WORKSHOP ON MODELLING EARTHQUAKE CASUALTIES FOR PLANNING AND RESPONSE

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Co-Sponsors

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PREFACE

The combination of users needs, research, experience, and computers has reached the point where it is now feasible to develop a model to estimate the dead and injured from earthquakes Estimates are needed to support emergency medical planning and actual response operations Moreover, realistic casualty estimates could reinforce arguments for taking effective actions to mitigate earthquake hazards.

The potential for making casualty estimates in the near future will provide those responsible for preparing loss estimates, vulnerability studies, and planning scenarios with a powerful new tool. The ability to make projections at the time of an earthquake could greatly enhance the speed and effectiveness of emergency medical response by allowing the mobilization of outside resources to begin on the basis of expected needs rather than waiting--often too long--for real data to be gathered and communicated from the stricken area.

This state of affairs led to the organization of the December 4-6, 1990 Workshop on Modelling Earthquake Casualties for Planning and Response. It has its roots in the excellent 1989 workshop sponsored by the Johns Hopkins University. Titled "International Workshop on Earthquake Injury Epidemiology", it also was multidisciplinary in nature. The proceedings provided very valuable insights into the states of knowledge, practice, and research. These proceedings contain the papers commissioned especially for the meeting, and the following comments summarize both the process and major results.

Several criteria governed the planning and conduct of the workshop. It had to involve several disciplines and professions. The attenders had to be a mix of users, researchers, and program managers. The focus was to be on solving a problem that combined the talents of those invited preparing a proposal to design a casualty estimation model for a city faced with the threat of a major damaging earthquake. The papers were designed to stimulate thinking and to save as resource documents. The principals responsible for the workshop acted as two members of the "city council" who were responsible for selecting consultants to develop the model for the city. The participants were

divided into four groups ("consulting firms"), each of which had to present its proposal to the city council members at the concluding plenary session

Three objectives were stated, as follows:

1. Define the necessary products/results needed from the model,

2. Identify the required data needed to support the model, sources of it and appropriate collection methods, and

3. Specify key relationships among the most critical variables that should be in the model.

The participants were energetic and productive. From their deliberations and presentations several major conclusions were drawn, as follows.

1 Further model development is feasible The users will have to continue to play key roles in defining casualty information needs, but progress will depend on a mix of disciplines and professions. This workshop clearly helped educate the participants about the needs, capabilities, and limitations of their respective specialties. Thus, it served to stimulate an interdisciplinary appreciation for all elements of casualty estimation modelling.

2. Any model should be able to provide several types of information. They include estimates of the numbers of casualties (dead and injured), the nature and severity of the injuries, their location (preferably down to street address), typical nature of the damaged structures containing the casualties, survival of local medical response resources, and others The model also must be capable of aggregating the information from several jurisdictions to help suppliers of outside aid understand the estimated total requirements.

3. Data collection is critical to the quality of the results. Needed data fell into several principal categories capable of being included in a Geographic Information System (GIS) based model. The data needs included demographic (size, age, sexual composition of the population, etc), social (work and commute patterns, building occupancies, prevailing health situation, etc.), earth science (faults, probabilities of occurrence, magnitudes, site response estimates, poor ground areas, etc.), structural data (locations, numbers and types of buildings, typical failure modes, configuration of major structures, historical and prevailing codes and standards.

critical facilities, etc), special hazards (dams large industrial facilities, etc.), climatological (seasonal and weather data, etc.), and medical resources (hospitals, clinics, medical and paramedic personnel, ambulance and related transportation resources supplies mutual aid arrangements, etc)

This workshop was designed to explore the states of practice and knowledge, and in that regard we see it as part of a continuing interdisciplinary process that requires the interaction of all those who can contribute to advancing our abilities It is, of course, through research, experience, and meeting the needs of the users that the states of practice and knowledge advance The workshop participants recognized that current casualty estimation abilities remain crude, but believe that better methods are achievable in the near future with adequate support. Some ways of progressing include:

1. Giving higher priority to and supporting research that results in the necessary data and conceptual understandings that will improve the scope and quality of earthquake casualty estimations

2. Continuing to recognize that developing a capability to estimate casualties is a multidisciplinary challenge, the success of which will be measured by the utility of the results achieved and the collective efforts of those involved

3 Keeping the users' needs in mind. They have the jobs of saving lives through effective response planning and operations. Eventually, the model must enhance their abilities.

Special acknowledgements are due to Dr. William A Anderson of the National Science Foundation, who was the Program Manager for this grant, Calvin Freeman of the California Emergency Medical Services Authority, who contributed a great deal intellectually and financially to the workshop, and to the participants who made it enjoyable and successful. The participants are listed in the back of the report. While both NSF and EMSA financially supported this project, all activities, conclusions, and materials related to it are the responsibility of VSP Associates, Inc.

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TABLE OF CONTENTS