Fall 2019 | Volume 2, Number 2

PULSE DIGEST

News You Can Use — for members of the Earthquake Engineering Research Institute



Leadership Communique

A message from the president, Laurie A. Johnson (M.EERI,1990)

While at the University of Washington last month, I had the opportunity to visit with a few members of the local student chapter of EERI. Their enthusiasm for EERI and the Learning from Earthquakes (LFE) program is so exciting. Two of the graduate students participated in the LFE travel study program to New Zealand in May 2019 and we had a lively discussion about the recovery and resilience efforts following the 2010-2011 Canterbury and 2016 Kaikoura earthquakes. Reflecting on this during my flight home, I was filled with gratitude and hope.

As 2019 and the first year of the LFE endowment campaign comes to a close, 100 members have pledged more than $1.8 million (both in cash pledges and planned giving) to secure the future of LFE for these and other future leaders in earthquake engineering and risk reduction. We're halfway toward the $4 million goal we set for the campaign. This is a remarkable milestone for the Institute since, for the past decade, EERI has been funding the LFE program and individual event reconnaissance efforts from annual membership revenue, the Institute's general endowment fund, Institute reserves, and event-specific grants.

The funding uncertainty year-on-year has been a strain on the program and a concern for the health of the Institute as a whole. Our $4 million target can provide an estimated annual income of $200,000 dedicated to LFE post-earthquake reconnaissance, the travel study program, and other core program activities, as well as future innovations and initiatives.

The LFE program has been active this year, bringing our members more opportunities to learn and connect. Last month, an LFE team in Indonesia wrapped up studying population displacement and relocation aspects of the September 28, 2018, Palu, Indonesia earthquake and tsunami. Their work will build upon EERI's ground-breaking research and development of the LFE Seismic Resilience Observatory framework to better understand earthquake impacts over time, space, and societal systems.

In September, EERI, in partnership with the Alaska Earthquake Center, hosted the successful symposium on the 2018 M7.1 Anchorage Earthquake. EERI also deployed quickly following the July 4 and 5 earthquakes near Ridgecrest, California. EERI (as part of the California Earthquake Clearinghouse) established physical and virtual clearinghouses to facilitate the timely exchange of reconnaissance observations.

As the year comes to a close, EERI's membership renewal campaign is now underway. The Board of Directors appreciates the 200+ respondents to the 2019 membership survey. We heard very clearly that members want relevant and timely information to help them in their careers and professions. We are working with staff and have launched a new Professional Development Committee to help enhance the Institute's programming in this area, including a growing portfolio of webinars. Surveyed members also rated LFE and Earthquake Spectra as the top offerings of the Institute. Your membership in EERI comes with a full-access subscription to both the regular and special edition issues of Earthquake Spectra. We are really looking forward to the January 2020 start of EERI's publishing partnership with SAGE that will enhance members' experiences with the journal both as a reader and an author.



So, I hope you feel like me that it is an exciting time for the Institute and that your investment as an individual or subscribing member is delivering both the value and opportunities to connect, learn, and lead with EERI. I also encourage you to reach out to at least one other person or organization and ask them to consider joining EERI. Details on membership benefits and levels are available on our website, and the EERI staff is available if you need information, materials, or any other help.

As you think about your year-end giving, I ask that you please consider making a pledge to the LFE endowment campaign so that LFE and its unique suite of post-earthquake, multi-disciplinary learning and sharing opportunities will be strengthened and sustained for years to come. I also invite you to read the "Why I give" testimonials from some of our early donors, highlighting the importance of the program and the transformative impacts it has had on individual careers and seismic safety both nationally and abroad, as well as our full case statement online. Please feel free to contact me, Past-President David Friedman, or Executive Director Heidi Tremayne for more information.

On behalf of the Board of Directors, I want to express our sincere appreciation to Heidi Tremayne and staff at EERI for all of your hard work delivering an incredible array of programs, meetings, seminars, and member services this past year. I look forward to all that is in store for 2020, including the National Earthquake Conference and 72nd EERI Annual Meeting, March 4-6, in San Diego.

