

Extreme Events Reconnaissance: The Promise and Possibility of Collaborative Social Science and Engineering Research



Award #1745611



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*We envision a just and equitable world where knowledge is applied
to ensure that humans live in harmony with nature.*



**EE
RI**






Resilience
Center of Excellence for Risk-Based
Community Resilience Planning



How can we collaborate even more effectively as engineers and social scientists to reduce the harm and suffering caused by disaster?





What if “the big one” strikes tomorrow?

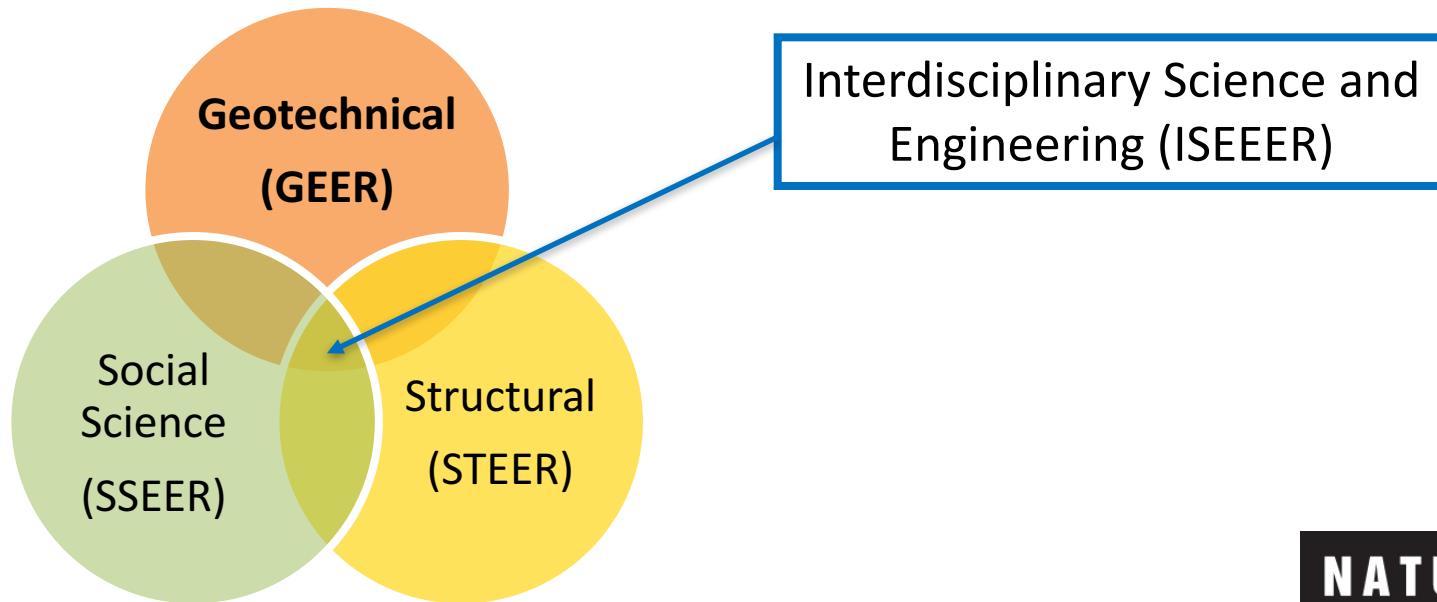
How will the hazards engineering and disaster social science research communities respond?

Purpose

To establish a platform and network for all-hazards
Social Science Extr^em^e Events Reconn^aiss^ance
(SSEER) and Interdisciplinary Science and Engineering
Extr^em^e Events Reconn^aiss^ance (ISEEER)

