# 800px-FEMA_-_44649_-_Earthquake_damaged_buildings_in_California.jpg800px-FEMA_-_26845_-_Photograph_by_Adam_Dubrowa_taken_on_11-02-2006_in_Hawaii.jpg800px-US_Navy_110315-N-2653B-054_The_city_of_Ofunato%2C_Japan%2C_is_severely_damaged_by_a_9_0_magnitude_earthquake_and_subsequent_tsunami.jpg

**Business Continuity Plan Test**

**Situation Manual**

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# Preface

The Business Continuity Plan Test was developed as a mechanism for testing Business Continuity Plans.

This Situation Manual is an unclassified exercise document and is intended FOR EXERCISE USE ONLY. Due to the nature of the information discussed, special considerations may be applicable for document access and storage. All exercise participants should use the appropriate guidelines to protect this material in accordance with their jurisdictional directives.

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# Handling Instructions

1. The title of this document is the *Business Continuity Plan Test Situation Manual.*
2. This Situation Manual is intended FOR EXERCISE USE ONLY. This document should be safeguarded, handled, transmitted, and stored in accordance with the appropriate security directives.
3. At a minimum, the attached materials should only be disseminated on a need-to-know basis to applicable partners.

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# Introduction

## Purpose

The purpose of the Business Continuity Plan (BCP) Test is to create an opportunity for businesses to identify and examine the issues and capability gaps they are likely to face in implementing their BCPs and in recovering from business operation disruptions.

## Scope

The BCP Test focuses on a facility’s recovery efforts following selected business disruptions intended to represent a broad spectrum of disruption threats: hurricane, earthquake, ice storm, and blackout. The intent is to improve the overall recovery capabilities and actions and the collective decisionmaking process. It is designed to be an open, thought-provoking exchange of ideas to help develop and expand existing knowledge of policies and procedures within the framework of BCP implementation.

## Exercise Objectives

Exercise design objectives are focused on improving the understanding of information sharing and incident management activities, and developing recommended actions and procedural adjustments to address potential problem areas. Sample objectives are as follows:

1. Discuss and validate internal BCP implementation procedures in response to various incidents in accordance with existing plans and procedures.
2. Discuss and validate the effectiveness of BCP functions in directing and controlling recovery activities in accordance with existing plans and procedures.
3. Assess the ability to identify critical functions, actions, and timeframes to facilitate short- and long-term recovery.
4. Identify gaps, redundancies, developmental activities, and best practices in the event of a catastrophic incident.
5. Add personalized exercise objectives as necessary.

## Roles

* *Players* respond to the situation presented based on expert knowledge of current plans, procedures, and insights derived from training and experience.
* *Observers* observe the exercise; they are not participants in the moderated discussion.
* *Facilitators* provide situation updates and moderate discussion. They also provide additional information or resolve questions as required.
* *Evaluators* are responsible for gathering relevant data arising from facilitated discussions during the exercise. They will then use this information to collectively build an After Action Report and Improvement Plan (AAR/IP).

## Exercise Structure

The following is an approximate breakdown of a schedule for the exercise:

* Registration: 8:30 a.m. – 9:00 a.m.
* Introduction: 9:00 a.m. – 9:15 a.m.
* Scenario Module 1: 9:15 a.m. – 10:00 a.m.
* Scenario Module 2: 10:00 a.m. – 10:45 a.m.
* Break: 10:45 a.m. – 11:00 a.m.
* Scenario Module 3: 11:00 a.m. – 11:45 a.m.
* Hot Wash: 11:45 a.m. – 12:30 p.m.
* End: 12:30 p.m.

Players in the Test will participate in the modules listed above. Each module begins with a scenario update that summarizes the key events occurring within that time period. A series of general questions following the scenario summary will guide the facilitated discussion of critical issues in each of the modules. Based on exercise priorities, time dedicated to each module will be managed by the facilitator.

## Exercise Guidelines

* This is an open, low-stress, no-fault environment. Varying viewpoints, even disagreements, are expected.
* Comments will be non-attribution, using the “Chatham House” rule.[[1]](#footnote-1)
* Responses should be based on knowledge of current plans and capabilities (i.e., use only existing capabilities) and insights derived from training.
* Decisions are not precedent setting and may not reflect your organization’s final position on a given issue. This is an opportunity to discuss and present multiple options and possible solutions.
* Problem-solving efforts should be the focus. Issue identification is not as valuable as suggestions and recommended actions.
* The situation updates, written material, and resources provided are the basis for discussion; there are no hidden materials or scenarios.