And, I wish everyone a very joyful holiday time and thank you for your membership and service to EERI.

Laurie A. Johnson

Cover photo by Laura Whitehurst.

Leadership Communique

A message from the executive director, Heidi Tremayne (M.EERI,2004)



The new year is around the corner and it will start off strong for EERI with the joint National Earthquake Conference and 72nd EERI Annual Meeting! For many months now, more than 30 member volunteers on various committees have been planning the conference.

This will be a special conference that blends many community ideas submitted through abstracts, as well as unique ideas generated from the collaborative program committees. The program will feature national developments, like functional recovery, Disaster Recovery Reform Act, new FEMA products developed by ATC, and NEHRP Seismic Provisions, alongside findings from recent earthquakes and relevant regional and local topics. We're also including practical case studies and new research developments, such as simulated ground motions, to appeal to members in all fields and sectors.

One of the most exciting developments for me is the San Diego earthquake scenario project developed by EERI's Regional Chapter, which will be released for the first time at the opening plenary. The group has been diligently working over the last several months to refine their final report and create a vision for a seismically resilient San Diego by 2050. I've had the opportunity to work alongside the regional chapter colleagues as we prepare the final products, and I'm inspired by their passion and enthusiasm for local action.

In this work, it is also very interesting to see how unique San Diego is, yet also observe how many of the pathways towards seismic resilience

Continued on page 10

2020 National Earthquake Conference and the 72nd EERI Annual Meeting

Register today for the 72nd EERI Annual Meeting and the National Earthquake Conference, March 4-6, 2020 in San Diego, California! Join hundreds of your colleagues — multidisciplinary professionals, leaders, and experts — at one of the premier earthquake conferences in the world.

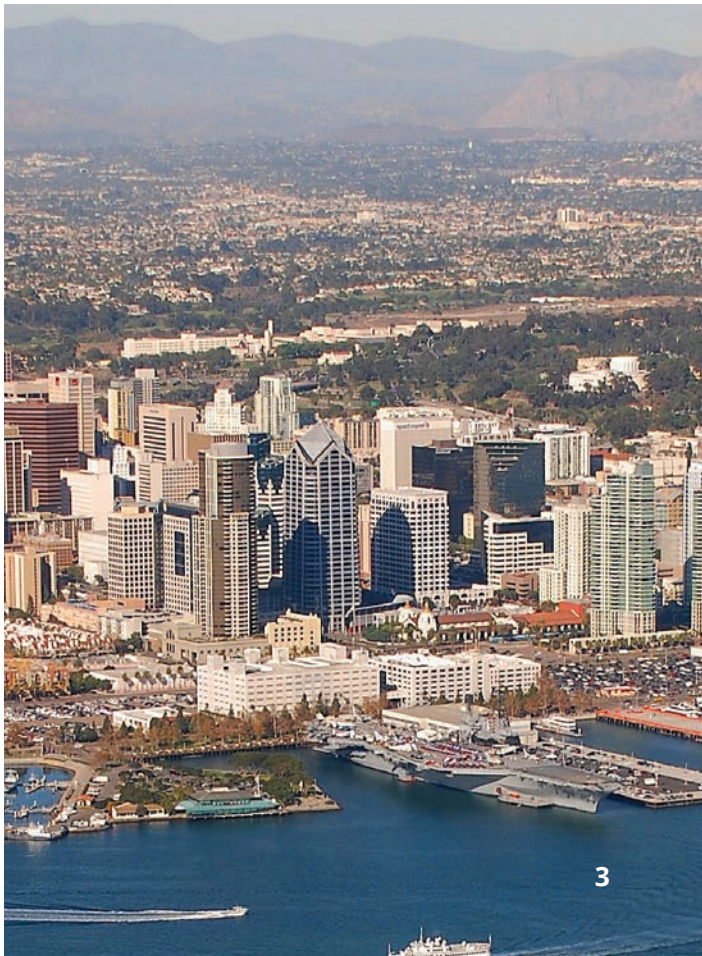
The dynamic agenda will feature the first public release of results from a new earthquake scenario and risk study for the San Diego region. Developed by experts — including leaders from the EERI San Diego Regional Chapter — over the last five years, the scenario will showcase the impacts and consequences of a potential M6.9 earthquake on the Rose Canyon Fault.

