

Assessing the Usability of Equity-Focused Near-Real-Time Earthquake Information for Operationalizing Equity in Emergency Management

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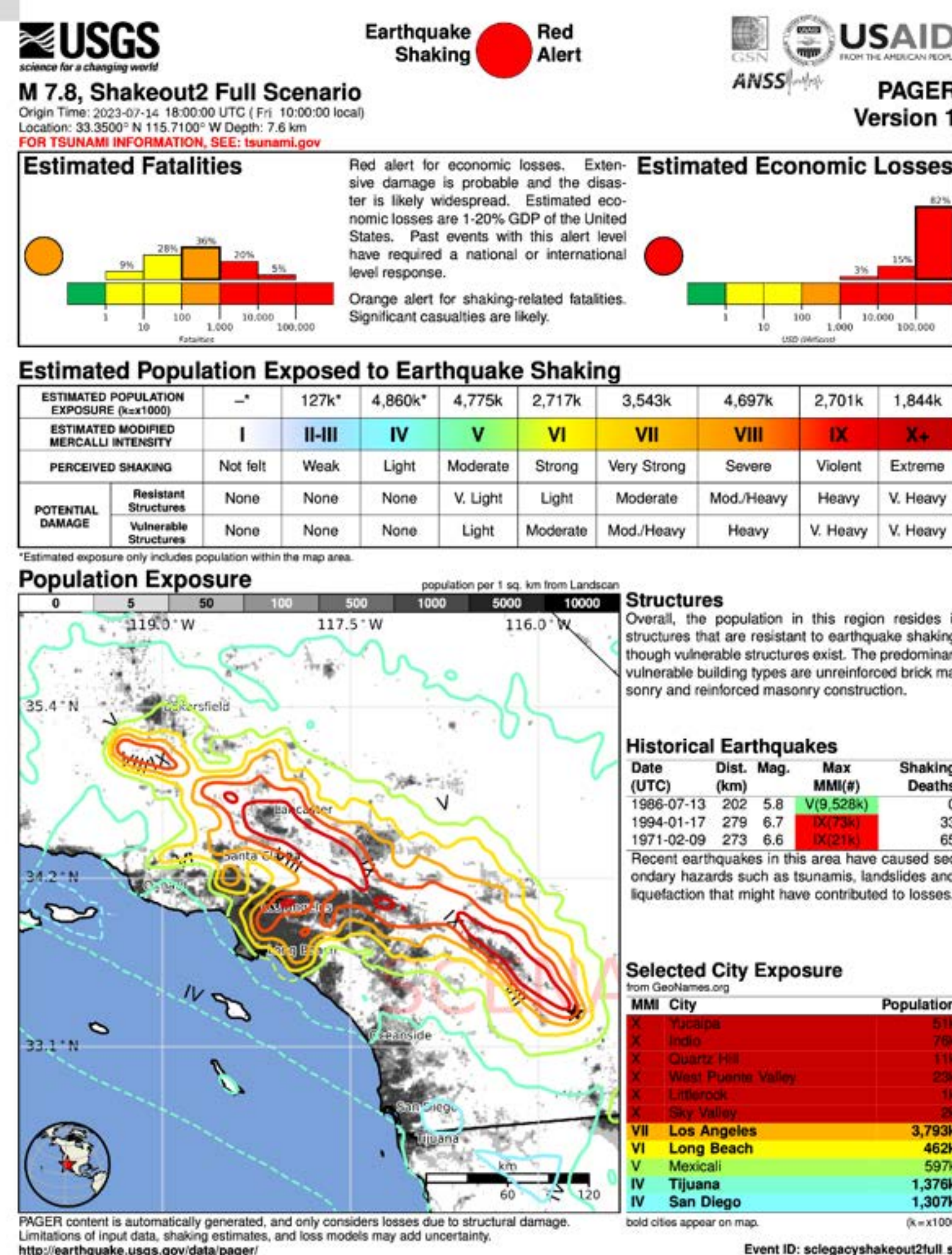
Introduction

