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HOW TO PLAN, CONDUCT AND EVALUATE TSUNAMI EXERCISES

UNESCO

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The guideline represents an adaptation of the New Zealand document 'CDEM Exercises Director's Guideline for Civil Defence Emergency Management Groups (DGL10/09)'. Other best practice material that is recognised in 'Bibliography and References' were also used.

It has further benefitted from a wealth of published and unpublished information and experience, including Exercise Pacific-Wave'06, A Pacific-wide tsunami Warning and Communication Exercise (IOC/INF-1244) and Exercise Pacific-Wave'08, A Pacific-wide tsunami Warning and Communication Exercise (IOC/2008/TS/82), as well as New Zealand's national tsunami warning exercise 'Exercise Tangaroa' in November 2010. The IOC post-event assessment of the 27 February 2010 Chile Earthquake and Tsunami event (IOC/2010/TS/92) was also considered.

Case studies from Indonesia, New Zealand, Philippines, and USA have also been included.

Through the facilitation of Irina Rafliana (Chair of TOWS Task Team 2), a draft of the guideline was reviewed by the Task Team members of the respective Intergovernmental Coordination Groups (ICGs) of the four Tsunami Warning and Mitigation Systems acting under the aegis of the Intergovernmental Oceanographic Commission of UNESCO. The members of the Task Team are David Coetzee and Laura Kong (PTWS), Stacey Edwards and Julie Leonard (CARIBE-EWS), Russell Arthurton and Stefano Tinti (NEAMTWS), and Irina Rafliana and Sam Hettiarachchi (IOTWS).

The guideline was translated into Spanish by the Chile's Servicio Hidrográfico y Oceanográfico de la Armada de Chile (SHOA) and the translation reviewed by Julie Leonard, USAID/Office of Foreign Disaster Assistance.

FOREWORD

The Intergovernmental Oceanographic Commission (IOC) of United Nations Educational, Scientific, and Cultural Organization (UNESCO) was given a mandate by its Member States to facilitate ocean-specific tsunami exercises (known as Tsunami Wave) following the disastrous Indian Ocean tsunami in December 2004. These exercises are aimed at encouraging Member States to maintain a high state of readiness so as to be able to efficiently and effectively act to provide for the public's safety during a fast-onset and rapidly-evolving tsunami event. These international exercises are co-ordinated by IOC, covering the Pacific, Indian, North Eastern Atlantic, the Mediterranean and Connected Seas, and the Caribbean and Adjacent Regions.

Exercising is a core part of readiness and assists in identifying gaps and issues. The lessons identified are integrated into plans and procedures that improve the ability to respond to, and recover from tsunamis.

The exercises test communication and dissemination of tsunami messages and information from the warning centre to the key stakeholder agencies, and in some cases down to selected communities. A key component and objective of each exercise is the improvement of preparedness through public awareness, education and risk assessment. Intergovernmental Coordination Groups in coordination with regional organizations have the important role of planning and implementing regional programmes, wherein regional tsunami warning centres or service providers issue alerts on tsunami threat level to National Tsunami Warning Centres. The onward communication of hazard events and the issuance of warnings by National Tsunami Warning Centres to local authorities are the responsibilities of individual countries.

The purpose of this Guideline is to provide a set of generic and consistent advice on exercise development, management and evaluation that will apply to both exercise coordinators and exercise players (tsunami service providers and warning centres), as well as disaster management agencies, that can be used by all Intergovernmental Coordination Groups (ICGs).

This Guideline provides a step-by-step approach for conducting national to local tsunami exercises in the context of the UNESCO/IOC-coordinated Tsunami Wave exercises.

The Intergovernmental Oceanographic Commission (IOC) of UNESCO recommends that exercise planners use this guide as a basis for developing and conducting Tsunami Wave exercises.

Wendy Watson-Wright
Assistant Director-General, UNESCO
Executive Secretary,
Intergovernmental Oceanographic Commission

July 2011

EXECUTIVE SUMMARY

Tsunamis have caused damage locally in all ocean basins. There have been more than 2,000 tsunamis observed over the past 4,000 years, 1,100 of which have been confirmed by scientific research. In terms of casualties over the last 200 years, this averages out to about one fatal tsunami per year. For confirmed tsunamis, the distribution by source region shows 73% have occurred in the Pacific Ocean, 16% in the Mediterranean and Black Sea, 6% in the Caribbean Sea and Atlantic Ocean, and 5% in the Indian Ocean. Of these, 84% of the tsunamis were triggered by earthquakes, and 14% by earthquake-generated landslides. Finally, more than 99% of all casualties have been caused by local or regional tsunamis that have impacted shores within minutes to several hours, highlighting national and local preparedness as the key important activities for mitigating losses due to tsunamis.

The 2004 Indian Ocean tsunami, which killed about 230,000 people in 14 countries with nearly 170,000 estimated in northern Sumatra, Indonesia alone, highlighted the fact that tsunamis can (and will) occur in all ocean basins, and can happen at any time. In the aftermath, under the auspices of the Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational, Scientific, and Cultural Organization (UNESCO), three new Intergovernmental Coordination Groups (ICG) for tsunami warning and mitigation systems were established in the Indian Ocean (ICG/IOTWS), the Caribbean and adjacent regions (ICG/CARIBE EWS), and the North-eastern Atlantic, the Mediterranean and connected seas (ICG/NEAMTWS). These have been developed based on experience from the oldest system, ICG/PTWS established in 1965.

Tsunamis are unique from other hazards because of their fast-onset and non-predictable character; we do not know when the next tsunami will hit nor where, and when it does happen, the hazard impacts us with little notice and therefore little time to prepare. This puts a tremendous responsibility on countries to prepare ahead of time through planning, development of agreed-upon standard operating procedures, and practice through exercises.

The purpose of Tsunami Wave exercises is to evaluate the ability of countries and their national and local organizations to respond to a tsunami, whether local or distant. While the international exercises emphasize the testing of communications from the international warning centres to national tsunami warning focal points (TWFPs), the exercises also provide excellent opportunities for countries to further exercise their national and local chains of command and decision-making, including the alerting and evacuation of people from selected coastal communities. They also provide an opportunity to promote emergency and tsunami preparedness.

This guideline contains information on how to plan, conduct and evaluate Tsunami Wave exercises. It has been designed for use by IOC Member States who will participate in these exercises and has been divided into four easy stages to provide a range of practical advice and templates for in-country exercise developers to analyse the need for an exercise at the country, provincial or local level, design the exercise, conduct the exercise, and evaluate the exercise.

A number of case studies have also been included to provide examples of various in-country tsunami exercises. The case study examples are not necessarily based on Tsunami Wave exercise scenarios, but they provide an insight into the planning and execution of national level tsunami exercises.

A. INTRODUCTION

A.1 TSUNAMIS

There have been more than 2,000 tsunamis observed over the past 4,000 years, 1,100 of which have been confirmed by scientific research. In terms of casualties over the last 200 years, this averages out to about one fatal tsunami per year. For confirmed tsunamis, the distribution by source region shows 73% have occurred in the Pacific Ocean, 16% in the Mediterranean and Black Sea, 6% in the Caribbean Sea and Atlantic Ocean, and 5% in the Indian Ocean. Of these, 84% of the tsunamis were triggered by earthquakes, and 14% by earthquake-generated landslides. Finally, more than 99% of all casualties have been caused by local or regional tsunamis that have impacted shores within minutes to several hours, highlighting national and local preparedness as the key activities for mitigating losses due to tsunamis.

Over the past three years (2009–2011), the Pacific witnessed three destructive and deadly tsunamis that each placed PTWS countries in various levels of warning for distant tsunamis. Locally, five countries were impacted nearly immediately with people having only 10 to 30 minutes before the first large waves hit. From 11 March 2011 in Japan, arguably the most tsunami-prepared country in the world, casualty estimates indicate more than 25,000 people lost their lives. In reviewing the Pacific's Tsunami Warning System (IOC Technical Series, 92 for 27 February 2010 Chile Earthquake and Tsunami Event [IOC/2010/TS/92], and IOC Technical Series, 96 for March 2011 [IOC/2011/TS/96], document in preparation), it can be said that while countries in general responded well to the 2010 and 2011 tsunamis as distant sources, there is still a need to reflect on how Member States can improve in responding to local tsunamis.

A workshop was held in May 2011 to look at lessons identified in recent Pacific Ocean tsunami events (Looking Back, Looking Forward: Scientific, Technical, Operational, and Preparedness Aspects of the Samoa 2009, Chile 2010, and Japan 2011 Tsunamis, [ICG/PTWS-XXIV/3]). Workshop participants agreed that an effective tsunami early warning system ensures that every coastal community and every person on the beach knows what to do when a tsunami is coming. The key components of such a system are the rapid detection and analysis of the tsunamigenic potential of great earthquakes, the rapid dissemination of tsunami warnings to a prepared public, and an active and sustained education and awareness programme.

The 2004 Indian Ocean tsunami, which killed about 230,000 people in 14 countries with nearly 170,000 estimated deaths in northern Sumatra, Indonesia alone, highlighted the fact that tsunamis can (and will) occur in all ocean basins, and can happen at any time. In the aftermath, under the auspices of the Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational, Scientific, and Cultural Organization (UNESCO), three Intergovernmental Coordination Groups (ICGs) for tsunami warning and mitigation systems were established in the Indian Ocean (ICG/IOTWS), the Caribbean and adjacent regions (ICG/CARIBE EWS), and the North-eastern Atlantic, the Mediterranean and connected seas (ICG/NEAMTWS). These have been developed based on experience from the oldest system, the ICG/PTWS that was established in 1965.

A.2 MOTIVATION FOR THIS GUIDELINE

Regional and national tsunami warning systems in every ocean must maintain a high level of readiness so as to be able to efficiently and effectively act to provide for the public's safety during fast-onset and rapidly-evolving natural disasters such as tsunamis.

Because of the relative infrequency of tsunamis, but knowing that tsunamis can have widespread impact across oceans, the UNESCO/IOC, as well as its ITIC through training

programmes, and Member States have been advocating through their intergovernmental tsunami coordination groups (ICGs) for the regular conduct of tsunami exercises. To maintain a high state of operational readiness, tsunami warning centres and emergency agencies must regularly practice their response procedures to ensure that vital communication links work seamlessly, and that agencies and response personnel know the roles that they will need to play during an actual event.

The purpose of an exercise is to evaluate the ability of countries and their national and local organizations to respond to a tsunami, whether local or distant. While the international exercises emphasize the testing of communications from the international warning centres to national tsunami warning focal points, the exercises also provide excellent opportunities for countries to further exercise their national and local chains of command and decision-making, including the alerting and evacuation of people from selected coastal communities. Exercises provide an opportunity to promote emergency and tsunami preparedness.

After each Tsunami Wave exercise, countries are asked to provide post-exercise evaluations and to make suggestions for improving the international exercises. In past exercise evaluations, it was noted that the preparation, conduct and evaluation of the tsunami exercises presents significant challenges. The challenges apply to:

- Resource commitment for exercise planning/preparation,
- Extensive scope of exercise participation,
- Absence of consistent and independent evaluation at each participant level,
- Responsibilities for exercise typically crosses working groups within an ICG and/or within Member States.

It was also noted that there is no generic and consistent guideline available to support ICGs in the development and management of international and national tsunami exercises. Accordingly, with the start of regular international tsunami exercises in all oceans, it was deemed a high priority to develop a set of generic and consistent guidelines on exercise development, management and evaluation that will apply to both exercise coordinators and exercise players (tsunami service providers and warning centres as well as disaster management agencies) and that can be used by all ICGs. The justification for the need for the guideline comes from the Exercise Pacific Wave post-exercise evaluations and the recommendation of the IOC Tsunami and Other Hazards Related to Sea-Level Warning and Mitigation Systems Working Group Inter-ICG Task Team 2 on Disaster Management and Preparedness.

A.3 PURPOSE OF THIS GUIDE

The guideline is the collaborative effort of the New Zealand Ministry of Civil Defence and Emergency Management, and the UNESCO/IOC-NOAA International Tsunami Information Centre, and is based on Exercise Guidelines developed by New Zealand (MCDEM, 2009). It is hoped that this guideline will help to establish a process or system whereby ICGs can support each other in the development, management and evaluation of tsunami exercises.

The purpose of this guideline is to support personnel tasked with developing and managing their country's participation in international and national exercises.

A.4 HOW TO USE THIS GUIDELINE

This guideline provides a step-by-step approach for conducting national to local tsunami exercises in the context of the UNESCO/IOC-coordinated international exercises like Exercise Pacific Wave. Where useful, examples are provided for Exercise Pacific-Wave'11,

A Caribbean Tsunami Warning Exercise (IOC/2010/TS/93), which will be a multi-scenario exercise to allow countries to practice for a local or regional tsunami.

The guideline is divided into four sections. Section 1 provides an introduction emphasizing the importance of analysing the need for an exercise and how to identify the type of exercise to adopt. Section 2 focuses in the steps and planning requirements for designing the exercise, including timelines, aim and objectives, performance indicators, scenario development, developing an exercise manual, injects, and marketing or public awareness campaigns. Section 3 summarizes the principal activities during the conduct of the exercise itself. Section 4 outlines perhaps the most important component, which is the post-exercise evaluation in which stakeholders evaluate the exercise performance and adequacy of operating procedures and identify short and long-term improvements to their systems and processes.

SECTION 1

INTRODUCTION TO UNESCO/IOC TSUNAMI WAVE EXERCISE

1. OVERVIEW

1.1 INTRODUCTION

Exercises are activities that consider or simulate a real life situation so that an agency is able to review or test procedures and practice participants in defined roles.

The Tsunami Wave exercises are aimed at testing official communication links for message dissemination from international warning centres to national, provincial and local jurisdictions and the general public. Organizational decision making processes about public warnings and evacuations can also be tested.

For these international exercises, countries are provided tsunami scenario(s) and then each country is given the opportunity to decide how to test their system's responsiveness. Testing can range from straight forward communications tests of principal emergency contacts, to full-scale alerting and 'warm-body' evacuations of people from tsunami hazard zones.

All Member States are encouraged to participate at UNESCO/IOC exercises from national to provincial to local levels (without alarming the public).

1.2 PACIFIC AND OTHER TSUNAMI WAVE EXERCISES

The Pacific Tsunami Warning and Mitigation System (PTWS) is an intergovernmental cooperative effort to reduce tsunami risks. It was formed in 1965 as an International Coordination Group for International Tsunami (ICG/ITSU) in response to the M9.5 Chile earthquake and tsunami in 1960 that killed 5,000 people locally, as well as 138 people in Japan where it struck 22 hours later. ITSU was renamed to the PTWS as an intergovernmental group in 2005. At the heart of the system are international and regional tsunami warning centres that provide timely alerts and advice to countries for tsunamis.

The ITSU Master Plan (IOC/INF-1124), reviewed in 2004 and still valid, provides the overarching description of the system requirements for comprehensive risk reduction that involve hazard and risk assessment, warning guidance, and mitigation and preparedness. For the 2009–2013 period, the PTWS Medium Term Strategy (Annex V of report ICG/PTWS-XXIII/3) provides direction and priority for improving preparedness. As of 2011, there are officially 32 Member States of the IOC's Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (ICG/PTWS).

After the 2004 Indian Ocean tsunami, the ICG/PTWS immediately took proactive action in 2005 (ICG/PTWS-XX/3) to organize Exercise Pacific-Wave 06 (IOC/INF-1244) to encourage Member States to prepare for the next Pacific tsunami. Exercise Pacific-Wave 06 used tsunami sources in Chile and the Philippines to develop its scenario, and 44 countries participated in the exercise. With support from the IOC and the UNDP, the Philippines worked to prepare and facilitate Albay province to conduct a full-scale exercise as part of Exercise Pacific-Wave'06 (EPW06 or PacWave06, Annex I).

Exercise Pacific-Wave 08 (IOC/2008/TS/82) used a northwest Pacific tsunami source. The Pacific Wave series of exercises provide Pacific countries with an opportunity to test the readiness of the PTWS in terms of communications and decision-making from the international to the national and 'downstream' levels, and to identify changes that can improve its effectiveness.

Since then, other ICGs have organized and conducted Tsunami Wave exercises. In the Indian Ocean, the ICG/IOTWS organized Exercise Indian Ocean Wave'09 (IOWave09), An Indian Ocean-wide Tsunami Warning and Communication Exercise. (IOC/2009/TS/88) and conducted Exercise Indian Ocean Wave 2011 (IOC/2011/TS/99) as the final test before the official implementation of Regional Tsunami Service Provider services in 2012. Member States of the ICG/CARIBE EWS conducted Exercise Caribe Wave (IOC/2010/TS/93 Rev.) in March 2011, and the ICG/NEAMTWS is planning its first Tsunami Wave exercise in 2012 (IOC/2012/TS/103).

