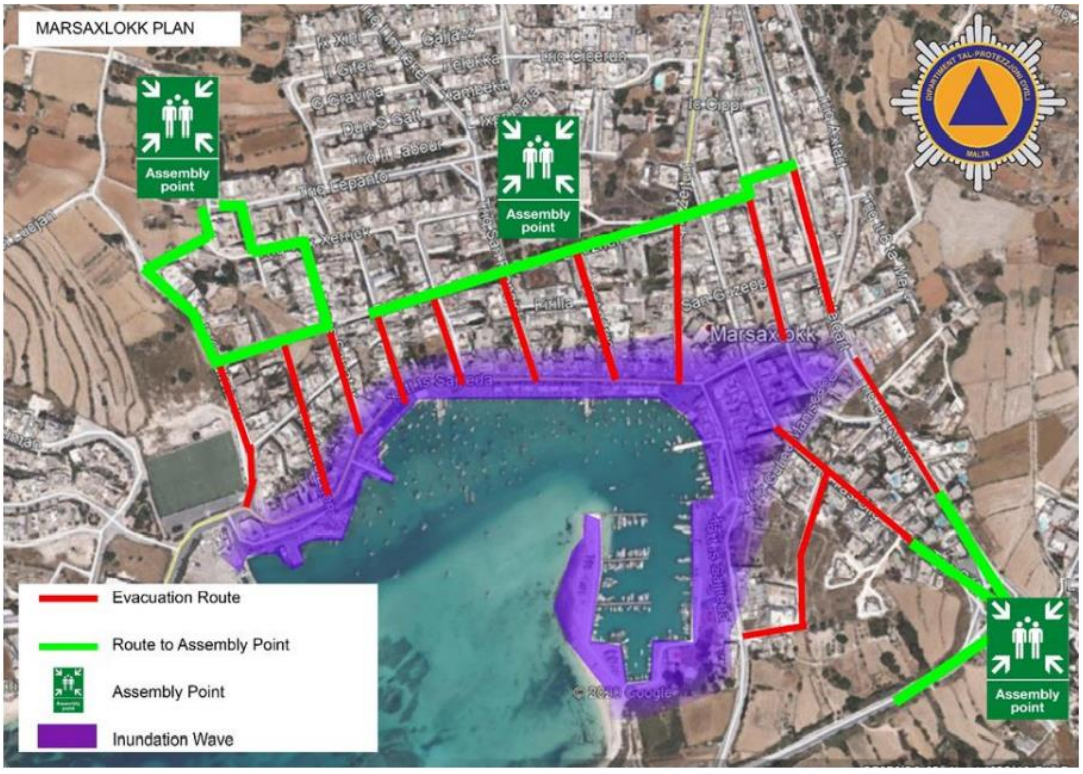
Tsunami Last Mile-MALTA21 exercise

Marsaxlokk (Malta), 5 November 2021

DRAFT[1] Evaluation report

Evaluation team, 5 April 2022



[1] Waiting for the formal registration as JRC publication.

“We don't rise to the level of our expectations; we fall to the level of our training”
Originally attributed to the Greek lyrical poet Archilochus

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Preface

The first Tsunami Last Mile Project was decided in 2017, after the occurrence of two tsunami events in the Aegean Sea, which affected the coasts of Greece and Turkey (12th of June and 20th of July, 2017). In both cases, the national tsunami warning messages, issued by the National Observatory of Athens and Kandilli Observatory and Earthquake Research Institute, both acting as a Tsunami Service Providers within the ICG/NEAMTWS framework, did not effectively reach the local authorities, to allow for a timely alerting of the exposed population.

In agreement and with the support of European Commission DG ECHO[2], JRC[3] designed a novel programme aimed at solving the 'Last Mile' issue, i.e. the timely provision of alert information to the local population, in the worst case of near to shore tsunami events. The Last Mile Project aimed at testing a prototype local system for tsunami early warning, which relies on a suite of technological solutions installed locally, able to detect tsunami events and timely alert the community in question. This system foresees the integration with the national tsunami warning system, which can push the national tsunami alert messages into the local alerting system, to confirm or integrate what has been detected locally or to warn the population through the civil protection agencies/organisation in case of tsunami events generated far from the considered location, thus not detected locally. The project foresees as well fundamental tsunami risk mitigation activities like the tsunami risk assessment, the tsunami emergency management plan and the tsunami risk awareness raising in the chosen local communities to ensure effective use of the tsunami warning to be disseminated.

The first Tsunami Last Mile Project was implemented in 2018-2019 in the two municipalities that have been mostly affected during the Mw 6.6 earthquake event of 20th of July 2017: Kos in Greece and Bodrum in Turkey. The second implementation of the Tsunami Last Mile Project took place in 2020-2021 and the chosen local community in Malta was Marsaxlokk.

In the frame of the project the University of Malta performed tsunami scenario calculations, identified the maximum expected strong motion acceleration (PGA), and defined the inundation areas and the evacuation routes. The full Tsunami Last Mile suite of devices was installed by JRC, thus establishing an experimental local tsunami detection and warning system, which was successfully tested during the final event of the project, which also consisted of a full scale exercise in Marsaxlokk, with involvement of the entire local emergency management bodies and the participation of local population.

Currently, the system is not fully operational, although the devices are functioning. Its operational use is dependent on the local authorities' decisions and formal adoption, as well as on the further fine-tuning of the system.

[2] Directorate-General for European Civil Protection and Humanitarian Aid Operations
[3] European Commission, Joint Research Centre

A second location for the implementation of the project is Pandangaran, in Indonesia, where another exercise is planned for the second quarter of 2022.

After this second implementation of the Tsunami Last Mile project, the Commission is handing over this activity to UNESCO through the new EU ECHO project (CoastWAVE) on "Strengthening the Resilience of Coastal Communities in the North-East Atlantic and Mediterranean Region to the Impact of Tsunamis and Other Sea Level-Related Coastal Hazard" COASTWave 2.5 years Project started 1 September 2021 and is designed to strengthen the resilience of vulnerable coastal communities in North-East Atlantic, Mediterranean Tsunami Warning System (NEAMTWS) countries to tsunamis and other sea level-related hazards. At the end of the project selected communities will have improved understanding of tsunami and sea-level related risks; better communication strategies to govern sea-level related risk, recognized Tsunami Ready communities; as well as an improved framework for the sustainability of the existing Inexpensive Device for Sea Level (IDSL) Network.

Executive summary

An exercise was organized during the World Tsunami Awareness Day, November, 5th 2021 at the completion of the activities performed in Malta for the Tsunami Last Mile Project. The exercise involved the entire town of Marsaxlokk in Malta, a fishermen village with a great touristic activities. The exercise aimed at evaluating the response of the local and national Civil Protection mechanism in case of a tsunami generated by an earthquake close to the Sicily coasts. tThe town population was invited to participate on a voluntary basis and simulate the evacuation activities.

During the exercise:

- all the newly installed devices for tsunami warning of the local community were tested (2 seismographs; 2 IDSLs – Inexpensive Devices for Sea Level monitoring; 2 TADs – Tsunami Alerting Devices; 1 long-range siren)
- the alert messages from the regional tsunami service provider (CAT-INGV) were received and integrated in the draft tsunami emergency protocol (SOP) at test during the exercise
- all the emergency response system, local and national, was mobilized
- all the residents in the expected inundation area of Marsaxlokk were invited to evacuate via newly identified evacuation routes, following the tsunami evacuation signs (temporarily installed for the exercise), towards the meeting/assembly points.

A team of 10 experts (from University of Malta, Malta Local Council, Malta hotels and restaurant organization, Malta Civil Protection, JRC, ECHO and IOC/UNESCO) were invited to observe/evaluate the exercise and report on the final outcomes, highlighting strengths of the adopted approach and identifying areas for improvements. An analysis of the exercise outcomes

against the UNESCO IOC Tsunami Ready indicators has been also performed (see Tab 2 of this document).

The present document report about the outcomes of the full scale exercise performed in Marsaxlokk (Malta) on 5 November 2021.

Figure 1: evacuation map for Marsaxlokk, included in the "Tsunami emergency protocol for Marsaxlokk, Malta" document prepared by CPD for the exercise.

Evaluation activity

i. Evaluation framework

TLM-MALTA21 exercise was evaluated to measure the effectiveness of the Tsunami Last Mile project's outcomes and their transferability to other areas of the Mediterranean region. To produce a meaningful evaluation it is important to have a clearly defined goal and objectives to evaluate the exercise activities against. The exercise aim and objectives defined here are derived from the Tsunami Last Mile project technical description document approved by the European Commission.

The exercise **aim** was:

To provide an opportunity for emergency management authorities to define/update their emergency plans with respect to the tsunami risk, exercise their operational lines of communications, and promote tsunami preparedness in the community.

Specific exercise objectives were:

A. TEST THE "LAST MILE" TECHNOLOGIES TO WARN THE PUBLIC IN THE EVENT OF A TSUNAMI THREAT RESULTING FROM A REGIONAL EARTHQUAKE.
B. TEST THE INTEGRATION OF "LAST MILE" TECHNOLOGIES WITH THE TSUNAMI WARNING MESSAGES PROVIDED BY THE REGIONAL TSUNAMI SERVICE PROVIDER IN ROME, AND THE ADVISORY SUPPORT OF THE UNIVERSITY OF MALTA.
C. TEST OF THE LOCAL EMERGENCY MANAGEMENT AND RESPONSE SYSTEM FOR TSUNAMI EVENTS.
D. TEST OF EVACUATION ROUTES AND SHELTER AREAS FOR TSUNAMI HAZARD IN THE VILLAGE OF MARSAXLOKK.
E. PROMOTION OF TSUNAMI PREPAREDNESS.

The evaluation team members (Table 1) received the Standard Operational Procedures (SOPs) "*TSUNAMI EMERGENCY PROTOCOL FOR MARSAXLOKK, MALTA, Version 1.0*" document and the exercise timeline before the exercise day.

A preparatory briefing with the evaluation team members took place the day before the exercise, on the 4th November 2021 in the afternoon (14:00 local time). The aim of the meeting was to describe the exercise baseline (i.e. Tsunami Last Mile project, the overall framework of the exercise; the reference documents) as well as to explain the evaluation approach. Task distribution, detailed schedule for the evaluation, logistical and organizational arrangements were also clarified during the morning briefing, before the exercise start.

Figure 2: on-site morning briefing of the evaluators, just before the exercise start.

Data and information collection was performed by the evaluation team during the exercise, using the observation checklists, but also by interviewing the participants and Exercise CONtrol team (EXCON), participating to its briefings/debriefings. Evaluators also participated inthe hot-wash session organised at the end of the exercise with the aim of sharing initial findings of the evaluation team and collect further feedback from all actors of the exercise.

Finally, an analysis of the data and information collected was carried out with the aim of identifying/highlighting efficiency, effectiveness and usefulness of the exercise in reference to meeting exercise aims and objectives. The final evaluation report document and presents the lessons identified and key recommendations for future implementation of similar exercises. In this report, a specific reference is also made with regards to the UNESCO IOC Tsunami Ready guidelines indicators, to assess the level of compliance of Marsaxlokk, after the implementation of the Tsunami Last Mile project.

ii. Evaluation methodology, team and steps

TLM-MALTA21 exercise was evaluated to measure the effectiveness of the Tsunami Last Mile project's outcomes and their potential transferability to other areas of the Mediterranean region.

The evaluation team analysed the exercise by comparing data and information about the conduction of the exercise with reference to what was planned or intended. Data and information were collected by the evaluation team during the exercise. After the exercise, the automatic logs of the Tsunami Last Mile devices were also analysed.

The exercise evaluators represented various national and international organisations and, similarly to the exercise control team, were asked to not interfere with the exercise activities, but to just observe them from an external point of view (they were asked to behave as if they were "invisible" for the exercise participants). The Tsunami Last Mile exercise evaluators are listed in the table below.

Table 1: evaluation team members

	Name, surename	Affiliation	Role	Email
1	Marzia Santini	Joint Research Centre of the European Commission	Evaluation coordinator	Marzia.santini@ec.europa.eu
2	Olimpia Imperiali	European Civil Protection & Humanitarian Aid Operations General Directorate	Evaluator	Olimpia.imperiali@ec.europa.eu

3	Dr Ritienne Gauci	University of Malta	Evaluator	ritienne.gauci@um.edu.mt
4	Dr Matthew Agius	University of Malta	Evaluator	matthew.agius@um.edu.mt
5	Chief Officer Michel Galea	Civil Protection Department	Evaluator & leader of the observer's group	michel.galea@gov.mt
6	Dr. Denis Chang Seng	IOC UNESCO	Evaluator	d.chang-seng@unesco.org
7	Station Officer Anthony Grech	Civil Protection Department	Observer	anthony.grech@gov.mt
8	Station Officer Renato Aguis	Civil Protection Department	Observer	renato.agius@gov.mt
9	Counsil Member Daniel Zerafa	M'Xlokk Local Council	Observer	dan.zerafa@gmail.com
10	Mr. Tonio Cini	Malta Hotel Restaurants Assosiation	Observer	secretary@mhra.org.mt

Figure 3: the evaluation team members and Alessandro Annunziato (JRC-project coordinator).

