REVIEW AND MODERNIZATION OF THE GMDSS

Report of the Correspondence Group - First draft of the high level review

Submitted by the United States

SUMMARY

Executive summary: The Maritime Safety Committee at its 90th session approved an unplanned output on "Review and modernization of the Global Maritime Distress and Safety System (GMDSS)", with a target completion year of 2017. In accordance with the Work Plan, the paper presents the first draft of a High Level review.

Action to be taken: Paragraph 8

Related documents: MSC 90/28, COMSAR 16/17

Background

1 The Maritime Safety Committee at its 90th session approved an unplanned output on "Review and modernization of the Global Maritime Distress and Safety System (GMDSS)", with a target completion year of 2017. It also endorsed the terms of reference for the Correspondence Group on the Review of the GMDSS to enable intersessional work to be done between MSC 90 and COMSAR 17 (MSC 90/28, paragraphs 8.10 to 8.13 and 25.18, and COMSAR 16/17, annex 3).

2 The coordinator of the Correspondence Group would like to thank the following Member States, intergovernmental organizations, and non-governmental organizations for their participation in the Correspondence Group: Argentina, Australia, Brazil, Bulgaria, China, Denmark, Finland, France, Germany, Greece, Iran, Japan, Republic of Korea, Liberia, Marshall Islands, Netherlands, Norway, Poland, Portugal, Sweden, United Arab Emirates, United Kingdom, United States, CIRM, IEC, IMSO, ISO, and the Nautical Institute.

3 In accordance with the Work Plan (COMSAR 16/17, Annex 2), the project is to begin with a high-level review of the GMDSS. The Work Plan identified a minimum of 5 areas to be included in the high level review:
.1 review of the existing nine functional requirements, including:

- the possible need for inclusion of security related communications in the GMDSS; and

- the consideration of the possible need to develop a clearer definition of "General Communications", which is continuing to cause confusion and consider if this category should be included within the requirements of the GMDSS;

.2 the need for the current order of priorities in use for radiocommunications;

.3 the future need for the four different areas of carriage requirements (sea areas A1 to A4), and Port State control procedures if sea areas are changed;

.4 the future need to allow for differences for certain categories of ships, including non-SOLAS ships; and

.5 whether distress communications should be separated from other types of communications and in consequence whether the arrangements in chapters in SOLAS could be revised (Note: chapter II, (part D – Electrical installations), chapter III (part B in several instances), chapter V in various instances including e-navigation applications).

In addition the Correspondence Group identified two subjects in the Work Plan list for detailed review that could be brought forward to the high level review, subject to agreement of the Experts Group, plus an additional subject to be included. These subjects are:

.1 possible alignment between chapters III, IV, V and XI-2 of SOLAS, in particular, with regard to type approval, secondary equipment and maintenance arrangements and their regulatory status (i.e. mandatory or discretionary);

.2 assess whether to increase the use of goal-based methodologies when reviewing the regulations and regulatory framework for GMDSS in SOLAS chapters IV and V and the STCW Convention, to provide flexibility to allow the GMDSS to adapt to new and evolving technologies without major revision of the SOLAS and STCW Conventions in future; and

.3 review existing systems and new systems for inclusion in the modernized GMDSS.

The Correspondence Group has noted all of the contributions made from COMSAR 14 onward, and it is the intention to consider all of these in the review. The comprehensive Gap Analysis created in support of the e-navigation strategy implementation plan has been taken into account. That analysis has identified numerous issues related to maritime communication and the GMDSS, and shows that the GMDSS must support e-navigation needs. The Work Plan shows that the GMDSS Modernization Plan will proceed with the contributions of:

- The Sub-committee on Safety of Navigation
- The Subcommittee on Standards of Training and Watchkeeping
- The ICAO/IMO Joint Working Group on SAR
The IMO/ITU Experts Group

The Correspondence Group notes that to the extent the project on review and modernization of the GMDSS affects provisions in Chapter III of SOLAS, or the equipment in survival craft, that the Sub-committee on Ship Design and Equipment would need to be informed in due course.

6 The Correspondence Group has prepared a separate Annex to this paper for each of the topics under the high level review. The review process to be followed is illustrated in a flow diagram at Appendix 1 of the Work Plan (COMSAR 16/17, Annex 2). The various sections of each of the Annexes correspond to elements of the prescribed review process.

7 A member of the Correspondence Group has suggested that discussion on sea area (annex 3) and discussion on requirements of equipment (annex 8) are closely related, and thus classification of sea area and equipment requirements should be considered as a package. It might be difficult to draw a final conclusion on the discussion on sea area before considering equipment requirements in annex 8.

Action requested of the Experts Group

8 The Experts Group is invited to review, discuss, and revise the Annexes as appropriate, and in accordance with the Plan of Work, complete the first draft of the high level review and submit it to COMSAR 17 for consideration.

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ANNEX 3  Future need for the four different areas of carriage requirements
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ANNEX 5  Separation of distress communications from other types of communications
ANNEX 6  Possible alignment between chapters III, IV, V and XI-2 of SOLAS
ANNEX 7  Assess whether to increase the use of goal-based methodologies
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ANNEX 1

REVIEW AND MODERNIZATION OF THE GMDSS
High Level Review

Review of the existing nine functional requirements

Discussion

1 SOLAS Regulation IV/4 requires that every ship, while at sea, shall be capable of:

.1 except as provided in regulations 8.1.1 and 10.1.4.3, of transmitting ship-to-shore
distress alerts by at least two separate and independent means, each using a
different radiocommunication service;

.2 of receiving shore-to-ship distress alerts;

.3 of transmitting and receiving ship-to-ship distress alerts;

.4 of transmitting and receiving search and rescue co-ordinating communications;

.5 of transmitting and receiving on-scene communications;

.6 of transmitting and, as required by regulation V/12(g) and (h), receiving signals for
locating;

.7 of transmitting and receiving maritime safety information;

.8 of transmitting and receiving general radio communications to and from shore-based
radio systems or networks subject to regulation 15.8; and

.9 of transmitting and receiving bridge-to-bridge communications.

Is it fit for purpose? Does it work? Is it required?

