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SP a professional paper

THE EMERGENCY OPERATIONS RESEARCH CENTER:

DISASTER BY DESIGN

by

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ABSTRACT

The Emergency Operations Research Center (EORC) is identified as a civil application of the simulation and system training technologies developed originally by SDC for military use. EORC capabilities permit anticipatory, integrated team training for a city's top management and associated staffs in terms of simulated emergency conditions (e.g., fire, flood, earthquake, hurricane, riot, nuclear attack, etc.). This provides, in a laboratory setting, an opportunity for the city's emergency operations team to evaluate and modify its plans, procedures, and performance in preparation for handling real emergencies. A potential application of EORC technology and capabilities to comprehensive urban and regional planning and development is suggested. This application deals with the possibility of testing, in advance, the impact of projected plans for urban change and growth upon the operations and management of public services and providing feedback from such simulated experience into the planning process itself.

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For more than a decade, System Development Corporation has been involved, both intensively and extensively, in the development and implementation of system training programs. Until recently, the effort has been conducted, primarily, for the Air Defense Command, United States Air Force, and the U. S. Army Air Defense Command.

The salient features of these programs include the following:

- . an entire operating team, from a single crew to--periodically--an entire world-wide command, working in their normal operating environment and performing their regular functions and interactions, is subjected to a simulated, high-stress, emergency situation, such as a mass nuclear attack on continental United States;
- . the training is anticipatory; in other words, the entire operating system, both men and machines, has an opportunity to utilize its normal procedures and interactions in terms of situations that, thankfully, they have not faced, but for which they must always be prepared;
- . the operating team has an opportunity to evaluate its system performance in terms of an objective accounting of the critical stimuli provided and their responses to those stimuli;

- . the consequences of the training are to be found in improved individual, team, and system performance and in the continued development, testing, and adoption of more effective standardized procedures--all in anticipation of and in preparation for situations that have not as yet been experienced in reality.

Under SDC's general program of corporate self-sponsored research aimed at developing appropriate civil applications for technologies originated in the realm of military R&D, laboratory experiments in civil emergency operations were begun in 1964. In 1965, the first of a number of projects were undertaken for the Office of Civilian Defense. It focused upon the development of a capability for integrated team training for a city's top management staff (e.g., Mayor, City Council, City Manager) and its associated staff (e.g., Chiefs of Police and Fire, Directors of Health, Welfare, and Sanitation, etc.) under emergency conditions related to nuclear attack. The program has been broadened since to deal with a variety of natural disasters and is applicable to such phenomena as riots; the failure of vital services, such as power and communications; earthquakes; fire; and flood. In short, the program is one of disaster by design.

All of this activity has resulted in the Emergency Operations Research Center (EORC), which provides a laboratory environment for anticipatory training and evaluation of integrated team or system performance under emergency operating conditions. Within its 6,000 square feet, the EORC includes flexible areas for simulating all essential operational activities as well as provision for

observing, monitoring, recording and analyzing the performance of any appropriate civil management system (See Figure 1). These facilities and tools are the means through which the EORC makes it possible for an organization to examine and strengthen its effectiveness with respect to decision-making, communication, chain of command relationships, use of information, and resource distribution under conditions of stress. The technique involved pits a real civil management organization against a completely and realistically simulated emergency.

The need for such a capability is not limited only to relatively small civil entities. For example, the great Northeast power failure and its impact upon public services demonstrated vividly the need for large-scale, system-wide, anticipatory procedural and operational training. We might have attempted to develop a capability for handling large-scale power failure situations were it not for one puzzling factor: the rumored impact of the blackout upon maternity hospitals some nine months later. We still cannot figure out how to cope effectively with such variables, especially in terms of simulation.