Within Member States, Indonesia has conducted tsunami drills and simulations annually since December 2005, and has been replicating the process down to the community level across the country (Annex I). In the US, Atlantic and Pacific exercises (LANTEX, PACIFEX) have been carried out annually since 2009; in Hawaii, local and distant tsunami communications exercises have been conducted regularly since the early 2000s and are now conducted semi-annually (Annex I). New Zealand carried out a national distant source tsunami exercise in 2010 (Annex I).

In Japan, most local municipalities in tsunami-prone areas, as well as the central government, have carried out tsunami evacuation exercises for many years. In the Tohoku region, for instance, scenarios have been mostly based on the past Sanriku Earthquakes (Meiji 1896 and Sowa 1933).

1.3 TSUNAMI EXERCISES

Tsunamis are unique from other hazards because of their fast-onset and non-predictable character; we do not know when the next tsunami will hit nor where, and when it does happen, the hazard impacts us with little notice and therefore little time to prepare. This puts a tremendous responsibility on countries to prepare ahead of time through planning, development of agreed-upon standard operating procedures, and practice through exercises.

Tsunami exercises and improvements, however, should be conducted as part of a country's all-hazards approach to mitigating all natural disasters since many of the types of preparedness and the means of warning communication may be similar to those used for other hazards.

1.4 WHY EXERCISE?

Recent tsunami events in Indonesia (2004, 2006), the Solomon Islands (2007), the Samoa Islands (2009), Chile (2010) and Japan (2011) have illustrated how damaging and deadly tsunamis can be and demonstrated the need for countries across the Pacific and in the Indian Ocean to be better prepared on a 24 x 7 basis at all levels of government. At the same time, global awareness of the destructive power of tsunamis has been achieved and Member States of all oceans are increasing their preparedness efforts.

A country's national and local government, along with non-governmental agencies can use the international exercises to evaluate its capability to execute one or more components of its response or recovery capability to tsunami events.

It is important that local authorities, emergency services, local utility and infrastructure providers, government agencies and other local partner agencies (such as the Red Cross and Red Crescent where applicable) work, plan, train, exercise and respond together. Research shows that people generally respond to an emergency in the same way that they have been trained.

International and most importantly, national and local exercises are a good way to measure the effectiveness of plans and allow an opportunity to practice skills according to a scenario

in a simulated emergency environment. While the UNESCO/IOC Tsunami Wave exercises are an international undertaking, they allow for adaptation and customization at the national, provincial and/or local levels to:

- Improve coordination,
- Improve operational readiness,
- Improve response time, especially important for local tsunamis,
- Identify planning weaknesses,
- Identify resource gaps,
- Improve inter-agency coordination and communications,
- Provide training,
- Clarify roles and responsibilities,
- Evaluate plans, policies and procedures,
- Test equipment, especially communications methods to the last kilometre,
- Improve individual performance,
- Demonstrate capability,
- Develop the knowledge, skills and enthusiasm to participate in emergencies,
- Gain public recognition of emergency programmes and promote public awareness.

2. EXERCISE DEVELOPMENT CYCLE

2.1 INTRODUCTION

Multi-year planning, agency engagement, and resource management are essential ongoing processes that provide the basis for the planning, conduct and evaluation of tsunami exercises. The success of tsunami exercises relies on the execution of four distinct stages, which are collectively known as the exercise development cycle: analyse the need, design the exercise, conduct the exercise and evaluate the exercise.

2.2 EXERCISE DEVELOPMENT CYCLE

The exercise development process is designed to be flexible enough to meet the unique needs of the country/agency using it. Therefore, each milestone should be designed, tailored and applied in a manner that suits the country/agency's specific objectives and capabilities.

Each stage of the exercise development cycle is discussed in detail in this guideline.

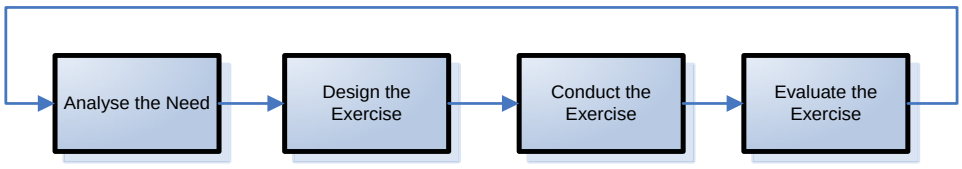


Figure 1. Exercise Tsunami Wave design cycle

1. ANALYSE THE NEED

3.1 INTRODUCTION

All exercises emerge from an identified need. A needs assessment is conducted to identify whether an exercise activity is required.

For example, at the Twentieth Session of the Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (IOC/ITSU-XX/3) (held bi-annually), Member States recognized that the PTWS requires regular testing and review and noted that simulating scenarios and identifying lessons through exercises is an effective way to improve tsunami preparedness. Since there had never been a Pacific-wide exercise before, it consequently recommended that Exercise Pacific-Wave'06 be conducted, and that tsunami exercises be carried out at regular intervals in the future.

In each international exercise, it has been left to Member States to decide and select their level of involvement in the Tsunami Wave exercises. Undertaking a needs assessment at a country-wide level or provincial/local level provides an opportunity to:

- Understand a country/agency's requirements,
- Identify issues,
- Establish the reasons to do an exercise,
- Identify the functions to be exercised.

3.2 HOW TO CONDUCT A NEEDS ASSESSMENT

Follow these steps to conduct a needs assessment for your country/agency.

Step	Action
1	**Review your country/agency's emergency management plans, addressing:** ▪ What hazards and risks associated with tsunami is the country/ agency most likely to face, and what are the priority levels of these? ▪ What area(s) are most vulnerable? ▪ What functions or components in the plan need some practice? ▪ What are the country/agency's current priorities?
2	**Consider past exercises:** ▪ When were particular functions or aspects last exercised and what type of exercise was conducted? ▪ Who (staff and agencies) participated in the previous exercise(s) and who did not? ▪ To what extent were previous exercise objectives achieved? ▪ What lessons were identified? ▪ What problems were identified, and what was needed to resolve them? ▪ What improvements were made following the past exercise(s), and have they been tested?

Step	Action
3	**Identify available resources:** ▪ Is there a budget to deliver the exercise? ▪ Does the agency have the resourcing to tailor the exercise further, and what staff and time commitment will be required to do this? ▪ What are the country/agency's liabilities? (e.g. lack of trained staff) ▪ What limitations could the country/agency face in developing or delivering the exercise?
4	**Review the finding: the needs assessment should reveal the following issues if they exist:** ▪ Primary and secondary hazards that the country/agency faces, ▪ Issues that need to be resolved, ▪ Issues that recur, ▪ Skills that need to be practiced, ▪ Functions that are weak or uncertain, ▪ Improvements made that need to be tested, ▪ New facilities, personnel, or equipment that have not been included in an exercise before, ▪ Weaknesses (such as gaps, conflicting policies, or vague procedures) in the emergency plan or the standard operating procedures, ▪ The need to clarify exercise coordination and working with other agencies, ▪ The need for a certain type of exercise, ▪ Budgetary and resourcing issues, ▪ Risks.

Table 1. Steps to conduct a needs assessment

2. TYPES OF EXERCISE

4.1 INTRODUCTION

Tsunami Wave exercises are an international undertaking and may appear quite complex. However, each country/agency can simplify these exercises to suit its own requirements.

There are five different types of exercise described in this section. Each of these types of exercise (ranging from simple to complex) can be used at the national, provincial or local level in Tsunami Wave exercises, depending on which functions require exercising.

Your country/agency can choose which type of exercise suits your requirements (which should have been identified through the needs assessment process). Stakeholder agencies involved in the end-to-end tsunami warning, as well post-disaster response and the media, can be involved**.**

4.2 ORIENTATION EXERCISE

An orientation exercise may also be referred to as a ‘walk through’, and it can be conducted through a workshop. It puts people in a place where they would work during a tsunami response, or uses them as participants in a demonstration of an activity. This type of exercise is used to familiarise the players with the activity. It lays the foundation for a comprehensive exercise programme.

Orientation exercises are generally used when:

- No previous exercise related to tsunami has been conducted.
- No recent real tsunami events have occurred.
- There is a need to bring together organizations (government, NGOs, private sector) in developing emergency response planning, problem solving, SOPs, and resource integration.
- A new plan has been developed that requires testing.
- There are new procedures.
- There are new staff or leadership.
- There is a new facility.
- There is a new risk.
- Personnel training is required.

An example of an orientation exercise would be setting up a mock welfare centre to take in tsunami evacuees, and walking staff through how the centre is organized.

Another motivation for an orientation exercise may be because there is a need to provide stakeholders with an overview of authorities, strategies, plans, policies, procedures, protocols, and resources available for responding to a tsunami. Coordination between the tsunami warning centre, emergency operations centre, and response officials is essential for effective end-to-end warning.

4.3 DRILL EXERCISE

In a drill exercise, staff physically handle specific equipment or perform a specific procedure or single operation. A drill usually focuses on a single organization, facility, or agency such as a hotel, school, village, etc. The exercise usually has a time frame element and is used to test procedures. Performance is evaluated in isolation; a drill is a subset of a full-scale exercise.

A drill exercise is used to:

- Assess equipment capabilities.
- Test response time.
- Train personnel.
- Assess interagency cooperation.
- Verify resource and staffing capabilities.

An example of a drill exercise would be activating an Emergency Operations Centre or using alternative communications (such as radios) in a tsunami exercise. Within a warning centre, a drill might consist of the operations for a local tsunami warning, or just the communication notification procedures for a local tsunami.

4.4 TABLE-TOP EXERCISE

A table-top exercise may also be referred to as a ‘discussion exercise’, or ‘DISCEX’.

Participants are presented with a situation or problem that they are required to discuss and for which they formulate the appropriate response or solution. Normally, the exercise requires no simulation other than a scenario and/or prewritten exercise injects. An exercise controller or moderator introduces a simulated scenario to participants and as the exercise advances (in time) exercise problems and activities (injects) are further introduced. This type of exercise is used to practice problem solving and coordination of services with or without time pressures. There is no deployment or actual use of equipment or resources.

Table-top exercises should be used to:

- Practice group problem solving.
- Promote familiarity with plans.
- Assess plan coverage for a specific case study.
- Assess plan coverage for a specific risk area.
- Examine staffing contingencies.
- Test group message interpretation.
- Assess interagency or interdepartmental coordination.
- Observe information sharing.
- Train personnel (usually of staff with equal status or functions).

An example of a table-top exercise may involve participants discussing their response to a tsunami threat to a particular area, where the only injects are tsunami messages from the international tsunami warning centres such as the PTWC in Hawaii, which describes the nature of the threat.

4.5 FUNCTIONAL EXERCISE

A functional exercise may also be referred to as an ‘operational’ or a ‘tactical’ exercise. It takes place in an operational environment and requires participants to actually perform the functions of their roles.

A normally complex response activity is simulated, which may require multiple activities to carry out the response. It lacks only the people "on the ground" to create a full-scale exercise.

Participants interact within a simulated environment through an exercise control group who provide prewritten injects and respond to questions and tasks developing out of the exercise.

Functional exercises normally involve multi-agency participation (real or simulated) and can focus on one or many geographical areas. Commonly, they involved the testing of standard operating procedures and internal/external communications between organizations.

This type of exercise is used to practice multiple emergency functions e.g. direction and control, resource management and communications and is particularly useful to:

- Evaluate a function.
- Evaluate or test physical facilities use.
- Reinforce or test established policies and procedures.

- Assess preparedness.
- Test seldom-used resources.
- Measure resource adequacy.
- Assess and strengthen inter-jurisdictional or inter-agency relations.
- Support policy formulation.

An example of a functional exercise would be multi-agency response to a potentially devastating tsunami, where evacuation of a coastal community is required. Messages and injects are provided by exercise control and are handled by the participants in the way described in appropriate plans and procedures. Outcomes are generated that would be expected in a real situation.

Functional exercises may also just focus on a specific aspect of warnings, such as the command and control activities of emergency operations centres or the communications flow and procedures from international to national to provincial levels.

4.6 FULL-SCALE EXERCISE

A full-scale exercise may also be referred to as a ’practical’ or ‘field’ exercise. These include the movement or deployment of people and resources to include physical response ‘on the ground’ to a simulated situation. It could be labelled as the climax of a progressive exercise programme.

They can be ‘ground’ focused only or may include the higher-level response structures, and they can be simple (single agency) or complex (multi-agency, multi-levels of government from national to local).

These exercises are typically used to test all aspects of a country’s warning and emergency management systems and processes, and to the extent practical, using actual centres and communications methods. They are useful to:

- Assess and improve an operational activity.
- Assess and improve interagency cooperation.
- Assess negotiation procedures.
- Test resource and personnel allocation.
- Manage the public and media.
- Assess personnel and equipment locations.
- Test equipment capabilities.

Full-scale exercises are the largest, most costly, most-time consuming, and most complex to plan, conduct, and evaluate.

An example of a full-scale exercise would be a post impact tsunami response with volunteers portraying 'victims' and the emergency services using real rescue equipment at the scene. Coordinated, multi-agency response to the event is exercised. Actual field mobilization and deployment of response personnel are conducted.

4.7 CHARACTERISTICS OF EXERCISES

Each exercise type has certain characteristics. Table 2 provides a general idea of how much time is necessary to prepare for these exercise types and what format and facilities may be required.

Types of Exercise	Orientation Exercise	Drill Exercise	Table-top Exercise	Functional Exercise	Full Scale Exercise
Format	Informal discussion in group setting. Various presentation methods.	Actual field or facility response of a specific element or function. Actual equipment is used or a physical action performed.	Group discussion of a scenario or problem. Presented narrative scenario; can be facilitated by exercise control. Players note or present their solutions or outcomes.	Players respond to a scenario in real or condensed time and in a realistic environment. Narrative scenario facilitated by exercise control. Players are evaluated. Interactive and complex.	Players respond to a scenario (with simulated enactments) in real time. Visual narrative, players exercise in actual centres and/or impact site(s). Tsunami Warning Centre (TWC) actions trigger Emergency Operations Centre (EOC) actions. EOC actions trigger community actions. Actions at scene serve as input to EOC simulation. Interactive and simple or complex.
Leaders	Manager, supervisor, department head, or exercise coordinator	Manager, supervisor, department head, or exercise coordinator	Facilitator	Exercise Coordinator	Exercise Coordinator
Players	Single agency/ department, or cross-functional staff	Functional staff	Normally staff of the same level with a warning/response role for the type of situation	All staff with warning/response roles for that function	All or specific staff with warning/response roles
Facilities	Conference room	Facility, field, or EOC	Conference room or rooms	TWC, EOC or other operating centre (multiple rooms)	Realistic ‘on the ground’ setting TWC, EOC or other operating centre.

Types of Exercise	Orientation Exercise	Drill Exercise	Table-top Exercise	Functional Exercise	Full Scale Exercise
Time (typical)	1–2 hours	1–4 hours	2–4 hours or longer, up to 3 days	4 hours up to 1 or more days	2 hours up to 1 or more days
Preparation	Simple preparation, 1 week. No participant preparation.	Simple preparation, 1–2 weeks. Participants need orientation.	Complex but inexpensive preparation, 1–3 months. Preceded by orientation and potentially 1 or more drills.	Complex and expensive, 6–18 months preparation. Preceded by simpler exercises. Significant allocation of resources.	Expensive due to extensive time, effort, and resources. 6–18 months preparation. Preceded by drills, table-tops, functional exercises.

Table 2. Characteristics of exercises

SECTION 2

DESIGN THE EXERCISE

1. DETERMINE THE SCOPE

1.1 INTRODUCTION

The key to designing and conducting a successful exercise is to understand from the outset what the purpose and scope of the exercise is.

Determining the scope of an exercise means putting realistic limits on:

- The issues identified in the needs assessment.
- The resources available (including finance and personnel) to be used and the functions or agencies that are expected to participate in the exercise.

In each ocean, the UNESCO/IOC ICG's Exercise Tsunami Wave Task Team is responsible for determining the scope of the exercise. The scope must be broad enough so that the objectives can be achieved and measured by all countries of the region, and narrow enough to exclude any unnecessary activities or participation.

The Tsunami Wave Task Team determines the scope of the exercise taking into account the following factors:

Factor	Action
1	**Operations:** The type of behaviour(s) planned for the players. Will the exercise test notification methods, communication flow, decision-making, resource allocation and/or user competency such as understanding or following a plan or standard operating procedures?
2	**Countries or stakeholders involved:** Which country/agencies will be involved.
3	**Hazard and risk scenario:** A relevant priority problem is selected (e.g., local, regional, distant source tsunami)
4	**Geographical target area:** A logical place (or places) is/are selected where the simulated event could occur.
5	**Degree of realism:** A decision should be made early in the design phase as to how realistic the exercise will be (such as the amount of stress, complexity and time pressures the exercise will generate).
6	**Date and time:** A date and time for the exercise is selected, allowing as much lead time as possible for scheduling and design purposes.