2 Are all of the present nine functional requirements needed, or do some require revision?

2.1 The Correspondence Group on e-navigation determined that the existing functional
requirements should be further developed to simplify, modernize, harmonize and
integrate radio communication functions with relevant navigational functions, in line with
e-navigation principles. (COMSAR 15/11 (Annex, 17-24)

3 Should security-related communications be included in the GMDSS?

3.1 Maritime safety information (MSI) is included as one of the functional requirements.
MSI may include security-related information, so to that extent, security-related
communications are already included in the GMDSS. The exchange of security related
information/threats (shore to ship), by region, much like the MSI is presently being
communicated, would be beneficial to the vessel.

3.2 While the arrangements for sending and receiving a security alert differ based on
the particular system in use, it is still in its most basic form a ship to shore distress
message by definition. However, the Ship Security Alert System (SSAS) was developed
and added as SOLAS Regulation XI-2/6. SSAS allows a ship to send a security alert to a competent authority, which then decides whether a distress response or some other type of response is appropriate. This regulation is almost purely goal-based in that it permits any type of communication method including GMDSS systems, and a diversity of SSAS methodologies was considered to be an advantage. SSAS appears to be required and fit for purpose.

3.3 If the SSAS system were to be a part of and/or integrated with the GMDSS station(s)/system, then a variety of methods would become available to send a Security Alert Message. The SSAS would still have to comply with the regulations stated in both Chapter XI 2-6 & performance standards of Chapter IV, which include the message not being sent to any other vessel. A new functional requirement regarding security-related communications would appear to be the most logical option, as it would enable it to remain standalone with regard to its goal based regulatory framework but still able to sit comfortably within the ethos and mission goals of GMDSS. Assigning a dedicated frequency or frequencies both RT & RX for security related topics only, would reduce radio traffic relating to navigational safety and distress.

4 Is there a need to develop a clearer definition of "General Communications", which is continuing to cause confusion and consider if this category should be included within the requirements of the GMDSS?

4.1 The e-navigation gap analysis suggests "revise the performance standard of GMDSS equipment taking into account that GMDSS should be changed to maritime mobile service – to cover all." (COMSAR 16/11, annex 1, 120-Gte03-Sre03 and also see 120-Gte04-Sre01).

4.2 The Nautical Institute’s members noted that GMDSS consoles differ widely making onboard familiarization difficult, and this is compounded by the fact that as GMDSS functions are rarely used, familiarization is not aided by usage either. Mariners almost universally suggested that there should be far more standardization of interface, and/or that GMDSS functions should be integrated into general bridge communications systems to improve familiarization through everyday use (COMSAR 15/INF.3 (2)).

4.3 The Nautical Institute also notes that the term "general communications" is perceived to be any type of communication, received or transmitted, which in its content is not related to safety or distress. With the passage of time, advancing technologies and the methods by which shipping business is conducted has skewed the definition from its defined meaning. The definition given in the GMDSS Manual (p.9, 2011 Edition) gives greater detail than that in SOLAS (regulation IV/2.1.5). There is still a need for having general communication capabilities. Navigators can still use the equipment to receive time signals for example, enabling the correction of chronometers.

4.4 The United States Coast Guard’s GMDSS Task Force validated most of the GMDSS functional requirements but, found that "General Communications" needs further consideration. This function was intended to enable ships to utilize those systems they used for private communications, ships business, and for safety communications as well, with the expectation that the operators would not need repetitive training for systems they use routinely. The GMDSS VHF/MF/HF DSC services previously had a Public Correspondence component which provided voice and record general communications. Unfortunately most have since been terminated for economic reasons. (COMSAR 15/INF.4 (12))
5 It may be concluded that the nine functional requirements are fit for purpose, they work, and are required, but improvements are possible.

Can it be improved, including human factors considerations?

6 The comments indicated that there is scope for improvement:

6.1 In order to support e-navigation communication requirements, the existing functional requirements should be further developed to simplify, modernize, harmonize and integrate radio communication functions with relevant navigational functions, in line with e-navigation principles.

6.2 The French delegation made specific comments on some of the functional requirements,

   .1 They noted the importance of the Coast Radio Station (CRS) to functional requirements 1 to 5, and that CRS should be standardized worldwide. A European standard for CRS could be the basis for an international standard.

   .2 No 6 could be improved but this should not be sophisticated equipment, only because they are designed to work once in their life or (hopefully) never. A need for ships to have direction finding equipment for EPIRBs was noted.

   .3 No 7 could be improved to enlarge the scope of information to security, piracy, harbour, VTS, etc. There could be better display of the information. Integration of the information into navigation equipment (ECDIS, INS...) would be useful.

   .4 No 8 could be improved by developing automatic CRS systems for ship-shore link calls. Again it is important to develop an international standard for CRS.

   .5 No 9: bridge-to-bridge communications could be extended to communication between a ship and divers operating from this ship.

6.3 In addition to MSI, other security communications can be included in the GMDSS, but unique security functions such as SSAS do not need to be included in the GMDSS. SSAS does provide a ship-to-shore alert, but this alert goes to a competent authority, which may be the company. Therefore, interoperability with other ships and shore facilities is not required, unlike typical GMDSS functions. If this alert can be reliably sent by means other than GMDSS systems, then there is no need for it to be a GMDSS system.

6.4 It may be appropriate to find another term that includes “general communications,” such as “Maritime Mobile Communications” or “Global Maritime Communications System.”

6.5 Four possible ways to organize future maritime communications are shown below:

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<tr>
<th>Maritime Communications System</th>
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<tr>
<td>GMDSS</td>
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Under the above scenario, GMDSS remains separate from other communications functions, but communications systems should not be limited to serving just one of the functions. It may not be necessary to revise the functional requirements of the GMDSS.
in this case. The French delegation said that a consistent way to organize the revision of GMDSS would be to maintain the present organization with the 9 functional requirements. Then it should be focus to the enhancement of the different functional requirements and see the connection of GMDSS with Public Correspondence, Security, LRIT (for reporting), AIS (for identification) and navigation systems requirements with the understanding that e-navigation will be the possible collection and use of all the data coming from all different systems.

<table>
<thead>
<tr>
<th>Maritime Communications System</th>
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<tr>
<td>GMDSS + Security</td>
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The comments of some Correspondence Group members seem to support this structure, noting that there is no longer a necessity to include ‘public correspondence’ within the definition of GMDSS. Essentially this would formalise the separation between emergency radio communications from ship’s business communication entirely.

