Simulation Exercise Hand Book

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Director General's Message

Disaster early warning system should be an end-to-end in nature, and should include several aspects of early detection, warning, quick response, evaluation, decision making and evacuation. This consists of two main phases of upstream and downstream. The upstream process deals with the detection and forecasting and the latter with warning dissemination and evacuation. Between these two, there occurs the interface where the decision to warning is taken and order for evacuation is given. The interface mechanism is a complex and dynamic process involving a large number of stakeholders who operate at different levels. The decision-making involves technical knowledge, practical experience in the field as well as managerial and social skills to deal with the emergency situation and handing of human subjects.

Although there are clear guidelines available at the international and national level, the complexity of reaching all vulnerable groups in the community makes it difficult to operationalize and assess its effectiveness if we do not practice, rehearse and exercise down to the last man last mile. Hence, understanding the complexity and seriousness of disasters, DMC initiated to develop simulation Exercise handbook which will be useful for the disaster risk managers at different level.

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Preface

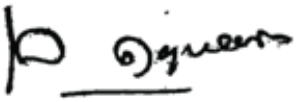
The Sendai Framework for Disaster Risk Reduction adopted by UN Member States in 2015 calls for the substantive reduction of disaster risk and loss by 2030. Among its four priorities for action, the Priority 4 component on enhancing disaster preparedness for effective response highlights the important actions such as; promote regular disaster preparedness, response and recovery exercises, including evacuation drills, trainings and the establishment of area-based support systems, with a view to ensuring rapid and effective response to disasters and related displacement, including access to safe shelter, essential food and non-food relief supplies, as appropriate to local needs; strengthen the capacity of local authorities to evacuate persons living in disaster-prone areas; support regional cooperation to deal with disaster preparedness, including through common exercises and drills.

Lack of proper guideline on how to conduct simulation exercise was one of the gaps identified by Disaster Management Centre and this hand book has been prepared to bridge the gap in curtained extend. This handbook targets disaster management professionals, relevant government officials and many other actors responsible for disaster preparedness planning and drills representing different sectors. The hand book consists of basic information on Simulation Exercise based on the globally accepted mechanism, theories and norms on simulation exercise.

Special acknowledgment is due to Director General, Disaster Management Centre for guiding and generous support. It is pleasure to acknowledge all the professionals, stakeholder agencies who have contributed so far to conduct simulation exercise in the country.

We hope this hand book will contribute to achieve resilience society.

Brigadier Kanishka Heiyantuduwa
Director
(Emergency Operation)



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Abbreviations

Community Based Organization	CBO
Department of Census and Statistics	DCS
Disaster Management	DM
Disaster Management Centre	DMC
Disaster Management Coordinating Units	DDMCU
Emergency Operation Centre	EOC
Federal Emergency Management Agency	FEMA
Gross Domestic Product	GDP
Geological Survey and Mines Bureau	GSMB
Grama Niladari	GN
High Frequency	HF
Inter-Governmental Organization	INGO
Indian Ocean Tsunami Warning and Mitigation Systems	IOTWMS
Local Disaster Management Organization	LDMO
Non-Governmental Organization	NGO
National Tsunami Warning Centre	NTWC
National Disaster Management Organization	NDMO
National Disaster Management Plan	NDMP
National Emergency Operation Plan	NEOP
Simulation Exercise	SIMEXS
Standard Operating Procedures	SOP
Table Top Exercise	TTX
Tsunami Service Provider	TSP
United Nation	UN
United Nations Educational, Scientific and Culture Organization	UNESCO
United States Geological Services	USGS
Very High Frequency	VHF

1. Introduction

On 26 December 2004, the world experienced one of the deadliest natural disasters ever recorded. A 9.1 magnitude earthquake off the west coast of Sumatra, Indonesia, triggered a massive tsunami that directly affected fourteen countries in Asia and Africa. The tectonic shifting of plates and the widespread impact of the subsequent waves, led to 230,000 deaths and massive human suffering in the world. Sri Lanka was one of the hardest hit countries by this Tsunami, devastating 1700 km long coastal strip of Sri Lanka seriously shattering 12 out of the 14 coastal administrative districts.

The total population of these twelve districts was estimated at 9.8 million and out of this, 0.9 million (9.1 percent) was seriously affected. According to statistics published by the Department of Census and Statistics (DCS) of Sri Lanka, the death toll exceeded 35,000 with 20,000 injured and about 100,000 dwellings completely or partially damaged leaving half a million people homeless and causing massive disruption to livelihoods.

Global Disaster Management Strategies underwent a rapid transformation after the 2004 Tsunami event. Similarly, the Disaster Management Act, was passed in the parliament of Sri Lanka in 2005, paving the way to create a new entity called Disaster Management Centre (DMC) under the of the Ministry of Disaster Management and Human rights to coordinate and monitor disaster management activities in the island.

At present Disaster Management subject is been gazetted under the portfolio of Ministry of Defence. DMC closely work with various line ministries/agencies addressing all four phases of Disaster Management (DM) cycle. Some of the important disaster management activities of the DMC include information management, planning and preparedness, coordination of emergency rescue and relief operations, mitigation activities awareness programmes.

Simulation exercises are one popular and effective tool use by DMC to enhance the community awareness, training, and to test procedures in place and raising awareness of preparedness and response requirements and actions are applied in many types of disasters.

