



Agenda 6.2

Working Group 2- Tsunami Detection, Warning and Dissemination

**Padmanabham J,
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Chair, WG2

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Vice- Chairs:

**Robert Greenwood, BOM-Australia
Yedi Dermadi, BMKG-Indonesia**

19th Meeting of ICG/IOTWMS Steering Group, Jakarta, 17-19 June 2025

Terms of Reference-WG2

Liaise with other working group(s) and task team(s) within the ICG/IOTWMS and with working groups from the other ocean basins through the TOWS-WG to:

- 1. Coordinate and strengthen the operational implementation of tsunami detection, warning and dissemination**, including for tsunamis generated by non-seismic and complex sources, and multi-hazard framework.
- 2. Support the Tsunami Service Providers (TSPs) for delivery of interoperable regional tsunami threat information products** to Member States.
- 3. Support Member States in the development of their national tsunami warning capabilities.**
- 4. Monitor the performance of key observational, warning and communication system components.**
- 5. Support implementation of IOWave Exercises.**
- 6. Identify areas of priority for action** following assessments, communications tests, exercises, and real tsunami events. of Member States.

Terms of Reference

7. Provide advice to and collaborate with the UNESCO-IOC Indian Ocean Tsunami Information Centre (**IOTIC**) on **capacity development on warning system and services** including for non-seismic and complex sources.
8. Provide special attention to the needs of SIDS, LDCs, Africa in the work program.
9. Develop **WG2 work plans in line with the broad objectives of ODTP RDIP, Ocean Decade Challenge 6, EW4ALL.**
10. In collaboration with UNESCO-IOC IOTIC and UNESCO-IOC Secretariat for ICG/IOTWMS, **help strengthen the capacity and capability of Member States.**

Membership

Chair: Mr. J Padmanabham(India)
Vice-Chair: Dr Robert Greenwood (Australia)
Vice-Chair: Mr. Yedi Dermadi (Indonesia)

ICG/IOTWMS Secretariat

- **Dr. T. Srinivasa Kumar**
- **Ms. Nora Gale**

Members:

1. Ms Adrienne Moseley (Australia)
2. Mr M Nagaraja Kumar (India-ICG Nomination)
3. Dr Wijayanto (Indonesia)
4. Mr Iman Fatchurochman (Indonesia)
5. Mr Januar Arifin (Indonesia)
6. Mr Bayu Pranata (Indonesia)
7. Mr Mohd Robi Amri (Indonesia)
8. Dr Endang Widjiati (Indonesia)
9. Dr Chai Mui Fatt (Malaysia)
10. Mr Nik Mohd Riduan Nik Osman (Malaysia)
11. Mr Mat Kamarulzaman Mat Adam (Malaysia)
12. Dr Yin Myo Min Htwe (Myanmar)
13. Ms Moza Al Marhoobi (Oman)
14. Mr Anjum Nazir Zaigham (Pakistan)
15. Ms Doreen Ikula (Seychelles)
16. Ms Rose Soy (Seychelles)
17. Mr Badr Alameri (UAE)
18. Ms Shamma Alneyadi (UAE)

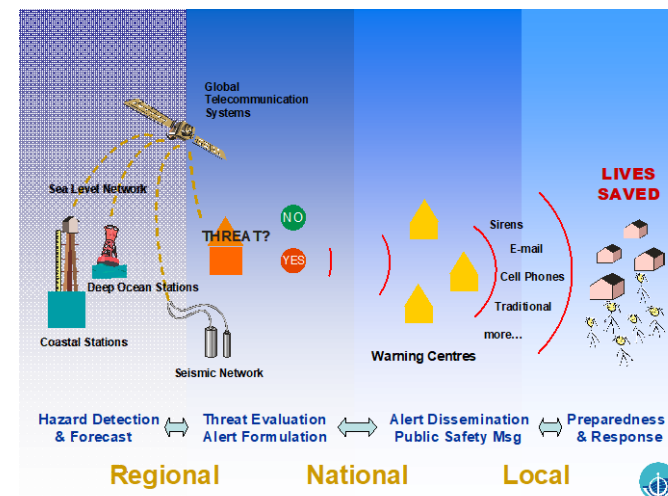
Key Workplans of WG2 – 2024-2026

- *Trial dissemination of maritime bulletins to respective NAVAREA operators in the Area of Service (AoS) for the upcoming communication test and for full operational implementation in 2025.*
- *Develop a Standard Operating Procedure (SOP) document for TSPs to address Tsunami-Generating Volcanic Events (TGVEs).*
- *Develop an optimal notional observing network design to meet the objectives of ODTP, facilitate the strategic and coordinated submission of projects to the UN Ocean Decade and potential funding sources.*
- *Utilise and promote the use of multi-purpose sea level monitoring stations to support MHEWS in enhancing data coverage and reducing costs.*
- *Utilise exercises and communication tests as an opportunity to simultaneously monitor data availability and quality.*

