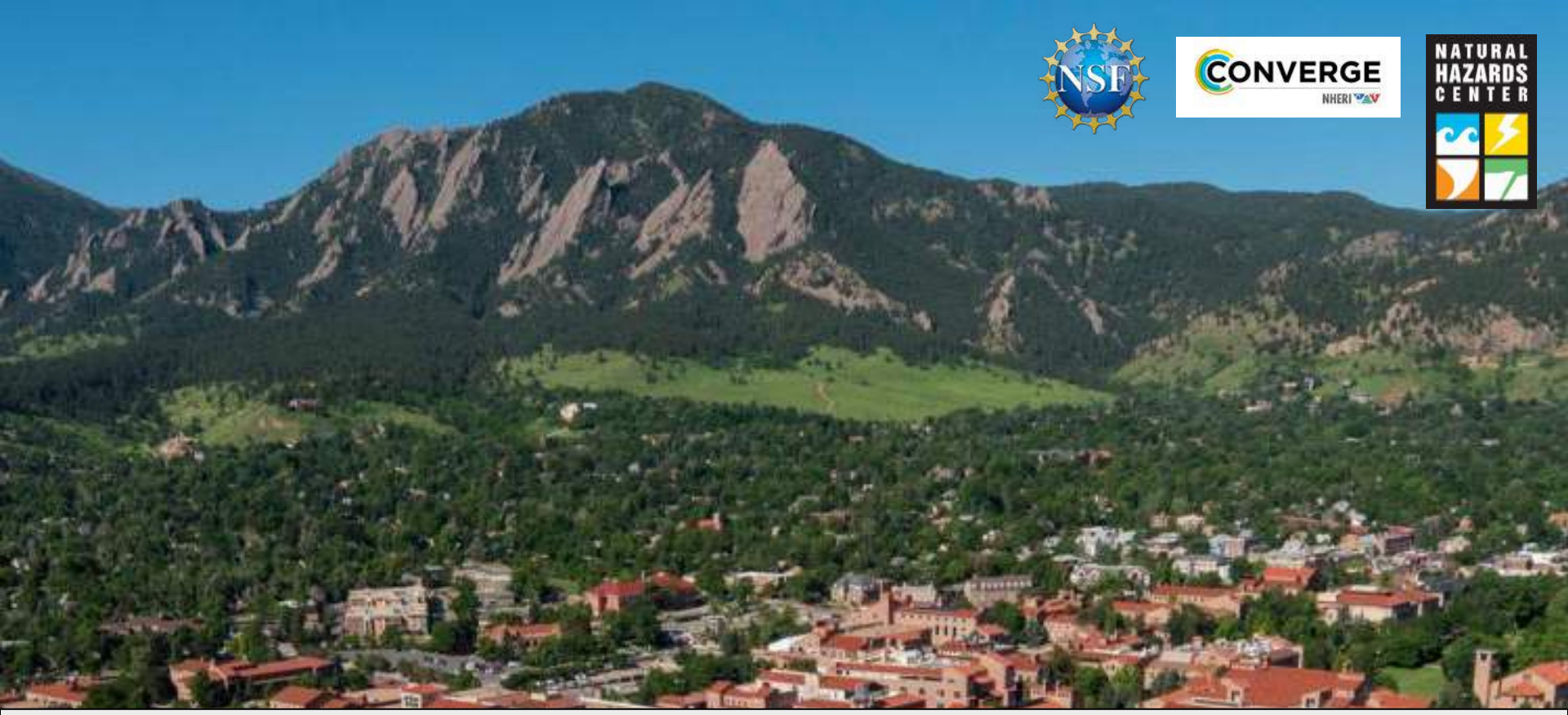

A Framework for Convergence Research in the Hazards and Disaster Field – NHERI CONVERGE

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frontiers in Built Environment

ORIGINAL RESEARCH

A Framework for Convergence Research in the Hazards and Disaster Field: The Natural Hazards Engineering Research Infrastructure CONVERGE Facility