Compare to the other training and awareness tools simulation exercises are highly effective to prepare the communities for disastrous situations which they are likely to encounter, and as such must be as realistic as is practicably possible . Within the Disaster Risk Management (DRM), simulation exercises have been shown to increase safety, decrease errors, improve judgments, and be useful for teaching and evaluating specific skills and capacities of organizations as well as communities. Further, it has been experienced those that undertake exercises typically score higher in self-confidence and perceived confidence than those who are not participating to the simulation exercises.

Lack of proper guidance document on how to organize simulation exercise is one demanding entity among the professionals involved in disaster management representing private, public, Non-Governmental Organization (NGO) and Community Based Organization (CBO).

2. Simulation Exercise

A Simulation Exercise (SimEx) is a fictional disaster event created with the purpose of testing the plans and procedures that would come into effect during a real emergency, helping to identify strengths and weaknesses. Emergency responders are given the chance to develop their skills and knowledge and it also provides a valuable opportunity for the various stakeholders to meet and work together to improve coordination. A SimEx can be big or small depending on the aims of, and resources available to, the organisers. The size does not really matter, simulations are a highly effective training and educational tool that develop skills and deepen people's understanding of disaster response through practical experience .

Disaster Risk Management (DRM) Cycle, SimEx can be placed in the middle of the preparedness element as shown figure 1.

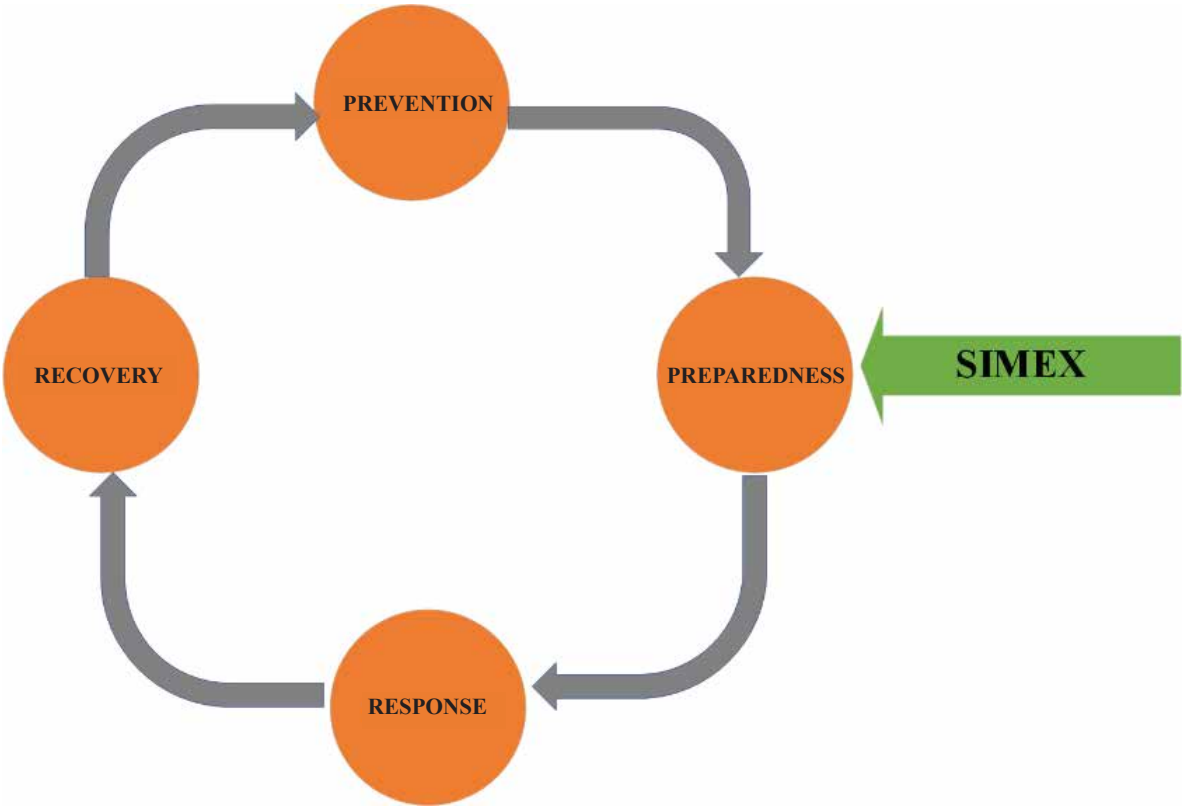


Figure 1 SimEx in Disaster Risk Management Cycle

2.1. Types of Simulation Exercise

Simulation exercises have been categorized into four main types based on the resources needed for planning and conducting the exercises as well as in their degrees of realism is shown in Figure 2.