Table 3. Factors and Actions

2. ESTABLISH EXERCISE TSUNAMI WAVE PLANNING TEAMS

2.1 INTRODUCTION

International Tsunami Wave exercises involve long planning and development periods. Each ICG should appoint an Exercise Tsunami Wave Task Team to schedule and plan the exercise. Representatives are sought from Member States. The Task Team also includes the international tsunami warning centres, for example, in the Pacific, the Task Team includes the International Tsunami Information Centre (ITIC).

A team approach shares the workload across a number of staff in a number of countries. By selecting a Task Team with a variety of skill sets, it improves the quality of the exercise and provides country representatives with experience in planning an international exercise.

The international Tsunami Wave exercises also require in-country planning teams at various levels (which may include national, provincial and/or local levels)

Successful Tsunami Wave exercising involves:

- Selecting participants for the exercise planning team,
- Developing an exercise planning timeline with milestones,
- Scheduling planning meetings.

Each Tsunami Wave exercise is a unique undertaking and must be managed like any other significant project. Project management skills (such as planning, organizing and managing resources) are essential during the exercise planning process.

2.2 INTERNATIONAL EXERCISE PLANNING STRUCTURE

Exercise Tsunami Wave exercises adhere to an organized structure. It is important that the planning teams have clearly defined roles and responsibilities and that subject matter experts be involved during the planning process where necessary.

Figure 2 outlines the planning team structure used in Pacific Wave exercises for which the ICG/PTWS establishes the Terms of Reference.

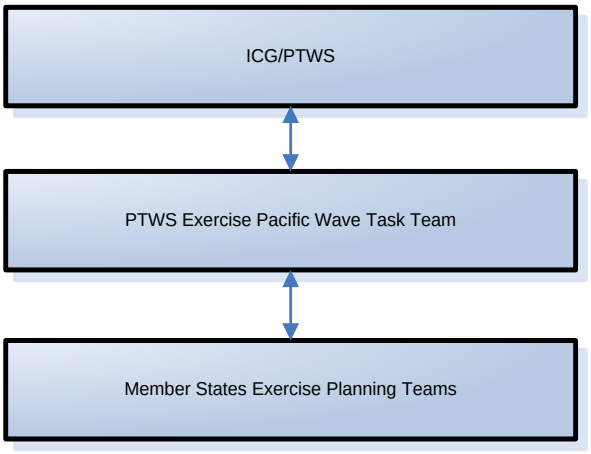


Figure 2. Exercise Pacific Wave planning team structure

3. ESTABLISH EXERCISE TSUNAMI WAVE PLANNING TEAMS

3.1 EXERCISE TSUNAMI WAVE TASK TEAM

The Exercise Tsunami Wave Task Team members should be experienced in exercise management and project management, and be capable and able to dedicate a considerable amount of time to the exercise planning.

The Exercise Tsunami Wave Task Team is responsible for the successful execution of all aspects of the exercise, including exercise planning, conduct, and evaluation. They will develop the exercise narrative, Master Schedule of Events List, and messages and injects. Technical specialists and subject matter experts from that region's ICG will be involved to help provide realistic information to the scenario and messages and injects.

The Exercise Tsunami Wave Task Team uses the exercise aim and objectives to determine the evaluation criteria and evaluation tools for the exercise and will also develop appropriate promotion and media strategies prior to the exercise. Afterward, the Task Team is responsible for collating the post-exercise evaluations and writing the Summary Report.

The Exercise Tsunami Wave Task Team must have representatives from a number of participating Member States but should be kept to a manageable size. Generally, members are not exercise players in their own country. Instead, due to their high level involvement, members are ideal for roles such as Exercise Director and/or evaluator positions during the exercise within their own country.

3.2 NATIONAL EXERCISE PLANNING TEAM (IN-COUNTRY)

Each country is encouraged to appoint its own in-country Exercise Planning Team and Exercise Planning Coordinator to develop the exercise further and tailor it to its own requirements. The Exercise Planning Team should have representatives from each major participating agency, but should be kept to a manageable size.

Once again, Planning Team members are generally not exercise players. Instead, due to their high level involvement, members are ideal for roles such as Exercise Director and/or evaluator positions during the exercise within their own agency.

If exercises are taken down to the provincial or community levels, each should have its own Planning Team.

4. GENERAL EXERCISE ROLES

4.1 INTRODUCTION

The Exercise Tsunami Wave Task Team and in-country planning team members take on additional roles and responsibilities during the exercise and these roles are collectively known as Exercise Control staff. This is the group responsible for ensuring that all exercise aims and objectives are achievable during exercise play.

4.2 EXERCISE CONTROL STAFF ROLES

Exercise Control staff roles (international and in-country) may include:

- Exercise Director
- Evaluator(s)
- Agency representatives.

4.3 EXERCISE CONTROL STAFF RESPONSIBILITIES

Exercise Control staff in each country is responsible for:

- Managing the in-country's input into the exercise.
- Facilitating the progress of the exercise scenario through the controlled flow of information in the control documents/injects.
- Representing all agencies external to the exercise including non-participating and supporting agencies that are notionally exercising their arrangements.
- Controlling and coordinating the actions of role players.
- Providing corrective advice to agencies to facilitate the flow of events.
- Ensuring appropriate risk management strategies are undertaken during the exercise.
- Monitoring the Master Schedule of Events List, and releasing control documents in accordance with the Master Schedule of Events List.

4.4 OVERALL TSUNAMI WAVE EXERCISE DIRECTOR

The Overall Tsunami Wave Exercise Director is in charge of the timing and execution of the exercise. This could be the Chair(s) of the Tsunami Wave Task Team, or the lead international tsunami warning centre such as the Pacific Tsunami Warning Centre.

4.5 IN-COUNTRY NATIONAL EXERCISE DIRECTOR

The in-country National Exercise Director supervises the speed and flow of the exercise and addresses any issues during the exercise. The in-country Exercise Director does this by monitoring the Master Schedule of Events List to ensure the exercise is proceeding according to plan.

Where the exercise has unanticipated actions or resource requirements the in-country National Exercise Director determines how to maintain the exercise flow or bring it back in line. They are also responsible for maintaining order and professionalism during the conduct of the exercise as well as attending to observers. Observers could include VIPs, invited guests and new or inexperienced staff.

On completion of the exercise the in-country Exercise Director will be involved in the production of the end of exercise report and may have responsibilities to implement recommendations made in the report.

5. GENERAL EXERCISE ROLES

5.1 EVALUATION TEAM

Countries may appoint Exercise Evaluators to observe and evaluate selected objectives during their exercise. Evaluators should be subject matter experts in the field they are evaluating, such as in warning centre operations, emergency response, or in specific agency areas of responsibility.

The Exercise Evaluators are responsible for:

- Evaluating against allocated objectives and/or key performance indicators (KPIs).
- Observing and assessing processes, procedures and techniques.
- Evaluating and reporting on achievement of outcomes and the extent to which the overall exercise objectives have been met.

- Evaluating the effectiveness of exercise facilitation and management
- Providing input into the exercise debrief.

***Note**: An evaluator does not generally mentor, coach or act as exercise controller.*

5.2 EXTERNAL AGENCIES

External agency representatives act on behalf of their agency during both the design and delivery phases of the exercise.

Responsibilities include:

- Being the main point of contact for their agency.
- Providing expert advice and input from the department or agency they represent.
- Having input into the scenario and providing control documents as required.
- Ensuring their agency input is consistent with that of other agencies, and the aims and objectives of the exercise.
- Responding to requests from exercise participants through either prepared control documents or the creation of new control documents.

During the delivery of the exercise, agency representatives may become simulators or role players where they will respond to requests from exercise participants through either prepared control documents or the creation of new control documents.

6. EXERCISE TIMELINE

6.1 INTRODUCTION

An exercise timeline outlines the timeframes for reaching significant milestones. This is particularly important when planning major exercises. The Exercise Tsunami Wave Task Team uses a project management approach to ensure all the steps happen in the right order.

6.2 EXERCISE TSUNAMI WAVE MILESTONES AND TIMELINE

When developing the timeline, the Exercise Tsunami Wave Task Team selects a date for the exercise and then, working backwards, inserts the key milestones into the timeline. There are certain timeframes that must be adhered to such as issuing the Exercise Manual no later than 90 days before the exercise – these must be worked into the timeline.

The main milestones for developing Tsunami Wave exercises are listed in table 4 below:

Milestone	Description
1	Member State Tsunami National Contact (TNC) and Tsunami Warning Focal Point (TWFP) receive IOC Circular Letter announcing the exercise.
2	TWFP responds to the contacts specified in the IOC Circular Letter advising the name and contact details of his/her country's National Tsunami Wave exercise contact.
3	TWFP/TNC disseminate the IOC Circular Letter to in-country agency representatives.
4	TWFP establishes an in-country National Exercise Planning Team including key stakeholder agencies. Provincial or Local Planning Teams may be established as necessary.
5	In-country national planning teams select a scenario out of the Tsunami Wave set of scenarios (if more than one scenario is provided).
6	In-country National Exercise Planning Teams plan the exercise (use the *How to Plan, Conduct and Evaluate Tsunami Wave Exercises Guideline*).
7	In-country planning teams receive and read the Exercise Tsunami Wave Exercise Manual.
8	In-country planning teams receive and read applicable documents such as the International TWC Operational User Guide and other related information (for example, for Exercise Pacific-Wave'11 (IOC/2011/TS/91Vol.1), these are the Operational users guide for the Pacific Tsunami Warning and Mitigation System (PTWS) [IOC/2011/TS/87rev.] and the PTWC Experimental Products guideline (Exercise Pacific Wave'11, Annex I).
9	In-country National Exercise Planning team checks the Tsunami Wave website for updates, Guideline, and other documentation.
10	Conduct the Tsunami Wave exercise.
11	National Exercise Planning Team coordinates, and as appropriate, conducts and collates in-country debriefs.
12	In-country agencies complete Tsunami Wave evaluation (Word version, or online electronic version) forms at local and provincial levels then forward to the in-country National Exercise Planning Team.
13	National Exercise Planning Team collates evaluation forms and completes the national evaluation online. (***Note**: only one online evaluation to be completed per country*).
14	National online evaluations are collated and summarized by the Tsunami Wave Exercise Task Team who produces a final exercise report.

Table 4. Milestone for developing Tsunami Wave exercises

6.3 IN-COUNTRY NATIONAL EXERCISE CHECKLIST

A checklist can be useful when designing and managing Tsunami Wave exercises at the national/provincial/local level. A basic checklist to assist with Tsunami Wave development, with sample for Exercise Pacific-Wave'11, is provided as Annex II.

7. EXERCISE PLANNING MEETINGS

7.1 INTRODUCTION

For large undertakings, such as the multi-scenario Exercise Pacific-Wave'11, planning meetings are a very important aspect of the development of the exercise.

Due to the number of participating countries and the geographic spread involved in Tsunami Wave exercises, it is not practical to hold many face-to-face Exercise Task Team planning meetings.

The Exercise Tsunami Wave Task Team may meet to discuss the framework for the exercise at an initial face-to-face planning meeting but then it is more practical and cost-effective to conduct further correspondence via email or teleconferences. Relevant planning information and decisions on progress can then be posted to the Tsunami Wave website (http://itic.ioc-unesco.org/index.php?option=com_content&view=category&layout=blog&id=2017&Itemid=2332&lang=en) for all countries to monitor.

However, within countries, further national planning is important and planning meetings should be held to do this. An initial face-to-face meeting is desirable, and additional regular meetings may be necessary.

Each meeting should have an agenda to ensure relevant issues are raised and resolved satisfactorily.

Table 5 below – Exercise planning meeting requirements – outlines what might typically be discussed by the planning team when developing the exercise in each planning meeting while working through the development of the exercise. The number of planning meetings may vary depending on the type of the exercise (e.g., Drill, Table-top, Functional or Full-scale exercise) being conducted in each country.

7.2 GENERAL EXERCISE COMMUNICATIONS

The key to a successful Tsunami Wave exercise is communication. Exercise Planning Teams must ensure regular communication is maintained with participating agency exercise representatives about planning progress.

The Tsunami Wave website provides a central location for the international Tsunami Wave Task Team to post relevant documents and templates. Member States are encouraged to check the site regularly during the exercise planning stages to ensure they have up-to-date information and where they have questions, direct these to the Exercise Task Team members.

Exercise planning meetings	Description	Exercise type	Timing prior to exercise
Concept and objectives meeting	▪ Identifies the type, scope, objectives and purpose of the exercise, and may include discussion on resources, location, date, duration, planning team and participants, assumptions etc. ▪ Outcomes should include: ○ agreement on exercise type, scenario, capabilities, tasks and objectives.	Functional, full scale or a series of exercises	Prior to, or concurrent with initial planning meeting
Initial planning meeting	▪ Lays the foundation for exercise development. ▪ Gathers input from Exercise Planning Team on the scope, design, objectives, scenario, exercise location, schedule, duration, and other details required to develop exercise documentation. ▪ Assigns responsibility to planning team members. ▪ Outcomes should include: ○ Planning schedule, ○ Clearly defined, obtainable, measurable capabilities, tasks and objectives, ○ Identified exercise scenario variables (e.g. threat, scenario, scope of hazard, venue, conditions), ○ Participant list, ○ Outline communications plan for how planning team will communicate, ○ Availability of source documents needed to draft the exercise, ○ List of established dates for completion of corrective actions and responsibilities, ○ List of critical activities for next planning conference, ○ Agreed date, time and location for next planning conference and actual exercise.	All	Discussion based exercises: 3 months Operations based: 6 months

Mid-term planning meeting	▪ Resolves logistical and organizational issues that arise during planning such as scenario and timeline development, scheduling, logistics, administrative requirements, and draft documentation review. ▪ May be held separately or in conjunction with a Master Schedule of Events List conference. ▪ Outcomes should include: o Agreement on final exercise details, o Fully reviewed exercise scenario timeline (Master Schedule of Events List), o Fully reviewed exercise documentation, o Well developed injects, ▪ Agreed date, time and location of final planning meeting.	Operations based	3 months
Final planning meeting	▪ Uses a forum to review the process and procedures for exercise conduct final drafts of exercise material, and logistical requirements. ▪ Ensures there are no major changes made to the design or scope of the exercise or to any supporting documents. ▪ Outcomes should be: o Attendees have clear understanding of, and give final approval for exercise processes and procedures, o Exercise documentation approved, o Last minute issues are resolved, ▪ Logistical elements are confirmed.	All	Discussion based: 6 weeks Operations based: 6 weeks

Table 5. Exercise planning meeting requirements[1]

[1] This table is sourced from Homeland Security Exercise and Evaluation (HSEEP). Volume I: HSEEP Overview and Exercise Program Management (revised February 2007, USA).

8. ESTABLISH THE EXERCISE AIM

8.1 INTRODUCTION

The aim is a broad statement of intent. It provides the direction for what is to be achieved by the exercise

8.2 WRITING AN EXERCISE AIM

The aim should begin with a verb and should be positive, clear, concise and achievable. It must be broad rather than specific. There should be only one aim for a Tsunami Wave exercise. However, each participating country/agency may wish to develop a specific country/agency aim to complement the overall aim of the exercise.

8.3 EXERCISE AIM EXAMPLES

- To improve local and regional source tsunami warning capability in the Pacific.
- To participate in the international tsunami warning exercise.

9. DEFINE EXERCISE OBJECTIVES

9.1 INTRODUCTION

An objective is a statement of what is to be done and should be stated in terms of results. In other words, an objective should state who should do what, under what conditions, according to what standards.

The overall Exercise Tsunami Wave objectives are developed by the Exercise Task Team. Objectives go hand-in-hand with the aim but are more specific and performance based.

Objectives should be expressed in a way that informs participants what they will be working towards, evaluating or observing. They form the basis of the exercise design process and the eventual exercise delivery. Writing the objectives is also the starting point for the evaluation process. During the exercise, the evaluators assess whether the exercise is meeting the objectives.

9.2 HOW MANY OBJECTIVES?

There can be as few as two or three objectives in a small exercise, or they can number into the hundreds in a large complex exercise that includes multiple agencies. For Exercise Tsunami Wave, no more than ten objectives per agency are recommended.

In Tsunami Wave exercises, each participating country/agency is encouraged to develop its own specific objectives in addition to the main exercise objectives to serve its specific functions.

9.3 GOOD OBJECTIVES

Objectives must be clear, concise, and focused on participant performance. They should contain:

- An action or behaviour stated in observable terms,
- The conditions under which the action will be performed (including any tools or assistance to be provided), and
- Standards (or levels) of performance.

9.4 SMART OBJECTIVES

Objectives can also be tested against the 'SMART' guidelines described in the table below:

'SMART' Guidelines for Useful Objectives	
Guideline	**Description**
Specific	Objectives should specify what they want to achieve – i.e. what results is the agency looking for?
Measurable	How will the objective be measured? The objective should set the level of performance, so that results are observable, and you can identify when the objective has been achieved. Depending on the objective, it can set a quantifiable standard or it can simply be stated in a way so that people can agree on whether they succeeded.
Achievable	The objective should not be too difficult to achieve. For example, achieving it should be within the resources that the agency would reasonably be expected to commit to in a in a real event.
Realistic	The objective should present a realistic expectation for the situation. Even though an objective might be achievable, it might not be realistic for the exercise.
Task oriented or time driven	The objective should focus on a behaviour or procedure. With respect to exercise design, each objective should focus on an individual function. Objectives should also be time driven stating when something should be completed by.

