

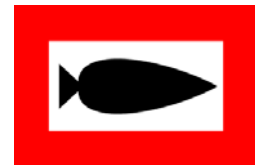
Submarine Escape, Survivability and Rescue

Refuge Alternative Workshop

14 November 2018



Submarine Rescue Mission

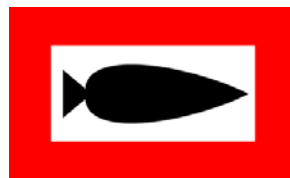


Established at the beginning of the 20th century, mission of submarine rescue forces is rescue survivors of a Distressed Submarine – both domestic and foreign

Capability validated during successful response to USS SQUALUS on 23 May 1939 when Submarine Rescue Chamber saved 33 submariners

Submarining is a dangerous business as illustrated by sinking of RN Kursk (2000) and ARA SAN JUAN (2017), as well as near sinking of USS SAN FRANCISCO (2005), USS GREENVILLE (2001), and USS MONTPELIER (2012)

SUBMARINE RESCUE BLACK FISH INSIGNIA

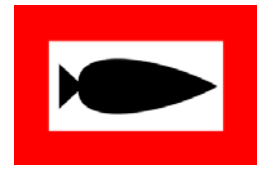


The fish emblem is the international symbol for submarine rescue.

DUTY OF CARE



Submarine Escape and Rescue (PMS391)



Escape



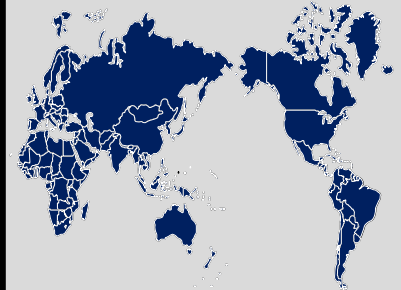
Survivability



Rescue

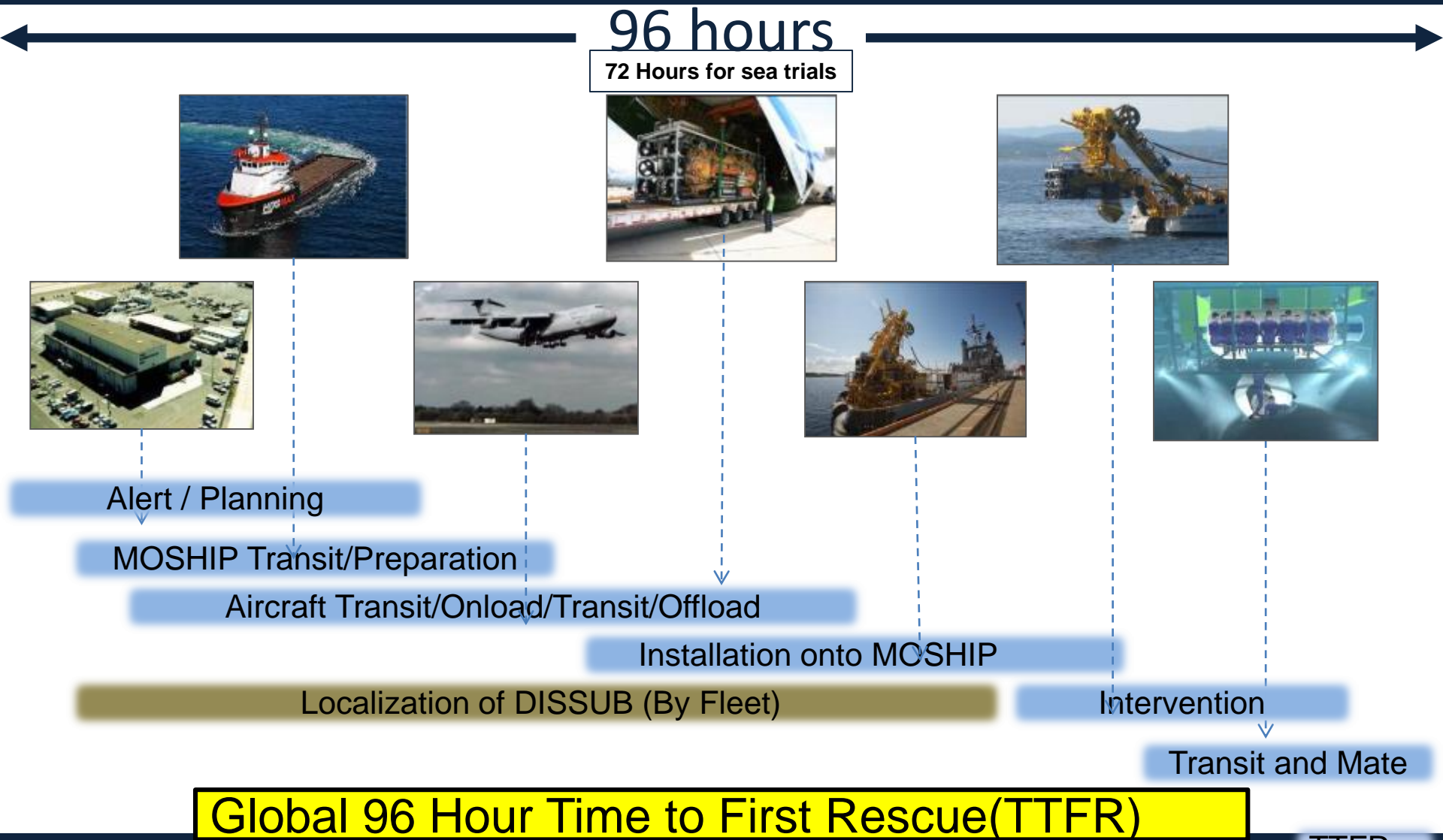
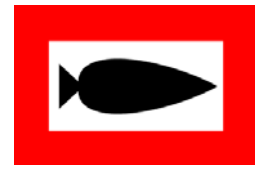