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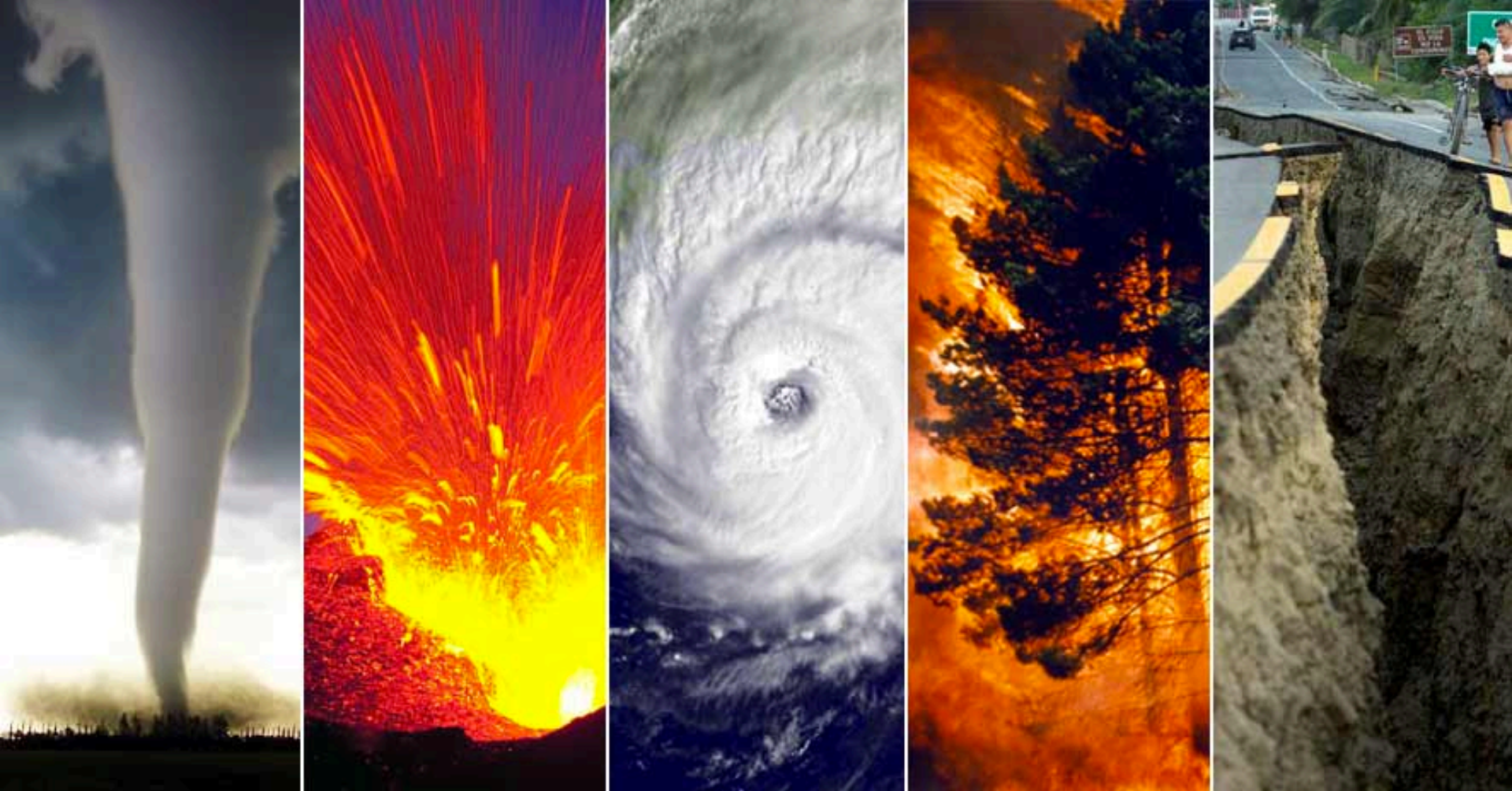
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Vision

For hazards and disaster researchers to be prepared
to carry out extreme events reconnaissance research
that is *coordinated, comprehensive, coherent, ethical,*
and scientifically rigorous.

