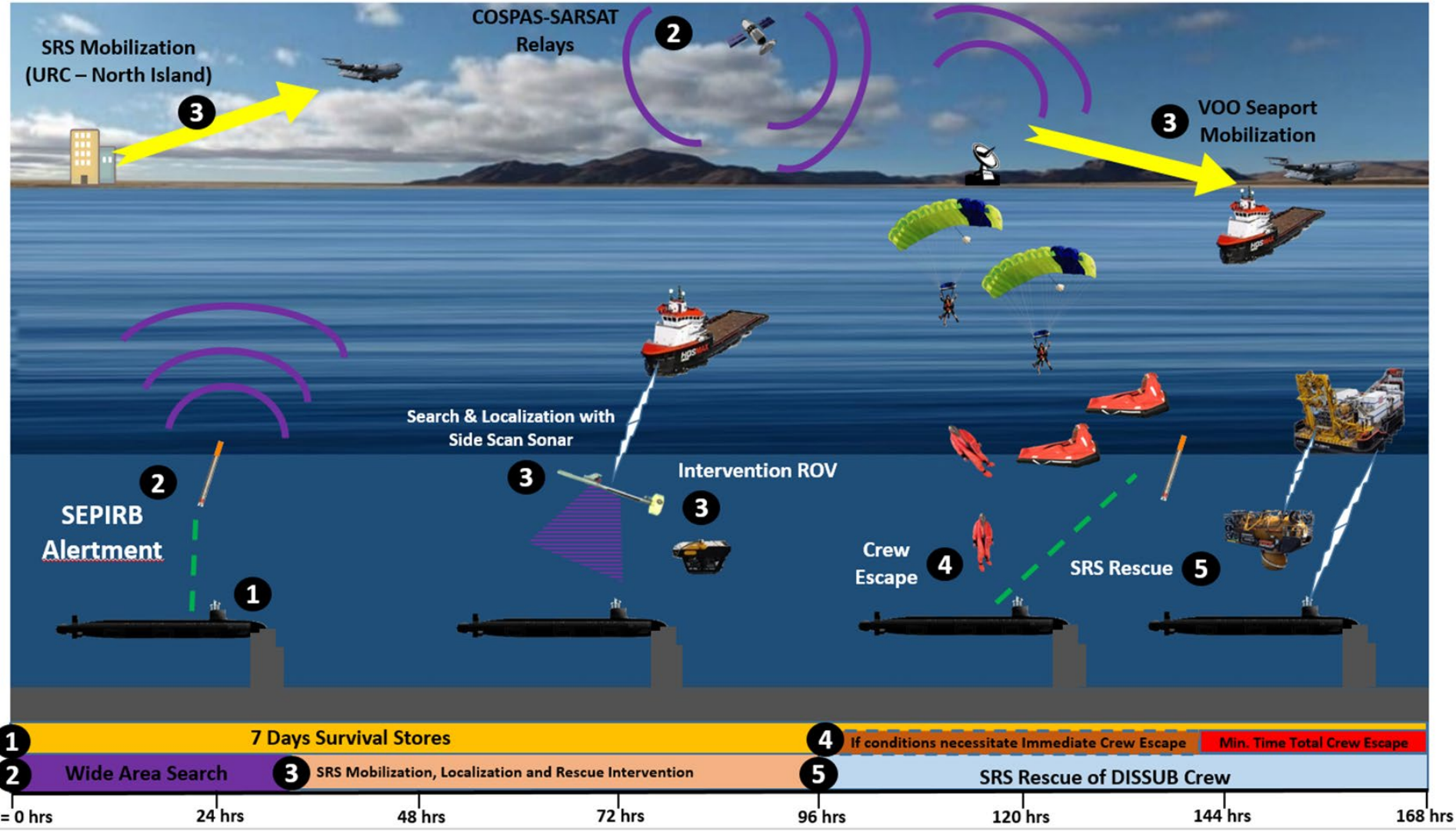
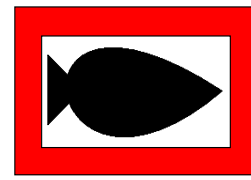


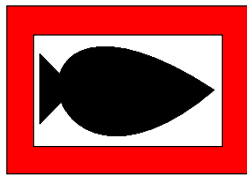
National Institute for Occupational Safety (NIOSH) Rescue Alternative