- Historically underserved communities often experience disproportionate impacts from natural hazards, including earthquakes,¹ and require equity-focused disaster response.²
- Near-real-time earthquake impact products provide decision-makers with valuable information to respond quickly after earthquake disasters.
- End-users are often not involved in the development of earthquake impact products, resulting in products not equipped to support equity-focused disaster management decisions through social vulnerability data.³
- To address this gap, we are evaluating the usability of the U.S. Geological Survey's PAGER system in meeting users' equity-focused informational and communication needs.

Equity in Emergency Management

- Traditional post-earthquake emergency management approaches are often:
 - “One-size-fits-all” (equal rather than equitable)^{1,4}
 - Exposure-based (proportional relative to earthquake shaking and physical impacts)⁴
- Recently, there has been a broader push for considering equity in emergency management.

Current post-earthquake impact information supports traditional emergency management approaches



The USGS's PAGER is an example of post-earthquake impact information.

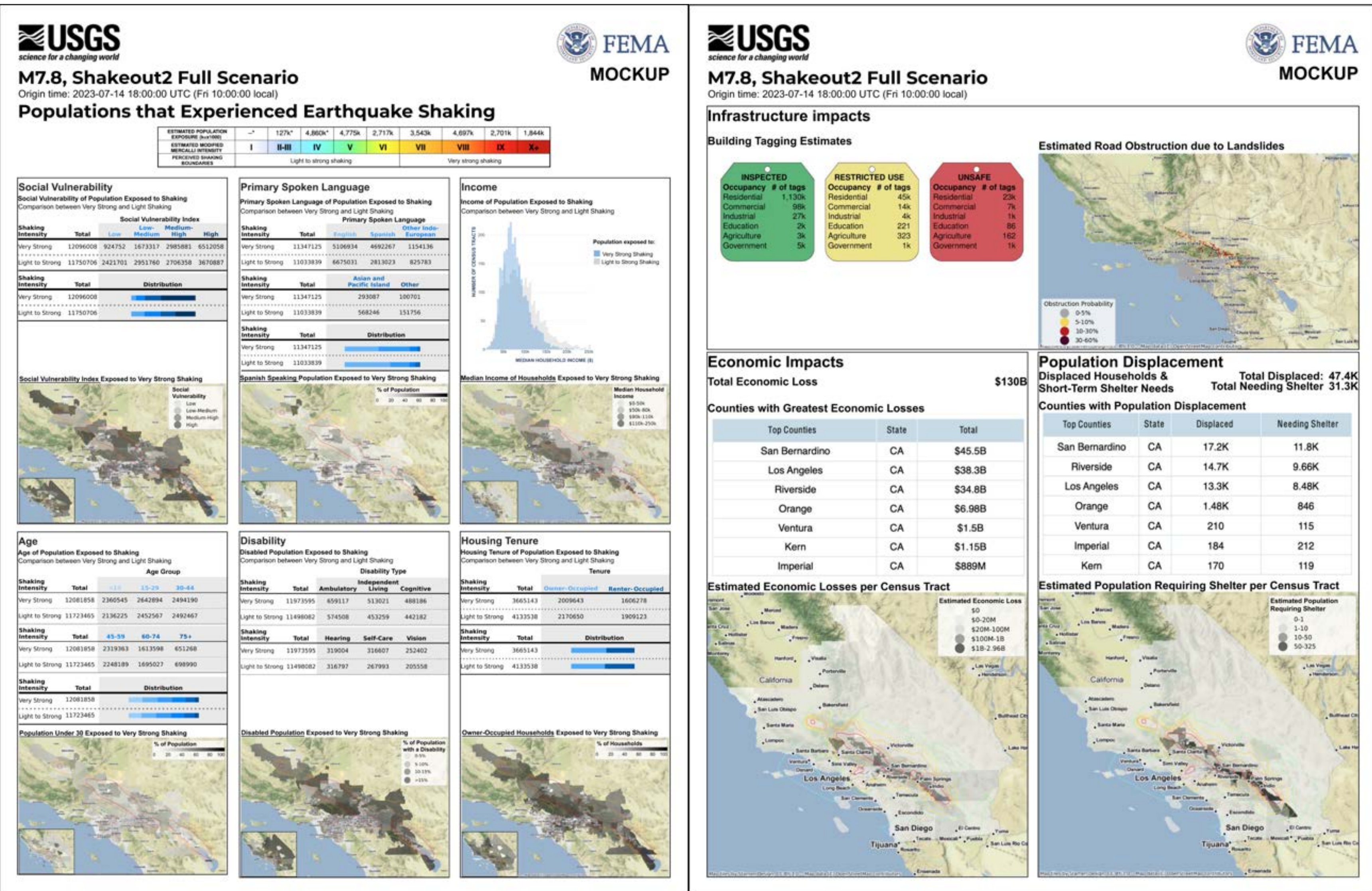
- These data are used by emergency managers their decision-making.⁵
- However, it does not consider social vulnerability.

