Smart Seas Toolkit for Disaster Resilience

ITU/CTU/TATT Project

Project Brief
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About the Smart Seas Toolkit (SST) for Disaster Resilience ("Smart Seas") Project: The Smart Seas Project is a joint project among the International Telecommunication Union (ITU), Caribbean Telecommunications Union (CTU) and Telecommunications Authority of Trinidad and Tobago (TATT). It sets out to preserve the lives of vulnerable small-scale fishers (SSF) in the Caribbean and increase their resilience through information and communications technologies (ICTs), with emphasis on the associated *enabling environment*. The project is instantiated in Trinidad and Tobago, the Maritime Rescue Co-ordination Centre (MRCC) for Grenada, Barbados and St. Vincent and the Grenadines.

The project's outputs focus on strengthening, among other things, the compliance with policy and regulation, operations, capacity and the use of technology in maritime communications ecosystem. It will also facilitate a global partnership to report on technological, service and market innovations to address the perennial problem of accessible emergency communications for small-scale fishermen. Stakeholder engagement is critical in ensuring the effectiveness and the viability of the project's outputs and impacts.

For more information, please reach out to the Smart Seas Project Team at sst@ctu.int.

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1 Introduction

1.1 Digitally Excluded: The Small-scale Fisher

Globally, a number of strides have been made towards connecting people, households, businesses and communities[1], with the current number of persons who remain offline standing at approximately 2.6 billion people, roughly one-third of the global population[2]. The *unserved* refers to those without access to information and communications technologies (ICTs). The *underserved refers* to persons whose access to ICTs is notably limited (TATT 2013[3]). Persons who are particularly at risk of being underserved include those with disabilities, the elderly and indigenous people. While many initiatives have been made to ensure universal and meaningful connectivity[4] on land, gaps still exist in bringing affordable, accessible ICTs to all. Among the underserved lie a unique community who, in addition to facing digital and socioeconomic exclusion, are vulnerable to risks while plying their daily trade.

Small-scale fishers (SSF) comprise roughly 94% of the world fisheries fleet (IYAFA 2022[5]) and are responsible for approximately 40% of the daily fish consumed (FAO 2022[6]). The definition of SSF vary by community, country and region, and are defined in this context, through a synthesis of definitions from the FAO[7], and Caribbean stakeholders as those who:

1. operate in wooden, undecked, motor-powered vessels less than 12 m, termed *pirogues*
2. ply their trade within their country's exclusive economic zones (EEZs), typically 40 km from shore or less
3. typically have low levels of ICT adoption and digital literacy

These pirogues offer little protection to fishers, leaving them highly vulnerable to risks at sea, such as piracy and adverse weather conditions. ICTs suitable to the marine environment have potential to strengthen the resilience of SSF but their adoption rates are low.

The compounding threats of digital and socioeconomic exclusion, as well as high risk while plying their trade motivate the consideration of SSF as a marginalized, underserved population. The continued neglect for the digital inclusion of SSF will, in turn, result in the continued widening of the gaps to accessible ICTs and hence, continued loss of life at sea.

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1 According to the International Telecommunication Union (ITU), the universality metrics under universal and meaningful connectivity comprise people, households, communities and businesses.

2 ITU. 2023. Population of global offline continues steady decline to 2.6 billion people in 2023 - Accelerating progress is key in race toward universal and meaningful connectivity. Available at: https://www.itu.int/en/mediacentre/Pages/PR-2023-09-12-universal-and-meaningful-connectivity-by-2030.aspx#:~:text=The%20number%20of%20people%20worldwide,global%20population%20unconnected%20in%202023.

3 Telecommunications Authority of Trinidad and Tobago (TATT). 2013. *The Digital Divide Survey Report in Trinidad and Tobago, 2013*. Available at: https://tatt.org.tt/DesktopModules/Bring2mind/DMX/API/Entries/Download?Command=Core_Download&EntryId =340&PortalId=0&TabId=222

4 ITU. 2023. Aspirational targets for 2030 - Achieving universal and meaningful digital connectivity in the Decade of Action. Available at: https://www.itu.int/itu-d/meetings/statistics/umc2030/

5 Sustainable Small-Scale Fisheries." Food and Agriculture Organization of the United Nations. https://fao.org/policy-support/policy-themes/sustainable-small-scale-fisheries/en/ .