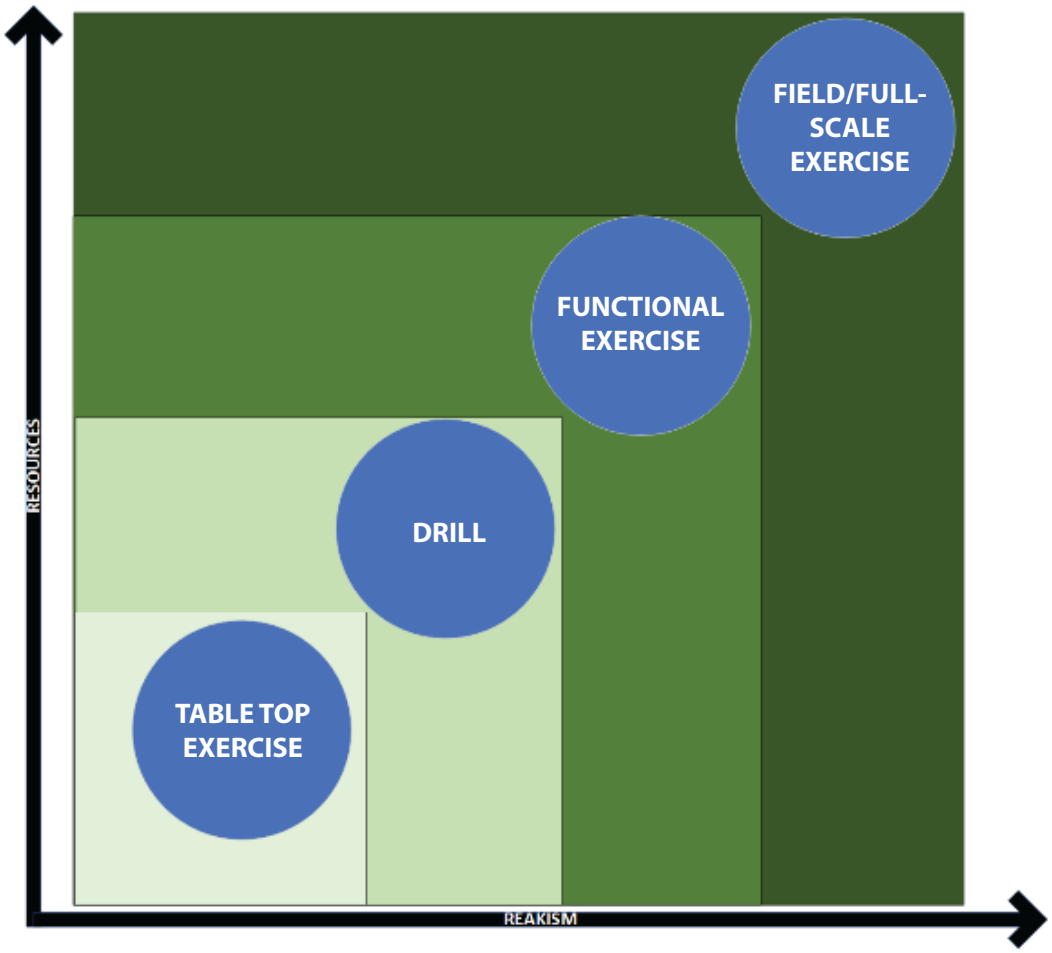


Figure 2 Main Types of Simulation Exercise

Description and the purpose of different types of the exercises are summarized in table1

[1]Preventionweb.net

Exercise	Description	Purpose
Table Top Exercise (TTX)	• Facilitated group analysis of an emergency situation in an informal, stress-free environment basically two types of table top simulation exercises as simple and enhanced. A simple table top exercise is a facilitated analysis of a specific situation in an informal, stress-free environment. It is designed to elicit constructive discussion as participants examine and resolve problems based on existing operational plans and identify where those plans need to be refined. Equipment is not used, resources are not deployed, and time pressures are usually not introduced. • An enhanced table top exercise is a simulated interactive exercise that helps to test the capability of an organization to respond to a simulated event. Tests multiple functions of an organization's operational plan. It is a coordinated response to a situation in a time-pressured, realistic simulation that involves several departments within an organization. These types of simulation exercises will require much more planning, preparation, and coordination than a simple table top exercise. To a large extent, the value and benefit of an enhanced table top exercise comes from bringing representatives from all of the stakeholder roles in the exercise together to participate in the exercise. It is still possible to run an enhanced table top exercise without representatives being present from the entire stakeholder's. If possible, you can fill these roles with individuals that are familiar with the mission of the individual stakeholder that is missing. It is recommended that you note during your after action review that actions taken by the missing agency may have been different than those taken by the "stand-ins" during the course of the exercise. It usually takes a few hours, depending on the participation. The preparation time for Table Tob Exercise (TTX) will take as much as one month.	A simple table top exercise For examination of operational plans, problem identification, and in-depth problem solving. An enhanced table top exercise used for the confirmation of planning, preparation,and coordination

Drill	Coordinated, supervised exercise used to typically test a single specific operation or function. Drills should be as realistic as possible, employing personal as well as any equipment or apparatus for the specific function. Unlike the TTX, drills require actual mobilization and use of resources. A drill can take an hour or a full day, depending on the systems tested. The preparation will take about one month depending on the magnitude of the drill.	Single or specific operations, functions or systems are tested in a repeated fashion. Review and improve a part of the overall emergency plan.
Functional Exercise	The Functional Exercise is a fully simulated interactive exercise that tests the capability of an organization to respond to a simulated event. The exercise tests multiple functions of the organization's operational plan, coordination, integration and interaction of an organization's policies, procedures, roles and responsibilities before, during and after the simulated event. The simulated emergency should be as close to the reality as possible, so that plans can be tested under the corresponding real-life stress level and time-pressure. Functional SIMEXs can run several hours or days, and will require 6-18 months of preparation depending on the magnitude of the exercise.	The aim is to identify lapses in the participants' familiarity with the plans as well as to identify any gaps in the plan itself. This type of SIMEX will test the hierarchies, responsibilities as well as the chain of commands.
Full-Scale Exercise	This focuses more on specific capacities or series of capacities, such as procedures for Rapid Response Teams. A full-scale exercise simulates a real event as closely as possible. This includes the mobilization and movement of emergency personnel, equipment and resources. Ideally, the full-scale exercise should test and evaluate all functions of the emergency management plan and operational plan. Differing from the Functional Exercise, a full-scale exercise typically involves multiple agencies and participants physically deployed in an exercise field location. The full-scale SIMEX requires a large amount of resources and coordination in all phases of the SIMEX process. It can take a few hours or several days, and its preparation requires a year or longer. The evaluation of the outcomes can significantly improve the system	Evaluate the operational capability of emergency management systems in a highly stressful environment, simulating actual response conditions.