Three evaluation checklists were prepared corresponding to the exercise specific objectives, the expected outcomes and the evaluation "objects", as described in the table below. Each checklist consisted of an introductory page in which the specific focus was explained and the important observations to make were clarified.

Evaluators were asked to provide their observations with a numerical value, accompanied with a descriptive reply, with respect to the specific activity observed. The numerical value was a ranking, on a scale from 1 to 5 (Very Satisfied = 5; Satisfied = 4; Neutral = 3; Dissatisfied = 2; Very Dissatisfied = 1), based on the evaluators objective observation regarding how the activity/procedure was executed. The descriptive reply should have information about observations (saw/heard), analysis (due to that/as a consequence), preliminary evaluation (opinion) and recommendations (in a future similar situation I would suggest that...).

Figure 4: evaluators at work with the evaluation checklists.

A dedicated checklist was used to perform a meta-evaluation, i.e. an overall evaluation of the individual evaluations. At the end of the exercise, the experts of the evaluation team were asked to provide feedbacks on the evaluation methodology adopted and their evaluation experience.

	Objective	Expected outcome	Evaluation
Checklist 1	A. Testing "Last Mile" technologies to warn the public in the event of a tsunami threat.	- TAD panels activated with first message; - TAD panels updated with second message; long range siren activated - IDSL devices (both) confirm arrival of the tsunami wave at harbour entance and TAD/sirens activated.	- Device's proper functioning - Proper updating of messages - Timing of device's activation - Effectiveness of the TAD location (**reference**: "exercise timeline" document)
	B. Testing the integration of "Last Mile" technologies with the incoming tsunami warning messages provided by regional Tsunami Service Provider (INGV, Italy)	- INGV, Italy sends tsunami WATCH message (email) to the Civil Protection Department (CPD) in Malta - University of Malta confirms EQ to CPD - INGV confirms tsunami generation and sends further messages (ONGOING messages, 4 of them) - CPD sends messages to the TAD panels in M'Xlokk - TAD panels in M'Xlokk visualise CPD messages	- Timing, update and readability of CPD messages on TAD panels (**reference**: "exercise timeline" document)
Checklist 2	C. Test of the local emergency management and response system for tsunami events	- Activation of the emergency operation center onsite - Activation of the operational bodies responsible for the local emergency response	- Coordination of the local operational response - Coordination with regional/district/national levels - Management of eventual spontaneous reaction by non-target population (if applicable) (**reference**: "Marsaxlokk SOP" document)
	D. Testing of evacuation maps and gathering areas for tsunami hazard in the Local Council.	- Target population groups self-evacuate to identified safe/assemblyareas by following the evacuation routes and evacuation signs	- Implementation of draft Standard Operational Procedures for evacuation of target groups - Integration of the Tsunami Last Mile network in the draft SOPs - Timing of the evacuation - Visibility and clarity of evacuation signs - Appropriateness of assembly areas (**reference**: "Marsaxlokk SOP" document)
Checklist 3	E. Promote tsunami preparedness.	- Tsunami risk awareness raising activities conducted before and/or during the exercise day at specific locations - Provision of information about the Tsunami Last Mile project and upcoming exercise to the local population	- Level of awareness about Tsunami Last Mile network and exercise among the locals - Local's feedbacks on awareness raising initiatives conducted before/during the exercise - Community's reaction to the tested last mile warning

Checklist 4	Evaluation of the individual evaluations	- Feedbacks on the evaluation experience and methodology from the evaluators	- organization of the evaluation activity - evaluation methodology

Evaluation outcomes

Exercise participation

As a whole, the exercise was a successful event that involved 13 different organisations from the local to the national level:

1. Civil Protection Department
2. University of Malta
3. Armed Forces of Malta
4. Malta Police Department
5. Marsaxlokk Local Council
6. Transport Malta
7. Local Enforcement System (LESA)
8. Health Department/Mater Dei Hospital Emergency section
9. Infrastructure Malta
10. Enemalta
11. Malta Hotels and Restaurants Association (MHRA)
12. Ministry for Home Affairs, National Security and Law enforcement (MHSE)
13. Red Cross Malta

The full local emergency management and response system was mobilised, testing for the first time the respective operational procedures for tsunami events, according to the Standard Operational Procedures (SOPs) "*TSUNAMI EMERGENCY PROTOCOL FOR MARSAXLOKK, MALTA, Version 1.0*" document, prepared by the national civil protection authority in the framework of the project**.** The Local Council administration, the Police, the Armed Forces, Port authorities, Transport Authority, traffic management authorities, the ambulance service, Red Cross and volunteers participated in the exercise.

The University of Malta participated in the exercise simulating the occurrence of a hypothetical earthquake and associated tsunami generated from the Calabrian arc. They monitored the simulated IDSLs measurements and, in general, played an advisory role for the national civil protection authority.

Figure 5: scientists from the University of Malta at work in the emergency operations centre during the exercise.

The regional Tsunami Service Provider CAT-INGV, Italy served as the official tsunami alerting agency for Malta Civil Protection Department. INGV **participated from the INGV premises in Italy**, issuing the tsunami alert messages according to the ICG/NEAMTWS regional procedures.

At the European level, besides JRC, the European Civil Protection & Humanitarian Aid Operations General Directorate was fully involved in the evaluation of the exercise and actively contributed to the discussion of the hot wash debrief.

The residents in the expected inundation area in Marsaxlokk, Malta (3500 people; another 7000 in the weekends and during summer time this is a conservative figure) were informed weeks before about the exercise and the emergency management plan. They were invited to participate in the exercise on a voluntary basis, self-evacuating to identified assembly/safe areas, following the evacuation routes and evacuation signs. The citizens reaching the assembly areas were registered by the personnel of the local emergency management system.

Marsaxlokk did not have any tsunami mitigation measure before the implementation of the Tsunami Last Mile 2 project. Currently, *in addition to the mentioned suite of devices for locally warning the population*, the Local Council has at its disposal:

- Detailed tsunami modelling (University of Malta)
- Detailed analysis of expected inundation areas (University of Malta)
- Tsunami emergency protocol for Marsaxlokk (Malta Civil Protection Department)
- Tsunami evacuation routes & meeting points (Malta Civil Protection Department)

- Prototype tsunami signs (Malta Civil Protection Department, see annex)
- Information material (leaflets in Maltese and English) about tsunami risk (Malta Civil Protection Department)
- A local community better informed about tsunami risk in their area (see pictures in annex 1 of this document)

Exercise timeline and calendar of main activities

The TLM-MALTA21 exercise started at 09:00 (local time) and lasted until 13:30 (local time) on November 5th, 2021. The exercise lasted for about 6 hours if we consider also the hot wash debriefing after the end of the exercise. The exercise also served as an action to raise the awareness on tsunami in light of the UNDDR campaign on World Tsunami Awareness Day, November 5th..

The exercise timeline, as retrieved from the analysis of the information manually recorded together with the automatic logs of the Tsunami Last Mile devices, is shown in table 1.

November, 4th: preliminary activities

After a visit to IDSL-34 to refurbish its sensor, the plan of evacuation was revised to verify the installation of the temporary tsunami signage in terms of location and visibility. They were installed quite high at more than 2 meters to reduce the risk of vandalism, with the drawback of reduced visibility.

Figure 6: visit to IDSL-34 before the exercise, for maintenance intervention.

It was noted that the number of installed tsunami signs were also considered to be very few and rather far from the sea front, thus reducing its use and effectiveness: people would likely not know where to go. . As this activity was designated to the responsibility of the national Civil Protection, no further action was taken for the exercise.

During the afternoon, an evaluation team briefing took place: the exercise was introduced to the evaluators and the observers. It was also an opportunity to finalize some details about the timeline of the exercise. The meeting was concluded with a visit of all the exercise sites, including the area where the mobile command centre was expected to be set up in the early hours of the exercise day.

Figure 7: exercise briefing in the afternoon before the exercise start, with participation of the evaluators, observers, exercise control team and representatives of the emergency management system.

November, 5th: exercise

The tsunami exercise started at 9:00 local time, i.e. at this time the mobile command centre and of the simulation software was finally set up. At 10:00 local time the exercise started according with the exercise timeline with an exchange of messages with the regional Tsunami Service Provider, i.e. CAT-INGV and Malta.

The initial message from CAT-INGV was sent to Malta Civil Protection about the occurrence of an earthquake event, followed by an evaluation by the University of Malta which then lead to the manual and automatic activation of the tsunami last mile alerting devices to warn the local

population. The use of the simulated tsunami height in the port of Marsaxlokk provided the possibility to perform automatic activation of the devices as a result of the computation of alerts through an algorithm developed by JRC.

Figure 8: Tsunami Alerting Device display during the exercise

As a consequence of the alerts disseminated through the tsunami last mile alerting devices about 200 people evacuated from the tsunami prone zone to the safe gathering areas.

The tools developed by JRC for the exercise worked fairly well, even if they were not extensively tested in advance, noting they were not available until the week of the exercise. The most important device to alert the population, the long-range siren, manually activated or automatically activated based on the behaviour of the sensing device, worked very well and was very much audible at distance. This was not the case for the exercise in Kos, Greece in November 2019, where the long range siren was inaudible at a distance. Since all the sirens are battery operated and communicates via 4G, the system would be very reliable even in case of real disasters.

Table 1: Exercise timeline

Time (UTC)	Device	Activation mode	Message text	Speaker activation	Siren activation	Siren duration (sec)
05/11/2021 08:40	TAD-MT-001		["An EXERCISE for ","TSUNAMI preparedness"," will start at 10:00"]	False	False	null
05/11/2021 09:00	EQ		M7.9 Earthquake			
05/11/2021 09:07	INGV	Manual	1st TSP message			
05/11/2021 09:13	TAD-MT-001		["** EXERCISE **","STRONG EARTHQUAKE ","DETECTED NEAR SICILY","** EXERCISE **","POSSIBILITY OF ","TSUNAMI WAVES !!","** EXERCISE **","WATCH FOR","FURTHER NOTICE"]	True	True	30
05/11/2021 09:25	INGV	Manual	2nd TSP Message; Tsunami confirmed in Sicily			
05/11/2021 09:26	TAD-MT-002	Manual	["** EXERCISE **","TSUNAMI CONFIRMED","WAVE EXPECTED IN 30 MIN","** EXERCISE **","MOVE TO HIGH GROUND","OR INLAND"]	True	True	20
05/11/2021 09:27	SIREN-MT-001	Manual	Siren on	False	True	30
05/11/2021 09:28	SIREN-MT-001		Siren on	False	True	30
05/11/2021 09:53	SIREN-MT-001		Siren on	False	True	30
05/11/2021 09:55	TAD-MT-002	Manual	["** EXERCISE **","TSUNAMI CONFIRMED","WAVE EXPECTED IN 5 MIN","** EXERCISE **","MOVE TO HIGH GROUND","OR INLAND"]	True	True	20
05/11/2021 09:55	TAD-MT-001	Manual	["** EXERCISE **","TSUNAMI CONFIRMED","WAVES EXPECTED IN 5 MIN","** EXERCISE **","MOVE TO HIGH","GROUND OR INLAND"]	True	True	30
05/11/2021 09:56	SIREN-MT-001	Manual	Siren on	False	True	30

05/11/2021 09:59	**SIREN-MT-001**	**automatic**	Siren activated	False	True	30
05/11/2021 09:59	**TAD-MT-002**	**automatic**	["** EXERCISE **","TSUNAMI DETECTED","IN MARSAXLOKK","** EXERCISE **","WAVE ARRIVES","IN 2-3 MIN","** EXERCISE **","MOVE QUICKLY TO HIGH","GROUND OR INLAND","** EXERCISE **","EVACUATE ","THIS AREA !!"]	True	True	0
05/11/2021 09:59	**TAD-MT-001**	**automatic**	["** EXERCISE **","TSUNAMI DETECTED","IN MARSAXLOKK","** EXERCISE **","WAVE ARRIVES","IN 2-3 MIN","** EXERCISE **","MOVE QUICKLY TO HIGH","GROUND OR INLAND","** EXERCISE **","EVACUATE ","THIS AREA !!"]	True	True	30
05/11/2021 10:02	SIREN-MT-001	manual	Siren off (switched off but not needed)	False	True	null
05/11/2021 10:02	TAD-MT-002	manual	Siren off because it was not stopping	False	True	null
05/11/2021 10:05	TAD-MT-002	manual	["** EXERCISE **","TSUNAMI DETECTED","IN MARSAXLOKK","** EXERCISE **","WAVE ARRIVES","IN 2-3 MIN","** EXERCISE **","MOVE QUICKLY TO HIGH","GROUND OR INLAND","** EXERCISE **","EVACUATE ","THIS AREA !!"]	False	True	null
05/11/2021 10:08	TAD-MT-002	automatic	["** EXERCISE **","TSUNAMI DETECTED","IN MARSAXLOKK","** EXERCISE **","WAVE ARRIVES","IN 2-3 MIN","** EXERCISE **","MOVE QUICKLY TO HIGH","GROUND OR INLAND","** EXERCISE **","EVACUATE ","THIS AREA !!"]	True	True	null
05/11/2021 10:08	SIREN-MT-001	automatic	Siren activated	False	True	30
05/11/2021 10:08	TAD-MT-001	automatic	["** EXERCISE **","TSUNAMI DETECTED","IN MARSAXLOKK","** EXERCISE **","WAVE ARRIVES","IN 2-3 MIN","** EXERCISE **","MOVE QUICKLY TO HIGH","GROUND OR INLAND","** EXERCISE **","EVACUATE ","THIS AREA !!"]	True	True	30
05/11/2021 10:10	TAD-MT-002	manual	siren off	True	False	null