Detection, Warning and Dissemination – Current Status / Highlights

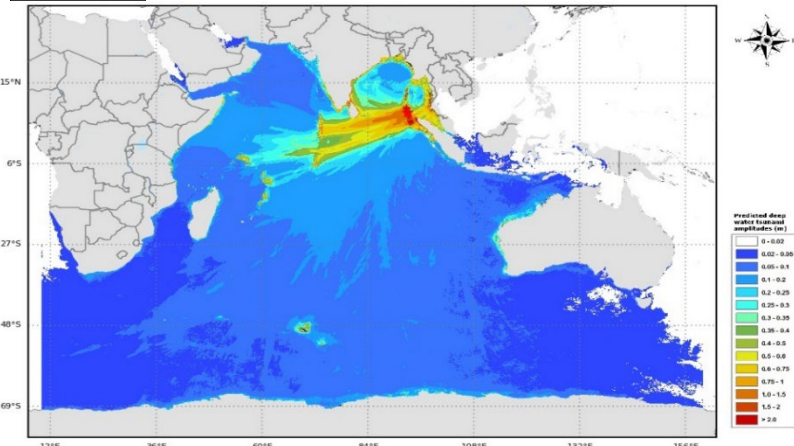
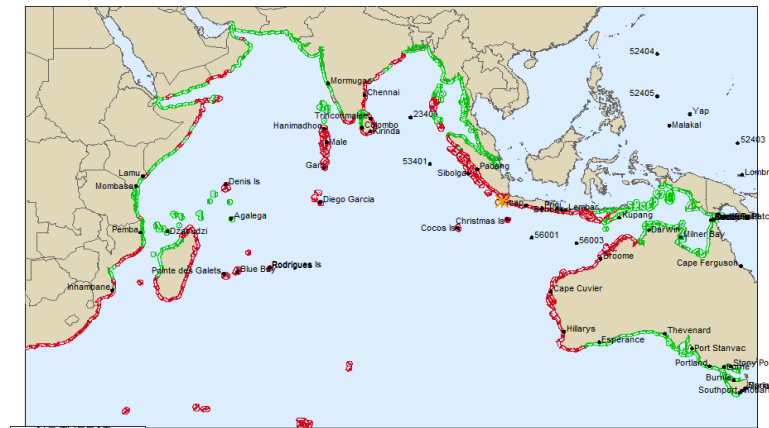
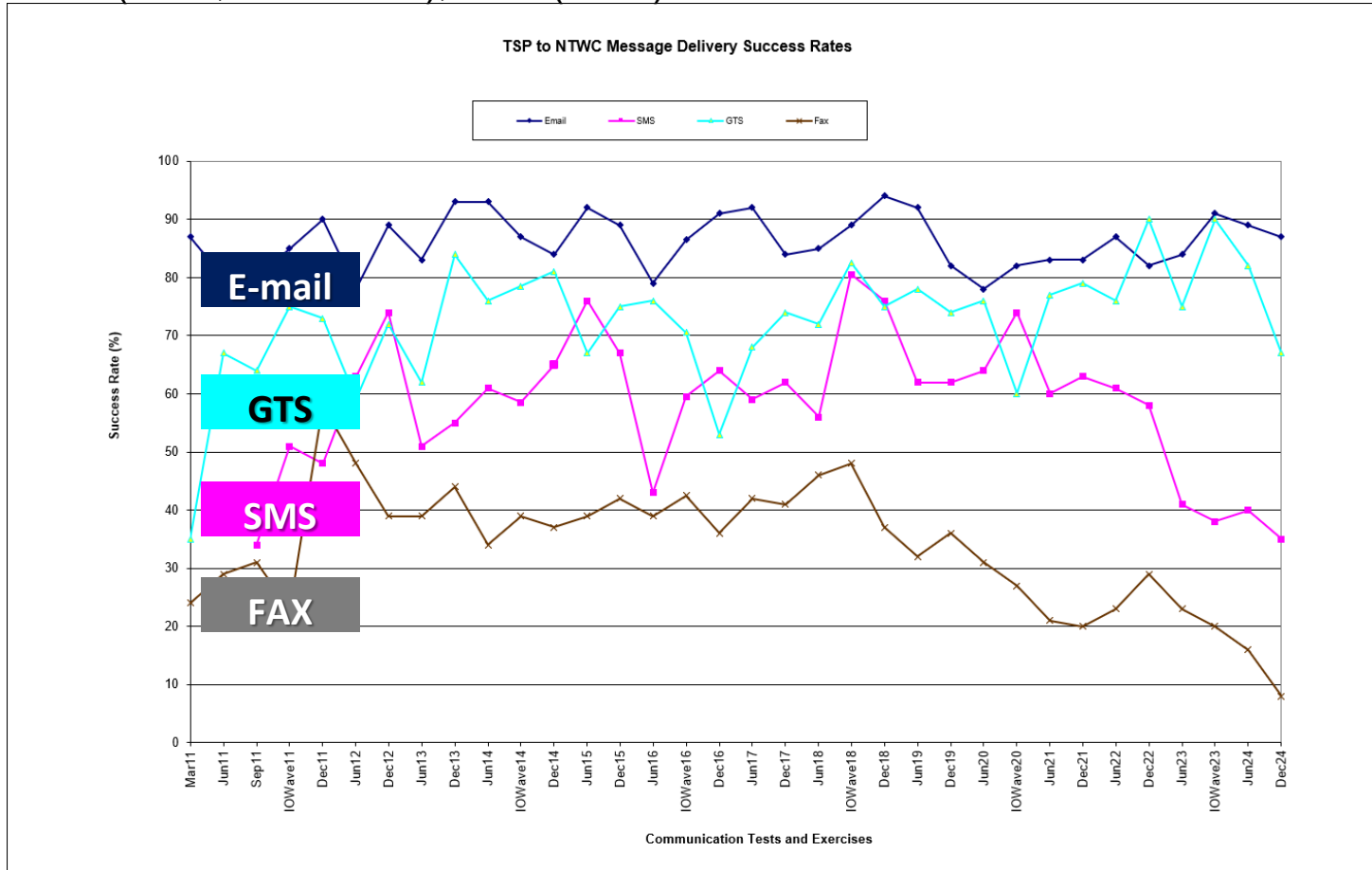
Sovereign national tsunami warning principle