6 FAO. 2022. The State of World Fisheries and Aquaculture 2022: Towards Blue Transformation. Available at: https://www.fao.org/publications/home/fao-flagship-publications/the-state-of-world-fisheries-and-aquaculture/2022/en

7 FAO defines SSF or artisanal fishers, as those who make short trips close to shore in small vessels; and utilize low levels of technology and capital investment

1.2 Communications @ Sea

ICTs play a vital role across all four phases of the disaster management cycle: mitigation, preparation, response and recovery (see Figure 1). The foundations for comms@sea are based on the International Convention on Safety of Life at Sea (SOLAS Convention; IMO 2020[8]), which instantiated the Global Maritime Distress and Safety System (GMDSS), a system which includes a number of comms@sea solutions, protocols and operational procedures, and provides the standard means for comms@sea. While the GMDSS is widely known, adopted, and proven to be an effective and comprehensive comms@sea system, it is only applicable to vessels over 300 GT, covering many commercial and shipping vessels, and some larger-scale fishing vessels, but not SSF.

Currently, no international regulations or UN conventions exist to mandate the carriage of comms@sea solutions by SSF, only *voluntary recommendations* (FAO/ILO/IMO 2012[9]), which include some of the essential comms@sea provisions from the GMDSS, such as VHF-DSC radios, as well as other non-essential solutions, such as cellular phones. It is the responsibility of Administrations to instantiate these communications into national policies, regulations and legislation. However, very few countries around the world have indeed instantiated these recommendations into national policies, regulations and legislation, potentially creating gaps to the adoption and routine use of comms@sea solutions by SSF.

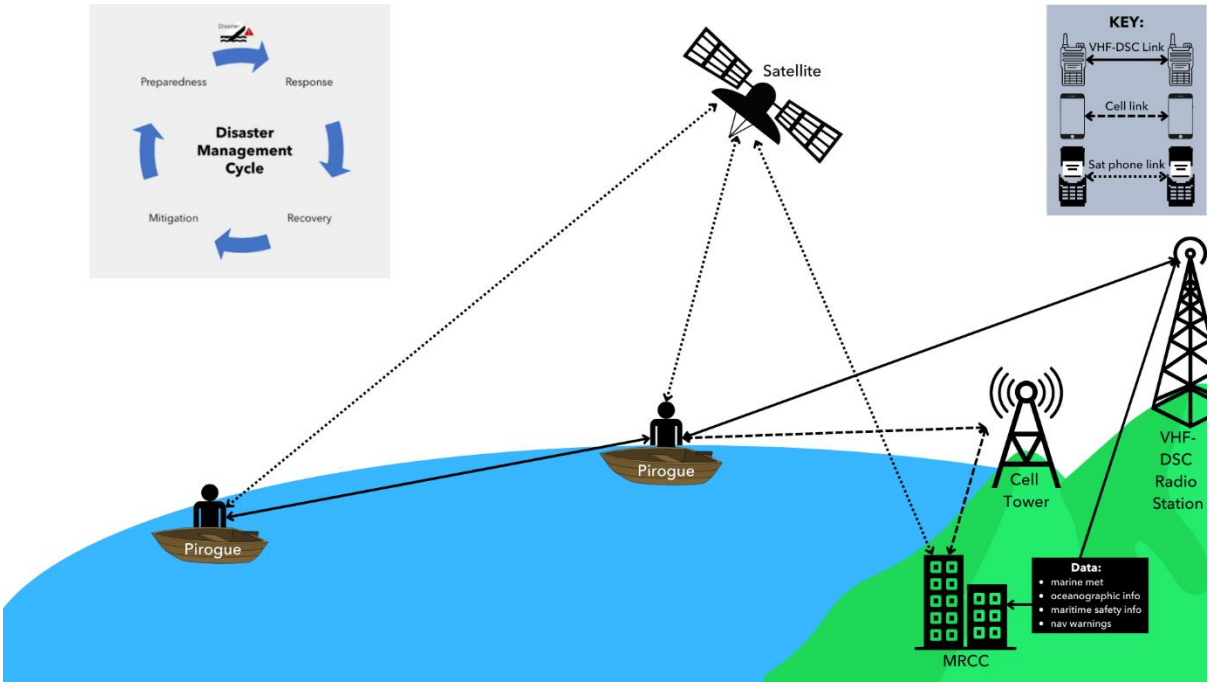

Figure 1 Comms@Sea for SSF

[8] IMO. 2020. Consolidated International Convention for the Safety of Life at Sea, 1974. 2020 Edition.

[9] FAO/ILO/IMO. 2012. Safety Recommendations for Decked Fishing Vessels of Less than 12 metres in Length and Undecked Fishing Vessels. Rome, FAO. 254 pp. Available at: http://www.fao.org/3/a-i3108e.pdf

2 Response: The Smart Seas Project

The Smart Seas Toolkit (SST) for Disaster Resilience ("*Smart Seas*") Project is a joint initiative of the International Telecommunication Union (ITU), Caribbean Telecommunications Union (CTU) and the Telecommunications Authority of Trinidad and Tobago (TATT), supported by the Government of the Republic of Trinidad and Tobago. The Project sets out to increase the resilience and *ultimately* preserve the lives of Caribbean small-scale fishers (SSF) through information and communications technologies (ICTs), with emphasis on the enabling environment[10].