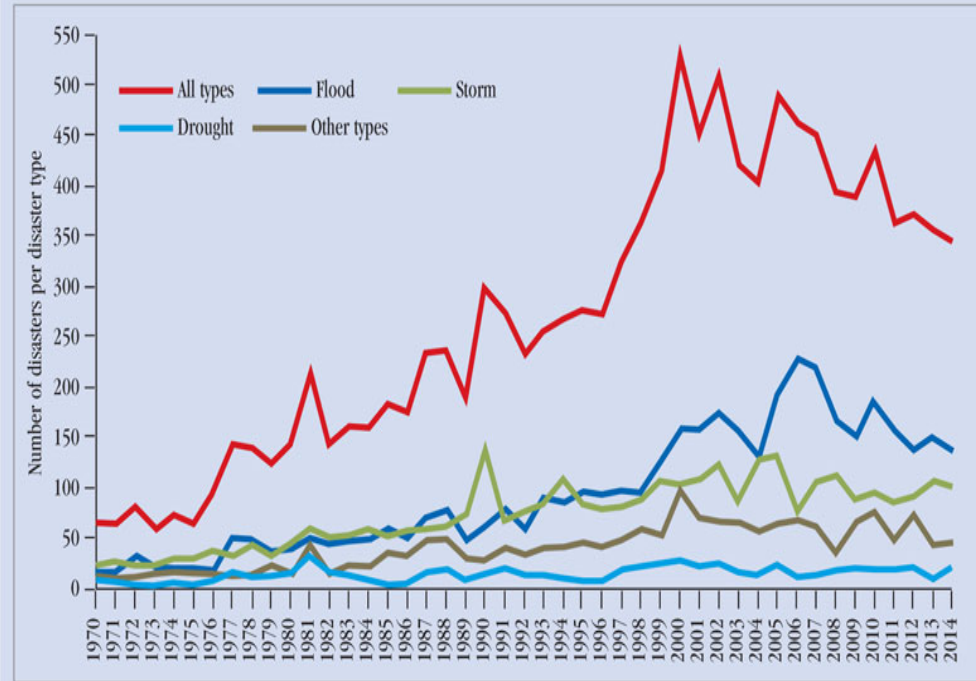




A New Approach for Rapid Reconnaissance Research
is Urgently Needed

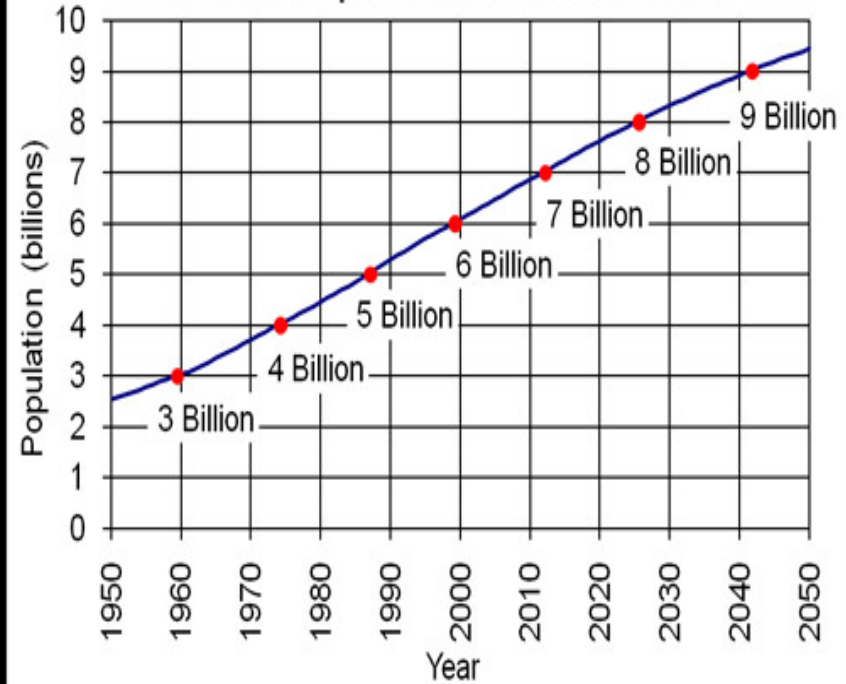


Figure 1: Natural disasters frequency globally between 1970 and 2014



Source: EM-DAT

World Population: 1950-2050



Source: U.S. Census Bureau, International Data Base, June 2011 Update.

A New Approach for Rapid Reconnaissance Research
is Urgently Needed



Challenges to the Advancement of Extreme Events Reconnaissance

1

Lack of Identification and Coordination of Researchers

2

Inadequate Guiding Research Frameworks and Insufficient Catalog of Research Approaches

3

Over-Emphasis on Large-Scale, Sudden-Onset Extreme Events

4

Cross-Sectional Data Collection, Time Scale Deviations, and Lack of Replication

5

Lack of Interdisciplinary Integration in Rapid Reconnaissance Teams

1. Lack of Identification and Coordination of Researchers



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1. Lack of Identification and Coordination of Researchers

- Duplication of effort

If engineers go off “like cowboys riding on their own, you end up with five reports on the same building collapse” – Tracy Kijewski-Correa, Univ. of Notre Dame

1. Lack of Identification and Coordination of Researchers

- Duplication of effort
- Ethical issues
 - researchers with limited knowledge of affected areas, no time for literature reviews, lack of cultural competence
 - negative impacts for researchers in affected communities and emergency response operations
- **Opportunity:** Identifying and mapping core, periodic, or situational researchers in the field
- Ethics training in advance for all