Table 6. SMART Guidelines for writing objectives

9.5 OBJECTIVE EXAMPLES

For Exercise Pacific-Wave'11, the following objectives were selected:

- Utilise PTWC experimental products, including forecast models and other science information, for timely national hazard assessment.
- Validate that the dissemination of warnings and information/advice by national tsunami warning centres to relevant in-country agencies and the public is accurate and timely.

10. DEFINE KEY PERFORMANCE INDICATORS

10.1 INTRODUCTION

Key Performance Indicators, also known as KPIs, are tools used to help an agency define and measure progress towards exercise objectives.

A KPI may further define an objective, and is helpful when formulating the evaluation tool or measures.

10.2 KPI EXAMPLES

- The information issued by our national decision-making and dissemination point was timely.
- Arrangements to assemble the in-country disaster management group relevant to decision-making on tsunami warning and response were in place before the exercise.

11. EVALUATION

11.1 FINALISE EVALUATION PLAN

The evaluation plan is finalised once exercise requirements have been defined. Whilst the evaluation is conducted during the actual exercise, the evaluation tool and/or associated forms are developed during the design phase of the exercise.

In Tsunami Wave exercises the evaluation plan is contained in the Exercise Tsunami Wave manual. The manual will provide information on the exercise scenario, schedule of events, conduct, and evaluation tools and schedule.

Each country/agency is responsible for appointing its own exercise evaluators. If country/agency exercise evaluators are appointed, the in-country National Exercise Planning Team should provide them with a document in writing that provides:

- Evaluator instructions: step-by-step instructions for evaluators regarding what to do before they arrive (e.g. review exercise materials, wear appropriate clothing for assignment), as well as how to proceed upon arrival, during the exercise, and following its conclusion.
- Evaluator tools: Exercise-specific evaluation guidelines and analysis forms, the Master Schedule of Events List, blank paper or timeline forms. Reference materials or background information if decision-making, or written SOPs if operating procedures are being evaluated, may be good for the evaluator to have. Clocks or other quantitative measures of performance, or video/photographic equipment may also be useful.

11.2 EVALUATION TOOLS

The format and content of evaluation tools for Tsunami Wave exercises may vary over the course of time. The overall evaluation tool/forms will be prepared and disseminated by the Exercise Tsunami Wave Task Team.

An evaluation guideline or analysis form will prompt the evaluator(s) to look for certain actions in the exercise and will allow them to determine whether or not objectives and key performance indicators were met.

12. DEVELOP THE SCENARIO

12.1 INTRODUCTION

The tsunami scenario is a narrative that describes a tsunami event to which the exercise participants will need to respond to. It provides a brief description of the events that have occurred up to the minute the exercise begins. The scenario has two important functions.

- It gives the background and sets the mood for the exercise, captures the participants attention and motivates them to continue (it is important participants are motivated to participate in the exercise).

- It also sets the stage for later action by providing information that the participants will need during the exercise.

The Exercise Tsunami Wave Task Team will develop the overall exercise scenario (or series of scenarios). National Exercise Planning Teams can build detail from the overall scenario to create their national exercise

12.2 DEVELOPING THE SCENARIO

The Exercise Tsunami Wave Task Team calls on technical expertise from the ICGs and their corresponding international tsunami warning centres to produce the tsunami scenario or scenarios, and to decide on the international warning arrangements that will trigger the national exercising.

Each country/agency is expected to use the scenario to further refine and add detail to describe the event's impact on specific services or sections of their country (such as the warning centres or emergency operations centres) and/or community. They may also address effects beyond the immediate impact area, along with a timeline for restoration of key lifeline utilities. Further details could include a clear definition of the number of dead, injured or displaced persons and the extent of property damage if a country or agency wishes to look at post impact implications.

The detail of the scenario is not normally made available to exercise participants before the exercise. Instead, it is used by the Exercise Planning Team from each country/agency to write the exercise. The outline of the scenario (such as an earthquake generated off the coast of Chile, causing a Pacific-wide tsunami) would be sufficient information to provide to exercise participants.

The scenario will also help in the writing of the Master Schedule of Events List.

13. ANNOUNCE THE EXERCISE: EXERCISE TSUNAMI WAVE MANUAL

13.1 INTRODUCTION

Tsunami Wave exercises are announced via the IOC Circular Letter which is ideally distributed to Member States at least 180 days in advance of the exercise. The Circular Letter provides overview information on:

- The date of the exercise,
- Its aim and objectives,
- The exercise scenario(s),
- General conduct and arrangements,
- Further information on additional resources available, such as the Tsunami Wave Exercise Manual, Tsunami Wave website, press releases, etc.

Once the outline scenario has been developed by the Exercise Task Team, the Exercise Tsunami Wave manual is produced.

The Exercise Tsunami Wave manual is the major exercise document produced and is used to inform Member States and agencies involved about the basic details of the exercise.

The Tsunami Wave Exercise Manual is made available to Tsunami Wave National Contacts at least 90 days in advance of the exercise. The Manual provides detailed information about the conduct of the exercise to exercise participants, including:

- An exercise overview,
- Scenario(s) details,
- Parameters and assumptions describing how the exercise will be carried out,
- Master Schedule of Events List (timeline listing all messages and injects, including the exercise start and exercise end messages),
- Products issued, including how they will be disseminated,
- Post-exercise evaluation method and questionnaire forms.

The manual can be printed in hard copy, or if voluminous, distributed electronically to the Tsunami National Contact, Tsunami Warning Focal Point, and National Exercise Coordinators in each country.

Each National Exercise Coordinator should distribute the Manual to the National Exercise Planning Team, and is encouraged to forward it also to all relevant in-country agencies' representatives

14. CONFIRM AGENCY PARTICIPATION

14.1 INTRODUCTION

Careful project management is required for Tsunami Wave exercises due to their size and scale. One important aspect of exercise management is determining which countries are participating in the exercise so the appropriate information can be sent through to the right people prior to, during and after the exercise.

Upon receiving the IOC Circular Letter, each country should nominate a Tsunami Wave National Contact or National Exercise Coordinator and provide his/her contact information to the IOC and the Tsunami Wave Task Team chair. All Tsunami Wave information henceforth will be sent to the Tsunami Wave National Contact. The contact should then ensure that all pertinent information is sent to the National Tsunami Exercise Planning Team, and participating stakeholders.

Each country is encouraged to invite appropriate national/provincial/local agencies to participate.

When inviting other agencies to participate in Tsunami Wave exercises:

- Discuss dates with them at the earliest opportunity,
- Explore likely levels of support,
- Invite a representative to planning meetings.

***Note**: If the exercise takes place outside of normal business hours, some agencies may have to adjust shifts or schedule overtime for those involved.*

A cover letter may accompany the IOC Circular Letter and/or Exercise Tsunami Wave manual outlining expected commitment and to request confirmation of participation in the exercise.

14.2 LEVELS OF PARTICIPATION

It can be helpful when planning an exercise to ascertain the level of commitment an agency will give to the exercise.

The following table provides some guidance regarding the levels of participation in exercise planning and exercise play.

Category	Description
Full	Agency commits to all parts of exercise including: ▪ Contributing to exercise development and ▪ Staff within the agency will participate in response coordination.
Partial	Agency participates in a specific part of the exercise. ***Note:*** *the agency may contribute to exercise development.*
Facilitation	Agency not actively involved in exercise development but personnel made available to facilitate exercise injects or enquiries (i.e. a control function). ***Note:*** *Contact person nominated to be contactable for exercise related matters or enquiries.*
Not engaged	Agency not involved in exercise development or exercise play. Agency inputs and outputs will be notional if required (i.e. exercise writers will make up that agency's input if required). Exercise Planning Team will advise the agency that the exercise is taking place but no invitation to participate is required. ***Note:*** *No communication or contact during exercise.*

Table 7. Exercise planning and exercise play

15. EXERCISE DOCUMENTATION

15.1 INTRODUCTION

Tsunami Wave exercises, due to their international and multi-agency complexities, generate a number of exercise documents.

Documentation may include (but is not limited to):

- IOC Circular Letter announcing Exercise Tsunami Wave.
- Exercise Tsunami Wave manual.
- Master Schedule of Events List (MSEL), and additionally:
  - Tsunami products to be issued
  - Observed tsunami heights, calculated tsunami travel times, and tsunami forecast wave heights
- Exercise Evaluation Guidelines / Evaluation forms.
- International planning meeting agendas and minutes.

- Tsunami Wave briefing notes and presentations to participants.
- Participant lists.
- Media or press releases.
- International TWC Operational Users Guides (such as the PTWS Operational Users Guide).
- List of ICG Tsunami National Contacts and Warning Focal Points, and appropriate National Warning and Emergency Response Contacts.
- Staff memos.
- Observer invitations.
- Financial records.
- Collated feedback from hot and cold debriefs.
- Corrective action plans.
- National summary reports.
- Collated Tsunami Wave country evaluations.
- Tsunami Wave Summary Report, including findings and recommendations to the ICG and its Member States.

Each country may have its own exercise documentation in addition to the items listed above.

15.2 NATIONAL GENERAL INSTRUCTION

Each participating agency should issue some guidance to staff participating in the exercise.

A General Instruction is a detailed document that outlines essential information including administrative arrangements specific to each participating agency, such as roster details, communications plans, and meal break times and how the exercise will be controlled. It is distributed to all exercise participants about one month before the exercise.

A General Instruction should be issued once the Tsunami Wave manual is released and should include:

- Exercise purpose,
- Exercise aim,
- Exercise objectives and key performance indicators,
- Exercise scope,
- Exercise appointments,
- Methods of communication,
- Public information strategies (media arrangements etc.),
- Evaluation strategy (including umpire appointments if appropriate),
- Observer programme arrangements,
- Budget and expenditure.

15.3 DOCUMENT MANAGEMENT

Documents should be allocated a version number and distributed to participants during the exercise in an accurate and timely manner.

15.4 EXERCISE MESSAGES AND INJECTS

Messages and other injects are used to communicate detailed incidents or developments to exercise participants. One message may represent an event, or several messages may be needed to collectively represent the event.

Messages and injects serve one purpose: to generate a response, (i.e. to cause exercise participants to make decisions and take actions that meet the exercise objectives).

When they are known in advance, they should be listed as part of the Master Schedule of Events List.

15.5 TRANSMITTING MESSAGES AND INJECTS

Messages can be transmitted in various ways, including:

- Landline telephone
- Cellular telephone, voice or simple text message
- Satellite phone
- Mass media broadcast, such as through Radio or Television
- In person
- Written note
- Fax
- Email

When transmitting messages in functional or full-scale exercises, try to use the method of transmission that would be most likely in a real emergency. In this case, utmost care should be taken to ensure that the public and all stakeholders are aware that the messages are for part of an exercise, and are not real.

Tsunami Warning Centre products are message injects. Depending on the scenario/scenarios for Tsunami Wave exercises:

- Every tsunami product may be disseminated from the Tsunami Warning Centres, or
- The Exercise Tsunami Wave Task Team may elect for the exercise to be started with an initial ‘Exercise Start Messsage’ issued by the Tsunami Warning Centres and then subsequent messages will be available for in-country control teams and participants to refer to using an exercise ‘playbook’ containing all the relevant bulletins. The ‘playbook’, which is part of the Exercise Tsunami Wave Manual, can be available in hard copy, or if there are many scenarios, electronically or through the Tsunami Wave website.

15.6 MESSAGE AND INJECT FORMAT

Exercise Planning Teams often use a standard form when creating messages and injects. A standard form should include a space for a message number, the time that the message is to be delivered, and the information that will prompt the action to be taken.

For example, for Exercise Pacific-Wave’11, the PTWC, WC/ATWC and NWPTAC bulletins will look similar to the real thing but they will be marked ‘Exercise Pacific-Wave’11 only’.

A sample message inject template can be found in Annex III.

15.7 HOW TO WRITE MESSAGES AND INJECTS

Countries/agencies may elect, at national, provincial or local levels to supplement the PTWC, WC/ATWC and NWPTAC products with additional exercise messages/injects to further challenge participants.

The table below outlines the steps to write a message or inject:

Step	Action
1	Identify an expected action.
2	Consider who could send a message and what that person could say to motivate the expected action.
3	Consider the four message variables: ▪ Message source (Who would realistically send the message?) ▪ Transmission method (How will the message be transmitted?) ▪ Message content (What – does the message provide all of the information needed to make a decision?) ▪ Recipient (Who will receive the message? If not the decision maker, where would the message best be redirected?)
4	Keep it realistic.
5	Practice with the messages. Read them through with someone who is familiar with the agency involved. Does the message motivate the expected action? If it does, then the message is likely to be more successful.
6	Ensure the messages are numbered and have time of release on them. This may need to be done as the Master Schedule of Events List (MSEL) is put together.

Table 8. Steps to write a message or inject

15.8 SPONTANEOUS MESSAGES

The majority of exercise messages in Tsunami Wave exercises will be pre-determined. When designing the exercise at a national, provincial or local level, however, it is a good idea to try to anticipate things that might go wrong and to provide the in-country/agency Exercise Director with ideas about ways to handle those situations. These may be ‘spontaneous’ messages.

In an actual exercise, the participants do not always respond as expected. When this happens, the Exercise Director will need to improvise. Typically, the Exercise Director will decide on an appropriate response.

If the Exercise Director is familiar with the scenario and objectives, their spontaneous messages can still fulfil the purpose of the exercise.

When improvising inputs or details, these are made up within the confines of understood capabilities and capacities. Anything that does not fit the confines of understood capabilities and capacities should be noted by evaluators as 'knowledge gaps' to be addressed after the exercise.

16. MASTER SCHEDULE OF EVENTS LIST (MSEL)

16.1 INTRODUCTION

The Master Schedule of Events List is a detailed sequence of events used by Exercise Control staff to ensure that the exercise runs smoothly. It is also known as a running sheet, programme, script or main event list.

***Note**: A Master Schedule of Events List should only be circulated to Exercise Control staff, not to general exercise participants.*

16.2 PREPARING A MASTER SCHEDULE OF EVENTS LIST

The international Master Schedule of Events List is prepared by the Exercise Tsunami Wave Task Team. The international list can be supplemented at a national, provincial or local level to create the national list, in which case, contributions will be required from all participating agency exercise management representatives.

A Master Schedule of Events List is usually a spread sheet that contains the following items:

Contents	
Serial number	
Day/date	
Time	
Activity of event	
Location	
Desired outcome	
Control documents	
Comments/remarks	
Initiator (who puts the message in)	
Recipient (who receives the message)	Optional
Resources	Optional
Role players	Optional
Monitoring and follow up arrangements	Optional
Critical completion times	Optional
Cross referencing	Optional
Links with the objective	Optional
Expected actions	Optional

An abbreviated example of the Master Schedule of Events List for national exercises is given in Annex IV. This was conducted as part as an IOC Strengthening Tsunami Warning and Emergency Response training workshop in the Philippines in May 2009.

16.3 LINKS TO CONTROL DOCUMENTS

The Master Schedule of Events List identifies the events linked to the tsunami products or other injects. The Exercise Tsunami Wave manual and/or Tsunami Wave website will contain the tsunami products. Exercise Control staff use the schedule to introduce information at appropriate times and help to control the pace of activities.

16.4 TIMING OF EVENTS

When determining the timing of events consider the following:

- Events should be positioned to keep the exercise at a fairly steady pace; as one problem is resolved, another should appear,
- Problems closer to the scene will appear before those experienced further away,
- Communications problems may initially create a lack of information from warning centres, emergency agencies, and/or worst hit areas,
- Recovery and repair efforts will take considerable time to arrange.

16.5 ANTICIPATING RESPONSES

Considering likely reactions to messages and injects helps exercise design by:

- Identifying likely questions so that the required answer can be made available; this is especially important since experience shows that information flow to/from the public and the media during a local tsunami is often chaotic and therefore prone to mis-information and mis-interpretation.
- Providing time estimates for repair, restoration and regeneration (which can be written into the Master Schedule of Events List).

To assist and improve understanding by the public and media of tsunami and tsunami-warning related questions during a warning event, it is recommended that warning centres and emergency response agencies prepare ‘Frequently Answered Questions’ or other talking points. When an event occurs, public spokespersons will then be able to immediately provide clear and concise answers to commonly asked questions.

16.6 CONTROL OF DETAIL

In large functional or full-scale exercises, control of detail is essential. This is achieved by cross-referencing, ensuring facts and figures are accurate (using graphs and tables may help), and checking the frequency and distribution of exercise items.

All documents in large, complex exercises need to be broken into clearly labelled components and given a serial number to assist in tracking and tracing.

Ideally, messages and injects should be entered into a log database (e.g. Microsoft Excel) to allow sorting by time, location, subject etc. Key problems may be mapped to provide a quick visual summary for exercise writers (e.g. warning centre messages, public safety evacuation advisories, sirens, road closures, wave observations, service break locations, etc.).