2.1 Scope & Dimensions

The Project's scope covers:

1. *Geographic area*: Trinidad and Tobago's (TTO) search and rescue region (SRR) of approximately 62,500 square nautical miles. This includes the countries of Barbados (BRB), Grenada (GRD) as well as St. Vincent and the Grenadines (VCT)
2. *Problem space*: maritime communications
3. *Beneficiary sector*: fisheries

The Project spans four dimensions: policy and regulation, operations, capacity and technology. While these are being instantiated through the Project's scope, its outputs, outcomes and impact of this Project are intended to be both *transferrable* to other vulnerable communities, and *extensible*, to the rest of the Caribbean, and worldwide.

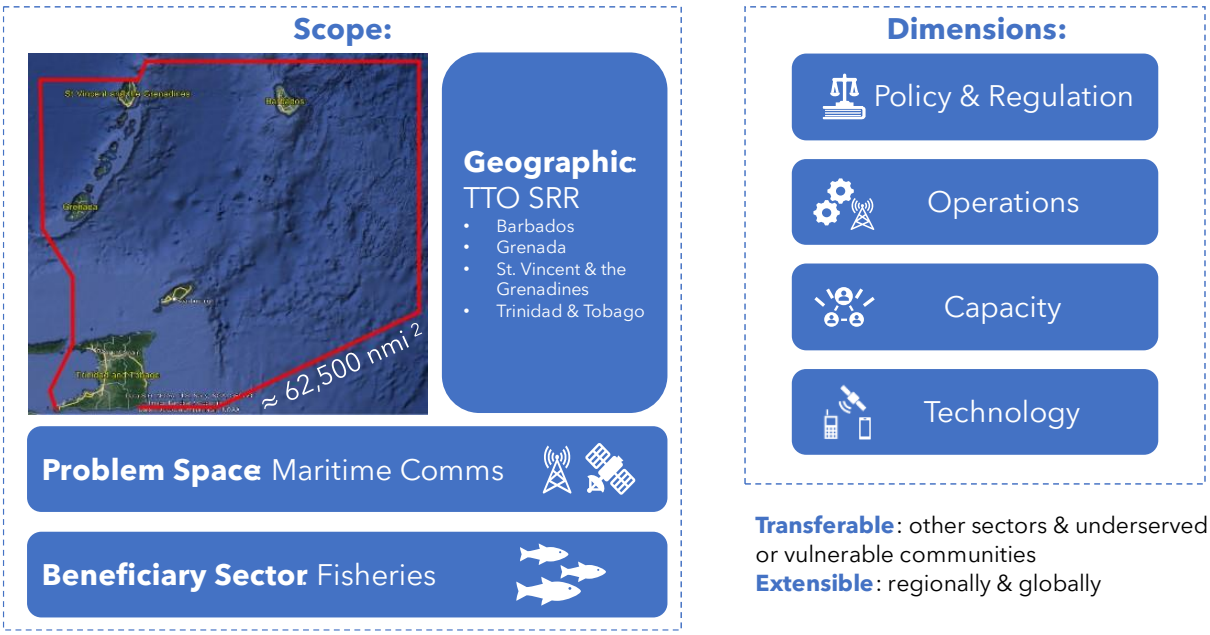

Figure 2: Smart Seas Scope & Dimensions

[10] In this context, the enabling environment is defined as the set of actors, policies, regulations, frameworks, capacity, operations and associated engagements among actors and agencies which facilitate maritime communications to increase the resilience of small-scale fishers

2.2 Outputs, Outcomes & Impact

The Project comprises four outputs:

1. A *Gap Analysis of the Maritime Communications Enabling Environment*: a multi-dimensional analysis for the four Smart Seas countries; emphasis on compliance with UN Conventions and Recommendations, operations, policy and regulatory environment, ecosystem and capacity

2. *The Smart Seas Toolkit*: online resources to support regulations, operations and capacity building within the enabling environment

3. *Equipment*: procurement of VHF-DSC equipment and GMDSS training to strengthen the capacity of key agents involved in maritime search and rescue

4. *Agendas for Accessible Comms@Sea for SSF*: multi-sectoral, multi-stakeholder priorities to fill gaps in affordable, accessible comms@sea solutions; identifies areas for future research and development

The Project's *outcomes*, defined as the short-term goals, include capacitating the maritime communications ecosystem, as well as strengthening the associated enabling environment, while the intended *impact*, or long-term goal, is that of disaster resilient SSF.

