Collaborative for Disaster Mitigation at San José State University

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ABSTRACT

Collaborative effort – among local governments, the private sector and academia – has resulted in the formation of the Collaborative for Disaster Mitigation (CDM) at San José State University (SJSU). The purpose of the CDM is to promote and enable implementation of mitigation measures before the occurrence of natural disasters so that the consequences in terms of life safety and property damage can be minimized. This trilateral collaboration, as equal partners, with the purpose of working towards hazard mitigation implementation, is unique.

The need for a *collaborative* approach to disaster mitigation was articulated during a meeting of approximately 40 stakeholders, on June 29, 1999. It was the consensus of this gathering that by taking a collaborative approach, economies of scale could be achieved, thus reducing the financial and personnel burden on any one jurisdiction. It was also emphasized that the major bottleneck at this time was implementation of hazard mitigation, based on research already completed, rather than perusal of more basic research.

1. INTRODUCTION

The fact that public agencies are understaffed and there is a lack of in-house resource, created the motivation for this type of Collaborative. In addition, there are problems in technology transfer and issues in public sector's ability to address private sector needs. With these issues at hand, there were opportunities for inter-jurisdictional cooperation, to protect economic vibrance and technological leadership of the region, and most importantly, establish a local model of collaboration and implementation.

The concept of CDM, representing a partnership among the public sector, private sector, non-profits and academia, consequently was formed in July 1999. Its focus is to encourage disaster mitigation in the greater San Jose region, including Santa Clara and San Mateo counties, where the major threat of this region is earthquakes. Most of the area covered by Santa Clara County is also known as Silicon Valley – home to the highest concentration of high technology industries in the world. Damage to this industry, from a natural disaster such as an earthquake, can cause major economic losses and seriously jeopardize the technological leadership that the USA currently enjoys. It is this threat that the Collaborative is fundamental.

CDM is one of the first partnership in which the university is an integral player. By having the university as a partner, all local jurisdictions are able to meet on "neutral grounds". In addition, the multi-disciplinary expertise that resides in the university becomes readily accessible for activities of the Collaborative. Around September 1999 the organizational framework of CDM was put into place at San José State University (SJSU), and meetings of the Executive Board and Users Group begun to be held. In July 2000, CDM received funding from The Federal Emergency Management Agency (FEMA), through the recommendation of the Governor's Office of Emergency Services (OES), in the form of a Hazard Mitigation Grant. Shortly thereafter, an office was established at SJSU; CDM received status as an Organized Research Unit (ORU) within SJSU, recruited staff and started operations. CDM operates under the SJSU Foundation, which is a 501c(3) non-profit organization.

3. MISSION / VISION

The mission of CDM is to reduce the loss of life and property damage due to, and accelerate economic recovery from, natural and other disasters by working in partnership with local governments, businesses, academia and non-profits to achieve high levels of practical, cost effective hazard mitigation implementation and more effective community response.

The Vision that the participants of the CDM have is to establish a model of collaboration and hazard mitigation implementation for a locality or region that can be replicated in other localities or regions across the state of California, and eventually across the U.S.A. By keeping the CDM a community-based organization, a high level of trust and ease of communication among the participants, two key elements that are essential for the success of such an organization, can be achieved and maintained.

The emphasis in the mission statement of CDM is on its ***collaborative*** nature and ***implementation*** of hazard mitigation measures. These have been the primary foci of CDM's activities.

4. STAFF AND OFFICE

CDM operates as a collaborative, with an administrative office located at San Jose State University. In the later part of the year 2000, CDM set up office in the College of Engineering (Rm 494) with the assistance of SJSU's Associate VP, Nabil Ibrahim. The office is approximately 600 sq. ft. of space with a separate conference area and library.

CDM staff includes an Executive Director, Associate Director, Administrator, and Student Assistants. Dr. Guna Selvaduray, Professor of Engineering at SJSU, is the Executive Director of CDM. The Executive Director's responsibility is in the day-to-day operations. Richard Sedlock, Associate Professor of Geology, was the Associate Director of CDM from Sept. 1999 - Aug. 2001. The Associate Director assists the Executive Director in all duties. As CDM's activities continue to grow, the need for a full-time Associate Director – an individual with professional qualities and capabilities in hazard mitigation – became more apparent. This was considered especially essential since the Executive Director has been serving on a part-time basis, due to the fact that he is a faculty member and has other academic duties to fulfill as well. Due to uncertainties in CDM's budget situation, efforts to recruit a full-time Associate Director were not initiated during 2001.

