WG2 Tsunami Detection Warning and Dissemination Progress Report

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1. Progress on Activities

- 3 WG2 meetings - Sep 2019, Dec 2020, and Nov 2021
- 4 Comms Tests and Reports - June 2019, Dec 2019, June 2020, June 2021. Planned Dec 2021
- IOWave20 tsunami exercise held on 6, 13 and 20 Oct 2020
- Palu Symposium. Supported the International Symposium and IORA Workshop on Lessons Learnt from the 2018 Tsunamis in Palu and Sunda Strait, 26-28 Sep 2019.
- COVID-19. Conducted a survey of impact to networks and TSPs; contributed to the tsunami evacuation guideline
- TOWS-WG. Supported the 2020 and 2021 meetings of TOWS-WG and its Task Team Tsunami Watch Operations, the Tsunami Concept Note for the Ocean Decade, and the global performance framework (in progress)
- Ocean Decade. Supported the WTAD Indian Ocean Webinar of 10 Oct 2021 to develop a Strategic Pathway for the decade

# 1. Progress on Activities as set out in the Work Plan 2019 - 2021

1. Maintain the NTWC User Guide and TSP Service Definition Document and assist TSPs to implement the requirements of the TSP Service Definition Document
   - ✓ Add an explicit statement about TSPs can issue a Level 2 bulletin if a threat to the Indian Ocean even if earthquake is outside the Indian Ocean and less than M8.0
   - ✓ Any earthquake magnitude change will be marked as "Updated" instead of "Revised"
   - ✓ Add requirements and format of a new TSP product for NAVAREA Maritime Community
   - ✓ KPIs reporting now requires Mag 6.8 or above, also defined thresholds of each KPI for assigning traffic light of on target/near target/missing target
   - ❑ Expand the TSP services to atypical tsunami (but on best effort basis only, discussion in progress to agree on exact wording)

2. Review and harmonise TSP products and websites for NTWC users including NTWC reporting (ongoing)

3. Conduct 6 monthly IOTWMS Communication Tests and prepare reports of each test in conjunction with the Secretariat. Also assist the Secretariat in maintaining a log of issues arising from the tests, and in following up the issues with Member States.
   - ✓ 4 comms tests and one IOWave20 conducted with issues captured in each report.

4. Contribute to the planning and running of SOP Training workshops for Indian Ocean NTWCs, DMOs and Media, IOWave20 Exercise and to the Post IOWave20 Workshop. Follow up the Working Group 2 related recommendations in the IOWave18 Report.
   - ✓ Contributed to the IOTWMS - IOTIC - BMKG Indian Ocean Regional Workshop on Strengthening Tsunami Warning Chain to Critical Infrastructure, 20-22 Nov 2019
   - ✓ Supported the Pre-IOWave20 Webinar 28-30 Sep 2020, and the Post-IOWave20 Webinar 11-12 Nov 2020

5. Review and support operationalising the comprehensive system developed by TSP India for archiving and auto generating KPIs for the IOTWMS (in progress).

6. Assist the Secretariat in maintaining the database of seismic and sea-level reporting stations for the IOTWMS (yes).

7. Assist the TSPs in planning for the later introduction of Service Level 3 coastal inundation services, in collaboration with Working Group 1 and the NTWCs (TSP India piloting).

8. Assist the TSPs in implementing CAP, mobile applications and social media for effective dissemination of tsunami information (Task Team on CAP formed, WRS being tested)

9. Assist the TSPs for initiating tsunami bulletins for the Maritime community based on formats finalised by the TOWS-WG (TSP Australia implemented, other TSPs planned)

10. Assist the TSPs on service enhancements for atypical and near-field tsunami sources by utilising new techniques and enhanced observational networks as GNSS, SMART Cables, etc. (Ongoing)

11. Coordinate with WG-NWIO and the Task Teams for strengthening tsunami early warning in the North West Indian Ocean region (Contributed and collaborated between teams)