<table>
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<th>GMDSS</th>
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<td>Distress and Safety</td>
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In this arrangement, the functional requirements of the GMDSS would need to be expanded to include support of security and E-navigation functions. “Public correspondence” and “general communications” are similar, but communications with the company may or may not be over public correspondence facilities. Eight functional requirements remain under “distress and safety.”

<table>
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<th>E-navigation</th>
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<td>Distress and Safety</td>
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This arrangement recognizes that all communications are in some way related to navigation.

Scope and compelling need for change

7 A decision on the maritime communications architecture discussed in 6.5 drives the decision on what to do with the functional requirements.

Plan for review

8 The Joint Experts Group is invited to consider the conceptual relationship between maritime communications functions as illustrated in 6.5 (or other possible arrangements), and then decide on the proper relationship between GMDSS and the other functions.

8.1 If GMDSS is the “umbrella” under which all other maritime communications functions are included, the functional requirements would need to be expanded to include these functions.

8.2 If GMDSS is to be one of several functions of the maritime communications system, then the functional requirements should be reviewed to ensure that they reflect the proper relationship between the GMDSS and the other functions, and to what extent the GMDSS supports the other functions.

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ANNEX 2

REVIEW AND MODERNIZATION OF THE GMDSS
High Level Review

Order of priorities in use for radiocommunications

Discussion

1 Article 53 of the Radio Regulations says:

53.1 § 1 All stations in the maritime mobile service and the maritime mobile-satellite service shall be capable of offering four levels of priority in the following order:

1) Distress calls, distress messages, and distress traffic.

2) Urgency communications.

3) Safety communications.

4) Other communications.

53.2 § 2 In a fully automated system, where it is impracticable to offer all four levels of priority, category 1 shall receive priority until such time as intergovernmental agreements remove exemptions granted for such systems from offering the complete order of priority.

Is it fit for purpose? Does it work? Is it required?

2 The United States Coast Guard’s GMDSS Task Force noted that this traditional requirement originated when it was appropriate to give Morse Radio Operators aboard ships and ashore, guidance on the relative priority of messages which sometimes had to be queued for manual transmission. With the modern systems now in use and the high degree of automation, it is no longer necessary to have four levels. A single category of "Priority" for communications relating to distress and the safety and movement of shipping, with provisions of availability speed of service and service availability would be adequate. Some further work will be necessary to specify which type of Priority messages warrant being sent from shore to ship and from ship to ship preceded by an alerting signal to activate shipboard alarms (COMSAR 15/INF.4 (11)).

3 The Correspondence Group on e-navigation noted a lack of solutions for maintaining priority for distress communication and a potential loss of priority for distress communication. (No further explanation is provided; see COMSAR 16/11, annex 1, 320-Gre01)

Can it be improved, including human factors considerations?

4 Consideration should be given to changing to two levels of priority, Priority and Routine. Simplification of the priority levels could improve human factors by simplifying training and the communication process.

5 However, the French delegation noted that a change in the four priority levels could create problems. Seafarers have been trained and used to the four orders of priority. It
helps to categorize the emergency: distress, salvage, MSI and routine. This will need a lot of training to change so many years of habits and after all quite good practice. With a single priority level, there would be a risk of having two levels of equipment in the world: previous GMDSS, new GMDSS and may be some countries with still no equipment at all. The ICAO/IMO Joint Working Group on SAR should be consulted on that topic for it will modify drastically the SAR procedures of the IAMSAR manual. The base of SAR operations is the emergency phases: uncertainty phase, alert phase or distress phase. And each emergency phase is associated to a different order of priority for radio communication. Nevertheless, the present situation concerning reception of emergency messages is counter-productive. Whatever the priority (distress, urgency or safety) the same alarm sounds which results in switching off the GMDSS station on many ships. Two levels of priority would not change this situation. Hence any automation system should be compatible with the 4 orders of priorities when sounding on the bridge, in the RCC or in the CRS. A different sounding alarm should be mandatory for instance to identify the priority of the message received. Distress messages at least should be clearly distinguished from others.

6 The Correspondence Group on e-navigation made a number of suggestions, some of which may be more appropriately considered later under the detailed review, but are listed here insofar as they affect the discussion on priorities, especially in the context of SAR communications:

5.1 VHF (or GMDSS) system should automatically change VHF channel into one assigned it by AIS SAR message (320-Gre01-Sop01).

5.2 Consider to allocate a VHF channel (not Ch. 16) only for SAR operation when the stakeholder engaged in SAR operation (320-Gre01-Ste01).

5.3 Potential AIS message for SAR should have a parameter to assign SAR operation channel of VHF in a field of SAR activity (320-Gre01-Ste02).

5.4 Develop the new interface sentence (IEC 61162) between AIS and VHF equipment (320-Gre01-Ste03).

5.5 Assign high priority to the AIS message for SAR operation to be developed for e-navigation SAR system (320-Gre01-Sre01).

5.6 Revise the standard and regulation of AIS and VHF(or GMDSS) (320-Gre01-Sre02).

5.7 SAR persons should only be acknowledged for this situation and not required to have additional training for this operation (320-Gre01-Str01).

Scope and compelling need for change

7 The four levels of priority preserve a system that is no longer necessary. Because of the capacity of modern communications systems, the only communications that require priority are those associated with distress and the safety and movement of shipping. However, the transition to two priority levels could be difficult.

8 SAR communications are associated with distress and urgency situations, and therefore may require a dedicated VHF channel. Alternatively, it may be appropriate for the On Scene Coordinator to determine appropriate VHF channel(s) for local communications concerning the SAR event.
Plan for review

9 The Joint Experts Group is invited to -

.1 Consider and advise on a two-level system, one for priority communications dealing with distress and the safety and movement of shipping, and a second for all other communications.

.2 Consider and advise on a review of the operation of alarms in a two-level priority system, and the problems related to a transition from four levels.

.3 Consider and advise on a review of the role of AIS in distress and SAR situations, during the detailed review phase of the modernization project.