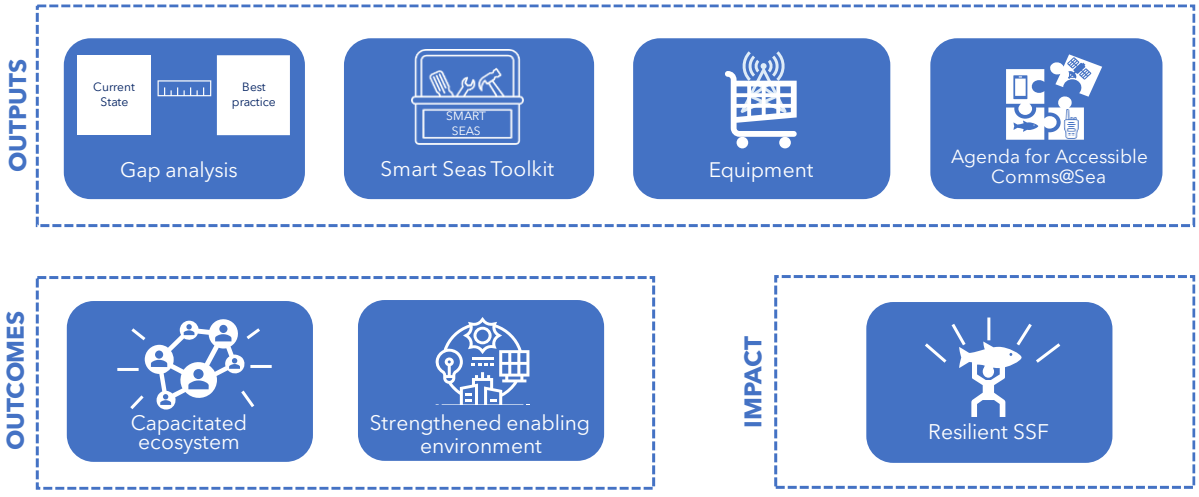

Figure 3: Smart Seas Intended Outputs, Outcomes & Impact

3 Status & Key Findings

The Project has uncovered several gaps within the enabling environment through its activities, from which a number of gap-filling recommendations and supporting tools have been prepared.

3.1 Gap Analysis of the Maritime Communications Enabling Environment

The gap analysis, initially conducted in 2022, revealed a number of gaps across the 4 Smart Seas countries, in areas such as compliance with UN Conventions and Recommendations, the ecosystem, policy and regulatory environments, operations and capacity.

Gaps existed in complying with UN Conventions, such as the IMO's SOLAS Convention (IMO 2020), International Convention on Maritime Search and Rescue (SAR Convention; IMO 1979[11]) and the ITU Radio Regulations (Edition of 2024). This is evidenced in Radio Regulation 20.16, which obligates member states to notify the ITU Radiocommunication Bureau (BR) on its maritime coastal facilities, for inclusion in its List IV and MARS Database. Prior to the Project, *none* of the 4 Smart Seas countries had ever complied with this Regulation, and hence, had never notified the ITU BR on its maritime coastal facilities. Some countries were unaware of the notification requirement, while others were unsure of who should be the state entity to perform such notifications: the national telecommunications regulator/spectrum management authority (SMA) or the maritime administration (MARAD).

Through this activity, the Project and Administrations across all four Smart Seas countries were provided the opportunity to engage with the ITU BR on the notification process, and ensure that other regulations, such as the use of maritime frequencies and channels, were in accordance with the other articles of the Radio Regulations.

The maritime notifications were initially facilitated by a resource within the *Smart Seas Toolkit*: the *MRCC and Coast Station Emergency Telecommunications Survey*, which was circulated to the CTU's Member States through its *Spectrum Management Task Force*. Further work is required in this activity to fill gaps in notification compliance.

The impacts of maritime notifications are of importance to realizing objectives captured in regional initiatives, such as CITEL's AG/RES. 2966 (LI-O/21) and PCC.I/REC. 28 (XXXIII-18), as well as the ITU-D Regional Initiatives for the period 2022-2025: AMS1, AMS4. Among other things, Administrations can use the data collected through the notification process to manage critical maritime communications infrastructure and services, ensuring availability to all mariners, which is vital for safety of life at sea.

[11] IMO. 1979. International Convention on Maritime Search and Rescue (SAR), 1979. Edition of 2016