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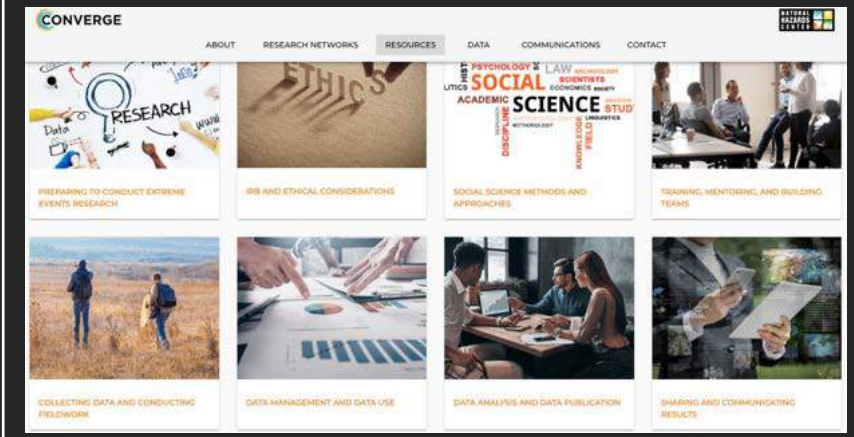
The goal of this article is twofold: to clarify the tenets of convergence research and to motivate such research in the hazards and disaster field. Here, convergence research is defined as an approach to knowledge production and action that involves diverse teams working together in novel ways – transcending disciplinary and organizational boundaries – to address vexing social, economic, environmental, and technical challenges in an effort to reduce disaster losses and promote collective well-being. The increasing frequency and intensity of disasters coupled with the growth of the field suggests an urgent need for a more coherent approach to help guide what we study, who we study, how we conduct studies, and who is involved in the research process itself. This article is written through the lens of the activities of the National Science Foundation-supported CONVERGE facility, which was established in 2018 as the first social science-led component of the Natural Hazards Engineering Research Infrastructure (NHERI). Convergence principles and the Science of Team Science undergird the work of CONVERGE, which brings together networks of researchers from geotechnical engineering, the social sciences, structural engineering, nearshore systems, operations and systems engineering, sustainable material management, and interdisciplinary science and engineering. CONVERGE supports and advances research that is conceptually integrative, and this article describes a convergence framework that includes the following elements: (1) identifying researchers; (2) educating and training researchers; (3) setting a convergence research agenda that is problem-focused and solutions-based; (4) connecting researchers and coordinating functionally and demographically diverse research teams; and (5) supporting and funding convergence research, data collection, data sharing, and solutions implementation.

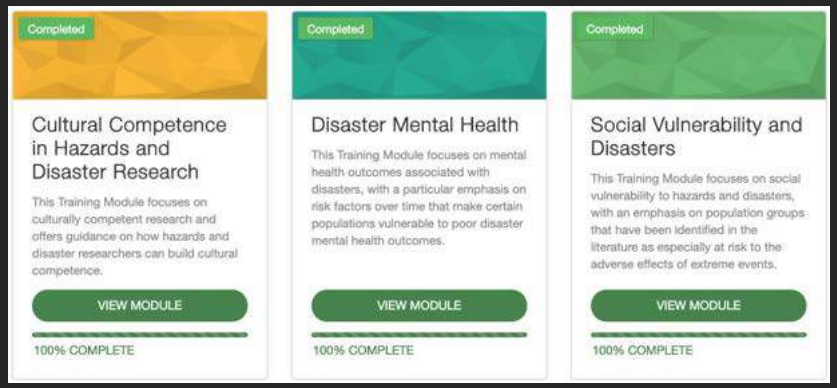
Keywords: convergence research, natural hazards, disasters, interdisciplinary, transdisciplinary, training, Science of Team Science, research coordination networks

https://www.frontiersin.org/articles/10.3389/fbuil.2020.00110/full

The What…

CONVERGE
NHERI





https://converge.colorado.edu/signup

Paper Overview

Offer background and approach for bringing *convergence research* to the field of hazards and disasters.