05/11/2021 10:10	INGV	Manual	3rd TSP Message			
05/11/2021 10:11	TAD-MT-001		["***EXERCISE***","TSUNAMI IS ONGOING.","REMAIN IN HIGH GROUND"]	True	True	20
05/11/2021 10:12	TAD-MT-002		siren off	False	True	null
05/11/2021 10:12	TAD-MT-002		Manually issued voice message			
05/11/2021 10:14	TAD-MT-001	manually	["** EXERCISE **","TSUNAMI DETECTED","IN MARSAXLOKK","** EXERCISE **","WAVE ARRIVES","IN 2-3 MIN","** EXERCISE **","MOVE QUICKLY TO HIGH","GROUND OR INLAND","** EXERCISE **","EVACUATE ","THIS AREA !!"]	False	True	null
05/11/2021 10:14	TAD-MT-002	manually	["** EXERCISE **","TSUNAMI DETECTED","IN MARSAXLOKK","** EXERCISE **","WAVE ARRIVES","IN 2-3 MIN","** EXERCISE **","MOVE QUICKLY TO HIGH","GROUND OR INLAND","** EXERCISE **","EVACUATE ","THIS AREA !!"]	False	True	null
05/11/2021 10:18	TAD-MT-002	Automatic	["** EXERCISE **","TSUNAMI DETECTED","IN MARSAXLOKK","** EXERCISE **","WAVE ARRIVES","IN 2-3 MIN","** EXERCISE **","MOVE QUICKLY TO HIGH","GROUND OR INLAND","** EXERCISE **","EVACUATE ","THIS AREA !!"]	True	True	0
05/11/2021 10:18	TAD-MT-001	Automatic	["** EXERCISE **","TSUNAMI DETECTED","IN MARSAXLOKK","** EXERCISE **","WAVE ARRIVES","IN 2-3 MIN","** EXERCISE **","MOVE QUICKLY TO HIGH","GROUND OR INLAND","** EXERCISE **","EVACUATE ","THIS AREA !!"]	True	True	30
05/11/2021 10:18	SIREN-MT-001	Automatic	null	False	True	30
05/11/2021 10:20	TAD-MT-002	Manually	Siren off	False	True	null
05/11/2021 10:22			Fixed ruleset of MT-002 siren			
05/11/2021 10:23	SIREN-MT-001	Automatic	null	False	True	30

05/11/2021 10:23	TAD-MT-002	Automatic	["** EXERCISE **","TSUNAMI DETECTED","IN MARSAXLOKK","** EXERCISE **","WAVE ARRIVES","IN 2-3 MIN","** EXERCISE **","MOVE QUICKLY TO HIGH","GROUND OR INLAND","** EXERCISE **","EVACUATE ","THIS AREA !!"]	True	True	30
05/11/2021 10:23	TAD-MT-001	Automatic	["** EXERCISE **","TSUNAMI DETECTED","IN MARSAXLOKK","** EXERCISE **","WAVE ARRIVES","IN 2-3 MIN","** EXERCISE **","MOVE QUICKLY TO HIGH","GROUND OR INLAND","** EXERCISE **","EVACUATE ","THIS AREA !!"]	True	True	30
05/11/2021 10:31	TAD-MT-002	Manual	Siren off	False	True	null
05/11/2021 10:33	TAD-MT-001	Automatic	["***EXERCISE***","TSUNAMI IS ONGOING.","REMAIN IN HIGH GROUND"]	True	True	20
05/11/2021 10:33	TAD-MT-002	AUtomatic	["***EXERCISE***","TSUNAMI IS ONGOING. ","REMAIN IN HIGH GROUND"]	True	True	30
05/11/2021 10:33	SIREN-MT-001	Automatic	null	False	True	30
05/11/2021 10:50	TAD-MT-001		["** EXERCISE **","No more Tsunami wave","is expected","** EXERCISE **","You can go back","to your activities"]	True	True	null
05/11/2021 10:50	TAD-MT-002		["** EXERCISE **","No more Tsunami wave","is expected","** EXERCISE **","You can go back","to your activities"]	True	True	null
05/11/2021 11:00	INGV	Manual	4th TSP Message: End of exercise			
05/11/2021 11:01	TAD-MT-002		["END OF EXERCISE","HAVE A NICE DAY","JRC/CPD Malta/University of Malta"]	True	False	null
05/11/2021 11:01	TAD-MT-001		["END OF EXERCISE","HAVE A NICE DAY","JRC/CPD Malta/University of Malta"]	True	False	null
05/11/2021 13:29	TAD-MT-002		["END OF EXERCISE","HAVE A NICE DAY","JRC/CPD Malta/University of Malta"]	False	False	null

Below, we summarise the evaluation outcomes as reported by the evaluation team, divided by evaluation checklists and associated exercise objectives. For each question we provide the average and the standard deviation of the scores assigned by the evaluators. It is to be noted that JRC received scores and comments from 5 evaluators and not all of them were assigned a score for each question, as evaluators were observing the exercise at different l locations during the exercise.The distribution of the evaluators along Marsaxlokk proved to be appropriate, as scores were received for all questions.

Test of the "Last Mile" technologies and their integration with the national tsunami warning service (objectives A, B – checklist 1)

During the exercise, the simulated seismic sensors, sea level stations, digital information panels with loudspeakers and a long-range siren were all activated following the simulation of the occurrence of an earthquake and tsunami. The Tsunami Last Mile local network's successfully detected **the event, created/prepared a proper tsunami alert message; and disseminated message to predefined receivers.**

Below is the **full list of questions of checklist 1, with the corresponding rankings and comments received from the evaluators**.

Objective A: test of the "Last Mile" technologies to warn the public in the event of a tsunami threat

1.1 **Were the Tsunami Last mile technologies in place and operational at each location[4]?**
Average score: 3.8

- The long-range siren system and Tsunami Alerting Device (TAD) panels with a local siren and loudspeaker were in place.
- The TAD visual message was operational all the time. The voice alerts from the TAD loud speakers were not functioning for the first and second messages. It started working for the other messages.
-
- By the end of the exercise all the devices were functioning well.
- The evaluator positioned at *Triq ir-Rikka* highlighted that the signals were timely disseminated for the first and second message and well audible.The rest of the messages (3rd and final message) were not audible at the assembly point *Tas-Silg* due to incremental noise from assembled crowd, helicopters etc.

Recommendations:

[4] 1 large siren system; 2 Tsunami Alerting Device (TAD) panels with a local siren and loudspeaker; 2 Inexpensive Devices for Sea Level measurement (IDSL)

- Identify the cause of failure of the voice alert system. Test again the alert system.
- Tsunami notices provided in different languages since it's a touristic area e.g. Maltese, English, German and French.

1.2 Were the visual messages timely and clearly displayed, in the correct sequence and with timely updates on the TAD panels?

Average score: 4.6

- The location of TAD in front of the church square is good. It can be improved by moving the TAD a few meters back on the water edge to make it more visible to the people walking or eating on the promenade.
- First message was shown on the TAD at 10:14.
- Second message was shown on the TAD at 10:27.
- Sequence of messages was correct and updated in a timely manner.

Recommendations:

- Move TAD closer to the expected inundation area to get better visibility.

1.3 Were the contents of the visual messages understandable and complete?

Average score: 4

Yes. For clarity and effectiveness I would display the message with a clear action to be taken only when the tsunami and its time arrival is confirmed. Informing people that an earthquake was felt in Sicily could induce people not to care or to take note of future information, therefore missing to take action when needed.

The "Possibility of tsunami wave" and "Watch for further notice" messages in particular do not convey a clear messages. It may cause people to wonder about 'if', 'maybe yes', 'maybe not' and may not trigger the necessary concerns for people to evacuate when a real treat is confirmed.

Recommendations:

- Consider simplifying the sequence of alert messages shown on the TADs, to provide clear instructions on what to do, and reduce confusion on the seriousness of the message.
- Invert the colours of the display messages for the alerts, i.e., the background is shown bright and the text in black. In this way the display attracts more attention than when displaying general text.

1.4 Were the voice messages timely and clearly sent out from TAD panel? Were they audible and understandable?

Average score: 3

The voice messages were audible and understandable with the exception of the first and second messages, in which the voice message of the TAD did not work.
As explained in 1.1 the first and second messages were audible from *Triq ir-Rikka* (Zone 3) at the start of the exercise, however the third and last message were less audible from Assembly Point *Tas-Silg*. The evaluator interviewed some residents and a young couple living in *Triq Tas-Silg*: they claimed they did not hear the voice messages (they had a TV switched on in the background). They realized the drill had started from checking on Facebook.

Recommendations:
- Identify the failure of the voice alert system. Test again the alert system.

1.5 Was the long-range siren timely activated? Was it audible?

Average score: 4.2
The long-range siren was activated in a timely manner and audible from all areas of Zone 2. Timing of the siren's activation, as recorded by the evaluators: first at 10:14; second at 10:27; third at 11:18. The long-range siren was less audible from Zone 3, as explained above.
The sirens were operated intermittently, making it unclear what does the second or third siren etc. meant. If someone was far away and could not read the TAD or listen to the voice, it was unclear what each siren call meant.

Recommendations:
- Test again the alert system.
- The long-range siren sound should be maintained for a longer duration ongoing until the end of the exercise.

Objective B: Testing the integration of "Last Mile" technologies with the tsunami warning messages provided by the regional Tsunami Service Provider

1.6 Were the tsunami messages from CAT-INGV timely transmitted to the Department for Civil Protection in Malta?

The evaluation team members were distributed in the field and did not receive the messages from CAT-INGV, as this was not foreseen in the exercise plan. However, the exercise control team received them and reacted promptly. The time of delivery of the communication was around 6 minutes through a common email message. In normal condition, the reaction time would grow based on the time passed before the operator are aware of the email message. CPD phoned the University of Malta for confirmation before any other action was taken.

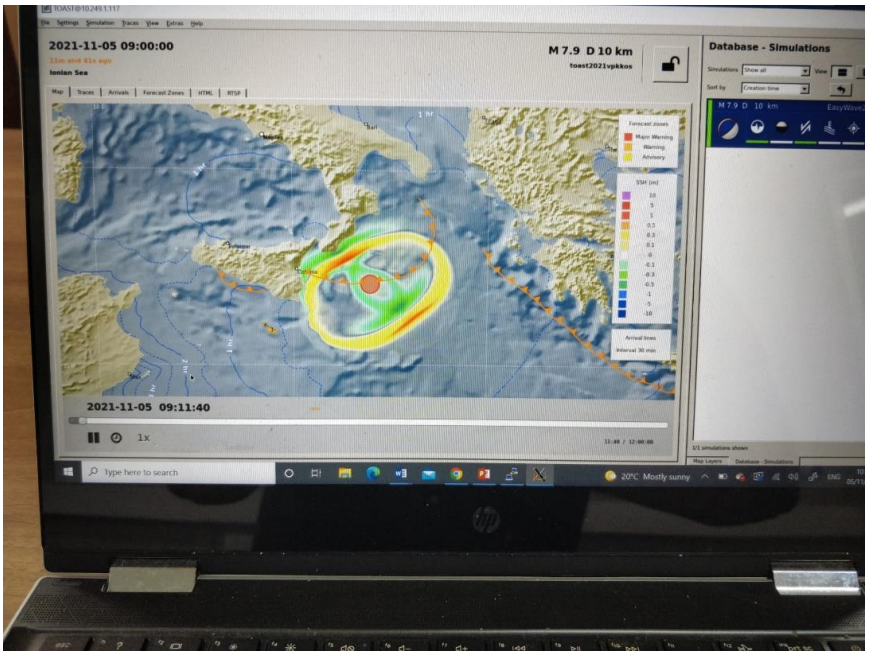


Figure 9. Detail of the earthquake modelling run during the exercise by the University of Malta

1.7 Were the messages transmitted by CPD through the TAD panels coherent with the information received from INGV up until the detection of tsunami waves by the IDSL?