2. Inadequate Guiding Research Frameworks and Insufficient Catalog of Research Approaches

Zone # 11

Hu's = 60

Household Surveys

Includes
Overview Map
Spreadsheet
Checklist

Zone # 12

Hu's = 66

Household Surveys

Includes
Overview Map
Spreadsheet
Checklist

Zone # 13

Hu's = 20

Damage
Assessments

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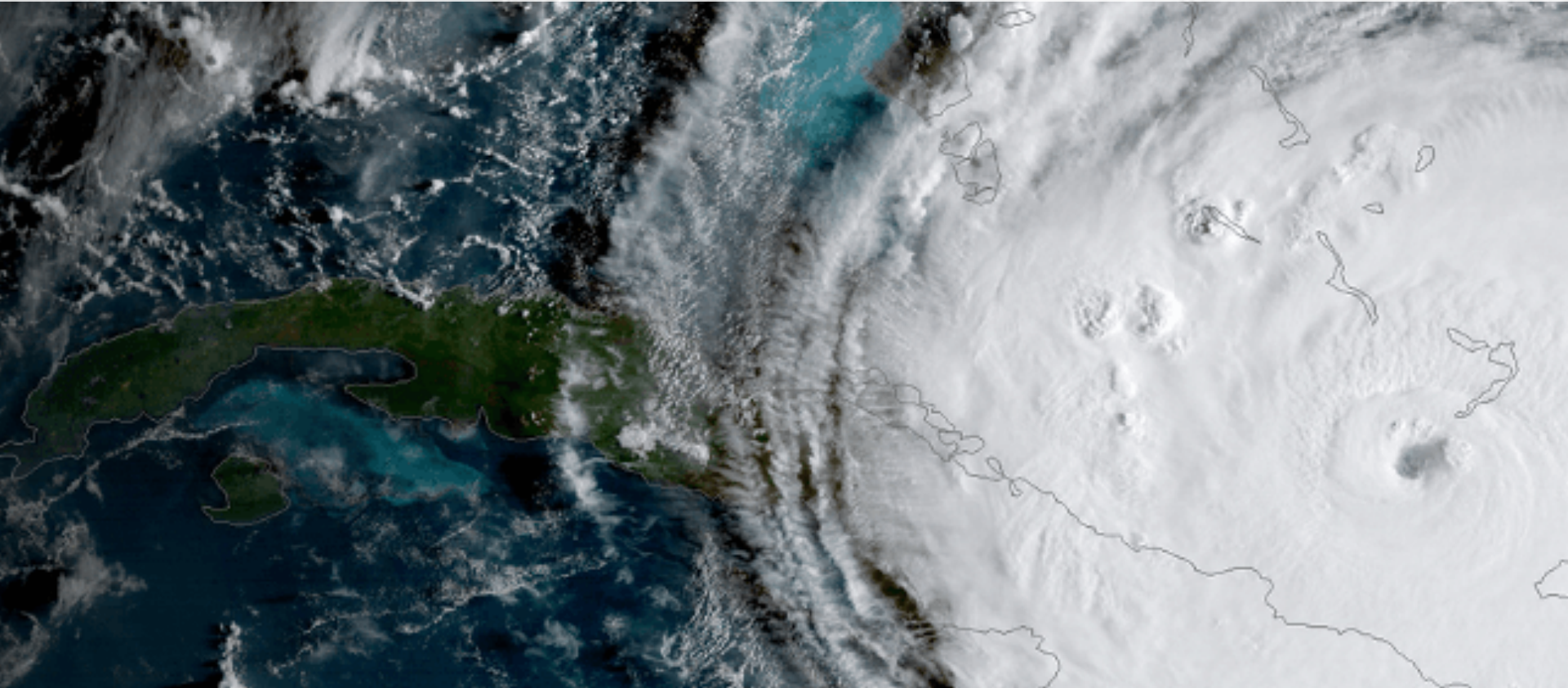


2. Inadequate Guiding Frameworks and Catalog of Research Approaches

- Research approaches at present: inductive and exploratory, small scale, convenience samples
- No systematic inventory of research instruments and standardized scales and measures leads to “homemade scales”
- No catalogue of publically accessible and privately available secondary data sets and sources
- **Opportunity:** create multi-scale frameworks
- Inventory and catalog standardized validated scales and measures



3. Over-Emphasis on Large-Scale, Sudden-Onset Extreme Events



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3. Over-Emphasis on Large-Scale, Sudden-Onset Extreme Events

- “Paradigm of the Extreme”
 - Large scale
 - Urban
 - Developed nations
- **Opportunity:** Learn from chronic, small-scale, repetitive loss events to test theoretical and conceptual applicability of prior rapid reconnaissance studies