Table 1 Different Types of Simulation Exercise[2]

An exercise decision tree, such as displayed in the WHO Exercise Manual 2017, can facilitate the choice of exercise type as shown in Figure 3.

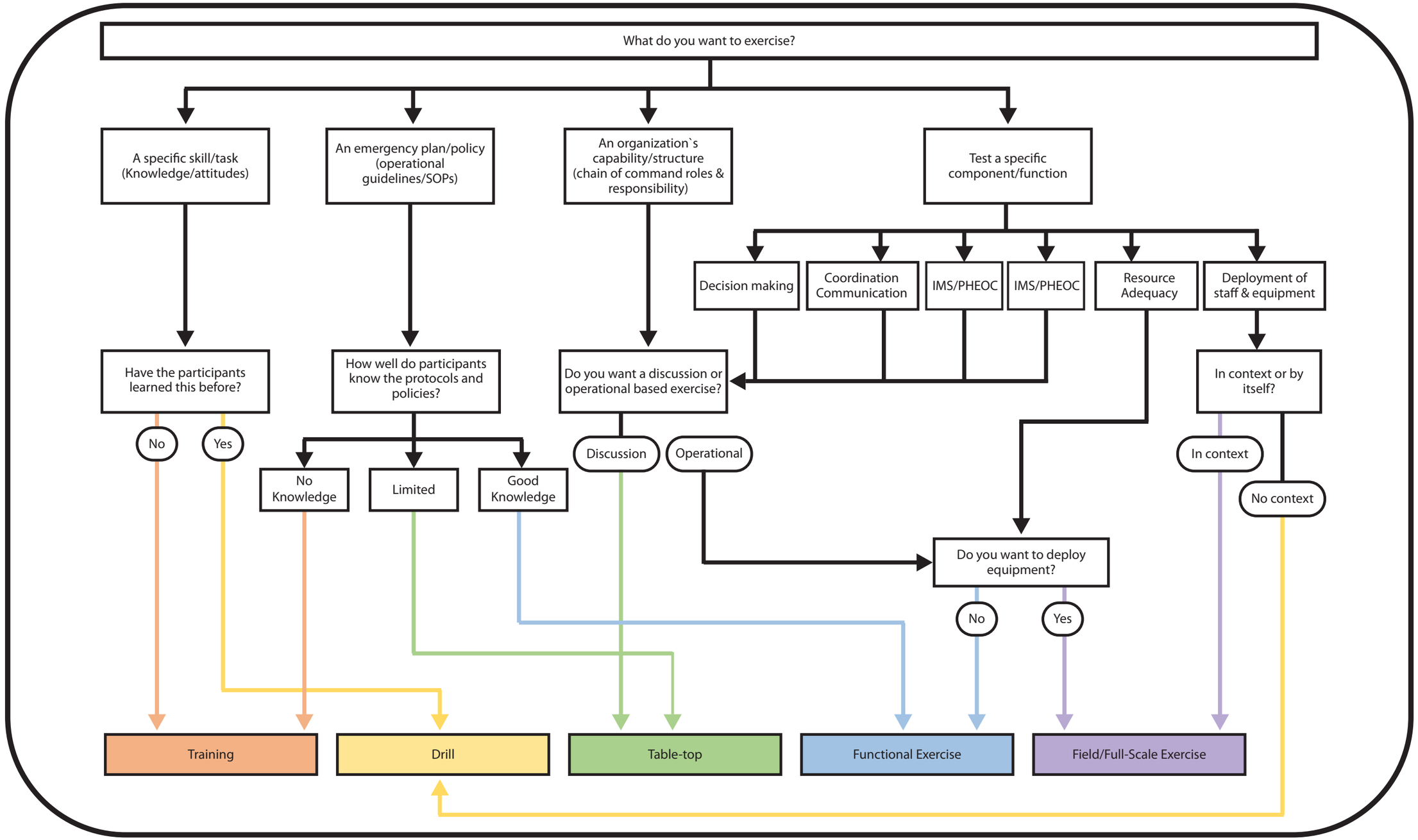


Figure 3 Exercise Decision Tree[3]

[2]Guideline for Simulation Exercise Federal Emergency Management Agency (FEMA) USA

[3]Exercise Planning Tool-World Health Organization

2.2. Planning & Executing Simulation Exercises for Disaster Response

Entire exercise process can be divided in to five steps as show in the Figure 4.