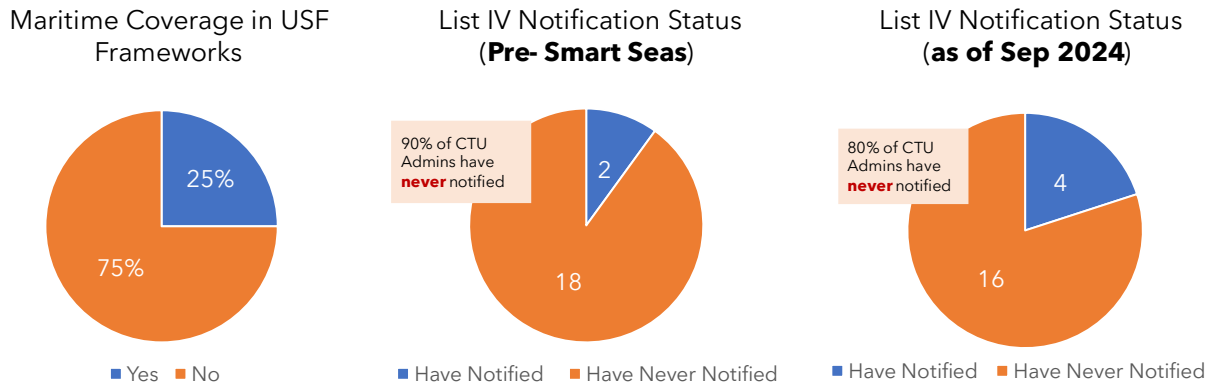

Figure 4: Sample Data: Maritime Coverage in USF Frameworks & CITEL Country Compliance with ITU RR 20.16

In addition to gaps in UN compliance, gaps existed in the operations of key agencies, which were identified through the Project's maritime measurement campaign. This campaign set out to assess VHF coverage within Trinidad and Tobago's waters, of its national coast station in 2023. The findings of this campaign revealed glaring gaps to the operations of agencies responsible for discharging the country's obligations under UN treaties which focus on preserving the safety of life at sea. Most notably, the search and rescue co-ordination agreements between all four countries which Trinidad and Tobago serves as the MRCC for, have never formalized through the signing of relevant lateral agreements. Instead, the search and rescue co-ordination is undertaken on an operational basis only. Furthermore, based on field tests conducted in 2023, only 2 of the 6 sites of the Trinidad and Tobago's national coast station appear functional, which results in gaps to maritime VHF coverage, for which this station is responsible for discharging the state's obligations under IMO Conventions, and for coordinating communications of vessels in distress and other parties who can offer assistance. These gaps pose threats to ensuring the safety of life at sea for all mariners, and to their resilience when disaster hits. Finally, two of the four Smart Seas countries do not consider maritime areas within its universal service frameworks. These changes should be considered for future revisions, to ensure that those who make their livelihoods at sea have adequate access to communications while at sea, to support their lives and livelihoods. A summary of the key **findings** and **gaps** are presented as follows:

UN Conventions & Recs

- **Overlap in notification reqs**
  IMO GISIS[4]; ITU MARS[5]/List IV
- **Compliance**
  e.g. notification[3]: 80% of CTU Member States have never notified ITU MARS on their coast stations
- **Country membership**
  ITU: 25% , IMO: 30% , FAO: 20% , WMO: 15%

Ecosystem

- **Knowledge of process flows**
  What agency is responsible for discharging mandates under UN Conventions & Recs?
- **Roles & responsibilities**
  Gaps & overlaps: notification, registration, ...
- **Engagement**
  Room for more collaborations and support across agencies within the ecosystem

Policy Environment

- **Currency of policies & related artefacts**
  Consider maritime areas and SSF as underserved in USF
- Official **agreements**
  e.g. on rescue co-ordination

Regulatory Environment

- **Inclusive regs & related artefacts**
  Maritime area coverage in USF
- **Official documentation**
  e.g. monitoring measures

Operations

- **Data** on national shore -based facility operations
  Channel usage, available times, etc.
- Radio **coverage** within MRCC

Capacity

- **Relevant curricula & certification schemes** for *Caribbean* SSF & coast stations
  Reduced & context-appropriate

Figure 5 Gap Analysis Findings

3.2 Smart Seas Toolkit

The Smart Seas Toolkit comprises resources, such as guidelines, templates, checklists, as well as informational and data collection resources, to support agencies in the maritime communications ecosystem to:

- support and monitor compliance with UN **regulations** & recommendations
- improve & monitor **operational** efficiency & effectiveness
- strengthen **capacity** with respect to VHF radio use by SSF & limited coast stations