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ANNEX 3

REVIEW AND MODERNIZATION OF THE GMDSS
High Level Review

Future need for the four different areas of carriage requirements (sea areas A1 to A4), and Port State control procedures if sea areas are changed

Discussion

1 Sea areas are defined in Regulation V/2 of SOLAS:

.12 "Sea area A1" means an area within the radiotelephone coverage of at least one VHF coast station in which continuous DSC alerting is available, as may be defined by a Contracting Government.

.13 "Sea area A2" means an area, excluding sea area A1, within the radiotelephone coverage of at least one MF coast station in which continuous DSC alerting is available, as may be defined by a Contracting Government.

.14 "Sea area A3" means an area, excluding sea areas A1 and A2, within the coverage of an INMARSAT geostationary satellite in which continuous alerting is available.

.15 "Sea area A4" means an area outside sea areas A1, A2 and A3.

Is it fit for purpose? Does it work? Is it required?

2 The United States Coast Guard’s GMDSS Task Force noted a higher level of usage of the 2 MHz system (without DSC) in recent years and to the extent that domestic users may be required to upgrade to DSC, a more reliable performance of the system can be expected. The principal motivations for continuing to upgrade MF service are to improve coverage, facilitate ship-to-ship usage at ranges greater than Very High Frequency (VHF), improve Coastal Marine Safety Information (MSI) Broadcasts, and to better support primary users in the commercial fishing industry. It would then follow that retention of 2 MHz DSC in the GMDSS system should be supported, which is also the likely position of nations without plans for a coastal watch on VHF-DSC. By advocating retention of Sea Area A2, there is an implicit recommendation for retaining all four Sea Areas (COMSAR 15/INF.4 (9)).

3 The Nautical Institute felt improvements would be achievable by making the GMDSS more focused on a vessel's navigational area. It was deemed that much of the GMDSS traffic (including false alarms) and in particular MSI are not pertinent to their areas of concern and therefore major distractions (COMSAR 15/INF.3 (4)). Sea areas A1-A4 are still a necessity as infrastructure around the globe dictates vessels carriage requirements when passing through waters supported by their radio service.

4 Australia suggests that new sea areas for additional satellite providers could be established. A sea area A5 could be considered for regional satellite coverage areas with less than geostationary coverage (i.e. "sub-geostationary"). Within sea area A5, certain areas could be declared in a similar way to sea areas A1 and A2 as required. A sea area A6 could be considered for systems which provide whole-earth coverage. Operational partnerships could be explored to provide coverage in sea area A4, or to
enhance the interoperability between sub-geostationary regional systems and geostationary systems (COMSAR 16/3/9 (16-17)).

5 The Correspondence Group on e-navigation notes insufficient provision of short range but wider bandwidth communication means such as WiMAX (A0?) (COMSAR 16/11, annex 1, 120-Gte06).

5.1 Automatic information exchange without human intervention even automatic communication channel transition to wideband channel (120-Gte06-Sop01).

5.2 Automatic transition of communication channels between new technologies and current communication technologies of ship (120-Gte06-Ste02).

6 Singapore has provided information on WiMAX point-to-multipoint and mesh network trials near Singapore and in Norway (IMO/ITU EG 5//4/12).

Can it be improved, including human factors considerations?

7 The present sea areas are based on a logical division of geographic areas based on the communication technologies of 25 years ago. Unlike the A1 through A4 sea areas, A0, A5 and A6 sea areas as in the preceding discussion would overlap the present sea areas, and could therefore be the source of confusion. It is true that some satellite systems can cover more than one or even all of the present sea areas, but sufficient clarity may be available by simply designating these systems as A1-A4 or A1-A3, as appropriate. When considering regional satellite systems, it may be appropriate to indicate partial coverage, suitable for ships operating in that region.

8 The French delegation raised several problems that would have to be considered with the acceptance of additional satellite systems.

.1 If the coverage or a regional system is equivalent to the ship’s operational area, there would be no problem, but the ship would be on a “regional voyage” rather than an international voyage.

.2 Would this new satellite system be able to comply with the WWNWS?

.3 If a distress call is sent through a new satellite system, what is the guarantee that this signal would be dispatched to the right MRCC? Could MRCCs use all satellite systems to relay a Mayday as it is the present case through Enhance Group Call (EGC)?

.4 In the case of different satellite systems there would be a unique procedure for MRCCs to broadcast a Mayday Relay. All the satellite systems should be compatible to the GMDSS functional requirements.

.5 The ITU MARS database should be kept current in order for MRCCs to be able to contact any ship when necessary. The more systems there are, the more complicated it is to maintain a data base and for MRCC to have data on ships.

9 If sea areas are to be revised, it should be noted that this will have affects on items 11 to 14 in the detailed review -

11) Narrow Band Direct Printing (NBDP)
12) Role of MF/HF Digital Selective Calling (DSC) and the complexity of some of the signaling functions

13) Problems which might arise due to a lack of HF stations in future (The French delegation notes that there are only 11 HF stations listed in the current GMDSS Master Plan.)

14) Satellite equipment as an alternative in sea areas A2 currently based around MF/HF DSC

10 WiMAX or mesh networks could be used in localized areas within any of the present sea areas, but would not cover them fully. Nevertheless they may prove to be a useful way of extending communication capabilities (especially data communications) in certain areas, although they could not be used throughout any of the existing sea areas. Such systems might be used to provide information relevant to a more limited geographical area than the present NAVAREAs, and could address the Nautical Institute's concern for information more focused on a vessel's navigational area. The French delegation notes that WiMAX systems are regional and operated by different private companies. It would not be possible for all ships transiting an area to be covered by these systems.

Scope and compelling need for change

11 The possible merging of Sea Areas A2 and A3 may be considered, but the Sea Areas are still relevant for classifying the communication technologies that are useful in those areas.

12 The identification of INMARSAT in the definition of Sea Area A3 needs to be revised to identify satellite communication providers more generically.

13 Consideration may also be given to incorporating WiMAX or mesh networks into GMDSS communications, taking into consideration the reliability of such networks for distress and safety communications.

14 Changes to the Sea Areas might have Port Sate Control implications.

Plan for review

15 The Joint Experts Group is invited to consider the consolidation of Sea Areas A2 and A3.

16 The Joint Experts Group is invited to consider and advise on the retention of Sea Areas A1 and A4, as well as A2 and A3, either as separate Sea Areas, or a single consolidated Sea Area.

