally, the contributions of the study and its limitations are discussed in the conclusion.

QUALITY FUNCTION IN DECISION CYCLE

The origin of the word “decide” is the Latin word “decidere“, which means, literally, “to cut-off” (“de“ means “off” and “cidere“ means “to cut”) (Stump, 2002). If all other conditions could be held equal, the quality of decision improves with time of thinking up to certain level and thereafter declines. A good practice