

A Collective Impact Approach for Earthquake Public Education and Preparedness

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The Southern California Earthquake Center's *Communication, Education, and Outreach* (CEO) program is a global leader in expanding knowledge of earthquake science and risk topics while motivating preparedness among a wide range of stakeholders, through a collection of bold and creative activities. For example, SCEC CEO coordinates the *Great ShakeOut Earthquake Drills* initiative, which provides opportunities each year for millions of people nationally and worldwide to learn about earthquake hazards and how to reduce casualties and losses. ShakeOut and other CEO partnerships such as the *Earthquake Country Alliance* (ECA) accelerate innovation and provide new capabilities for encouraging and facilitating risk reduction. These activities are sustained via our many communication channels (websites, events, email newsletters, social media, and news media) to reach public, private, and community leaders to inspire new ways of thinking and responding to the challenges that earthquakes and their impacts pose to the nation and the world.

SCEC CEO also broadens participation of underrepresented groups in the STEM workforce through its *Internships Program* (which has provided research experiences for nearly 600 undergraduates), and its *Transitions program* (which supports students and early career scientists with mentoring, networking, and travel support). Separate white papers have been submitted that highlight these *Experiential Learning and Career Advancement* activities and offer suggestions for future earthquake centers.

Overall, the SCEC CEO program aims to improve application of earthquake science in policy and practice; reduce loss of life, property, and recovery time; increase science literacy; and increase diversity, retention, and career success in the scientific workforce. These are broad, long-term goals for improving the national welfare that complement the many applications of SCEC research for risk reduction (led by SCEC's Executive Director for Applied Science, Christine Goulet).

Through its *Public Education and Preparedness* activities, SCEC CEO has become known as a trusted and reliable "backbone organization" among many community leaders, organizations, and regional partnerships. This role is one of five "key elements" of the [Collective Impact Framework](#) [Kania, John, and Mark Kramer. "Collective Impact." *Stanford Social Innovation Review* 9, no. 1 (Winter 2011): 36–41.], a model for how future earthquake centers can create, implement, and evaluate their activities via collaborative approaches. This paper provides examples and recommendations for each of these five elements.

1. A Common Agenda for change, including a shared understanding and a joint approach

The *Earthquake Country Alliance*, created in 2003 and managed by SCEC, engages more than 1,000 public-private-grassroots leaders across California with a shared mission to support and coordinate efforts which improve earthquake and tsunami resilience. SCEC supports a statewide ECA steering committee who are leaders of regional coordinating committees that implement local activities. ECA began in Southern California, where it created the first "Great Southern California ShakeOut" drill in 2008 (involving 5.4 million participants). This success prompted leaders in the Bay Area and North Coast to join the ECA and to expand ShakeOut statewide, establishing a shared agenda and commitment to consistent messaging development and distribution across the state that continues to this day.

Beyond California, SCEC has expanded ShakeOut across 26 additional official regions across the U.S. and around the world (see [ShakeOut.org](#)). New countries are being actively recruited to join the ShakeOut movement, which serves to coordinate earthquake messaging internationally. The prime example is how our "Drop, Cover, and Hold On" graphics, and related messaging resources ([EarthquakeCountry.org/step5](#)) are routinely being incorporated into local, national, and international materials and messaging efforts. ShakeOut is now also a common platform for educating West Coast residents about Earthquake Early Warning, and SCEC is supported by NOAA (via CalOES) to create and manage [TsunamiZone.org](#), which adapts the ShakeOut registration system to assess participation in Tsunami activities in west coast states and across many territories and countries within and bordering the Caribbean.

SCEC also fosters a common agenda via the *GeoHazards Messaging Collaboratory* (GMC), which involves partners at IRIS, UNAVCO, USGS, and NOAA who present webinars for media and scientists, coordinate special outreach campaigns, and lead conference workshops, all focused on the value of messaging consistency and resource leveraging. Post-earthquake crisis messaging has been an active aspect of the GMC, allowing each organization to share or amplify messaging in order to reach more people.

SCEC is able to coordinate these activities given its focus on earthquake science, resilience, and education (unique among its partner organizations, such as government agencies, non-profit organizations, etc., most which are not solely earthquake-oriented). Future earthquake centers should recognize and build on this leadership role and the opportunities it presents for implementing a common agenda beyond their own resources and expertise.

2. Shared Measurement Systems that ensure alignment and accountability.

This element is exemplified by the now ubiquitous approach that ShakeOut has introduced to measuring public participation in drills and related earthquake resilience activities each year, which reached new records in 2019 with nearly 21.8 million people involved across the U.S., including 10.8 million in California alone. In total, global engagement reached a record 67.2 million. These are only the overall totals; each ShakeOut region also has statistics by subregion (county or state), as well as by participation category (for example, in 2019 more than 13.5 million K-12 school students and staff participated across the U.S.). Additional statistics are gathered for all regions through an annual survey of registrants, with results such as 80% of the respondents stating that they updated their overall disaster plan in 2019, up from 41% in 2009.

Such measurements also show trends due to external influences and indicate areas where additional support is needed. For example, in 2017 the Centers for Medicare and Medicaid Services implemented new training requirements of all healthcare facilities nationwide, leading to healthcare registration nearly doubling by 2019. Seeing this trend, the ECA Healthcare Committee updated ShakeOut healthcare materials to include these new rules, and SCEC co-presented a webinar with more than 700 attendees nationwide.

SCEC also tracks a variety of metrics for its other activities that span multiple organizations and regions. ECA activities such as local workshops, public lectures, social media, and resource downloads help to identify what is working well and can inspire adoption of similar activities elsewhere. We are also aligning efforts with other initiatives such as the California Governor's *Listos* campaign for local preparedness activities that target vulnerable populations, in order to both help its success and highlight our capabilities. As many of these activities combine earthquake science education and preparedness messaging, partnering with such campaigns to increase their success can also provide dividends to future earthquake centers in terms of expanded financial or in-kind support.