The meeting will also host the largest EERI Undergraduate Seismic Design Competition to date — we have proposals from 50 teams coming from eight countries, from as far as Egypt, Romania, and Malaysia. Each team will design and construct a scaled wood mixed-use building based on a scenario in downtown San Diego, which will then be tested in several rounds of simulated earthquake shaking. Other highlights include findings from the M7.1 Anchorage earthquake and the Ridgecrest earthquake sequence.

You'll also get the opportunity to hear from the leading experts in the field, including Dr. Lucy Jones, the 2020 EERI Distinguished Lecturer David Bonowitz, and the 2020 William B. Joyner Lecturer Dr. Julian J. Bommer.

Don't wait until the last minute — register today! For more information on accommodations, registration, and the program schedule, please visit **EarthquakeConference.org**.

We look forward to seeing you in San Diego!

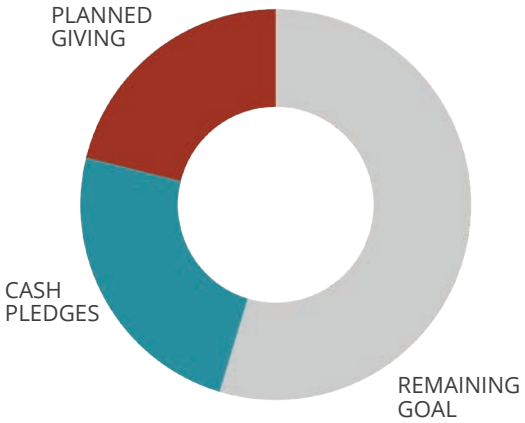


Learning from Earthquakes Endowment Fund

At our 2019 annual meeting in Vancouver, EERI officially launched a landmark campaign to raise $4 million to ensure the continuation of a robust and dynamic Learning from Earthquakes program for generations to come. The endowment campaign will enable the program to become financially sustainable, expand earthquake reconnaissance efforts, develop innovative programming, and invest in the next generation of leaders.

As of November 25, we've received $970,000 in cash pledges and $845,000 in planned giving from a total of 100 donors! In total, we've raised more than $1.8 million. We're halfway there, and with your help, together we can reach this ambitious milestone and secure LFE's future.

As the end of 2019 approaches, we hope that you will consider giving to the LFE endowment fund as part of year-end charitable giving. Please visit **LearningFromEarthquakes.org** to learn more about the fund and how you can give.



WE'RE GRATEFUL

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LEARNING FROM EARTHQUAKES

Ridgecrest Earthquake Sequence

In the wake of the M6.4 and M7.1 earthquakes in eastern California, southwest of Searles Valley, EERI, as part of the California Earthquake Clearinghouse, established a physical clearinghouse in the town of Ridgecrest from July 5 through July 11.

EERI is one of the managing partners of the California Clearinghouse along with the California Geological Survey, United States Geological Survey, the California Seismic Safety Commission, and the California Office of Emergency Services.

Over the course of the week, the clearinghouse brought together more than 50 investigators, including EERI members, to conduct timely field investigations and share their observations on nightly briefing meetings. As subject matter experts, EERI members provided trusted observations of conditions in the field.

