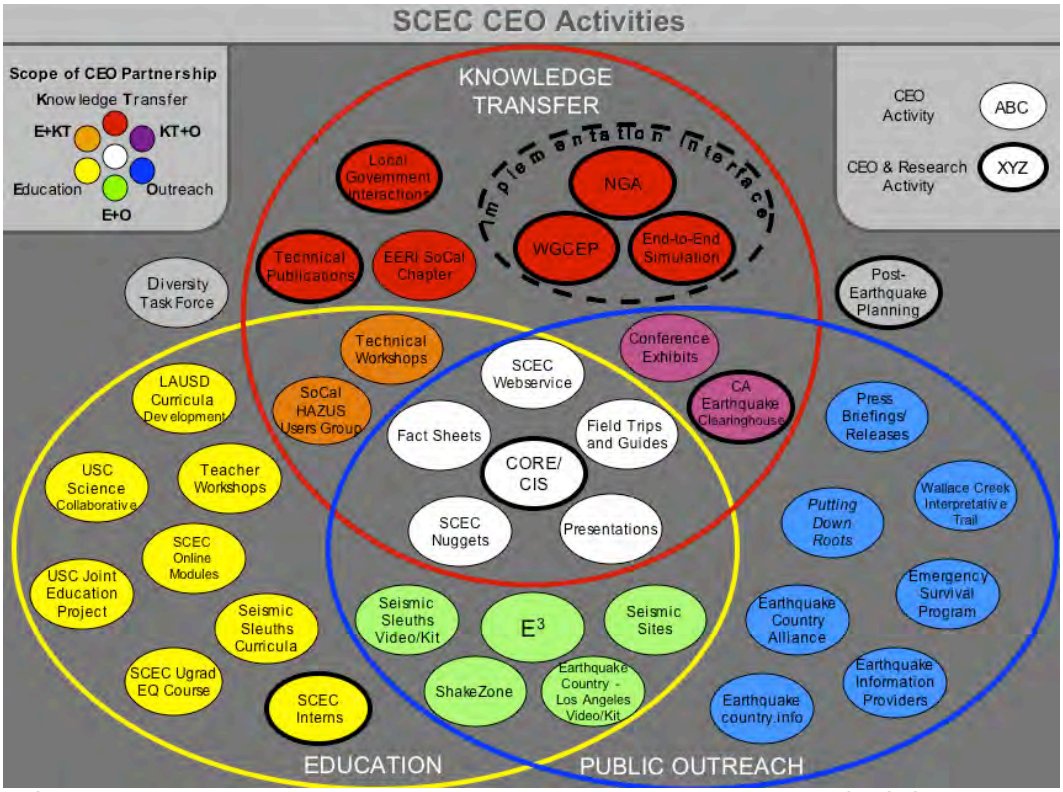
SCEC Communication, Education and Outreach (CEO) program

2005-2006 Summary

The SCEC2 *Communication, Education, and Outreach* (CEO) program has four long-term goals:

- Coordinate productive interactions among a diverse community of SCEC scientists and with partners in science, engineering, risk management, government, business, and education;
- Increase earthquake knowledge and science literacy at all educational levels, including students and the general public;
- Improve earthquake hazard and risk assessments; and
- Promote earthquake preparedness, mitigation, and planning for response and recovery.

CEO is well integrated within the SCEC science planning process. This includes participation of CEO staff in the development of short-term research objectives and evaluation of proposals received each year in order to develop products and services needed by our various audiences. SCEC scientists in turn are involved in developing and fulfilling CEO short-term objectives, which are organized within four CEO focus areas: *education* programs and resources for students, educators, and learners of all ages; *public outreach* activities and products for the general public, civic and preparedness groups, and the news media; *knowledge transfer* activities with practicing professionals, government officials, scientists and engineers (with research partnerships coordinated within the SCEC *implementation interface)*; and *SCEC Community development* activities and resources for SCEC scientists and students.



SCEC CEO Activities, showing how many activities span more than one CEO focus area. Activities within the SCEC Community Development focus area are shown outside the three circles, though have connections to many of the activities shown.