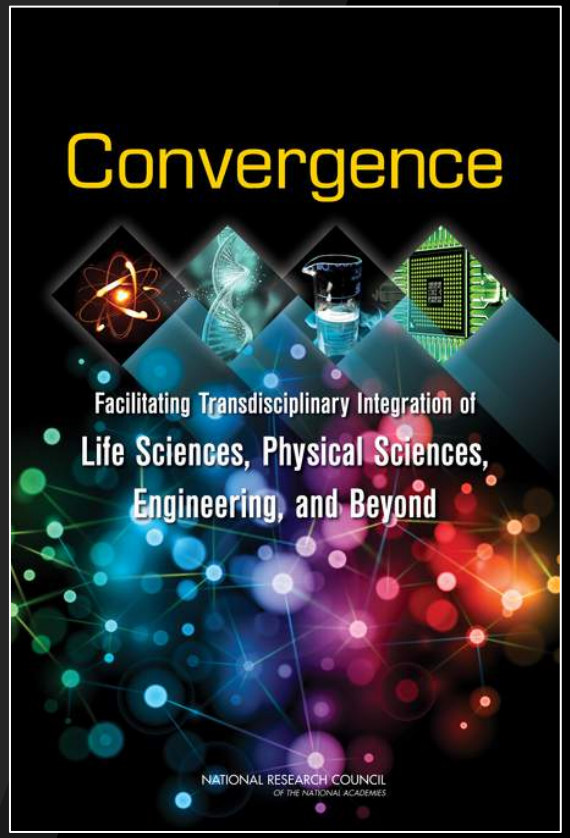
Motivate such possibilities in our field.

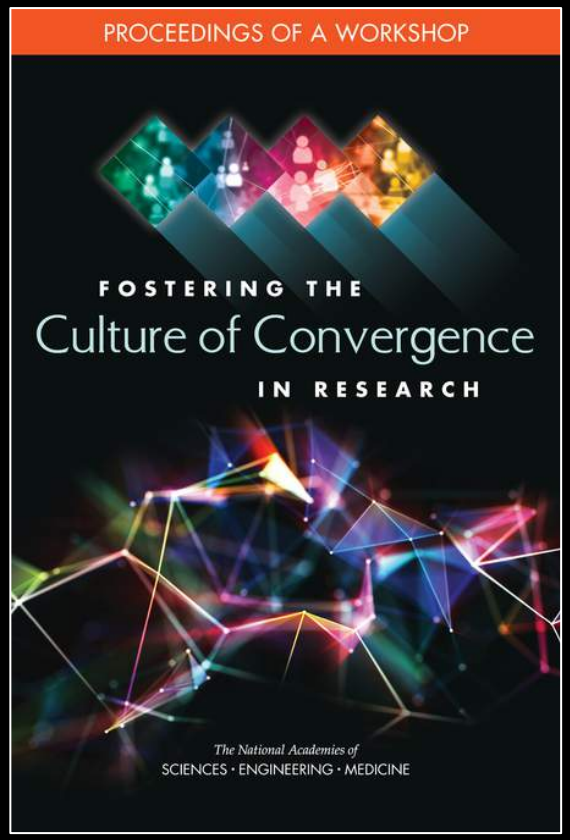
Convergence

Convergence behavior – or *"the mass movement of people, messages, and supplies toward a disaster struck area"* – has long been of interest to hazards and disaster researchers.

Convergence

This paper, however, focuses on more recent process-oriented and research-based definitions of convergence.





Convergere:

con- = together +

vergere = to incline.

What is convergence?

(1) Research driven by a specific and compelling problem

Convergence research is generally inspired by the need to address a specific challenge or opportunity, whether it arises from deep scientific questions or pressing societal needs (NSF, 2019, p.1).

(2) Research that involves deep integration across disciplines

As experts from different disciplines pursue common research challenges, their knowledge, theories, methods, data, research communities, and languages become increasingly intermingled or integrated. New frameworks, paradigms, or even disciplines can form sustained interactions across multiple communities (NSF, 2019, p.1).

The Convergence "Revolution": Gaps and Barriers

(1) "…social sciences and humanities are under- tapped resources for convergence efforts" (NRC, 2014, p. 14). *(Yet, many of the grand challenges of pressing concern are at their core moral, ethical, social, political, and economic problems.)*

(2) "Problem-driven" and "solutions-oriented" approaches can be highly fraught.

The Convergence "Revolution": Gaps and Barriers

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(2) "Problem-driven" and "solutions-oriented" approaches can be highly fraught.

(3) Structural and institutional barriers that threaten convergence research (e.g., shortage of researchers, inadequate funding, problems with organizational cultures, faculty development and promotion issues, etc.).

(4) Lack of training, support, and incentives for encouraging the functional and demographic diversity that convergence requires.