Groups in the field included:

- Geologists from the U.S. Geological Survey, California Geological Survey, the Inland Geological Society, and the Nevada Bureau of Mines and Geology mapped fault rupture and other ground deformation.
- Geotechnical engineers from the Geotechnical Extreme Reconnaissance Team and others investigated the impacts of ground failure on structures and lifelines systems.
- Structural engineers from the Structural Engineers Association of Southern California and others assessed the performance of structures in the town of Trona and learned more about structural damage assessment efforts in Ridgecrest.

Following the clearinghouse, EERI organized a follow-up webinar where members of reconnaissance teams presented their observations. The webinar, reaching nearly 500 people, featured an overview of the earthquakes, geological observations, geotechnical engineering impacts, and structural engineering impacts.

You can continue to share and find data on our virtual clearinghouse on **LearningFromEarthquakes.org,** including a recording of the webinar.

Photos from Maria Luisa Jiminian, Andrew Martinez, and Van Nguyen (counterclockwise)







LEARNING FROM EARTHQUAKES

Anchorage Earthquake Symposium

EERI, in partnership with the Alaska Earthquake Center, hosted the successful meeting, "One Year Later: Symposium on the 2018 M7.1 Anchorage Earthquake," in Anchorage, Alaska from September 24 to 26. More than 130 diverse stakeholders, who participated in response, recovery, and post-earthquake investigations, attended the symposium.

Over the course of the symposium, participants discussed major lessons learned from the earthquake and considered the next steps for mitigation in Alaska and beyond. Technical breakout sessions highlighted findings from ground motion recordings, structural and nonstructural performance, port and lifeline performance, and response and recovery efforts, including a field tour of impacted sites. We learned that peak ground accelerations in most cases were less than 0.3g, with engineering studies now showing that shaking was often less than the design basis earthquake.





As a result, the damage was mostly limited to areas without code enforcement or on sites with poor soil conditions that were ineffectively mitigated or identified prior to construction. We also learned that reactivation of former ground failures from the 1964 earthquake, fortunately, did not occur, likely due to the limited duration of the shaking.

In addition to technical sessions, the meeting featured lunchtime plenaries focused on impacts on teachers, parents, and students and a panel describing the role of media in disseminating earthquake impact information. The meeting closed with a day-long field trip to locations impacted by the earthquake, including the Port of Alaska and Gruening Middle School in Eagle River.

The symposium and the reflection of this earthquake reminded us of the importance of what we all do. Beyond technical learning, we reflected on the personal and emotional toll of earthquakes. A short video — shared by Anchorage Municipal Manager Bill Falsey, who led the response and recovery for Anchorage — compiled recordings from the 911 call center immediately after the M7.1 earthquake. We heard the voices of terrified residents shaken in the dark, cold early winter morning, many of whom were scared and alone, seeking assurance from the call operators, who continued to field calls despite their own uncertainty.

The Anchorage community is still grappling with various challenges and struggling to afford the necessary repairs, despite the limited impact on the built environment. On our field tour, we saw homes still unusable a year later due to ground failures that induced structural damage, and damage to the aging wharf piles at the critical regional port that were only revealed after the spring thaw. Local residents and officials are still dealing with the financial complexities of recovery. The symposium brings to light the importance of working together across our professional disciplines to both solve and prevent these problems.

We look forward to sharing many more lessons gained from this symposium at the 2020 EERI Annual Meeting and the National Earthquake Conference in San Diego.

You can now access presentation slides and posters from the symposium on **LearningFromEarthquakes.org**.

Photos from Maria Luisa Jiminian and Heidi Tremayne.



LEARNING FROM EARTHQUAKES

New Zealand Travel Study

"The Learning from Earthquakes program in New Zealand really opened up my eyes to the risks and dangers that we all face," said Maria Luisa Jiminian (M.EERI,2017), a recent graduate of Pontificia Universidad Catolica Madre y Maestra in the Dominican Republic. "It's very different when you read a textbook and then you go out and see it with your own eyes."