SCEC CEO Team

Staff
Mark Benthien, SCEC associate director for CEO
John Marquis, digital products manager
Bob de Groot, K-12 and informal education programs manager
Sue Perry, earthquake information technology student programs manager

2005-2006 Student Employees
Monica Maynard, education specialist and Spanish translator
Brion Vibber, web specialist
Alex Hubbell, web specialist

Consultant
Paul Somerville, Implementation Interface project manager

Education Activities

SCEC and its expanding network of education partners are committed to fostering increasing earthquake knowledge and science literacy at all educational levels, especially K-12 and college-level education in Earth science.

Objectives

The SCEC2 objectives for the Education focus area are to (1) interest, involve and retain students in earthquake science, (2) develop innovative earth-science education resources, (3) offer effective professional development for K-12 educators.

Results

SCEC Undergraduate Internship Program. SCEC has provided internships to over 180 students since 1994. SCEC interns are paid a stipend of $5000 over the summer with support from the NSF REU program. SCEC offers two summer internship programs, SCEC/SURE, and SCEC/USEIT. These programs are the principal SCEC *framework* for undergraduate student participation in SCEC, and have common goals of increasing diversity and retention. In addition to their research projects, participants come together several times during their internship for orientations, field trips, and to present posters at the SCEC Annual meeting. Students apply for both programs at http://www.scec.org/internships.

The *SCEC Summer Undergraduate Research Experience (SCEC/SURE)* has supported students to work one-on-one as student interns with SCEC scientists since 1994. The goals of SCEC/SURE are (1) to provide hands-on experiences for undergraduates and expand student participation in the earth sciences and related disciplines, (2) to encourage students to consider careers in research and education, and (3) to interest, train, and retain talented students, including women, members of underrepresented minorities, persons with disabilities, and students outside the earth sciences. SCEC/SURE has supported students to work on numerous issues related to earthquake science including the history of earthquakes on faults, risk mitigation, seismic velocity modeling, science education, and earthquake engineering. From 1994 through 2006, SCEC provided SURE 121 internships to 113 students (8 students had 2 internships). 83 SCEC scientists were mentors to these students (several were mentors repeatedly). Of the 113 SURE students, 60 were women and 18 were underrepresented minorities. Since 2005, when we began gathering additional information, there were 17 SURE students, 11 were women, 6 were underrepresented

minorities, 8 were first-generation college students, and 2 were from schools with no research opportunities.

The *SCEC Undergraduate Studies in Earthquake Information Technology (SCEC/USEIT)* program, unites undergraduates from across the country in an NSF REU Site at USC. SCEC/USEIT interns interact in a team-oriented research environment with some of the nation's most distinguished geoscience and computer science researchers. The goals of the program are: (1) to allow undergraduates to use advanced tools of information technology to solve important problems in interdisciplinary earthquake research; (2) to close the gap between two fields of undergraduate study--computer science and geoscience; and (3) to engage non-geoscience majors in the application of earth science to the practical problems of reducing earthquake risk.

Since Summer 2002, 79 students in computer science, engineering, geoscience, cinema, economics, mathematics, architecture, communications and pre-law majors have participated in the SCEC/USEIT program. Overall, 37% of USEIT interns have been women, 19% percent have come from ethnic minorities that are traditionally under-represented in the physical sciences and engineering, and 15% percent have been first-generation college students. In the latest summer program (2006), 50% of the interns were women and 45% were under-represented minorities.

SCEC/USEIT interns have developed the "LA3D" and "SCEC-VDO" (Visual Display of Objects) visualization platforms, object-oriented, open source, and Internet-enabled systems. These tools are being used by SCEC researchers interested in displaying objects that represent the complex subsurface structure of Southern California. The interns are encoding visualization objects, creating a *visual vocabulary* comprising earthquake-related objects that are interconnected into a new *visual ontology*. In addition, the interns have built scripting capabilities into the tools, to allow the creation of *visual stories* that communicate the results of SCEC system-level research.