## Exercise Assumptions and Artificialities

In any exercise, a number of assumptions and artificialities may be necessary to complete play in the time allotted. During this exercise, the following apply:

* The scenario is plausible, and events occur as they are presented;
* There are neither “hidden agendas” nor any “trick questions;”

All players receive information at the same time;

The scenario is completely artificial; and

Assume cooperation and support from other organizations and agencies as appropriate.

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# Scenario Module 1: Earthquake



**Tuesday; Time**

* The (insert fault name) fault located approximately 40 miles (insert cardinal direction – N, S, E, or W) of your facility ruptures at a magnitude of 7.7 (Mw).[[2]](#footnote-2)2
* The released energy is felt as shaking from hundreds of miles away.
* A large number of aftershocks have been triggered since the first earthquake. It is estimated that the aftershocks for the next 48 hours will include numerous events with magnitudes between 7.1 (Mw) and 3.0 (Mw).

Figure 1. Collapsed Building (DHS Photo)

* Unconfirmed news reports are estimating hundreds of fatalities and injuries in the (insert local) region. The (insert local) region is the most severely impacted region to be hit by this catastrophic disaster.
* It is estimated that approximately 25% of your physical facility has been severely damaged and compromised due to structural failure, such as collapsed walls and ceilings.

**Wednesday; Time**

* Local police, fire department, hospital, and emergency services are operating at full capacity with volunteers mobilized, but are overwhelmed and have significant difficulty in providing services.
* Limited do-not-drink and boil water alerts have been disseminated to the majority of hospitals, fire suppression, and some communities.
* Broken drinking water lines are cross-contaminated from damaged wastewater lines.
* Citizens may be unable to adhere to cautions to boil water for consumption due to the loss of electricity and natural gas.
* Major electrical transmission and gas lines have experienced moderate damage and may result in intense fires.
* There are rolling blackouts in the immediate area; partial restoration is not expected for the next few weeks.
* Numerous highway bridges and railroad bridges have collapsed or are severely damaged and declared unsafe.
* Many roads are either severely damaged or covered with debris, making movement difficult and unsafe, and frustrating for response elements.
* Radio, telephone, cell phone, and internet connectivity is severely limited or busy.
* Radio systems for city departments are sustaining limited functionality.

**Discussion Questions**

*Note: Not all questions may be relevant to your organization.*

1. In this case, what would your organization do first?

Figure 2. Bridge Destroyed by Earthquake (DHS photo)

1. What initial damage assessments, if any, could be conducted at this time?
	1. Who will conduct these assessments, and what roles, responsibilities, and qualifications do these personnel have in conducting these assessments?
	2. Does your Facilities Management/Security Team have any specific rules regarding re-entry into the facility?
2. At what point would the organization declare a disaster?
	1. How would this be done? Who makes this decision?
	2. How would the employees be notified of a disaster declaration and by whom? What if power is out?
	3. What criteria or conditions determine that your facility/organization cannot continue to operate?
	4. Who makes the decision that operations must be slowed or ceased?
	5. What notifications need to be made if your organization’s operations are slowed or ceased? How is this information communicated to your customers?
	6. If operations are slowed or ceased, will your employees continue to be paid or will they need to take leave?
3. What means of communication will be used to allow the facility and operational elements, components, and/or divisions to remain in contact with one another?
	1. Are alternate and resilient means of communication available?
4. If your organization operates an Emergency Operations Center (EOC), would it be stood up?
	1. How? Who makes that decision?
	2. Where is it located? Do the appropriate people know its location?
	3. How would your organization deal with travel restrictions or impassibility? What if personnel cannot get there? Are there alternatives?
5. Would you relocate to your Alternate Site?
	1. How would your Alternate Site be activated and by whom?
	2. Where is your Alternate Site located? How would team members get there?
	3. What functionality is available at the Alternate Site? Does it have full telecommunication capabilities?
	4. What kinds of logistical arrangements might be needed if staff need to stay at the site for an extended period?
6. What preparations would you take for a possible long-term power outage?
	1. Does your facility have a backup generator and fuel? If so, how long is emergency power available?
	2. What kind of arrangement do you have with your fuel supplier?
	3. If you lost power, how would your organization maintain communications?
7. What data is most important to business operations?
	1. Do you store backup data at an Offsite Storage Site? If so, where is this site located?
8. How much downtime is acceptable without significantly affecting business operations? Can anything be done to extend this period of time?