Limitations of current disaster impact and social vulnerability information

- Impact products often focus on “deaths and dollars.”³
- The often-used CDC's Social Vulnerability Index (SVI) uses socioeconomic and demographic data to construct a social vulnerability index (Cutter et al., 2003).⁶
 - However, it has some shortcomings due to it trying to generalizing complex data.⁷
- User input is often underutilized in earthquake impact product development to ensure usable data.

Our Proposed Solution

Design an equity-supporting information product that is actionable for users and supports more equity-focused emergency management tasks.



Our User-Centered Design Process

Goal: Design equity-supporting product that is actionable for end-users and supports more equitable disaster response decision-making.

- Conduct preliminary focus groups for PAGER
- Analyze focus groups through qualitative coding
- Design equity-supporting mockup based on informational and communication needs from focus groups
- Evaluate equity-supporting mockup through usability testing workshop**
- Revise equity-supporting mockup based on usability testing results



Preliminary Focus Groups

The 16 preliminary focus groups had 49 participants from a wide range of user groups, from traditional emergency management to humanitarian aid organizations to the media. Five continents were represented to reflect the PAGER's global distribution.

The results informed the mockup used in the usability testing workshop:

Informational Needs

- Impacts disaggregated by demographics
- Locations of vulnerable structures
- Access to services and critical infrastructure
- Physical access
- Housing impacts by housing type

Communication Needs

- Written in plain language
- Available in local languages
- Downloadable map data
- Easily accessible and shareable on mobile devices

Equity-Supporting Mockup Usability Testing Workshop

Objectives

- Understand how users are using PAGER to make decisions in disaster response (specific use cases)
- Evaluate twoPAGER mockup – primarily the new equity-centered metrics and not focusing on formatting
- Assess if and how the inclusion of equity-centered data leads to more equitable earthquake disaster response activities

Participant Scope

- Domestic governmental and non-governmental emergency managers
 - FEMA, American Red Cross, state and county-level government emergency management
- Within the short-term/immediate response phase (the first few hours and days)