Using a database for messages and injects can assist when determining the frequency and distribution of messages (who is getting them – will they get sufficient work out of the exercise or be overloaded, etc.).

17. EXERCISE SETUP

17.1 INTRODUCTION

The Exercise Planning Team will be responsible for the preparation and setup of the exercise. Simple exercise types may require very little in the way of setup. However, the more complex the exercise the more setup will be required. The team is responsible for the coordination of:

Item	Description
Exercise venue(s)	Venues should be organized well in advance with consideration given to: ▪ Site or location selection and suitability ▪ Approval to use site or location ▪ Pre-planning site inspection ▪ Site access ▪ Site control and security ▪ Site realism and detailed staging to suit the scenario ▪ Damage control requirements ▪ Site safety requirements and arrangements ▪ Staging areas ▪ Car parking ▪ Power/gas ▪ On site amenities
Site simulation	▪ Role players ▪ Moulage (make-up)
Communications and Information Technology	Examples are: ▪ Telephone lines ▪ Internet Broadband access ▪ Fax machines ▪ Cellular phones ▪ Commercial radio and/or television monitors ▪ Computers ▪ Printers ▪ Photocopiers ▪ Radio communications, and/or other dedicated or direct communications methods ▪ Satellite phones ▪ Exercise log ▪ Display boards
Media involvement	▪ Room ▪ Communications and computer equipment
Accommodation	Visiting staff and observers
Travel and transport	Flights and transfers
Catering	Meals and refreshments

Item	Description
Visitors and observers	Formal and informal
Maps	▪ Topographical ▪ Cadastral, including shelters, safe assembly areas, critical facilities, schools and special needs populations and first responder locations ▪ Street enlargements ▪ Historical seismicity and tsunami maps ▪ Pre-calculated scenario maps (tsunami travel times, energy distribution, offshore wave heights) ▪ Inundation maps ▪ Evacuation maps
Stationery	Forms Pens and paper Trays and clipboards Marker pens
Documentation	Plans and Standard Operating Procedures, or Station Duty Manuals
Item	Description
Finance	Authorities and accounts
General administration	Cleaning Security Toilets Liabilities and insurance
Public relations, Media	Before the exercise During the exercise After the exercise
Identification	Provide appropriate identification Restrict access of non-exercise personnel to all exercise sites.

Table 9. Exercise coordination

17.2 PHYSICAL FACILITIES AND ROOM SETUP

It is important to conduct the exercise in the location(s) where normal operations would take place and to set it up as it would be for a real event in order to simulate reality.

The type of setup will vary depending on the size and complexity of the exercise. When using control staff, a separate exercise control room or facility must be set up where Exercise Control staff can send, receive and track messages and other communications with players.

The control room will need to be equipped with the necessary communications equipment e.g. radios, fax, computers and phones, as well as display and map boards or other means

to keep track of exercise progress. Provide control staff with large printouts of the master schedule of events.

17.3 EVALUATOR TRAINING

Evaluator training must take place before the exercise and address all aspects of the exercise, including:

- The exercise aim and objectives,
- The scenario,
- Participants roles,
- Evaluator roles and responsibilities.

Before or during the training, provide evaluators with copies of the following materials to review before the exercise starts:

- Exercise documents, such as the Exercise Pacific Wave manual, and agency General Instruction.
- Evaluation materials such as:
    - Exercise Evaluation tool/form
    - Master schedule of events list
- Relevant plans, policies, procedures, and agreements of the exercising agency.

Evaluator training should also include guidance on observing the exercise discussion or operations, what to look for, what to record, and how to use the exercise evaluation tools. To promote effective observation, evaluators must be instructed to do the following:

- Be at the designated position when players arrive,
- Observe player actions (or player discussion) but avoid getting in the way or becoming involved,
- Focus on observing the activities and tasks in relevant exercise evaluation guidelines to ensure exercise objectives are accomplished,
- Take legible, detailed notes, including times and sequence of events,
- Remain at the assigned post at key times,
- Allow players to act and answer questions without prompting.

17.4 EVALUATOR INTERACTION

Evaluators should not interfere with exercise play. However, it may be necessary for an evaluator to interact with players during the exercise if he or she has a question about something observed.

***Note**: Evaluators should wait until there is a break in activity to ask questions. These questions must not prompt or lead players in any way, and conversation should remain brief and focused.*

17.5 OBSERVER PROGRAMME

Tsunami Wave exercises may generate interest within the wider sector or local community. Visitors from other agencies (whether local or international) may be invited to observe various exercise activities.

An Exercise Observer Programme is a structured agenda that provides visitors with an overview of the exercise activities. All visitors should be provided with appropriate identification and site access. The programme will identify a point of contact at each site, and often include a tour of the exercise area and a chance to observe exercise play.

For those visitors who do not live locally, accommodation and transport may be part of the programme.

In large, complex exercises, an Observer Coordinator should be appointed to manage the Exercise Observer Programme.

17.6 MEDIA

Each country is responsible for the coordination of national in-country media communications for Tsunami Wave exercises. Media may be invited to participate and/or be simulated by Exercise Control staff.

The role of the media should not be underestimated in raising tsunami awareness to the public. Member States are encouraged to involve the media in Tsunami Wave exercises.

Media involvement will vary from country to country, from a paragraph in a newspaper to television coverage of an evacuation drill to information transmitted to the public via media networks. It is important, however, to ensure that the media and public know about the exercise beforehand so that they do not mistake it for a real tsunami warning.

Participating agencies should seek guidance from their national Tsunami Wave Focal Point/Exercise Coordinator regarding responses to individual approaches by in-country media concerning the exercise. An exercise communication plan concerning the media should be developed by the Tsunami Wave Task Team and issued as part of the Tsunami Wave Manual.

The UNESCO Bureau of Public Information will issue at least one international media advisory prior to a Tsunami Wave exercise to alert the press of the upcoming exercise. The Tsunami Wave exercise manual will also contain a sample press release that can be customized by Member States. Member States should consider issuing one to two exercise press releases to their respective country’s media in conjunction with the UNESCO releases. The Member State press releases should provide adequate alert to the population and give local media time to conduct interviews and documentaries with participating agencies in advance of the exercise.

SECTION 3

CONDUCT THE EXERCISE

1. EXERCISE BRIEFINGS

1.1 INTRODUCTION

The international Exercise Tsunami Wave Task Team can be available to provide countries with briefings on the Exercise Tsunami Wave Manual.

Additionally, in-country briefings by the Tsunami Wave National Contact and/or the National Exercise Planning Team may be useful to introduce participants to the exercise, especially if there is a number of staff participating in the exercise.

As exercise planning progresses, several different ways of communicating information can be considered for use. Regular planning meetings can be held, newsletters distributed, and/or participants can visit the international Tsunami Wave website or the National Tsunami Exercise web site for information.

A final briefing should be conducted just before the exercise begins.

1.2 EXERCISE BRIEFINGS

An initial exercise briefing is provided to exercise participants, Exercise Control staff, and evaluators before the exercise begins. It is used to orientate all people involved with the exercise. The key points to raise at the initial briefing regardless of the group receiving it are:

Topic	Description
Timings	Timings and duration of participation required.
Exercise boundaries	What can and cannot occur in terms of role playing and also operational response. The physical boundaries of the exercise.
Locations	Locations of key venues or activities where relevant.
Expected outcomes	What is expected as a result of the exercise?
Safety briefing	What the emergency procedures for the exercise are.
Exercise logistics briefing	What the logistical and administration arrangements for the exercise are. What will happen in case of a real warning or emergency.

1.3 EXERCISE CONTROL STAFF BRIEFINGS

While Exercise Control staff may attend the initial exercise briefing, a second briefing must be given to Control staff to expand on the initial briefing and to state the range and limitations of their activities. Control staff briefings should include:

- Roles and responsibilities,
- Exercise documents,

- Methods to be used,
- Departures from scripts,
- Responding to participant actions,
- Keeping notes for later debrief.

This second briefing is not done in the presence of exercise participants and should be reasonably short in duration as the Control Staff should already have received training on how to perform their responsibilities.

At the end of the final briefing, the exercise will start. Regular briefings may also be required during a long duration exercise to ensure the scenario is on track.

1.4 EVALUATOR BRIEFINGS

Before the exercise begins, the lead country evaluator should meet with the National Exercise Coordinator and/or evaluators to verify roles, responsibilities, and assignments and to provide any significant updates, such as changes to the scenario. A summary of the MSEL is provided so that evaluators know which events are the most important.

This briefing is the time for evaluators to ask questions and to ensure complete understanding of their roles and responsibilities.

For operations-based exercises, the briefing often includes a tour of the exercise site so that evaluators are familiar with the venue and know where they should position themselves to observe exercise play.

Because many events may occur at once, evaluators may not be able to record all of the action. Knowing which events are most important ensures that these are most closely evaluated.

2. CONTROL THE EXERCISE

2.1 INTRODUCTION

National Exercise Control staff are responsible for controlling the exercise. This includes starting and stopping the exercise and introducing messages and injects (e.g., tsunami bulletins or products) into exercise play.

2.2 START THE EXERCISE

Tsunami Wave exercises may be started immediately following the last participant briefing. The in-country/agency Exercise Director ensures that all Exercise Control staff are in place and are ready to begin.

The international and regional tsunami warning centres, such as the PTWC, NWPTAC, and WC/ATWC in the Pacific, are responsible for sending the initial “Exercise Start Message” which will indicate the start of the exercise.

2.3 CONTROL STAFF

Each in-country/agency Exercise Director uses the Master Schedule of Events List (MSEL) to control the exercise. He/she ensures that any problems are rectified to keep the exercise flowing. The Exercise Director can modify the flow of the exercise to make sure objectives are met.

Exercise Control staff have a range of responsibilities in order to keep the exercise running. They need to stay in contact with the Exercise Director throughout the exercise.

2.4 INTRODUCING TSUNAMI BULLETINS

Once the exercise has started and participants are in place the tsunami bulletins or products identified in the Master Schedule of Events List can be introduced into exercise play. The tsunami bulletins may be disseminated via the international and regional tsunami warning centres or by each country/agency Exercise Control team via the 'exercise play book'. The exercise manual will outline what method will be adopted for each Tsunami Wave exercise.

2.5 ENCOURAGING SPONTANEITY

Players should be able to decide among a full range of responses normally available to them during an emergency.

To allow for participant spontaneity Exercise Control staff must be well trained and prepared to handle the unexpected so that events can be brought back under control if required.

2.6 SUSTAINING AND CONTROLLING EXERCISE ACTIVITY

Sustaining exercise activity is achieved by the continuous injection of exercise information to the participants. This needs to be closely monitored to ensure that the information is released at an appropriate time. Depending on how well participants react to the injects, the rate of injects in addition to the tsunami warning products (international and national or local), may need to be increased or slowed down. It may be necessary to add or remove injects to suit the pace of the exercise.

It is also important to control exercise activity. Participants may react in a different way to what was anticipated. If this happens, then a check needs to be made to see if the reaction will have an ongoing effect on the exercise. Free play also needs to be controlled to prevent it from de-railing the exercise. If there is a danger that free-play or a reaction will have a negative effect on the exercise, the addition of a spontaneous problem or solution inject may correct the problem. The in-country Exercise Director may need to step in and put the exercise back on track.

Control staff must mark off on the Master Schedule of Events List when tsunami products and other injects are 'sent'. These products/injects are marked with an exercise inject serial number (e.g. #001).

In some cases where participants start to get frustrated, injects start to back up, or conflict occurs between players, then the in-country/agency Exercise Director may need to step in temporarily and pause the exercise. Once the problems have been resolved, the Exercise Director can start the exercise again. It is important that the Exercise Director ensures the exercise is a positive experience for the participants.

In a real situation, experience has shown that communications channels, especially the public-access lines, get back-logged, slow, or shut down. It is especially important that that public is not allowed to distract operations staff (such as at the tsunami warning centre or emergency operations centre) and prevent them from issuing time-sensitive and critical safety information. To avoid this, it is essential that agencies have a public information and media plan as one of their standard operating procedures.

The Exercise Director can control the pace of the exercise by adjusting the inject flow, slowing things down when the pace is too frantic, or speeding it up when the exercise drags. He/she can also even out the pace among participants.

Ideas to slow the pace:

- Reschedule events to allow more reaction time. Have control staff wait before sending injects.
- Discarding injects that are relatively unimportant or do not impact on decisions.

Ideas to increase pace and fill gaps:

- Speed up delivery pace (varying from planned schedule).
- Determine what is causing gaps and be ready to add or alter injects spontaneously when needed.
- Keep supply of optional injects on hand that can be added when needed.
- Adding side events and routine actions that have to continue throughout the emergency.
- Adding secondary events that develop out of the main flow of exercise events.
- Adding special planning requirements that would cause an inactive group to engage in activity.
- Adding misdirected injects, (messages given to the wrong agency or function). Such injects can be used to gauge the agency or function's clarity of role definition and test whether they forward the message properly.

Ideas to relieve overload on particular agencies

- Reassign: verify that all injects are assigned to the correct agency or function. Then move any specific injects that could be used by another agency.
- Thinning: divide the overloaded injects into two piles, 'essential to flow of exercise' and 'nice to have' and remove some of the latter.

2.7 END THE EXERCISE

Finishing the exercise is a controlled activity. The in-country/agency Exercise Director stops the exercise at a pre-planned time (e.g., this could be the international cancellation tsunami bulletin).

An immediate hot debrief should be provided for all players and staff to capture information and feedback while it is still fresh in their minds.

For health and safety purposes in functional exercises, ensure that all of the participants and staff are accounted for before releasing people from the exercise.

SECTION 4

EVALUATE THE EXERCISE

1. EVALUATE THE EXERCISE

1.1 INTRODUCTION

All exercises should have a learning focus. Learning is maximised when there is a continuous process of review to draw out the lessons identified. Review is the process of evaluating and validating the exercise. The exercise should test an agency's Standard Operating Procedures (SOPs). Areas that agencies are encouraged to evaluate include, but are not limited to:

- Are there written SOPs for staff to follow?
- Are there templates, or other pre-scripted communications to make the response faster and standardised?
- Have stakeholders been educated on what they should expect, when, and what they should do with the information your agency provides?

A review and hot and cold debrief should evaluate their effectiveness and identify if there are any corrective actions.

The primary method to evaluate an exercise is through debriefing while validation relies on a range of processes that investigate an exercise's impact on an agency's workplace.

There are two principle reasons for evaluating and validating exercise performance:

- Identify improvements needed in an agency, process or function.
- Establish whether the exercise achieved its objectives.

1.2 EVALUATION THROUGH DEBRIEF

A post exercise debrief is a critical review of the entire exercise and it identifies those areas that were handled well, those areas where issues were experienced and identifies recommendations for improvement.

The aim of organizational debriefing is for staff to communicate their experiences of the exercise so that lessons can be identified. Arrangements (plans, procedures, training etc.) can then be modified to reflect lessons identified and best practice and therefore improve the agency's ability to respond in future exercises/real events.

It is vital that all staff are involved regardless of seniority, and understand that an organizational debrief is about improving performance and not about assigning blame. All participants who contributed to the exercise should be able to contribute to the debriefing process. These expectations should be communicated to all agencies prior to the exercise.

After the exercise, activities will include preparing reports, undertaking organizational debriefs, reviewing plans and arrangements and documenting and implementing lessons.

If countries/agencies choose to involve members of the public e.g., evacuate a coastal community as part of a Tsunami Wave exercise, these participants should also be given an opportunity to be part of the debriefing process. This might take the form of public meetings to discuss what lessons community members have identified from the exercise. Feedback from community meetings should be fed into organizational debriefs.

A debrief should be run by an experienced facilitator to:

- Determine what went right, what went wrong and why, without trying to lay blame.
- Note specific questions which arise from achievement or non-achievement of objectives.
- Acknowledge good performance.
- Seek constructive information from those being debriefed.
- Focus on improving procedures and training.
- Record relevant information to enable reports to be compiled.
- Summarise key points and suggest follow up action.

Depending on the size of the exercise and the number of participants, there may need to be a series of debriefs building on one another.

There are usually two debriefs conducted after an exercise:

- Hot debrief
- Cold debrief

Hot debrief

Held immediately after an exercise, a hot debrief (or hotwash) is an opportunity for all participants to provide feedback while the exercise is still fresh in their minds.

A suggested format for this is:

- Have a short break of about 10 minutes after the end of the exercise.
- The in-country/agency Exercise Director gives his or her initial feedback.
- Obtain participant round-table feedback.
- Evaluators provide their feedback.
- Provide appropriate acknowledgements.

Cold debrief

A cold debrief is a more formal debrief held within four weeks following the exercise. The debrief process should include:

- What happened during the exercise?
- What went well?
- What needs improvement?
- What plans, procedures or training programmes need amendments?
- What follow up is required, including identifying any capability gaps for future capacity building?
- Was the exercise realistic?
- How could the exercise have been improved?