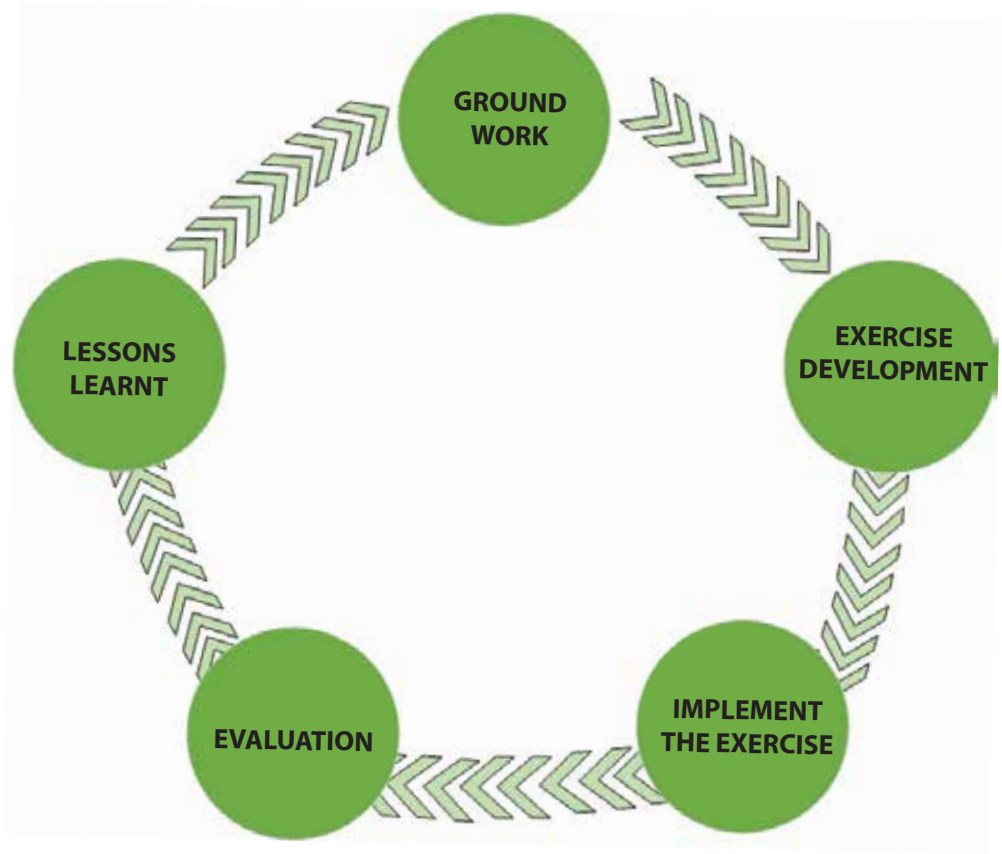


Figure 4 Major Steps in Simulation Exercise4

2.2.1. Ground Work on Simulation Exercises

Step I

As first step of the ground work requirment identification or the subject of simulation need to be identified and agreed.

Step II

Select a group of key stakeholder institutions involve in disaster preparedness and response activities and ensure the stakeholder institutions preparedness to allocate resources and/or staff time to planning and participating in the exercise.

Step III

Nominate leader having practical experience of designing and running exercises to oversee the planning and implementation of the simulation exercise.

Step IV

Appoint a team having different skills, expertise and exposures, made up of representatives from the key organisations to design the exercises is very much crucial for the success of the exercise. Having a range of stakeholders involved in the design and planning will ensure the achievement of the goals of all stakeholders. While selecting team members and assigning tasks them, members following things need to be considered (Table 2).

Item	Action	Task
Composition of the team	Lead Agency Stakeholder/Partner Agencies Representatives from Local agencies UN/NGO/INGO/ International Agencies Any other representatives deemed based on the exercise scenario	Ensure participation of Key stakeholder agencies
Competencies	Strategic leadership with expertise Research and Intelligence gathering Scenario building Skills Monitoring and Evaluating skills Technical specialities relative to emergency management Planning and Organizing Budgeting and finance	Identify composition of the team. Composition of the team
Core Responsibilities of Design Team	Define exercise objectives Obtained required approval and authorization Develop action plan to guide exercise Develop the scenario, injects, awareness schedule, Exercise Master plan, including key activities and monitoring/evaluation plan, Select and brief role players Communicate and liaise with participants and key stakeholders Identify and manage the logistics associated with the exercise Identify and provide resources required	Allocate all the key responsibilities and tasks to design team members

Table 2 Criteria and Task for the Team

Step V

Planning for the exercise has three major components as;

- **Location selection-**

  Most vulnerable areas for disasters are better to conduct the exercises as active local level participation could also be ensured for the exercise.
  Accessibility, safety and security factors
  are also essential to be considered while selecting the location.