Yes, the CPD followed the procedure and updated the panels with information and instructions.

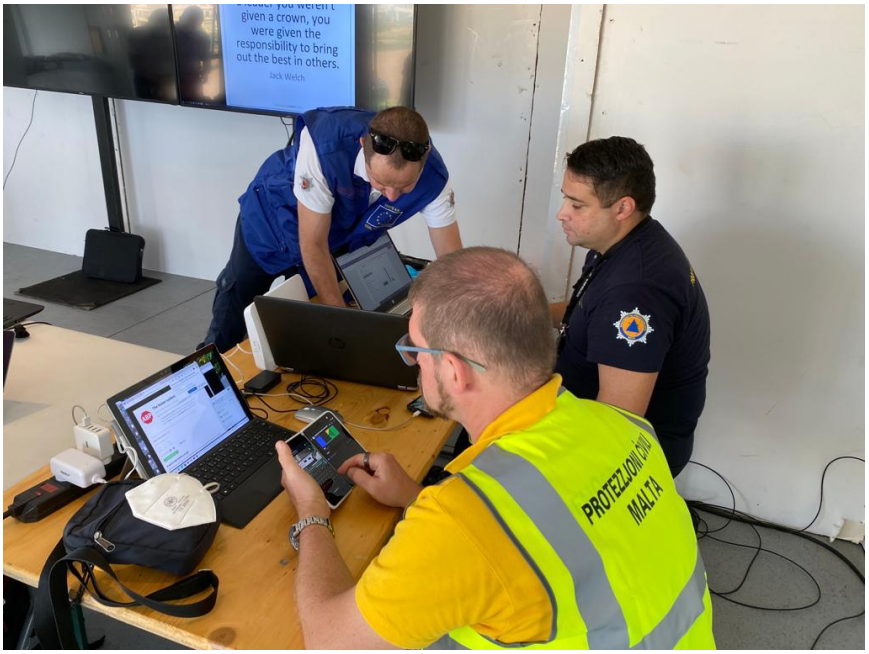


Figure 10: in the back, CPD personnel implementing the SOP and updated the TAD panels with information and instructions; in front, member of the exercise control monitoring the situation from a mobile device.

1.8 Were the information/data coming from other sources (GDACS, IDSL) properly taken into account in the sequence of messages transmitted by CPD through the TAD panels?

The CPD displayed the GDACS page to describe the event as soon as it was available .The page with an online self-updating set of plots of the IDSL data was always present on the main screen, until the automatic alert was activated.

Figure 11: GDACS page describing the event displayed in the on-site emergency operation centre of the CPD

Test of the local emergency management and response system for tsunami events (and) testing of evacuation maps and assembly areas for tsunami hazard in the Local Council (objectives C, D – checklist 2)

TLM-MALTA21exercise tested the effectiveness of **the Local Council emergency management plan, and its interoperability with the regional tsunami alert messages disseminated by the Tsunami Service Provider of Malta, i.e. CAT-INGV. The entire local emergency response system was involved**, implementing respective emergency management procedures, as foreseen in the Standard Operational Procedures (SOPs) "*TSUNAMI EMERGENCY PROTOCOL FOR MARSAXLOKK, MALTA, Version 1.0*" document, prepared by the Civil Protection Department of Malta in the framework of the project.

The Local Council administration, the Police, the Armed Forces, Port authorities, Transport Authority, traffic management authorities, the ambulance service, Red Cross and volunteers took part in the exercise and tested for the first time the mentioned procedures.

The population present inside the expected inundation area (650 persons) were informed weeks before about the exercise and was invited to participate by evacuating from that area and meeting at the designated safe/assemblyareas on a voluntary basis. As a consequence of the alerts disseminated through the tsunami last mile alerting devices about 200 people evacuated from the tsunami prone zone and moved to the safe gathering areas.

It should be noted that several people remained in the tsunami area and did not evacuate. The instructions provided by the local exercise coordinator (Malta Civil Protection Department) to operational bodies was to not force anybody to evacuate the area, as the participation of the population was agreed to be on a voluntary basis. However, the operational bodies 'staff (e.g. the police cars patrolling the expected inundation area to make sure people were not standing in areas at risk) did not proactively invite people, in particular in the early period of the evacuationto move away from the expected inundating area and this was noted as a negative outcome during the hot-wash session. The voluntary mode of the evacuation could have been proactively encouraged.

Below is the **full list of questions of checklist 2, with the corresponding rankings and comments received from the evaluators**.

Objective C: test of the local emergency response system for induced tsunami events.

2.1 Was the emergency management plan for tsunami events available and timely implemented?

Average score: 4.4

The emergency plan was available for the exercise and was implemented during the exercise. The Standard Operational Procedures document was distributed to the evaluators ahead of the exercise. It provided information about the village geography, the population, the communication chain, contacts, evacuation map, etc.

Recommendations:

- SOP document up to date at least every number of years (< 5 years)

2.2 Were Standard Operational Procedures[5] for tsunami events well known and timely implemented by the emergency operators?

Average score: 4

The SOP for tsunami events were implemented by the emergency operators. However, some evaluators felt that some questions were still open, among the emergency operators, to clarify their mission. In fact, most of the emergency operators – apart from

[5] for the evacuation of the population towards the gathering areas

LESA and CPD Site Manager – said that they were aware of the exercise and they did not have any issues in responding in a timely manner. For example, from Zone 2, various organizations (CPD, medical, AFM, police, etc.) were seen in action following the first alert. By the time the evaluator walked to the assembly point of Zone 2 (10:51), the area was set up and operational (crowd control, registration of citizens, medical services, traffic control).

LESA officers said that they were dispatched on site and no briefing were provided by their superiors. Briefing was held on the day at the meeting points. The CPD Site Manager mentioned the need of more information on the assembly points management procedure. In the registration process, more instruction, tools and hands-on experience should be introduced. The assembly points should be better known, and the people should be educated on the subject.

Most of the residents who were evacuated said that they were well informed of the evacuation procedure (though some admitted to have taken shorter alternative routes to reach the assembly point). They praised the initiatives of CPD and the Local Council for their awareness campaigns.

2.3 Was the Emergency Operations Centre timely activated and effectively organized to handle the situation?

Average score: 4

The emergency operations seemed to have been well handled. A coordination centre on site centre was established. The evacuation of vulnerable people such as the elderly home in the marina was taken care by the emergency operators. Assembly points were organised with emergency operators ready to register and manage evacuated people.

Figure 12: mobile on-site coordination centre established quickly at the beginning of the exercise

Figure 13: The evacuation of vulnerable people from the elderly home in the marina

2.4 Were the relevant operational bodies[6] timely activated by the Emergency Operation Centre?

Average score: 4

[6] The Local Council administration, the fire brigade, the Police, the Armed Forces, Port authorities, Transport Authority, traffic management authorities, the ambulance service, – Red Cross and volunteers

Evaluators reported timely activation of the Military, Police, Health facility and volunteers association (e.g. Red Cross) .

Figure 14: CPD personnel, representatives of the emergency operational bodies, researchers from the University of Malta, members of the exercise control, all at work in the emergency operation centre.

2.5 Did the relevant operational bodies timely and effectively take action, according to a clear understanding of respective mandate and responsibilities?

Average score: 3.6

All actors were aware of their roles and what needed to be done. For example, from Triq ir-Rikka the evaluators observed some police on foot, patrolling the area in the time between the first message and the second message. By the time the evaluator reached the assembly point after the second message, most operational bodies were also there. There did not seem to be any confusion and evacuees were impressed that the exercise was well managed by the operational bodies.

In some cases the operators mentioned that they would have welcomed more meetings/briefings about what was expected from them. For example, some evaluators observed that emergency personnel only started to instruct people to evacuate at a time when tsunami would have already impacted the coast. In other hand, it was not clear if they should have proactively encouraged the evacuation of citizens or not, given the voluntary character of the evacuation exercise.

2.6 Was a communication flow established to ensure a common situational awareness of the ongoing situation (also known as common operational picture)?

Average score: 3.3

At the assembly point, some emergency response operators and residents felt the need for more cross-sectorial updates on how the situation was unfolding. Operators were keeping themselves updated within their own division, but they felt that a more central communication flow was required to keep everyone updated.

Moreover, as mentioned above, CPD drivers going around with cars did not stop to inform what the population had to do. In zone 3, only one police car did this. However, as already mentioned, this could be due to the lack of clarity on what was expected from them, given the voluntary character of the participation of the population to the exercise.

2.7 Were there any unplanned spontaneous reaction by non-target population? If so, were they handled by the operators in a timely and coordinated manner?

Average score: 4

A family with two small children were curious of the sirens and asked for information. They decided to go to the assembly point in order for the children to learn how to behave in case they would ever hear a siren.

A group of children from a nearby school outside Marsaxlokk happened to be visiting the Marina during the exercise. They were not informed or part of the exercise. Despite the teacher's initial resistance to change their plans for the day, they finally agreed to participate to help show the children of what self-protective actions should be taken in such cases. They only agreed to follow instructions from the police/ CPA past 40-45 min- a time when tsunami would have already impacted the coast. The children began to spontaneously ask for information and were excited to learn more on the exercise, in particular after having seen the helicopter at sea performing the rescue of a person.

On an individual level, not all the citizens at the waterfront showed interest and decided to be part of the exercise. However, about 200 citizens were registered in total by the emergency management personnel in the gathering areas.

A spontaneous reaction by the target population was that not everyone followed the indicated evacuation route as they felt too exposed and or too long to walk. They opted for shorter routes to reach the assembly point.

Figure 125: children from a nearby school outside Marsaxlokk being registered at the gathering area during the exercise

Figure 1613: simulation of rescue operations at sea, performed using an helicopter during the exercise

Objective D: Testing of evacuation maps and gathering areas for tsunami hazard in the Local Council.

2.8 Were tsunami inundation maps, with evacuation routes and gathering areas, known by the local emergency operators? Were they displayed in the Emergency Operations Centre?

Average score: 4

I would say yes. I would be in doubt if the same question was asked to the people. Local emergency operators replied that they were informed about the evacuation and gathering areas.

Figure 17: members of the exercise control and of the evaluation team consulting the evacuation plan map in the emergency operations centre.

Figure 18. Exercise participants consulting the evacuation plan map displayed in the emergency operations centre.

2.9 Were tsunami evacuation routes clearly marked in the field with tsunami signs?

Average score: 2.75

The evacuation routes had signs along roads and crossroads. Often the signs were placed too high up in non-prominent position to be noticed (especially if situation of alarm really takes place).

The signs may have been visible to a certain extent during the day, but they were not sure if it would nevisible, if an actual evacuation happened during the night, noting the labels were in green, but not fluorescent (glow in the dark type).

The dimensions of the signs were very small, they were not frequently displayed along the evacuation routes and maybe the signs themselves were not very well known in general by the public.

Recommendations:

- Make all tsunami labels with high-visibility marks and glow in the dark features.

2.10 Were the tsunami signs properly positioned to follow the evacuation route until the gathering areas? Were they visible and understandable?

Average score: 2.8

The signs were positioned well in terms of their geographic position – but there is room for improvement in terms of their visibility to the general public in situations of emergency.

The evacuation route should also be in the direction that goes to higher ground. For example, there was a sign showing the evacuation route which was slightly downhill. Seemingly, the instinct would suggest to go to the right, i.e. to higher ground.

The signs were positioned at a good height against street poles; however, the labels were too small, sometimes hard to spot immediately.

Recommendations:

- Larger signage, which is visible from one or two crossroads away. The evacuation route should follow the natural (instinctive) route, going up to higher ground.

Figure 19: example of tsunami evacuation sign positioned along the roads for the exercise.

2.11 Were the gathering areas properly located, in safe areas, clearly marked with visible signs, with enough space available?

Average score: 4.2

The assembly areas were well selected as they were good-sized areas in high ground, accessible from various routes. However, their suitability to people with special needs and the elderly wasan issue.

There is a need for more enclosed spaces especially for wet or cold periods and also at night. Need for more toilets, and possible a refreshment facility.

The sign of the assembly point was positioned quite high up and not so prominent at first glance.

Figure 20: aerial view of one of the gathering areas, showing the location and the space available for rescuers and population.

2.12 Were the gathering areas properly set up and managed by the operators of the local emergency response system? Were they ensuring a proper situation management at each assembly area[7]?

Average score: 4.25

There were medical teams and reception facilities, the gathering areas were well managed.