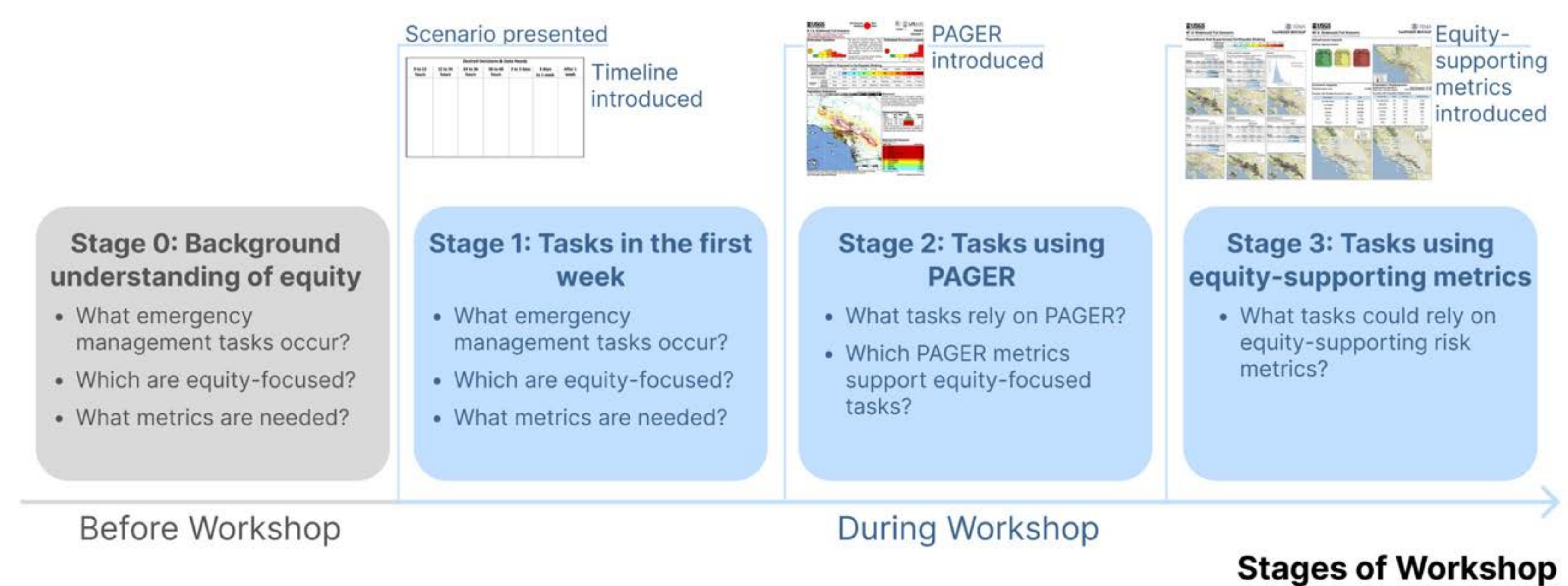
Workshop Structure

Stage 0: Pre-workshop survey to gain **background on understanding of equity**

Stage 1: Activities focused on **equity-focused tasks in the first week**

Stage 2: Activities focused on **tasks using the existing PAGER product**

Stage 3: Activities focused on **tasks using the equity-supporting mockup**



Workshop Activities

- Individual worksheets** to gain data from each participant
- Small group activities** to synthesize group discussion to generalize tasks
- Large group discussions** to present findings from each small group discussion and to provide opportunity to hear and learn from each group