3. Mutually Reinforcing Activities via a plan of action that outlines roles and leverages expertise

Collective Impact is most effective when there are a variety of participants and activities that all work towards the common agenda from their different perspectives. The ECA was built on this principle; leaders of each regional alliance (SoCal, Bay Area, and the Redwood Coast Tsunami Work Group) develop their own activities and resources, but share them via regular statewide calls and meetings. For example, the *Redwood Coast Tsunami Work Group* worked with SCEC to update tsunami safety imagery that is now used globally. ECA SoCal created a "mini award" campaign now adopted by ECA Bay Area, and in turn San Francisco's *Neighborfest* program is being replicated by ECA Bay Area regionally and by SCEC statewide.

ECA also sustains sector-based committees that develop resources and organize activities for many audiences (businesses, healthcare, people with disabilities, etc.), and outreach bureaus that coordinate campaign outreach and implement best practices with many partners. These various leadership groups allow a broad number of people to contribute innovative new resources and activities to the common plan.

As SCEC's coordination of earthquake science and safety information expands nationally and globally via ShakeOut communication channels, we are broadening the reach of ECA resources. Many states and regions have now adapted ECA's Seven Steps to Earthquake Safety (EarthquakeCountry.org/sevensteps) as an organizational structure for their messaging, and FEMA has now incorporated the structure into a new version of their *Homeowner's Guide to Earthquake Safety*. Similarly, our "Drop, Cover, and Hold On" graphic is now in use by FEMA (www.ready.gov/earthquakes), in ShakeAlert earthquake early warning phone apps, and in resources distributed by other organizations across the country and around the world. We have also worked with a local non-profit organization (RocketRules.org) to create earthquake science and preparedness "Rocket Rules" materials for grades K-3.

These are only a few of many activities SCEC coordinates with partners; for example, nearly every ShakeOut region has developed its own outreach activities, with many adapted by other regions. ShakeOut has effectively become a global infrastructure for providing earthquake information to the public. Future earthquake centers should seek or create such alignment, encourage broad use of common resources, and

incentivize participation by supporting foundational services (webpages, shared messaging, etc.) that allow others to expand and reinforce the overall plan through their own expertise, and accomplish mutual goals.

4. Continuous Communication that builds trust and creates common motivation.

All the activities described above involve a broad variety of communication approaches to build and sustain participation, expand adoption of messaging and resources, and achieve common goals. The various communications channels developed for recruiting ShakeOut participants and providing them information needed to conduct their drills and other preparedness activities are also used to also communicate knowledge about earthquake hazard and risk for each region. These channels include frequent emails to participants, which include overviews of earthquake science, resources for mitigating earthquake damage, and resources for learning about recent earthquakes, as well as ShakeOut and ECA social media channels. Millions more learn about ShakeOut via broad news media coverage. As the ShakeAlert system expands its implementation, these channels will be employed to help the public understand its value and limitations.

CEO also communicates SCEC research findings and other news about the SCEC Community, via press releases, interviews and media events, articles for the SCEC website and Newsletter, and SCEC's social media channels (such as [Twitter.com/scec](https://twitter.com/scec) and [YouTube/com/scecmovies](https://www.youtube.com/scecmovies)). SCEC also coordinates and develops crisis communications principles, messaging, resources, and other critical public information (as in the 2019 Ridgecrest earthquake sequence). These activities are also in collaboration with partners of the GeoHazards Messaging Collaboratory described in section 1. Each year SCEC CEO also partners with several organizations to offer programs that train (1) the media on how to report earthquake science and (2) the SCEC community on how to communicate their research to the public and the media.

Other communication activities coordinated by SCEC include presentations and webinars for businesses, community groups, technical professionals (building officials, practicing engineers, etc.), emergency managers, insurers, realtors and others. Many of these are coordinated through partnerships such as the Structural Engineers Association of Southern California or Los Angeles Association of Realtors. Such activities often identify mutual goals and lead to new research or outreach activities.

5. Backbone Organization(s) that coordinates participating organizations and agencies.

SCEC CEO is globally known as the Backbone Organization of ShakeOut, though much of our work is strategically designed to appear locally generated, to foster ownership of each region's activities by their local coordinators and participants. This includes: customizing monthly update emails for each region; contacting organizations to renew participation each year; posting frequent social media messaging ([ShakeOut.org/messaging](https://www.shakeout.org/messaging)); developing localized and global drill guidance resources and educational content; training ShakeOut Regional Coordinators; supporting regions in times of earthquake and tsunami crises; and coordinating Evaluation.

CEO staff also play key roles in managing the various components of the Earthquake Country Alliance, supporting the many leader groups at the statewide and regional levels. This support allows committee leaders to focus on implementing activities (rather than scheduling calls and taking notes), and for SCEC to guide the development of consensus messaging, common approaches, and sustained funding (from FEMA, CalOES, and other sponsors, in addition to core NSF/USGS support).

SCEC created these "brands" (ECA, ShakeOut, GMC, etc.) to leverage investment by partners in a shared effort (rather than emphasize our own branding), which successfully created trust and a sense of common ownership. Prior to the formation of ECA in 2003, many efforts among our current partners were seen as competitive or required funding for their involvement. While over time we have been able to expand SCEC's visibility as the backbone organization of these activities, by initially minimizing public awareness of SCEC's role we were able to build respect and trust among our many partners and leverage extensive in-kind contributions throughout California, across the country, and around the world.