CDM's Administrator, Jessica Tran, began her employment with CDM on Jan 22, 2001. Student assistants, Patrick Yeoh and Kelvin Seling began their employment with CDM in June, 2001 and August, 2001. In addition, other SJSU students have been employed on a temporary (as-needed) basis. Jessica Tran assuming her position, as CDM Administrator was critical in CDM being able to operate efficiently and smoothly during 2001.

5. ORGANIZATION

Overall leadership and administrative responsibility of the Collaborative lies with the Executive Director. CDM has been designed to ensure smooth operations with accountability and oversight provided by the Advisory Committee, Executive Board, Users Group, SJSU Faculty Group, and Staff. The system of the organizational structure is outlined in the chart below:

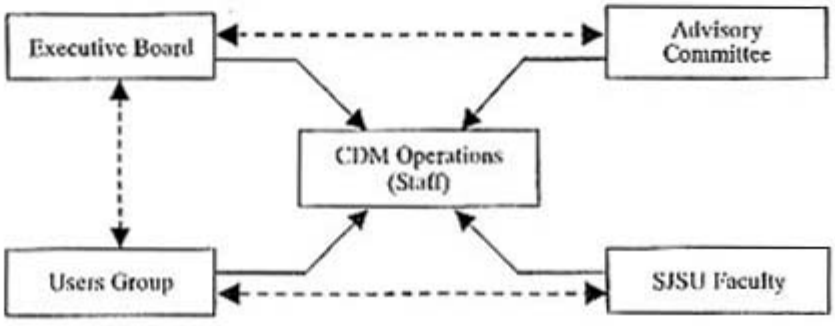

Figure 1

5.1 Advisory Committee

The ***Advisory Committee*** consists of individuals who have a broad range of expertise and visibility in the community. They provide guidance and assistance necessary to achieve the objective of CDM. A list of CDM's Advisory Committee members is presented in Table 1.

Table 1 – CDM Advisory Committee

Elaine Alquist, *Assemblymember*	22nd Assembly District
Nancy Bussani, *Executive Director*	Metropolitan Technology Center
Manny Diaz, *Assemblymember*	23rd Assembly District
Carl Guardino, *President*	Silicon Valley Manufacturing Group
Mike Honda, *Congressman*	US House of Representatives, District 15
Nabil Ibrahim, *Associate Vice President*	San José State University
Paul Jacks, *Deputy Director*	Governor's Office of Emergency Services
Richard McCarthy, *Executive Director*	California Seismic Safety Commission

5.2 Executive Board

The ***Executive Board*** was designed to be made up of individuals who would provide operations and financial oversight, decides on policy matters, and approves projects to be undertaken. A list of CDM's Executive Board is shown in Table 2. One new Executive Board member, Mr. Robert Fields of the Santa Clara Valley Water District, was invited to join the Board effective January 1, 2002. The Executive Board meets, on the average, at 8-week intervals.

Table 2 – CDM Executive Board

Fred Fowler, *(Chair)*	Mayor, City of Sunnyvale
Frannie Winslow, *(Vice-Chair)*	City of San José, Office of Emergency Services
Chris Adams	CA Governor's Office of Emergency Services
Phyllis Cauley	CA Governor's Office of Emergency Services
Bob Fields	Santa Clara Valley Water District
Terry Gitlin	Santa Clara County, Office of Emergency Services
Bruce Paynter	Applied Materials, Inc.
Mary Sidney	SJSU Foundation
Guna Selvaduray, *(Ex-officio)*	SJSU—College of Engineering

Besides discussing in detail all of CDM's activities, and giving appropriate directions, one of the major achievements of the Executive Board for the year 2001 was finalization of CDM's bylaws.

5.3 Users Group

The *Users Group* consists of emergency preparedness and hazard mitigation professionals who are the potential users of CDM's work products. The group members come from the public sectors, private sectors, and academia. They recommend and evaluate projects and products to be undertaken and assess utilitarian value of the projects. The Users Group membership totals approx. 40 individuals, from the public and private sectors. The membership in the Users Group still tends to be weighted in favor of public sector individuals. Representatives from the private sectors include individuals from California State Automobile Association, Lockheed Martin Missiles and Space Co., NASA/Ames Research Center, Solectron, and State Farm Insurance Companies to name a few. The Users Group has been meeting, on the average, at 6-week intervals. CDM continues to make efforts to invite more private sector and non-profit organization representatives to join the Users Group.