Does Human Resources have strategies in place to assist employees and their families?

1. Are policies in place to provide flexibility to displaced employees, such as policies for working alternate schedules and/or teleworking?
2. Does your company carry business interruption insurance?
3. How long could it take to repair structural and physical damage?
	1. How could this affect your business operations?
4. How will you restore disrupted services?
5. How will you clean the facility and remove all health and safety hazards?

What would be your business’ long term prospects in the face of this kind of disaster? What kinds of strategies might be needed in order to improve your resilience?

# Scenario Module 2: Ice Storm

**Saturday, 7:00 PM**

* A powerful upper-level system begins to move into the State. The National Weather Service (NWS) Forecast Office is predicting one to two inches of freezing rain and issues a winter weather advisory.
* Overnight, warm, moist air lifts over the surface Arctic air that sits in place across much of the State, forcing temperatures below freezing. With the warm air about 1,000 feet above the surface, precipitation begins to fall in the form of freezing rain. 

**Sunday, 1:00 AM**

* The ice storm has downed tree limbs and power lines, and local utility reports indicate that approximately [68,400] people are without service. Many areas are reporting severe black ice conditions.
* The hardest-hit area is the [insert your region - eastern, western, northern, southern, central] part of the State, which has received more than two inches of ice.

Figure 3. Downed trees (FEMA photo).

* Telephone offices are running on generator power, but telephone and cell service are still available for most customers. Travel is discouraged in the [insert region] portion of the State, as well as the local metropolitan area.

**Sunday, 4:00 AM**

* The State department of transportation has more than 200 vehicles clearing State roads, though progress is very slow. In addition to plowing many of the State-maintained roadways, the trucks are applying sand, salt, and magnesium chloride to the most impacted roads in the [insert region] part of the State.
* Meanwhile, police, fire, and EMS crews are being overwhelmed with weather-related calls; most first responders are handling nearly double their normal number of calls.

Requests are being made for drivers with 4-wheel drive vehicles and snow mobiles to report to local hospitals to assist in providing transportation for nurses and other critical staff.

* Weather forecasts predict more freezing rain.

**Monday, 5:30 AM**

* Most people awaken on Monday morning to find that numerous schools and businesses across the State have closed because of the inclement weather conditions, power outages, and treacherous roads. This includes your facility.

Figure 4. Ice Storm (FEMA photo)

* The NWS predicts another inch of freezing rain that day. Efforts to clear the roads are ongoing; however, travel will be extremely limited for several days, and efforts to restore partial power to the region could take several days.

**Pre-Storm Discussion Questions**

*Note: Not all questions may be relevant to your organization.*

1. In this case, what would your organization do first to prepare for a possible ice storm?
2. What means of communication will be used to allow the facility and operational elements, components, and/or divisions to remain in contact with one another?
	1. Are alternate and resilient means of communication available?
3. What initial damage assessments, if any, could be conducted at this time?
	1. Who will conduct these assessments, and what roles, responsibilities, and qualifications do these personnel have in conducting these assessments?
	2. Does your Facilities Management/Security Team have any specific rules regarding re-entry into the facility?
4. What preparations would you take for a possible long-term power outage?
	1. Does your facility have a backup generator and fuel? If so, how long is emergency power available?
	2. What kind of arrangement do you have with your fuel supplier?
	3. If you lost power, how would your organization maintain communications?
5. What data is most important to business operations?
	1. Do you store backup data at an Offsite Storage Site? If so, where is this site located?
6. How much downtime is acceptable without significantly affecting business operations? Can anything be done to extend this period of time?