TSP to NTWC Message Delivery Success Rates
All Comms Tests
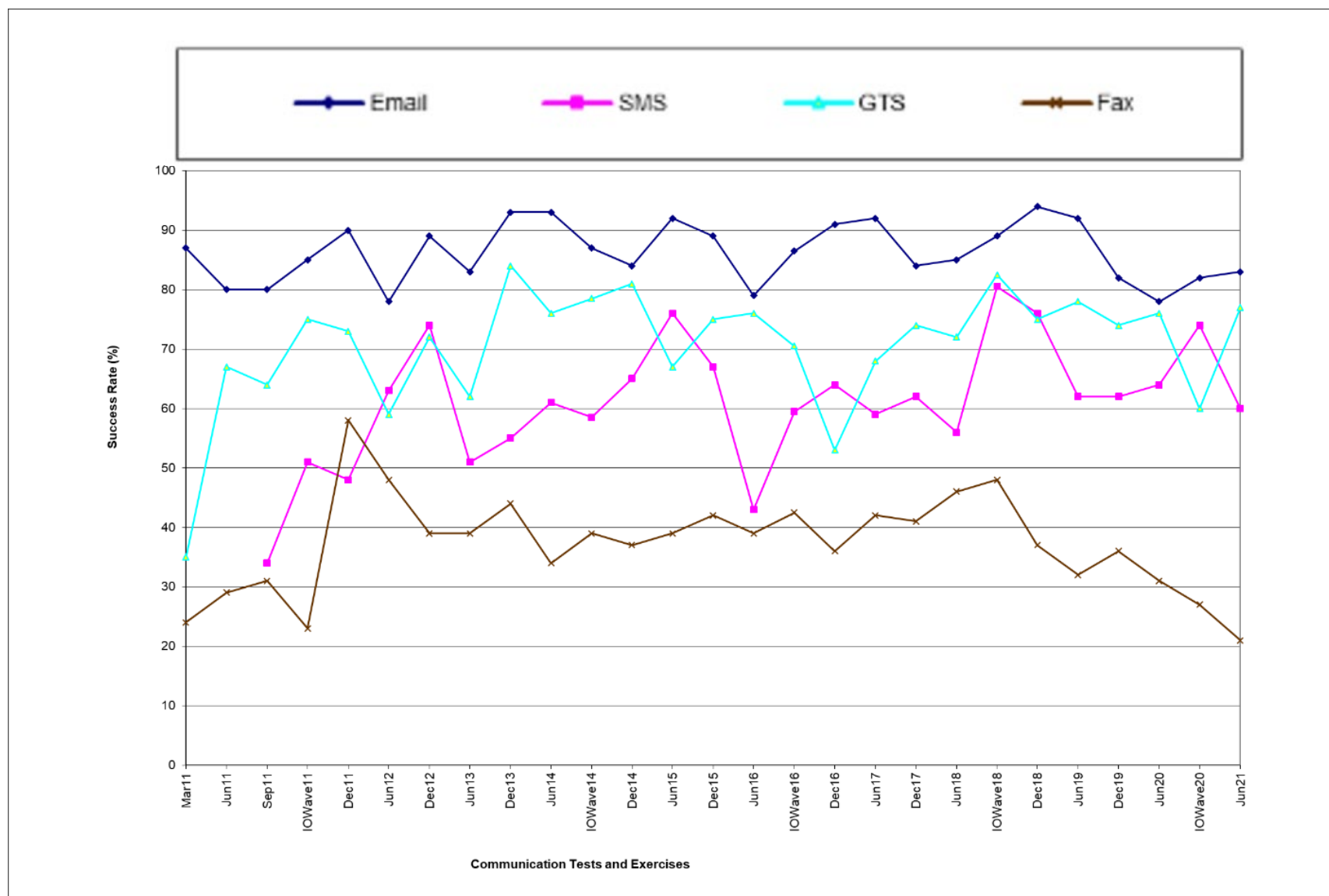
Web Access and Status Reporting