An EORC operation is usually started upon request of a city executive who is desirous of upgrading his organization's capabilities through simulated emergency operations training. A fundamental first step is to determine the exact nature and composition of that organization and the specific objectives it hopes to achieve. For example, such objectives may center about testing the validity of an existing emergency operations plan or selected features of it; uncovering deficiencies in planning or staffing; providing operational training

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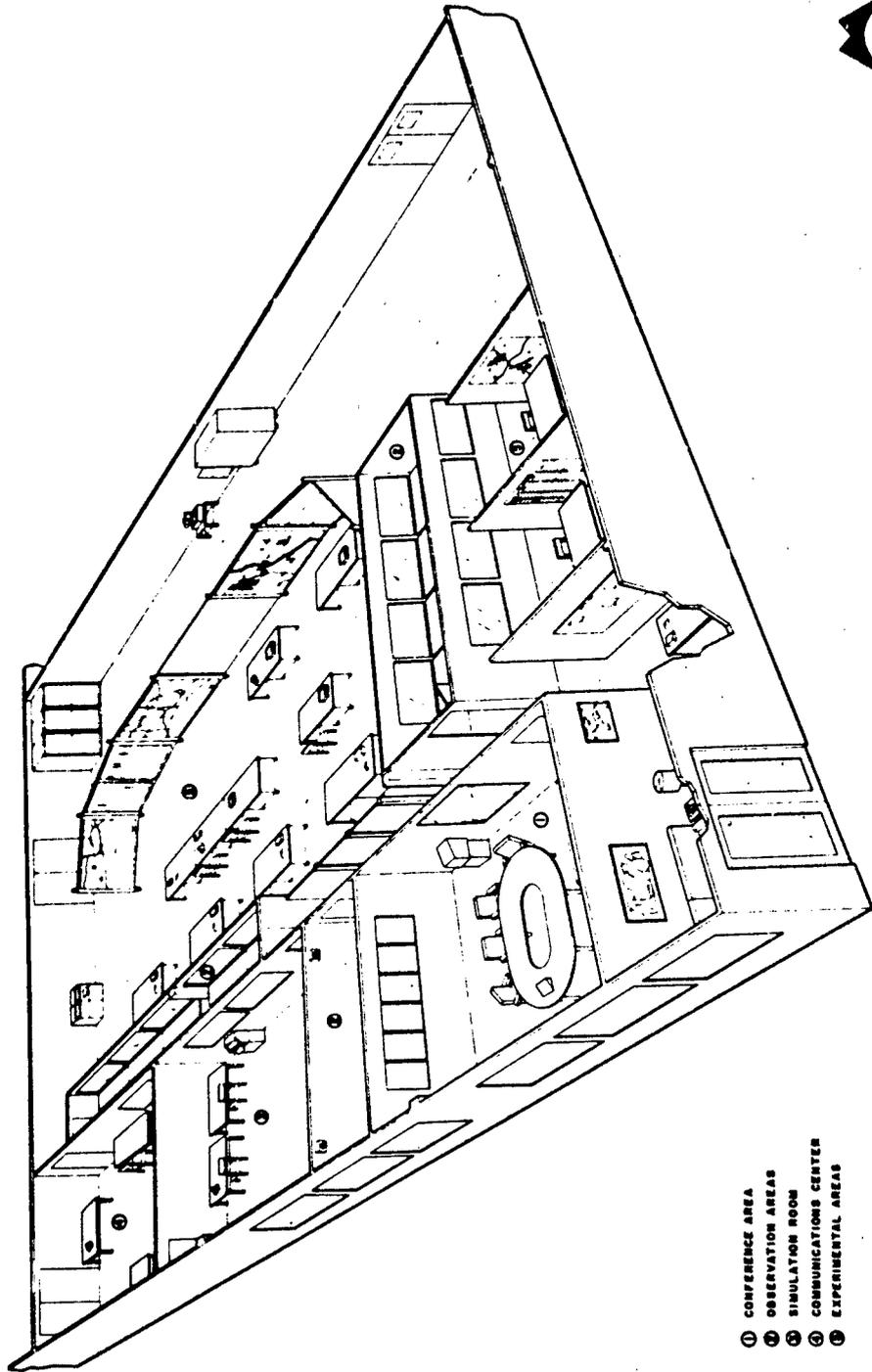


Figure 1

for the staff; testing existing or proposed procedures; evaluating the quality and applicability of information available to and used by the team; or, in some cases, to develop an integrated plan where none presently exists.

