

# Center for Collective Impact in Earthquake Science (C-CIES): Building Inclusive Excellence, Diversity, Equity, and Community into Earthquake Science

Aaron A. Velasco<sup>1</sup>, Jeffrey Weidner<sup>1</sup>, Marianne Karplus<sup>1</sup>, Susan Bilek<sup>2</sup>, Mike Brudzinski<sup>4</sup>, Divya Chandrasekhar<sup>5</sup>, John Ebel<sup>3</sup>, Tiegan Hobbs<sup>6</sup>, Jose M. Hurtado<sup>1</sup>, Steven Jaume<sup>7</sup>, Eric Jones<sup>8</sup>, Alan Kafka<sup>3</sup>, Vladik Kreinovich<sup>1</sup>, Yolanda Lin<sup>9</sup>, Anne-Marie Nunez<sup>1</sup>, Kris Pankow<sup>5</sup>, Zhigang Peng<sup>10</sup>, Alexandros Savvaidis<sup>11</sup>, Iris Tien<sup>10</sup>, Conevery Bolton Valencius<sup>3</sup>, Elizabeth Vanacore<sup>12</sup>, Monica Alvililar<sup>1</sup>

<sup>1</sup>University of Texas at El Paso, <sup>2</sup>New Mexico Tech, <sup>3</sup>Boston College, <sup>4</sup>Miami Univ. of Ohio, <sup>5</sup>Univ. Of Utah, <sup>6</sup>Geological Survey of Canada, <sup>7</sup>College of Charleston, <sup>8</sup>UT Health Science Center Houston El Paso Campus, <sup>9</sup>University of New Mexico, <sup>10</sup>Georgia Tech, <sup>11</sup>Bureau of Economic Geology UT Austin, <sup>12</sup>Univ. of Puerto Rico at Mayagüez

## ABSTRACT



Throughout this poster you will see QR codes, like this one on the left. Take out your phone, open the camera app and scan. A URL will appear, click the link!

## MOTIVATION

- The Center for Collective Impact in Earthquake Science (C-CIES) aims to advance earthquake by addressing fundamental science questions related to natural hazards through a novel approach of involving all stakeholders.
- Our vision is to become an interdisciplinary research center rooted in equity, diversity, and engagement that helps communities prepare for, withstand, and recover from earthquakes and associated hazards
- The core values of the center are: Scientific integrity, equity, inclusive excellence, diversity, access, justice, and collective impact.



- The goals of the center will be to:
  - Advance basic hazard science and engineering;
  - Establish a foundation for a shared, value-driven understanding of science;
  - Be responsive to the needs of all communities through user-inspired research;
  - Grow to national prominence;
  - Recruit, retain, and train the next generation of diverse, interdisciplinary scientists;
  - Develop a framework for impactful geoscience that translates results of scientific discovery into actions that can improve resilience and reduce risk from geohazards.
- Central to our effort is Collective Impact, the commitment of a group of actors from different sectors to a common agenda to solve specific problems, such as High-Impact Low-Probability (HILP) events, meaning those events that will cause significant devastation if they occur but are unlikely to happen.