Maria Luisa was one of the 24 graduate students and young professionals from around the world – from Peru to Singapore — who participated in EERI's Travel Study program in New Zealand in May. Hosted in partnership with QuakeCore — the New Zealand Centre for Earthquake Resilience — this program was a unique opportunity for emerging leaders to gain direct exposure and firsthand accounts of the nuances of recovery. One of the biggest takeaways for many participants was the inspiration they drew from witnessing the resilience of the communities and individuals they met, deepening their resolve to bring lessons home.

"I am extremely grateful for this opportunity. I want my life's work to focus on making society a safer place," said Angel L. Pérez Irizarry (M.EERI, 2011), a graduate student in structural engineering at the University of Wisconsin, Madison. "This program was essential in developing the networks and knowledge that will help me continue to work towards that goal."

Participants learned directly from those in the field through lectures, site visits, and group research projects. From Christchurch, to Kaikoura, then Wellington, they talked to local experts to understand the impacts of earthquakes on the "4 R's of Resilience": reduction, readiness, response, and recovery.

Here are just a few of the highlights:

- Tours of structural retrofits, rebuilds, infrastructure repair, and community planning following the series of earthquakes that caused extensive damage in Christchurch around 2011.
- Mike Olsen from Oregon State University brought RAPID facility equipment to the Kaikoura region, where he and team members collected LIDAR data, tracking the evolution of landslides triggered by the 2016 earthquake.
- Discussion of the impacts to the Marlborough wine region after the 2016 M7.8 earthquake, led by Wine Marlborough CEO, Marcus Pickens.
- Visit to a surface rupture site of a fault discovered after the Kaikoura earthquake.

"I took a piece of New Zealand in my heart and my head is filled with ideas to bring back to the Dominican Republic, and I thank EERI LFE because of this," said Maria Luisa.





Photos from Laura Whitehurst and Paul Daly.

PUBLICATIONS

New Earthquake Spectra Partnership

EERI is pleased to announce a new partnership with SAGE Publishing. SAGE will publish the first issue of Earthquake Spectra in February 2020 (Volume 36, Issue).

Over the past 35 years, we are proud of the impact and influence that Earthquake Spectra has had in earthquake engineering. Our vision is to remain the leading source of innovative research and practical applications in the field, while always looking for opportunities to enhance the journal. As a self-publisher, we lack the competitive edge in accessing advanced systems and software that would improve the production process and user experience, as well as dedicated marketing services that would help us reach more readers and libraries.

We need an experienced partner to help EERI stay abreast of changes to the publishing environment so that we can expand the impact of Spectra and better serve readers and authors alike. After an extensive 3-year process involving EERI's board, editors, and staff, we've chosen to partner with SAGE. SAGE are experts in working with previously self-published titles and we believe our journal is in the best hands. EERI members, readers, and authors will get more value from your membership: an enhanced reading experience, greater ease of access, as well as improved author services. EERI and SAGE are making every effort to ensure that the transition runs as smoothly as possible.

Until the new website and author submission interfaces are ready, you can continue to access content as usual on **EarthquakeSpectra.org**.



PUBLIC POLICY

White Paper on Functional Recovery

Design for functional recovery is a necessary tool for assessing and improving community resilience. Broadly speaking, design for functional recovery means making two measures of design equally important: safety and recovery time. However, functional recovery concepts and design provisions are still nascent.

EERI's white paper, "Functional Recovery: A Conceptual Framework," first released in July 2019, offers an important first step: an expanded definition and conceptual framework for functional recovery that discusses its application to both buildings and lifeline infrastructure. You can view and download the white paper on EERI.org. Expect to hear more about this at the EERI Annual Meeting and National Earthquake Conference.

The development of this white paper was in response to new language in the December 2018 reauthorization of the National Earthquake Hazards Reduction Program (NEHRP). This language, suggested to Senator Diane Feinstein by EERI's PPA in 2018 and passed in the final version of the bill, calls for FEMA and NIST to convene experts to recommend "options for improving the built environment and critical infrastructure to reflect performance goals stated in terms of post-earthquake reoccupancy and functional recovery time" (42 U.S.C. § 7705(b); 2018 Senate Bill 176).