5.4 Faculty Group

The SJSU Faculty Group, which represents the availability of a multi-disciplinary knowledge and talent pool for CDM members, has grown since CDM was formed. The SJSU faculty members who are currently active in CDM are listed in Table 3. Based upon the needs of the Collaborative members, other faculty will be invited to join the existing faculty group.

Table 3 – CDM Faculty Group

Thalia Anagnos, *Professor*	Civil Engineering
Steve Arnold, *Adjunct Professor*	Civil Engineering
Kurt McMullin, *Assistant Professor*	Civil Engineering
Richard Sedlock, *Associate Professor*	Geology
Guna Selvaduray, *Professor*	Chemical & Materials Engineering
Richard Taketa, *Associate Professor*	Geography
Steve Vukazich, *Associate Professor*	Civil Engineering
Raymond Yee, *Associate Professor*	Civil Engineering

6. ACTIVITIES

Since its inception, CDM has worked with its partners to undertake a wide variety of activities to achieve its mission of reducing damage due to disasters and devising effective response measures. All activities are focused on implementation of pre-disaster mitigation measures in an effective manner, capitalizing on the synergy among local governments, businesses, non-profits and academia, thus reducing the potential consequences of disasters that may occur in the future. The activities are divided into the following categories:

- Information Dissemination
- Meetings/Conferences
- Presentations on CDM and by CDM Personnel
- Mitigation Projects
- MPA Program in Emergency Management

6.1 Information Dissemination

The participants of the Collaborative have pointed out that there is a need for one source of information, both before and during a disaster. CDM serves as this information clearinghouse for its participants by providing accurate, consolidated, screened and summarized disaster-related information at all times. This is especially important since the participants, especially local jurisdictions generally do not have the requisite personnel to identify the source(s) of information, access or obtain this information, and then evaluate its accuracy and relevancy before utilizing it.

In December 2000, CDM set up a website (www.sjsu.edu/cdm) to provide this information and assist local government personnel access appropriate information. Work products of CDM are posted on the web site and made available to all interested parties. Another unique feature of the website is the *"Mitigation Works"* page where photos of successful mitigation are posted as a means of encouraging implementation of mitigation. The website is ongoing and is frequently updated as CDM's latest work products are presented. It also provides annotated links to other disaster-related mitigation sites.

CDM also provides to its partners a comprehensive library as another means of information dissemination. The library contains periodicals from past disasters, disaster-related publications, meeting & conference proceedings, videos, to information on community programs, literature on disaster preparedness products and much more. Also included in the library are Japanese disaster-related publications and periodicals. All materials are available for loan to all CDMs participants and partners.

6.2. Meetings / Conferences

There is a need for continuing education and professional development of the personnel involved in emergency services and disaster mitigation so that they can keep abreast of state of the art mitigation techniques, technologies and standards. The Collaborative addresses this need by organizing and conducting topical & professional seminars and meetings.

6.2.1 Fires, Floods, and Faults Conference

CDM sponsors its two signature conferences annually. The first event, *Fires, Floods & Faults*, is a one-day event and is designed to bring together a broad range of emergency preparedness professionals for a variety of purposes which include: improving their skills set, obtaining state-of-the-art information, and networking with other professionals. This event was first held on May 19, 2000 when CDM was publicly launched. Participation increases every year, with 168 attendees at the Third Fires, Floods, and Faults Conference on April 29, 2002. 34% of participants were from the private sector and 52% from public sector. Next year, April 2003, CDM will sponsor its Fourth Annual *Fires, Floods, and Faults* in conjunction with *Disaster Resistant California Conference*, sponsored by the Governor's Office of Emergency Services.

6.2.2 Business Continuity Planning Conference

The second event, ***Business Continuity Planning Conference***, is a half-day event that CDM sponsors annually with the City of San Jose. This conference is designed to target owners and employees of medium and small companies, who are directly involved in emergency preparedness. This is in recognition of the fact that small businesses are especially vulnerable to emergencies and disasters, and that they frequently do not have the resources to cope with the situation on their own. In addition, the vulnerability of medium and small companies does translate into the vulnerability of the larger companies, and hence it is important to make sure that the small business community is adequately prepared.

