Welcome!

Earthquake Country Alliance

ECA Bay Area
Winter 2023 Workshop

Suggested Ice-Breaker Discussion:

What is something you need to secure or fasten in your workplace or home?

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ECA Bay Area Coordinating Committee Co-Chairs

Daniel Homsey
City and County of San Francisco

Ray Bonilla
Meta

Dena Gunning
Central County Fire Department

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ECA Bay Area Coordinating Committee

- Coordinating Committee Chairs: **Ray Bonilla,** Meta
  Dena Gunning, Central County Fire Dept. (San Mateo County)
  Daniel Homsey, City and County of San Francisco NEN
- Communications Coordinator: **Susan Garcia**, USGS
- Events Bureau Coordinators: **Chief David Cosgrave**, Coastside Fire Protection District
  Kacey Treadway, San Mateo Consolidated Fire
- Media Bureau Coordinator: **Janet Ruiz**, Insurance Information Institute
- Membership Coordinator: **Wendi Ellis**, US Department of Health and Human Services
- Participation Bureau Coordinator: **Theresa Langdon**, Alameda County Office of Emergency Services
- Regional Workshops Coordinator: **Jeff Airth**, SFO

SCEC Liaison for ECA Bay Area: **Sharon Sandow de Groot (USC/SCEC)**
bayarea@earthquakecountry.org

Each Coordinator welcomes additional members of their committee!

Today's Agenda

Welcome from the ECA Bay Area Chairs
Dena Gunning

Participant Self-Introductions
You!

ECA Statewide Leadership Opportunities, Key Resources and Mini Awards
Mark Benthien (SCEC/ECA)

Quake Break: Bay Area Seismic Activity Since Last Workshop
Dr. Kathryn Materna (USGS)

HayWired Scenario Exercise Toolkit and Exercise
Monika Stoeffl (California Resiliency Alliance) and Mark Benthien (SCEC/ECA)

Open Discussion, Sharing, and Networking

Optional EOC Tour

Self Introductions

Name

Organization or Community

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ECA Statewide Leadership Opportunities, Key Resources, and Mini Awards

Mark Benthien
SCEC/ECA

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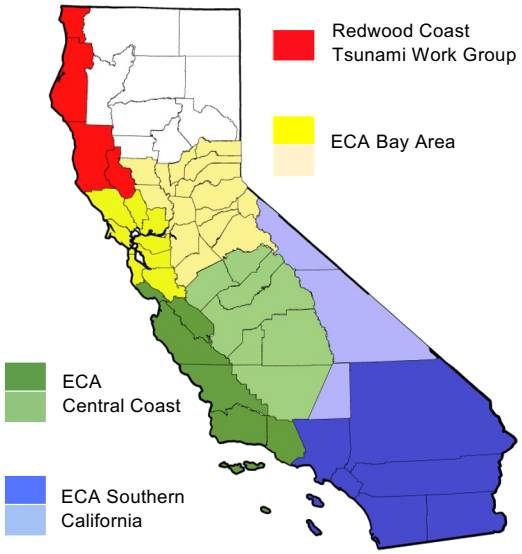
Earthquake Country Alliance

- 4000+ *Public-Private-Grassroots* leaders
- Subject matter expert *Committees* develop resources and programs
- *Regional Alliances* organize meetings and outreach activities (***Next Bay Area: May 24***)
- California's Office of Emergency Services provides FEMA NEHRP funding for ECA earthquake mitigation activities
- USC's Southern California Earthquake Center (SCEC.org) administers ECA



Join: **EarthquakeCountry.org/join**

Earthquake Country Alliance | nehrp | Cal OES Governor's Office of Emergency Services | SCEC An NSF+USGS Center

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National Earthquake Hazards Reduction Program (NEHRP)

- Cal OES applies to FEMA for NEHRP funding, which is then subawarded to USC for SCEC to administer ECA's earthquake education, outreach, and mitigation activities.
- NEHRP is a partnership of four federal agencies that provide resources to mitigate and reduce losses caused by earthquakes in the U.S., including support for:
  - Research on the causes and effects of earthquakes
  - Building design recommendations to reduce earthquake damage and disruption
  - Activities that advocate earthquake risk reduction awareness and practices
- ECA also receives funding from NSF and USGS via their support of SCEC.

FEMA | NIST National Institute of Standards and Technology | NSF | USGS science for a changing world

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ECA Statewide Activities

Develop Messaging and Resources:

EarthquakeCountry.org
EarthquakeCountry.org/resources
Terremotos.org

Support Tsunami Preparedness Week:

TsunamiZone.org/california

March 27-31, 2023

Created and Coordinate
The Great California ShakeOut:

ShakeOut.org/california

ShakeOut™

Oct. 19 in 2023

Webinars & other events

EarthquakeCountry.org/calendar

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Seven Steps To Earthquake Safety

BEFORE

1. Secure Your Space

2. Plan To Be Safe

3. Organize Supplies

4. Minimize Financial Hardship

DURING

5. Drop, Cover, and Hold On

6. Improve Safety

AFTER

7. Reconnect and Restore

EarthquakeCountry.org/sevensteps

Terremotos.org/sietepasos

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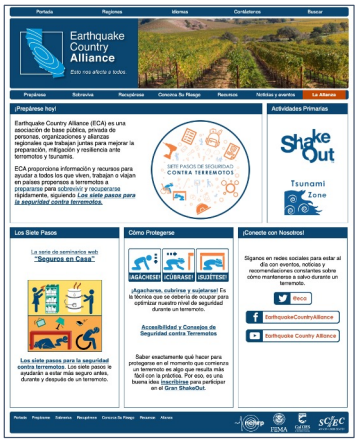
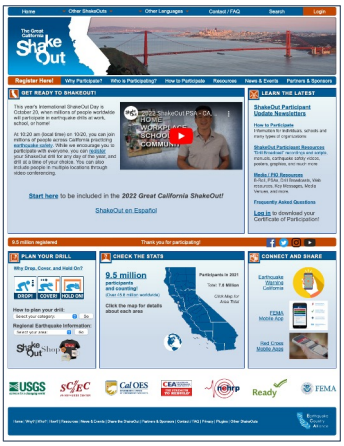
ECA Websites

EarthquakeCountry.org



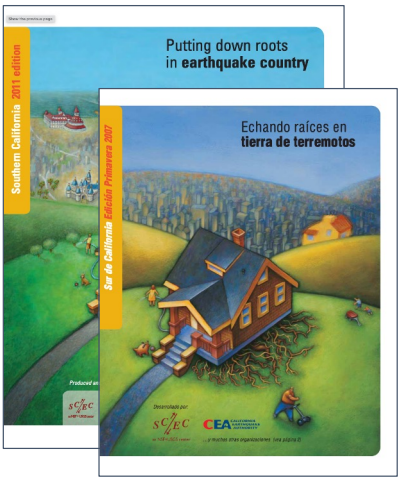
Terremotos.org



ShakeOut.org

TsunamiZone.org

ECA Booklets

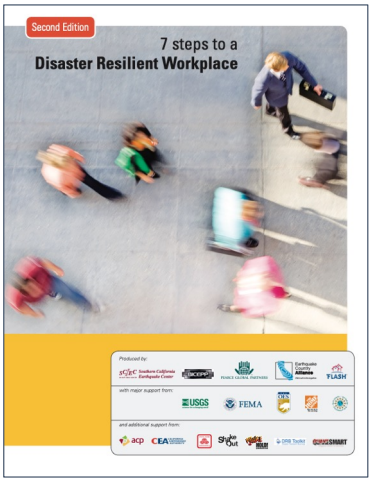


[EarthquakeCcountry.org/booklets](EarthquakeCountry.org/booklets)

Southern California (English & Spanish)
Bay Area (Several Languages)
Also versions for Central US,
Nevada, and Utah

EarthquakeCountry.org/stayingsafe

Statewide (English, Spanish, Chinese)
10 Regional versions (English)

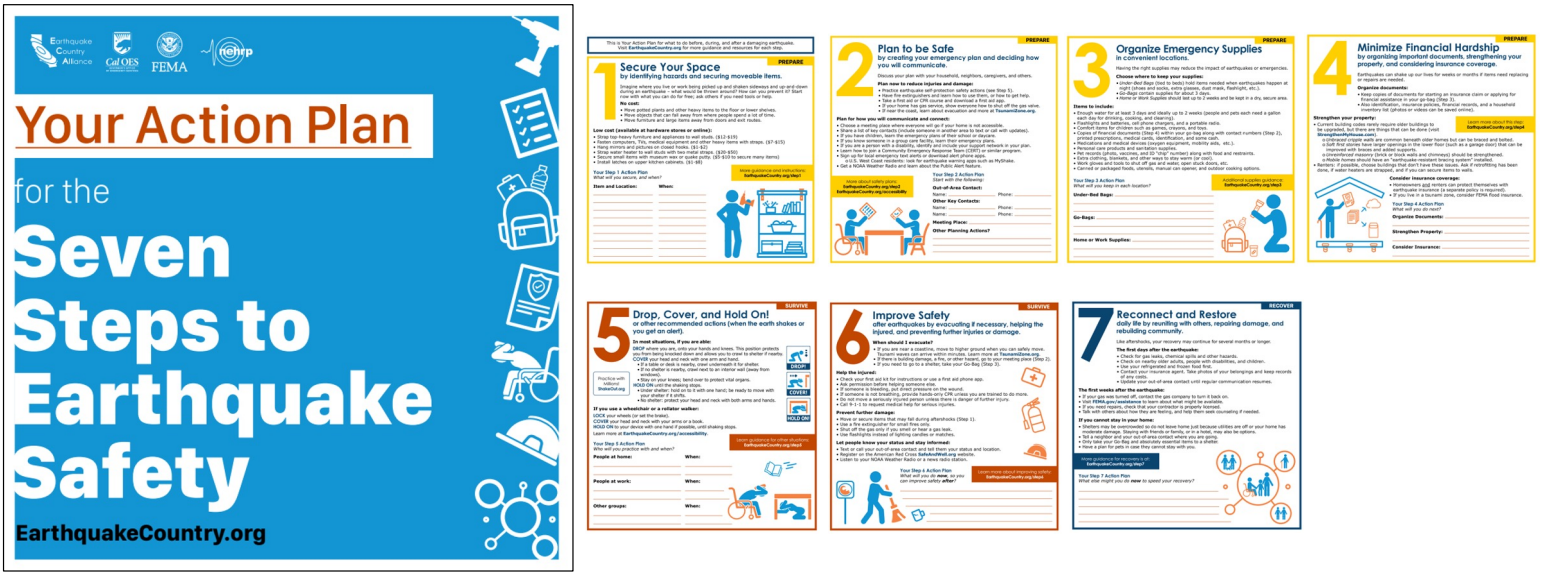


ResilientWorkplace.org

Updated Materials in 16 Languages

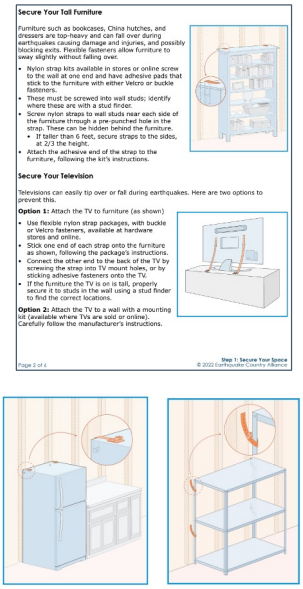
EarthquakeCountry.org/languages

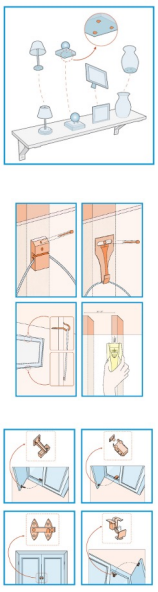
Your Action Plan for the Seven Steps



EarthquakeCountry.org/languages

Secure Your Space Guide & Worksheet





EarthquakeCountry.org/languages

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ECA Sector-Based Outreach Committees

- Public Sector
- Businesses
- Accessibility
- Non-Profit & Faith-Based Organizations
- Healthcare
- Higher Education
- PreK-12 Education
- EPIcenters (Museums, parks, libraries, etc.)

Each meets bimonthly; Join us!

EarthquakeCountry.org/committees

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ECA Outreach Bureaus (Regional & Statewide)

- **Events Bureau**
  - Speakers for online/in-person events
  - Booths and tables at events
  - Request presenter or information table: **EarthquakeCountry.org/events**
- **Participation Bureau**
  - ShakeOut and Tsunami Week recruitment and communications
  - County/City Partners for local engagement
- **Media Bureau**
  - Statewide and local coordination
  - Media event planning
  - Year-round messaging / news releases
  - Post-earthquake shared messaging

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ECA Accessibility Committee

ACCESSIBILITY RESOURCES

- Guide for People with Disabilities & AFN (8 page)

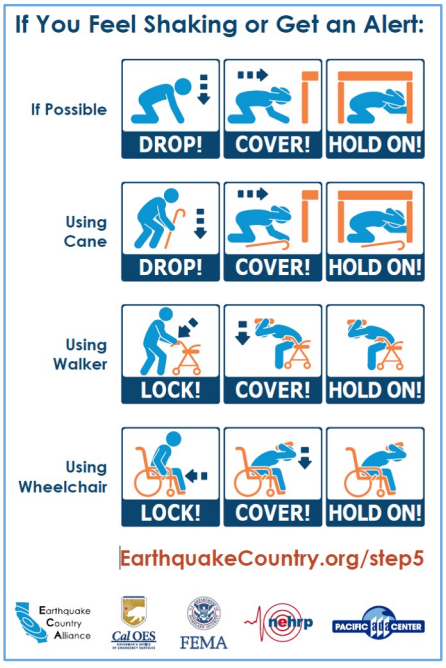
Available in 15 languages:

- Key Earthquake Tips
- Recommended Earthquake Actions
- Earthquake Protective Actions Graphics

Accessibility Webinar Available:

- "How to adapt our messaging and reach the whole community"

Abilities Expo: March 9-12, 2023, LA Convention Center



EarthquakeCountry.org/accessibility

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ECA Business Committee

- Secure Your Space trainings presented with Safe-T- Proof and ReadyAmerica to promote business and household mitigation
- Development of ShakeOut business resources
- Promotion of the HayWired Toolkit to small businesses
- Coming soon: Small Business Resilience Seminars

JOIN US!

EarthquakeCountry.org/committees

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Non-Profit/Faith-Based Committee

EarthquakeCountry.org/HMGPjune22

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ECA EPIcenter Committee

(Earthquake Education and Public Information centers)

EPIcenter Resources include:

Great ShakeOut Earthquake Toolkit for Free-Choice Learning Environments

The Turtle Story: a Native American story of how earthquakes occur told by storyteller Jacque Tahuka-Nunez, a tribal descendant of the Acjachemen Nation.

Place-based immersive experiences including the Hayward Fault Walk and Wallace Creek Interpretive Trail and Guide

EarthquakeCountry.org/epicenter

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ECA Public Sector Committee

Community Engagement Programs, Activities and Resources

This webpage is being developed to showcase local and statewide community engagement programs, webinars and other activities, and resources that can be implemented in local communities to support preparedness, training, mitigation, and response.

ECA Community Engagement Webinars

ECA's Public Sector Committee is hosting a series of Community Engagement Webinars to showcase programs from across California that support community preparedness, training, mitigation, and response.

#1: Inyo County TEEN CERT & Topanga Coalition for Emergency Preparedness (TCEP).

#2: City of Los Angeles RYLAN program & Humboldt County CERT (featuring Blue Lake CERT)

#3: City of San Francisco Neighborhood Empowerment Network (NEN) programs, including *Neighborfest*

#4: Martinez Area CERT (Bay Area) & Health Center Partners Emergency Preparedness and Response Program (Southern California)

#5: Coachella Valley Disaster Preparedness Network

#1: Inyo County TEEN CERT & Topanga Coalition for Emergency Preparedness (TCEP)

The first webinar in the series, held May 13, 2021, featured these community-based programs:

EarthquakeCountry.org/community

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ECA Healthcare Committee

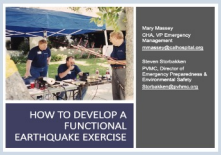
Webinars

2021: Great ShakeOut After Action Reporting and Improvement Planning
This webinar was presented on August 24, 2021 by Nora O'Brien (CEO, Connect Consulting Services) and Mark Benthien (Global Coordinator, ShakeOut):

- PowerPoint Presentation (PDF)
- ShakeOut Controller Evaluator Handbook Template (Word)
- ShakeOut After Action and Improvement Plan (Word)
- View recording of the webinar

2021: How to Develop a Functional Earthquake Exercise
This webinar was presented on July 19, 2021 by Mary Massey, California Hospital Association and Steve Storbakken, Pomona Valley Hospital Medical Center:

- PowerPoint Presentation (PDF)
- View recording of the webinar
  NOTE: The first minutes of the webinar are not within the recording, however you can view the slides that were shown in the PDF of the presentation.



2020: Shakeout Your CMS Emergency Preparedness Exercise Requirements
This webinar was presented on August 12, 2020 by Mark Benthien (Global Coordinator, ShakeOut) and Nora O'Brien (CEO, Connect Consulting Services):

- PowerPoint Presentation (PDF)
- View recording of the webinar

Resources

Drill Planning Resources

ShakeOut Drill Manual for Healthcare Organizations
This manual provides three options for drills and exercises that healthcare organizations can organize. Each drill uses the general earthquake response of Drop, Cover, and Hold On (www.EarthquakeCountry.org/step5) as its foundation. Level 2 and Level 3 exercises may meet the guidelines of the CMS Emergency Preparedness Rule.

Hospital Incident Command System

Homeland Security Exercise and Evaluation Program (HSEEP) Guidance and Templates

www.ResilientWorkplace.org
This website includes the *7 Steps to a Disaster Resilient Workplace* which provides a simple overview of what organizations can do to be prepared to survive and recover when disasters occur.

Seven Steps to Earthquake Safety
The Earthquake Country Alliance has worked with experts in earthquake science, preparedness, and mitigation to develop this step-by-step guide staying safe before, during, and after an earthquake. Share this with your employees to encourage preparedness at home.

ShakeOut.org/healthcare

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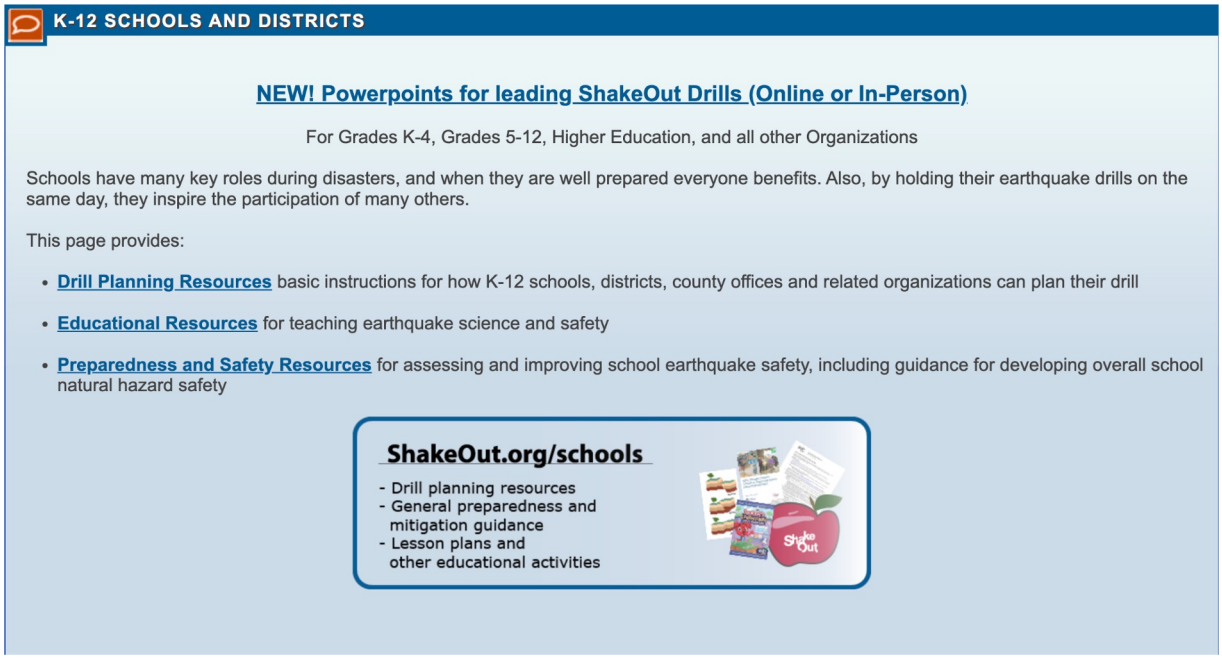
ECA PreK-12 Education Committee



ShakeOut.org/schools

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ECA Higher Education Committee

ShakeOut.org/highereducation

ECA Mini Awards

- **Purpose:** provide materials for ECA member projects that improve earthquake resilience by promoting mitigation, awareness, and preparedness, and multiply impact of programs
- **Purchases**: $500 to $1000 each
- **Eligibility:** Proposals for earthquake mitigation and education activities
- **Pre-defined packages:** Sets of materials will be available, however you can also customize them or propose other items
- **2023 Awards:** Apply NOW at **EarthquakeCountry.org/miniawards**

READYAMERICA
THE DISASTER SUPPLY PROFESSIONALS

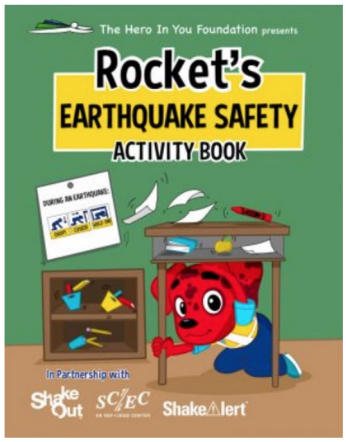
Secure WORKPLACE $500 Package

ITEM #	ITEM NAME	IMAGE	QUANTITY
4160-64	Furniture Strap		15
4740	File Cabinet Strap		15
5040	Bookcase Strap		15
4173	Home Electronics Safety Strap, Black		30
4338	A-Maze-ing Picture Hook, 4 Pack		10
4250	Kitchen & Cabinet Door Latch, 4 Pack		10
88111	QuakeHOLD! Museum Putty		10

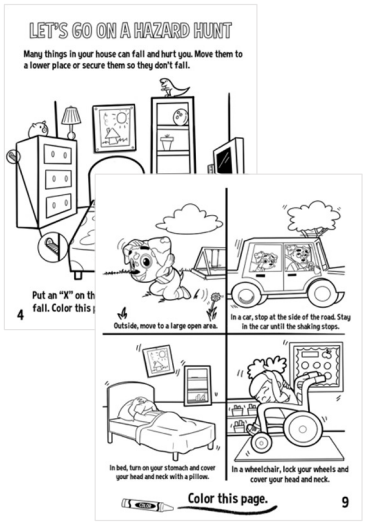
New materials for children age 4-9

English and Spanish Story Books

The Hero In You foundation



Many Languages



RocketRules.org/earthquake

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How to Collaborate within the ECA

1. Join the ECA (free!)

EarthquakeCountry.org/join

2. Participate with an ECA Regional Alliance

Attend quarterly workshops (or host one!) EarthquakeCountry.org/calendar

Serve on your region's Coordinating Committee

Plan local events, recruit members, organize ShakeOut activities, etc.

Learn more: EarthquakeCountry.org/alliance

3. Serve on an ECA Sector-Based Committee

Public Sector	Healthcare
Business	Higher Education
Accessibility	PreK-12 Education
Non-Profit & Faith-Based	EPIcenters (Museums, Parks, Organizations Libraries, etc.)

Learn more: EarthquakeCountry.org/committees

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How to Collaborate within the ECA

4. Collaborate via an ECA Outreach Bureau

News and Social Media Bureau- coordinate local and statewide earthquake news & events

Participation Bureau- recruit and support your area's ShakeOut and Tsunami Week registrants

Events Bureau– train & arrange speakers and staffing for preparedness fairs, conference booths, etc.

Request a presenter or information table: **EarthquakeCountry.org/events**

Email info@earthquakecountry.org to learn more.

5. Use, share, and help promote our resources and activities (link from your site, etc.)

Seven Steps to Earthquake Safety- **EarthquakeCountry.org/sevensteps**

Guidance in Multiple Languages- **EarthquakeCountry.org/languages**

Workshops, webinars, & other events- **EarthquakeCountry.org/calendar**

ECA Mini Awards- **EarthquakeCountry.org/miniawards**

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Q&A

To be notified of future events and recordings, join ECA (free!):
EarthquakeCountry.org/join

Please take our survey:
SurveyMonkey.com/r/JVBYLDY

Questions?
info@earthquakecountry.org

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Quake Break:
Bay Area Seismic Activity since last ECA Workshop

Dr. Kathryn Materna
United States Geological Survey (USGS)

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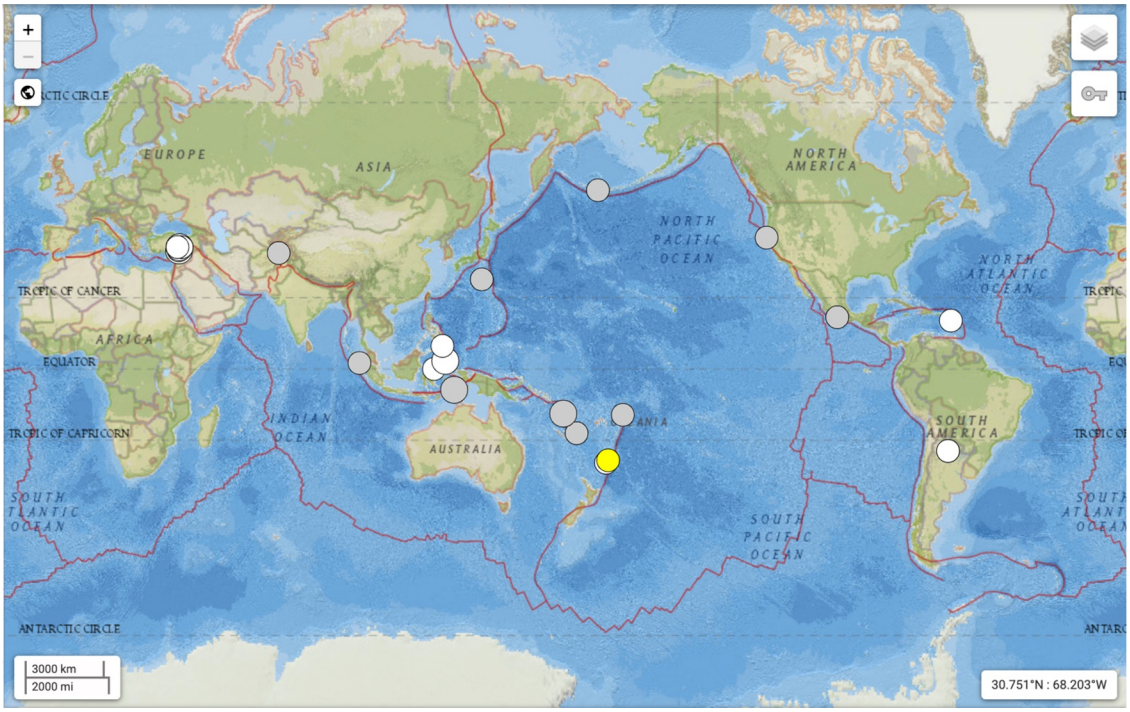
Quake Break

Kathryn Materna
Research Geophysicist
USGS Earthquake Science Center
Moffett Field, CA

Feb 16, 2023



WORLDWIDE

- 23 earthquakes above **M6**
- 5 earthquakes above **M7**, in Turkey and Indonesia
- Deadliest: M7.8 and M7.5 in Turkey, Syria

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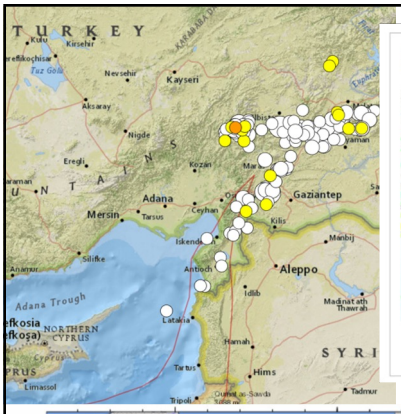

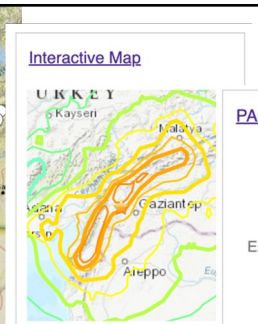

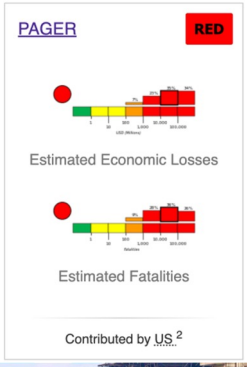

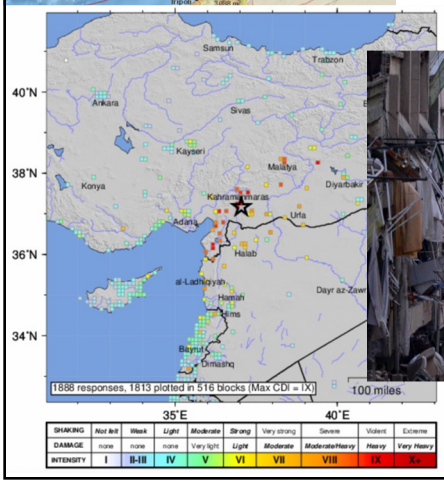

Turkey and Syria: February 6, 2023

M7.8 on the East Anatolia Fault, followed 9 hrs later by **M7.5** to the west.

This is a seismically active area, but earthquakes this exact spot haven't occurred for a long period of time. Aleppo, Syria experienced a ~**M7.1** in 1138 A.D.

It was felt as far away as Cairo, Egypt.

Massive damage to the built environment. Current death toll is about 41,000.

Probably largest human impact of any earthquake since 2011 M9.0 Tohoku-oki.

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N. CALIFORNIA

- 67 earthquakes above **M3**
- 9 earthquakes above **M4**, mostly aftershocks
- M6.4 Ferndale earthquake December 20, 2022, with M5.4 aftershock

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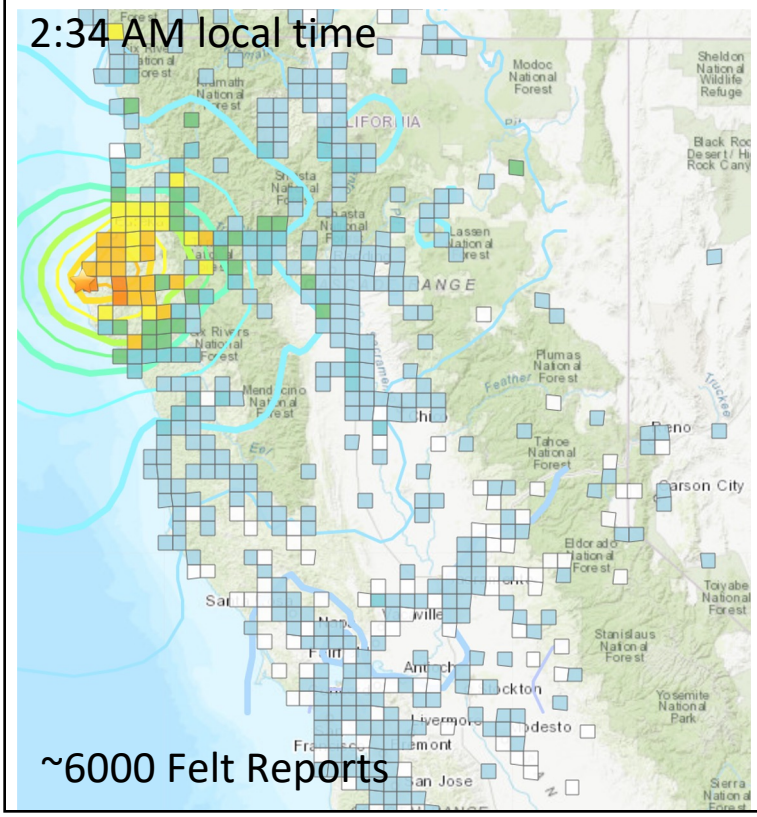
M6.4 Ferndale Earthquake – 12/20/2022
2:34 AM local time



~6000 Felt Reports

Fortuna	22 km (13 mi)	~0.0 s	VII
Eureka	37 km (23 mi)	~3.7 s	VI
Fort Bragg	130 km (81 mi)	~29.3 s	IV

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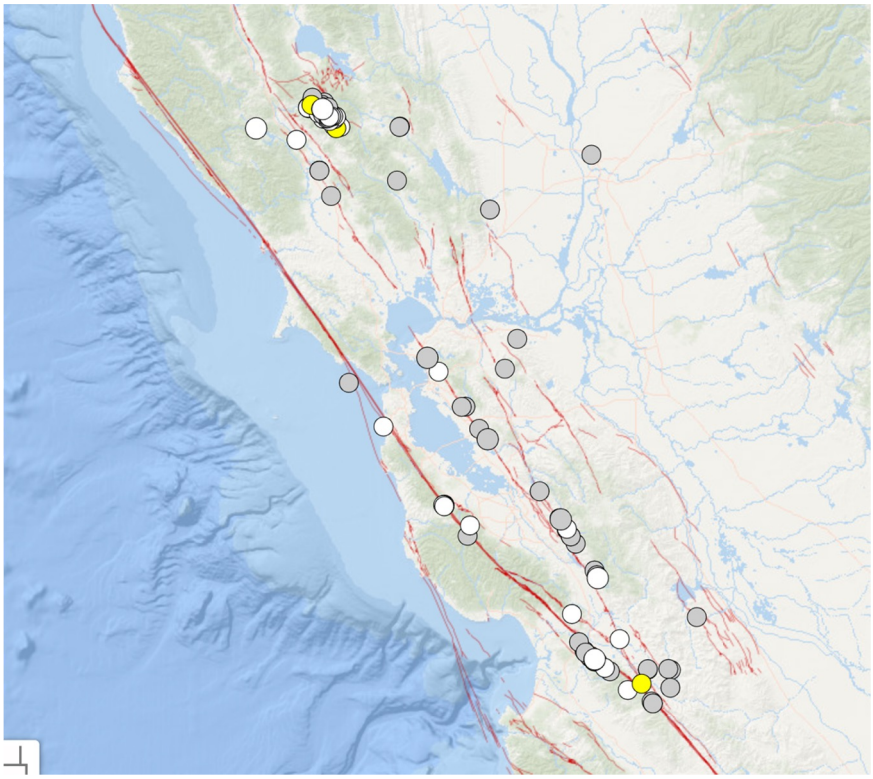
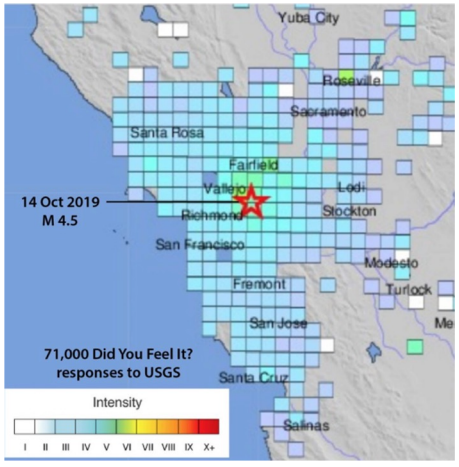


BAY AREA

- 9 earthquakes above **M3**
- Many along known faults, fault intersections, and the Geysers
- Notable: Alum Rock **M3.6**, El Cerrito **M3.6** each produced several thousand DYFI

If you feel an earthquake…



Q&A

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Questions?
info@earthquakecountry.org

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HayWired Scenario Earthquake Toolkit and Exercise

Monika Stoeffl
California Resiliency Alliance

Mark Benthien
SCEC/ECA

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HayWired Scenario EXERCISE TOOLKIT

A guide for creating discussion-based exercises using the HayWired Earthquake Scenario

USGS science for a changing world

Earthquake Country Alliance

CALIFORNIA RESILIENCY ALLIANCE

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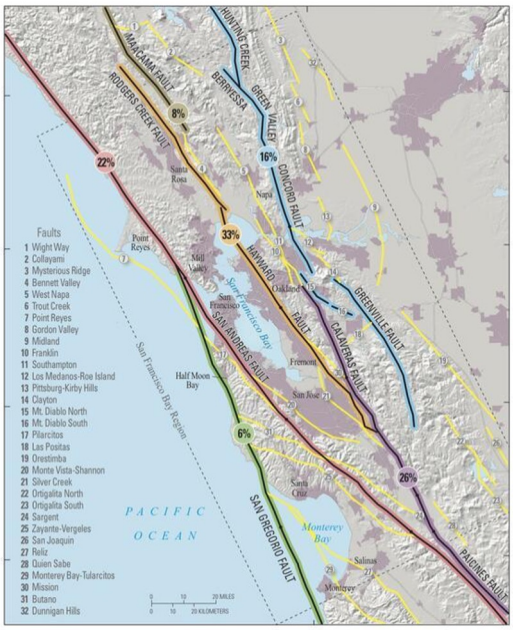
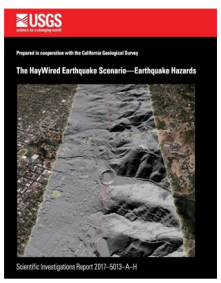
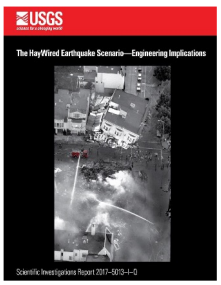
HayWired Scenario Exercise Toolkit

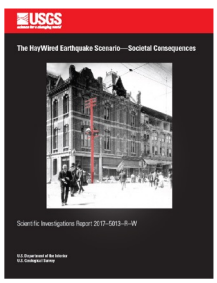
What is the HayWired Scenario?

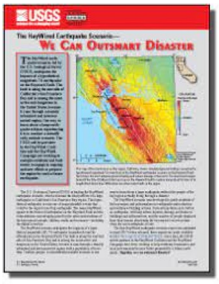
- Multi-year study led by the U.S. Geological Survey (USGS) and many partners
- Explores the many impacts of a magnitude 7.0 earthquake on the Hayward Fault, centered near Oakland, and its aftershocks
- Important to understand as the fault runs through a densely urbanized and interconnected region











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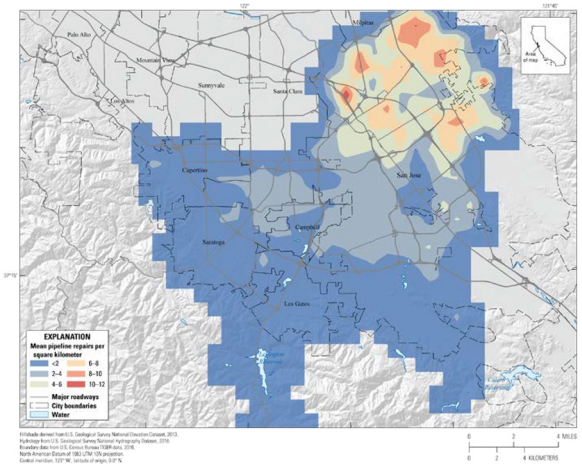
What is a Discussion-Based Exercise?

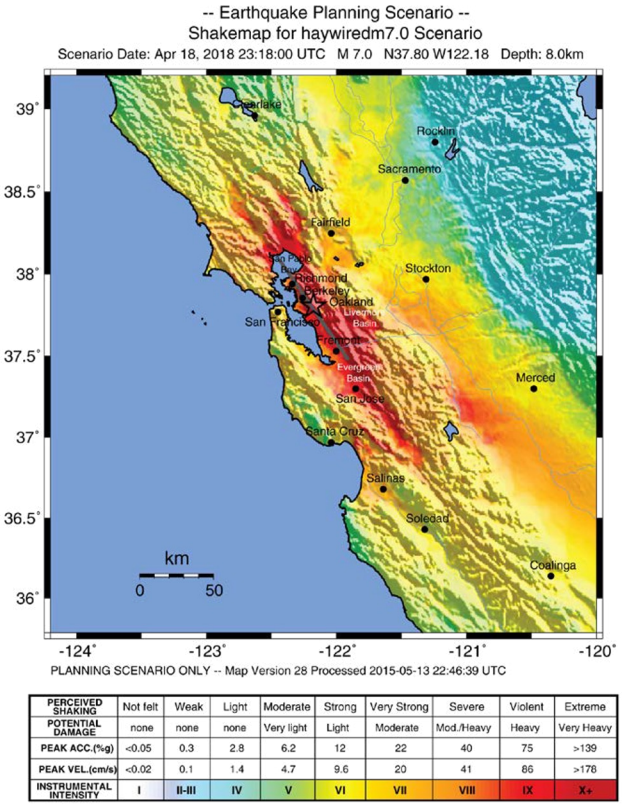
- Session where team members meet in an informal setting to discuss their roles during an emergency and their responses to a particular emergency situation. Also known as a "tabletop" exercise.
- A facilitator guides participants through a discussion of one or more scenarios.
- The duration depends on the audience, the topic being exercised and the exercise objectives.
- Most discussion-based exercises can be conducted in a few hours, so they are cost-effective tools to validate plans and capabilities.

Why the HayWired Scenario is Useful for Exercises

- Emphasizes the variety of physical, technological, and societal impacts associated with the multiple hazards and cascading impacts of such an event.
- Insights gained from exercising for an earthquake can help us to better meet other more frequent challenges.
- The Toolkit is designed to help any organization plan, lead, and learn from discussion-based exercises.



Number of water pipeline repairs needed per square kilometer after the earthquake, in San Jose and nearby areas.



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Mod./Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<0.05	0.3	2.8	6.2	12	22	40	75	>139
PEAK VEL.(cm/s)	<0.02	0.1	1.4	4.7	9.6	20	41	86	>178
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

USGS ShakeMap of the San Francisco Bay region showing estimated shaking intensities for the hypothetical magnitude-7.0 mainshock selected for the scenario.

The earthquake begins under the City of Oakland (star) and ruptures the Hayward Fault along more than 83 kilometers (about 52 miles) of its length in both directions.

The Wealth of Information in the Scenario

Utility	50-percent restoration	Tail restoration
Water[1]	3 days	100 percent at 7 days
Natural gas[2]	~9 days	90 percent at ~33 days
Electricity[3]	1 day	99.5 percent at 30 days
Voice/data[4]	5 days	100 percent at 7 days

Estimated restoration delays due to utility disruption at a San Francisco, location following the hypothetical magnitude-7.0 mainshock of the HayWired earthquake scenario.

Data Spanning Many Themes and Topics

Exposure of telecommunications infrastructure to HayWired earthquake scenario hazards in the San Francisco Bay region, California.

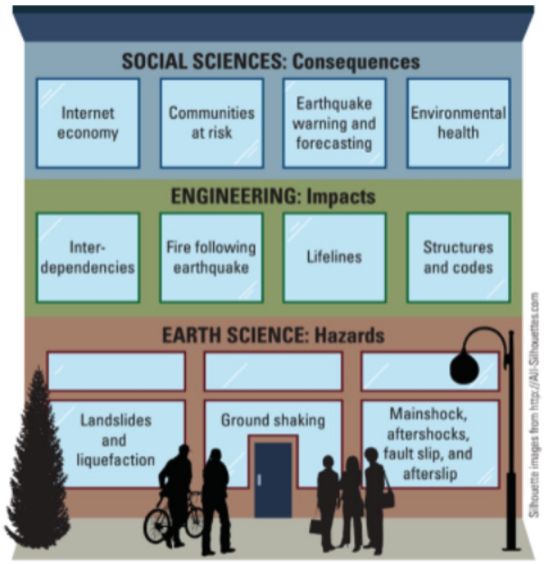
Total in study area	Fiber routes, long-haul (km)	Fiber routes, interoffice (km)	Cellular sites	Fiber-lit buildings, data centers	Fiber-lit buildings, central offices	Fiber-lit buildings, point of presence	Wireless switch offices	Internet exchange points	Microwave towers	AM radio antennas	FM radio antennas	DTTS television transmitters	Digital television transmitters
Fire following earthquake													
Percentage developed[1]	63%	60%	73%	98%	95%	95%	96%	100%	66%	22%	18%	11%	27%
Low exposure	1,029	7,882	2,054	287	158	14,650	11	8	905	9	7	0	0
Percentage exposed	17%	17%	25%	67%	23%	36%	21%	73%	24%	12%	2%	0%	0%
Moderate exposure	287	1,284	251	3	38	2,264	1	0	111	0	2	0	0
Percentage exposed	5%	2%	3%	1%	6%	6%	2%	0%	3%	0%	1%	0%	0%
High exposure	254	409	119	0	9	540	0	0	40	0	2	0	0
Percentage exposed	4%	1%	1%	0%	1%	1%	0%	0%	1%	0%	1%	0%	0%
Total exposure	1,570	9,575	2,424	290	205	17,454	12	8	1,056	9	11	0	0
Percentage exposed	26%	20%	29%	68%	30%	43%	23%	73%	28%	12%	3%	0%	0%

Toolkit Development Partners

As with the HayWired reports, partners from many organizations have helped to develop the Toolkit or provide feedback:

- United States Geological Survey (USGS)
- Federal Emergency Management Agency (FEMA)
- California Governor's Office of Emergency Services (CalOES)
- California Geological Survey
- Earthquake Country Alliance (ECA)/ Southern California Earthquake Center (SCEC)
- California Resiliency Alliance (CRA)
- Association of Bay Area Governments
- Bay Area Council Economic Institute
- Joint Venture Silicon Valley
- Bay Area Center for Regional Disaster Resilience
- Pacific Earthquake Engineering Research Institute (PEERI)
- State of California Seismic Safety Commission

Toolkit Overview – Scenario Information



- Begins with an overview of key Scenario findings:
  - Earthquake Hazards
  - Engineering Implications
  - Societal Consequences
- Includes an annotated index connecting chapters of the HayWired Scenario Reports to the themes and topics suggested for exercises within the Toolkit.

Volume 2: Engineering Implications

Chapter/ Pages	Chapter Title	Topics	Themes
J (p. 13-56)	HayWired Scenario—Hazus Analyses of the Mainshock and Aftershocks	Building Inventory Data; Hazus Results—HayWired Mainshock; HayWired Liquefaction and Landslide Implementation in Hazus; HayWired Landslide implementation in Hazus; Liquefaction	Aftershocks & Fault Afterslip; Alternate Locations; Building Contents; Clean-up; Structural & Non-Structural Building Damages

Toolkit Overview – Developing Your Exercise

- Guidance for developing a discussion-based exercise, with a corresponding planning worksheet
  - Basic questions to consider
  - How to select a theme/idea to exercise (with consideration for different phases of emergency management)
  - Description of components needed
    - Discussion objective
    - Key participants
    - Base scenario (specific for *your* exercise)
    - Discussion questions
    - Relevant data and visuals

HayWired Scenario Exercise Toolkit

Toolkit Overview – Suggested Themes/Ideas

- The Toolkit identifies **30** Themes addressed in the scenario, spanning **45** ideas for discussion-based exercises, organized within each emergency management phase
- Document symbols indicate **17** ideas for which we have developed *Facilitator Tools*

	Planning and Preparedness	Response	Recovery	Mitigation
Access to Data & Information		29		39
Accounting for Employees		29		
Aftershocks & Fault Afterslips			35	
Alternate Locations	23		36	
Building Content				39
Clean-up				39
Communications & Internet	23 & 24	29 & 30		
Customer Base			36	
Economic Impact			36	
Elevators		31		
Employee Commutes and Residences	24			
Employee Retention & Staffing Shortage		31	37	
Fires After the Earthquake				40
Fuel (Gasoline and Diesel)	24	31		
Generators	25			
Insurance			37	
Lifeline Infrastructure in Fault Zones				40
Mail | Package Delivery		32		
Mental Wellbeing			37	
Natural Gas	25	32		
Payroll	26			
Power (Electricity)	26	33	38	
ShakeAlert®	26			40
Shutting Off Utilities				41
Slow Return to Normal			38	
Structural & Non-Structural Building Damages				41
Supply Chain | Movement of Goods	27			41
Water	27	33 & 34		
Wastewater | Sewer	27	34		
Working Remotely	28			

HayWired Scenario Exercise Toolkit

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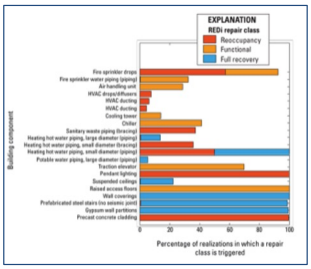
Mitigation: Reducing vulnerabilities and the impacts of hazards

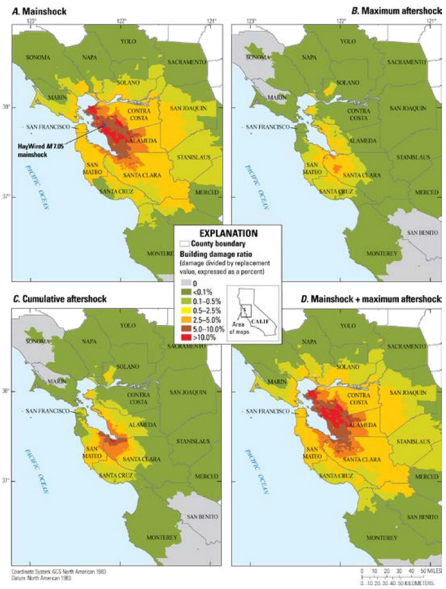
Theme	Exercise Ideas
Access to Data & Information	**Issue:** This Scenario disrupts electric power and connectivity to data services, with restoration timelines varying by infrastructure types and location. The earthquake may impact your ability to access records. **Idea:** Identify options to reduce the risk of losing access to important data and information you will need post-earthquake. **HayWired Scenario Report References:** Volume 3 (Chapter S and T)
Building Contents	**Issue:** This Scenario upsets building contents and overturns unanchored equipment. **Idea:** In each of your work and storage areas, identify supplies and equipment that have the potential for moving, falling, or tipping. For items posing safety risks and/or higher monetary loss, identify how you can secure them or otherwise minimize the risk. **HayWired Scenario Report References:** Volume 2 (Chapters J and Q); Volume 3 (Chapter S)

Toolkit Overview – Facilitator Tools

- Each set of *Facilitator Tools* includes:
  - Suggested exercise objectives
  - Recommended participants
  - Discussion questions to select from
  - Locations of relevant data in the Reports
  - Slide deck of useful imagery and tables
- Facilitators can follow closely, or use as inspiration for their exercises



Toolkit Overview – Facilitating Your Exercise



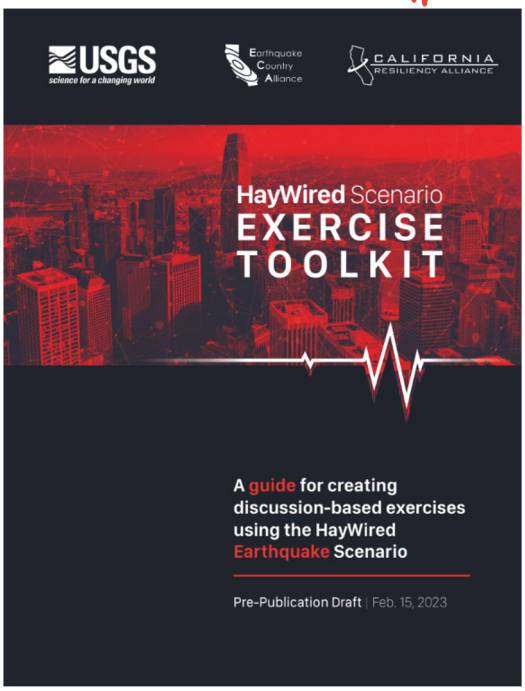
- Now that you have developed (or selected) the components needed for your exercise, this section provides best practices for how to:
  - Prepare your participants
  - Get started, including ground rules
  - Manage discussion dynamics - to involve all participants, manage the pace, etc.
  - Use visuals and data
  - Take notes to capture key results

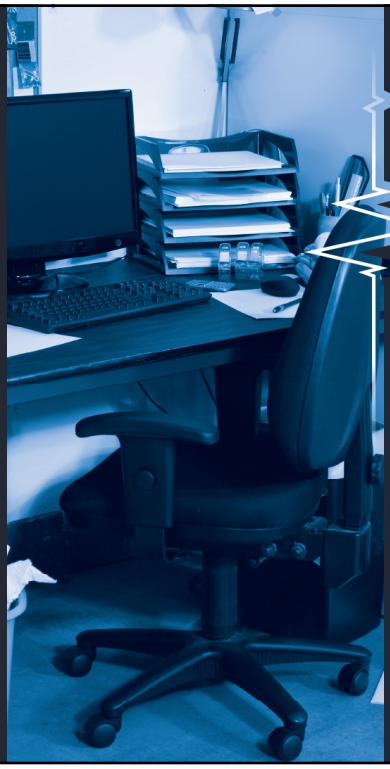
Toolkit Overview – Implementing Lessons

- The goal of your exercise should be to enable continuous improvement by applying the lessons and insights learned.
- This section has suggestions for how to:
  - Capture lessons, insights, ideas, and actions
    - What gaps and vulnerabilities were identified?
    - What tasks and actions were identified?
    - What were the team's strengths?
  - Leverage results to improve everyday operations
  - Find answers to questions that remain unanswered
  - Follow through on actions and tasks

Rollout of the Toolkit

- The Toolkit & Facilitator Tools are in final review
- All materials and event information will soon be available at **EarthquakeCountry.org/haywired**
- Trainings and Outreach in coming months:
  - Today's workshop!
  - Train-the-Trainer workshops for Chambers of Commerce staff and their members
    - USGS (Menlo Park): March 9
    - San Francisco: March 27
    - FEMA (Oakland): March 29
- Registration information will be emailed soon; email any requests to bayarea@earthquakecountry.org





HayWired Scenario
EXERCISE
TOOLKIT

Building Content

Mitigation

Discussion-Based Exercise Using the HayWired Exercise Toolkit

Earthquake Country Alliance Bay Area Meeting
February 16, 2023

HayWired Toolkit
Mock Exercise

Discussion Exercise Caveats

- Since not everyone is from the same organization a mock company has been created.
  - For company information not provided make (reasonable) assumptions. Take note of any assumptions you do make. If unsure what to assume, ask.

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HayWired Toolkit
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  - For company information not provided make (reasonable) assumptions. Take note of any assumptions you do make. If unsure what to assume, ask.
- Exercise is designed to highlight use of the HayWired Exercise Toolkit facilitator tools, therefore, some information is included that would not usually be part a discussion-based exercise slide deck.
- The Toolkit is close to done, but some modifications are still being made.

Exercise "Agenda"

- Introduce Mock Company
- Break into Groups
- Scenario Overview
- Discussion Topic 1 Introduction
- Small Group Discussion
- Discussion Recap
- Networking Break
- Discussion Topic 2 Introduction
- Small Group Discussion
- Discussion Recap
- Closing Take-Aways

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The Company

- Specializes in managing the digital marketing for online marketplaces.
- Employs about 40 people who are required to be in the office 3 days a week and can work from home the other 2.
- Rents office space on the 4th floor of a multistory building located in the East Bay.

Knowing the Bay Area is in earthquake country and shocked by the images from the earthquakes in Turkey and Syria, your company leadership has decided it may be a good idea to more actively think about earthquake safety.

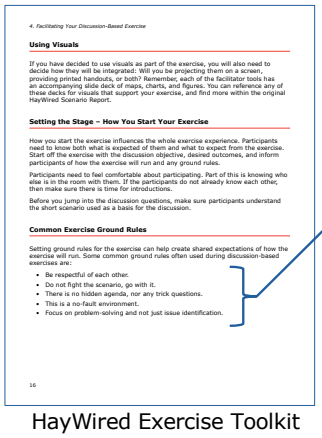
You are employees of this company participating in a discussion-based exercise focused on mitigation.

Overall Objective

Identify mitigation actions we can take prior to an earthquake to minimize the safety risks and damages caused by the shaking.

Break into small groups &
identify a note-taker/someone to report out

Ground Rules



4. Facilitating Your Discussion-Based Exercise

Using Visuals

If you have decided to use visuals as part of the exercise, you will also need to decide how they will be integrated: Will you be projecting them on a screen, providing printed handouts, or both? Remember, each of the facilitator tools has an accompanying slide deck of maps, charts, and figures. You can reference any of these decks for visuals that support your exercise, and find more within the original HayWired Scenario Report.

Setting the Stage – How You Start Your Exercise

How you start the exercise influences the whole exercise experience. Participants need to know both what is expected of them and what to expect from the exercise. Start off the exercise with the discussion objective, desired outcomes, and inform participants of how the exercise will run and any ground rules.

Participants need to feel comfortable about participating. Part of this is knowing who else is in the room with them. If the participants do not already know each other, then make sure there is time for introductions.

Before you jump into the discussion questions, make sure participants understand the short scenario used as a basis for the discussion.

Common Exercise Ground Rules

Setting ground rules for the exercise can help create shared expectations of how the exercise will run. Some common ground rules often used during discussion-based exercises are:

- Be respectful of each other.
- Do not fight the scenario, go with it.
- There is no hidden agenda, nor any trick questions.
- This is a no-fault environment.
- Focus on problem-solving and not just issue identification.

16

HayWired Exercise Toolkit

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- There is no hidden agenda, nor any trick questions.
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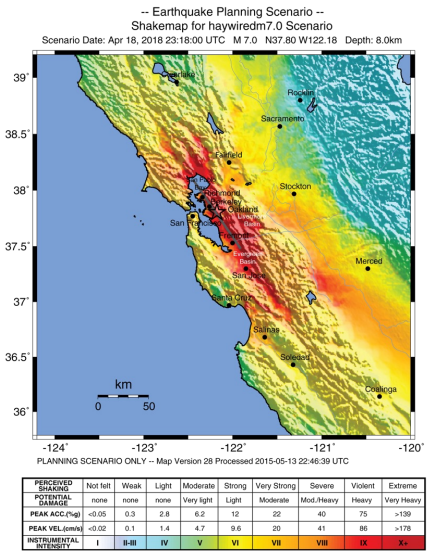
HayWired Earthquake Scenario

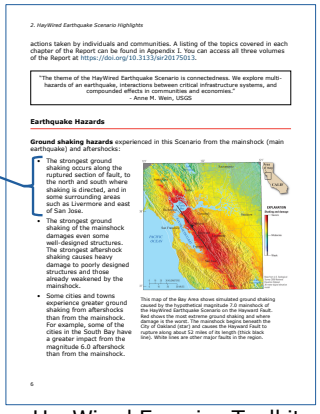
- Magnitude 7.0 earthquake on the Hayward Fault with an epicenter in Oakland, CA.



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Mod./Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<0.05	0.3	2.8	6.2	12	22	40	75	>139
PEAK VEL.(cm/s)	<0.02	0.1	1.4	4.7	9.6	20	41	86	>178
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

HayWired Earthquake Scenario

- Magnitude 7.0 earthquake on the Hayward Fault with an epicenter in Oakland, CA.
- The strongest ground shaking occurs along the ruptured section of fault, to the north and south where shaking is directed, and in some surrounding areas such as Livermore and east of San Jose.



2. HayWired Earthquake Scenario Highlights

actions taken by individuals and communities. A listing of the topics covered in each chapter of the Report can be found in Appendix I. You can access all three volumes of the Report at https://doi.org/10.3133/sir20175013.

"The theme of the HayWired Earthquake Scenario is connectedness. We explore multi-hazards of an earthquake, interactions between critical infrastructure systems, and compounded effects in communities and economies."
– Anne M. Wein, USGS

Earthquake Hazards

Ground shaking hazards experienced in this Scenario from the mainshock (main earthquake) and aftershocks:

- The strongest ground shaking occurs along the ruptured section of fault, to the north and south where shaking is directed, and in some surrounding areas such as Livermore and east of San Jose.
- The strongest ground shaking of the mainshock damages even some well-designed structures. The strongest aftershock shaking causes heavy damage to poorly designed structures and those already weakened by the mainshock.
- Some cities and towns experience greater ground shaking from aftershocks than from the mainshock. For example, some of the cities in the South Bay have a greater impact from the magnitude 6.0 aftershock than from the mainshock.

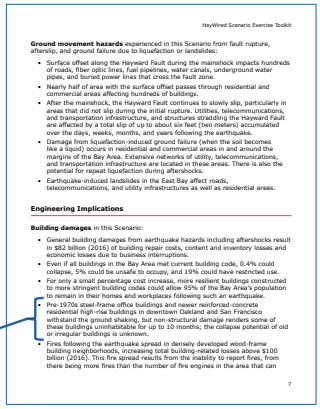
This map of the Bay Area shows simulated ground shaking caused by the hypothetical magnitude 7.0 mainshock of the HayWired Earthquake Scenario on the Hayward Fault. Red shows the most extreme ground shaking and where the City of Oakland (star) and causes the Hayward Fault to rupture along about 52 miles of its length (thick black line). White lines are other major faults in the region.

6

HayWired Exercise Toolkit

HayWired Earthquake Scenario

- Magnitude 7.0 earthquake on the Hayward Fault with an epicenter in Oakland, CA.
- The strongest ground shaking occurs along the ruptured section of fault, to the north and south where shaking is directed, and in some surrounding areas such as Livermore and east of San Jose.
- Pre-1970s steel-frame office buildings and newer reinforced-concrete residential high-rise buildings in downtown Oakland and San Francisco withstand the ground shaking, but non-structural damage renders some of these buildings uninhabitable for up to 10 months.



HayWired Scenario Exercise Toolkit

Ground movement hazards experienced in this Scenario from fault rupture, afterslip, and ground failure due to liquefaction or landslides:

- Surface offset along the Hayward Fault during the mainshock impacts hundreds of roads, fiber optic lines, fuel pipelines, water canals, underground water pipes, and buried power lines that cross the fault zone.
- Nearly half of area with the surface offset passes through residential and commercial areas affecting hundreds of buildings.
- After the mainshock, the Hayward Fault continues to slowly slip, particularly in areas that did not slip during the initial rupture. Utilities, telecommunications, and transportation infrastructure, and structures straddling the Hayward Fault are affected by a total slip of up to about six feet (two meters) accumulated over the days, weeks, months, and years following the earthquake.
- Damage from liquefaction-induced ground failure (when the soil becomes like a liquid) occurs in residential and commercial areas in and around the margins of the Bay Area. Extensive networks of utility, telecommunications, and transportation infrastructure are located in these areas. There is also the potential for repeat liquefaction during aftershocks.
- Earthquake-induced landslides in the East Bay affect roads, telecommunications, and utility infrastructures as well as residential areas.

Engineering Implications

Building damages in this Scenario:

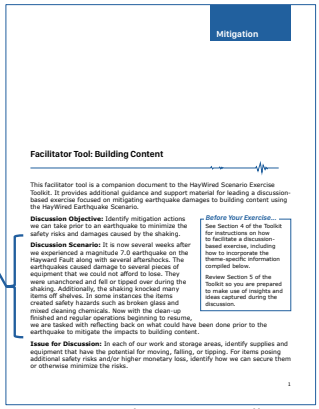
- General building damages from earthquake hazards including aftershocks result in $82 billion (2016) of building repair costs, content and inventory losses and economic losses due to business interruptions.
- Even if all buildings in the Bay Area met current building code, 0.4% could collapse, 5% could be unsafe to occupy, and 19% could have restricted use.
- For only a small percentage cost increase, more resilient buildings constructed to more stringent building codes could allow 95% of the Bay Area's population to remain in their homes and workplaces following such an earthquake.
- Pre-1970s steel-frame office buildings and newer reinforced-concrete residential high-rise buildings in downtown Oakland and San Francisco withstand the ground shaking, but non-structural damage renders some of these buildings uninhabitable for up to 10 months; the collapse potential of old or irregular buildings is unknown.
- Fires following the earthquake spread in densely developed wood-frame building neighborhoods, increasing total building-related losses above $100 billion (2016). This fire spread results from the inability to report fires, from there being more fires than the number of fire engines in the area that can

7

HayWired Exercise Toolkit

Discussion Base Scenario

- It is now several weeks after we experienced the magnitude 7.0 earthquake on the Hayward Fault.



Mitigation

Facilitator Tool: Building Content

This facilitator tool is a companion document to the HayWired Scenario Exercise Toolkit. It provides additional guidance and support material for leading a discussion-based exercise focused on mitigating earthquake damages to building content using the HayWired Earthquake Scenario.

Discussion Objective: Identify mitigation actions we can take prior to an earthquake to minimize the safety risks and damages caused by the shaking.

Discussion Scenario: It is now several weeks after we experienced a magnitude 7.0 earthquake on the Hayward Fault along with several aftershocks. The earthquakes caused damage to several pieces of equipment that we could not afford to lose. They were unanchored and fell or tipped over during the shaking. Additionally, the shaking knocked many items off shelves. In some instances the items created safety hazards such as broken glass and mixed cleaning chemicals. Now with the clean-up finished and regular operations beginning to resume, we are tasked with reflecting back on what could have been done prior to the earthquake to mitigate the impacts to building content.

Before Your Exercise...

See Section 4 of the Toolkit for instructions on how to facilitate a discussion-based exercise, including how to incorporate the theme-specific information compiled below.

Review Section 5 of the Toolkit so you are prepared to make use of insights and ideas captured during the discussion.

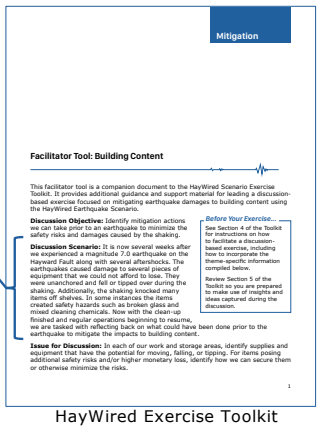
Issue for Discussion: In each of our work and storage areas, identify supplies and equipment that have the potential for moving, falling, or tipping. For items posing additional safety risks and/or higher monetary loss, identify how we can secure them or otherwise minimize the risks.

1

HayWired Exercise Toolkit
Facilitator Tool
Building Content, Mitigation

Discussion Base Scenario

- It is now several weeks after we experienced the magnitude 7.0 earthquake on the Hayward Fault.
- While the earthquake did not cause any structural damage, it did cause damage to several pieces of equipment that we could not afford to lose. They were unanchored and fell or tipped over during the shaking.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1

HayWired Exercise Toolkit
Facilitator Tool
Building Content, Mitigation

HayWired Toolkit
Mock Exercise

Discussion Base Scenario

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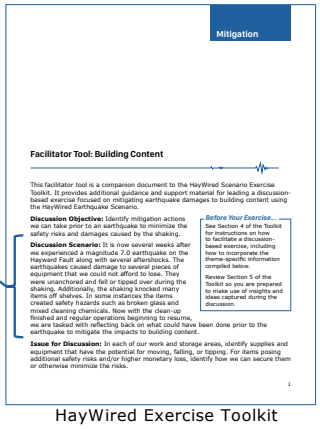
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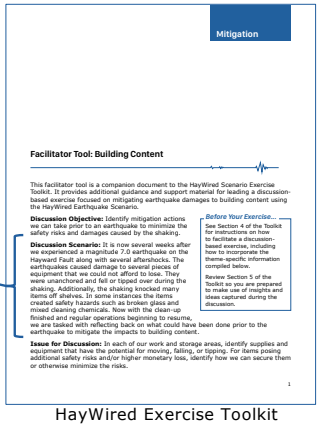
HayWired Exercise Toolkit
Facilitator Tool
Building Content, Mitigation

Discussion Base Scenario

- It is now several weeks after we experienced the magnitude 7.0 earthquake on the Hayward Fault.
- While the earthquake did not cause any structural damage, it did cause damage to several pieces of equipment that we could not afford to lose. They were unanchored and fell or tipped over during the shaking.
- Additionally, the shaking knocked many items off shelves. In some instances the items created safety hazards such as broken glass and mixed cleaning chemicals.
- Now with the clean-up finished and regular operations beginning to resume, we are tasked with reflecting back on what could have been done prior to the earthquake to mitigate the impacts to building content.



Mitigation

Facilitator Tool: Building Content

This facilitator tool is a companion document to the HayWired Scenario Exercise Toolkit. It provides additional guidance and support material for leading a discussion-based exercise focused on mitigating earthquake damages to building content using the HayWired Earthquake Scenario.

Discussion Objective: Identify mitigation actions we can take prior to an earthquake to minimize the safety risks and damages caused by the shaking.

Discussion Scenario: It is now several weeks after we experienced a magnitude 7.0 earthquake on the Hayward Fault along with several aftershocks. The earthquakes caused damage to several pieces of equipment that we could not afford to lose. They were unanchored and fell or tipped over during the shaking. Additionally, the shaking knocked many items off shelves. In some instances the items created safety hazards such as broken glass and mixed cleaning chemicals. Now with the clean-up finished and regular operations beginning to resume, we are tasked with reflecting back on what could have been done prior to the earthquake to mitigate the impacts to building content.

Issue for Discussion: In each of our work and storage areas, identify supplies and equipment that have the potential for moving, falling, or tipping. For items posing additional safety risks and/or higher monetary lose, identify how we can secure them or otherwise minimize the risks.

Before Your Exercise...

See Section 4 of the Toolkit for instructions on how to facilitate a discussion-based exercise, including how to incorporate the theme-specific information compiled below.

Review Section 5 of the Toolkit so you are prepared to make use of insights and ideas captured during the discussion.

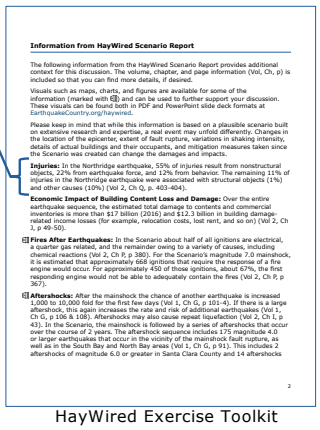
1

HayWired Exercise Toolkit
Facilitator Tool
Building Content, Mitigation

Discussion #1: Identifying Hazards

Data from HayWired Scenario Report

Injuries: In the Northridge earthquake, 55% of injuries result from nonstructural objects, 22% from earthquake force, and 12% from behavior. The remaining 11% of injuries in the Northridge earthquake were associated with structural objects (1%) and other causes (10%) (Vol 2, Ch Q, p. 403-404).



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Economic Impact of Building Content Loss and Damage: Over the entire earthquake sequence, the estimated total damage to contents and commercial inventories is more than $17 billion (2016) and $12.3 billion in building damage-related income losses (for example, relocation costs, lost rent, and so on) (Vol 2, Ch J, p 49-50).

Fires After Earthquakes: In the Scenario about half of all ignitions are electrical, a quarter gas related, and the remainder owing to a variety of causes, including chemical reactions (Vol 2, Ch P, p 380). For the Scenario's magnitude 7.0 mainshock, it is estimated that approximately 668 ignitions that require the response of a fire engine would occur. For approximately 450 of those ignitions, about 67%, the first responding engine would not be able to adequately contain the fires (Vol 2, Ch P, p 367).

Aftershocks: After the mainshock the chance of another earthquake is increased 1,000 to 10,000 fold for the first few days (Vol 1, Ch G, p 101-4). If there is a large aftershock, this again increases the rate and risk of additional earthquakes (Vol 1, Ch G, p 106 & 108). Aftershocks may also cause repeat liquefaction (Vol 2, Ch I, p 43). In the Scenario, the mainshock is followed by a series of aftershocks that occur over the course of 2 years. The aftershock sequence includes 175 magnitude 4.0 or larger earthquakes that occur in the vicinity of the mainshock fault rupture, as well as in the South Bay and North Bay areas (Vol 1, Ch G, p 91). This includes 2 aftershocks of magnitude 6.0 or greater in Santa Clara County and 14 aftershocks

2

HayWired Exercise Toolkit
Facilitator Tool
Building Content, Mitigation

HayWired Toolkit
Mock Exercise

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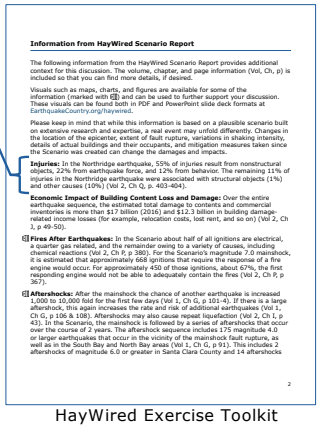

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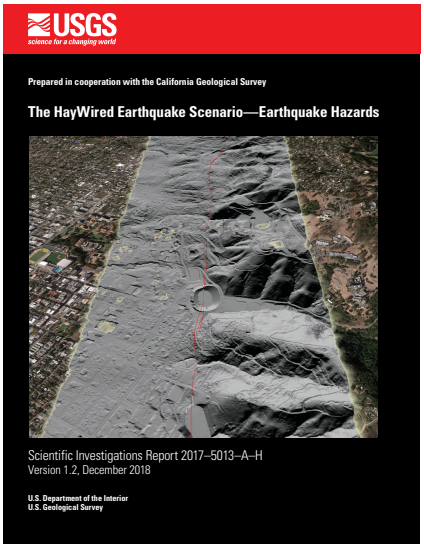

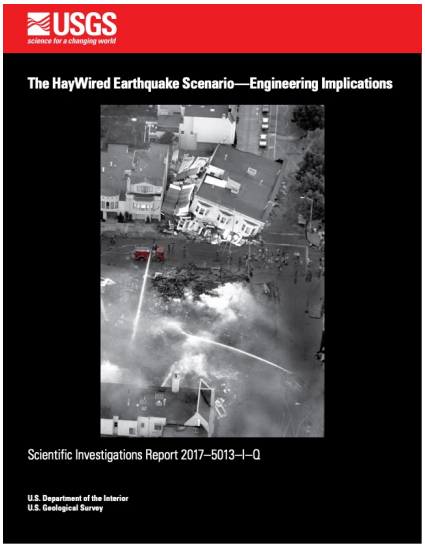

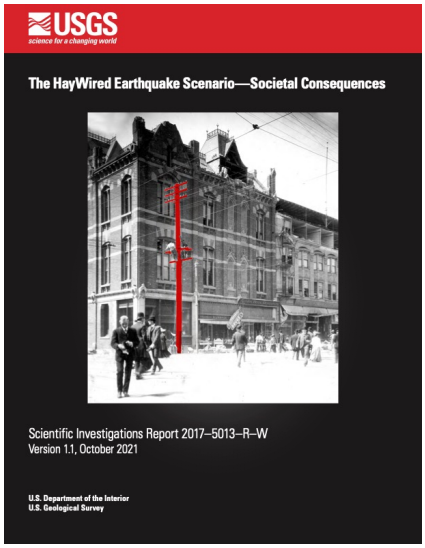

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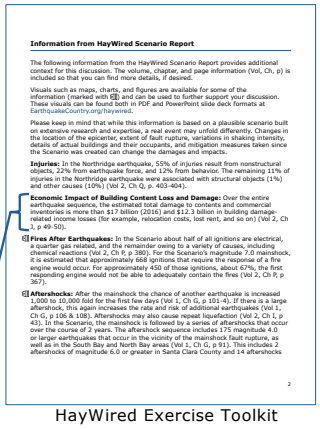

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Facilitator Tool
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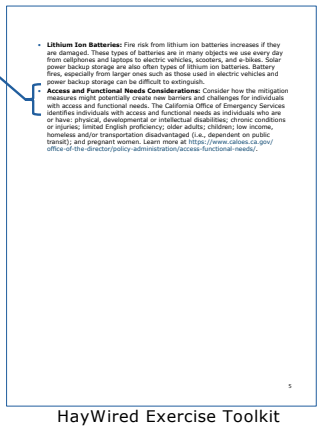
Additional Considerations

Access and Functional Needs Considerations: Consider how the mitigation measures might potentially create new barriers and challenges for individuals with access and functional needs.



HayWired Exercise Toolkit
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Mock Exercise

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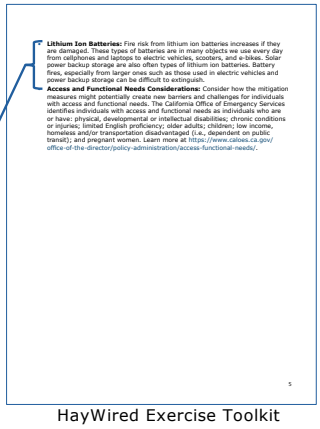

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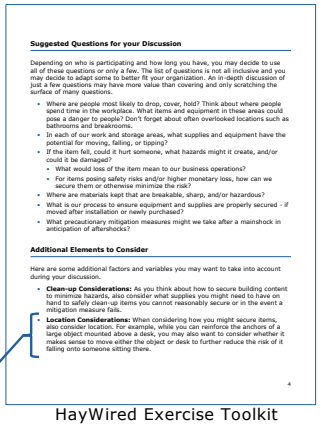

Suggested Questions for your Discussion

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- Where are people most likely to drop, cover, hold? Think about where people spend time in the workplace. What items and equipment in these areas could pose a danger to people? Don't forget about often overlooked locations such as bathrooms and breakrooms.
- In each of our work and storage areas, what supplies and equipment have the potential for moving, falling, or tipping?
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HayWired Toolkit
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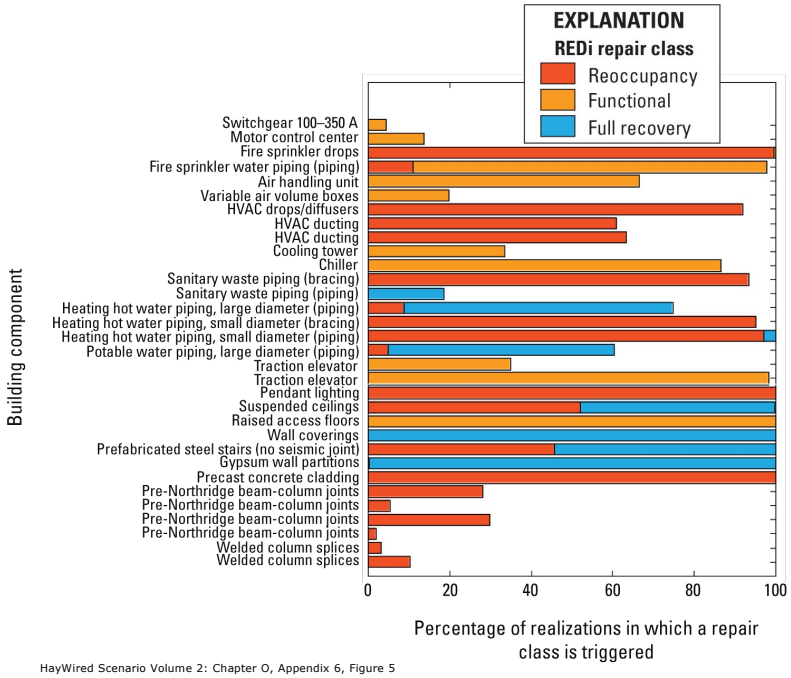
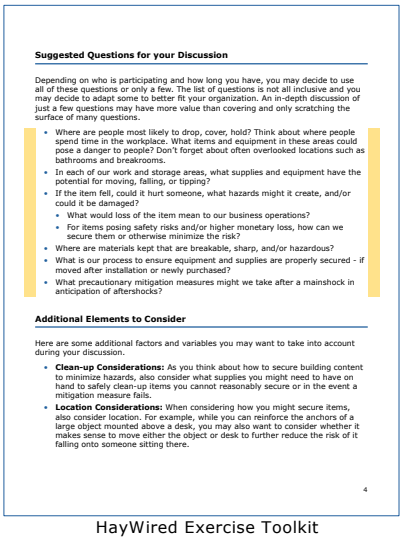


HayWired Scenario Volume 2: Chapter O, Appendix 6, Figure 5

Graph showing the percentage of realizations in which a building component type in building S-OK-B-20 (20-story steel-frame office building in Oakland, California; baseline orientation) incurs damage from the hypothetical moment-magnitude-7.0 mainshock of the HayWired earthquake scenario. Damaged components are assigned to a given REDi repair class reoccupancy, functional recovery, or full recovery. HVAC, heating, ventilation, air conditioning; A, ampere.

**** Caption is from the Report and is still being edited for the Toolkit ****

Discussion Questions



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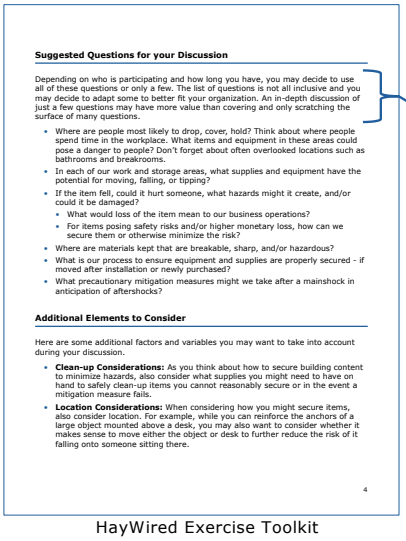

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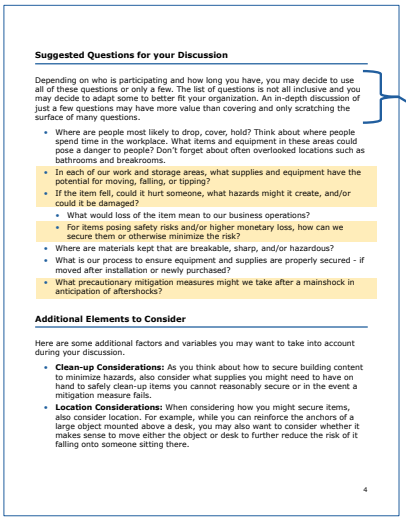

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Discussion #1 Questions

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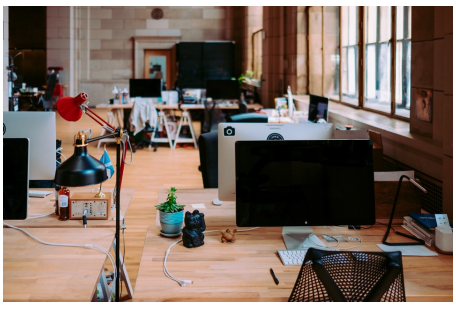
Meeting Room



Workspace

Also think beyond these two images: storage rooms, break rooms, cleaning closets, restrooms, up on the ceiling, …

Discussion #1 Questions - Home

What supplies and equipment have the potential for moving, falling, or tipping?

If the item fell, could it hurt someone, what hazards might it create, and/or could it be damaged? For items posing safety risks and/or higher monetary loss, how can we secure them or otherwise minimize the risk?



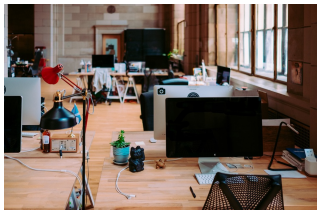
Discussion Recap

What gaps and vulnerabilities were identified?

What questions were raised that remain unanswered?

Were there any creative ideas you want to capture for future consideration?

What small adjustments could be made that will help both in day-to-day operations, as well as after an earthquake?


Networking Break

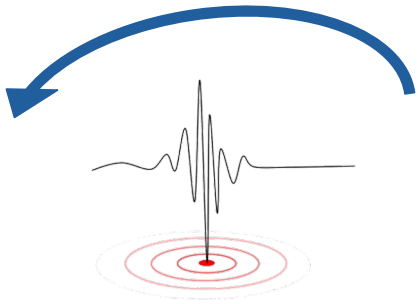
Ideas for during the break

- Introduce yourself to someone you don't know / Ask for an introduction
- Discuss strategies for mitigating building content hazards
- Discuss how you might use the HayWired Exercise Toolkit

Discussion #2: Thinking About Aftershocks

Discussion Base Scenario Recap

Imaging the earthquakes & aftershocks have happened and we are now reflecting about what we could have been done prior as mitigation.



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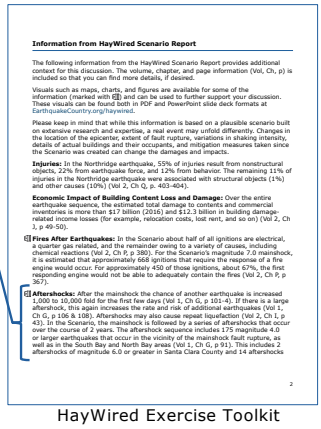

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Visuals such as maps, charts, and figures are available for some of the information (marked with) and can be used to further support your discussion. These visuals can be found both in PDF and PowerPoint slide deck formats at EarthquakeCountry.org/haywired.

Please keep in mind that while this information is based on a plausible scenario built on extensive research and expertise, a real event may unfold differently. Changes in the location of the epicenter, extent of fault rupture, variations in shaking intensity, details of actual buildings and their occupants, and mitigation measures taken since the Scenario was created can change the damages and impacts.

Injuries: In the Northridge earthquake, 55% of injuries result from nonstructural objects, 22% from earthquake force, and 12% from behavior. The remaining 11% of injuries in the Northridge earthquake were associated with structural objects (1%) and other causes (10%) (Vol 2, Ch Q, p. 403-404).

Economic Impact of Building Content Loss and Damage: Over the entire earthquake sequence, the estimated total damage to contents and commercial inventories is more than $17 billion (2016) and $12.3 billion in building damage-related income losses (for example, relocation costs, lost rent, and so on) (Vol 2, Ch J, p 49-50).

Fires After Earthquakes: In the Scenario about half of all ignitions are electrical, a quarter gas related, and the remainder owing to a variety of causes, including chemical reactions (Vol 2, Ch P, p 380). For the Scenario's magnitude 7.0 mainshock, it is estimated that approximately 668 ignitions that require the response of a fire engine would occur. For approximately 450 of those ignitions, about 67%, the first responding engine would not be able to adequately contain the fires (Vol 2, Ch P, p 367).

Aftershocks: After the mainshock the chance of another earthquake is increased 1,000 to 10,000 fold for the first few days (Vol 1, Ch G, p 101-4). If there is a large aftershock, this again increases the rate and risk of additional earthquakes (Vol 1, Ch G, p 106 & 108). Aftershocks may also cause repeat liquefaction (Vol 2, Ch I, p 43). In the Scenario, the mainshock is followed by a series of aftershocks that occur over the course of 2 years. The aftershock sequence includes 175 magnitude 4.0 or larger earthquakes that occur in the vicinity of the mainshock fault rupture, as well as in the South Bay and North Bay areas (Vol 1, Ch G, p 91). This includes 2 aftershocks of magnitude 6.0 or greater in Santa Clara County and 14 aftershocks

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Data from HayWired Scenario Report

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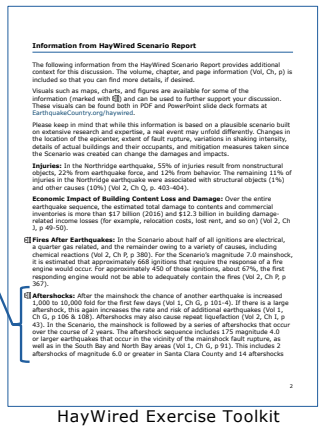

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Mock Exercise

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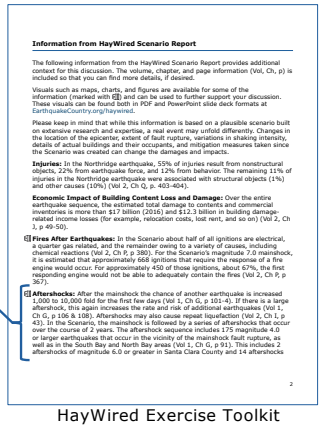
This includes 2 aftershocks of magnitude 6.0 or greater in Santa Clara County and 14 aftershocks of magnitude 5.0 to 5.9 near the Hayward Fault, near Vallejo, and in Santa Clara County (Vol 1, Ch G, p 97). Many of these aftershocks cause additional damage to infrastructure and buildings.



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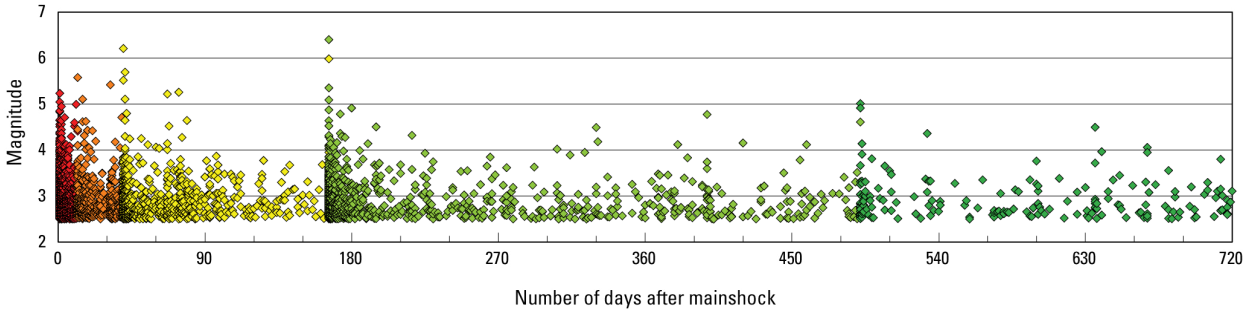
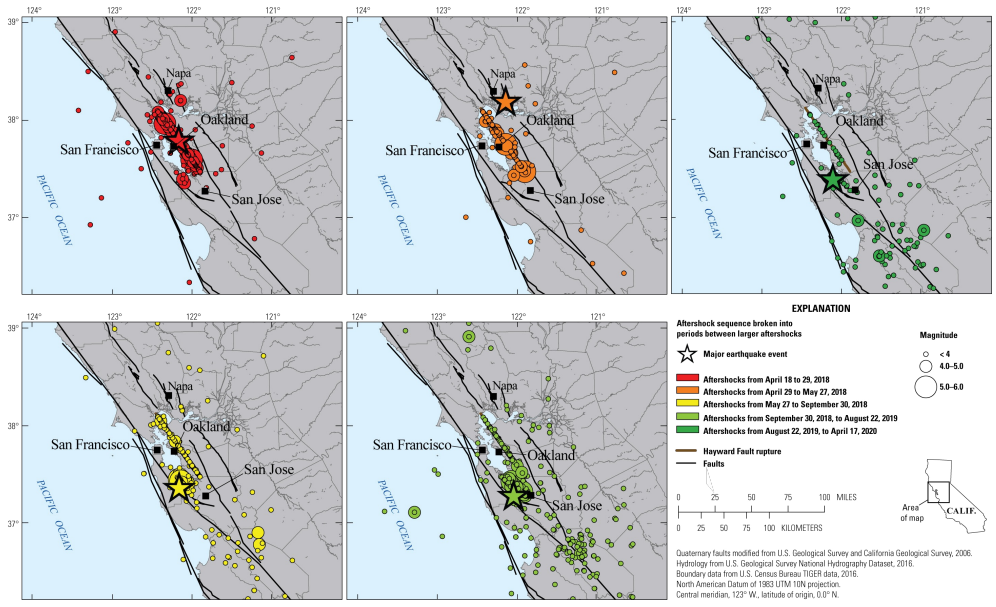


Graph showing the 2-year time series for HayWired earthquake scenario aftershocks of magnitude 2.5 or greater. The colored (red, orange, yellow, and green) dots mark periods in the sequence when a larger aftershock triggers more aftershocks.

HayWired Scenario Volume 1: Chapter G, Figure 4



Maps showing the HayWired Earthquake Scenario aftershock sequences within different time periods.

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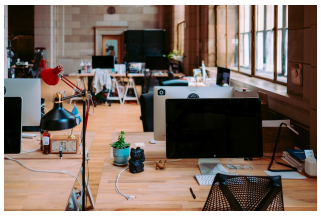
HayWired Scenario Volume 1: Chapter G, Figure 6

Discussion #2 Question

What precautionary mitigation measures might we take after a mainshock in anticipation of aftershocks?

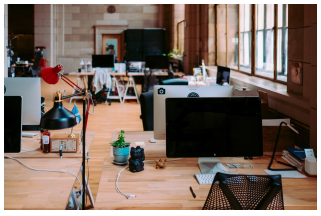

Discussion Recap

What gaps and vulnerabilities were identified?

What questions were raised that remain unanswered?

Were there any creative ideas you want to capture for future consideration?

What small adjustments could be made that will help both in day-to-day operations, as well as after an earthquake?


Closing Take-Aways

What ideas sparked by today's discussion

do you plan on taking away for

your organization and/or personal use?

Q&A

To be notified of future events and recordings, join ECA (free!):
EarthquakeCountry.org/join

Please take our survey:
SurveyMonkey.com/r/JVBYLDY

Questions?
info@earthquakecountry.org

Short Announcements from Attendees

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Participant Take-Aways

What is something that you:

learned
will do
will use
will tell others

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Open Discussion & Networking

Connect with ECA Bay Area

- EarthquakeCountry.org/bayarea
- bayarea@earthquakecountry.org

- Terremotos.org

Earthquake Country Alliance

- Twitter.com/eca
- info@earthquakecountry.org

Please take our brief survey about today's workshop:
SurveyMonkey.com/r/JVBYLDY