All Comms Tests
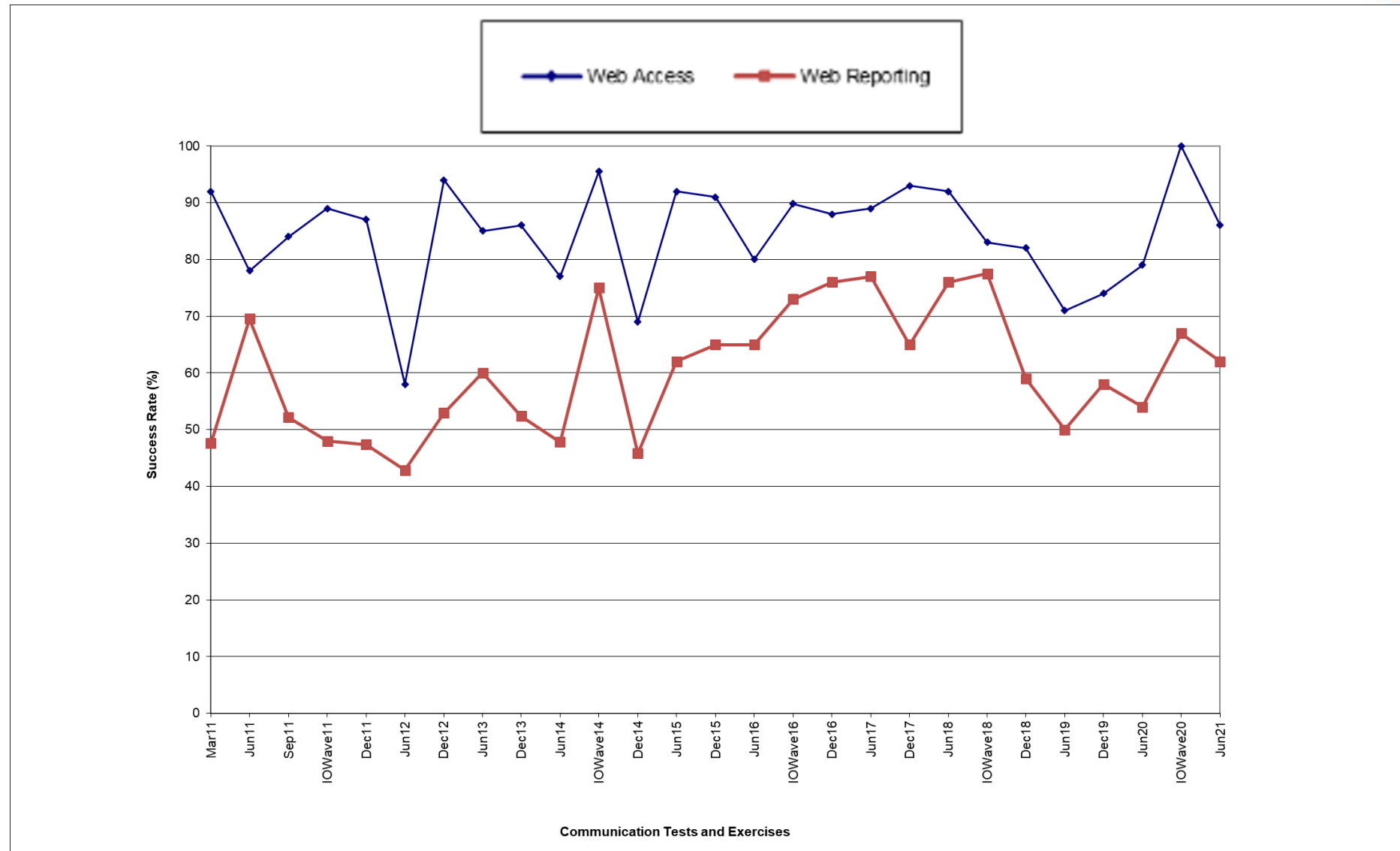
Changes and Clarifications to Performance Reporting