- Under ICG/IOTWMS there are 3 Tsunami Service Providers (TSPs) (Australia, India, Indonesia) to provide tsunami threat information to National Tsunami Warning Centres (NTWCs)
- During the reporting period **Indian Ocean witnessed 0 events $M > 6.8$** , NTWCs issue sovereign warnings to their at-risk communities
- NTWCs operate within multi-hazard frameworks.
- **Threat information now being provided for non-seismic source tsunami**, eg volcanoes, landslides,... by TSP-Australia. other two TSPs planned to implement.
- **Maritime products for NAVAREAs to be trialed and implemented in 2025 by TSPs –**
- **Competency training framework being developed for NTWCs**
- TSP operations are ISO compliant: ISO 9001 (India & Australia), ISO 22328-3 (Indonesia)



IOTWMS Communication Tests

- As of today, 6 IOWave Exercises and 29 Communication Tests were conducted.
- During the reporting period, 3 COMMS tests were conducted since last SG 2024(June, December); 2025(June)



TSP KPIs 2024 – M6.8+

	Service Level 1 EQ Bulletins					Service Level 2 Threat / No Threat Bulletins			General
Year	KPI 1 ET First EQ Bull Target: 10 mins (% met)	KPI 2 POD EQs GE M6.8 Target: 100%	KPI 3 EQ Mag Target: 0.3 (% met)	KPI 4 EQ Depth Target: 30 km (% met)	KPI 5 EQ Location Target: 30 km (% met)	KPI 6 ET First Threat Bull Target: 20 mins (% met)	KPI 7 POD Tsunami Waves Target: 100%	KPI 8 Tsunami Height Accuracy Target: Factor of 2	KPI 9 False/ incorrect Bulletins Issued Target: 0
Australia	10.1	100%	0.08	14.3	23.3	N/A	N/A	N/A	6
India	10.3	85%	0.13	42.4	18.6	n/a	n/a	n/a	0
Indonesia	9.2	99.3%	0.16	21.33	23.51	n/a	n/a	n/a	0