Electronic Encyclopedia of Earthquakes (E3). SCEC is developing this digital library of educational resources and information with CUREE and IRIS, with initial funding from the NSF National Science Digital Library (NSDL) initiative. When complete, information and resources for over 500 earth science and engineering topics will be included, with links to curricular materials useful for teaching and learning about earth science, engineering, physics and mathematics. E3 is also a valuable portal to anyone seeking up-to-date earthquake information and authoritative technical sources, and is a platform for cross-training scientists and engineers and will provide a basis for sustained communication and resource building between major education and outreach activities. Scientists, engineers, and educators who have suggestions for content can visit www.scec.org/e3 now to complete the "Suggest a Web Page" form.

E3 is planned as the the primary SCEC *framework* for presenting extensive earthquake science and engineering information, including curricular materials and technical information organized by topical areas. E3 is used to organize materials for SCEC teacher workshops, field trips, exhibits, and other SCEC activities. A sophisticated information system for building and displaying the E3 collection and web pages has been developed, now called the SCEC Community Organized Resource Environment (SCEC/CORE). This content development and management system has now been used to create many other web *and print* resources, such as the main SCEC website and the new version of the *Putting Down Roots in Earthquake Country* brochure.

In late 2005, the decision was made to partner with Wikipedia for content for the E3 overview sections (the longer encyclopedia-like summaries of each topic). A former SCEC student employee is now one of the top Wikipedia developers, and is helping SCEC parse in Wikipedia content related to earthquakes. We will be then encouraging the SCEC community and other earthquake experts to use the Wikipedia system for creating and revising content, rather than SCEC attempting to write the material at the right level and completeness, which has proved far more involved than originally expected.

ShakeZone. In partnership with the Riverside County Children's Museum ("KidZone"), the CUREE-Caltech Woodframe Project and UC Riverside, SCEC created an educational, family-oriented exhibit on earthquakes ("ShakeZone") that opened in January 2002. The mission of the exhibit is to reach the local community, particularly the 20,000 elementary school children who visit KidZone each year, with positive messages about studying the Earth and preparing for earthquakes. The exhibit presents information about science, engineering, safety and mitigation. A shake table, an interactive computer display, and wall displays teach the visitors about the tools and techniques of earth scientists, engineers and emergency services personnel. The initial exhibit closed in fall 2005, and SCEC is working with the museum to develop a smaller but updated exhibit that will open in September, 2006. Much of the new exhibit will feature materials and displays provided by the Scripps Institution of Oceanography Birch Aquarium, at the completion of their temporary earthquake exhibit in October 2005. (http://www.kidzone.org)

Teacher Workshops. SCEC offers teachers 2-3 full-day professional development workshops each year. The workshops provide a connection between developers of earthquake education resources and those who use these resources in the classroom. The workshops include: content and pedagogical instruction; ties to national and state science education standards; and materials teachers can take back to their classrooms. Activities include: the Dynamic Plate Puzzle; Seismic Waves with Slinkys; Brick and Sandpaper Earthquake Machine; and a Shake Table Contest. At the end of the day teachers receive an assortment of free materials provided by IRIS, including posters, maps, books, slinkys, and the binders with all the lessons from the workshop included.

In 2003 SCEC began a partnership with the SIO Visualization Center to develop teacher workshops. Facilities at the Visualization Center include a wall-sized curved panorama screen (over 10m wide). This allows the workshop participants to be literally immersed in the images being discussed. For example, when the traditional 2D maps of earthquake epicenter data were viewed in 3D, the teachers immediately understood that the faults depicted by the earthquake locations were 3D planes, not 2D lines. Four workshops have now been held with SIO, and will continue each summer. (www.scec.org/education)

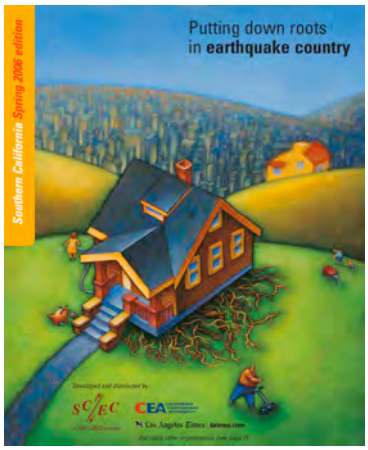
Public Outreach Activities

This Focus Area involves activities and products for media reporters and writers, civic groups and the general public, and has been a high priority during SCEC2. Much of 2003 was focused on planning activities and developing products for the 10-year anniversary of the Northridge earthquake in January 2004. These activities have continued through 2006 with product revisions and continue interactions with public outreach partners.