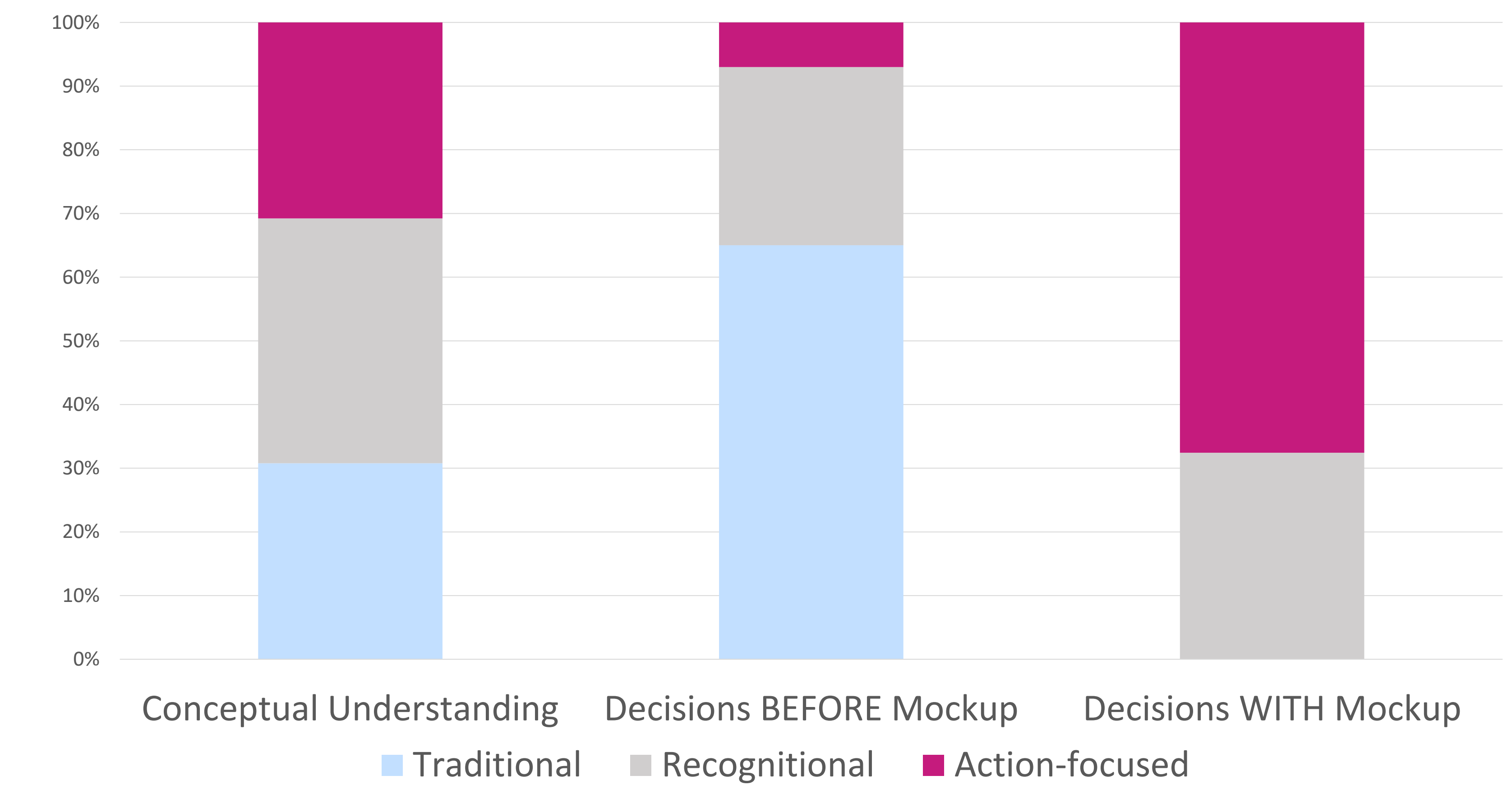
Workshop Findings

Approaches to Equity in Emergency Management

Participants' response tasks fell into 3 approaches (example tasks included):