The assembly point set up (3, Tas-Silg Roundabout) could do with some improvements in terms of management and emergency organization. Below are the suggestions that were collected from the target population[8] and emergency response operators at assembly point:

- Residents feedback:
  - Need for prompt set up of public toilets, shelters (in case of rain) and seats (for elderly people).
  - Need for an ambulance already in place prior to their arrival.
  - Need for better zonation instructions i.e. which part of the assembly point they should stay.
  - Better explanation of the use of the areas by different operators and residents is required.
  - Public were all spread out and often mixing with emergency operators – this may distract the emergency operators and public may be exposed to operational information which they do not need to know or may lead to more alarm.
- Emergency, Fire and Rescue Unit feedback:
  - The officers commented that they would need to know in which part of the Assembly Point they would be zonated and they also would prefer to have someone giving them an update on the situation every 10-15 minutes.
  - Although their role at the assembly point was clear, the unit feels they also require simulations in terms of the inundation aftermath – injuries, rescue hotspots (elderly, disabled, hearing impaired) in structural damaged areas, finding the casualties, body disposal.
  - Public registration zone requires signage.
  - More promotion of neighbourhood watch system as part of the simulation – to minimize the hotspots.
- LESA (Local Enforcement Systems Agency) feedback:

[7] Crowd management, population registration, provision of information, communication with the emergency operations center, …?

[8] The target population evacuated ranged mostly from young adult to retired elderly (of various nationalities). There was also a larger percentage of females compared to males.

- The officers commented that they were not briefed about the scope of the simulation exercise and were only informed once they reached the Assembly Point 3 on the day.

- Police feedback:
  - The audio messages were not so audible from the assembly point.
  - The officers observed noise conflict between the messages and helicopter engine noise.
  - They also asked about the dismissal procedure once the evacuation was concluded and all stakeholders left the assembly point. (It was observed in fact that upon the conclusion of the exercise, emergency operators started driving away, with assembly point areas crisscrossed? by operators' vehicles and pedestrians alike).
- St John's Ambulance feedback:
  - They remarked that registered people were left too alone. What about children management?
  - The CPD Site Manager was observed to be responsibility overloaded and may need one or two subordinates to help in the management of the assembly point.
  - Requirement of supplies of water, sugary drinks– if the actual evacuation takes longer.
  - It may be a good idea – for the evacuees to be supplied with a tsunami first aid box (to keep in their houses) in case of a rapid evacuation, especially during the night.

Figure 21: emergency response personnel ready to register and manage the population evacuated at the gathering area

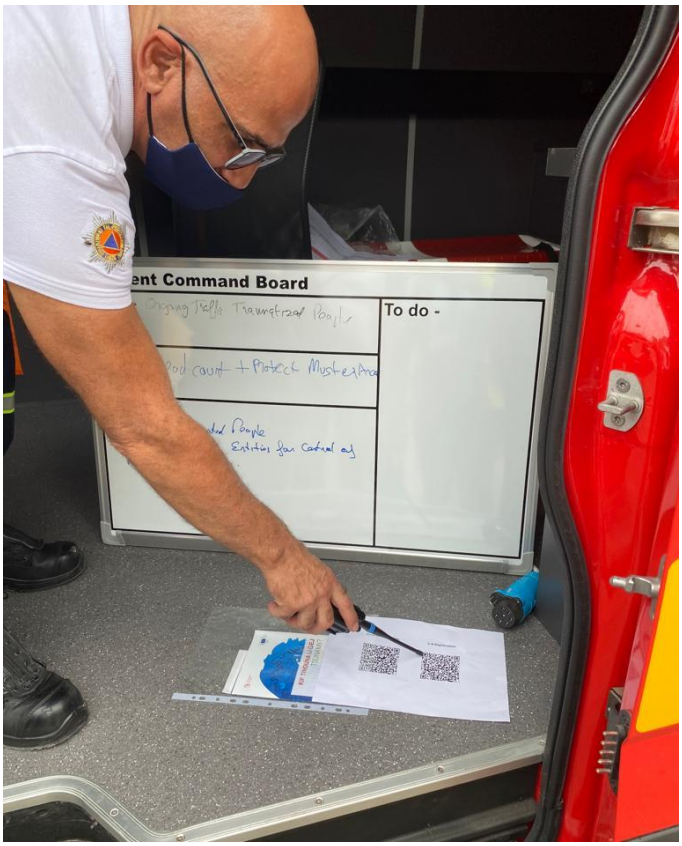


Figure 22: QR code system used to register the population coming to the gathering areas.

2.13 Did the target population timely and orderly self-evacuate towards the gathering areas, following the evacuation routes and evacuation signs? (Please, take note of the self-evacuation timing)

Average score: 3

There were few people willing to be involved in the self-evacuation procedures. Fishermen for example did not participate and most people remained in their house. Few boat owners continued business as usual taking tourist out to sea.

A few keen locals were seen self-evacuating and following the evacuation routes and signs. At 10:51, at the assembly point of Zone 2, there were about 20 people from the target population, as can be seen in the pictures below, including two English speaking people, possibly tourists. Two residents who self-evacuated said that it was their duty to participate and that they were aware of the risk a tsunami poses to their locality.

Those willing to be involved were orderly self-evacuating following the tsunami sign. Some evacuees were observed leaving their home and walking along the Triq ir-Rikka to reach Assembly Point 3 (Tas-Silg roundabout) after the first message.

The evacuees interviewed at Assembly Point 3 had the following comments:

- They felt safe in the presence of various emergency response operators.

- The residents felt they were adequately informed about the exercise by CPD and Local Councils in the weeks prior to the simulation day.
- Some evacuees did not take the pre-established route as they felt it left them too exposed walking along the coast. They took short cuts to feel more sheltered by the first line of buildings along the coast.
- They felt that the image with evacuation routes on leaflet provided by the Local Council was of rather low quality.
- Name of assembly point should be attached to a place name and not to a number – for better reference to the location of the assembly point.
- Signage of assembly point needs to be bigger.
- They also felt they need more information about the procedure prior to leaving home: what do you do if you have animals at home? Do they switch off electricity? Close the windows? How much time do they have to leave home after the first message?
- They heard police sirens – but they reported it was unclear whether they were related to the tsunami inundation. It is better to have police vehicles going round with loud speakers and give instructions.

Evaluators did not see any officer talking to people and encouraging them to evacuate, especially the expected arrival of the tsunami. During the hot-wash debriefing, it was clarified that officers were informed to encourage people to evacuate. Evaluators observed CPD, police, army and medical vehicles driving by with their sirens on. While the sirens received the attention of the people, they gave the impression that the emergency is for someone else or other emergency situation.

Recommendation:

- It is strongly encouraged that instead of sirens, messages are communicated out loud from the passing police vehicles to alert the locals that they are in danger and to go to high ground.
- Ensure that non authorized cars are not allowed through closed roads.

Promote tsunami preparedness (objective E – checklist 3)

The third checklist was dedicated to the evaluation of **the awareness raising activities conducted in preparation and after the exercise**, to promote tsunami preparedness in the community.

In this case, the evaluators' **interaction with the exercise participants and actors is fundamental**, to gather their feedbacks on the information activities conducted before the exercise, like the information meetings held before the 5th November, and their impressions about the exercise and the related tsunami awareness raising interventions.

All observations were aimed to gather an understanding of the impact of the Tsunami Last Mile project and connected exercise on the tsunami risk awareness of the local community in the medium-long term. This was to be done by focusing on both, the institutional and the public perspectives.

Below is the **full list of questions of checklist 3, with the corresponding rankings and comments received from the evaluators**.

3.1 Was the Local Council administration provided with a clear understanding of the Tsunami Last Mile project and associated exercise expected outcomes?

Average score: 4.4

The meeting for the evaluators was held at the local council premises in the presence of one of the councilors. The evaluators 'impression was that the Council was well informed and had an active role in the project. It was clear that Local Council have been for weeks managing calls from various residents and business operators.

However, some evaluators observed that while the test concerning testing devices and integration of regional, national to local system seemed to be successful, including the response of national organizations, the TLM exercise was not sufficiently rooted in the community, as they observed low participation and engagement/response of the community during the exercise day.

3.2 Did the local community receive from the Local Council clear information about the Tsunami Last Mile project and the upcoming exercise in advance (possibly through multiple channels and also in English)?

Average score: 4.4

Yes. They were very well informed, and in fact, they closed all the shops, which unfortunately resulted in only a few people participating inthe exercise. However, this suggest that they knew about the exercise, and this may have helped to raise awareness of the tsunami risk. The elderly home in the marina was also informed and two nouns were evacuated.

Moreover, the evaluators spoke to a few people and were informed that the Local Council (LC) and the CPD sent flyers and held awareness campaigns to inform the population.

Some residents commented that the images of the evacuation routes on the LC leaflet was too low resolution and thus not informative enough. Leaflets were in English and Maltese. LC was however very responsive to calls and queries made by the community in preparation of the simulation day. It was interesting to note that part of the evacuees was

not Maltese but retired expats – Belgians, Italians, Dutch. It is important to keep this is mind for future programs.

In conclusion, the evaluation team's impression was that the local community was aware and prepared for the exercise. They felt welcome by both the residents of the town as well as the business community.

3.3 Did the local emergency response operators and target group of population receive clear information about the upcoming exercise in advance, with clear role/task assignment and expected outcomes from each of them?

Average score: 4.5
The emergency response operators and the target group of the population showed they had clear roles and tasks assigned to them. The operators made a well-coordinated demonstration.
The operators performed according to the information they had received even if were not too many people participating.

3.4 Were the exercise briefings provided at the beginning of the exercise useful and "to the point", providing all the needed information to the exercise actors, according to their profiles?

Average score: 4.75
Yes, the briefing for the evaluators at the beginning of the exercise was informative and well prepared.

3.5 Was the target group of population aware of the safe behaviours to assume in case of a tsunami warning?

Average score: 3.75
Yes. They know how to respond and behave in a safe manner. One has to keep in mind however that they were not behaving under an actual state of stress or duress. In addition, as mentioned in other parts of this document, the emergency operators patrolling the expected inundation zone were in vehicles.Theyneed to stop and give clear instructions of the actions to take from the second warning.

Recommendation:
- Commission a study/survey aimed to understand why few people participated and answer questions such as: would a future drill lead to less or more people participating? How can you avoid participation fatigue?

3.6 Was any awareness raising activity implemented before/during/after the exercise? Was it captivating, informative and properly delivered?

Average score: 3.75

Yes before the exercise. A letter was shared with the population and media . A leaflet was also produced and distributed to the population. During the exercise the emergency operators provided information to the people who had requested it.

Before the event, CPD were seen on news and media speaking to the locals. The awareness /preparedness and their participation in the exercise suggests that the awareness activity was a success. At a national level, some evaluators heard stories of very concerned people who thought a real tsunami was going to impact Marsaxlokk.

During the event, no awareness raising activity was observed at the meeting points. The lack of a direct awareness campaign with the locals during the exercise, once they gathered in safe area, may be seen as a lost opportunity. National press media were invited to follow the drill.

After the exercise, the drill was reported on all national media (TV, radio, newspapers).

Figure 23: press conference at the on-site emergency coordination centre

Recommendation:

- Carry out awareness raising activity on a national level via Radio, TV and /or social media campaign.
- Run an awareness activity campaign soon after a future exercise (e.g., distribution of informative flyers).
- Consider running a post-event survey to understand better the community feelings and experience.

3.7 Was the hot-wash debriefing session organized at the end of the exercise effective in capturing first findings and the exercise actors' feedbacks?

Average score: 4.6

A hot wash debriefing session was organized at the end of the exercise outside the Local council premises. Debriefing was attended by various entities, including the CPD, Medical team (Mater Dei Hospital and Red Cross), MHRA, UOM, evaluators, observers, JRC and UNESCO representative..

Everyone congratulated all the parties involved, appreciating the efforts done to run a successful drill. All participating entities gave a brief of strengths and gaps identified and the suggestions on improvements for future exercises.The following are points noted during the briefing from different groups.

Comments by Health Department:

- Early warning call out to Health Department is imperative even if it is a false positive. False positives are not an issue since they are used to it but for health responders early preparedness is imperative.
- For health department responders, it is important to know where the hotspots are. Internal SOPs are required for evacuated school children – where they will be taken and how to communicate with parents where their children are being taken.

Comments by AFM operators:

- They need to be earlier at the On-Site Operation Centre
- The SOPs should encourage communication with VHF/UHF, should situation disrupt digital connections (mobiles, internet etc.)
- ICP room was too crowded. No coffee should be allowed in the control room.
- Police escort to disperse traffic would need to be mobilized to get troop from Pembroke to M'Xlokk
- Drones and helicopters should not work together.
- Include port authorities in future exercises.
- Have a representation of AFM in ICP room and parking provisions
- A landing site for AFM helicopter should also be identified in the vicinity of the operations. Football ground is not a good landing spot.