- **Obtained Authorization-**

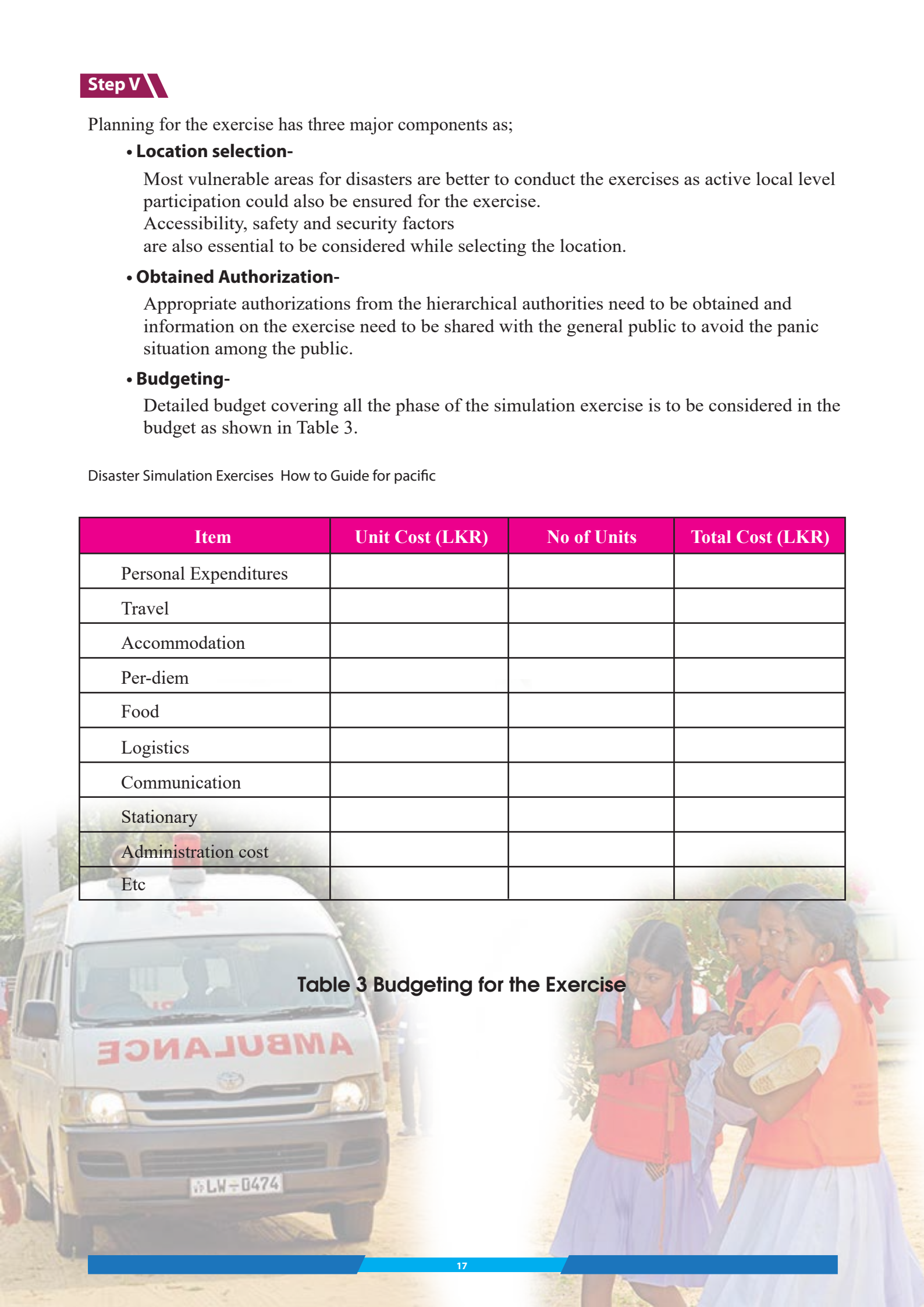
  Appropriate authorizations from the hierarchical authorities need to be obtained and information on the exercise need to be shared with the general public to avoid the panic situation among the public.

- **Budgeting-**

  Detailed budget covering all the phase of the simulation exercise is to be considered in the budget as shown in Table 3.

Item	Unit Cost (LKR)	No of Units	Total Cost (LKR)
Personal Expenditures			
Travel			
Accommodation			
Per-diem			
Food			
Logistics			
Communication			
Stationary			
Administration cost			
Etc			

Table 3 Budgeting for the Exercise



Step VI

Roles and responsibilities of the team members required to be assigned clearly.
Major responsibilities of the Team;

1. Determine objectives of simulation exercise

When identifying the key objectives for the simulation exercise it can be useful to consider the SMART (Specific, Measurable, Achievable, Relevant, Timely) method.

2. Develop the scenario and narrative of events

Scenarios are essentially required to develop to achieve the objectives of the exercise.