Exercise evaluation forms provided to agencies may be used to help structure the agenda and improve and focus the debrief session. Exercise Evaluators should provide their comments and preliminary analysis to the debrief participants.

The debriefing process should remain focused on evaluating the exercise's effectiveness – on issues, successes and problems.

Note: *Personal criticism of individual participants at the meeting must be disallowed. However, these issues may need to be addressed in separately facilitated 'defuse sessions'.*

1.3 PLANNING TEAM, CONTROL TEAM AND EVALUATORS DEBRIEF

A debrief with the in-country National Exercise Planning Team, as well as in-country Control Staff and Evaluators, should be held as soon as possible following the exercise. This debrief allows evaluators to collect observations and thoughts about the conduct of the exercise and leads to the development of preliminary analyses of exercise observations.

When writing preliminary analyses, evaluators should consider the following questions:

	Question
1	Were the objectives of the exercise met?
2	Did discussion suggest that all personnel would be able to successfully complete the tasks necessary to execute each activity? If not, why?
3	What are the key decisions associated with each activity?
4	Did discussion suggest that all personnel are adequately trained to complete the activities or tasks needed to demonstrate a capability?
5	Did discussion identify any resource shortcomings that could inhibit the ability to execute an activity?
6	Do the current plans, policies, and procedures support performance of activities? Are players familiar with these documents?
7	Do personnel from multiple agencies need to work together to perform a task, activity, or capability? If so, are the agreements or relationships in place to support the coordination required?
8	What should be learned from this exercise?
9	What strengths were identified for each activity?
10	What areas for improvement are recommended for each activity?

Table 10. Preliminary Analyses

1.4 EVALUATION THROUGH VALIDATION

After an exercise, the evaluation forms must be completed and collated, and a validation of the exercise conducted.

The validation will be presented in the form of an end of exercise report, prepared by the Exercise Tsunami Wave Task Team. Each country may elect to produce an exercise report in addition to the overall international report**.**

1.5 VALIDATION

The final stage of the exercise process is to determine whether or not the exercise has met the objectives identified in the needs assessment. Validation compares the performance of agencies and participants during the exercise against performance expected on the job. It is a way of measuring the value of the exercise and deals with more strategic issues than debriefing.

Validation answers the following questions:

- Did the exercise address the identified need?
- Did the exercise provide an opportunity for agencies and participants to perform in a manner closely resembling that expected in the real world?
- Did the exercise lead to improvements in agency policies, plans and procedures, or individual performance?

Validation can be carried out by:

- Observation on the job.
- Evaluation forms.
- Debrief notes.
- Interviews with participants and their supervisors.
- Post exercise questionnaires.

After validation, agencies may change or develop plans, procedures, and training programmes. Exercise outcomes may be retested in future Tsunami Wave exercises, or new exercises written to meet newly identified needs.

1.6 END OF EXERCISE REPORT

The final Exercise Tsunami Wave Summary report:

- Provides a description of what happened.
- Describes best practices or strengths.
- Identifies areas for improvement.
- Provides recommendations for improvement.
- Collates and provides a summary of the country evaluations.

Improvements will be assigned to a responsible person or agency. All improvements should be tracked to check on progress.

1.7 EXERCISE FOLLOW-UP

The recommendations of the final exercise report must be followed up.

The corrective actions included in the exercise report must be considered by the Tsunami Wave Exercise Task Team and agreed upon. Coordination and oversight of the implementation of the corrective actions might also be assigned to the Exercise Tsunami

Wave Task Team or ICG Steering Committee, who will develop a work programme towards implementation of the action points.

At the national level, a national exercise report may follow the same process.

In each country/agency a Tsunami Wave National Contact or Exercise Coordinators should:

- **Assign responsibility**: clearly assign tasks and schedules, and designate responsibility for each recommended action point.
- **Monitor**: establish a monitoring plan to track the progress of implementing recommended improvements.
- **Report**: provide regular reports to senior officials on the progress of implementing recommended improvements.

Other follow-up actions may include:

- Return of equipment,
- Payment of exercise related accounts, and
- Letters of appreciation.

ANNEX I

TSUNAMI EXERCISE CASE STUDIES

Philippines: Pilot Tsunami Evacuation Drill – Exercise Pacific Wave (EPW)'06, May 2006

Of the forty countries involved in Exercise Pacific Wave 2006 (EPW'06, also known as PacWave06), the Philippines was one of five countries that chose to include the public to plan and perform a pilot tsunami evacuation drill. Albay Province, located on the southeast section of Luzon, was selected for the tsunami evacuation drill because it had a high level of preparedness for frequent hurricanes and volcanic activity.

An elderly woman is carried during a pilot Philippine Tsunami Evacuation Drill in a coastal village, May 2006.

The Philippine Institute of Volcanology and Seismology (PHIVOLCS) conducted numerous drill planning activities with provincial officials, including developing local tsunami communication plans, deciding on evacuation routes, and developing community maps. Exercise observers supported by UNDP and IOC participated in their exercise.

The Albay Provincial Disaster Coordinating Council (Albay-PDCC) oversaw evacuations of one pilot barangay (local village).

PHIVOLCS issued the incoming 'mock' warning messages to the National Disaster Coordinating Council (NDCC), who in turn contacted the Office of Civil Defense (OCD), which provides vital information on impending disasters to the local government units (LGUs) and regional OCD offices (RDCCs).

The RDCCs relay information to the provincial (PDCC), then to the municipal or city (M/CDCC) and finally to the barangay (BDCC) for appropriate action. Later, two more barangays also conducted similar tsunami drills in December 2006.

More information available at:

http://www.phivolcs.dost.gov.ph/index.php?option=com_phocadownload&view=file&id=34:annual-report-2006&Itemid=44

Indonesia: Bali Tsunami Drill, 26 December 2006

Bali school children follow a designated tsunami evacuation route as part of an Indonesian Tsunami Drill, December 2006

An Indonesia Tsunami Drill was conducted in Sanur Beach – Bali on the morning 26 December, 2006 to continue the development of the Indonesia Tsunami Early Warning System (TEWS) and commemorate the second anniversary of the 2004 Indian Ocean Tsunami.

Some 1000 – 2000 school children and teachers were observed participating in the drill. The drill was conducted based on the recommendation of IOC Indonesia Tsunami Roundtable in May 2006. Since then, similar drills have occurred annually on

December 26 in provinces throughout Indonesia.

The Indonesia TEWS was developed by more than fifteen government ministries, agencies and universities under the coordination of the Ministry of Research and Technology (RISTEK) and in partnership with the international community. The first part of the drill involved the Meteorological and Geophysics Agency's (BMG) scientific technology with earthquake and tsunami detection, analysis, and dissemination of warnings to the affected community. The second part of the drill involved a cultural component to build a resilient and prepared community. Collaboration occurred with the City Government of Denpasar, the Armed Forces and International Community. The Tsunami Drill simulated a full-scale "end to end" TEWS by fusing the latest technology in tsunami early warning with disaster management and community socialization. The drill commenced with earthquake observation and concluded with the provision of disaster relief assistances.

In 2008, RISTEK published Guideline Tsunami Drill Implementation for City and Regency that comprehensively describes the steps involved in the preparation, planning and implementation of a full- scale end-to-end tsunami disaster drill involving the tsunami early warning system, local government and affected communities. Tsunami drills conducted in Padang, Sumatra (2005), Denpasar, Bali (2006), and Cilegon, Java (2007) are summarized.

The document can be found at:

http://www.gitews.org/tsunami-kit/en/E4/further_resources/Guideline%20Tsunami%20Drill%20Implementation%20for%20City%20and%20Regency.pdf

USA, Hawaii: Two Tsunami Exercises Conducted Annually

The State of Hawaii, USA conducts two functional, command post style tsunami exercises annually, using local and distant tsunami scenarios. The Pacific Tsunami Warning Centre customizes tsunami scenarios for the Hawaii State Civil Defense, the lead state disaster coordination agency. Multiple federal, state, county government agencies, private sector organizations and NGO's test their 24/7 emergency communications and simulate enabling Tsunami Emergency Response – Standard Operating Procedures.

Functional style Tsunami Exercise conducted at Hawaii State Civil Defense - Emergency Operating Centre, circa 2003.

The exercises are timed so that the public notification through sirens occurs when the monthly statewide siren test is conducted. One of the two exercises is used as a vehicle to publicize annual April Tsunami Awareness Month activities.

Moreover, all public schools in coastal tsunami evacuation zones are required by State Department of Education policy to conduct an annual tsunami drill by teachers walking students inland to safe assembly areas.

In the United States, exercises are undertaken by emergency management agencies according to standards established by the Homeland Security Exercise and Evaluation Programme (HSEEP). The programme is a capabilities and performance-based exercise programme that provides a standardized methodology and terminology for exercise design, development, conduct, evaluation, and improvement planning.

More information can be found at https://hseep.dhs.gov/pages/1001_HSEEP7.aspx

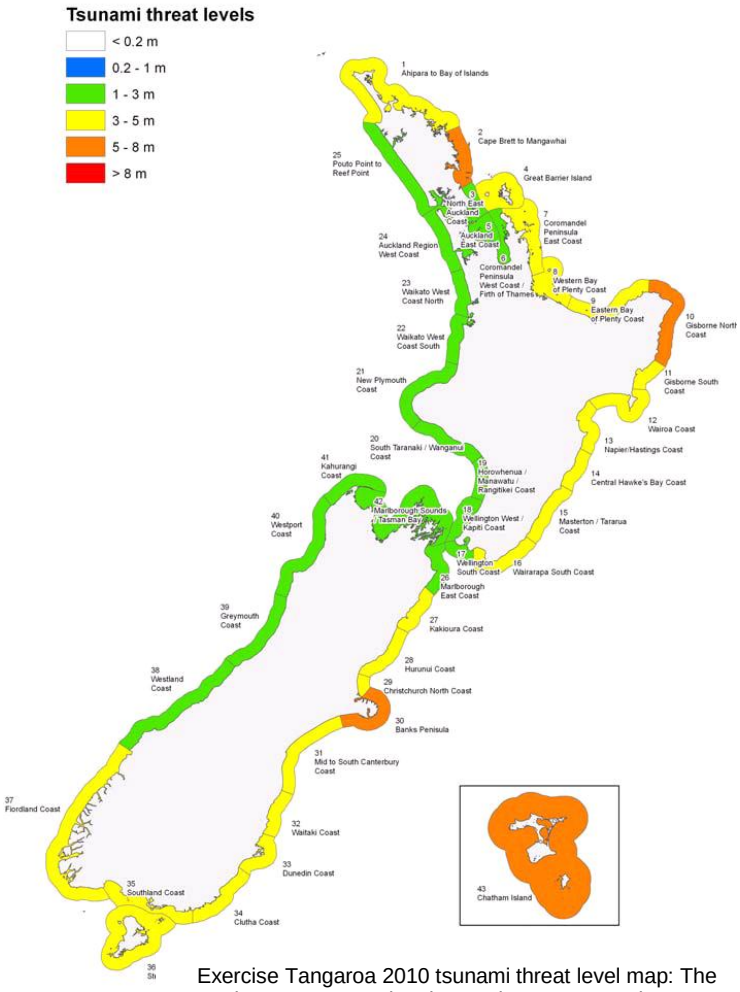
New Zealand: Exercise Tangaroa 2010

A national, multi-agency exercise focusing on the national response to a distant source tsunami event was held in New Zealand on 20 October 2010. The exercise was led by the Ministry of Civil Defence & Emergency Management (MCDEM), with participation from the 16 Civil Defence Emergency Management (CDEM) Groups, central government departments, emergency services, lifeline utilities, and other agencies across the country. In all, 100 agencies and companies took part, making it one of the largest civil defence emergency management exercises ever held in New Zealand.

The scenario for the exercise was based on a magnitude 9.1 earthquake off the coast of Central Peru in South America and focused on the lead-up to a tsunami arrival, stopping when the first waves reached the New Zealand coast. The exercise was played in real time.

Information about a simulated destructive tsunami crossing the Pacific was communicated through tsunami information bulletins issued (notionally) by the Pacific Tsunami Warning Centre (PTWC). These were sent to MCDEM (as the 24x7 designated national communication point responsible for tsunami warning) and to other agencies that normally subscribe to PTWC bulletins.

During the course of the exercise, MCDEM continued to monitor and evaluate the situation, and released further information (including hourly updates) as appropriate. A state of national emergency was notionally declared and a national action plan was developed to support the coordination of the overall response. The exercise provided an opportunity to test the recently developed tsunami threat level maps that illustrate expected impacts. Decision-making and notification down to the last stage before notifying the public within New Zealand was exercised.



Exercise Tangaroa 2010 tsunami threat level map: The colours correspond to the maximum expected water elevation (i.e. zero-to-peak) at the coastline in metres above sea-level.

MCDEM analysed the information received from the PTWC with the support of a science group coordinated by GeoNet (a collaboration between the Earthquake Commission and Geological and Nuclear Science (GNS Science) and subsequently issued national advisory and warning messages. The participating national agencies and CDEM Groups responded to this information by considering appropriate warning and response at their levels.

This resulted in local warnings, evacuations and welfare support within affected areas, most of them notional, but used as the basis for exercising response staff.

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ANNEX II

EXERCISE TSUNAMI WAVE DEVELOPMENT CHECKLIST

Generic tsunami wave checklist

Ref	Event	Check √
Analyse the need		
1	At least 180 days before Tsunami Wave exercise: Member State Tsunami National Contact (TNC) and Tsunami Warning Focal Point (TWFP) receive IOC Circular Letter announcing the exercise	
2	TWFP responds to the contacts specified in the IOC Circular Letter advising the name and contact details of his/her country's Tsunami Wave National Contact.	
3	TNC or TWFP disseminates the IOC Circular Letter to in-country agency representatives	
4	Conduct a needs assessment for your country/agency	
5	Determine the type of exercise to be conducted in your country/agency	
Design the exercise		
6	TNC/TWFP establishes an in-country National Exercise Planning Team including key stakeholder agencies: ▪ Appoint an Exercise Coordinator; this could be the Tsunami Wave National Contact. ▪ Appoint an Exercise Planning Team. ▪ Establish a Terms of Reference for the Planning Team. ▪ Appoint Exercise Control roles. ▪ Establish exercise timeline (include exercise planning meetings). Ensure that the Planning Team takes into account the following documentation: ▪ Exercise Tsunami Wave manual. ▪ International (and regional?) TWC Operational User Guides, and other pertinent TWC Products or guidelines (such as when new experimental products, plans, or services are being introduced). ▪ Tsunami Wave website for updates and documentation.	
7	Define in-country/agency exercise aim (in addition to the overall exercise aim) if appropriate.	
8	Define additional exercise objectives for your country/agency (in addition to the overall exercise objectives) if appropriate.	