**Post-Storm Discussion Questions**

1. Once the storm hits, what would your organization do first?
2. Would your organization declare a disaster?
	1. How would this be done? Who makes this decision?
	2. How would the employees be notified of a disaster declaration and by whom? What if power is out?
	3. What criteria or conditions determine that your facility/organization cannot continue to operate?
	4. Who makes the decision that operations must be slowed or ceased?
	5. What notifications need to be made if your organization’s operations are slowed or cease? How is this information communicated to your customers?
	6. If operations are slowed or ceased, will your employees continue to be paid or do they need to take leave?
3. If your organization operates an EOC, would it be stood up?
	1. How? Who makes that decision?
	2. Where is it located? Do the appropriate people know its location?
	3. How would your organization deal with travel restrictions or impassibility? What if personnel cannot get there? Are there alternatives?
4. Would you relocate to your Alternate Site?
	1. How would your Alternate Site be activated and by whom?
	2. Where is your Alternate Site located? How would team members get there?
	3. What functionality is available at the Alternate Site? Does it have full telecommunication capabilities?
	4. What kinds of logistical arrangements might be needed if staff need to stay at the site for an extended period?
5. Does your company carry business interruption insurance?
6. Are policies in place to provide flexibility to employees, such as policies for working alternate schedules and/or teleworking?
7. How will you restore disrupted services?

What would be your business’ short term prospects in the face of this kind of disaster? What kinds of strategies might be needed in order to improve your resilience?

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# Scenario Module 3: Hurricane

**Tropical Depression 6
Date -8; 9:00 am**

* The National Hurricane Center (NHC) is tracking Tropical Depression 6, currently at 15 degrees north latitude, 55 degrees west longitude in the mid-Atlantic.

**Hurricane Omni
Date -6; 11:45 am**

* Tropical Depression 6 is upgraded to Tropical Storm Omni, then to Hurricane Omni.
* It is currently a category 2, with winds at 100 mph and gusts in excess of 125 mph.

Figure 5. Hurricane (DHS photo)

**Omni Upgraded
Date -4; 1:25 pm**

* Omni is upgraded to a category 3 hurricane with sustained winds above 125 mph and gusts at 140 mph.

**Path Shifts
Date -2; 3:45 pm**

* Omni turns north. Its eye is now located approximately 120 nautical miles (nm) east of [insert your city/county and State], with a storm diameter of 450 miles.
* Hurricane-force winds extend to 95 nm from the eye. The storm travels at a speed of 15 mph with maximum sustained winds approaching 155 mph.
* High winds and rain squalls lash the coast.

**Landfall Predicted
[Date -2; 10:15 am]**

* The storm system has settled on a northwesterly track at 15 mph.
* The NHC predicts potential landfall near [insert your city/county and State], within the next 36 hours.
* Hurricane warnings have been issued for coastal areas. Extensive damage is predicted.
* Massive evacuation within 5 to 10 miles of the shoreline could be required. Airline service in the area is suspended due to weather conditions.
* Surge, winds, and heavy rains are experienced for hundreds of miles along the coast.

**Landfall
Month Day; 11:45 am**

* The eye of category 3 Hurricane Omni reaches [insert your city/county and State].
* Omni’s eye is 15 nm in diameter, with hurricane-force winds 120 nm from the center and tropical-storm-force winds up to 200 nm.
* Storm surge measures in excess of 25 feet.

**Preliminary Assessments
Month, Day; 4:00 pm**

* Preliminary assessments of damage are in progress throughout the region as the storm passes and begins to weaken.
* Casualties include persons trapped in congested traffic areas and collapsed structures.
* Many are reported as missing or carried away by storm surge.

Figure 6. Flooded Street (DHS photo)

* There is structural damage in low-lying areas from storm surge and subsequent water damage across the majority of residential and commercial structures.
* There are significant amounts of debris on major roadways, preventing access by response teams.
* Thousands are homeless and without transportation, placing a major burden on shelter and mass care facilities.
* Utility services are severely degraded:
	+ Power lines, high-voltage pylons, and street-level utility poles damaged by high winds and flying debris.
	+ Water and waste systems are inoperable due to damaged facilities and potentially contaminated source water.
* Underground tanks of gasoline and diesel fuel at service stations in lower-lying areas release uncontrolled amounts of fuels into floodwaters and are carried into other areas as water levels subside.

**Infrastructure Damage
[Date + 2]**

* It is estimated that approximately 25% of your physical facility has been severely damaged and compromised due to wind/rain/flood damage.
* Many businesses have experienced damage to buildings and infrastructure as well as lost employees and customers.
* All transportation routes are damaged to some degree and have limited use.

**Service Gaps
Date + 5**

* Service disruptions remain numerous.
* Power is restored to essential areas and systems.
* Most communication failures are addressed, but there are “dead spots” in areas that need continuous communication capabilities.