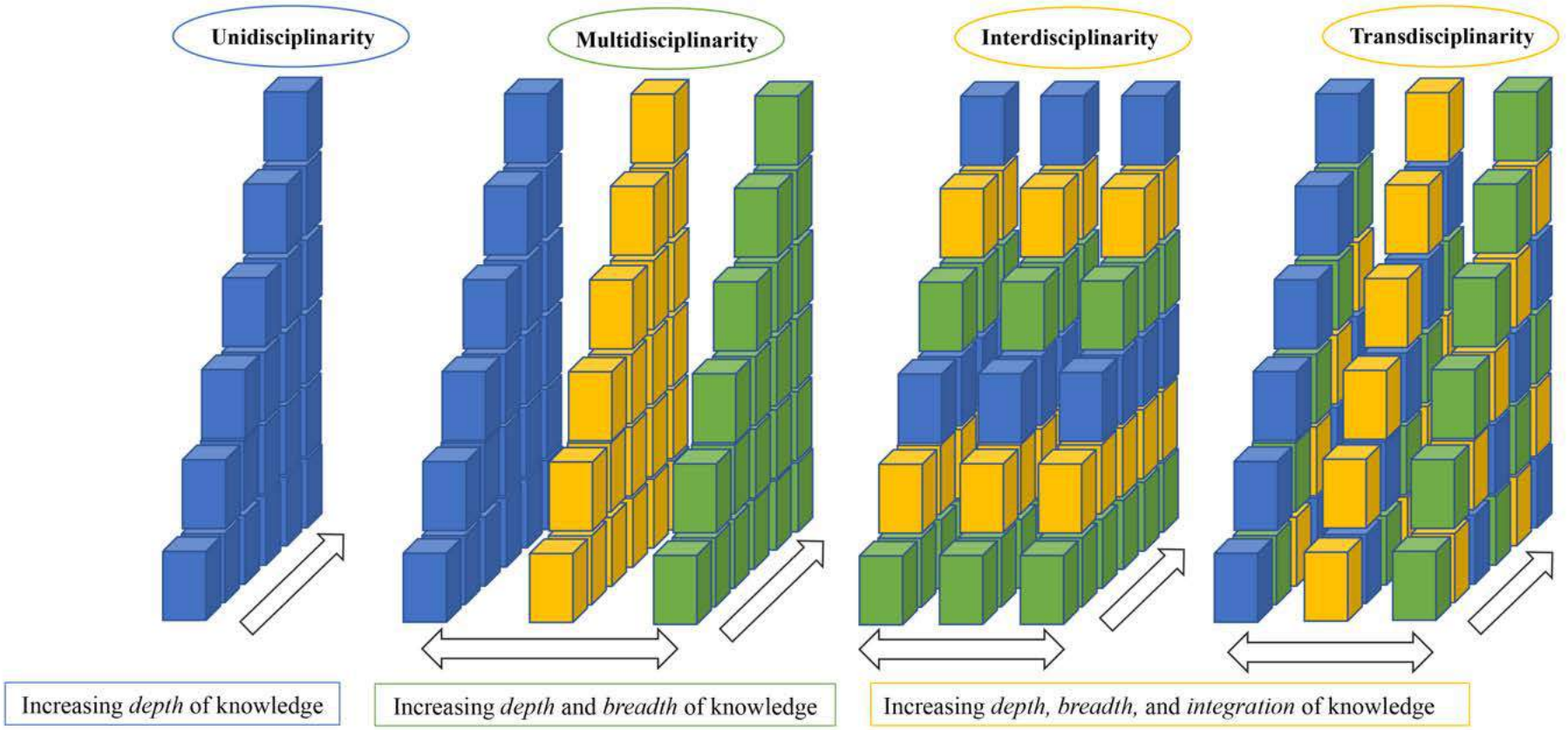
(5) How do you actually "do" convergence research? *(Science of Team Science (SciTS))*

Important to Acknowledge: "Convergent-Like" Approaches in the Hazards and Disaster Field

- "the remarkable reduction in earthquake fatalities in nations such as Japan, Chile, and the United States is the result of 'convergent-like' research partnerships between geologists, seismologists, earthquake engineers, architects, social scientists, and public officials…" (McNutt, 2017, p. 2-3).

- Why "convergent-like" rather than true "convergence"? (2 reasons)

"Convergent-Like" – Most research in the field remains uni-disciplinary or multi-disciplinary in nature.
(Of course, plenty of important exceptions!)



"Convergent-Like" – The field remains heavily (although certainly not entirely) in the "problem-diagnosis" stage. This is vital, but to move toward "true convergence" we need to consistently couple problem identification with potential solutions.