NOTES

* KPI-2: A couple of events outside the Indian Ocean region were detected as 6.4 Magnitude for which TSP-India and Indonesia

19 June 2

Meets
Target

Near
Target

Misses
Target

TSP KPIs 2025 till date– M6.8+

	Service Level 1 EQ Bulletins					Service Level 2 Threat / No Threat Bulletins			General
Year	KPI 1 ET First EQ Bull Target: 10 mins (% met)	KPI 2 POD EQs GE M6.8 Target: 100%	KPI 3 EQ Mag Target: 0.3 (% met)	KPI 4 EQ Depth Target: 30 km (% met)	KPI 5 EQ Location Target: 30 km (% met)	KPI 6 ET First Threat Bull Target: 20 mins (% met)	KPI 7 POD Tsunami Waves Target: 100%	KPI 8 Tsunami Height Accuracy Target: Factor of 2	KPI 9 False/ incorrect Bulletins Issued Target: 0
Australia	9.8	100%	0.06	20.2	21.0	N/A	N/A	N/A	4
India	10.7	80%	0.1	8.25	11.7	n/a	n/a	n/a	0
Indonesia	10.3	60%	0.27	17.33	30.8	n/a	n/a	n/a	0

NOTES

* KPI-2: A couple of events outside the Indian Ocean region were detected as 6.4 Magnitude for which TSP-India and Indonesia

Meets
Target

Near
Target

Misses
Target

NAVAREA Products: status

Action: Trial dissemination of maritime bulletins to respective NAVAREA operators in the Area of Service (AoS) for the upcoming communication test and for full operational implementation in 2025.

Status:

- The three TSPs of ICG/IOTWMS have implemented the generation of NAVAREA notifications.
- TSPs have issue these notifications during the COMMS TEST 11 June 2025 to the agreed closed list of emails to test the readiness. The results are satisfactory and the notifications are in line with the agreed templates as per SDD V5.0

Way forward:

1. WG2- to work on the draft tsunami warning chain to issue NAVAREA notifications and propose a webinar to conduct with NAVAREA co-ordinators.
2. Secretariate to officially get the NAVAREA co-ordinators email ids for the dissemination list.
3. To test operationally during IOWave25 with the NAVAREA co-ordinators.

T0

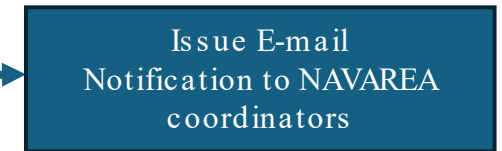
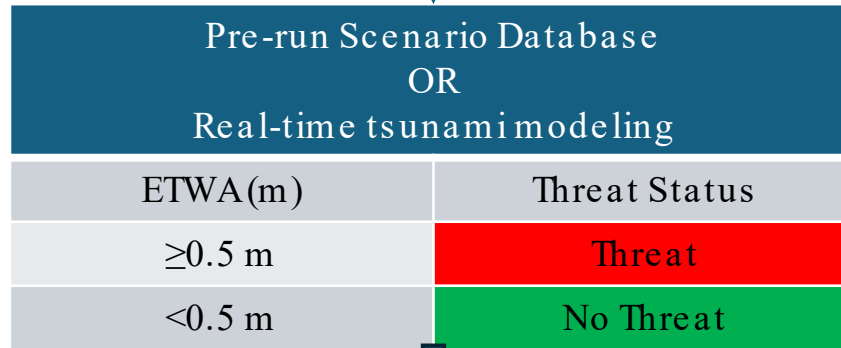
Draft SOP for NAVAREA

Earthquake Information



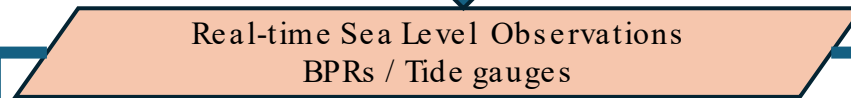
Type-I Bulletin
T0+10 mins

Potential Tsunami Threat

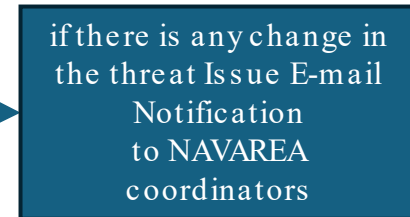
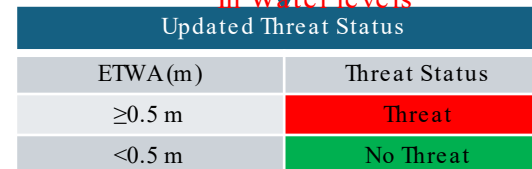