17 The Joint Experts Group is invited to consider how WiMAX or mesh networks could or should form part of the GMDSS.

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ANNEX 4

REVIEW AND MODERNIZATION OF THE GMDSS
High Level Review

Future need to allow for differences for certain categories of ships, including non-SOLAS ships

Discussion

1 The applicable regulations concerning the categories of ships to which SOLAS Chapter IV applies are:

SOLAS regulation I/1(a):
(a) Unless expressly provided otherwise, the present Regulations apply only to ships engaged on international voyages.

SOLAS regulation I/3:
(a) The present Regulations, unless expressly provided otherwise, do not apply to:
   (i) Ships of war and troopships.
   (ii) Cargo ships of less than 500 gross tonnage.
   (iii) Ships not propelled by mechanical means.
   (iv) Wooden ships of primitive build.
   (v) Pleasure yachts not engaged in trade.
   (vi) Fishing vessels.

(b) Except as expressly provided in Chapter V, nothing herein shall apply to ships solely navigating the Great Lakes of North America and the River St. Lawrence.

SOLAS regulation IV/1.1:
1 Unless expressly provided otherwise, this chapter applies to all ships to which the present regulations apply and to cargo ships of 300 gross tonnage and upwards.

Is it fit for purpose? Does it work? Is it required?

2 The United States Coast Guard’s GMDSS Task Force noted that while GMDSS requirements apply only to SOLAS vessels, it is customary for most Administrations to apply some of the GMDSS requirements to non-SOLAS vessels under domestic regulation. IMO has the Torremolinos Convention and recommended guidelines for fishing vessels of various sizes, but some Administrations have not adopted them. Simplification of GMDSS requirements and recognition of alternate satellite systems will provide more options for improving the safety of non-SOLAS vessels (COMSAR 15/INF.4 (19), COMSAR 14/WP.3, paragraph 6.1.2.7).

3 Germany, Ireland, and Romania have noted the use of devices for diver activities that use GMDSS frequencies and allow the initiation of a GMDSS distress alert. These devices might use GMDSS techniques such as frequencies and numbering that might conflict with SAR operations, as well as compliance with regulatory arrangements in the Radio Regulations. However, a diver in distress would not be prevented from making use of any radiocommunications to attract attention and obtain assistance (COMSAR 16/4/4 and COMSAR 16/WP.4).

4 COMSAR 16 also noted the growing use of Satellite Emergency Notification Devices (SEND) which do not use the Cospas-Sarsat system, primarily on non-SOLAS vessels,
and noted that there are different approaches used to notify SAR authorities of a distress signaled by a SEND device. Consideration was given to the possibility that such devices which are not Cospas-Sarsat EPIRBs, could use the Cospas-Sarsat 406 MHz frequency for alerting (COMSAR 16/6/3 and COMSAR 16/17 paragraphs 6.23 and 6.24).

5 The French delegation brought the Correspondence Group’s attention to two examples of the application of distress communications to non-SOLAS ships. The French West Indies have a 20 year successful experience with Cospas-Sarsat EPIRBs on fishing vessels. Distress alerts are about 30 a year, or about 2.9% of the 1150 vessels. Only half are false alerts. India has introduced a requirement for satellite EPIRBs on fishing vessels, but the system uses geostationary satellites using a non-GMDSS frequency around 403 MHz. The EPIRBs are equipped with GNSS location, and are of a robust design suitable for their use on fishing vessels. Different buttons provide for notification of specific incidents such as sinking, fire, man overboard, or medical emergency. The system was introduced in 2008.

6 The French delegation also noted that ships of war and troopships are excluded from SOLAS, but should use GMDSS distress systems, not only in case of their own distress, but also because they can be important SAR assets.

Can it be improved, including human factors considerations?

7 When any vessel in navigation needs to communicate navigation information or is in distress, it needs to be able to communicate that information to nearby vessels and in the event of distress, to SAR responders. Voice or data communications should be made with GMDSS equipment or GMDSS compatible equipment to ensure interoperability. The basic distress and safety radiocommunication system should be designed so as to be useful to non-SOLAS ships as well as SOLAS ships. Full application of GMDSS systems may not be practical for non-SOLAS ships, bearing in mind the need for an extensive equipment set and duplication. Furthermore, GMDSS operators require an extensive training course which may not be feasible for the operators of many non-SOLAS ships.

8 If SENDs are used for distress instead of Cospas-Sarsat EPIRBs, it must be ensured that the system is able to notify SAR responders promptly and accurately. Although GMDSS distress capabilities are used by many non-SOLAS vessels (including those complying with the Torremolinos Convention), other vessels are not so equipped.

Scope and compelling need for change

9 All vessels in navigation should be able to transmit information for navigational safety, and for distress alerting and locating, preferably using GMDSS equipment and frequencies, but in any case, using methods that are at least as effective. Functional requirements 1, 6, and 9 are implied. Other functional requirements of the GMDSS could be beneficial to many non-SOLAS, non-Torremolinos vessels, but need not be mandatory.

Plan for review

10 The Joint Experts Group is invited to consider and advise on the ability of all vessels at sea to transmit ship-to-shore distress alerts, to transmit signals for locating, and for transmitting and receiving bridge-to-bridge communications using equipment compatible with GMDSS systems.
11 The Joint Experts Group is invited to consider whether the applicability of SOLAS should be expanded to include mandatory equipment for GMDSS bridge-to-bridge and distress functions to more vessels, or whether it is sufficient to urge Administrations (e.g. through Circulars) to require or encourage the use of GMDSS distress equipment by all vessels at sea. In any case, adoption of new GMDSS equipment should take the need for capacity building for non-SOLAS ships into account.

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ANNEX 5

REVIEW AND MODERNIZATION OF THE GMDSS
High Level Review

Separation of distress communications from other types of communications

Discussion

1 Articles 31 and 32 of the Radio Regulations contains the following provisions:

31.2 §2 Any emission causing harmful interference to distress and safety communications or any of the discrete frequencies identified in Appendices 13 and 15 is prohibited.

31.4 §4 Before transmitting for other than distress and safety purposes on any of the frequencies identified in Appendix 15 for distress and safety, a station shall, where practicable, listen on the frequency concerned to make sure that no distress transmission is being sent.