Comments by Red Cross operators:

- Response time of RC is dependent on number of volunteers.
- It is important to have an inventory of the availability of rescue operations equipment – people carriers, what type of vehicles are required.
- A network/platform to identify all the resources available and what gaps need to be filled in.

Recommendations:

- Larger signs/labels along routes.
- Mater Dei and Red Cross ask to get an early callout right from the start when INGV issues the first alert so they can check what resources they have and put staff and volunteers on standby.
- Identify hotspots (e.g., schools and elderly home along the coast).
- Identify areas where helicopters can land closer to the town instead of going to the airport each time to land patients to save time and fuel.
- Careful planning to avoid traffic jamsnecking? at roundabouts close to the emergency sites.
- A database of all resources available for emergencies (ambulances, medical, military, CPD, etc).
- No coffee machine in the control room to avoid unwanted disruptions.
- AFM would welcome a police escort.
- Avoid flying drones and a helicopter at the same time over the same airspace.
- Army and CPD communication setup should be next to each other.
- Allocate more time for hot wash debriefing in future exercises.

Figure 24: hot-wash session ongoing at the end of the exercise, with exercise control members, evaluators and representatives of the whole emergency management system.

3.8 How do you evaluate the overall organization of the exercise, including the preparatory activities?

Average score: 4.6

Overall, the organization was well planned and executed, especially considering the drill was a first of its kind for Malta. It felt that everyone experienced a learning curve and had lessons to learn. The community, too, seemed satisfied with the drill.

The rather limited participation of the citizens to the evacuation procedures reveals that more is needed to be done. The exercise served well the purpose to test devices and integration and participation of CPA actors; on the local community side, it allowed to raise awareness of the tsunami risk, but it also represented a first step of a longer commitment needed in the future to engage with and further develop tsunami risk awareness and self-protection culture of citizens.

3.9 According to your observations during the exercise, as well as to the feedbacks collected from the local stakeholders, how do you evaluate the overall impact of this initiative in the tsunami risk awareness level of the local community?

Average score: 4.2

The TLM project and the exercise are key and have shown their added value. People were informed in advance. Maybe they decided to not participate, but they were informed and they knew what to do. The exercise was important to raise wariness also within the emergency management community that would better plan and prepare.

Some evaluators suggested the enrollment of also other organizations such as local NGOs, schools and the private sector.

In conclusion, participating organizations seemed satisfied with the exercise, noting the non engagement of schools because of ongoing COVID19 restrictions.

Recommendation:

- Run a survey/questionnaire as a follow up to the exercise for a broader qualitative assessment on the risk awareness level

3.10 Did you have opportunity to collect an impression about the local community's reaction to the Tsunami Last Mile warning system?

Average score: 4.2

An overall passive attitude was observed among the citizens.

The reaction varied across the local people, those who took the drill seriously and participated in the evacuation, compared to local people who did not evacuate and watched the exercise from their houses, streets or the square, to tourists visiting the town who were unresponsive to the drill either because they were not interested or because they considered it as a local exercise, not interesting them.

A series of informal interviews conducted by the evaluators at the assembly points (i.e. among the citizens who voluntarily chose to participate to the exercise) was useful in helping to assess how the residents felt. If they were well informed about this exercise and whether they understood the importance of the simulation. For example, an evaluator spoke to one family with two small children: they said they were ready for the exercise since 9 am. They were happy to participate and they thought it was very useful.

Interviewed citizens also provided some suggestions and recommendations which are outlined in various sections on this document.

Children were the most interested in the exercise. Tourist seemed not so interested and they did not think that the exercise was useful also for them to know what to do.

Figure 25: evaluation team members at work, interviewing locals.

Evaluation of the evaluation (checklist 4)

This final checklist was dedicated to collecting feedbacks to perform a meta-evaluation, i.e. a summary evaluation of the evaluation activities. At the end of the exercise, the experts of the evaluation team were asked to provide feedbacks on the evaluation methodology adopted and their evaluation experience.

Below is the **full list of questions of checklist 4, with the corresponding rankings and comments received from the evaluators**.

4.1 Did you enjoy the exercise?

Average score: 4.8

"Yes very much. I had the opportunity to learn from the other evaluators, to learn about Maltese Emergency Management System, and share some experience and knowledge. Malta is a beautiful country."

"Yes, the exercise was well planned but it needs more active participation from the local communities. Unfortunately, it is a risk that is low in ranking even though people are aware of what can occur e.g. Japan incident"

"Yes, it is a collective effort and positive in terms of outcomes."

"Yes. As a geoscientist, I had the opportunity to witness the impact science can have on the community."

"Absolutely, it was a chance to identify strengths and weaknesses, and this will help to implement new projects and activities, including Tsunami Ready not only in Malta but in other countries."

4.2 Do you consider the evaluation aspect of this exercise to be useful?

Average score: 4.8

"Yes, exercises need to be evaluated by external and internal evaluators who are able to identify gaps and help generate recommendations and improvement."

"Yes, since this was the first simulation exercise, collecting feedbacks and observations are crucial to inform better response model and organisation in future."

"Yes, because it gives me the opportunity to reflect on the performance of the exercise and present recommendations for future cases."

"Yes but should be shorter."

4.3 Do you consider the evaluation workload to be adequate? If not, please explain why in the "comments and suggestions" box

Average score: 4.6
"Yes. The evaluation has balanced workload."

"Some lined paper to be able to freely write further observations would have been of additional help".

4.4 Did you encounter any difficulties in the implementing activities evaluation? If yes, please specify your reasons in the "comments and suggestions" box

Average score: 4
"Meeting location with the whole team on the day was changed from near the Emergency Centre to next St Lucian Tower. I was informed 5 minutes before the meeting time of 9am on Whats App. Ideally one should avoid such last minute changes."

"Too long and needs to be structured according to groups of interviewee"

4.5 Did you find this method, based on a multi-choice questionnaire, appropriate for the purposes of a proper exercise evaluation?

Average score: 4.4

"Yes, the questionnaire was detailed and comprehensive."

"Yes. Perhaps consider the evaluator can also put videos that might be helpful for the evaluation."

"Simpler would be good"

4.6 Did you find the number of questions to be adequate?

Average score: 4.5
"Yes. The number of questions is adequate."

"Too long"

4.7 Were the requests clearly expressed in each question?

Average score: 4.5
"Yes. Some overlaps between different questions may have been resulted in terms of information."

"Not all"

4.8 Were the questions pertinent to the final exercise evaluation?

Average score: 4.5
"A few questions had overlaps and found myself repeating same answers."

"Some."

4.9 In light of this experience, do you think this type of exercise evaluation to be adequate for a "generalist"?

Average score: 3.25
"No. I think this type of exercise needs to involve a specialist who has competence in the theme of disaster management, has sharp observational skills and also is steadfast in collecting information and feedbacks from the actors involved in a very timely and responsive manner."

4.10 Would you adopt such an evaluation methodology in future exercises?

Average score: 3.25

"Yes. It is a good methodology, very reflective in its assessment."

"Yes. Perhaps consider the evaluator can also put videos that might be helpful for the evaluation."

"Adapt part of the method/questions."

Your further comments and suggestions

"Congratulations to all involved in the Last Mile project."
Overall, the evaluation team found the exercise most useful and beneficial to see the impact the science can have at the community level, while allowing the identification of the strengths and weaknesses. It was assessed as a successful collective effort and positive in terms of its outcomes, while the need for more active participation is recognized. Some difficulties in the

implementation of the evaluation activities and methodological improvements, such as simplification of the questionnaire and making use of videos in the evaluation process were identified. It was noted that the evaluation? of such exercise needs to involve a specialist who has competence in the theme of disaster management with sharp observational skills and ability in collecting information and feedback from the actors involved in a very timely and responsive manner.

Conclusions

A formal Tsunami Warning System in Malta is not yet established, and the Civil Protection Department receives tsunami messages from the INGV, Italy -NEAMTWS Tsunami Service Provider- and technical advisory support from the University of Malta. It is the first time that such an exercise was carried out in the country. Its outcome, and the preparations leading up to it, are therefore very important in assessing the suitability of the present situation, as well as serving as a basis for discussion of a future tsunami warning system.

Overall, the organization of the exercise was perceived to be well planned and executed. It was a steep learning curve. The community seemed satisfied with the first drill conducted in Marsaxlokk, Malta. The limited participation of the citizens to the evacuation reveals that more needs to be done. The TLM project and the exercise are key and have shown their benefits and added value. The exercise served well the purpose to test devices and integration and participation of CPA actors. On the local community side, it raised awareness of tsunami risk, as a first significant step of a longer commitment further develop tsunami risk awareness and self-protection culture of citizens.

This kind of exercise are experiments of crucial importance for the entire Mediterranean region. Tsunami events in the area may not be perceived as a high risk in institutional and public opinion, but scientific evidence shows that the frequency of occurrence of basin-wide tsunamis in the area is low, however, more frequent local tsunamis may occur with short arrival times that can have significant consequences in near-field coastal areas. The regional IOC UNESCO ICG/NEAMTWS with accredited TSPs in five countries (France, Portugal, Italy, Greece, Turkey) have been operational since 2012, and ensures the detection and the timely dissemination of alert messages to the national levels of the subscribed countries. However, further dissemination of the messages through the national warning chains in time to reach local communities and individual citizens remains a major challenge.

As planned in the evaluation design phase, below is a preliminary **assessment of the level of preparedness of Marsaxlokk for tsunami events, after the implementation of the Tsunami Last Mile project and making the hypothesis that the local authorities' side will make the effort to make the experimental system operational.** The table below presents an **evaluation of the level of compliance of Marsaxlokk against the UNESCO IOC Tsunami Ready Recognition Community indicators**.

Table 2: ***UNESCO IOC Tsunami Ready Recognition Community indicators*** *(ongoing review)*

	TSUNAMI READY INDICATORS	Date of evaluation: 31 March 2022			
	Stage of achievement	**Initial stage**	**Medium stage**	**Final stage**	**Comments**
I	**ASSESSMENT (ASSESS)**				
1	ASSESS-1. Tsunami hazard zones are mapped and designated.		X		Tsunami hazard zones mapped through the TLM project. Formal adoption still needed.
2	ASSESS-2. The number of people at risk in the tsunami hazard zone is estimated.		X		In the TLM project an initial estimate of the number of people potentially affected in case of tsunami is available, including the estimated seasonal variations.
3	ASSESS-3. Economic, infrastructural, political, and social resources are identified.	X			No such analysis included in any of the project's reports.
II	**PREPAREDNESS (PREP)**				
4	PREP-1. Easily understood tsunami evacuation maps are approved.	X			Evacuation maps were identified during the project and tested during the exercise. Based on the exercise outcomes, some may be revised and formal approval should follow.
5	PREP-2. Tsunami information including signage is publicly displayed.	X			Provisional, prototype tsunami signs installed for the exercise. Improved visibility of the signage is needed before formal adoption and installation of permanent ones along all evaluation routes.
6	PREP-3. Outreach and public awareness and education resources are available and distributed.		X		Outreach, public awareness and education material was prepared in two languages (Maltese and English) for the final exercise of the project. They were distributed to the population of Marsaxlokk in the weeks before the exercise.
7	PREP-4. Outreach or educational activities are held at least 3 times a year.	X			The TLM exercise was the first initiative of this kind in Marsaxlokk town. It included awareness raising activities. A commitment of the local civil protection authorities is needed to make it a periodic appointment, during the year.
8	PREP-5: A community tsunami exercise is conducted at least every two years.	X			TLM exercise was the first initiative of this kind in Marsaxlokk town. A commitment of the local civil protection authorities is

					needed to make it a bi-annual appointment.
IV	**RESPONSE (RESP)**				
9	RESP-1. A community tsunami emergency response plan is approved.	X			The Draft Standard Operational Procedures (SOPs) "TSUNAMI EMERGENCY PROTOCOL FOR MARSAXLOKK, MALTA, Version 1.0" document was prepared by the national civil protection authority in the framework of the project and was tested during the exercise. Formal adoption should follow.
10	RESP-2. The capacity to manage emergency response operations during a tsunami is in place.	X			The exercise provided an opportunity for all EOC members to reflect on their respective roles in case of a tsunami event in town. They should continue their reflections and translate them into final SOPs in their internal emergency plans.
11	RESP-3. Redundant and reliable means to timely receive 24-hour official tsunami alerts are in place.	X			Control Room is operational 24 hours a day, seven days a week, and that they can get official alerts. However, not all operators are already familiar and capable of quickly deciphering the tsunami alert message. Therefore, some additional training of the operators is needed.
12	RESP-4. Redundant and reliable means to timely disseminate 24-hour official tsunami alerts to the public are in place.	X			TLM local network, if made operational by the local authorities, could ensure this. However, the power of the loudspeakers of the TADs should be increased, as well as additional devices would be needed along the entire coast.