Type-III Bulletin
As and When Real-Time
Observations available

Confirmed Tsunami Threat

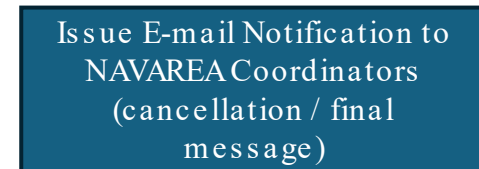


Significant changes
In Water levels

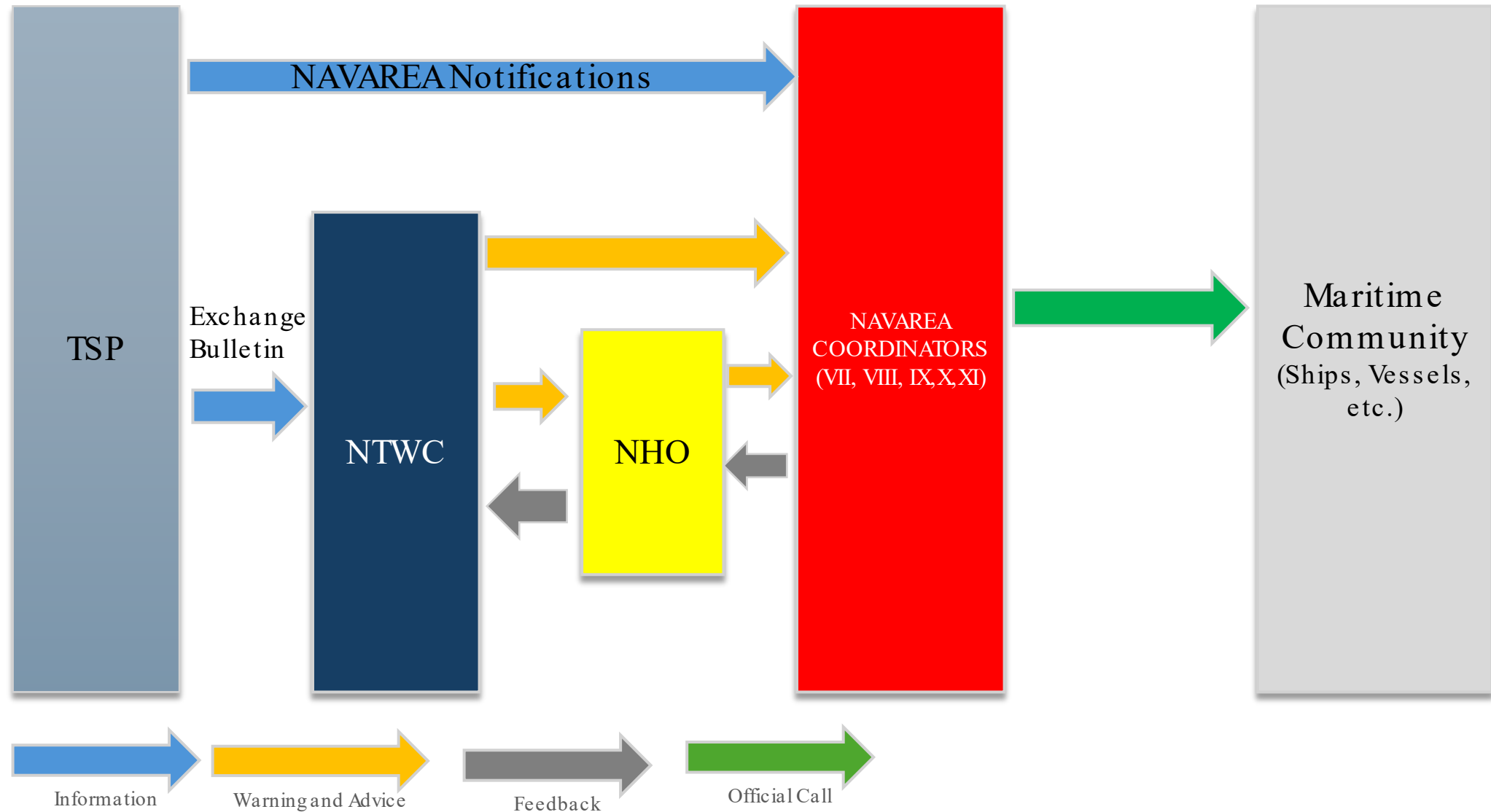


No Significant changes
in water levels

Type-IV Bulletin



Tsunami Warning Chain for Maritime Community (NAVAREA Product)