32.4 §3 All stations which receive and a distress alert transmitted by digital selective calling shall immediately cease any transmission capable of interfering with distress traffic and shall continue watch until the call has been acknowledged.

32.40 §25 Distress traffic consists of all messages relating to the immediate assistance required by the ship in distress, including search and rescue communications and on-scene communications. The distress traffic shall as far as possible be on the frequencies contained in Article 31.

32.49 §29 Until they receive the message indicating that normal working may be resumed, (see No. 32.51), all stations which are aware of the distress traffic and which are not taking part in it, and which are not in distress, are forbidden to transmit on the frequencies in which the distress traffic is taking place.

32.50 §30 A station of the mobile service which, while following distress traffic, is able to continue its normal service, may do so when the distress traffic is well established and on condition that it observes the provisions of No. 32.49 and that It does not interfere with distress traffic.

Is it fit for purpose? Does it work? Is it required?

2 The present system has served to enable distress and safety communications to be sent and received. Note has been taken of occasional misuse of VHF Channel 16. Such misuse is often corrected by other users monitoring the channel.

3 Users will want to use the same communication systems for distress, routine, and e-navigation applications.

Can it be improved, including human factors considerations?

4 Consideration should be given to how separate systems could be integrated. For instance, could systems used for Advance Notice of Arrival also be used for Long Range Identification and Tracking? Correspondence Group members noted that fishing vessels
sometimes have other tracking systems, and unification of these systems might make it easier for coastal authorities such as MRCCs. MAYDAY relay broadcasting by EGC on SafetyNet or NAVTEX is still efficient and relevant for MRCCs because they do not have to know the data for all ships to contact. This procedure is simple and efficient and is based on the MAYDAY relay for all ships at sea, all of which are potential SAR units.

5 Can AIS and VHF radiocommunications be more closely integrated, and can AIS be used for distress messaging (COMSAR 16/7/1, COMSAR 16/7/3 and COMSAR 16/17, paragraphs 7.4 to 7.8)? AIS is a text and graphical system, and VHF radio is primarily voice. There is a need for both, but one cannot replace the other. If the two systems are more closely integrated, they should still have separate aerials so that use of one system does not interfere with the use of the other.

6 Can AIS be used for distress messaging? AIS displays are already crowded, and AIS errors have been common because of operator or installation errors. The simplicity of EPIRBs and their unique purpose for distress alert and location means that they could not be replaced by AIS alerting. However, AIS as an identification system could play a role especially in locating a declared distress by SAR units.

Scope and compelling need for change

7 Note that discussion on the issues under Annex 1 may overtake this topic.

Plan for review

8 The Joint Experts Group is invited to discuss and recommend a plan for review as appropriate, taking into account any decision on the functional requirements and the structure of the maritime communications system as discussed in Annex 1.

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ANNEX 6

REVIEW AND MODERNIZATION OF THE GMDSS
High Level Review

Possible alignment between chapters III, IV, V and XI-2 of SOLAS, in particular, with regard to type approval, secondary equipment and maintenance arrangements and their regulatory status (i.e. mandatory or discretionary)

Discussion – Type Approval

1 SOLAS Chapter III includes requirements for survival craft two-way radios and for Search and Rescue Transponders (SART) in regulation 6. Regulation III/4 states:

1 Except as provided in paragraphs 5 and 6, lifesaving appliances and arrangements required by this chapter shall be approved by the Administration.

2 Before giving approval to lifesaving appliances and arrangements, the Administration shall ensure that such lifesaving appliances and arrangements:

   .1 are tested, to confirm that they comply with the requirements of this chapter and the Code, in accordance with the recommendations of the Organization*; or

   .2 have successfully undergone, to the satisfaction of the Administration, tests which are substantially equivalent to those specified in those recommendations.

3 Before giving approval to novel lifesaving appliances or arrangements, the Administration shall ensure that such appliances or arrangements:

   .1 provide safety standards at least equivalent to the requirements of this chapter and the Code and have been evaluated and tested in accordance with the recommendations of the Organization*; or

   .2 have successfully undergone, to the satisfaction of the Administration, evaluation and tests which are substantially equivalent to those recommendations.

4 Procedures adopted by the Administration for approval shall also include the conditions whereby approval would continue or would be withdrawn.

5 Before accepting lifesaving appliances and arrangements that have not been previously approved by the Administration, the Administration shall be satisfied that lifesaving appliances and arrangements comply with the requirements of this chapter and the Code.

6 Lifesaving appliances required by this chapter for which detailed specifications are not included in the Code shall be to the satisfaction of the Administration.

2 SOLAS regulation IV/14.1 requires:

* Refer to the Recommendation on Testing of Lifesaving Appliances adopted by the Organization by resolution A.689(17).
1 All equipment to which this chapter applies shall be of a type approved by the Administration. Subject to paragraph 2, such equipment shall conform to appropriate performance standards not inferior to those adopted by the Organization.

3 SOLAS regulations V/18.1 and 18.2 require:

1 Systems and equipment required to meet the requirements of regulations 19 and 20 shall be of a type approved by the Administration.

2 Systems and equipment, including associated back-up arrangements, where applicable, installed on or after 1 July 2002 to perform the functional requirements of regulations 19 and 20 shall conform to appropriate performance standards not inferior to those adopted by the Organization.

4 SOLAS Chapter V, electromagnetic capability is addressed in regulation 17:

1 Administrations shall ensure that all electrical and electronic equipment on the bridge or in the vicinity of the bridge, on ships constructed on or after 1 July 2002, is tested for electromagnetic compatibility taking into account the recommendations developed by the Organization.

2 Electrical and electronic equipment shall be so installed that electromagnetic interference does not affect the proper function of navigational systems and equipment.

3 Portable electrical and electronic equipment shall not be operated on the bridge if it may affect the proper function of navigational systems and equipment.

5 SOLAS regulation XI-2 includes requirements for Ship Security Alert Systems, but there are no requirements applying to type approval.

6 MSC.1/Circ.1221 provides guidance on the validity of type approval certificates.

Discussion – Secondary Equipment and Maintenance Arrangements

7 SOLAS regulations IV/15.6 through 15.9 state:

6 On ships engaged on voyages in sea areas A1 and A2, the availability shall be ensured by using such methods as duplication of equipment, shore-based maintenance or at-sea electronic maintenance capability, or a combination of these, as may be approved by the Administration.