Last year, Applied Materials, Inc., hosted *Business Continuity Planning Conference II* at their Sunnyvale Campus. The total number of participants was 76, which included 28% from the public sector, 64% from the private sector, 3% from non-profits, and 5% from academia. The speakers were again mainly from both the public and private sectors, and addressed some of the timely issues such as bioterrorism and cyber-terrorism. Feedback from the participants will be used to help plan for Business Continuity Planning-III Conference, which will be held on Nov. 20, 2002, at Applied Materials, Inc., in Santa Clara, CA.

6.2.3 Disaster Resistant California Conference

CDM also assisted in the organization of, and co-sponsored, the first *Disaster Resistant California – 2001 Conference*, sponsored by The California Governor's Office of Emergency Services (OES), and held on June 18-20, 2001, in Sacramento, California. Disaster Resistant California (DRC) is a conference series that expands on the concepts set forth by the Federal Emergency Management Agency's Project Impact program. Like the federal Project Impact program, Disaster Resistant California promotes public/private partnerships in an effort to reduce the vulnerability of individual communities to natural and man-made disasters. CDM participated in the organizing committee and assisted OES with developing the agenda for the three days. In addition, CDM also organized two sessions – one on Public-Private Partnerships, and one on International Programs – notably Japanese programs – in hazard mitigation.

Next year, CDM will partner with The Governor's Office of Emergency Services to host *Disaster Resistant California 2003 Conference* in conjunction with *Fires, Floods, and Faults IV*. This three-day conference will be held on April 21 – 23, 2003, at the Fairmont Hotel, in San Jose, California. This unique conference series has evolved into an exciting and highly dynamic exploration of disaster mitigation, planning, preparedness, response and recovery. Disaster Resistant California is designed to bring together emergency management professionals, local and state government representatives and private

business partners to share ideas, technology and resources for the purpose of mitigating disasters.

6.5 Mitigation Projects

The purpose of CDM's mitigation activities is to motivate the public to implement mitigation measures on their own volition, recognizing the benefits to be gained by doing so. A number of projects have been initiated. These include the following, which are described in greater detail within the subsections of this section:

- Retrofit one SJSU lab to demonstrate nonstructural hazard mitigation
- Translations of existing materials
- K-6 Nonstructural Hazard Mitigation
- Utilization of GIS for Hazard Mitigation
- Inventory of helicopter landing sites
- Countywide Inventory of Soft-first Story Multi-family dwellings
- Shake table testing of shelf-lip heights
- Implementation of HAZUS in the Silicon Valley region

6.5.1 Nonstructural Hazard Mitigation Demonstration Project

In most educational institutions today the equipment in the laboratories are not adequately restrained for seismic safety and therefore could result in injuries and equipment damage in the event of a major earthquake. Injuries and losses could be minimized by properly restraining expensive laboratory equipment and tools. A demonstration project on the nonstructural retrofit of one engineering laboratory at SJSU, served as a model laboratory for nonstructural hazard mitigation. The purpose was to design, fabricate and install seismic restraints for all equipment in an engineering laboratory, thus providing a means to demonstrate non-structural hazard mitigation. The project was completed in 2001.

In Phase I of this project "positive lock" latches were installed on all cabinets. Commercially available slide latches were purchased and modified to include a spring so that it becomes a "positive lock" latch. See Figure 2. In Phase II, countertop equipment and computers were restrained by WorkSafe Technologies who donated their materials and services to CDM's cause. See Figure 3.

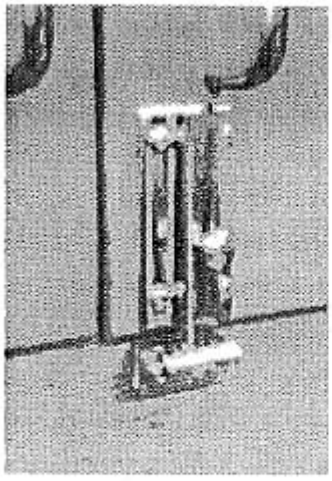

Figure 2

Figure 3

Larger floor mounted equipment were anchored to the floor using fabricated bolts and steel restraints custom-made to specifications. Design criteria and engineering drawings for the restraints were developed by Steven Arnold, Adjunct Professor of Civil & Environmental Engineering, SJSU. Cost benefit analysis, based on the comparison of mitigation cost to replacement cost, was also determined. Benefit ratios ranged from a low of 1.5 to a high of 100, with an average of approximately 35 to 40 for most of the equipment.