Objectives

The SCEC2 objectives for the Public Outreach Focus Area are to (1) provide useful general earthquake information, (2) develop information for the Spanish-speaking community, (3) facilitate effective media relations, and (4) promote SCEC activities.

Results



Putting Down Roots in Earthquake Country. In 1995 SCEC, USGS, and a large group of partners developed a 32-page color handbook on earthquake science, mitigation and preparedness. For the 10-year anniversary of the Northridge earthquake, a new version was produced by SCEC and the newly-formed ECA. The updated handbook features current understanding of when and where earthquakes will occur in Southern California, how the ground will shake as a result, and descriptions of what information will be available online. The preparedness section is now organized according to the "Seven Steps on the Road to Earthquake Safety." These steps provide a simple set of guidelines for preparing and protecting people and property. 200,000 copies were printed in January 2004, with funding from the California Earthquake Authority (CEA) and FEMA, and another 150,000 copies were printed in September 2004, with funding from CEA, USGS, Edison, Amgen, Quakehold, and others. In Spring 2005 a further revision was printed (60,000 copies) with coupons for home mitigation products. And in the largest new printing yet, in Spring 2006 1.5 million copies of another update were printed, with 1.3 million copies distributed via the *Los Angeles Times* as a "topper"- the booklet was bound on the cover of the Sunday, April 9, newspaper (rather than being lost amid other inserts). Copies of the document have been distributed at home improvement centers (on tables with preparedness products), by the American Red Cross (at neighborhood safety trainings), and by many others. The updated handbook is now at www.earthquakecountry.info/roots.

A notable acheivement in early 2006 was the first-ever Spanish version of *Putting Down Roots*. A team of Spanish-speaking scientists, emergency managers, and educators worked together to translate the text. 100,000 copies are now being distributed in Southern California.

Putting Down Roots is the principal SCEC framework for providing earthquake science, mitigation, and preparedness information to the public. The "Roots" framework extends beyond the distribution of a printed brochure and the online version. For example, the Birch Aquarium in San Diego developed an earthquake exhibit which featured a "Seven Steps" display, and the Emergency Survival Program (managed by LA County) will be basing it's 2006 campaign around the "Seven Steps." In October 2004 over 15,000 copies were included in the Earth Science Week packets distributed to science teachers and others nationwide.

The new version of *Putting Down Roots* was designed to allow other regions to adopt its structure and create additional versions. The first is a Northern California version produced by a partnership led by the USGS with SCEC, local and state emergency managers, the Red Cross and many other organizations. The handbook was revised with Bay Area hazards and a new section called "Why Should I Prepare?" was added that includes scenarios for likely damage, casualties, etc., and how life will change during a large earthquake in the region. Over 750,000 copies were printed in September, 2005, with funding from the California Earthquake Authority, USGS, FEMA, Red Cross, OES, CGS, and several others). 500,000 of these copies (with an inserted coupon for furniture straps and other mitigation products) were distributed in the San Francisco Chronicle. The handbook is available at home improvement

stores throughout the Bay Area, and is being distributed by the Red Cross and USGS. Because of high demand a second printing in October, 2005, produced another 130,000 copies for distribution by the USGS and in stores. And to commemmorate the Centennial of the 1906 San Francisco earthquake, an additional one million copies were printed and distributed in many Bay Area newspapers, the USGS, and other partners, along with a calendar of activities for the anniversary. SCEC coordinated the printing and financing of these materials. The Bay Area booklet can also be accessed from www.earthquakecountry.info/roots.

