“CONVERGE Webinar Series”

Written Questions and Answers from the October 23, 2020 Webinar

Coordinating After Natural Hazards to Document the Performance of the Built Environment: The Structural Extreme Events Reconnaissance (StEER) Network

**Tracy Kijewski-Correa,** University of Notre Dame

**David Roueche**, Auburn University

**Khalid Mosalam**, University of California, Berkley

**David O. Prevatt**, University of Florida

**Ian Robertson**, University of Hawai’i at Manoa

**Question from David Bonowitz:**

Please comment on this thought re events that look like they offer no new knowledge: Resilience-based reconnaissance is new, and we still need to fill in recovery data for relatively small events. An event that gives us no new info about collapse-prone structures still has much to tell us about reoccupancy and recovery.

**Response from StEER:**

We wholeheartedly agree. Each extreme events research/reconnaissance (EER) organization funded by NSF has a specific mandate and a fixed budget each year for field deployments. This requires each EER to make difficult decisions about when to deploy field assets under their NSF-defined mandate: in the case of StEER this requires selection of events where vulnerabilities in structural performance (load path) are suspected (based on early intel). However, as you rightfully note, functional performance and issues of reoccupancy and recovery are driven by factors well beyond the structural load path. Within this new reality, StEER notes some opportunities:

1. By coordinating the suite of EERs under Converge, we have a chance to integrate the different performance evaluations into a holistic view of societal performance under extreme events. StEER just plays one part in highlighting the role where deficiencies in the structural load path were the driver of losses.
2. Each EER has the potential to collect data enabling diverse questions to be explored. For example, StEER’s response to Hurricane Delta (a lower intensity storm) was an example of a longitudinal study that looked at compounding losses and recovery by gathering streetview over the same Laura-Delta exposure area. We believe that data can be useful beyond structural assessments.
3. By making our mobile app openly available, we enable regional researchers who are self-deploying to still document performance in comparatively lower-intensity events and share that learning back with the community (this was the case with Hurricane Sally). It is our hope that creating open shared infrastructure encourages even more exchange of such data, even when funds are not available to support the deployment of a full field investigation.
4. StEER’s v.2 operations (which we are now proposing to NSF) includes expanding our assessment framework to look at more diverse measures of performance. This will allow anyone using our open app (whether funded by StEER or not) to generate data that can be used to answer the questions you raised.

**Question from David Bonowitz:**

Addendum to previous Q: Maybe the criterion for which events Steer looks at are different from the events the Social Science or other EERs look at?

**Response from StEER:**

Yes, building off the response above, EERs each have different mandates and scopes of investigation, but working together we now have the potential to engage the most critical issues of resilience at a societal level.

**Question from Peter Wood:**

Please describe relationships of StEER with non-NSF supported groups e.g. EERI, GEER, NZSEE, NZ Quake CoRE, and other groups from other countries. Thanks, Peter Wood (Former President NZSEE, EERI M)

**Response from StEER:**

StEER also collaborates closely with the other NSF-supported Extreme Events Reconnaissance and Research (EER) ecosystem and the NHERI facilities that support rapid response research through the CONVERGE Leadership Corps.  StEER has specifically collaborated with EERI and GEER on recent earthquakes and tsunamis. We have also collaborated with GEER, NEER and other groups monitoring wind fields in preparation for hurricanes. Converge is helping now to better facilitate coordinated responses across the EERs funded by NSF in the past two years and foster sharing of knowledge: we are proud to note that the other EERs have learned from StEER, and also so pleased that we have learned from the other EERs. So we have formal collaborations in that particular NSF-funded ecosystem as well. More info is here: <https://converge.colorado.edu/research-networks>.

Beyond Converge, EERI and StEER are working to develop a joint-response protocol, which includes integrating StEER into the new response protocols across mission agencies under NHERP. Thus far, we have not formally field responded jointly, due to a lack of events where both organizations were deploying on the same timeline, but we have continued to exchange information, working closely with the LFE team and the Clearinghouse process, and even released joint-reports (in the case of the Anchorage Earthquake). We certainly expect to further build on this momentum in the future.

We have not had close collaboration with international organizations, as a new organization ourselves, but are keen to form relationships that will facilitate this type of collaboration for future events of common interest and especially hope to leverage PEER’s network to build out collaborative agreements and international regional nodes under StEER v. 2.0. We welcome any expression of interest via email at [admin@steer.network](mailto:admin@steer.network).