**Repair Problems
Date + 15**

* Hospitals are reporting a significant increase in worker-related injuries and respiratory problems.
* Homes and businesses with roof damage have been patched with tarpaulins by area contractors to expedite return of those facilities to normal use.
* Work-related safety issues arise as workers take shortcuts.
* Mold and mildew pose a health hazard to responders working in damaged buildings.

**Pre-Landfall Discussion Questions**

*Note: Not all questions may be relevant to your organization.*

1. In this case, what would your organization do first to prepare for possible landfall?
2. What means of communication will be used to allow the facility and operational elements, components, and/or divisions to remain in contact with one another?
	1. Are alternate and resilient means of communication available?
3. What preparations would you take for a possible long-term power outage?
	1. Does your facility have a backup generator and fuel? If so, how long is emergency power available?
	2. What kind of arrangement do you have with your fuel supplier?
	3. If you lost power, how would your organization maintain communications?
4. What data is most important to business operations?
	1. Do you store backup data at an Offsite Storage Site? If so, where is this site located?
5. How much downtime is acceptable without significantly affecting business operations? Can anything be done to extend this period of time?

**Post-Landfall Discussion Questions**

1. Once landfall occurs, what would your organization do first?
2. What initial damage assessments, if any, could be conducted at this time?
	1. Who will conduct these assessments, and what roles, responsibilities, and qualifications do these personnel have in conducting these assessments?
	2. Does your Facilities Management/Security Team have any specific rules regarding re-entry into the facility?
3. At what point would the organization declare a disaster?
	1. How would this be done? Who makes this decision?
	2. How would the employees be notified of a disaster declaration and by whom? What if power is out?
	3. What criteria or conditions determine that your facility/organization cannot continue to operate?
	4. Who makes the decision that operations must be slowed or ceased?
	5. What notifications need to be made if your organization’s operations are slowed or ceased? How is this information communicated to your customers?
	6. If operations are slowed or ceased, will your employees continue to be paid or do they need to take leave?
4. If your organization operates an EOC, would it be stood up?
	1. How? Who makes that decision?
	2. Where is it located? Do the appropriate people know its location?
	3. How would your organization deal with travel restrictions or impassibility? What if personnel cannot get there? Are there alternatives?
5. Would you relocate to your Alternate Site?
	1. How would your Alternate Site be activated and by whom?
	2. Where is your Alternate Site located? How would team members get there?
	3. What functionality is available at the Alternate Site? Does it have full telecommunication capabilities?
	4. What kinds of logistical arrangements might be needed if staff need to stay at the site for an extended period?
6. Does your company carry business interruption insurance or flood insurance?
7. How long could it take to repair structural and physical damage?
	1. How could this affect your business operations?

Does HR have strategies in place to assist employees and their families?

1. Are policies in place to provide flexibility to displaced employees, such as policies for working alternate schedules and/or teleworking?
2. How will you restore disrupted services?
3. How will you clean the facility and remove all health and safety hazards?

What would be your business’ long term prospects in the face of this kind of disaster? What kinds of strategies might be needed in order to improve your resilience?

# Scenario Module 4: Blackout

**Tuesday; 9:00 am**

* Temperatures have reached record highs in the region for four straight days. As a result, people are constantly running their air conditioning which is straining an already over-worked power grid. Officials have asked local residents to conserve power whenever possible.

**Wednesday; 2:00 pm**

* A rolling blackout leaves many neighboring cities and towns in the dark at various times. The surrounding region is at a standstill. Local officials are struggling to get emergency information to thousands of people who now have no TV or Internet service.
* So far, the blackouts have not affected your immediate area, but local officials are preparing for the worst and are urging citizens to prepare their homes and businesses for a possible loss of power.

Figure 7. Blackout (Cavus Media LLC)

* Your company has not yet been directly affected, but could be very soon.

**Thursday; 10:00 am**

* Transportation in the region has been severely impacted. The regional airport has been shut down and dozens of outbound and inbound flights have been cancelled, stranding thousands of passengers. Public transportation operating off the power grid is inoperable.
* Without power, gas stations are unable to pump fuel, leaving motorists and long-haul truckers low on fuel. Roads and highways are becoming clogged with vehicles stranded due to lack of fuel.
* Cell phone service is spotty at best; providers are struggling to restore service.
* Your facility loses power for the first time.