4. Cross-Sectional Data Collection, Time Scale Deviations, and Lack of Replication



4. Cross-Sectional Data Collection, Time Scale Deviations, and Lack of Replication

- Engineers and social scientists need to enter and exit the field at different moments post-disaster
- Data Collection
 - Short-term, single point in time, completed within one year of event
- **Opportunity:** prepare to enter the field, sync up time scales, encourage long-term studies, replicate studies

5. Lack of Interdisciplinary Integration in Rapid Reconnaissance Teams

Scheduled Meetings, Tues, Nov 29

10am Duke Energy (Networks Team)
 (@ hotel) John, Ken, Hana, JennH, JenT-G

1pm Public Works (Networks Team)
 (including water; wastewater) John, Ken, Hana, JennH, JenT-G

2pm Recovery Coordination Meeting (Social Science Team)
 Robeson County Offices JenT-G, MariaD, Judy, Derya, GE Engineer

Advance Team: Jamie + Network Team
 ↳ complete clusters 11 & 13 (~ 1 hr max)

Mixed Team 1	Mixed Team 2	Mixed Team 3	Mixed Team 4	Mixed Team 5
Walt Maria	Nathanael Derya	Andre Maria D	Bill Steve Mehrdad	Elaina Judy Shane



5. Lack of Interdisciplinary Integration in Rapid Reconnaissance Teams

- Interdisciplinary work is difficult and time consuming – rapid reconnaissance studies, by their very nature, necessitate rapid team formation and deployment
- **Opportunity:** establish interconnected platforms, take a systemic and measured approach, advance the field

Responding to Rapid Reconnaissance Challenges



Geotechnical
(GEER)

Interdisciplinary Science
and Engineering (ISEEER)

Social
Science
(SSEER)

Structural
(STEER)



NHERI RAPID Facility

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Science of Team Science



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Science of Team Science

- Examines the processes by which scientific teams *organize, communicate, and conduct research*
- *Micro-level processes and macro-level conditions*
- Helps to understand how teams collaborate to achieve scientific breakthroughs that would *not be attainable* through either individual efforts or a sequence of additive contributions

Next Steps

1

Establish Social Science and Engineering Advisory Committees

2

Convene a Meeting of Science of Team Science and Rapid Reconnaissance Team Leaders

3

Identify and Coordinate SSEER Researchers

4

Identify and Coordinate ISEEER Researchers

5

Establish Scientific Frameworks for Rapid Reconnaissance Research

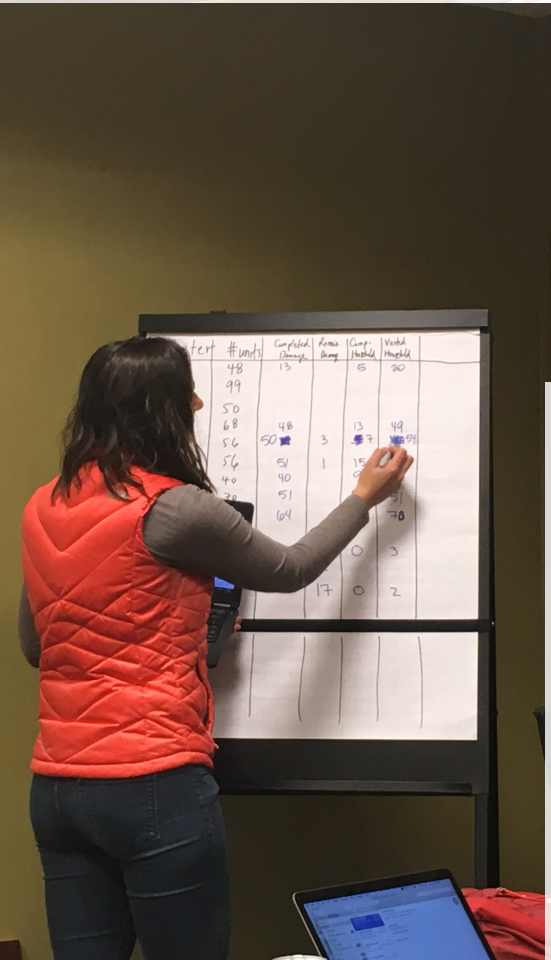
6

Catalog Research Instruments and Data Sets

7-9

Convene a Meeting of SSEER and ISEEER Researchers and Widely Disseminate Project Deliverables

Thank you!



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