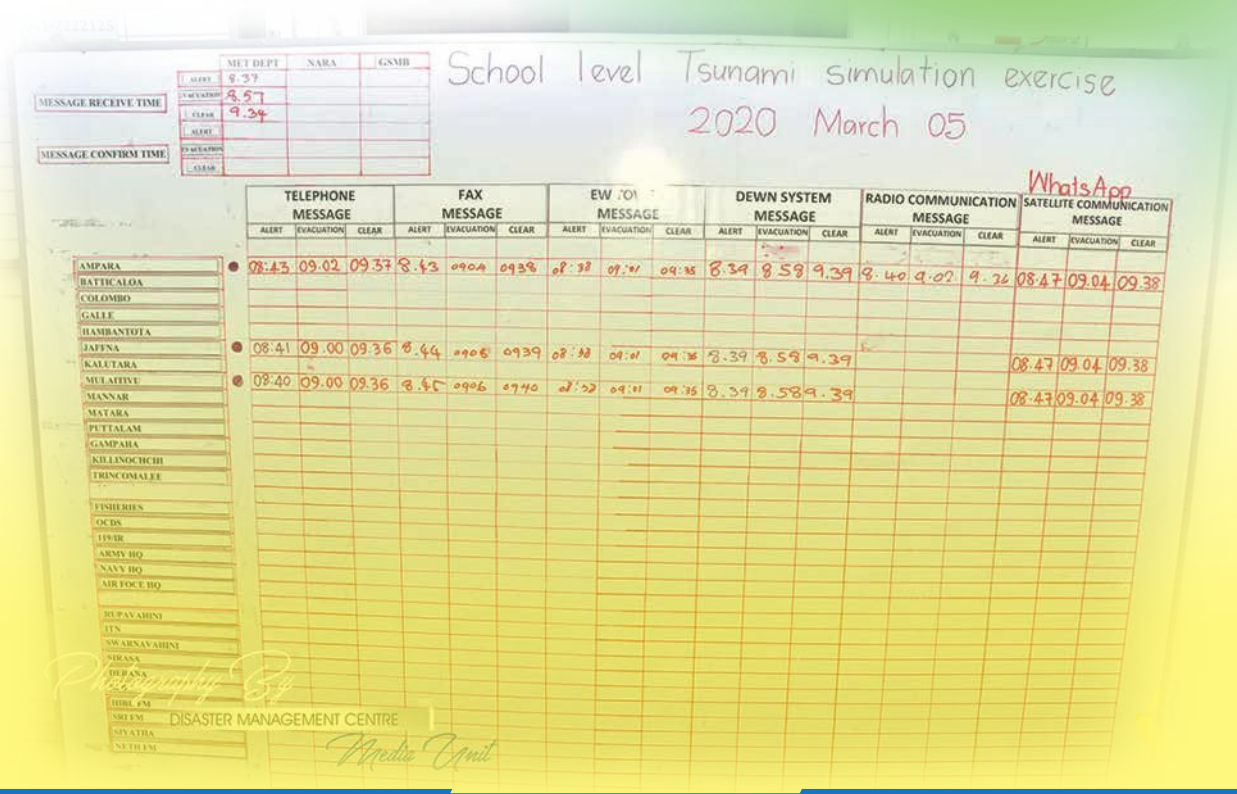
For example, if a key objective is to test the tsunami warning Towers in the coastal district of the country then the scenario would be tsunami and could involve local coastal communities.

3. Plan how the exercise is implemented and managed

Exercise team is responsible to plan, implement and manage the exercise. The objective of the exercise could be accomplished with the collaborative effort of the coordination, role players and monitoring and evaluation team members.

4. Develop simulation exercise materials

The design team is responsible for preparing key documents such as the Master Schedule, training materials and briefing documents etc. They must also ensure that exercise participants have up-to-date information, plans and forms in place prior to the exercise.



2.2.2. Simulation Exercises Development

Step I

It is pre-request to visit the area selected to conduct the exercise as it provide first-hand knowledge of the specific locations and resources available to conduct the exercise. Schedule meeting with all key stakeholders including local community, visit local venues such as schools, hospital, religious places at the area selected to conduct exercise, conduct well-prepared meetings, with a clear idea of the information, view relevant disaster response plans and knowledge of the expected responses of key agencies could be accomplished in the initial step.

Step II

Subsequently, exercise scenario needs to be developed. Development of realistic scenarios for the exercise highly important for the success of the exercise. The disaster scenario will be based on information such as:

- Type of disaster, Disaster intensity, Impact on location, Number of deaths, Number of causalities, Number of people affected, Number of buildings damaged/destroyed, Impact upon critical infrastructure, Impact on livelihoods etc.

Collecting data and information such as:

- Number of people in the village, transportlinks, local industries, warning systems in place, water supply, previous experience of natural disasters etc. would be essential for the development of realistic scenarios.

Step III

Consequently, the action plan it to be developed which outlines the task to be completed. . This plan, overseen by the exercise leader, and clearly identifies who is responsible for what and by when. It should be a simple, understandable one followed by the KISS (Keep It simple and stupid) principle. Following major components need to be addressed in the action plan (Table 4).

Task	Personal	Due date	Comment
Eg;		..../..../….	
Awareness on the exercise	Training Specialist	..../..../….	
Develop communication plan for organization and management of exercise	Communication Officer	..../..../….	
Confirm other key stakeholders and their role and level of involvement Etc.	Liaison officer	..../..../….	

Table 4 Action Plan

Moreover master scheduled following the sample given in table 5, injects – information, directives, or a new situation/problem provided by the exercise management team to challenge players, pre-exercise training & briefing, and risk management plan which ensure that the exercise takes place in a safe and secure environment are also supposed to develop under the exercise development phase.

2.2.3. Implementing Simulation Exercises

Unfolding the Exercise

When the exercise has been initiated, with the appropriate warning or notice, the players are encouraged to respond as they would to a real event. Players are expected to start by contacting key institutions to obtain more information following the institutions responsibilities. These stakeholder agencies should have been briefed beforehand. Once the teams have completed an initial assessment of the situation they should act in line with their existing Standard Operating Procedures (SOPs), and start putting plans into action.

Inject for the Exercise

The exercise continues to unfold according to the Master Schedule, with encoded injects supporting and escalating the initial scenario. Injects should be realistic and designed to meet the key objectives of the exercise.

2.2.4. Evaluation Simulation Exercises

Evaluations are a critical part of the exercise, where the system, tools, readiness, experiences can be shared, and lessons and recommendations discussed. Based on the evaluation forms and the observation made during the exercises evaluators need to discuss the ups and downs of the exercise constructively.