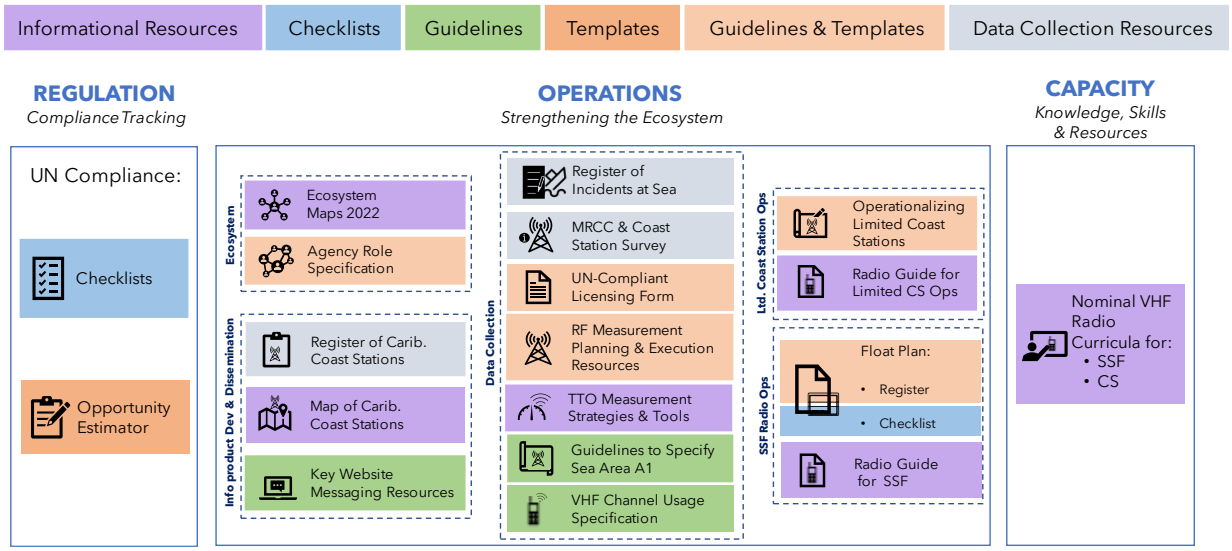

Figure 6: The Smart Seas Toolkit

Noteworthy resources include the *Multidimensional Maritime Communications Ecosystem Map* (Figure 7), which maps actors, resources and the policy and regulatory environments at national, regional and international levels, as well as the *UN Compliance Opportunity Estimator* (Figure 8), which classifies the opportunity to fill gaps to UN compliance by administrations, using measurements of the *impact* and *effort required* to do so.