SCEC Webservice and SCEC News. SCEC's webservice presents the research of SCEC scientists, provides links to SCEC institutions, research facilities, and databases, and serves as a resource for earthquake information, educational products, and links to other earthquake organizations. In 2000 SCEC introduced SCEC News to provide a source of information in all matters relevant to the SCEC community – to disseminate news, announcements, earthquake information, and in-depth coverage of earthquake research, in a timely manner via the World Wide Web. Visitors to the site can also subscribe to e-mailed news "bytes" which announce new articles. (www.scec.org)

Earthquake Country Alliance. To coordinate activities for the 10-year anniversary of the Northridge Earthquake in January 2004 (and beyond), SCEC led the development of the "Earthquake Country Alliance" (ECA). This group has been organized to present common messages, to share or promote existing resources, and to develop new activities and products. The ECA includes earthquake scientists and engineers, preparedness experts, response and recovery officials, news media representatives, community leaders, and education specialists. The ECA is now the primary SCEC framework for maintaining partnerships and developing new products and services for the general public.

The ECA first met in June 2003 to begin making plans for the Northridge earthquake anniversary. This planning resulted in a complementary set of activities (planned by the ECA or by individual organizations). The ECA will continue to coordinate public awareness efforts in southern California through these and additional products and activities over the next year and beyond. In 2006, the centennial anniversary of the 1906 San Francisco earthquake was commemorated and the Alliance participated in educational activities and events with partners in the Bay Area. For 2007, members of the ECA will work together again to achieve widespread awareness and preparedness goals to mark the 150th anniversary of the 1857 Ft. Tejon earthquake on the San Andreas fault.

Earthquake Country Alliance Website. SCEC hosts this new web portal (www.earthquakecountry.info.), which provides answers to frequently asked questions and descriptions of other resources and services that ECA members provide. The portal uses technology developed for the E3 project (see above). Each ECA member can suggest links to their organization's resources as answers to questions listed on the site. The structure is set up very similarly to the new *Putting Down Roots:* sections include "what should I know?" "why should I care?" "what should I do before?" and "what should I do during and after?"

The site is set up separately from the main SCEC

web pages (though has attribution to SCEC) so that all members of the ECA see the site as their own and are willing to provide content. The site features the online version of *Putting Down Roots* and special information pages that all groups can promote, such as a special page about the "10.5" miniseries and a page about the "Triangle of Life" controversy (see assessments below).

Earthquake Country- Los Angeles. This video was produced by Dr. Pat Abbott of SDSU as the second in his "Written in Stone" series. The video tells the story of how the mountains and valleys of the Los Angeles area formed, including the important role of earthquakes. The video features aerial photography, stunning computer animations, and interviews with well-known experts. The video features 3D fault animations produced by SCEC's "LA3D" visualization system. In addition to conducting several focus groups with teachers and preparedness experts where the video was evaluated, SCEC is also developing curricular kits for school and community groups to accompany the video, and has added captions in both English and Spanish. These kits will be duplicated in large quantities with funding from the California Earthquake Authority. The Los Angeles Unified School District has asked SCEC to train teachers how to use these curricular kits, and may include the video in a new sixth-grade Earth science curricula soon to be adopted district wide.

Emergency Survival Program SCEC serves on the Coordinating Council of the Los Angeles County-led *Emergency Surival Program*, with emergency managers from all southern California counties, many large cities, the American Red Cross, and Southern California Edison. The primary role of the program is to develop a series of public information materials including monthly Focus Sheets, newsletter articles, and public service announcements related to a yearly theme. In 2006 the program is focusing on earthquakes, with seven of the monthly focus sheets based on the "seven steps to earthquake safety" in *Putting Down Roots in Earthquake Country*. SCEC provided the Spanish version of the seven steps text also, and coordinated the translation of the five other monthly focus sheets for 2006.

Media Relations. SCEC engages local, regional and national media organizations (print, radio and television) to jointly educate and inform the public about earthquake-related issues. The goal has been to communicate clear, consistent messages to the public–both to educate and inform and to minimize misunderstandings or the perpetuation of myths. . For example, at the SCEC 2004 Annual Meeting a multi-topic press conference was held to provide SCEC's perspective on recent earthquake predictions, discuss large earthquakes on the San Andreas fault, and announce new results from the SCEC TeraShake project. In May 2005, CEO organized a major press briefing to announce the results of a study of losses expected from a range of earthquakes on the Puente Hills fault (www.scec.org/puentehills) which received broad regional, national, and international coverage. SCEC CEO encourages scientists who are interested in conducting interviews with media reporters and writers to take advantage of short courses designed and taught by public information professionals.