**Friday; 2:00 pm**

* Authorities begin restoring power on a rolling basis throughout the region.

**Saturday; 7:30 am**

* Your facility has its power restored, as well as phone and Internet capability.

**Pre-Blackout Discussion Questions**

*Note: Not all questions may be relevant to your organization.*

1. In this case, what would your organization do first to prepare for possible blackout?
2. What means of communication will be used to allow the facility and operational elements, components, and/or divisions to remain in contact with one another?
	1. Are alternate and resilient means of communication available?
3. What preparations would you take for a possible long-term power outage?
	1. Does your facility have a backup generator and fuel? If so, how long is emergency power available?
	2. What kind of arrangement do you have with your fuel supplier?
	3. If you lost power, how would your organization maintain communications?
4. What data is most important to business operations?
	1. Do you store backup data at an Offsite Storage Site? If so, where is this site located?
5. How much downtime is acceptable without significantly affecting business operations? Can anything be done to extend this period of time?

**Post-Blackout Discussion Questions**

1. Once blackout occurred, what would your organization do first?
2. What initial damage assessments, if any, could be conducted at this time?
	1. Who will conduct these assessments, and what roles, responsibilities, and qualifications do these personnel have in conducting these assessments?
	2. Does your Facilities Management/Security Team have any specific rules regarding re-entry into the facility?
3. At what point would the organization declare a disaster?

How would this be done? Who makes this decision?

* 1. How would the employees be notified of a disaster declaration and by whom?
	2. What criteria or conditions determine that your facility/organization cannot continue to operate?
	3. Who makes the decision that operations must be slowed or ceased?
	4. What notifications need to be made if your organization’s operations are slowed or cease? How is this information communicated to your customers?
	5. If operations are slowed or ceased, will your employees continue to be paid or do they need to take leave?
1. If your organization operates an EOC, would it be stood up?
	1. How? Who makes that decision?
	2. Where is it located? Do the appropriate people know its location?
	3. How would your organization deal with travel restrictions or impassibility? What if personnel cannot get there? Are there alternatives?
2. Would you relocate to your Alternate Site?
	1. How would your Alternate Site be activated and by whom?
	2. Where is your Alternate Site located? How would team members get there?
	3. What functionality is available at the Alternate Site? Does it have full telecommunication capabilities?
	4. What kinds of logistical arrangements might be needed if staff need to stay at the site for an extended period?
3. Are policies in place to provide flexibility to displaced employees, such as policies for working alternate schedules and/or teleworking?
4. Does your company carry business interruption insurance?
5. How will you restore disrupted services?
6. What would be your business’ short term prospects in the face of this kind of disaster? What kinds of strategies might be needed in order to improve your resilience?

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# Appendix A: Acronym List

| **Acronym** | **Definition** |
| --- | --- |
| **AAR/IP** | After Action Report/Improvement Plan |
| **DHS** | U.S. Department of Homeland Security |
| **EAP** | Emergency Action Plan |
| **EMS** | Emergency Medical Service |
| **EOC** | Emergency Operations Center |
| **FEMA** | Federal Emergency Management Agency |
| **HazMat** | Hazardous Materials |
| **HSEEP** | Homeland Security Exercise and Evaluation Program |
| **IP** | DHS NPPD Office of Infrastructure Protection |
| **MMS** | Moment Magnitude Scale |
| **MOU** | Memorandum of Understanding |
| **Mw** | See MMS |
| **N/A** | Not Applicable |

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1. “When a meeting, or part thereof, is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed.” (Reference: Chatham House, http://www.chathamhouse.org) [↑](#footnote-ref-1)
2. 2 Mw refers to the “moment magnitude scale” (abbreviated as MMS, but denoted as Mw), which is used by seismologists to measure the size of earthquakes in terms of the energy released. The scale was developed in the 1970s to succeed the 1930s era Richter magnitude scale. Even though the formulae are different, the new scale retains the familiar continuum of magnitude values defined by the older one. The MMS is now the scale used to estimate magnitudes for all modern large earthquakes by the United States Geological Survey. (Reference: USGS Earthquake Magnitude Policy, http://earthquake.usgs.gov/aboutus/docs/020204mag\_policy.php) [↑](#footnote-ref-2)