7 On ships engaged on voyages in sea areas A3 and A4, the availability shall be ensured by using a combination of at least two methods such as duplication of equipment, shore-based maintenance or at-sea electronic maintenance capability, as may be approved by the Administration, taking into account the recommendations of the Organization.

8 While all reasonable steps shall be taken to maintain the equipment in efficient working order to ensure compliance with all the functional requirements specified in regulation 4, malfunction of the equipment for providing the general radio communications required by regulation 4.8 shall not be considered as making a ship unseaworthy or as a reason for delaying the ship in ports where repair facilities are not readily available, provided the ship is capable of performing all distress and safety functions.

9 Satellite EPIRBs shall be:
.1 annually tested for all aspects of operational efficiency, with special emphasis on checking the emission on operational frequencies, coding and registration, at intervals as specified below:

.1 on passenger ships, within 3 months before the expiry date of the Passenger Ship Safety Certificate; and

.2 on cargo ships, within 3 months before the expiry date, or 3 months before or after the anniversary date, of the Cargo Ship Safety Radio Certificate.

The test may be conducted on board the ship or at an approved testing station; and

.1 tested at intervals not exceeding 12 months for all aspects of operational efficiency with particular emphasis on checking the emission on operational frequencies, coding and registration. However, in cases where it appears proper and reasonable, the Administration may extend this period to 12 +/- 3 months. The test may be conducted on board the ship or at an approved testing station; and

.2 subject to maintenance at intervals not exceeding five years, to be performed at an approved shorebased maintenance facility.

8 In SOLAS Chapter V, maintenance of equipment is addressed in regulation 16:

1 The Administration shall be satisfied that adequate arrangements are in place to ensure that the performance of the equipment required by this chapter is maintained.

2 Except as provided in regulations I/7(b)(ii), I/8 and I/9, while all reasonable steps shall be taken to maintain the equipment required by this chapter in efficient working order, malfunctions of that equipment shall not be considered as making the ship unseaworthy or as a reason for delaying the ship in ports where repair facilities are not readily available, provided suitable arrangements are made by the master to take the inoperative equipment or unavailable information into account in planning and executing a safe voyage to a port where repairs can take place.

9 In SOLAS Chapter III, multiple two-way VHF radios and SARTs are required to be carried. There is no requirement for duplication or maintenance of the SSAS in Chapter XI-2.

Is it fit for purpose? Does it work? Is it required?

10 The Correspondence Group on e-navigation notes that control (e.g. type approval) of software and hardware updates is not sufficient. "Lifetime regulatory compliance" should be discontinued for systems that are dependent on software for their key functions. Instead, software dependent systems should only be suitable for regulatory compliance when using software that complies with the most current version(s) of the relevant standard(s). Regulation of upgrading of navigation equipment operating systems is missing (COMSAR 16/11, annex 1, 134-Gre02).

11 The Nautical Institute notes that if security related communication is added to the GMDSS, it then follows that the regulations should also be re-aligned. From an at sea perspective, it is always easier and less time consuming to have all relevant information in one place, Merging all references to GMDSS into presumably Chapter IV would seem to be prudent (The GMDSS Manual has already combined all relevant regulations into a
concise chapter in its current edition which makes an infinitely easier reference document than SOLAS for this subject.) The danger of amending small sections to different chapters of SOLAS, all relating to one subject is not the most effective way to achieve any proposed changes to redundancy requirements or otherwise. If aligning meant to have one chapter (IV) inclusive of all things related to GMDSS then this would be a positive step in itself. Giving options i.e. discretionary "regulations" opens the door to ship owners and governments making loose interpretations of mandatory requirements. Requirements of GMDSS equipment onboard should be clearly stated, as well as any secondary equipment used as redundancy. Type approval in itself has the potential to vary standards of equipment found onboard any vessel. Stipulations, if ultimately stated, would negate the need for type approval.

12 Chapter V includes electromagnetic compatibility requirements that may be appropriate to apply to all communication and navigation equipment.

13 Chapter IV includes requirements for secondary systems and maintenance that do not apply to SSAS, LRIT, and navigation systems, except for radar and ECDIS which require backup systems. It should be considered whether these requirements should apply to systems presently outside of Chapter IV.

14 Software updating, usability, and human factors are issues for both navigation systems and communication systems, and are under consideration in the e-navigation project. Consistent requirements would seem appropriate.

15 On cargo ships, navigation equipment is covered on the safety equipment certificate and communication equipment is covered under a separate radiotelephony certificate. The equipment is covered in a single certificate for passenger ships. If the cargo ship certificates were unified, it might be helpful in enforcing such measures as software updating. It remains a difficult problem for Administrations and Port State Control authorities to have current information on software updates.

Can it be improved, including human factors considerations?

16 There are opportunities to adopt consistent type approval, software updating, secondary equipment and maintenance arrangements for communication and navigation systems, which should be considered.

Scope and compelling need for change

17 There are opportunities to adopt consistent type approval, software updating, secondary equipment and maintenance arrangements for communication and navigation systems, which should be considered.

Plan for review

18 The Joint Experts Group is invited to discuss and recommend a plan for review of the alignment between Chapters III, IV, V and XI-2 of SOLAS, in particular, with regard to type approval, secondary equipment and maintenance arrangements and their regulatory status (i.e. mandatory or discretionary) as appropriate.

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ANNEX 7

REVIEW AND MODERNIZATION OF THE GMDSS
High Level Review

Assess whether to increase the use of goal-based methodologies when reviewing the regulations and regulatory framework for GMDSS in SOLAS chapters IV and V and the STCW Convention, to provide flexibility to allow the GMDSS to adapt to new and evolving technologies without major revision of the SOLAS and STCW Conventions in future

Discussion

1 The nine functional requirements of the GMDSS are an example of goal-based regulation (see Annex 1). More detailed requirements such as those in SOLAS regulations IV/7 through IV/11 and possibly others, could be removed for SOLAS Chapter IV and placed in a Resolution or Code, which could be mandatory.

Is it fit for purpose? Does it work? Is it required?