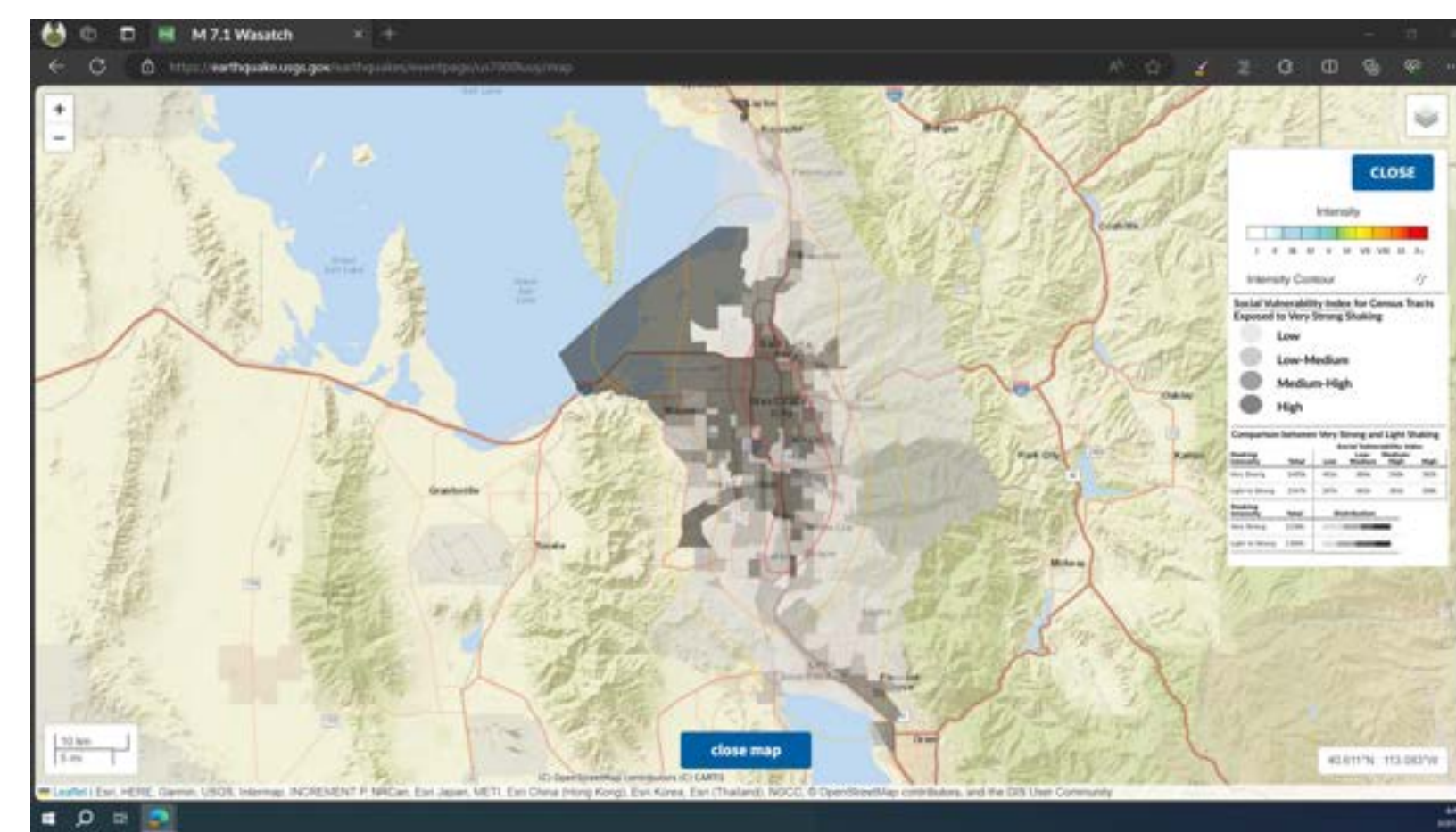
- Traditional response**
 - Prioritizing resources in areas of highest estimated exposure
 - Providing the same resources across the impacted population
- Recognitional equity**
 - Identifying areas of high social vulnerability
 - Recognizing specific populations with systemic barriers
- Action-based equity**
 - Locating shelters near areas of lower income
 - Using prominent spoken languages in the area to determine staffing and communication needs

Participants' Progression in their Approaches to Equity



Potential Applications

- Add census demographic layers to the existing interactive map
- Apply UCD process to other NRT earthquake products or other hazard information products



Conclusions

- Equity-focused data can support more action-focused approaches to equity in emergency management decisions.
- Incorporating equity into scenario exercises can support more equity-focused emergency management decisions.
- Our data matters and influences decision-making.**

References

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For More Information

Keep an eye out for our forthcoming article for more details:

Macías, M., Reddy, E., Knodel, E., Loos, S. (In Review). Operationalizing Equity: How Disaggregated Risk Metrics Support Equity in Emergency Management.

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For a project overview and updates:

