Inclusive, Collaborative, Dynamic

Incorporating Earthquake Early Warning

ShakeAlert® Tests, Drills and Exercises Toolkit

August 2022

Because seconds matter.

ShakeAlert™

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ShakeAlert Tests, Drills and Exercises Toolkit

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- Federal Emergency Management Agency
- Earthquake Country Alliance
- California Office of Emergency Services
- Oregon Office of Emergency Management
- Washington Emergency Management Division

ShakeAlert® Tests, Drills and Exercises Toolkit

Introduction

• Are you ready?

The West Coast of the United States is "earthquake country." The US Geological Survey (USGS)-managed **ShakeAlert® Earthquake Early Warning System** – in collaboration with academic, government, technical, emergency management, and community partners – is committed to educating the public about protective actions that can mitigate harm from earthquake hazards when shaking is expected. To advance this goal, the USGS has developed this ***ShakeAlert Tests, Drills, and Exercises Toolkit*** to incorporate earthquake early warning (EEW) into existing training activities.

As of 2022, ShakeAlert-powered alerts are delivered to cell phones via downloadable apps, the Android Operating System, and the Wireless Emergency Alert (WEA) system (similar to an AMBER alert). ShakeAlert-powered products and services also trigger automated actions to protect people, critical infrastructure, and vital systems, and to enable a faster return to normal status following an earthquake. For example, ShakeAlert EEW integration into facilities and vital infrastructure systems enables alerts to be automatically broadcast over public address systems in school and hospital settings. It can also slow and stop passenger rail trains, as well as close water valves to protect people and conserve this essential resource when shaking is expected.

Currently, EEW systems are operational in several places around the world, while others are in the development or construction phase. While the operational systems can vary in design, preparedness tests, drills, and exercises offer universal safety benefits.

• About this Toolkit

Emergency preparedness tests, drills, and exercises, including those with an EEW component, are key to whole-community preparedness. They help organizations to shape plans, assess and validate capabilities, and address areas for improvement. Designed for organizations that have implemented ShakeAlert EEW or are considering its integration, this ***ShakeAlert Tests, Drills, and Exercises Toolkit*** provides resources for planning, conducting, and evaluating tests, drills, and exercises with an EEW element. More broadly, organizations whose stakeholders (i.e., members, employees, visitors, patrons, etc.) receive ShakeAlert-powered notifications on their cell phones can also find this Toolkit to be helpful.

This ***ShakeAlert Tests, Drills, and Exercises Toolkit*** is meant to be "modular," so that an organization can use some or all of its contents to suit its size, resources, and desired frequency of tests, drills, and exercises. It can be used by both private and public entities, as well as community groups. This document will be regularly updated as the ShakeAlert EEW system evolves.

Importantly, this document and its associated tools adhere to the widely recognized and applied drill and exercise construct established by the Federal Emergency Management Agency (FEMA) Homeland Security Exercise and Evaluation Program (HSEEP).

HSEEP provides a set of guiding principles for exercise and evaluation programs, as well as a common approach to exercise program management, conduct, evaluation, and improvement planning.

Tests, Drills, Exercises

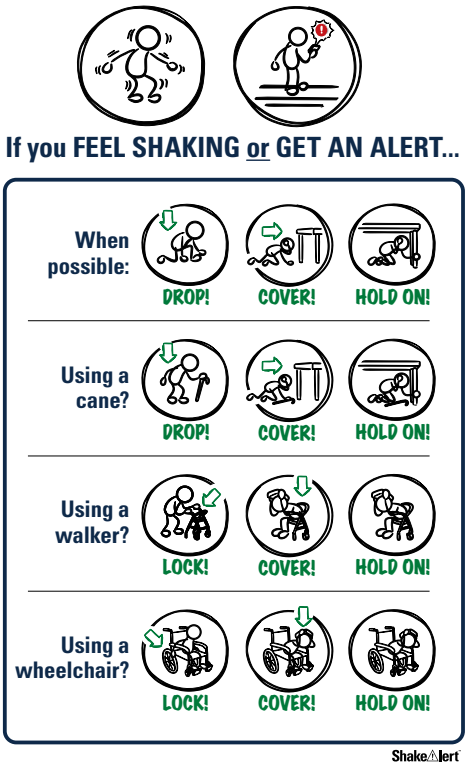
Tests, drills, and exercises are useful, cost-effective tools that have been proven to help organizations practice and refine their safety plans and procedures by identifying both capability gaps and areas for improvement. They can help to prepare individuals and build relationships among participants. The value of preparedness can be measured in lives saved, harm averted or mitigated, and a faster return to normal operations following an earthquake.

• Preparedness Value

Performing drills helps to save lives and minimize injuries.

Social science research has long shown that people who practice actions are more likely to take those actions when a safety-threatening event occurs, such as an earthquake or fire. Tests, drills, and exercises that repeat concepts build "muscle memory" of procedural knowledge and timely reaction. The more frequently a person practices a procedure or self-protective action, such as **DROP-COVER-HOLD ON**, the more likely they will employ it—almost without thinking—when they receive an alert or feel shaking.

It is vital that tests, drills, and exercises reach the whole community, including but not limited to people with access and functional needs. It is important to provide preparedness guidance and opportunities to test, drill, and exercise for those who may use mobility assistance tools and are not able to drop to the floor and take cover. The ShakeAlert Communications, Outreach, Education and Technical Assistance (CEO&TE) team offers guidance in these short videos that can be used in conjunction with tests, drills, and exercises, along with many multilingual digital and print files. These resources can be found at ShakeAlert.org. The Earthquake Country Alliance also offers helpful resources here.



Regular drills, performed at least annually, also increase safety from secondary hazards, such as tsunamis, landslides, and aftershocks.

• Opportunities to Test, Drill, and Exercise with Earthquake Early Warning

Incorporating a ShakeAlert EEW focus into an organization's existing tests, drills, and/or exercises can happen in various ways and venues.

Required Drills

Schools, government agencies, and other organizations often require regular drills. Adding an EEW focus to tests, drills, and/or exercises helps participants gain important knowledge about protective action to take during an earthquake. This can be done with only minor modifications to the original test, drill, or exercise. Also, many employers require and regularly practice a variety of tests, drills, and/or exercises (e.g., fire, active shooter, or evacuation). Incorporating tests, drills, and exercises with an EEW focus is a good complement to an existing training regime, and can be conducted during staff meetings, as a stand-alone event (if it is a more extensive exercise), and during both new employee onboarding and as refresher

training.

Disaster Preparedness and Awareness Events

ShakeOut – International ShakeOut Day is held annually on the third Thursday of October. This event provides an opportunity to practice **DROP-COVER-HOLD ON** as a response in preparation for an earthquake. Incorporating a ShakeAlert EEW focus is an ideal opportunity to reinforce this advance alert.

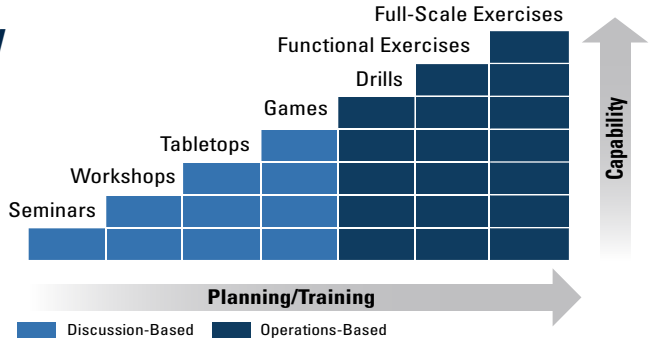
Tsunami Preparedness Events – Washington, Oregon, and California state and local governments hold tsunami awareness campaigns and preparedness events that include tests, drills, and exercises. These are ideal opportunities to incorporate ShakeAlert EEW, since tsunamis can follow large earthquakes.

National Preparedness Month – The Federal Emergency Management Agency (FEMA) has declared September as National Preparedness Month. State and local governments, along with organizations across the West Coast and United States, host a variety of disaster preparedness events and awareness campaigns, both in-person and virtually (visit ready.gov). This is an excellent time to incorporate ShakeAlert EEW into tests, drills, and exercises to reinforce self-protective actions, such as **DROP-COVER-HOLD ON**.

Anniversaries of Major Earthquakes and Other Natural Hazard Events – Anniversaries of major West Coast earthquakes and other natural hazard events worldwide can be annual reminders to encourage people and organizations to think about earthquake preparedness and associated hazard mitigation measures. However, it's important to keep in mind that these anniversaries can be particularly challenging for those who were negatively impacted by past events.

Types of Tests, Drills and Exercises with EEW

A test, drill, or exercise is an event or activity that is delivered through discussion or action to develop, assess, and/or validate plans, policies, procedures, and capabilities that organizations can use to achieve planned objectives.



Source: FEMA/HSEEP

There are a variety of tests, drills, and exercises that can be used for specific purposes (e.g., to test and drill employees' abilities to **DROP-COVER-HOLD ON** when they receive a ShakeAlert-powered alert) and in different venues with varying frequencies. A test can be a simple technical assessment with the purpose of ensuring that ShakeAlert System technology that is integrated into an organization's public address system is working properly, for instance. A short drill can be incorporated into a staff meeting, while a more expansive exercise can inject one or more scenarios to gauge an organization's preparedness and response abilities.

Many organizations use the FEMA HSEEP model to plan, conduct, and evaluate their capabilities and address deficiencies or gaps. The USGS adheres to the HSEEP's exercise type names and structure. The table on the next page crosswalks drill and exercise types named by HSEEP and the Earthquake Country Alliance (ECA), which organizes ShakeOut activities.

Tests

Tests are a way to assess an organization's EEW integration system to ensure it has the technical capacity and ability envisioned to offer ShakeAlert EEW. This often includes testing of hardware, software, and any required human interventions. Some schools and hospitals, for instance, have co-located ShakeAlert EEW technology with their fire alarm systems or as independent, stand-alone alerting systems. A test of this technology may only require the participation of a small number of the organization's leaders or technical staff. See Resources/Checklists in this Toolkit for steps to take before, during, and after a test.

CROSSWALK – HSEEP and ECA DRILL/EXERCISE TYPES	
HSEEP TYPE	**ECA TYPE**
DRILL ***A drill is a coordinated, supervised, operations-based activity to test a single, specific operation or function*** within an organization (e.g., people take a protective action, such as **DROP-COVER-HOLD ON** or a modified protective action) when an EEW is received).	**Level 1** (Simple: Information-sharing related to DROP-COVER-HOLD ON) **Level 2** (Basic: Life Safety)
TABLETOP EXERCISE (TTX) ***A TTX is discussion-based and involves key personnel who discuss simulated scenarios in an informal setting***. TTXs can be used to assess plans, policies, and procedures, including policies asking employees and or patrons/visitors to adhere to protective actions (**DROP-COVER-HOLD ON** or a modified protective action) when an EEW is received.	**Level 3** (Intermediate: Decision-Making, Discussion-Based
FUNCTIONAL EXERCISE (FE) ***FEs are operation-based activities designed to test personal, decision-making, procedures, and equipment.*** They simulate a crisis situation to assess how equipment and participants respond. They can range from very simple to very complex and are played out in real time with simulated hazards and situations.	**Level 4** (Advanced: Operations Drill)
FULL SCALE EXERCISE (FSE) ***FSEs are the most complex and resource-intensive type of operations-based exercise*** that requires significant time and coordination to plan, execute, and evaluate. They often involve large sites and multiple agencies, organizations, and jurisdictions in real time, and often include simultaneous scenarios.	**Level 4** (Advanced: Operations Drill)

Discussion-Based Exercises

Seminars, Workshops, Tabletop Exercises, Games

Discussion-based exercises involve a bit more preparation and participation than tests, and include seminars, workshops, tabletop exercises (TTXs), and games. These types of exercises familiarize participants or "players" with or task them to develop new plans, policies, and/or procedures. They are led by facilitators or presenters who keep participants moving towards exercise objectives.

Seminars are effective for all group sizes. With limited time constraints, seminars aim to achieve a common framework of understanding. Seminars are usually led by a facilitator, are lecture-based, and elicit minimal participant feedback.

Workshops may include lectures and presentations but are deliberately structured to be engaging. Workshops include breakout sessions that are guided by a facilitator who sets clear objectives to help prompt discussion from engaged participants.

Tabletop Exercises (TTX) are designed to generate in-depth discussion in a problem-solving environment. A scenario is presented to describe an event at a simulated time. Players apply their knowledge and skills to a list of problems presented by an experienced facilitator. TTX may include presentations; however, the majority of "work" is done in plenary or breakout sessions.

Games are a structured form of play designed for individuals or teams in a competitive or noncompetitive environment. Games are guided by clear rules, data, and procedures. They are designed to depict an actual or hypothetical situation to ensure that the participants make decisions and take plausible actions. Games can be used to reinforce training, stimulate team building, or enhance operational and tactical capabilities. Check out some of these games suggested by the National Academy of Sciences.

See Resources/Checklists in this Toolkit for steps to take before, during, and after discussion-based exercises.

Operations-Based Exercises

Operations-based exercises include drills, functional exercises (FE), and full-scale exercises (FSE). These exercises validate plans, policies, and procedures; clarify roles and responsibilities; and identify resource gaps. Operations-based exercises include a real-time response action, such as **DROP-COVER-HOLD ON** or other self-protective actions. Drills and exercises differ by their scope and complexity.

Drills, Functional and Full-Scale Exercises

Drills test a single function (e.g., fire drill, evacuation drill). They provide training on equipment, validate procedures, or practice and maintain current skills, such as **DROP-COVER-HOLD ON** or modified protective actions. They can be conducted as stand-alone events or as a series. Clearly defined plans, procedures, and protocols need to be in place so participants know what is expected of them.

Students in the Stanwood-Camano School District practiced DROP-COVER-HOLD ON during a ShakeOut drill. Image is courtesy of the University of Washington.

Functional Exercises (FE) are operation-based activities designed to test personnel, decision-making, procedures, and equipment. They simulate a crisis situation to assess how equipment and participants respond. Functional exercises can range from very simple to very complex. Typically, they are stressful, as the scenario is played out in real time with simulated hazards and situations, known as injects. Generally, functional exercises test some component(s) of an organization's Emergency Operation Plan (EOP), and/or its Continuity of Operations Plan (COOP), and involve the highest levels of the organization's leaders. Functional exercises may involve multiple organizations or many divisions within a large organization. They can be effective relationship-building tools.

Full-Scale Exercises (FSE) are the most complex and resource-intensive type of exercise that requires significant time and coordination to plan, execute, and evaluate. They often involve multiple agencies, organizations, and jurisdictions in real-time scenarios. An exercise site for an FSE is usually large and accommodates many activities that occur simultaneously. Many FSEs are conducted in California, Oregon, Washington (and beyond) during the Great ShakeOut event each fall.

See Resources/Checklists in this Toolkit for steps to take before, during, and after operations-based exercises.

Integrate EEW into Earthquake Tests, Drills, Exercises

The ShakeAlert Earthquake Early Warning (EEW) System can be integrated into existing tests, drills, and/or exercises. Ranging from simple to advanced, the following drill and exercise design options include an EEW component. See Resources/Checklists in this Toolkit for steps to take before (plan), during (conduct), and after (evaluate) the test, drill, or exercise. Based on its identified purpose, objectives, scope, and available resources, each organization will determine the appropriate type of drill or exercise.

Drills and exercises, in particular, can be ideal opportunities to establish and solidify recommended protective actions during and following earthquakes. Equally important is the need to refute misinformation about self-protective best practices. Official rescue teams, emergency preparedness experts, and others recommend **DROP-COVER-HOLD ON** (or a modified protective action for those who cannot easily drop to the floor) as the best way, in most situations, to self-protect during earthquake shaking. Running outside or standing in a doorway are dangerous or outdated recommendations, while the "triangle of life theory" is an unsubstantiated idea that doesn't apply to countries such as the United States, where many buildings are unlikely to experience total collapse.

Technical Check of Automated EEW Systems

Test EEW integration to ensure that all components of your organization's EEW system are working correctly.

A ShakeAlert-powered box (12 in. by 16 in.) is mounted on the wall in the main office of Stanwood Elementary School in WA. The Stanwood-Camano School District has integrated ShakeAlert EEW into its public address system, so all buildings across its campus are alerted simultaneously. Image is courtesy of Varius, Inc., a ShakeAlert Licensed Operator

Tabletop Exercises

A tabletop exercise (TTX) is a discussion-based exercise that usually includes a small group of the organization's operational staff who discuss their roles, plans, resource needs, and actions as soon as the alert is received (including a **DROP-COVER-HOLD ON** or modified protective action), and after the earthquake occurs. They can be ideal for small divisions in an agency and organizational leaders who make budgetary, policy, and safety-related decisions. The duration of a tabletop exercise depends on the audience, the topic being exercised, and the objectives. Many tabletop exercises can be conducted in a few hours, so they are cost-effective tools to validate plans and capabilities.

Functional

A functional exercise (FE) simulates an emergency in the most realistic manner possible. The scope will vary, but all functional exercises are conducted in a real-time environment to test and evaluate the capability of an organization's crisis response. The exercise could be for an earthquake alone or any scenario where an earthquake occurs, in which case the EEW could be inserted at any time during the scenario.

Planning with EEW

Planning for drills and exercises with an EEW component is not difficult when some simple steps and procedures are consistently followed. A well-designed drill or exercise provides a low-risk environment to test capabilities; familiarizes participants with an organization's goals and objectives, as well as their roles and responsibilities; and fosters meaningful interaction and communication to maximize learning.

1. **Create a Planning Team**. Involve representatives from the whole community to plan your organization's drills and exercises. This should include languages spoken locally, as well as people with access and functional needs. Simple drills may not require much planning, especially if they are mandated by regulation or law. However, to fully test a system or process, multiple perspectives and levels of expertise will enhance the experience and enable a better evaluation of your test, drill, or exercise.

   An Exercise Coordinator should be appointed if this position is not already established in the organization. This person oversees the drill or exercise and ensures that it stays on track.

   An Exercise Facilitator can be the same as the Exercise Coordinator for drills and smaller exercises. However, a dedicated facilitator is specifically needed for Tabletop Exercises (TTX). A facilitator guides participants through a discussion of one or more scenarios.

   Technical Support will be needed to integrate ShakeAlert EEW and any other technical features used in the test, drill, or exercise.

   Exercise Evaluators are often individuals who are outside the organization and can provide more objective observations. The larger the exercise, the more evaluators will be required.

   A Scribe(s) will be needed for taking notes during the drill or exercise, as well as during the evaluation.

2. **Identify a clear purpose, objective(s), and scope** that reflect what your organization wants to test, drill, or exercise with an EEW component. This will help to clarify what you are testing, drilling, or exercising and why.

3. **Identify who will be involved**. Decide if the test, drill, or exercise will include a specific group or the entire organization, and what their involvement or task(s) will be.

4. **Write your scenario**. Add the alert to start or to be used during your test, drill, or exercise.

   For **Drills**, the scenario is straightforward; typically, only a single action is tested.

   For **Functional Exercises**, scenarios could be short and simple or lengthy and complex, depending on what is being tested. The identified purpose and objective(s) will help your organization to focus on these topics for evaluation and improvement plans (i.e., often known as an After-Action Report/Improvement Plan [AAR/IP]).

WHOLE COMMUNITY INCLUSION

It is critical to carefully design physical and technologically accessible aspects of exercises, so all people can participate — including those with disabilities and access and functional needs, and those with limited or no English proficiency, for example. Be thoughtful, flexible, accommodating, and inclusive – from your planning team members to the planning itself. The "whole community" concept is central to FEMA's ***National Response Framework*** and HSEEP.

5. **Decide on a date, time, and location for optimal participation**. Confirm this time with the organization's leadership and all key participants.

6. **Determine what technical support is needed** before or during the drill or exercise. (See the Technical Checklist.)

7. **Notify or invite participants/players**. Include information that describes the ShakeAlert EEW test, drill, or exercise, possible benefits from participation, and proposed roles for the day of the event. Include the type, date, time, and location of the test, drill, or exercise; a description on what to expect; and a point of contact and note on where to access additional information in advance.

8. **Consider these registration tips**. Consider using a simple process for participants to register using online tools such as Eventbrite, Google Form, Zoom, other web-based formats, or whatever reliable approach works for your organization! Remember, not everyone has access to the internet and may not speak English. Encourage organizations to work with their stakeholders to encourage participation among the whole community and to manage registration for those who need help.

   Depending on your identified purpose, objective(s), and scope, consider registering the drill or exercise with the following:

   - ShakeOut
   - Your state and/or local Emergency Management Agency
   - Ready.gov (FEMA)

9. **Reminders are always important.** Consider issuing reminders via email, post them on the organization's website and on its social media channels, and via placards placed in high-traffic areas throughout the organization's facilities. This is important to engage sufficient and meaningful participation and to ensure those who have registered show up on the day of the drill or exercise.

KEEPING RECORDS

It may be important to keep a record of all participants for training records and to meet any compliance requirements.

Documented participation can also be kept in employee records to assist floor wardens and building assessment teams following earthquakes.

These records can be proof-positive of team, organizational, or community preparedness successes. They may even factor into future preparedness grant applications.

Determine Purpose, Objectives, Scope

It is imperative to determine the intended purpose of a drill or exercise, regardless of its size or complexity, and at least one objective and its scope. This will offer clarity and focus on what is to be tested and why. Capability gaps and areas for improvement will be more easily identified by evaluating if and how the drill or exercise did or did not meet the purpose, objective(s), and scope.

Purpose

Typically, the purpose of a drill or exercise focuses on the desired singular, overarching outcome. A simple purpose is best. Multiple purpose statements may be used for larger, more complex exercises.

Example: "The drill's purpose is to test employees' compliance with recommended self-protective actions when they receive a ShakeAlert EEW."

Objective(s)

An objective(s) is an actionable item(s) an organization wants to achieve in a specific amount of time. The best objectives are SMART (Specific, Measurable, Achievable, Relevant, and Time-Based). Only one objective is needed, but more should be added as more elements are tested.

Objective Example: Evacuate every employee from the building and assemble in the Evacuation Zone within 10 minutes after shaking has stopped.

Customizable Objective Example: Demonstrate the ability of <organization> staff to receive a ShakeAlert-powered alert through <system> and take appropriate protective actions (e.g., **DROP-COVER-HOLD ON** or a modified protective action) within seconds, in accordance with <plan/policy/procedure>.

SMART Guidelines for Exercise Objectives		
Specific		Objectives should address the five Ws – who, what, when, where, and why. The objective specifies what needs to be done with a timeline for completion.
Measurable		Objectives should include numeric or descriptive measures that define quantity, quality, cost, etc. Their focus should be on observable actions and outcomes.
Achievable		Objectives should be within the control, influence, and resources of exercise play and participant actions.
Relevant		Objectives should be instrumental to the mission of the organization and link to its goals and strategic intent.
Time-bound		A specified and reasonable timeframe should be incorporated into all objectives.

Source: FEMA/HSEEP

Scope

The scope is the "how big" part of your drill or exercise. Determine who and what should be included.

Scope Example: The drill and evacuation exercise will only include employees on the second floor of the building.

Conducting Tests, Drills, Exercises

For steps to conduct a test, drill, or exercise, see the checklists at Appendix A of this document.

Questions about ShakeAlert EEW among organizational or community participants should be a part of all drill and exercise discussions. Links to ShakeAlert EEW informational resources should be provided (and can be found at ShakeAlert.org). Since the EEW alert will be included in drill or exercise objectives, some questions for the Planning Team could include:

1. What weaknesses in your emergency plans were identified by the drill or exercise?
2. Did all technical and mechanical components of your ShakeAlert-powered integration work as planned?
3. What issues arose during the drill or exercise?
4. Were people able to perform protective actions in a timely manner after receiving the ShakeAlert-powered alert (such as **DROP-COVER-HOLD ON** or a modified protective action)?
5. Were there any gaps identified?
6. Are there high-priority issues that need to be addressed?
7. Were the purpose and objectives of the drill or exercise met?

The following questions could be asked of participants, either in-person or via an app, email, or other communication method:

1. What were your first thoughts and actions when you received the alert?
2. Have you identified a process to account for your employees/family members/volunteers?
3. What is your information-sharing plan of action?
4. What essential functions need to be shut down?
5. How did using the ShakeAlert EEW audio enhance your drill (if used)?
6. Did people respond properly with protective actions?

Evaluating Tests, Drills, Exercises

Evaluating drills and exercises should be done by reviewing their purpose and objective(s). For additional information, refer to the checklists at Appendix A of this document.

Urge players and participants to provide feedback immediately after the drill or exercise. If too much time has elapsed after the event, people tend not to respond. When possible, participants should come together immediately after an exercise to conduct a "hotwash," which is a time to discuss the strengths and weaknesses of the drill or exercise. Scribes should be used to document the hotwash and other after-exercise meetings.

Typically, the Exercise Planning Team regroups to listen to the comments about the exercise, then creates an After-Action Report/Improvement Plan (AAR/IP). The AAR/IP analyzes the exercise and its observed strengths and weaknesses. Using the drill's or exercise's purpose and objective(s), identify the procedures or plans that require change or refinement and dates for correction. Share the AAR/IP with the organization's leadership for approval and implementation of corrective actions.

Other Considerations

• Accessiblity

Accessibility pertains to people's ability to access information regardless of a disability, an access and functional need, or situational issues with language, limited English proficiency, or location.

Information about ShakeAlert EEW and any earthquake-related preparedness and safety guidance should be accessible, inclusive, and culturally competent (See the ***ShakeAlert Inclusive and Culturally Competent Messaging Best Practices Guide*** and accompanying short video.)

Planning and designing drills and exercises should include representation from your whole organization or community. Perspectives from a variety of people's experiences enhance the drill and exercise design, and create a more realistic view of what actually works and what does not – for all.

• Tsunami Evacuation

Organizations located in a tsunami hazard zone should consider planning for and conducting a tsunami evacuation drill or exercise in conjunction with (and immediately following) an EEW-focused earthquake drill or exercise.

Although EEW alerts may not directly announce an approaching tsunami, the earthquake itself serves as the tsunami warning for coastal communities. By constructing drills or exercises that deliberately pair protective actions to be taken when an EEW alert is received (e.g., **DROP-COVER-HOLD ON** or a modified protective action) with a tsunami evacuation drill or exercise, the association between earthquakes and the protective steps to be taken for a possible impending tsunami can be strengthened. (See infographic at right.)

Consistent Messaging

It is very important to avoid any conflicting messages in drill and exercise planning.

For example, if your organization's earthquake response plan involves an evacuation of the building after shaking stops, begin your drill or exercise with **DROP-COVER-HOLD ON** or a modified protective action. It's best to begin by asking if participants are familiar with these protective actions; consider demonstrating them. Immediately after the drill or exercise, consider conducting an evacuation or fire drill, so participants will "learn" what to do after earthquake shaking ceases. Make it clear to participants that **DROP-COVER-HOLD ON** and modified protective actions should be viewed separately from an evacuation after an earthquake; stress that an evacuation may only be necessary if it is unsafe to remain inside or if authorities instruct them to exit the building.

Discipline-Specific Considerations

In Educational Settings

Test-Drill-Exercise Challenges in K-12 Environments

- Typically, K-12 environments are individual schools that involve hundreds of children where different types of drills and exercises occur regularly (e.g., fire, active shooter, etc.).
- Public schools are guided by school district policies as well as state policies and regulations, whereas private schools may not be required to conduct drills.
- Relative independence of high school students could result in them being outside of a classroom setting during a drill.

Test-Drill-Exercise Challenges in Higher Education (Colleges/Universities)

- Student populations at colleges and universities can vary significantly. Those with a large physical footprint and large student populations can make drills and exercises challenging to conduct.
- As adults, college students can choose whether or not they wish to participate in on-campus drills and exercises. Additionally, participation often resides with individual professors, which can make participation spotty.
- While state colleges and universities are subjected to state-mandated requirements for fire or evacuation drills, class schedules can make drill and exercise participation challenging.

In Free-Choice Learning Environments

- Free-choice learning environments, such as museums and libraries, present unique challenges when planning for and conducting drills and exercises during operational during operational hours. This is because visitors will vary by their ability to take a protective action, their English proficiency (assuming an EEW message is broadcast over a public address system in English), and other factors.
- Consider posting multilingual signage and infographics that advise and depict **DROP-COVER-HOLD ON** and modified protective actions throughout the facility.
- Consider advising visitors when they enter that a test or drill is scheduled for a particular time that day and that their participation is voluntary but is encouraged.

APPENDIX A: CHECKLISTS

Check out additional HSEEP exercise and preparedness tools here.

Technical Checklist for Tests, Drills, and Exercises with EEW

NO.	ACTIONS	COMPLETED
	BEFORE THE TEST, DRILL, OR EXERCISE	
	Test your entire system to check its ability to alert people to take an immediate protective action or to trigger an automated machine-to-machine action.	
	If applicable, contact your ShakeAlert EEW Technical Partner to assist with testing and trouble-shooting.	
	Test the audio and video that have been downloaded for the drill and ensure they play as expected. (See Appendix B for these resources.)	
	DURING THE TEST, DRILL, OR EXERCISE	
	Ask your organization's ShakeAlert EEW Technical Partner to assist with any technical issues that arise during the drill or exercise.	
	AFTER THE TEST, DRILL OR EXERCISE	
	Work with your ShakeAlert EEW Technical Partner to address any technical issues that occurred during the test, drill, or exercise.	

EEW and Protective Actions Checklist

NO.	ACTIONS	COMPLETED
	BEFORE THE TEST, DRILL, OR EXERCISE	
	Assemble your Planning Team. For simple drills, this could be just a Drill Coordinator, Technical Support, an Evaluator, and a Scribe.	
	Determine the purpose, objective(s), and scope, date and time of the drill, the venue, and how you will incorporate ShakeAlert EEW.	
	If your organization serves the general public, determine if and how you will involve them in the test, drill, or exercise.	
	If applicable, contact your ShakeAlert EEW Technical Partner to assist with testing, trouble-shooting, and procedures to activate an EEW alert.	
	Notify participants of the test, drill, or exercise and provide multilingual infographics that depict and describe **DROP-COVER-HOLD ON** and modified protective graphics.	
	Register your drill or exercise at www.ShakeOut.org if you are participating in ShakeOut, and your state/local management agencies, where appropriate.	
	Download ShakeAlert EEW drill audio and any recordings of realistic earthquake sound effects to play during the earthquake component of the drill or exercise. (See Appendix B for these resources.)	
	Establish contingency plans for unexpected events that could halt or change your drill or exercise.	
	DURING THE TEST, DRILL, OR EXERCISE	
	Start your drill or exercise with an announcement, such as "This is a drill." Instruct participants to **DROP-COVER-HOLD ON** or take a modified protective action as soon as players receive the EEW alert.	
	Add audio or video as described in your drill or exercise plan.	
	After one minute, announce that the shaking has stopped, participants may return to where they were, and that the drill or exercise has ended.	
	Invite your ShakeAlert EEW Technical Partner to assist with any technical issues that arise during the drill or exercise.	

NO.	ACTIONS	COMPLETED
	AFTER THE TEST, DRILL OR EXERCISE	
	Solicit feedback from all participants to reflect viewpoints across the whole community.	
	Use feedback to analyze the drill or exercise, and to assess if your purpose and objective(s) were achieved.	
	Create an After-Action Report and Improvement Plan (AAR/IP) that details what was successful and should be continued, as well as what needs to be improved or corrected. Submit the AAR/IP to the organization's leadership for corrective action or to record successful elements.	
	Work with your ShakeAlert EEW Technical Partner to address any technical issues that occurred during the drill or exercise.	
	Schedule the next earthquake drill with EEW as soon as possible.	
	Share photos and stories on Twitter (be sure to tag @USGS_ShakeAlert), with your state and local emergency management agency, and at www.ShakeOut.org.	

Discussion-Based Tabletop Exercise (TTX) Checklist

NO.	ACTIONS	COMPLETED
	BEFORE THE EXERCISE	
	Assemble the TTX Planning Team. TTXs require a Facilitator to guide discussions; the Exercise Coordinator could also serve this role. A Scribe is also required to take detailed notes of the discussion.	
	Decide who should participate in the discussion-based TTX. Invite the organization's decision-makers; they will be key to assessing the effectiveness of current plans and procedures. Ensure that people from the whole community are represented to get a realistic viewpoint from those who may be most affected by the plans and procedures being evaluated.	
	Determine the purpose, objective(s) and scope, date and time of the exercise, and where and how you will incorporate a ShakeAlert EEW.	
	Write the scenario you want to discuss in your TTX.	
	Invite your ShakeAlert EEW Technical Partner to assist with testing, trouble-shooting, and procedures to activate a ShakeAlert EEW alert.	
	Notify participants of the exercise and provide multilingual **DROP-COVER-HOLD ON** and modified protective action infographics. Consider demonstrating these protective actions before or during the TTX; these exercises offer an opportunity to show short videos of these protective actions.	
	Register your TTX at www.ShakeOut.org if you are participating in ShakeOut, and your state/local management agencies, where appropriate.	
	Download ShakeAlert EEW drill audio and any recordings of realistic earthquake sound effects to play during the earthquake component of the TTX. (See Appendix B for these resources.)	
	Establish contingency plans for unexpected events that could halt or change your TTX.	
	DURING THE EXERCISE	
	Start with the TTX scenario. Remind participants that a ShakeAlert EEW will be a part of the exercise and that they are expected to **DROP-COVER-HOLD ON** or take a modified protective action when the EEW alert is received.	
	Initiate the EEW alert according to the exercise scenario and add audio/video described in the scenario.	
	After one minute, announce that the shaking has stopped and that participants may resume the discussion.	
	Invite your ShakeAlert EEW Technical Partner to assist with any technical issues that arise during the TTX.	

NO.	ACTIONS	COMPLETED
	AFTER THE EXERCISE	
	Solicit feedback from all TTX participants. Be sure to solicit feedback from people who represent the whole community to get a realistic viewpoint from those who may be most affected by the plans and procedures being evaluated.	
	Use feedback to analyze the exercise and to assess if your purpose and objective(s) were achieved.	
	Create an After-Action Report and Improvement Plan (AAR/IP) that details what was successful in the exercise that should be sustained, as well as what needs to be improved or corrected. Submit the AAR/IP to the organization's leadership for corrective action or to memorialize successful elements.	
	Update the organization's plans and procedures to reflect what was learned in the TTX.	
	Work with your ShakeAlert EEW Technical Partner to address any technical issues that occurred during the exercise.	
	Schedule the next TTX that incorporates ShakeAlert EEW as soon as possible.	
	Share photos and stories on Twitter (be sure to tag @USGS_ShakeAlert), with your state and local emergency management agency, and at www.ShakeOut.org.	

Functional Exercise (FE) Checklist

NO.	ACTIONS	COMPLETED
	BEFORE THE EXERCISE	
	Assemble an Exercise Planning Team. Functional exercises often need larger teams, especially with bigger and/or more complex scenarios. An Exercise Coordinator will guide the planning, but input from personnel in the areas being tested or impacted provides helpful expertise. Ensure the Planning Team includes representation from your whole community.	
	Determine the purpose, objective(s) and scope, date and time of the exercise, and where and how you will incorporate ShakeAlert EEW.	
	Carefully design your scenario to be as realistic as possible, while ensuring it aligns with what is to be tested. This should be defined in your purpose and objective(s). Consider the best times to incorporate the EEW alert and how that will affect the scenario.	
	Determine who will participate in the exercise and what roles they will play. Players (actors) are those who are being affected by the procedure or system; they are typically volunteers playing a role, such as a victim of falling debris or someone who has evacuated from a building, etc. If members of the general public are involved in the exercise, their role will be limited to a member of the general public.	
	Training may be required for participants and players in FEs. Plan this in advance, so everyone who needs training can attend.	
	Notify participants of the FE and provide multilingual **DROP-COVER-HOLD ON** and modified protective action infographics.	
	Invite your ShakeAlert EEW Technical Partner to assist with testing, trouble-shooting, and procedures to activate a ShakeAlert-powered alert.	
	Register your FE at www.ShakeOut.org if you are participating in ShakeOut, and your state/local management agencies, where appropriate.	
	Download ShakeAlert EEW drill audio and any recordings of realistic earthquake sound effects to play during the earthquake component of the FE. (See Appendix B for these resources.)	
	Establish contingency plans for unexpected events that could halt or change your exercise.	

NO.	ACTIONS	COMPLETED
	JUST BEFORE THE EXERCISE STARTS	
	Remind all participants that this is a no-fault situation and that they are present to test a procedure or system, not themselves.	
	Also remind participants that safety is paramount and that there is an established "safe word" to halt the exercise and attend to the safety issue.	
	DURING THE EXERCISE	
	Initiate the EEW alert according to the exercise scenario and add audio/video described in the scenario. (See Appendix B for these resources.)	
	After one minute, announce that the shaking has stopped, and that participants should resume the exercise.	
	Invite your ShakeAlert EEW Technical Partner to assist with any technical issues that arise during the exercise.	
	Ensure that water and snacks are available for all participants at all times.	
	AFTER THE EXERCISE	
	Thank and feed all participants.	
	Solicit feedback from all participants at the hotwash. The information gathered during a hotwash contributes to the AAR/IP, and any exercise suggestions can improve future exercises.	
	Use feedback to analyze the exercise and to assess if your purpose and objective(s) were achieved.	
	Create an After-Action Report and Improvement Plan (AAR/IP) that details what was successful in the exercise and should be sustained, as well as what needs to be improved or corrected. Submit the AAR/IP to the organization's leadership for corrective action or to record successful elements.	
	Update the organization's plans and procedures to reflect what was learned in the FE. Work with your ShakeAlert EEW Technical Partner to address any technical issues that occurred during the exercise.	
	Schedule the next FE that incorporates a ShakeAlert EEW as soon as possible.	
	Share photos and stories on Twitter (be sure to tag @USGS_ShakeAlert), with your state and local emergency management agency, and at www.ShakeOut.org	

Appendix B: Audio and Visual Resources

ShakeAlert end-users are encouraged to use the tones, alerts, and languages that are appropriate for their test, drill, or exercise. Below are audio and video resources; additional multimedia and multilingual resources are available at ShakeAlert.org.

- **ShakeAlert Audio**
  https://drive.google.com/drive folders/12Z0jGCIHnErxaLXU_82m2mMNtJd7EePD?usp=sharing
- **Earthquake Sound Effects (Audio)**
  www.ShakeOut.org/resources
- **ShakeAlert Protective Actions (Video)**
  - Basic **DROP-COVER-HOLD ON**
  - Modified protective actions (Wheelchair, Walker, In a Bed)
  - Tsunami zone protective actions

Appendix C: Other Resources

ShakeAlert.org Resources

- Messaging Toolkits and Associated Resources
- Examples of ShakeAlert-style drills (including news articles)
  https://environment.uw.edu/news/2021/10/shakealert-helps-students-learn-to-drop-cover-and-hold-on/

USGS Resources

- https://earthquake.usgs.gov/
- https://www.usgs.gov/programs/earthquake-hazards/connect
- https://earthquake.usgs.gov/data/shakemap/

FEMA Resources

- Homeland Security Exercise and Evaluation Program (HSEEP)
  https://www.fema.gov/emergency-managers/national-preparedness/exercises/hseep
- Ready.gov (Earthquakes)
  https://www.ready.gov/earthquakes

Earthquake Country Alliance Resources

- https://www.earthquakecountry.org/

State-Specific Resources

- California
  - California Governor's Office of Emergency Services (Cal OES) Earthquake Warning California
    https://earthquake.ca.gov/
  - Cal OES/My Hazards
    https://myhazards.caloes.ca.gov/
- Oregon
  - Oregon Office of Emergency Management/Hazards and Preparedness
    https://www.oregon.gov/OEM/hazardsprep/Pages/default.aspx
  - Oregon Health Authority/Earthquakes
    https://www.oregon.gov/oha/PH/Preparedness/Prepare/Pages/PrepareForEarthquake.aspx
  - 2 Weeks Ready
    https://www.oregon.gov/oem/hazardsprep/Pages/2-Weeks-Ready.aspx
- Washington
  - Emergency Management Division
    https://mil.wa.gov/emergency-management-division

Incorporated Research Institutions for Seismology (IRIS) Resources

(IRIS provides a wide range of education, workforce, and outreach resources. IRIS's mission is to advance awareness and understanding of seismology and earth science, while inspiring careers in geophysics.)

- https://www.iris.edu/hq/ (Select EDUCATION in the nav bar.)
- https://www.iris.edu/ShakeAlert (ShakeAlert resources)

Other Applicable Resources

- Substance Abuse and Mental Health Services Administration (SAMSHA)
  https://www.samhsa.gov/find-help/disaster-distress-helpline/disaster-types/earthquakes
- QuakeStart Toolkit
  https://flash.org/readybusiness/quake_smart.php
- Koshland Museum/National Academies LabX (decision-making hazard games/escape room)
  https://labx.org/extreme-event/materials