2 The nine functional requirements have worked, and goal-based methodologies have been successfully applied to other ship safety systems. The GMDSS provisions also include prescriptive requirements, which might be seen as limiting options for achieving goals.

3 There are some differences between GMDSS functions and the functions and systems in other SOLAS Chapters. For instance, a fire safety system may be used in a ship that is radically different than systems used on any other ship, and still meet the fire safety goals of SOLAS Chapter II-2. A ship’s GMDSS system must inter-operate with the systems of other ships and shore facilities, and within the international spectrum use standards, so there will be limitations on the flexibility provided by goal-based methodologies for communications.

Can it be improved, including human factors considerations?

4 The application of goal-based methodologies may improve the GMDSS modernization effort, including attention to human factors considerations.

5 If detailed requirements are stipulated not in SOLAS Convention but in non-mandatory guidelines or performance standards, amendments to these non-mandatory instruments can be approved and implemented promptly. In this sense, flexibility of adapting new technologies will be increased. However, this flexibility is obtained at the expense of “mandatory” nature of requirements. Many of prescriptive requirements of GMDSS, such as frequencies, are essential to ensure consistent and common operation of GMDSS among different administrations, ships and others. This trade-off between flexibility and mandatory nature should be kept in mind when considering whether prescriptive requirements can be removed from SOLAS Convention.

Scope and compelling need for change

6 Goal-based methodologies increase options as compared to prescriptive requirements. This might lead to more cost-effective solutions to meeting goals.
7 However, the Nautical Institute cautions that the system must remain as simple and as standardized as possible. Increasing goal-based methodology would be unhelpful in achieving this situation as, although it would be easier for ship-owners and manufacturers to comply with legislation, this would not necessarily mean it would be easier for seafarers and operators to use the equipment and as such could be deemed not to be in keeping within IMO’s general objective summary of ‘safe, secure and efficient shipping....without additional training and familiarization. However, there is certainly a place for goal-based methodology within the industry and industry regulation, as indeed is already the case among this and many other subjects, and is very useful in many scenarios, but do not feel it would be a benefit to the seafarer, more likely, only the manufacturers. This depends entirely on the stance the IMO has with regard to the result they would like to achieve. Goal-based methodologies do allow for change, yes. However with too much flexibility, standards may be compromised. If the goals of the maritime industry with reference to GMDSS were to swing from year to year with knee-jerk reactions to security incidents for example, then GMDSS may digress into something other than for which it was originally intended. Caution should be used when introducing such open, self-generating methodologies.

Plan for review

8 The Experts Group is invited to consider and advise on the use goal-based methodologies to the extent possible for the GMDSS modernization project.

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ANNEX 8

REVIEW AND MODERNIZATION OF THE GMDSS

High Level Review

Review existing systems and new systems for inclusion in the modernized GMDSS

Discussion

1 Since the formal beginning of the implementation phase of the GMDSS in 1992, without any formal review of the GMDSS, changes in radiocommunication and radio navigation have taken place as described by Australia in COMSAR 16/3/8. Consideration should be given to existing systems which could be replaced in the modernized GMDSS, and new systems which could be introduced to fulfill the functional requirements.

Is it fit for purpose? Does it work? Is it required?

2 The following systems relying on older or inefficient technology may be considered for replacement by more modern systems:
   - Narrow Band Direct Printing
   - NAVTEX
   - Obsolescent satellite communication technologies
   - Cospas-Sarsat LEOSAR system

Can it be improved, including human factors considerations?

3 The following systems and technologies might have a role in the modernized GMDSS:
   - AIS
   - Satellite monitoring of AIS
   - Additional AIS channels
   - HF E-mail and data systems
   - VHF data systems
   - Application Specific Messages over AIS or VHF data systems
   - NAVDAT
   - Modern satellite communication technologies including Fleet Broadband FB500 terminals
   - Additional GMDSS satellite service providers
   - Maritime Safety Information formatted for graphical display
   - Hand-held satellite telephones in survival craft
   - Hand-held VHF with DSC and GNSS for survival craft
   - Ship Security Alert Systems
   - Mobile Internet services
   - Mobile telephone services
   - Wimax/mesh networks
   - Wireless Local Area Networks onboard ships
   - Crew Overboard Devices
   - Cospas-Sarsat MEOSAR system
   - AIS and GNSS-equipped EPIRBs
   - 406 MHz direction finders
   - Satellite Emergency Notification Devices and other distress notification technologies not part of the present GMDSS
Scope and compelling need for change

4 The increasing need for voice and data communications at sea, and the limited availability of spectrum make it necessary to use more efficient communication protocols.

5 The Nautical Institute suggests a number of revisions:

   .1 Phase out MF/HF voice/text/telex GMDSS requirement
   .2 Phase out the DOS based and antiquated satellite telex terminals.
   .3 Adopt modern e-mail based system that has modern sort, file and forward facilities.
   .4 HF and Telex should be considered for replacement with an appropriate new technology, though failing that, streamlining the technical requirements to remove extraneous DSC submenus and options previously required for ‘public correspondence’ should be implemented to simplify the system as far as possible (without of course degrading functionality of its primary purpose)
   .5 Additionally the technical requirements for display and printing of EGC and Inmarsat messages could be reviewed, with a view to digitalizing outputs (on screen display, possibly PC based; touch screen technology) and only printing when required (perhaps this is already in place, however it is certainly not mainstream) This would remove the dated ‘dot matrix’ technology from the system and probably make integration with any e-navigation application more possible.
   .6 GMDSS equipment onboard still needs to be able to send and receive communication complying with the current regulations.
   .7 In the modern age of navigation where satellites are heavily relied upon, the review of mandatory requirements for all vessels sailing in any sea area to comply with carriage of satellite communication equipment may be beneficial,
   .8 The risk of increased distraction on the navigation bridge should be thoroughly assessed before implementing any changes causing additional & involuntary alarms to watch keepers. Multiple audible alarms received from GMDSS equipment which normally does not pertain to the vessel can be muted & overlooked. The symptom of complacency with regards to muting alarms is inherent to all equipment and sensors causing repetitive & multiple alarms.

Plan for review

6 The Experts Group is invited to consider and advise on replacement of systems based on older inefficient technologies and the introduction of new technologies.