SG24-Actions and Status

Reference	ACTIONS for WG2	Status
SG02/24-5	Action: WG2 to prioritise the actions associated with its work programme.	Prioritized the work plan
SG02/24-6	Action: TSP-India and TSP-Indonesia to continue work on also developing products for tsunamis generated by non-seismic and complex sources like those developed and implemented by TSP-Australia	<ul style="list-style-type: none"> • TSP-India (is in-progress) • TSP-Australia (developed and implemented) • TSP-Indonesia (is in-progress) Action: WG2 will work on drafting a generic SOP document to handle TGVs./ non-seismic
SG02/24-7	Action: WG2 to develop a TSP Cyber Protection Policy to mitigate against any potential threats	Cyber protection policy may be very subjective as TSPs might have already a policy in place
SG02/24-8	Action: WG2 with the help of the Secretariat finalise the IOTWMS Standard Services Documentation Document and associated NTWC User Guide for distribution to Member States through a Circular Letter.	SDD V5.0 completed

SG24-Actions and Status .. cont

Reference	ACTIONS for WG2	Status
SG02/24-9	Action: WG2 to coordinate with Secretariat and TOWS-WG TT TWO in the development of training materials and training workshops for NAVAREA operators for trial implementation of TSP Maritime Products in 2024 (including trial dissemination via IOTWMS Communications Test in December 2024) and full implementation sometime in 2025.	<ul style="list-style-type: none"> • TSP (India, Indonesia and Australia) successfully trailed the NAVREA products on 11th June 2025 COMMS test with closed email list. • Adraft tsunami SOP flow and
SG02/24-10	Action: TSP-India and TSP-Indonesia to continue work on also developing products for tsunamis generated by non-seismic and complex sources like those developed and implemented by TSP-Australia	<ul style="list-style-type: none"> • TSP-India drafted the SOP for TGVs and is currently implementing • TSP-Indonesia is also working on the implementation
SG02/24-11	Action: WG2 in collaboration with TSP-India develop training at the next IOTWMS SOP Workshops for NTWCs in the dissemination of national tsunami warnings by the Common Alerting Protocol (CAP)	INCOIS is currently getting the necessary approvals.

SG24-Actions and Status .. cont

Reference	ACTIONS for WG2	Status
SG02/24-12	Action: Action: WG2 to work in collaboration with TOWS-WG TT TWO and the Pacific Tsunami Warning Centre (PTWC) to develop automatic alerting procedures to help detect sea level anomalies associated with tsunamis generated by non-seismic and complex sources.	<ul style="list-style-type: none">• In-progress
SG02/24-13	Action: WG2 to prioritise SIDS, LDCs and Africa in its work programme.	included in Work programme
SG02/24-14	Action: WG2 to prepare its report to ICG/IOTWMS, including update on progress and recommendations to ICG/IOTWMS-XIV, for review and consideration at the next Steering Group meeting prior to ICG/IOTWMS-XIV	Agreed

Plans and timelines – 2024-2026



- Trial dissemination of maritime bulletins to respective NAVAREA operators in the Area of Service (AoS) for the upcoming communication test and for full operational implementation in 2025. **2025**
- Conduct Webinar / online workshop for the NAVAREA coordinators to understand the TSP services and maritime notification - **2025**
- Develop Standard Operating Procedure (SOP) document for TSPs to address Tsunami-Generating Volcanic Events (TGVEs). – **Draft SOP document targeted in 2025**
- **Conduct an online webinar or workshop for the volcanologists and a user guide for TGVs - TBD**
- Prepare an atlas of known sources with possible tsunami travel times for reference to NTWCs.- in-progress
- Contribute to the conduct of regular exercises and communication tests of the IOTWMS. – **[As and When]**
- Develop an optimal notional observing network design to meet the objectives of ODTP, facilitate the strategic and coordinated submission of projects to the UN Ocean Decade and potential funding sources.-**TBD**
- WG2 also contribute to PCTWIN-WP2 for Probabilistic Tsunami Forecasting- **We are contributing to the monthly discussions.**
- Utilise and promote the use of multi-purpose sea level monitoring stations to support MHEWS in enhancing data coverage and reducing costs ; - **WG2 will include MHEW perspective and come up with plans**

Thank You