The Hazards and Disaster Field is Well Poised to Advance the "Convergence Revolution."

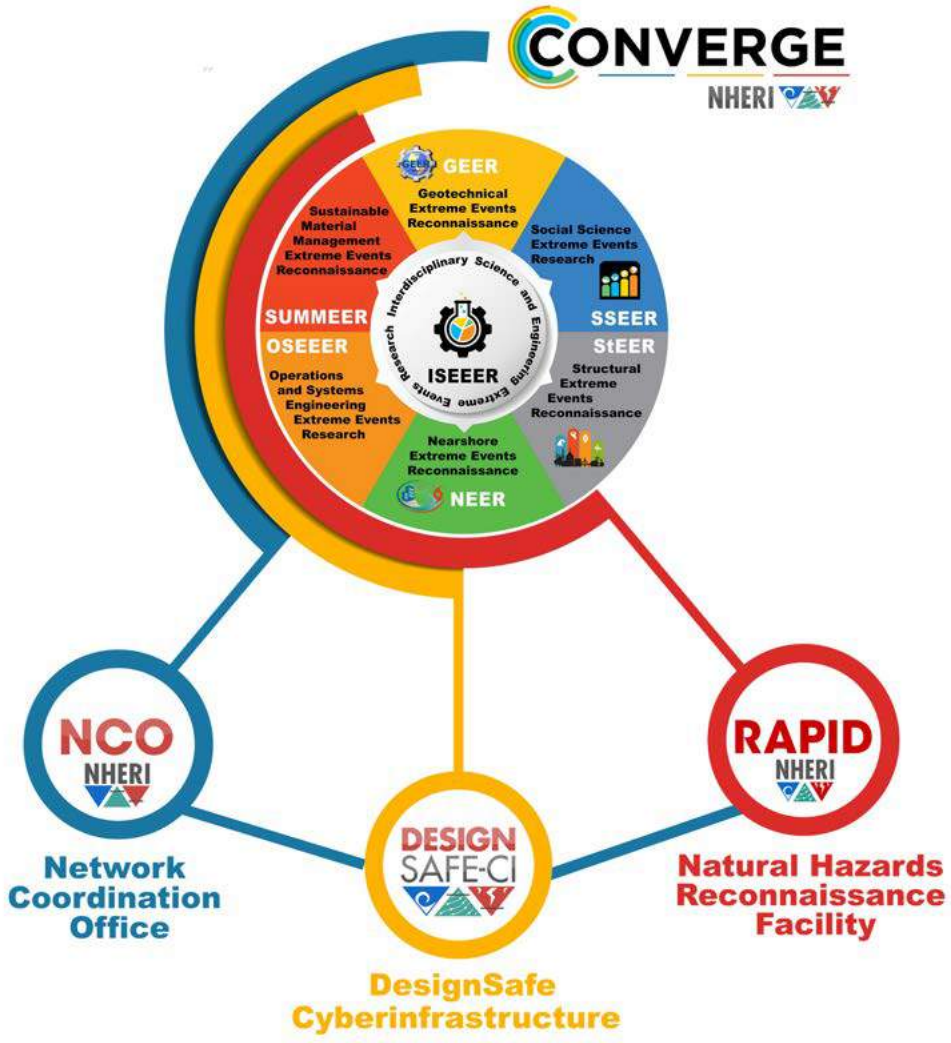
A definition for convergence for hazards and disaster research:

"An approach to knowledge production and action that involves diverse teams working together in novel ways – transcending disciplinary and organizational boundaries – to address vexing social, economic, environmental, and technical challenges in an effort to reduce disaster losses and promote collective well-being" (Peek, Tobin, Adams, Wu, and Mathews, 2020, p. 2).

A Framework and Support for Ethical, Rigorous, and Coordinated Convergence Research

Communicate, Coordinate, Collect and Share Data

Convergence requires deep disciplinary integration. Yet the challenge of connecting researchers across disciplinary divides and coordinating research teams is difficult and one that has long been of concern for those interested in participating in and supporting interdisciplinary research (Wilson et al., 2015) … The nature of disaster research – which often involves the collection of perishable data and necessitates rapid team formation and deployment - does not always allow for the kind of systematic, measured approach that is required if an area of scholarly inquiry is to make substantial theoretical and conceptual advancements (Tierney, 2007).



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