## COLLECTIVE IMPACT

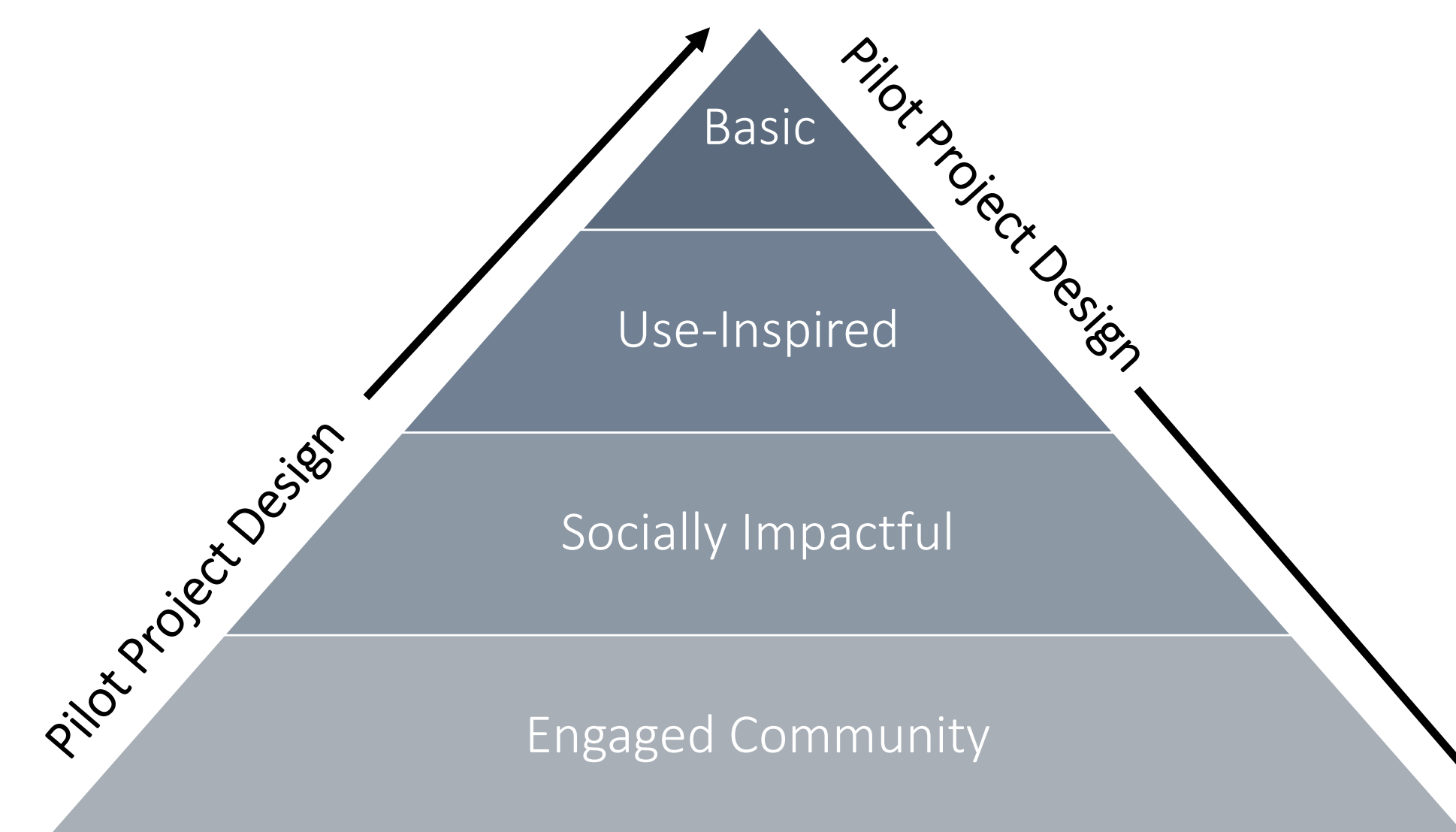
- The center will bring research with greater potential to respond to the needs of vulnerable populations that have been historically underserved by current science, engineering, and policies to the forefront. To accomplish this, we will apply the five elements of Collective Impact:



## INITIAL SCIENCE DRIVERS

- What is the true state of stress in the crust and the fundamental state of stress on faults? Can we use induced seismicity to help address these questions? What is the influence of pre-existing structures?
- Are there fundamental differences between induced, dynamically triggered and tectonic earthquakes that provide insight into more fundamental questions, such as how earthquakes initiate? Can induced and triggered earthquakes be used to understand the state of stress on specific faults? Does the triggering mechanism of earthquakes change the probability of their occurrence? Are there new approaches that can be used to better determine whether faults might fail in the near future?
- Do different types of earthquakes dictate potential differences in hazard and risk for the built environment? How does the built environment in HILP areas influence risk across communities?
- What can we learn from human behavior that would mitigate losses (both structural and human) caused by unexpected events? What factors drive community preparedness for HILP earthquakes and how can science translate into better informed and prepared communities?

## RESEARCH PLAN



- C-CIES will provide a foundation for a shared understanding of the science goals and to the meaning of Inclusive Excellence, Diversity, Equity, and Community (IEDEC) in the context of the science goals by adopting collective impact as a guiding principle.
- We begin by designing and executing pilot projects that address the key science challenges yet reach deep into the communities that they will impact.
- Training the next generation scientists will be key for the execution of the projects, given that graduate and undergraduate students will be funded once these projects transition to a full-fledged center.
- Pilot projects must include four elements:
  - 1) the basic science question that must align with the research themes,
  - 2) the use-inspired research where results may lead to implementation of practical solutions for the community,
  - 3) the social impact of the project, and
  - 4) the community engagement.



## PILOT PROJECTS

- Project 1:** Initial Steps for Integrated Earthquake Scenario Development,
  - Team: Yolanda Lin, Elizabeth Vanacore, Surya Pachhai, Kristine Pankow
- Project 2:** Central and Eastern US Collaborative for Community Earthquake Science and Hazard Mitigation,
  - Team: Zhigang Peng, Alan Kafka, Susan Bilek, John Ebel, Steven Jaume, Conevery Bolton Valencius
- Project 3:** Refining the Scenario for the East Franklin Mountain Fault (EFMF) Hazard in El Paso, TX,
  - Team: Aaron Velasco, Jeffrey Weidner, Jose Hurtado, Marianne Karplus, Eric Jones
- Project 4:** Crowdsourcing Approaches to Building Inventory Development,
  - Team: Jeffrey Weidner, Aaron Velasco, Marianne Karplus



## SUMMARY

- C-CIES brings together a diverse group of researchers to address high-impact low-probability geoscience hazards
- Central to its mission, the C-CIES is committed to Inclusive Excellence, Diversity, Equity, and Community (IEDEC) by adopting Collective Impact as a guiding principle
- We will be proposing and evaluating pilot projects as a central approach to building a full-fledged center
- All projects will be required to have 4 elements that will guarantee that they address the center goals.

### COMPONENTS FOR SUCCESS

Governance & Organizational Structure, Strategic Planning, Research, Strategic Partnerships, Connection & Involvement, Evaluation & Improvement