Initially the exercise could be evaluated under common themes proposed under table 5.

Key Areas	Key Areas	Provisions for improvement	Recommendations
Leadership & coordination			
Communication			
Logistics Etc			

Table 5 Sample for Common Evaluation of Exercise

Detail Evaluation form has been proposed below and the planning team can decide the level of details for the evaluation form based on the objectives of the exercise.

Evaluation Forms				
	General details of Evaluators			
Name	Address	Email	Telephone Number	Working Place

Details of Exercise						
Type of Exercise	Conducted Date	Message type	Watch/Alert/warning/Evacuation			

	Message type	Disseminate time	Remarks
Watch			
Alert			
Warning			
Evacuation			

Details of Institution Responsible for Tsunami Response			
General Details of Institute Evaluated			
Institution Name/ Division	Address	Email	Telephone Number

Systems available to receiving information on Tsunami with the capacities						
Type	Availability	Satisfactory Level				
		Excellent	Very Good	Good	Satisfied	Not Satisfied
Land Phone						
Mobile Phones						
Dedicated LGN Lines						
VHF						
UHF						
Radio Communication						
Satellite Communication						
Tsunami Towers						
Others						

Tools available to analyze the information on Tsunami with the capacities						
Type	Availability	Satisfactory Level				
		Excellent	Very Good	Good	Satisfied	Not Satisfied
Inundation Maps						
Statistical Databases						
Others						

Analytical capacity and decision making ability of the institution						
	Availability	Satisfactory Level				
		Excellent	Very Good	Good	Satisfied	Not Satisfied
Analytical Capacity						
Decision Making Capacity						

Systems Available to Disseminate information on Tsunami with the capacities						
System	Availability	Satisfactory Level				
		Excellent	Very Good	Good	Satisfied	Not Satisfied
Land Phone						
Mobile Phones						
Dedicated LGN Lines						
VHF						
UHF						
Radio Communication						
Satellite Communication						
Tsunami Towers						
Others						
Mechanisms to conform the receiving of disseminated message						

Reediness of the tool, system and Human Resources for Tsunami Response Activities

Item	Availability	Satisfactory Level				
		Excellent	Very Good	Good	Satisfied	Not Satisfied
Tools						
System						
Human Resources						
Coordination capacity						
Availability for Tsunami Response Plan						
Availability of Tsunami Response SOPs						
Staff awareness on the Response plan and SOPs						
Plan Available						
SOP available						
Communication Available						
Evacuation Centre Identified						
Mechanisms to service continuation is available						
Transport mechanism/ Traffic Plan Available						
Rules and Regulations/ Norms at the Evacuation time is known						

Any Other Remarks

Signature:		Date:	

General Evaluation Form

Evaluation Questions	Yes	No	Partly
Are you familiar with your preparedness organisation, its structure and procedures?			
How would you rate the work of the Emergency response group/staff?			
Were there any functions lacking in your Emergency response group/staffs			
What rating would you give internal collaboration within the organisation?			
How would you rate internal information dissemination?			
How would you rate contacts with the mass media?			
In your opinion, were enough resources available for handling the situation?			
Did the training and knowledge you received enable you to solve the task?			
What three most important experiences from exercise (lessons learned for authority) will you take with you?			

Evaluation Questions	Fully achieved	Good	Acceptable	Poor
What three most important experiences from exercise (lessons learned for authority) will you take with you?				
How would you rate the exercise structure and contents as a whole?				
How relevant was the scenario in relation to the purpose of the exercise?				
How highly would you rate the value of the exercise for your organisation's operations/role?				
How highly would you rate the significance of the exercise for creating networks?				
How did you find the length of the exercise? Was it:	Too Long	appropriate length		Too short
How did you find the pacing of the exercise? Was it:	Too Long	appropriate length		Too short

In advance of the exercise, did you receive sufficient information from the person(s) responsible on how it would be conducted?	yes	No	Partly

Hot Briefing of the Exercise

After evaluating the exercise hot brief could be conduct immediately to pick up the learning and experience of the exercise immediately. The hot briefing should focus on the aims and objectives of the exercise.

Cold Briefing of the Exercise

Cold briefing of the exercise will be conduct in a schedule date after the exercises completed. During the cold brief lesson learnt and the experience could be shared comprehensively after analyzing all evaluation information.

2.2.5. Lessons learnt Simulation Exercises

Simulation Exercises can range from small to large. It is opportunity to raise awareness, test systems and allow people to practice the response plans and SOPs of their respective institutions. It develops the skills and knowledge of individuals and can also help improve inter organizational relationships and coordination.

3. References

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2Emergency exercise development guide – who, Western Pacific Region (2009)

3Government's emergency simulations: facilitator's guide – inter-agency guidelines for developing emergency simulations and drills – Paho (2011)

4Guideline for simulation exercise Federal Emergency Management (FEMA) U.S.A.

5Handbook: evaluation of exercises – MSB Swedish civil contingencies agency (2011)

6Handbook on simulation exercises in EU public health settings

7Simex e-learning course:https://extranet.who.int/hslp/training/enrol/index.php?id=127

8Simex introduction video coursehttps://openwho.org/courses?q=simex

9Standing committee (IASC) / sub-working group on preparedness (2012)

10Who exercise manual – WHO (2017)

11WWW.preventionweb.net