**Question from David Bonowitz:**

Is there a procedure to ensure that the same buildings looked at by Steer for structural damage are also looked at by the Social Science team for reoccupancy and recovery times? That’s the key: We need to know the relationships between building types/damage modes and reoccupancy and functional recovery times.

**Response from StEER:**

We want to amplify the importance of this question. In our current model, StEER generates geotagged datasets made available to the community and distills a summary of major learnings from each event, including open questions worthy of further investigation for the natural hazard engineering community and related fields like social science. Version 2.0 of StEER will have new mechanisms to further improve these communications to non-engineering audiences in the hope of accelerating investigations of this type. These recommendations can then be used to seek additional funding for continued research, whether that be from NSF, other agencies or even other EERs.There is at least one pending research project that we are aware of that is integrating social science investigation with StEER deployments. That project also envisages re-use of existing StEER datasets to evaluate performance within the broader societal context. We are also aware of past uses of our data from other hurricanes by social scientists for recovery investigations. While StEER does not direct or fund that work (as it is beyond our scope), it is our goal to generate data and recommendations that will make it easier to engage in such longitudinal investigations after our fieldwork concludes. With that being said, the arrival of Converge offers the potential to now intentionally direct such interdisciplinary and longitudinal investigations that may be instigated by the early field reconnaissance generated by StEER.

**Question from Lynne Carpenter:**

I am the forest service’s new geohazards coordinator, I am very interested in the mobile app for post-fire hazard assessment. What is a good contact to further discuss applicability?

**Response from StEER:**

Lynne, you can access our Fulcrum Community page (data and app) at this link: <https://web.fulcrumapp.com/communities/nsf-rapid>. You can also reach out to Spatial Networks directly to create your own Fulcrum Community where you can build custom apps and share them with the community: [Apply for a Community Account](https://www.fulcrumapp.com/community?creative=461840744624&keyword=&matchtype=b&network=g&device=c&utm_campaign=11037401699&utm_campaign=Fulcrum_Non-Brand_DSA_Search_US&adgroupid=111131798591&utm_content=461840744624&utm_term=&utm_source=google&utm_medium=paid&gclid=CjwKCAjwoc_8BRAcEiwAzJevtXyWmMR6WYryk3DkPVVKZ1qBJH1KfraSReWZQefU_5mJgICe2oIfsRoCJxoQAvD_BwE). To learn more about our experience doing so, I would refer you to David Roueche, our Associate Director for Data Standards at [dbr0011@auburn.edu](mailto:dbr0011@auburn.edu), who led our Fulcrum efforts. However, there is also an outstanding platform from the NHERI RAPID EF called RApp. It supports the development of custom forms integrated with NHERI DesignSafe Data Depot for storing the data. Please reach out to the RAPID EF at [uwrapid@uw.edu](mailto:uwrapid@uw.edu) for more details. StEER V.2.0 will be developing an implementation of our assessment forms in RApp.

**Question from Lori Peek:**

If you had unlimited resources, what would you invest in to ensure maximum data reuse in the community? Here I am referring to both financial resources but also human resources. Who or what do you need to make sure that the data you collect is quickly and widely shared? What trainings might you need to ensure that other members of the structural engineering community and your allies understand how to publish data in collaboration with StEER and reuse the data you have collected?

Response from StEER: Ultimately, StEER’s efforts to date have been the result of a two-year EAGER award led by our leadership team with limited infrastructure and personnel. Our vision to more swiftly collect, quality assure, disseminate and curate our data to be in a better position to deliver on the questions above and our long-term vision, will require:

1. Funding dedicated staff that can support coordinating responses and managing the delivery of our products,
2. Automating our workflows working with different NHERI elements like the SimCenter, DesignSafe and the RAPID-EF to minimize the human labor and speed the processing of our data,
3. Mobilizing a formal network of partners worldwide to respond to events and more importantly disseminate generated knowledge and drive research and implementation of resilience-enhancing technologies and policies back to affected communities.
4. Continuing the culture shift away from research for one’s own purposes toward communal and societal-serving research. We have done a great job in 2 years starting to shift this culture, but we will need to continue to work with our research community to model (and build capacity for) this new mode of work, further lower the barriers to participate and reduce the burdens on our members, and incentivize participation in ways that align with how they are evaluated professionally.

The good news is that StEER v. 2.0 (which we are proposing to NSF currently) is hoping to make considerable strides on all of these fronts!