Ref	Event	Check √
9	Define the Key Performance Indicators (KPIs).	
10	At least 90 days before exercise: Tsunami Wave Task Team issues Exercise Tsunami Wave Manual. Other pertinent exercise material may follow at a later date.	
11	In-country planning team selects a scenario out of the Tsunami Wave set of scenarios (if more than one scenario is provided).	
12	Announce the country exercise. Forward the Exercise Tsunami Wave manual and pertinent national exercise materials to appropriate agency focal points.	
13	Confirm agency participation.	
14	Develop and issue national exercise documentation: ▪ Exercise General Instruction for your agency. ▪ Communications Plan. ▪ Control Staff Instruction (and resources if required).	
15	Develop further national control documents (messages and injects) in addition to tsunami bulletins or products if required.	
16	Develop National Evaluation and Exercise Control instructions if required.	
17	Develop National Evaluation Forms and Checklists, modifying international documents as needed.	
18	Develop National Master Schedule of Events List, modifying international MSEL as needed.	
19	National Exercise set-up: ▪ Logistics and administration ▪ Physical room / field setup ▪ Evaluator training ▪ Observer programme	
20	At least 1 week before exercise: IOC issues international press release, National press releases may follow.	
Conduct the exercise		
21	Conduct briefings to staff, exercise control and evaluators, other agency personnel and media. This should start immediately after the IOC Circular Letter Tsunami Wave announcement and continue until just before the start of the exercise	

Ref	Event	Check √
22	Conduct Tsunami Wave exercise: ▪ Start the exercise. ▪ Introduce problems. ▪ Sustain and control exercise activity. ▪ End the exercise.	
Evaluate the exercise		
23	Conduct Hot Debrief(s)	
24	Conduct Control Staff and Evaluator briefing	
25	Conduct Cold Debrief, including control staff and evaluators if possible Validation. Did exercise meet objectives?	
26	In-country agencies complete evaluation (Word version, or electronic online) forms at local and provincial levels then forward to in-country TWFP or Exercise Coordinator or Planning Team	
27	Exercise Planning Team or TWFP collates evaluation forms and completes the National Tsunami Wave Evaluation online. (***Note****: only one online evaluation to be completed per country*).	
28	Compile end of exercise Summary Report for your country (optional).	
29	Exercise follow-up.	
30	Tsunami Wave Task Team compiles Tsunami Wave Summary Report	

Exercise PACIFIC WAVE 2011 checklist for countries

Ref	Event	Check √
Analyse the need		
1	February 2009: ICG/PTWS-XXIII forms PTWS Exercises Task Team to oversee next Exercise Pacific Wave.	
	28 February–4 March 2011: PTWS Exercises Task Team meets in Wellington, NZ to discuss; 8 April 2011: ITIC issues scenarios survey to Task Team, Working Group 2, and Steering Committee to ask input on scenarios for local / regional tsunami exercise. 13–19 April, 2011: ITIC, PTWC, JMA, PTWS Exercises co-chairs, and ITIC meet in Honolulu to further plan and create draft documents.	
2	13 May 2011: IOC Circular Letter No. 2390 (English, French, Spanish) issued to Member States Tsunami National Contact (TNC) and Tsunami Warning Focal Point (TWFP) announcing Exercise Pacific Wave 2011 will occur on 9–10 November 2011.	
3	24–27 May 2011: PTWS Exercises Task Team reports to ICG/PTWS-XXIV; details are confirmed.	
4	10 June 2011: Exercise Pacific Wave 2011 (PacWave11) National Contact (name, contact details)_provided to IOC PTWS Secretariat (b.aliaga@unesco.org, cc to l.kong@unesco.org)	
5	TNC or TWFP disseminates the IOC Circular Letter No. 2390 to in-country agency representatives.	
6	Conduct a needs assessment for your country/agency.	
7	Determine the type of exercise to be conducted in your country/agency.	
Design the exercise		
8	TNC/TWFP establishes an in-country National Exercise Planning Team including key stakeholder agencies: ▪ Appoint an Exercise Coordinator; this could be the Tsunami Wave National Contact. ▪ Appoint an Exercise Planning Team. ▪ Establish a Terms of Reference for the Planning Team. ▪ Appoint Exercise Control roles. ▪ Establish exercise timeline (include exercise planning meetings). Ensure that the Planning Team takes into account the following documentation: ▪ Exercise Pacific Wave manual. ▪ International TWC Operational User Guides, and other pertinent TWC	

Ref	Event	Check √
	Products guidelines (such as when new experimental products, plans, or services are being introduced). ▪ Tsunami Wave website for updates and documentation ▪ http://itic.ioc-unesco.org/index.php?option=com_content&view=article&id=1686&Itemid=2333&lang=en	
9	Define in-country/agency exercise aim (in addition to the overall exercise aim) if appropriate.	
10	Define additional exercise objectives for your country/agency (in addition to the overall exercise objectives) if appropriate.	
11	Define the Key Performance Indicators (KPIs).	
12	July 2011: How to Plan, Conduct, and Evaluate Tsunami Exercises (this guideline) made available to countries.	
13	July 2011: PacWave11 website established by ITIC to provide information to countries. http://itic.ioc-unesco.org/index.php?option=com_content&view=article&id=1686&Itemid=2333&lang=en	
14	9 August 2011: PacWave11 Task Team issues Exercise Pacific Wave 2011 Manual. PTWC Experimental Products information provided.	
15	Starting in August or earlier: PacWave11 Task Team available to provide PacWave11 briefings, pending funding, to regions and/or countries.	
16	22 August–2 September 2011: ITIC Training Programme (ITP-Hawaii) to focus on SOPs and PacWave11 preparations.	
17	In-country planning team selects a scenario out of the Tsunami Wave set of scenarios (if more than one scenario is provided).	
18	Announce the country exercise. Forward the Exercise Tsunami Wave manual and pertinent national exercise materials to appropriate agency focal points.	
19	Confirm agency participation.	
20	Develop and issue national exercise documentation: ▪ Exercise General Instruction for your agency. ▪ Communications Plan. ▪ Control Staff Instruction (and resources if required).	
21	Develop further national control documents (messages and injects) in addition to tsunami bulletins or products if required.	

Ref	Event	Check √
22	Develop National Evaluation and Exercise Control instructions if required.	
23	Develop National Evaluation Forms and Checklists, modifying international documents as needed.	
24	Develop National Master Schedule of Events List, modifying international MSEL as needed.	
25	National Exercise set-up: ▪ Logistics and administration. ▪ Physical room / field setup. ▪ Evaluator training. ▪ Observer programme.	
26	2 November 2011: IOC issues Exercise Pacific Wave 2011 press release. National press releases may follow.	
Conduct the exercise		
27	Conduct briefings to staff, exercise control and evaluators, other agency personnel and media. This should start immediately after the IOC Circular Letter 2390 issued (May 2011) and continue until just before the start of the exercise.	
28	9–10 November 2011: Exercise Pacific Wave 2011: ▪ Start the exercise. ▪ Introduce problems. ▪ Sustain and control exercise activity. ▪ End the exercise.	
Evaluate the exercise		
29	Conduct Hot Debrief(s).	
30	Conduct Control Staff and Evaluator briefing.	
31	Conduct Cold Debrief, including control staff and evaluators if possible Validation. Did exercise meet objectives?	
32	In-country agencies complete evaluation (Word version) forms at local and provincial levels then forward to in-country TWFP or Exercise Coordinator or Planning Team.	
33	9 February 2012: Exercise Planning Team or TWFP collates evaluation forms and completes the National Tsunami Wave Evaluation online. (**Note**: only one online evaluation to be completed per country).	

Ref	Event	Check √
34	Compile end of exercise Summary Report for your country (optional).	
35	Exercise follow-up.	
36	May 2012: Tsunami Wave Task Team compiles Tsunami Wave Summary Report, PacWave11 Task Team, PTWS Enhancing Tsunami Products, and PTWS Steering Committee meet in Honolulu to discuss results, and requirements and timelines for official implementation of PTWC experimental products.	

ANNEX III

STANDARD MESSAGE/INJECT TEMPLATE

Exercise Name – Exercise Only – Exercise Name – Exercise Only

[Insert date]
Time hrs
INJECT ID: [Insert number-insert time E.g.01-0635]

TO	Eg. ALL EXERCISE PARTICIPANTS
FROM	EXERCISE CONTROL (EXCON)
	Playing [insert agency name]
SUBJECT	**[Insert subject]**

MESSAGE STARTS

[Insert message]

MESSAGE ENDS

NOTES

* ANY ENQUIRIES ABOUT THIS INJECT SHOULD BE DIRECTED TO EXCON: [Insert name of EXCON member of staff and/or contact details]

ANNEX IV

EXAMPLE NATIONAL MASTER SCENARIO EVENT LIST

INTRODUCTION

As part of the UNESCAP-funded IOC Project, Strengthening Tsunami Warning and Emergency Responses: Training Workshops on the Development of Standard Operating Procedures for Indian Ocean and Southeast Asian Countries, the IOC conducted three country missions to the Philippines in 2008–2009. During the last mission (May 2009), a real-time functional tsunami exercise and post-exercise evaluation was conducted involving the Philippine Institute of Volcanology and Seismology (National Tsunami Warning Center, PHIVOLCS), and the Philippine Office of Civil Defense (National Disaster Management Office, OCD). Warnings and response operations were carried out from national to several regional offices during this communications and decision-making exercise; no evacuations were conducted.

More information, including the Exercise Manila Trench 2009 (EMT09) manual, can be found at :

http://itic.ioc-unesco.org/index.php?option=com_content&view=article&id=1693&Itemid=2348&lang=en

MASTER SCENARIO EVENT LIST – EXERCISE MANILA TRENCH 2009

Inject No	UTC	Local Time	Event	To	From
1	300	1100	START OF EXERCISE Earthquake! It has been raining hard for the past week throughout SW Luzon.	All	Controller
2	301	1101	PHIVOLCS Earthquake alarms trigger from : – Philippine Seismic Network – Metro Manila Digital Seismic Telemetry Network Amplitudes of P waves at a few stations are off-scale, suggesting to the west of Manila.	PHIVOLCS	Controller
3	305	1105	PHIVOLCS calculates Preliminary Earthquake parameters: 14.0 N 119 E, depth unknown, Magnitude mb 6.8. Seismic waveforms are saturated.	PHIVOLCS	Controller
4	312	1112	PTWC Message 1: M7.9, warning based on EQ evaluation; estimated arrival times.	PHIVOLCS	PTWC

Inject No	UTC	Local Time	Event	To	From
5	315	1115	Philippines Radio calls PHIVOLCS. My building was swaying. What has just happened? Where was the earthquake?	PHIVOLCS	Media
6	314	1114	JMA NWPTAC Message 1: M 7.9, Possibility of destructive ocean-wide tsunami possible, estimated arrival times, wave amplitude.	PHIVOLCS	JMA
7	317	1117	PHIVOLCS Tsunami Wet Sensor alarm All Lubang Island Tsunami Wet Sensors have just triggered.	PHIVOLCS	PHIVOLCS
8	318	1118	PHIVOLCS calculates a revised earthquake parameters: 14.0°N, 119°E, depth 20 km, M 8.0.	PHIVOLCS	Controller
9	320	1120	PHIVOLCS Director calls to request: 1) Earthquake report, 2) Tsunami travel time plot and coastal arrival times using TTT, 3) What do the Tide Tool maps for stations Subic Bay, Manila (reverse tsunami travel times, station location) say? 4) Is it high tide or low tide?	PHIVOLCS	PHIVOLCS Director
10	325	1125	PHIVOLCS TTT plot and arrival times.	PHIVOLCS	Controller
11	325	1125	Lubang Island Wet Sensor caretaker calls PHIVOLCS - they evacuated before some very large waves hit.	PHIVOLCS	Lubang Wet Sensor caretaker
12	325	1125	Tsunami wave hits Bagac, Bataan – estimated to be 2 m. Fishing boats break loose from their piers and are being tossed by waves.	OCD RC3 (copy PHIVOLCS)	Mayor
13	328	1128	Philippines television arrives PHIVOLCS. They want a live in-person interview. PHIVOLCS TWC Team Leader leaves the room to give interview and does not return until 245.	PHIVOLCS	Media
14	340	1140	PTWC Message 2: M 8.3, magnitude increase.	PHIVOLCS	PTWC

Inject No	UTC	Local Time	Event	To	From
15	340	1140	Tsunami wave hits Batangas port; waves break fuel lines causing small fires.	OCD RC4A (copy PHIVO LCS)	Batangas Port Authority
16	342	1142	JMA NWPTAC Message 2: M 8.3, destructive ocean-wide tsunami possible.	PHIVO LCS	JMA
17	345	1145	PTWC calls PHIVOLCS	PHIVO LCS	PTWC
18	345	1145	BBC News broadcasts: Destructive Ocean-wide Tsunami Warning has been issued for Pacific Ocean by PTWC and JMA (they did not mention that it is for the South China Sea only)	PHIVO LCS	BBC TV news
19	350	1150	President wants an IMMEDIATE update: What is going on? What actions are being undertaken? What is expected for Manila and when?	NDCC (copy PHIVO LCS to provide input)	President
20	352	1152	Many communities on the Pacific Ocean side call. Are we going to be hit? How big will it be? When will it hit me? What should I do? They report that some people have evacuated.	OCD (copy PHIVO LCS)	Public
21	400	1200	Preliminary Earthquake Damage Report for Manila. Many buildings collapsed (possible casualties) from North Port to Navotas along Manila Bay. Tsunami may occur. Concern that low-rise wooden or half-wooden buildings will be swept away.	OCD (copy PHIVO LCS)	OCD NCR
22	400	1200	CNN calls PHIVOLCS for Director Solidum.	PHIVO LCS	CNN
23	402	1202	Many coastal provinces and local governments on Manila Trench side hear media reports of the PTWC Tsunami Warning. Local governmental agencies call inquiring what should they do?	OCD (copy PHIVO LCS)	Ilocos Norte Local Govt

Inject No	UTC	Local Time	Event	To	From
24	410	1210	Tsunami wave (observed 4 m) hits Baseco.	OCD (copy PHIVOLCS)	Media radio report
25	415	1215	PHIVOLCS calculates revised Earthquake magnitude, M 8.3; TideTool shows 1.5 m drop in sea level at Subic Bay tide station, RP.	PHIVOLCS	PHIVOLCS
	415	1215	ADVANCE CLOCK TIME TO 1230.		Controller
26	430	1230	PTWC Message 3; reports tsunami at 0416Z 2.5m @ Subic Bay	PHIVOLCS	PTWC
	435	1235	ADVANCE CLOCK TIME TO 1250		Controller
27	450	1250	Large flooding waves reported.Coastal Road blocked by waves and debris in several places near Mamburao.	OCD RC4B Regional Office (copy PHIVOLCS)	Mamburao Local Govt
28	455	1255	PTWC Message 4: reports tsunami at 0422Z 4.0m (16 min period) @ Manila; 0421Z 4.5m (18 min period) @ Subic Bay	PHIVOLCS	PTWC
29	500	1300	Resident calls to report Earthquake Intensity VII in Manila (Iba Zambales)	PHIVOLCS	Local official
30	505	1305	Earthquake Damage Report for Manila. Over 100 buildings estimated as heavily damaged and over 1000 are partially damaged. Relatively heavy damage seen between North Port to Navotas along Manila Bay. Low-rise wooden and half-wooden buildings damaged by unsecured ships or have been swept into the sea by tsunami waves.	PHIVOLCS	City Engineer of Manila
31	530	1330	PTWC Message 5: reports tsunami at 0405Z 2.5M (20 min period) @ Qui Nhon, VN	PHIVOLCS	PTWC

Inject No	UTC	Local Time	Event	To	From
	535	1335	ADVANCE CLOCK TIME TO 0630		Controller
32	630	1430	The PTWC issues Message 6 - Cancellation at 630	PHIVOLCS	PTWC
33	640	1440	END OF EXERCISE. THANK YOU FOR PARTICIPATING!	ALL	Exercise Controller

ANNEX V

BIBLIOGRAPHY AND REFERENCES

This guideline has been modelled on the New Zealand 'CDEM Exercises Director's Guideline for Civil Defence Emergency Management Groups (DGL10/09]. This Guideline also relied on information obtained from a variety of other sources:

Australian/New Zealand Standards. 2004. *Handbook, Risk Management Guidelines*, 3rd ed. New Zealand, Standards Australia International Ltd and Standards New Zealand. (ISBN 0 7337 5904 1)

Australian Government Attorney-General's Department. 2007. 'Exercise Management Skills *Enhancement Course*' participant materials.

Australian Government Attorney-General's Department. 2007. '*National Counter Terrorism Exercise Management Course*' participant materials.

Australian Homeland Security Research Centre, Intelligent Futures. 2009. *Managing Training Exercises participant workbook*. Canberra.

California Office of Emergency Services. 2007. *Tsunami Warning Communications Exercise. Exercise Plan. California,* Office of Emergency Services.

Cabinet Office. UK Resilience. (1998) The *Exercise planners Guide.* Part 1. http://www.cabinetoffice.gov.uk/sites/default/files/resources/the-exercise-planners-guide.pdf

Emergency Management Australia. 2001. *Australian emergency manuals series. Part V, The management of training. Manual 2. Managing exercises*. Australia, Emergency Management Australia. (ISBN 0642476802)

Emergency Management Australia. *Managing Exercises. Manual 42*. Australia, Emergency Management Australia (currently under review)

Justice Institute of British Colombia, '*Exercise Design Participant Manual'.*

New Zealand Ministry of Civil Defence & Emergency Management. 2005. *Organisational Debriefing.Information for the CDEM Sector* [IS6/05].New Zealand, Ministry of Civil Defence & Emergency Management. (ISBN 0-478-25467-9)

New Zealand Ministry of Civil Defence & Emergency Management. 2006. *Exercise General Instructions. Writing Guidelines for Multi-Agency Exercises.* New Zealand, Ministry of Civil Defence & Emergency Management.

New Zealand Ministry of Civil Defence & Emergency Management. 2006 (rev 2009). *The Guide to the National Civil Defence Emergency Management Plan 2006.* New Zealand. Ministry of Civil Defence & Emergency Management. (ISBN 0-478-25470-0)

New Zealand Ministry of Civil Defence & Emergency Management. *Exercise Management. RAPID® Self Paced Module*. New Zealand, Ministry of Civil Defence & Emergency Management.

New Zealand Ministry of Civil Defence & Emergency Management. 2008. *National CDEM Exercise Programme (NEP) Charter*. Version 4. New Zealand, Ministry of Civil Defence & Emergency Management.

New Zealand Ministry of Civil Defence & Emergency Management. 2009. *CDEM Exercises. Director's Guidelines for Civil Defence Emergency Management Groups [DGL 10/09]*. New Zealand, Ministry of Civil Defence & Emergency Management. (ISBN 978-0-478-25490-7)

Office of Government Commerce. 2005. *Managing Successful Projects with PRINCE2*. United Kingdom, The Stationery Office (ISBN 9780113309474)

O'Kane, K. 2002. *Writing Operational Exercises for Emergency Management,* 3rd ed. New Zealand, Ministry of Civil Defence & Emergency Management.