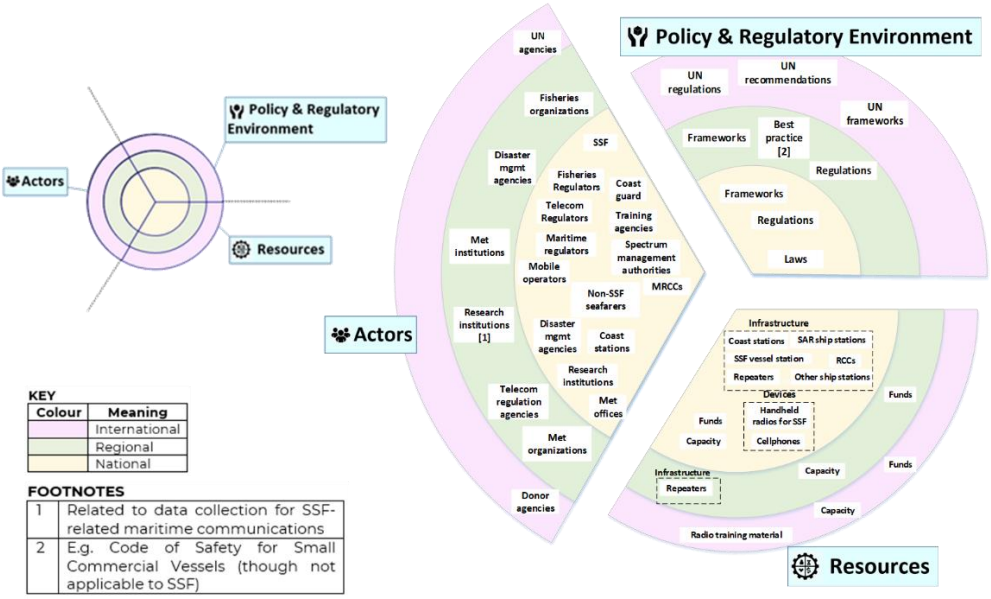

Figure 7: Multidimensional Maritime Communications Ecosystem Map

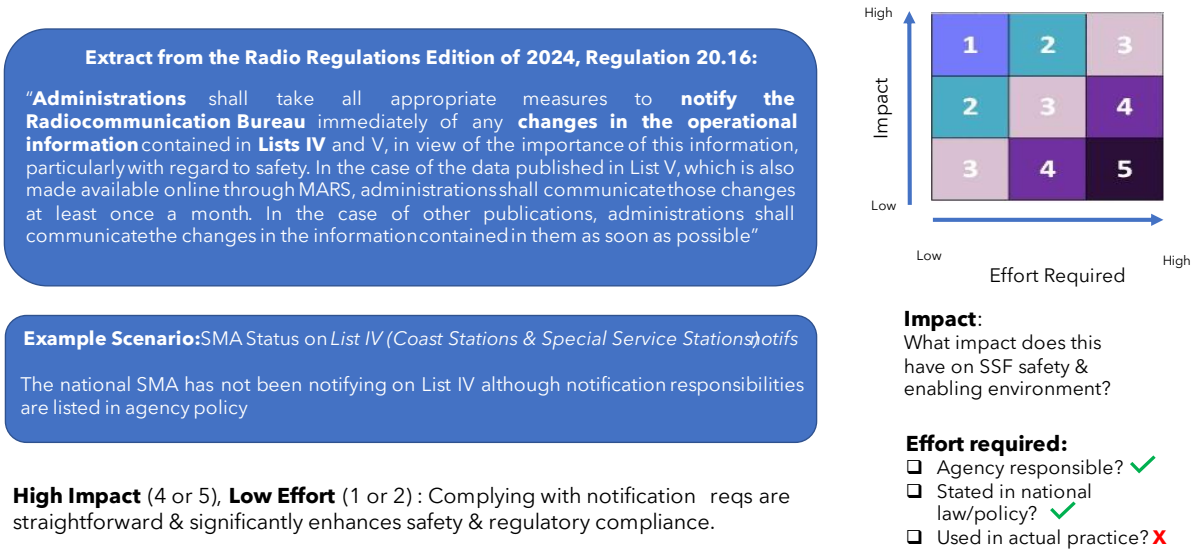

Figure 8: Extract from the UN Compliance Opportunity Estimator

The Smart Seas Toolkit can be found online on each of the Partners' websites[12], and its resources are *free* to download and use by Administrations and other interested parties.

3.3 Equipment

The Project is currently facilitating the procurement of VHF equipment and GMDSS training for the Trinidad and Tobago Coast Guard (TTCG), who serves as the TTO MRCC. These include:

1. the installation of a remotely controlled VHF-DSC transceiver, to cover a blind spot in Trinidad and Tobago's waters [**starting in Feb 2025**]
2. repairs and maintenance to existing TTCG sites [**starting in Feb 2025**]
3. GMDSS training and certification for TTCG radio operators [**complete**]

In November 2024, North West Maritime Ltd. was engaged to deliver GMDSS Training to 10 TTCG personnel over a two-week period. The hybrid training comprised a mix of theoretical and practical methods, theoretical sessions took place online, and practical in-person. This training was vital in strengthening the capacity of TTCG personnel, to efficiently and effectively leverage the GMDSS suite of maritime communications towards discharging its mandate as the MRCC for 4 Caribbean countries. A summary of key details follows:

- Duration: 2 weeks
- Modality: online (theoretical session) & in-person (practical session)
- Number of participants: 10
- Pass rate: 100%
- Certificates awarded: yes

The installation and repairs for VHF equipment for the TTCG is set to commence in February 2025, and is essential in filling VHF coverage gaps identified by the TTCG.

[12] https://www.itu.int/en/ITU-D/Regional-Presence/Americas/Pages/ACTVTS/PRJ/smart-seas/smart-seas-toolkit/default.aspx

3.4 An Agenda for Accessible Comms@Sea for SSF

An Agenda for Accessible Comms@Sea for SSF recognizes that barriers to affordable, accessible ICTs exist for SSF, across 5 dimensions: *devices*, *services*, *capacity*, *adoption* and the *policy and regulatory environment*. While many comms@sea solutions exist, such as those within the GMDSS, barriers exist in the form of high costs, service coverage gaps, gaps in the policy and regulatory environment for SSF, and the routine carriage and use of solutions by SSF.

The *Agenda* recognizes the current state of comms@sea, defines accessible comms@sea for SSF, and identifies gaps which may exist and their gap-filling priorities (Figure 9). It has facilitated a number of consultations, leading up to a final validation workshop in December 2024. A preliminary workshop was held in March 2024 in Trinidad and Tobago, in which representatives from around the world came together to discuss priorities for accessible comms@sea for SSF.