SCEC Publication Distribution. Copies of SCEC's field trip guides, technical reports (Phase I & II reprints, Liquefaction and Landslide Mitigation Guidelines reports, etc.), and *Putting Down Roots in Earthquake Country* general public handbook (see below) are widely distributed at workshops, earthquake preparedness fairs, and through the SCEC website. (www.scec.org/resources/catalog)

Knowledge Transfer Activities

There is a widely perceived gap between basic earthquake science and its implementation in risk mitigation. SCEC's mission dictates that it work to close this implementation gap with engineers, emergency managers, public officials, and other users of earthquake science. The Knowledge Transfer focus area coordinates these activities.

Objectives

The SCEC2 objectives for the Knowledge Transfer focus area are to (1) Engage in collaborations with earthquake engineering researchers and practitioners, (2) develop useful

products and activities for practicing professionals, (3) support improved hazard and risk assessment by local government and private industry, and (4) promote effective mitigation techniques and seismic policies.

Results.

Implementation Interface. A goal of SCEC2 has been to establish a closer working relationship with the earthquake engineering community that would be more effective in implementing physics-based hazard and risk analysis. We therefore established a new working group, the *SCEC Implementation Interface* (P. Somerville, leader; R. Wesson, co-leader), as a funded component of the Center's program to promote these partnerships. It coordinates activities with all other SCEC working groups, particularly the Seismic Hazard Analysis focus group (N. Field, leader; D. Jackson, co-leader), which is responsible for developing earthquake forecasting models (with the ESP and Fault Systems groups) and intensitymeasure relationships (with the Ground Motions group).

The objectives of the Implementation Interface are to (1) integrate physics-based seismic hazard analysis (SHA) developed by SCEC into earthquake engineering research and practicethrough two-way knowledge transfer and collaborative research, (2) provide a flexible computational framework for system-level hazard and risk analysis through the OpenSHA platform and the Community Modeling Environment, and (3) interface SCEC research with major initiatives in earthquake engineering, such as the Next Generation Attenuation project and the NSF-sponsored George E. Brown Network for Earthquake Engineering Simulation (NEES).

A major Implementation Interface activity in 2005 involved proposal preparation for special projects. Major contributions were made to the implementation component of the SCEC3 Proposal and to the Japan component of the MPRESS Proposal for international collaboration. A major contribution was also made to preparing the work plan for the DOE Extreme Ground Motion Project, culminating in the organization of the Workshop that was held just before the SCEC Annual Meeting for the purpose of developing the work plan. Support was provided for finalizing the proposal to CEA.

Implementation activities through late 2005 was concentrated in six main areas. The first three areas are part of the SCEC Project "Implementation of SCEC Research for Seismic Risk Reduction," sponsored jointly by CMS and EAR, for which Somerville prepared a report (SCEC, 2005). First, we participated in two case studies of end-to-end simulation. Second, we participated in the development of guidelines for the selection and scaling of ground motion time histories for use in engineering testing and simulation, and in the presentation and discussion of these guidelines at the Annual Meeting of the Network for Earthquake Engineering Simulation (NEES). Third, we participated in the Next Generation Attenuation (NGA) Project, developing and validating procedures for broadband strong motion simulation.

Two of the remaining three areas in 2005 involved workshops that initiated new ventures. Fourth, we held a SCEC/USGS/DOE Workshop on Physical Limits to Earthquake Ground Motion in Rock. Fifth, we held a SCEC/PEER workshop on the impact of large earthquakes on tall buildings in Los Angeles. Sixth, we developed a more realistic representation of seismic hazards using vector-valued seismic hazard analysis, and applied it in a rigorous manner to a structural response problem (toppling of precariously balanced rocks) to place constraints on current ground motion prediction models.