**Stephanie Mohundro, NAVSEA PMS390
20 November 2021**





Current CONOPS Assumptions and Parameters

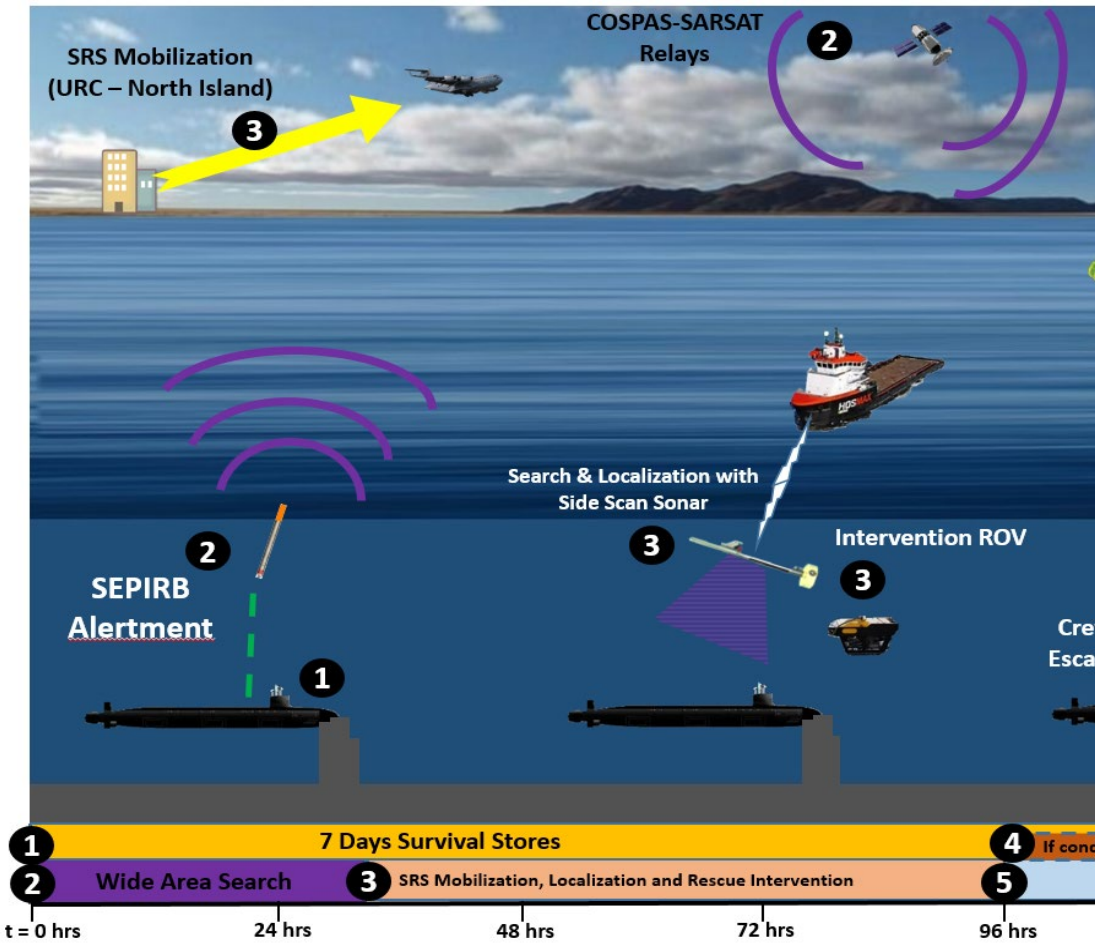
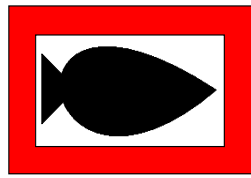


- (1) Distressed Submarine (DISSUB) location known
- (2) Effective and accurate Submarine Emergency Positioning Radio Beacon (SEPIRB)
- (3) Survivors can await rescue for 7 days in all scenarios
- (4) Ability to establish 2-way communications between survivors and rescue forces at water depth of 2000 feet via Underwater Telephone or Tap Codes
- (5) Ability to maintain safe atmospheric environment

Rescue Protocol: *Do not rescue from unresponsive submarine due to risks for rescue forces*



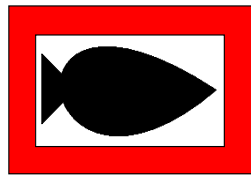
Through-Hull Communications



- Establish 1-way and 2-way communications between rescue forces and survivors
- External to internal without survivor input
- Utilize data transfer via mid-water ROV/UUV
- Transmit necessary data to determine:
 - (1) Status of survivors
 - (2) Condition of atmosphere
 - (3) Condition of submarine (i.e. internal compartment pressure, compartment location, etc.)
- Allow for real-time risk analysis of safe-to-rescue an unresponsive submarine



Passive Atmospheric Sampling and Scrubbing



- Increase likelihood to allow survivors to wait for rescue
- Passive capability without survivor input
- Data input to communications
- Passive scrubbing of 7 Submarine Escape Action Limit (SEAL) gases to below SEAL 1 limits for 7 days

- (1) CO 125ppm
- (2) HCN 10 ppm
- (3) NH3 75 ppm
- (4) Cl2 1 ppm
- (5) HC1 20 ppm
- (6) SO2 20 ppm
- (7) CO2 5 ppm