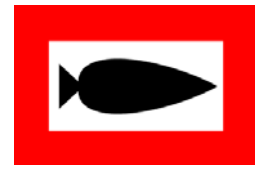
Global





Submarine Rescue Process Overview



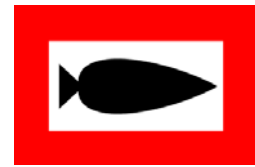


Submarine Escape, Survivability & Rescue

ESCAPE, SURVIVABILITY & RESCUE ASSETS & EQUIPMENT



Submarine Survivability



Crash Bag & Misc. Below Deck Escape Equipment
Guard Book (Procedure for survival and escape)
Analox O2 & CO2 Analyzers



7 day Survivability

LiOH Curtains, Extend Air Sheets, and deployment kits
O2 Candles and Furnaces
Draeger Tubes



Submarine Emergency Position Indicating Radio

Beacon (SEPIRB)

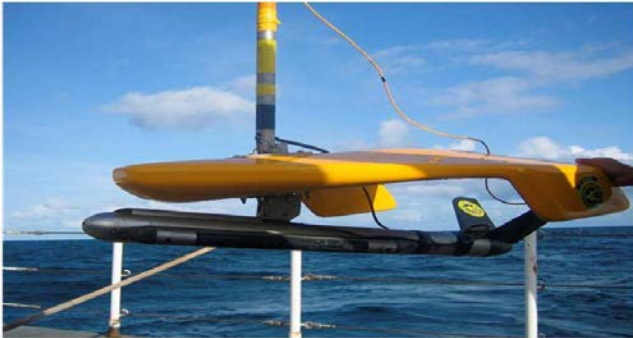
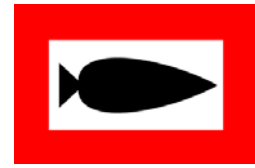
Launch from escape trunk or 3" launcher
Obtains GPS fix and sends to satellites
Emits homing signal for SAR assets



***Installed onboard every submarine**



Submarine Intervention



Side scan sonar

Remotely Operated Vehicle "SIBITSKY"

STATS:

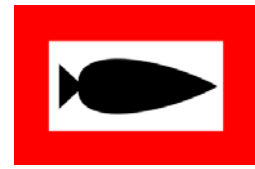
0-2000 fsw

Light Weight Configuration



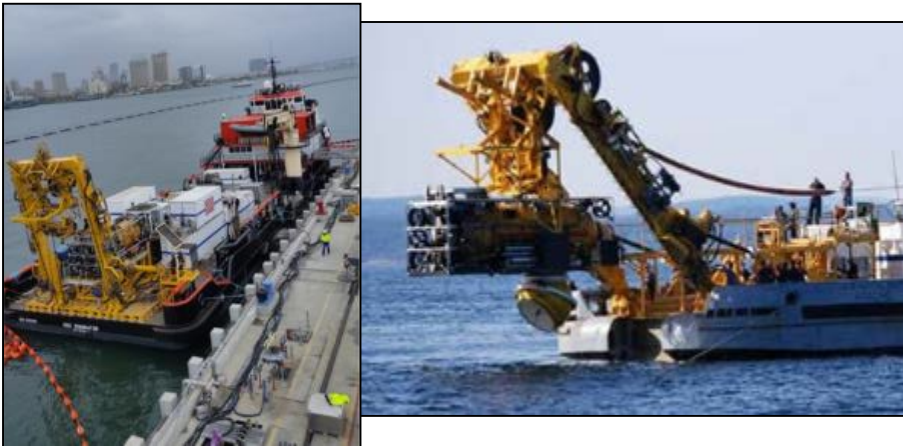
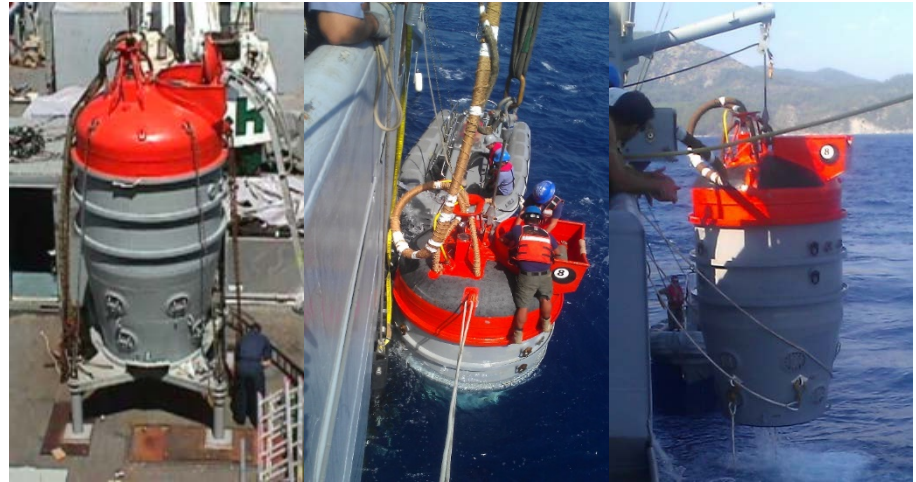


Submarine Rescue



Submarine Rescue Chamber (SRC)

STATS:
0-850 fsw
1 ATA
6 rescues + 2 attendants

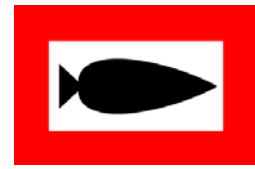


Submarine Rescue and Diving Recompression Chamber (SRDRS)

STATS:
~450-2000 fsw
1-6 ATA
16 rescues + 2 attendants



Submarine Escape



Submarine Escape and Surface Survival Personnel Equipment (SESSPE)

STATS:

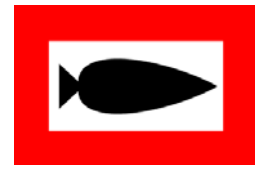
0-600 fsw

1 ATA

2 escapers per cycle

Single-person life raft



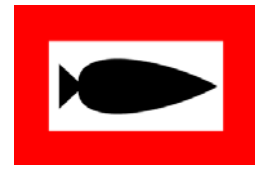


Submarine Escape, Survivability & Rescue

RESEARCH AND DEVELOPMENT COLLABORATION INITIATIVES



Collaboration Initiatives

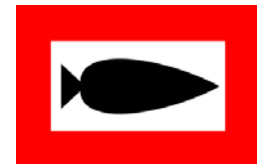


To establish collaboration with government agencies with similar focus areas for the survivable and rescue of personnel trapped in CONFINED, EXTREME, and AUSTERE environments

To establish MOU/MOA for technical exchange on current and future R&D efforts with the goal to synergize and capitalize on cross-organization efforts



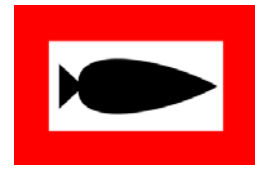
PMS391 Technology Objectives



- Develop/implement shallow water pressurized rescue capability
- **Improve ability and length of time for DISSUB personnel to survive while awaiting rescue**
- Develop/improve mobilization technologies and processes to ensure mobilization for a DISSUB event in 96 hours or less
- Develop/improve capability to successfully rescue in heightened environmental conditions
- Improve ability to timely and successfully search and identify location of DISSUB
- **Develop/improve means to accurately and quickly determine risks associated with rescue of a DISSUB**
- **Develop/improve and implement biomedical capabilities to maximize successful medical treatment of DISSUB survivors**



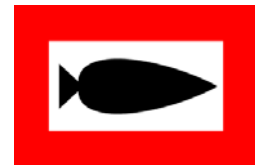
Collaboration Synergy Recommendations



- **Life support (passive and powered)**
 - CO2 & other atmospheric contaminant monitoring & removal
 - O2 generation
- **Communications**
- **Physiological stressors**
- **Rescuer risk determination**
- **Others?**



Way Forward



- **Intent to host cross-organizational technical information exchange meeting**
 - **January/February 2019**
 - **Government and industry participation**