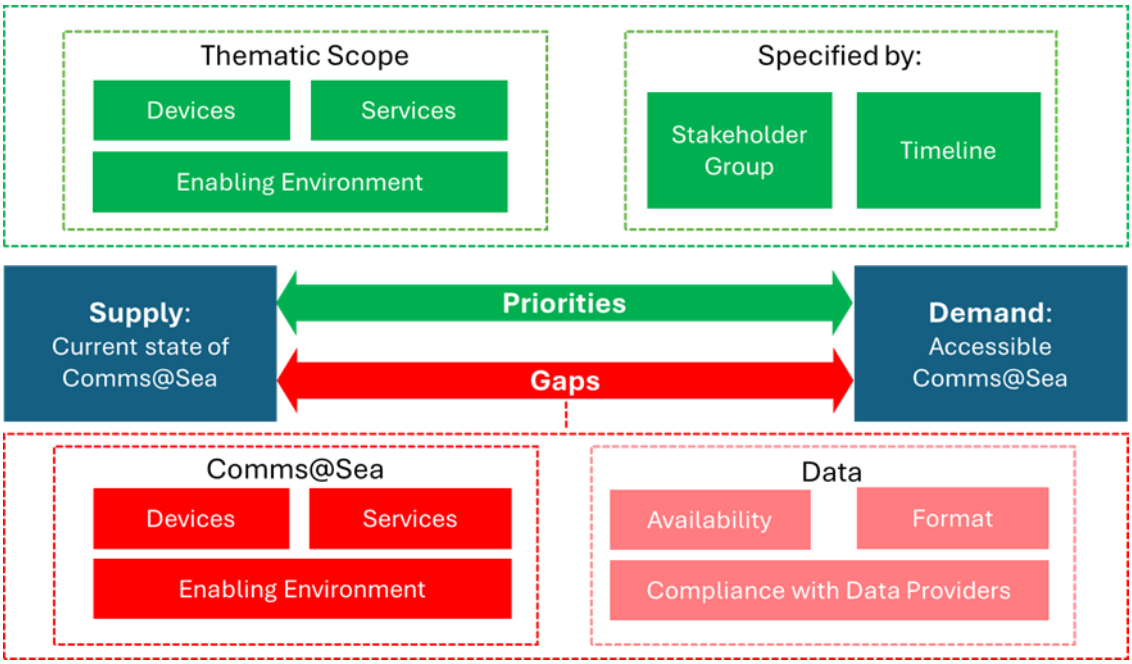

Figure 9: Scope of the Agenda for Accessible Comms@Sea Solutions for SSF

4 Key Recommendations

The Smart Seas Project's activities have uncovered a number of gaps and observations, for action by Administrations, applicable to the Project's 4 beneficiary countries as well as all CTU Member States. Collaboration across sectors (telecommunications, maritime, fisheries, etc.) and focal points is essential to promote affordable, accessible ICTs for SSF, and ultimately achieve international goals of universal and meaningful connectivity for all. Key recommendations to achieve this, include but are not limited to:

1. Bringing to the attention of the relevant agencies, across sectors within your jurisdiction, the findings of the Smart Seas Project

2. Conducting ongoing reviews & revisions to Universal Service Frameworks, to align with findings of digital inclusion surveys

3. Revising national policies, regulations & frameworks to consider:
    a. maritime environment within the scope of universal service
    b. vulnerable populations who earn their living at sea (such as SSF)

4. Ongoing engagement among and within sectors and entities with overlapping strategic objectives, such as CTU Member States, CTU's Spectrum Management Task Force, and CITEL's PCC.I and PCC.II, with respect to maritime notifications, and the impact of these notifications on managing critical maritime communications infrastructure

References

A4AI. Meaningful Connectivity: Assessing the Impact of Connectivity on Participation in the Digital Economy. Alliance for Affordable Internet, 2021. https://a4ai.org/wp-content/uploads/2021/02/Meaningful-Connectivity_Public-.pdf.

FAO. 2022. The State of World Fisheries and Aquaculture 2022: Towards Blue Transformation. Available at: https://www.fao.org/publications/home/fao-flagship-publications/the-state-of-world-fisheries-and-aquaculture/2022/en

IMO. 1974. Consolidated International Convention for the Safety of Life at Sea, 1974. Edition of 2020.

IMO. 1979. International Convention on Maritime Search and Rescue (SAR), 1979. Edition of 2016

FAO/ILO/IMO. 2012. Safety Recommendations for Decked Fishing Vessels of Less than 12 metres in Length and Undecked Fishing Vessels. Rome, FAO. 254 pp. Available at: http://www.fao.org/3/a-i3108e.pdf

ITU. 2023. Population of global offline continues steady decline to 2.6 billion people in 2023 - Accelerating progress is key in race toward universal and meaningful connectivity. Available at: https://www.itu.int/en/mediacentre/Pages/PR-2023-09-12-universal-and-meaningful-connectivity-by-2030.aspx#:~:text=The%20number%20of%20people%20worldwide,global%20population%20unconnected%20in%202023

ITU. 2023. Aspirational targets for 2030 - Achieving universal and meaningful digital connectivity in the Decade of Action. Available at: https://www.itu.int/itu-d/meetings/statistics/umc2030/

ITU. 2023. Measuring Digital Development: Facts and Figures 2023. International Telecommunication Union, 2023. https://www.itu.int/en/ITU-D/Statistics/Documents/IDI/IDI_2023_Version1_DraftDocument_April2023.pdf.

ITU. “World Telecommunication Development Conference 2022 (WTDC-22) Final Report”. 2022. Available at: https://www.itu.int/dms_pub/itu-d/opb/tdc/D-TDC-WTDC-2022-PDF-E.pdf