TSP	Service Level 1 EQ Bulletins (Change to report Mag 6.8 and above in all IOTWMS source zones)					Service Level 2 Threat / No Threat Bulletins			General
	KPI 1 ET First EQ Bull Target: 10 mins (% met)	KPI 2 POD EQs 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
Meets Target	<10 min	100%	<0.3	<30 km	<30 km	<20 min	100%	50-200%	0
Near Target	10-15min	90-100%	0.3-0.45	30-45 km	30-45 km	20-30 min		25-50% or 200-400%	1
Misses Target	>15 min	<90%	>0.45	>45 km	>45 km	>30 min	<100%	>400% or <25%	2+

KPI 9

- Test/Exercise Bulletins issued live by mistake
- Bulletin Issued against SOPs, e.g. issuing an EQ bulletin for event outside of the IOTWMS ESZ or with a Magnitude <M6.5
- Bulletin Issued according to SOPs but the USGS final solution is less than M6.2 (i.e., a false alarm)

TSP KPIs 2021 (Jan – Oct) – M6.8+

TSP	Service Level 1 EQ Bulletins					Service Level 2 Threat / No Threat Bulletins			General
	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	13.4 min (26.3%)	95%	0.07 (100%)	21.1 km (73.7%)	25.6 km (73.7%)	21.3 min (33.3%)	N/A	41%	2
India	12.8 min (60.0%)	95%	0.19 (85.0%)	19.0 Km (70.0%)	20.0 Km (85.0%)	N/A	N/A	N/A	1
Indonesia	10.5 min (77.8%)	95%	0.23 (72.2%)	19.2 km (72.2%)	26.4 km (55.6%)	N/A	N/A	N/A	1

NOTES

KPI 6:
TSP Australia issued 2 No Threat and 1 Confirmed threat Bulletin. All for M8.0+ events outside the Indian Ocean.
TSPs India and Indonesia assessed these events as <M8.0
For the recent South Sandwich Island event, TSP India has issued a no threat bulletin as an information. This event is not considered for calculation of KPI 6.

KPI 7: No events caused threat-level tsunami waves.

KPI 8: Based on 4 observations in CFZ's from the 12 Aug South Sandwich Islands event

KPI 9: TSPs Australia , India and Indonesia each issued a EQ bulletin where the USGS final solution was <M6.2

Meets Target	Near Target	Misses Target

2. Challenges

- Maintaining sustainable funding either for maintaining existing and implementing new observing systems, or for R&D on supporting the effort in implementing new technologies

- Working in Silos, within and between the upstream and downstream agencies

- Integrating Multi-hazard warning

- Improve the <u>timeliness</u> and <u>certainty</u> of tsunami detection and warning

3. Pathways Forward & Opportunities

1. **Expansion of existing and deployment of new technologies addressing observational gaps**

   - Identify fit-for-purpose integrated observational systems

   - Need to also detect and warn for atypical tsunamis

   - SMART Cable. US$7 million fund approved by Gordon and Betty Moore Foundation to support the science and early warning aspects of the Vanuatu-New Caledonia cable.

   - Actively pursue strategic partnerships with other relevant and potential national and international data and information providers e.g. IUGG, ITU

2. **Wide expansion of real and near-real time data access and availability**

   - Strongly advocate the importance of data sharing by monitoring and highlighting data gaps

   - Development of MOUs on data access

   - Actively pursue strategic partnerships with other relevant and potential national and international data and information providers

3. **Access to data, tools and communication platforms, protocols and training to timely and effectively warn coastal and maritime communities**

   - Demonstrations of the effectiveness of enhanced warnings reaching the level of local community

   - Regular training on SOPs for early warning to demonstrate value adding of data, tools and training itself

   - Engage and integrate with other agencies, institutions, organization working on early warning as part of the multi-hazard approach

   - Actively pursue strategic partnerships with other relevant and potential national and international groups involved in R&D, data and warning tool development, e.g. maritime authorities, community leaders, NGOs, WMO, IUGG, Youth and young professional platforms

4. Key WG2 Recommendations and Actions

15.2	WG2 2019.01R WG2 to develop a discussion paper on whether TSPs should send actual threat information bulletins directly to NTWCs, and not just notifications to obtain information from registered TSP web sites, as per present practice	WG2	May 2022 (ICG XIII)
15.2	WG2 2019.02R WG2 to update the ICG/IOTWMS Service Definition Document for Tsunami Service Providers (TSPs)	WG2	May 2022 (ICG XIII)
15.2	WG2 2019.07 WG2 to prepare advice and guidelines on how to monitor and warn for atypical tsunami events, taking into account the work of the TOWS-WG on Tsunami Watch Operations.	WG2	May 2022 (ICG XIII)
15.2	WG2 2021 Secretariat in conjunction with IOTIC to implement two NTWC/DMO/Media SOP workshops in the 2nd half of 2022 (western IO and eastern IO), taking into account lessons learnt from the UNESCAP project in the NWIO, and considering the fact the next IOWAVE Exercise is in 2023.	Secretariat IOTIC	Jul - Dec 2022

Thanks!