HAZUS Activities. SCEC is coordinating the development and activities of the Southern California HAZUS Users Group (SoCalHUG) with the Federal Emergency Management Agency (FEMA) and the California Office of Emergency Services (OES). HAZUS (www.hazus.org) is FEMA's earthquake loss estimation software program. SoCalHUG brings together current and potential HAZUS users from industry, government, universities, and other organizations to (a) train GIS professionals in HAZUS earthquake loss estimation software, (b) improve earthquake databases and inventories, and (c) develop and exercise emergency management protocol. SCEC is considering how it can improve the data and models that HAZUS uses in its calculations, and sees this community as an important audience for SCEC research results. SCEC CEO has

organized five general meetings of the user group and several HAZUS trainings. A general meeting and two mini-trainings were held in February, 2006 at the Southern California Association of Governments. A comprehensive four-day training was held in May, 2006, at SCEC headquarters at USC, with six participants trained to be HAZUS "vendors" in the region. (www.hazus.org)

EERI Southern California Chapter. Since 2003, SCEC has hosted the bi-monthly meetings of the southern California chapter of the Earthquake Engineering Research Institute. These meetings include a speaker on a particular topic of interest to the attendees, typically civil, structural, and geotechnical practicing engineers. For example, on November 19, 2003, over 40 people attended a meeting with a speaker addressing new research on "Assessment and Repair of Earthquake Damage in Woodframe Construction," and on January 19, 2005, 20 EERI members attended a briefing on the recent Sumatran earthquake and Indian Ocean Tsunami.

International Earthquake Mitigation and Preparedness SCEC participates with the City of Los Angeles in the international *Earthquakes and Megacities Initiative,* as part of the Americas Cluster which includes Los Angeles, Mexico City, Bogota, and Quito. Each city is represented by emergency managers and academic representatives. The goal of the initiative is to promote the sharing of best practices for earthquake mitigation and preparedness and to develop common resources and joint projects. In addition to developing partnerships with other cities, participation in this program has also strengthened SCEC's ties with the City of Los Angeles. SCEC was represented with the City of Los Angeles in Bogota, Colombia in October, 2005, and Quito, Ecuador, in June 2006.

SCEC Community Development

The foundation of SCEC CEO is our partnerships and participation in many communities in each of the previous focus areas. Supporting the SCEC community from within is a parallel activity that bolsters our ability to reach out effectively to others. This focus area includes activities and resources relevant to SCEC scientists and students.

Objectives

The SCEC2 objectives for the SCEC Community Development focus area are to (1) increase the diversity of SCEC leadership, scientists, and students, (2) facilitate communication within the SCEC Community, and (3) increase utilization of products from individual research projects.

Results

SCEC Diversity Issues and Possible Activities for a Diversity Task Force. SCEC is committed to supporting the participation of a diverse community of scientists, students, and staff and others. At the beginning of SCEC2, a Diversity Task Force of the Board of Directors was established to identify policies for increasing diversity. This Task Force began by identifying several issues:

- The leadership of SCEC, including the Officers and the Board, is predominantly white and male.
- The Planning Committee has significant power in SCEC2 and serves as a stepping-stone to leadership. It would be desirable for the planning committee to be significantly diverse.
- Although many women and minority students are involved in intern and other programs at the undergraduate level, successively smaller numbers of women and minorities are involved at the graduate student, post doctoral, junior faculty and senior faculty levels.
- SCEC is a consortium of institutions and as an organization has very little control in hiring scientists and staff, and in admitting students. Diversity goals can be encouraged but not mandated.
- The current situation is not unique to SCEC, but reflects historical trends in the earth and physical science communities.

Several activities to address these issues have been identified, including improved demographic assessments of SCEC participants (for a baseline understanding of diversity in

SCEC), establishing goals for increasing the numbers of women and under-represented minorities at all levels of SCEC leadership (Board, Planning Committee, etc.), and establishing policy guidelines for the selection of individuals for "stepping stone" opportunities, including speaking at SCEC meetings, and membership on SCEC committees. These activities have been implemented. For 12 years, the SCEC intern program has given research opportunities to studens with diversity as a goal, and long-term tracking shows that many of the under-represented students that participated are still in science careers.