To inform this governmentally-mandated expert committee, EERI's PPA set about developing a white paper to outline a multidisciplinary perspective that (1) offers some background and definition of functional recovery in the context of community resilience, (2) identifies four key issue areas to be researched, developed, and discussed to clarify and refine this new performance target, and (3) explores how the current state of practice can be applied to future functional recovery goals.

EERI is now expanding its work to consider the types of public policy actions that legislatures and government agencies at the federal, state, and local levels might take to facilitate the implementation of functional recovery-based seismic design.

As thinking about functional recovery evolves, EERI's Board of Directors feel that it is critical to forge consensus amongst technical experts. Towards this aim, EERI's PPA is collaborating with the Structural Engineers Association of California (SEAOC) and is considering engaging additional technical experts and organizations in the coming year.

2019 Highlights from Chapters

ALASKA

In May, the chapter hosted a one-day short course at the University of Alaska, Anchorage on ground improvement and foundation retrofit in response to the November 30, 2018 Anchorage earthquake. The course sought to provide local engineers with the best practices for repairing recent foundation damage and to provide solutions for new construction over liquefiable soils.

NEW YORK – NORTHEAST

In September, the chapter hosted a panel, "Site Amplification Models for NGA-East," which focused on the main findings of the NGA-East's Geotechnical Working Group (GWG). GWG leaders presented to an audience of more than 100 on regional developments for site amplification and their impact on local seismic design, especially in New York City.

The chapter also hosted a lecture by Dr. Robert Kayen, Professor of Civil Engineering at UC Berkeley and Senior Research Scientist and Civil Engineer at the Pacific Science Center of the USGS. The talk, "Structure-from-Motion & LIDAR: Computational Imaging Tools for Engineers," highlighted recent advances in computational imaging tools and application examples in reconnaissance missions.

NORTHERN CALIFORNIA

The chapter delivered many valuable programs and events to the Bay Area technical community this year. A November event featured guest speaker David Wald (M.EERI,1988), discussing the potential benefits and practical limitations of early earthquake warning. In October, the chapter organized a tour with David Schwartz (M.EERI,2000) to learn how one of the Bay Area's most-likely-to-slip faults makes its mark on the natural and built environment. The tour started at Tule Pond in Fremont (paleoearthquake history site) and proceeded through the City of Hayward (earthquake fault in an urban setting).

Other panels included a discussion on EERI's Learning from Earthquakes program, including "resilience observatory" and "VERT," and another one in June on early earthquake warning.

SAN DIEGO

The chapter has been busy at work preparing a new earthquake scenario for the San Diego region, which will be unveiled at the 2020 National Earthquake Conference. As part of this effort, the chapter organized a stakeholder workshop in June, in which more than 40 participants — including representatives from public entities and emergency responders — discussed long-term earthquake disaster planning efforts. The workshop helped participants gain a greater understanding of the region's seismic risks and how to build a more resilient region.

In August, the chapter organized a successful second annual Kenji Ishihara Colloquium Series on earthquake geotechnical engineering and a one-day short course with more than 120 attendees. The colloquium honored the lifetime contributions and achievements in seismic lateral displacements and earthquake geotechnical engineering of T. Leslie Youd (M.EERI,1974), Professor Emeritus, Brigham Young University.

SOUTHERN CALIFORNIA

The chapter, in partnership with the Southern California Earthquake Center, hosted an interactive training on EERI's Learning from Earthquakes program in June. The training covered reconnaissance data collection goals and methods, as well as clearinghouse opportunities. Participants also participated in a simulated field exercise and discussed how the chapter can assist its members and the broader community in the wake of a major California earthquake.