ANNEX I

Photographic info on preparatory activities conducted in the weeks before the exercise day

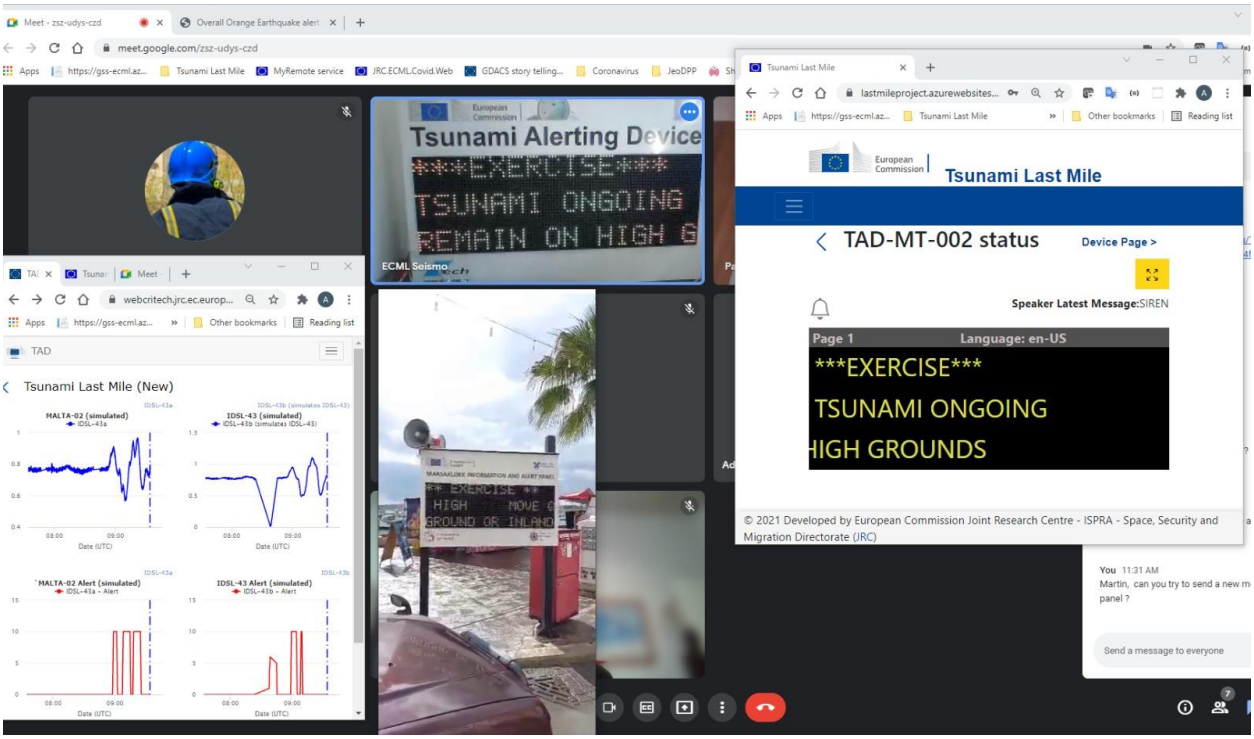


Figure 26: preparatory table top exercise on 13 October 2021 (International Day of Disaster Risk Reduction)

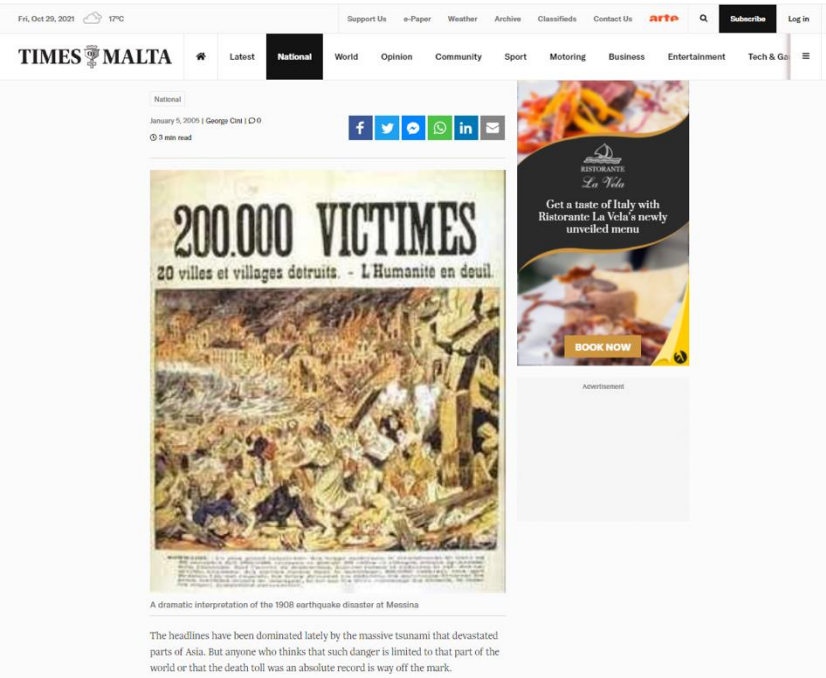


Figure 27: media coverage on 29 October 2021 (link to the article)

Figure 28: public information and awareness-raising activities hold on the weekend 16-17 October 2021 in Marsaxlokk

Figure 29: operational bodies 'briefing on 20 October 2021

Figure 30: Information and alert panels in Marsaxlokk

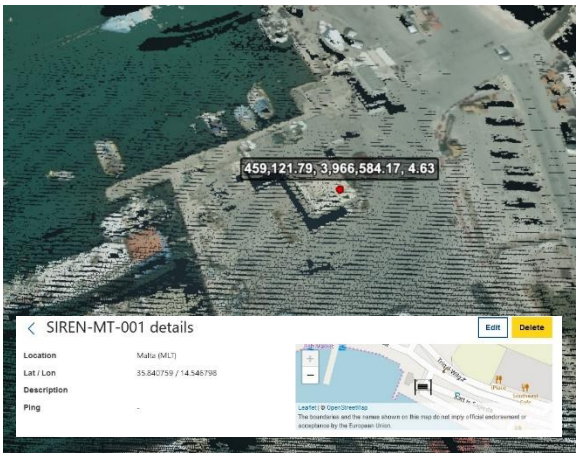
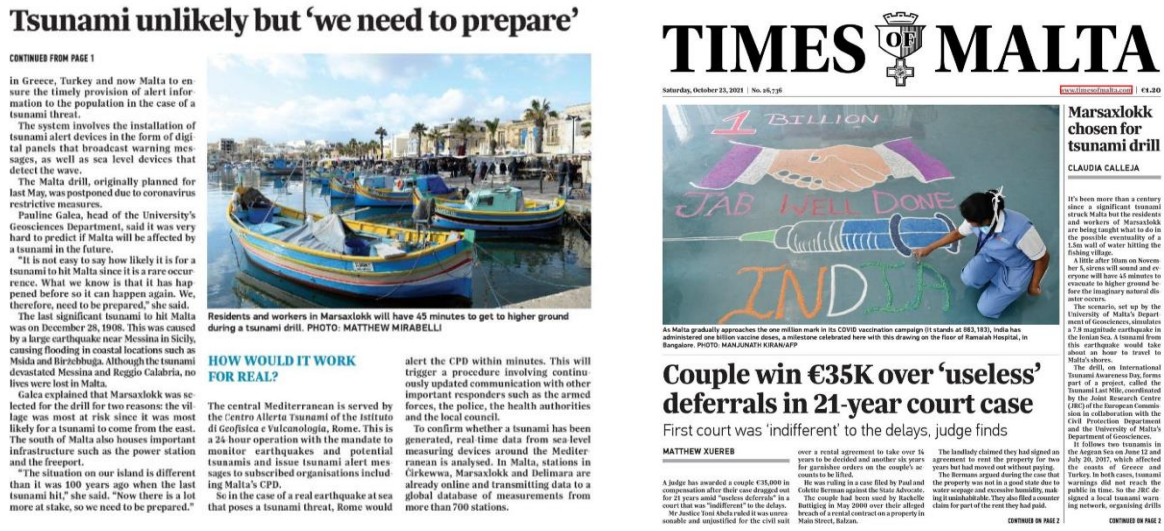


Figure 31: long range siren installation site



Tsunami unlikely but 'we need to prepare'

CONTINUED FROM PAGE 1

in Greece, Turkey and now Malta to ensure the timely provision of alert information to the population in the case of a tsunami threat.

The system involves the installation of tsunami alert devices in the form of digital panels that broadcast warning messages, as well as sea level devices that detect the wave.

The Malta drill, originally planned for last May, was postponed due to coronavirus restrictive measures.

Pauline Galea, head of the University's Geosciences Department, said it was very hard to predict if Malta will be affected by a tsunami in the future.

"It is not easy to say how likely it is for a tsunami to hit Malta since it is a rare occurrence. What we know is that it has happened before so it can happen again. We, therefore, need to be prepared," she said.

The last significant tsunami to hit Malta was on December 28, 1908. This was caused by a large earthquake near Messina in Sicily, causing flooding in coastal locations such as Msida and Birżebbuġa. Although the tsunami devastated Messina and Reggio Calabria, no lives were lost in Malta.

Galea explained that Marsaxlokk was selected for the drill for two reasons: the village was most at risk since it was most likely for a tsunami to come from the east. The south of Malta also houses important infrastructure such as the power station and the freeport.

"The situation on our island is different than it was 100 years ago when the last tsunami hit," she said. "Now there is a lot more at stake, so we need to be prepared."

Residents and workers in Marsaxlokk will have 45 minutes to get to higher ground during a tsunami drill. PHOTO: MATTHEW MIRABELLI

HOW WOULD IT WORK FOR REAL?

The central Mediterranean is served by the *Centro Allerta Tsunami* of the *Istituto di Geofisica e Vulcanologia*, Rome. This is a 24-hour operation with the mandate to monitor earthquakes and potential tsunamis and issue tsunami alert messages to subscribed organisations including Malta's CPD.

So in the case of a real earthquake at sea that poses a tsunami threat, Rome would alert the CPD within minutes. This will trigger a procedure involving continuously updated communication with other important responders such as the armed forces, the police, the health authorities and the local council.

To confirm whether a tsunami has been generated, real time data from sea-level measuring devices around the Mediterranean is analysed. In Malta, stations in Ċirkewwa, Marsaxlokk and Delimara are already online and transmitting data to a global database of measurements from more than 700 stations.

TIMES OF MALTA

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www.timesofmalta.com | €1.20

As Malta gradually approaches the one million mark in its COVID vaccination campaign (it stands at 983,183), India has administered one billion vaccine doses, a milestone celebrated here with this drawing on the floor at Ramaiah Hospital, in Bangalore. PHOTO: MANJUNATH KIRAN/AFP

Marsaxlokk chosen for tsunami drill

CLAUDIA CALLEJA

It's been more than a century since a significant tsunami struck Malta but the residents and workers of Marsaxlokk are being taught what to do in the possible eventuality of a 1.5m wall of water hitting the fishing village.

A little after 10am on November 5, sirens will sound and everyone will have 45 minutes to evacuate to higher ground before the imaginary natural disaster occurs.

The scenario, set up by the University of Malta's Department of Geosciences, simulates a 7.9 magnitude earthquake in the Ionian Sea. A tsunami from this earthquake would take about an hour to travel to Malta's shores.

The drill, on International Tsunami Awareness Day, forms part of a project, called the Tsunami Last Mile, coordinated by the Joint Research Centre (JRC) of the European Commission in collaboration with the Civil Protection Department and the University of Malta's Department of Geosciences.

It follows two tsunamis in the Aegean Sea on June 12 and July 20, 2017, which affected the coasts of Greece and Turkey. In both cases, tsunami warnings did not reach the public in time. So the JRC designed a local tsunami warning network, organising drills

CONTINUED ON PAGE 2

Couple win €35K over 'useless' deferrals in 21-year court case

First court was 'indifferent' to the delays, judge finds

MATTHEW XUEREB

A judge has awarded a couple €35,000 in compensation after their case dragged out for 21 years amid "useless deferrals" in a court that was "indifferent" to the delays.

Mr Justice Toni Abela ruled it was unreasonable and unjustified for the civil suit over a rental agreement to take over 14 years to be decided and another six years for garnishee orders on the couple's accounts to be lifted.

He was ruling in a case filed by Paul and Colette Berman against the State Advocate.

The couple had been sued by Rachelle Buttigieg in May 2000 over their alleged breach of a rental contract on a property in Main Street, Balzan.

The landlady claimed they had signed an agreement to rent the property for two years but had moved out without paying.

The Bermans argued during the case that the property was not in a good state due to water seepage and excessive humidity, making it uninhabitable. They also filed a counter claim for part of the rent they had paid.

