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Editorial: Technology transfer from the Natural Hazards Engineering Research Infrastructure (NHERI)

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Editorial on the Research Topic

Technology transfer from the Natural Hazards Engineering Research Infrastructure (NHERI)

Technology transfer entails the systematic transference of scientific research results to practical tasks. The research product may be a novel design, an effective process, a tool or a set of tools. Effective technology transfer depends on many factors. It includes recognizing a gap in knowledge, focusing on the end user's needs, long-term planning, effective communication and collaboration between researchers, standards organizations, and potential users, and a successful reduction of the knowledge or training burden required by the user. This Research Topic provides five examples of robust technology transfer from researchers seeking to mitigate the effect of natural hazards on the built and natural environment—transfers of knowledge that will significantly advance our nation's resilience in the face of growing natural hazard threats.

In 2016, the National Science Foundation established the Natural Hazards Engineering Research Infrastructure (NHERI) network. NHERI provides engineering and social science researchers with access to a world-class research infrastructure to support their efforts to improve the resilience and sustainability of the nation's civil, natural and social infrastructure against earthquakes, windstorms and associated natural hazards such as tsunami and storm surge in coastal areas. Supported by the National Science Foundation, NHERI is a nation-wide network that consists of 12 university-based, shared-use experimental facilities, a computational modeling and simulation center, and a shared community cyber-infrastructure. The network is led and coordinated by a Network Coordination Office (NCO) centered at Purdue University.

A prior *Frontiers in Built Environment* Research Topic (Ramirez et al., 2021) detailed the unique capabilities of the twelve NHERI components and illustrated the effectiveness of large-scale laboratories, technical resources and expertise, and ability to support multi- and interdisciplinary research in the field of natural hazards mitigation.

Now, after 6 years, researchers employing NHERI facilities have produced a diverse set of fruitful transitions from research into practice. The five papers in this Research Topic demonstrate different forms of technology transfer from NHERI-centric research to varied

types of end-users. The reconnaissance work of Hain et al. in Puerto Rico that followed the natural hazard sequence of Hurricane Maria (2017) and the January 2020 earthquake resulted in published field data and field survey instruments that translated into a process for future data and field surveys in a multi-hazard environment. CONVERGE training modules detailed by Adams et al. have made available knowledge and skills to over 6,300 members of the natural and disaster research community to date. Their reach has continued to expand globally through translation of their modules into various languages in partnership with practice-oriented users. A versatile, open source computational tool has been developed by Lewis et al. to address the gap in understanding of nonlinear fluid-structure interaction. This tool expands design, code-based “life-safety” requirements to include sequential hazards, such as an earthquake followed by a tsunami. Largent et al. also describe an open source, computationally efficient, user-friendly software tool that enables end-users to estimate the risk of seismic damage to their infrastructure, particularly gas pipelines and storage facilities. Such state-of-the-art risk assessment enables utility owners and operators to prioritize hazard mitigation efforts. The final paper by Sutley and Lyles illustrates by example three forms of community engagement as a catalyst for technology transfer. The first example exemplifies technology transfer by way of regulatory changes, the second, through industry and outreach publications and public media, and the third, due to a community engaged approach that resulted in immediate adoption of research outcomes.

The examples of technology transfer from NHERI published here represent a sample of the research being undertaken that has led to technology transfer to a wide array of users. It is anticipated that

the impact of NHERI research will continue to grow as a wealth of invaluable experimental and field data are published (see designsafe-ci.org) and reuse of that data is catalogued. The NHERI community will continue to produce transformational research and outcomes that influence engineering and, increasingly, inform interdisciplinary practice.

Author contributions

CB: Conceptualization, Writing–review and editing. JR: Writing–review and editing.

Conflict of interest

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