Whatever the intent, objectives must be precisely defined and agreed upon at the outset since they will govern the ensuing preparation and evaluation activities. For example, if the city's emergency operations plan is predicated upon the interactions between and among the top management staff and such interacting agencies as fire, police, health, sanitation, welfare, hospitals, and light and power, the situations presented during the simulation must include such interactions. Furthermore, it must involve all of these interactions at a level of stress appropriate to the predetermined objectives.

Once the preliminary steps are accomplished, preparation of a realistically simulated situation is undertaken, based upon the EORC staff's special skills and knowledge. These capabilities derive from ongoing operations research activities; the investigation of numerous actual emergency situations throughout the United States (e.g., the Alaskan earthquake of 1964, the strike of hurricane "Betsy" at New Orleans in 1965, the 1965 Watts Riot); and the construction of numerous emergency environments in the laboratory.

First, a schedule of prior events is constructed, both in terms of information about the buildup of phenomena leading to the emergency as well as the likely preparatory steps taken by the organization. Next, a chronological description, or scenario, of the significant events that are to take place in the simulated emergency is developed with the help of a "trusted agent" from the community who

is thoroughly familiar with its special problems and characteristics. With scenario completed, the EORC research team visits the city to gather the specific information needed to achieve realistic simulation. Finally, the emergency situation is constructed in detail in terms of simulated input messages about events; maps, and other information displays; the set-up of the considerable communications equipment and facilities in the laboratory in accordance with the organization and staffing of the participating group; and the training of simulators who represent requisite external functions such as police and fire unit commanders, weather bureau, Red Cross, ambulance crews, hospital administrators, and so forth.

The laboratory also includes various data-gathering aids, such as video tape, telephone monitoring equipment, timing devices, and electronic tape equipment for continuous recording of the many activities involved in an exercise.

In some circumstances, the exact geographic features of a given locality are used. For others, a prototype, or model, city--Middletown--has been constructed for use in the laboratory. Middletown's characteristics may be configured into many different entities in terms of, for example, proximity to state and county borders; topographic features, such as rivers, mountains, and oceans; patterns of land use and street layout; and so forth.

The participating organization is briefed on these preparations and on the carefully constructed environment, settled into place, and confronted with a realistically simulated emergency situation of whatever scope and intensity desired. As soon as the exercise is completed--and it may have run for three

hours--an immediate review of the events and team responses is conducted.

During this open discussion, the city's emergency operations team, with the assistance of the EORC staff, has an opportunity to identify its problems, evaluate its own performance, and develop an insight into whatever organizational and operational modifications are required.

The EORC staff prepares a report on the outcome of the exercise, visits the participating organization in its own city, and presents their conclusions and recommendations, both in documentary form and by means of a briefing.

Thus, through the experience gained in the simulation laboratory, the city's emergency operations team is provided with the ingredients required for developing more effective plans, procedures, and performances in anticipation of ensuing real emergencies.

In looking toward the future and attempting to define new applications for the EORC technology, capabilities, and experience, a variety of possibilities are being explored. One of these possibilities is concerned with potential requirements deriving from the growth of comprehensive urban and regional planning.

The variables involved in comprehensive urban and regional planning and development continue to increase in number and complexity. One dimension of this growth centers about the availability of new technologies, concepts, and capabilities for organizing and integrating public services functions so that they may be able to cope with new patterns of land use, increasing population densities, and a variety of innovations in the fields of transportation, housing,

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public and environmental health, education, and many others. In this context, it is appropriate to raise the question of how all of these factors impinge upon the operations and management of public services, both now and in the future. How, for example, can we test, before the fact, the impact of projected plans and designs upon public services operations and management? How can we attempt to deal with the operational consequences of the totality of a network of planned changes, in advance, and ensure feedback from such experience into the planning process itself? How do we provide adequate anticipatory training for the vast complex of organizations and people involved?

Although none of us is close to even a tentative answer, it is possible that the operations simulation approach of the EORC may offer an effective means for investigating, organizing, and preparing personnel to deal with the vastly complex interrelationships inherent in the process of urban growth and change.

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