CONTINUED ON PAGE 2

Figure 32: media coverage on the exercise

Figure 33: interview on the local radio on 28 October 2021

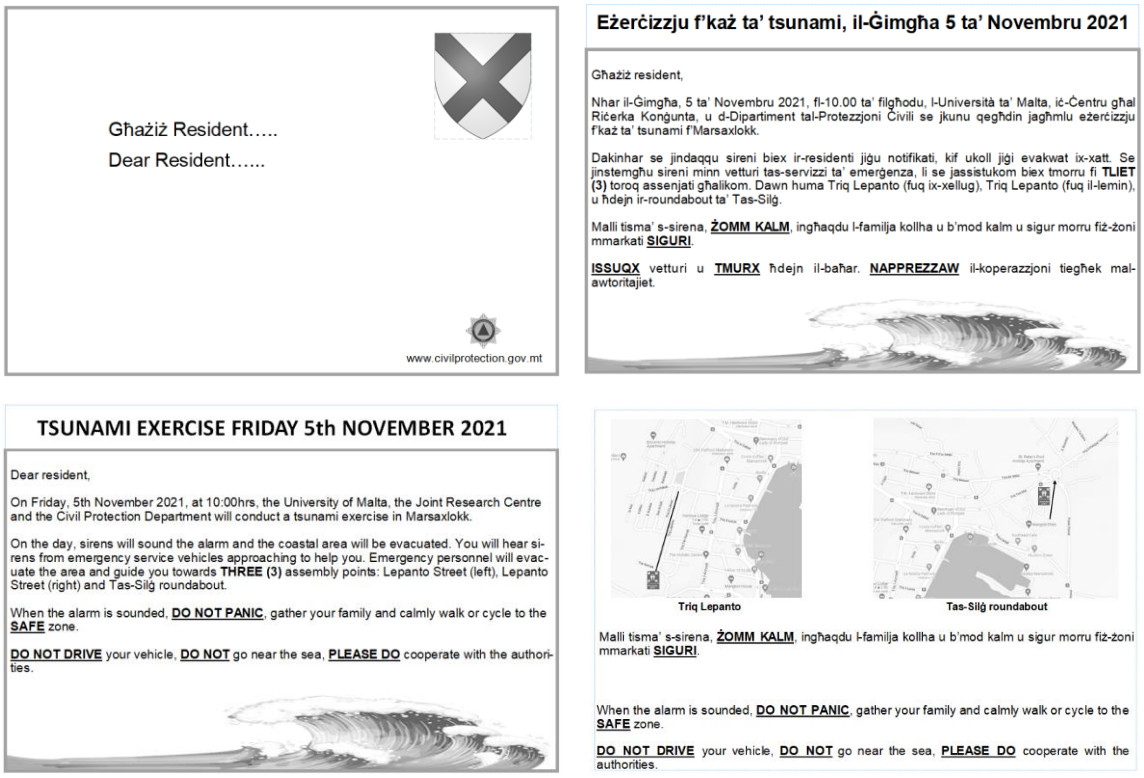

Figure 34: letter to residents from Malta Civil Protection Department about the exercise

Figure 35: tsunami information flyers (all printed also version in Maltese)

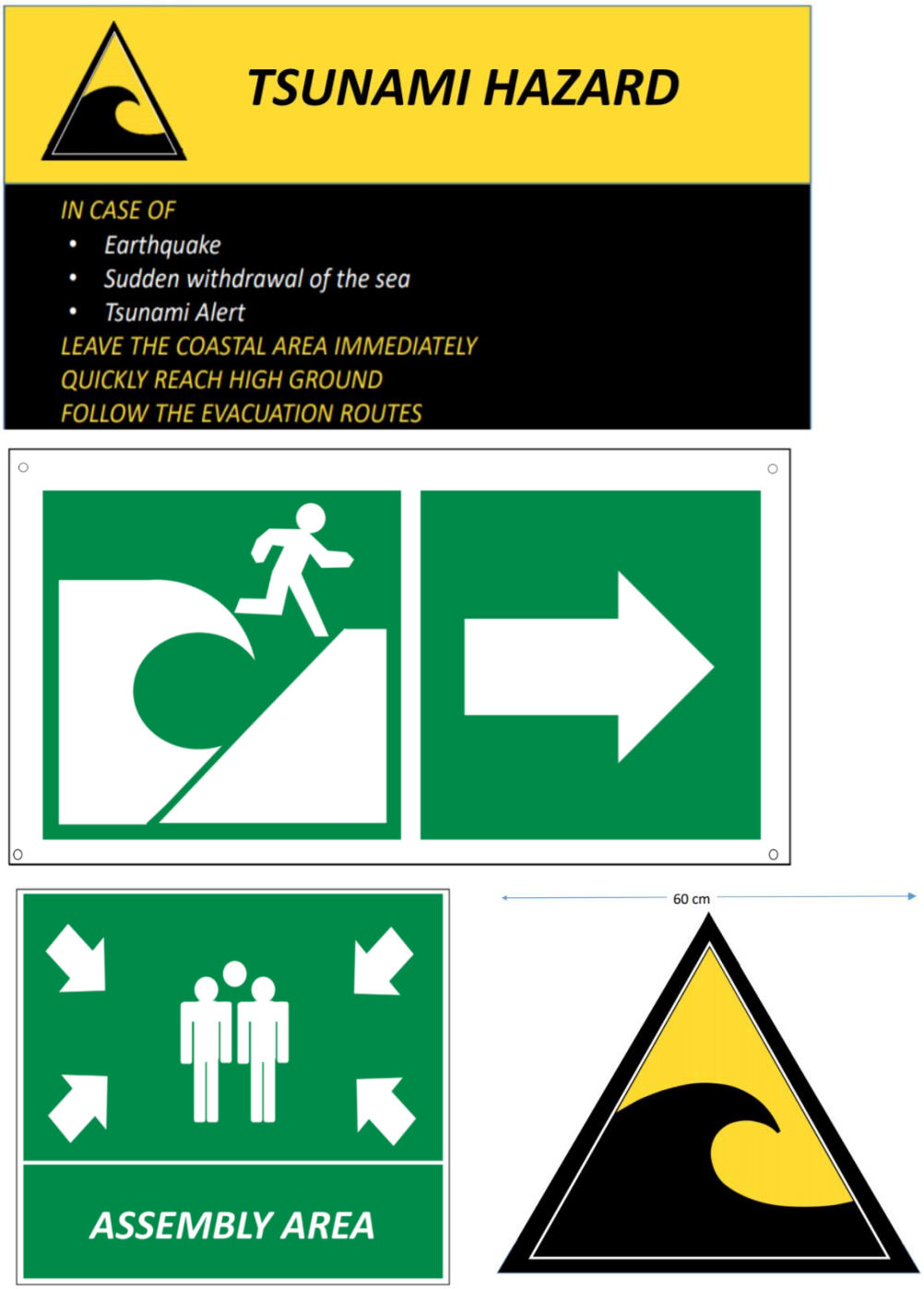

Figure 36: tsunami signs for Malta

Sign	Type	Number of signs
	**Tsunami Hazard Zone**	8
	**Evacuation Route** (with a vertical and a horizontal arrow)	11
	**Entering Tsunami Evacuation Area**	5
	**Leaving Tsunami Evacuation Area**	5
	**Meeting point**	3
TOTAL NUMBER OF SIGNS:		32

Figure 37: types and number of temporary tsunami evacuation signs installed in Marsaxlokk for the exercise.

ANNEX II

Summary list of findings identified during the exercise, grouped by topic:

Functionality of the local tsunami warning network and its integration with the national system

- The long-range siren system and Tsunami Alerting Device (TAD) panels with a local siren and loudspeaker were in place and the TAD visual message was operational all the time. The voice alerts from the TAD loud speakers were not played for the first and second messages, but started working for the other messages. Signals disseminated from the TAD were not easily audible in all assembly points.

Tsunami warning messages' contents

- The messages disseminated included references to possibilities and waiting for further information, hence were not clear enough to force the recipients to act.

Local emergency management and response system for earthquake events

- The emergency plan and the Standard Operational Procedures were available for the exercise and were implemented during the exercise.

- The SOP for tsunami events were implemented by the emergency operators but some aspects regarding roles and responsibilities were not clear at least to a sub-group of evaluators. Nevertheless, such issues were not observed for the active participants of the exercise. In some cases, though, the need for more meetings/briefings in advance of the exercise, were stated to have a better understanding of the roles and responsibilities.

- Residents evacuated reported on their overall satisfaction regarding the information received on the evacuation procedure.

- The emergency operations, including the activations of military, police, health facilities and volunteers associations appeared to be well organized, including the evacuation of vulnerable people. Emergency operators were ready at the assembly points to register and manage evacuated people. Nevertheless, the need for central communication was observed to provide on-the-spot clarity in case of need. Some feedback has been provided by the Emergency, Fire and Rescue Unit indicated the lack of adequate briefing, problems with hearing the audio messages, especially due to the interference from the helicopter noise.

- About 200 citizens were registered in total by the emergency management personnel in the gathering areas, however not everyone followed the indicated evacuation route as they found it to exposed to the coast or too long and opted for shorter routes to reach assembly point. It should also be noted that there were few people willing to be involved in the self-evacuation procedures. The need for instructions were expressed related to what actions needed to be made when individuals leave their houses. Overall, the target group of population appeared to know how to respond and behave in a safe manner, but noting that they were not behaving under an actual state of stress or duress. Children were found the most interested group in the exercise where the tourist were not so interested and did not thought that the exercise was also for them.

- A hot wash debriefing session was organized at the end of the exercise outside the Local Council premises attended by various entities, including the CPD, Medical team (Mater Dei Hospital and Red Cross), MHRA, UOM, evaluators, observers, JRC and UNESCO representatives. All participating entities gave a brief of strengths and gaps identified and the suggestions on improvements for future exercises, including allocation of more time for hot wash debriefing in future exercises.

Evacuation maps, tsunami signs and assembly areas for tsunami hazard in the Municipality

- Tsunami inundation maps, with evacuation routes and gathering areas, were known by the local emergency operators and were displayed in the Emergency Operations Centre. Nevertheless, often the signs were placed too high up in non-prominent position to be noticed and may not be visible at all depending on the daylight. In addition, the dimensions of the signs were very small and the signs were not frequent along the evacuation.

- The tsunami signs were positioned well in terms of their geographic position – but there is room for improvement in terms of their visibility to the general public in situations of emergency.

- The assembly areas were found to be well chosen as they were good-sized areas in high ground, accessible from various routes. They were properly set up and managed by the operators of the local emergency response system. However, their suitability to people with special needs and the elderly needs further assessment.

Promotion of earthquake and tsunami preparedness

- Some evaluators pointed out that while the test concerning testing devices and integration of regional, national to local system seemed to be successful, including the response of national organizations, the TLM exercise was not enough rooted in the community, as observed low participation and engagement/response of the community during the exercise day. Having said that, this was contrary at the local council level, but having all shops closed unfortunately resulted in low level of participation by the people. Overall, the evaluation team's impression was that the local community was well prepared.

- Various awareness activities were conducted before the exercise with the involvement of the media, which is associated with the good preparedness of the locals, even few, who chose to participate to the exercise. The fact that no awareness raising activity was observed during the event has been assessed as a lost opportunity. The drill was reported on all national media (TV, radio, newspapers) after its end

Recommendations

- Reasons for failure in the siren/voice alert systems should be investigated and identified and the system should be checked to verify the improvements implemented. Improvements in the use of sirens should be investigated to ensure that they have a meaning to the recipient. In that regard, it may be advisable to consider playing out loud the messages from the passing vehicles to alert the locals that they are in danger and to go to high ground, naturally taking into consideration of the logistical shortcomings for such an effort. Furthermore, better regulation of the vehicle traffic is recommended to ensure that non-authorized vehicles are not allowed through closed roads.

- Multi-linguistic voice alerts should be considered especially in touristic areas.

- Necessary measures should be undertaken to improve the visibility of the TAD.

- Alert messages should be clear, concise and directly linked to an action to be followed by the recipients. Visual improvements should be investigated.

- The Emergency Plan and the Standard Operational Procedures should be updated very 5 years latest and efforts should be made to eliminate all ambiguities that may lead to a confusion during their implementation.

- Focus should be given to meetings/briefings in advance of the exercise to ensure a better understanding of the roles and responsibilities among the active players.

- Tsunami signs should be made larger and highly visible under all light conditions. In addition, they should be positioned in compliance with the instinctive route perceived by the individual who evacuate.

- needs for improvements have been identified for the assembly areas, such as the need for prompt set up of public toilets, shelters (in case of rain) and seats (for elderly people), availability of an ambulance and supplies of water, sugary drinks, better instructions on which part of the assembly point they should stay etc.

- Efforts should be made to investigate possible means of promoting wider participation among the people at a future drill.

- Efforts should focus on the improvement of awareness raising activities through all possible means before, during and after the exercise, where the latter could include a post-event survey.

Figure 38: TAD panel showing message of "end of exercise"

END OF DOCUMENT