Rahayu, H. P., I. I. Wahdiny, Aria Mariany, and State Ministry of Research and Technology. 2008. *Guideline Tsunami Drill Implementation for City and Regency.* State Ministry of Research and Technology. (ISBN 9796300524, 9789796300525)

UNESCO Intergovernmental Oceanographic Commission. 2006. *Exercise Pacific-Wave'06. A Pacific-wide Tsunami Warning and Communication Exercise*.

UNESCO Intergovernmental Oceanographic Commission. 2007. *Exercise Pacific-Wave'06 Summary Report*. Paris, UNESCO. (IOC/INF-1244)

UNESCO Intergovernmental Oceanographic Commission. 2008. *Exercise Pacific-Wave'08. A Pacific-wide Tsunami Warning and Communication Exercise.* IOC Technical Series No 82. Paris, UNESCO. (IOC/2008/TS/82)

UNESCO Intergovernmental Oceanographic Commission. 2009. *Exercise Pacific-Wave'08 Summary Report*. UNESCO. (IOC/INF-1254)

UNESCO Intergovernmental Oceanographic Commission. 2009 (rev. 2010). *Operational Users Guide for the Pacific Tsunami Warning and Mitigation System (PTWS)*. IOC Technical Series No 87, Second Edition. UNESCO/IOC. (IOC/2011/TS/87rev.)

UNESCO Intergovernmental Oceanographic Commission*,* 2009*. Indian Ocean Tsunami Warning and Mitigation System (IOTWS). Exercise Indian Ocean Wave 2009 (IOWave09).An Indian Ocean-wide Tsunami Warning and Communication Exercise,* IOC Technical Series No 88. Paris, UNESCO. (IOC/2009/TS/88)

UNESCO Intergovernmental Oceanographic Commission. 2011. *27 February 2010 Chile Earthquake and Tsunami Event. Post-Event Assessment of PTWS Performance*. IOC Technical Series No 92. Paris, UNESCO. (IOC/2009/TS/92)

UNESCO Intergovernmental Oceanographic Commission*.* 2011*. Exercise Caribe Wave 11. A Caribbean Tsunami Warning Exercise*. IOC Technical Series No 93. Paris, UNESCO. (IOC/2010/TS/93 rev.) (English/French/Spanish).

UNESCO Intergovernmental Oceanographic Commission. 2011. *Working Group on Tsunami and Other Hazards Related to Sea-Level Warning and Mitigation Systems (TOWS-WG),* IOC Reports of Meetings of Experts and Equivalent Bodies. Paris, UNESCO. (IOC/TOWS-WG-IV/3)

US Department of Homeland Security. 2007*. Homeland Security Exercise and Evaluation Programme (HSEEP) Volume I: HSEEP Overview and Exercise Programme Management, Volume II: Exercise Planning and Conduct, Volume III: Exercise Evaluation and Improvement, Volume IV Library: Sample Exercise Materials*, https://hseep.dhs.gov/pages/1001_HSEEP7.aspx

ANNEX VI

LIST OF ABBREVIATIONS

The following is a reference list of definitions and abbreviations used in this guideline.

Agencies	Means: ▪ Government agencies, including public service departments, non-public service departments, Crown entities, and Offices of Parliament; and ▪ Non-governmental organisations; and ▪ Lifeline utilities
Capability	An organisation is able to undertake functions, such as provide a service or fulfil a task. This implies that it has the required staff, equipment, funding, systems and resources to do this. Organizations are likely to have a number of capabilities.
Capacity	The adequacy of resources in terms of quantity, and suitability of personnel, equipment, facilities and finances.
CDEM	Civil Defence Emergency Management.
Cold Debrief	A briefing held to review the exercise four to six weeks following the exercise. All exercise players should be invited to attend.
Control Documents	Exercise tools that create an artificial environment and framework for an incident.
Exercise	An activity that stimulates a situation in order to test procedures and practice participants in defined roles.
Exercise Aim	A broad statement of intent.
Exercise Control Staff	A group or person responsible for the overall conduct of an exercise.
Exercise Coordinator	A person responsible for the exercise throughout its entire development process, including management of administration and logistical matters. This could also be the Tsunami Wave National Contact.
Exercise Director	A person responsible for supervising the speed and flow of an exercise and addressing any issues during the exercise.
Exercise Governance Group	A group of senior officials from the agencies taking part in the exercise. This group is responsible for signing off the exercise purpose statement and commits resources to the exercise (this role may be fulfilled by an Exercise Sponsor in a small exercise).
Exercise Planning Team	A group of people responsible for the successful execution of all aspects of the exercise, including exercise planning, conduct and evaluation.

Exercise Programme	A series of 'linked' exercises.
Exercise Sponsor	A senior person responsible for signing off the exercise purpose statement and commits resources to the exercise. (This role may be fulfilled by an Exercise Governance Group in a large exercise).
Evaluator	A person assigned to observe and evaluate selected objectives during an exercise.
General Instruction	A detailed document that outlines the administrative arrangements for an exercise specific to a particular agency.
Hot Debrief (Hotwash)	A briefing held immediately after an exercise.
ICG/CARIBE-EWS	Intergovernmental Coordination Group for the Caribbean and adjacent Seas Tsunami Warning and Mitigation System.
ICG/IOTWS	Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System.
ICG/NEAMTWS	Intergovernmental Coordination Group for the Mediterranean and North Atlantic Tsunami Warning and Mitigation System.
ICG/PTWS	Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System.
IOC	Intergovernmental Oceanographic Commission (of UNESCO).
ITIC	UNESCO/IOC – NOAA International Tsunami Information Centre.
ITSU (PTWS)	Tsunami Warning System in the Pacific. See PTWS.
Key Performance Indicators	Tools used to help an agency define and measure progress toward objectives.
Master Schedule of Events List	A detailed list of events that are scheduled to occur during the exercise.
MCDEM	Ministry of Civil Defence & Emergency Management (New Zealand).
Needs assessment	A process used to quantify an agency's development needs.
NDMO	National Disaster Management Office.
NGO	Non-government organization.
No Duff	A term used to describe a real event that occurs simultaneously to an exercise.
NWPTAC	Northwest Pacific Tsunami Advisory Centre.
NTWC	National Tsunami Warning Centre.

Objectives	A set of measurable actions or outcomes to be realised by conducting an exercise.
Observers	Internal or external agency personnel invited to view the exercise but do not participate. External observers report lessons identified and outcomes back to their agency.
Participants	A term that refers to all control staff, players and observers.
Players	Participants who have to perform for real by receiving and responding to incoming messages or injects supplied by simulators.
Project Management	The planning, organising and management resources to successfully complete specific project goals and objectives.
PTWS (ITSU)	The Pacific Tsunami Warning and Mitigation System (PTWS) is an intergovernmental cooperative effort to reduce tsunami risks. It was formed in 1965 as an International Coordination Group for International Tsunami (ICG/ITSU) in response to the 1960 M 9.5 Chile tsunami. ITSU was renamed to the PTWS as an intergovernmental group in 2005.
Risk	A combination of the likelihood and the consequence of a hazard.
Scenario	A narrative that describes an event that exercise participants need to resolve.
Scope	The limitations applied to an exercise.
SOPs	Standard Operating Procedures – these detail the procedures and other activities used to perform various tasks.
TER	Tsunami Emergency Response.
TNC	Tsunami National Contact.
TWC	Tsunami Warning Centre.
Tsunami Wave	Name for international tsunami exercises, such as Exercise Pacific Wave 2011, Indian Ocean Wave 2009, Caribbean Wave 2011.
Tsunami Wave National Contact	Official country contact for international Tsunami Wave exercises.
TWFP	Tsunami Warning Focal Point.
UNESCO	United Nations Educational, Scientific & Cultural Organization.
WC/ATWC	West Coast/Alaska Tsunami Warning Centre.

IOC Manuals and Guides

No.	Title
1 rev. 2	Guide to IGOSS Data Archives and Exchange (BATHY and TESAC). 1993. 27 pp. (English, French, Spanish, Russian)
2	International Catalogue of Ocean Data Station. 1976. *(Out of stock)*
3 rev. 3	Guide to Operational Procedures for the Collection and Exchange of JCOMM Oceanographic Data. Third Revised Edition, 1999. 38 pp. (English, French, Spanish, Russian)
4	Guide to Oceanographic and Marine Meteorological Instruments and Observing Practices. 1975. 54 pp. (English)
5 rev. 2	Guide for Establishing a National Oceanographic Data Centre. Second Revised Edition, 2008. 27 pp. (English) *(Electronic only)*
6 rev.	Wave Reporting Procedures for Tide Observers in the Tsunami Warning System. 1968. 30 pp. (English)
7	Guide to Operational Procedures for the IGOSS Pilot Project on Marine Pollution (Petroleum) Monitoring. 1976. 50 pp. (French, Spanish)
8	*(Superseded by IOC Manuals and Guides No. 16)*
9 rev.	Manual on International Oceanographic Data Exchange. (Fifth Edition). 1991. 82 pp. (French, Spanish, Russian)
9 Annex I	*(Superseded by IOC Manuals and Guides No. 17)*
9 Annex II	Guide for Responsible National Oceanographic Data Centres. 1982. 29 pp. (English, French, Spanish, Russian)
10	*(Superseded by IOC Manuals and Guides No. 16)*
11	The Determination of Petroleum Hydrocarbons in Sediments. 1982. 38 pp. (French, Spanish, Russian)
12	Chemical Methods for Use in Marine Environment Monitoring. 1983. 53 pp. (English)
13	Manual for Monitoring Oil and Dissolved/Dispersed Petroleum Hydrocarbons in Marine Waters and on Beaches. 1984. 35 pp. (English, French, Spanish, Russian)
14	Manual on Sea-Level Measurements and Interpretation. (English, French, Spanish, Russian)
	Vol. I: Basic Procedure. 1985. 83 pp. (English)
	Vol. II: Emerging Technologies. 1994. 72 pp. (English)
	Vol. III: Reappraisals and Recommendations as of the year 2000. 2002. 55 pp. (English)
	Vol. IV: An Update to 2006. 2006. 78 pp. (English)
15	Operational Procedures for Sampling the Sea-Surface Microlayer. 1985. 15 pp. (English)
16	Marine Environmental Data Information Referral Catalogue. Third Edition. 1993. 157 pp. (Composite English/French/Spanish/Russian)
17	GF3: A General Formatting System for Geo-referenced Data
	Vol. 1: Introductory Guide to the GF3 Formatting System. 1993. 35 pp. (English, French, Spanish, Russian)
	Vol. 2: Technical Description of the GF3 Format and Code Tables. 1987. 111 pp. (English, French, Spanish, Russian)
	Vol. 3: Standard Subsets of GF3. 1996. 67 pp. (English)
	Vol. 4: User Guide to the GF3-Proc Software. 1989. 23 pp. (English, French, Spanish, Russian)
	Vol. 5: Reference Manual for the GF3-Proc Software. 1992. 67 pp. (English, French, Spanish, Russian)
	Vol. 6: Quick Reference Sheets for GF3 and GF3-Proc. 1989. 22 pp. (English, French, Spanish,

No.	Title
	Russian)
18	User Guide for the Exchange of Measured Wave Data. 1987. 81 pp. (English, French, Spanish, Russian)
19	Guide to IGOSS Specialized Oceanographic Centres (SOCs). 1988. 17 pp. (English, French, Spanish, Russian)
20	Guide to Drifting Data Buoys. 1988. 71 pp. (English, French, Spanish, Russian)
21	*(Superseded by IOC Manuals and Guides No. 25)*
22 rev.	GTSPP Real-time Quality Control Manual, First revised edition. 2010. 145 pp. (English)
23	Marine Information Centre Development: An Introductory Manual. 1991. 32 pp. (English, French, Spanish, Russian)
24	Guide to Satellite Remote Sensing of the Marine Environment. 1992. 178 pp. (English)
25	Standard and Reference Materials for Marine Science. Revised Edition. 1993. 577 pp. (English)
26	Manual of Quality Control Procedures for Validation of Oceanographic Data. 1993. 436 pp. (English)
27	Chlorinated Biphenyls in Open Ocean Waters: Sampling, Extraction, Clean-up and Instrumental Determination. 1993. 36 pp. (English)
28	Nutrient Analysis in Tropical Marine Waters. 1993. 24 pp. (English)
29	Protocols for the Joint Global Ocean Flux Study (JGOFS) Core Measurements. 1994. 178 pp . (English)
30	MIM Publication Series:
	Vol. 1: Report on Diagnostic Procedures and a Definition of Minimum Requirements for Providing Information Services on a National and/or Regional Level. 1994. 6 pp. (English)
	Vol. 2: Information Networking: The Development of National or Regional Scientific Information Exchange. 1994. 22 pp. (English)
	Vol. 3: Standard Directory Record Structure for Organizations, Individuals and their Research Interests. 1994. 33 pp. (English)
31	HAB Publication Series:
	Vol. 1: Amnesic Shellfish Poisoning. 1995. 18 pp. (English)
32	Oceanographic Survey Techniques and Living Resources Assessment Methods. 1996. 34 pp. (English)
33	Manual on Harmful Marine Microalgae. 1995. (English) [superseded by a sale publication in 2003, 92-3-103871-0. UNESCO Publishing]
34	Environmental Design and Analysis in Marine Environmental Sampling. 1996. 86 pp. (English)
35	IUGG/IOC Time Project. Numerical Method of Tsunami Simulation with the Leap-Frog Scheme. 1997. 122 pp. (English)
36	Methodological Guide to Integrated Coastal Zone Management. 1997. 47 pp. (French, English)
37	Post-Tsunami Survey Field Guide. First Edition. 1998. 61 pp. (English, French, Spanish, Russian)
38	Guidelines for Vulnerability Mapping of Coastal Zones in the Indian Ocean. 2000. 40 pp. (French, English)
39	Manual on Aquatic Cyanobacteria – A photo guide and a synopsis of their toxicology. 2006. 106 pp. (English)
40	Guidelines for the Study of Shoreline Change in the Western Indian Ocean Region. 2000. 73 pp. (English)

No.	Title
41	Potentially Harmful Marine Microalgae of the Western Indian Ocean Microalgues potentiellement nuisibles de l'océan Indien occidental. 2001. 104 pp. (English/French)
42	Des outils et des hommes pour une gestion intégrée des zones côtières - Guide méthodologique, vol.II/ Steps and Tools Towards Integrated Coastal Area Management – Methodological Guide, Vol. II. 2001. 64 pp. (French, English; Spanish)
43	Black Sea Data Management Guide *(Cancelled)*
44	Submarine Groundwater Discharge in Coastal Areas – Management implications, measurements and effects. 2004. 35 pp. (English)
45	A Reference Guide on the Use of Indicators for Integrated Coastal Management. 2003. 127 pp. (English). *ICAM Dossier No. 1*
46	A Handbook for Measuring the Progress and Outcomes of Integrated Coastal and Ocean Management. 2006. iv + 215 pp. (English). *ICAM Dossier No. 2*
47	TsunamiTeacher – An information and resource toolkit building capacity to respond to tsunamis and mitigate their effects. 2006. DVD (English, Bahasa Indonesia, Bangladesh Bangla, French, Spanish, and Thai)
48	Visions for a Sea Change. Report of the first international workshop on marine spatial planning. 2007. 83 pp. (English). *ICAM Dossier No. 4*
49	Tsunami preparedness. Information guide for disaster planners. 2008. (English, French, Spanish)
50	Hazard Awareness and Risk Mitigation in Integrated Coastal Area Management. 2009. 141 pp. (English). *ICAM Dossier No. 5*
51	IOC Strategic Plan for Oceanographic Data and Information Management (2008–2011). 2008. 46 pp. (English)
52	Tsunami risk assessment and mitigation for the Indian Ocean; knowing your tsunami risk – and what to do about it. 2009. 82 pp. (English)
53	Marine Spatial Planning. A Step-by-step Approach. 2009. 96 pp. (English). *ICAM Dossier No. 6*
54	Ocean Data Standards Series: Vol. 1: Recommendation to Adopt ISO 3166-1 and 3166-3 Country Codes as the Standard for Identifying Countries in Oceanographic Data Exchange. 2010. 13 pp. (English) Vol. 2: Recommendation to adopt ISO 8601:2004 as the standard for the representation of date and time in oceanographic data exchange. 2011. 17 pp. (English)
55	Microscopic and Molecular Methods for Quantitative Phytoplankton Analysis. 2010. 114 pp. (English)
56	The International Thermodynamic Equation of Seawater—2010: Calculation and Use of Thermodynamic Properties. 2010. 190 pp. (English)
57	Reducing and managing the risk of tsunamis. Guidance for National Civil Protection Agencies and Disaster Management Offices as Part of the Tsunami Early Warning and Mitigation System in the North-eastern Atlantic, the Mediterranean and Connected Seas Region – NEAMTWS. 2011. 74 pp. (English)
58	How to Plan, Conduct, and Evaluate Tsunami Exercises. 2012. 88 pp. *(*English, Spanish*)*