Of the 580 participants throughout SCEC2 (some of which no longer are involved), diversity at various levels seems to reflect historical trends, with much greater diversity among students than senior faculty. In terms of gender, women account for 42% of SCEC undergraduates, 36% of graduate students, 27% of non-faculty researchers, 42% of administrative staff, and 15% of faculty researchers. SCEC has increased the representation of women on its Board of Directors (3 of 16), though board members are appointed by institutions and not selected by SCEC leadership. Three women now participate in the SCEC Planning committee, and SCEC hopes to continue to identify women within each working group willing to take on leadership roles.

Participation of under-represented minorities in SCEC also reflects general Earth science levels, and is generally much lower than preferred at this time. Overall, of the 580 SCEC2 participants, 25 are latino, 10 are Native American, 3 are black, 2 are Pacific Islander, 105 are asian, 413 are white, and 32 are unknown.

Other plans that have been discussed include the establishment of a “sounding board” (a committee of SCEC participants who could serve as informal counselors), holding an evening session at the annual meeting where diversity issues could be aired, developing a mentoring program at a variety of scales (especially at the graduate student, post doc and junior faculty levels), and identifying successful diversity practices of other large science organizations. These and other activities are being considered to continue to support the career trajectories of all members–and potential members– of the SCEC community

SCEC Community Information System (SCEC/CIS). SCEC has developed a new online database system, using technology developed as part of the Electronic Encyclopedia of Earthquakes project. This system was first implemented to facilitate registration for the 2002 SCEC Annual Meeting, and has since been used for registration for most SCEC workshops and meetings, for tracking SCEC publications, for submitting and reviewing SCEC proposals each year, maintaining demographic information, managing e-mail lists, and for providing access to contact information for each of the 750+ members of the SCEC Community. This system also allows SCEC CEO to better track research projects with potential CEO applications.

As a service for other communities associated with SCEC, similar interfaces have been developed using the same system. Such communities include the California Post Earthquake Information Clearinghouse, the Earthquake Country Alliance, the Earthquake Information Providers (EqIP), and soon others. Members of multiple communities only need to remember a single password and update their information in one location, to keep their information current for all communities.

CEO Management Activities

Recruit CEO Advisory Panel. To expand participation by partners and recipients of SCEC CEO activities, a small advisory panel will be recruited to help review progress and provide suggestions for opportunities that might otherwise be unknown.

Develop strategic plan. Continue development of long-term strategic plan, with a focus on evaluation strategies. The CEO advisory panel will be instrumental in providing guidance for evaluation priorities. Careful assessment must be conducted at every stage of program development in order to ensure that the program can be responsive to audience needs and effective in achieving its goals:

1) Stakeholder needs assessment will determine a base level of knowledge among various audiences and identify specific needs to be addressed. This information will be gathered through document reviews and interviews with representatives of the key targets audience groups.
2) Evaluation design will consider the types of evaluation methodologies and logic models SCEC CEO will employ, based on decisions of what should be evaluated (quality and/or quantity of products? Usefulness of services? Cost-effectiveness?) and why the evaluation is needed (improve the discipline of E&O? Accountability to agency management and stakeholders? Improve service delivery and program effectiveness?)
3) Performance measurement of product development and implementation will involve collecting accountability information for stakeholders, tracking intended and unintended outcomes of the program, and providing information vital to program improvement in order to achieve pre-established goals. This information can be useful for management of activities, resources, and partnerships.
4) Programmatic assessment of the overall success in achieving SCEC's stated goals and identification of what was successful, what failed, and why. This step is broader than performance measurement as it addresses the long-term, overall affect of the CEO program as a whole, and has implications for other large-scale E&O programs.

Represent SCEC as Member of:

- Network for Earthquake Engineering Simulation (NEES) EOT Committee
- Earthquakes and Mega Cities Initiative (Los Angeles representative)
- Western States Seismic Policy Council
- California Post-Earthquake Technical Information Clearinghouse (Benthien is chair of Information Technology workgroup)
- Emergency Survival Program Coordinating Council
- Southern California HAZUS Users Group (Benthien is project lead)
- EERI Southern California Chapter (SCEC hosts bimonthly meetings)
- EERI Mitigation Center So. Cal. Planning Committee

Document and Report on CEO activities. Each year many presentations and reports are prepared to describe the activities of the CEO program. In 2003 a paper was published in a special issue of Seismological Research Letters focused on education and outreach.