A paper based on this project was prepared and submitted for presentation at the Seventh U.S. National Conference on Earthquake Engineering, held in July, 2002 in Boston.

6.5.2 Translations of Existing Materials

While there exists today a vast quantity of materials on hazard reduction and mitigation, most of these (educational) materials are written in English and therefore are accessible only to those proficient in English. In recognition of the cultural diversity of CDM's community, and as a means of demonstration a productive manner in which SJSU's cultural diversity can be harnessed for the benefit of the community, a non-copy righted brochure, entitled: ***Helping Children Cope after a Major Earthquake***, originally developed by The Center for Living with Dying has been translated into the following languages: Chinese, Korean, Vietnamese, Spanish, Tagalog, Turkish, Hindi, and Russian. Translations into Hindi and Arabic are currently being done and are expected to be completed in the near future.

The brochures that have been completed are available via CDM's website so that they can be downloaded and printed by anybody who is interested. In addition, letters were sent to all schools in Santa Clara County informing them of the availability of the translations of these brochures and their availability free of charge.

The California Seismic Safety Commission has also requested CDM to translate "The California Earthquake Loss Reduction Plan" into Japanese. The purpose of this translation is to improve communications with our Japanese colleagues and secure their understanding of our programs and progress. This will be another step in our continued efforts to learn from each other, thereby maximizing the efficiency with which we can use our resources.

It is expected that this effort will continue, with translations of documents that would serve the purpose of hazard mitigation for CDM's ethnically diverse community.

6.5.3 K-6 Nonstructural Hazard Mitigation

Since the enactment of the Field Act, the structural integrity of buildings on school sites has improved significantly. However, there are no standards for the seismic safety of nonstructural components, especially building contents and equipment. The primary objective of this project is to implement nonstructural hazard mitigation in the classroom in two elementary (K~6) schools in the Santa Clara/San Mateo area – one in each county. Schools located in low-income area would be targeted. As a part of this project, elementary school teachers would be trained in earthquake hazard mitigation and encouraged to include this component in their curriculum. Similarly, school district maintenance personnel would also be trained in earthquake hazard mitigation and encouraged to include this as part of their regular job function.

A similar project has been successfully carried out in the Seattle School District, under the aegis of Project Impact. The CDM Executive Director met with the Seattle Project Impact Director and representatives from the Seattle School District to learn from their experience. Based on this meeting, and also discussions in the Executive Board and Users Group, the overall scope of the project and a preliminary procedure on how the project would be implemented was developed. A proposal was prepared and submitted to Applied Materials Corporation, under their community services funding program, in November, 2001. Although the proposal was not approved, CDM will continue to explore other sources of funding for this project.

6.5.4 Utilization of GIS for Hazard Mitigation

Geographic Information System (GIS) is a template being created for facility owners so that they can use to determine their vulnerabilities, based on publicly available GIS information is. The SJSU campus and its immediate vicinity are being used to demonstrate this technology. Overlay maps of SJSU and its immediate vicinity have already been obtained and compiled, based on publicly available GIS information.

Rich Taketa, Associate Professor of Geography at SJSU, and Brian Quinn have been heading the task of data assembly

and interpretation. The data are currently designed for web-based users, using a software program that also runs on the laptop. In case of internet access failure, this information is readily stored on CDs for easy reference. The information obtained will be publicly available via the server that was donated by Santa Clara County. Further refinement of the GIS data to include PG&E utility data for the surrounding areas, fragility curves for individual buildings, soft first story buildings to address issue of providing mass care shelters and locations of multi-story buildings is underway.

6.5.5 Inventory of Helicopter Landing Sites

Reliable knowledge of available helicopter landing sites is always an important factor during the response phase of a disaster. The current list of available helicopter sites was prepared more than two years ago and there is the concern that some of those sites might no longer be available, due to urban development since the last inventory. The Users Group has proposed that an up-to-date inventory of helicopter landing sites, with latitudes and longitudes, be compiled in the form of a data base, so that it can be readily updated. A subcommittee of the CDM Users Group has initiated this project and will continue to put more efforts towards completing this inventory and compilation of the data base.