SACRAMENTO

In October, the chapter, along with the Sacramento chapters of the Association of Engineering and Environmental Geologists (AEG) and American Society of Civil Engineering (ASCE) Geo-Institute, hosted a short course on the upcoming updates to the 2019 California Building Code and CGS note 48. More than 100 practicing geoscience professionals, including geotechnical engineers, engineering geologists, and related fields, attended the course.

Photos: Northern CA chapter event on ShakeAlert (left, photo credit Van Nguyen); New York-Northeast event on NGA-EAST (right, photo credit Guillermo Diaz Fanas)





Friedman Family Visiting Professionals Progam Wraps Up Successful Season



Two dozen universities participated in the Friedman Family Visiting Professionals Program, facilitating exchanges between 14 professionals and nearly 500 students in 2019! The program matches professionals with universities for a workshop meant to be a part lecture and part informal discussion to foster better understanding and communications between earthquake practitioners and academics.

Every fall, EERI Student Chapters apply to receive one of the coveted spots in the Friedman Family Visiting Professionals Program. In 2019, our dedicated EERI volunteers even traveled internationally, including to the University of Toronto and Pontificia Universidad Católica Madre y Maestra in the Dominican Republic.

They represented various disciplines, including geotechnical and structural engineering, risk analysis, lifelines, emergency management, and seismology. We're in the process of matching student chapters with our dedicated EERI members, and we look forward to a spectacular program again in 2020!

Photo by EERI University of California, Davis Student Chapter, Dr. Jorge Meneses (M.EERI,2006) with geotechnical engineering graduate students.

We thank the following EERI members and student chapters for making this year's Friedman Family Visiting Professionals Program a success:

UNIVERSITIES

California Polytechnic State University, San Luis Obispo
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Leadership Communique from Heidi Tremayne

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can also be so universal. San Diego sits atop the recently identified Rose Canyon Fault Zone, which uniquely shapes the region's built environment and risk profile. Like many communities, there are some mitigation success stories to highlight in San Diego, yet there are also many opportunities to address older vulnerable building stock and infrastructure systems to limit their impacts on community recovery after a future earthquake.

The findings from this multi-year project will be showcased across five different sessions that will provide plenty of opportunities for engagement by participants to help shape the next steps for San Diego. I sincerely hope those local to the region adopt our chapter's vision for a seismically resilient San Diego and choose to actively participate in its implementation in the years to come. And I also hope that those who live outside the region can share their perspectives in these discussions, then apply some of these ideas to their own local region.

As you can tell, there will be incredible dialogue and opportunities for learning at the NEC, and I hope that you will register to attend. It'll be a great way to kick off a new year and inspire the actions needed for us to collectively reduce earthquake risk. As always, I believe that by working together we can accomplish so much. See you in San Diego!

Heidi Tremayne

YMC Webinars Available Online

If you missed these two informative and engaging webinars presented by the Younger Members Committee or want to watch them again, you can now view them on our YouTube channel.



In "Case Studies of Financial Decision-Making using Near Real time Post Earthquake Information," David Wald (M.EERI,1988), Seismologist at the U.S. Geological Survey (USGGS) and Editor of Earthquake Spectra, describes how USGS earthquake products like ShakeMap and PAGER are used to inform the distribution of relief, recovery, and insurance funds after disasters. In the immediate aftermath of a damaging earthquake, billions of dollars of relief, recovery and insurance funds are in the balance. Much of these funds are now distributed via new financial instruments that allow those with resources to hedge against disasters and those at risk to limit their losses and receive funds for response and recovery.



In the most recent webinar, "Engineering for Earthquake Resilience," David Bonowitz, S.E. (M.EERI,1994), discusses resilience and how the idea is influencing earthquake engineering. Broadly speaking, resilience-based design shifts the emphasis from the safety of buildings and infrastructure to the recovery of communities. This webinar will consider the implications of this shift and cover differences between resilience and performance-based design, retrofit programs, and other worthwhile efforts. You'll get the first opportunity to hear David speak and expand on this topic in-person at the National Earthquake Conference in March.

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