6.5.6 Countywide Inventory of Soft-first Story Multi-Family Dwellings

Past seismic events such as the Loma Prieta, Northridge, and Kobe earthquakes have shown that in addition to loss of human life, there was extensive damage to soft-first story buildings, particularly multi-family dwellings. Most residents of these apartment buildings had to be provided for in mass care shelters, with some staying in them for as long as six months. Because Santa Clara County has a relatively large number of similar buildings with the same vulnerability, CDM has received a grant from the Santa Clara County Emergency Preparedness Council to implement its project to take inventory of soft-first story multi-family dwellings in the County. In order to reduce the risk to human life and property, and also be able to prepare adequate response measures, we need to better identify the localities where these buildings are located and the number of residents involved. The information collected will be used to create a data base that will also contribute towards the success of HAZUS modeling at a future date when it becomes possible to undertake that effort. Two maps will be produced as a result of the data collected, one showing the density and location of soft-first story structures in each city, and one showing the number of residents affected at each of these localities.

6.5.7 Shake Table Testing of Shelf Lip Heights

Lab chemicals have always been a potential hazard in the event of an earthquake. Major spills, releases and conflagrations have occurred during past earthquakes – both in the US and in Japan. Reagents tend to tip-over and spill their contents. At the present time there are no guidelines for height of shelf-lips, and no reports on how reagent bottles behave during a seismic event.

Kurt McMullin, Assistant Professor of Civil Engineering at San Jose State University, is carrying out experimental testing on sliding damage of chemical bottles due to seismic motion. The Studies were initially conducted with a record from the 1995 Kobe earthquake in Japan. Testing was initiated with the Quanser Shaker Table. A scale model of a small shelf surface has been built to mount on the table, to allow for shaking similar to that expected in a major earthquake.

Three series of tests were conducted. The first series were of a single bottle shaken with Kobe ground motion. Variations were done with different sizes, types and amount of content. The second series of tests was identical to first with the exception that it was shaken three times. By repeating the motion, an attempt was made to see the effects of a strong earthquake with several cycles of large acceleration. The third series of tests were conducted with a row of bottles shaken three times with Kobe ground motion.

Preliminary results indicate that the arrangement of bottles might be more important than the behavior of a single bottle. It was also found that a single bottle that was partially or completely full was more stable and an empty bottle, particularly

when a single spike of large acceleration was applied.

6.5.8 Implementation of HAZUS in the Silicon Valley region

FEMA created HAZards U.S., or HAZUS, as a forward loss estimation software. HAZUS uses geographic information system (GIS) analysis of modeled damage to an inventory of the human-built environment.

The Users Group of CDM has formed a GIS Committee, of which Brian Quinn is the chair. Brian ran seven M6.8 earthquake scenarios for the San Jose area. For the most accurate estimate of loss, HAZUS was run with soils data from The California Division of Mines and Geology's Vs30 map, and with liquefaction susceptibility data from U.S geological Survey's Open File Report 00-444. See figure 4 below.

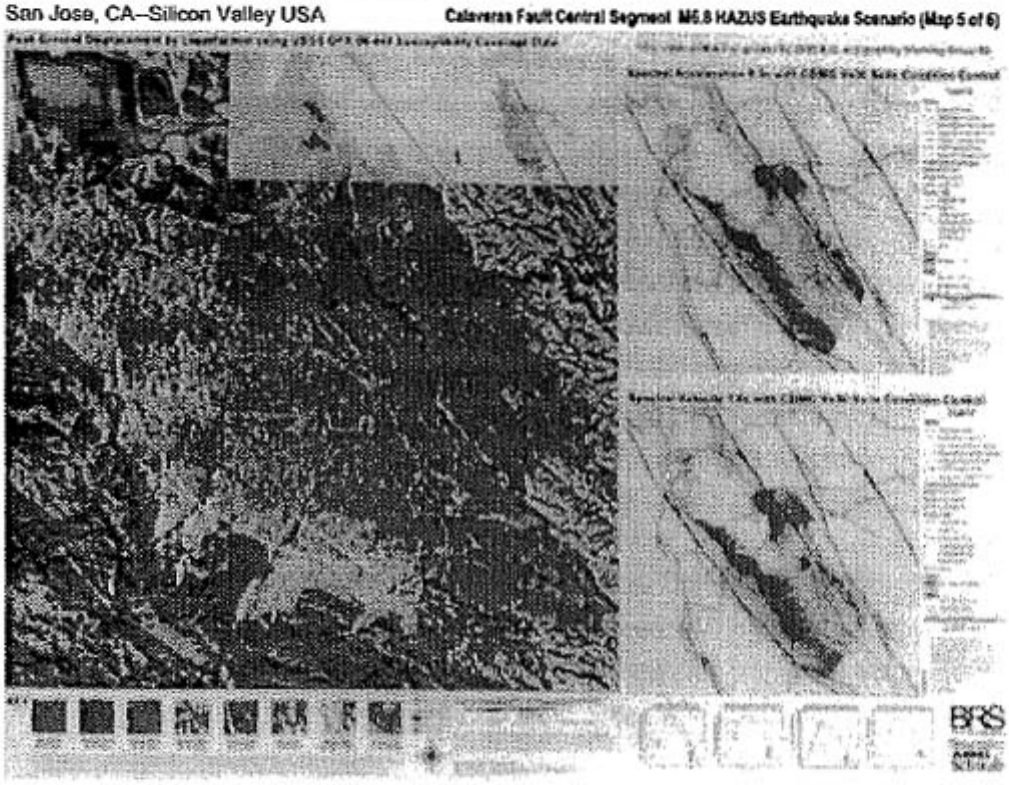

Figure 4

Several scenarios were developed, including a modeled pattern of liquefaction displacement for the San Jose metropolitan area in a Northridge-type event. The modeled liquefaction pattern was overlayed on a mosaic of US Geological Survey digital ortho-photo images. HAZUS estimated between 200 and 600 deaths in this scenario, depending on the event's time of day. Building damage of 16 million tons of debris was estimated in the form of 12 megatons of concrete and steel (above three times the World Trade Center Towers) and 4 megatons of wood and brick. 45,000 households were estimated as displaced, with 25,000 people expected to seek public shelter. Over 4 billion dollars of business interruption losses were estimated.

6.6 MPA Program in Emergency Management

Emergency Preparedness, emergency management and disaster mitigation are all interdisciplinary fields, covering a broad spectrum of the traditional disciplines, and can include diverse areas such as civil and structural engineering, urban planning, geology, psychology, counseling and management. A comprehensive university such as SJSU is an ideal institution to develop a graduate program in Emergency Preparedness and Emergency Management. This program builds on existing coursework available in San Jose State University's Masters in Public Administration Program. The curriculum plan has

been developed and is awaiting approval from the Public Administration Dept. The target date to offer this graduate program is Spring 2003.

7. COMMUNICATIONS PLAN

In order to ensure that the community that CDM serves is aware of CDM's existence and role, and also to ensure that CDM's work products are adequately distributed to its community, a significant part of the effort during 2001 has been devoted to this task.

A comprehensive communications plan for CDM was developed in April 2001. One plan of distributing CDM's work products in the most expedient manner would be via the World Wide Web. As a result, a CDM Website has been developed and is hosted by SJSU at its central server, with the web address of www.sjsu.edu/cdm. This website is not a static entity, but rather a dynamic entity with changes and updates being undertaken on a continual basis. CDM also joined the Business Wire Service as another means of generating press releases to announce CDM's latest work products or events. The CDM Newsletter, which was first released in Sept. 2001, was also developed as a part of this plan.

A number of opportunities arose for presentations on CDM to be made. This was seen as a means of communicating directly to targeted audiences the fundamental concepts behind CDM and to encourage their participation. In addition to presentations about CDM itself, a number of presentations based on the work that is on-going at CDM were also made. Most of these presentations were made by Dr. Guna Selvaduray, the Executive Director. Jessica Tran, the CDM Administrator also made presentations. In addition, constant efforts are being made to reach out to other professional groups, like the Association of Safety Engineers, so that linkages and alliances can be set up, and through these connections CDM's capabilities be brought to the attention of these other groups. These communications efforts will continue.

8. CONCLUSION

In the long term, the objective is to establish CDM as a Center of Excellence in the achievement of implementing comprehensive, long-term mitigation measures that contribute significantly to the creation of safer and more disaster resistant communities. It is also an objective of the participants to create a model that can be replicated in other local jurisdictions and regions throughout California and the United States. Towards this end, the participants are willing to assist other regions to develop similar collaboratives.