Fifth Joint Arctic SAR TTX

2020 EXERCISE REPORT

Association of Arctic Expedition Cruise Operators AECO

ARCSAR
Arctic and North Atlantic Security and Emergency Preparedness Network

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 786571

Title: Report from the Fifth Joint Arctic SAR TTX virtual event "Camp Collaboration"

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Date: August 2021

Published by: Association of Arctic Expedition Cruise Operators (AECO)

Number of pages: 40

Keywords: Arctic, Search and Rescue, survival, camp, Zodiac, equipment, evacuation, cruise industry, private-public partnerships, international cooperation, ARCSAR.

Cover photo by Brede Valanes, AECO.

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List of acronyms

ACO	Aircraft Coordinator
AECO	Association of Arctic Expedition Cruise Operators
AIS	Automatic Identification System
ARCSAR	Arctic and North Atlantic Security and Emergency Preparedness Network
CG	Coast Guard
CLIA	Cruise Lines International Association
CPR	Cardiopulmonary Resuscitation
EL	Expedition Leader
ETA	Estimated Time of Arrival
GMDSS	Global Maritime Distress and Safety System
GPS	Global Positioning System
HF	High Frequency
ICG	Icelandic Coast Guard
ICS	Incident Control System
IMO	International Maritime Organization
JRCC	Joint Rescue Coordination Centre
JRCC NN	Joint Rescue Coordination Centre North Norway
MRO	Mass Rescue Operation
OSC	On-Scene Coordinator
PAX	Passengers
PLB	Personal Locator Beacon
RFID	Radio-frequency Identification
RCC	Rescue Coordination Centre
SAR	Search and Rescue
SOLAS	International Convention for the Safety of Life at Sea
SOP	Standard Operating Procedure
STCW	Standards of Training, Certification, and Watchkeeping
TTX	Table top Exercise
VHF	Very High Frequency
VOO	Vessel of Opportunity

1 EXECUTIVE SUMMARY

1.1 Overview

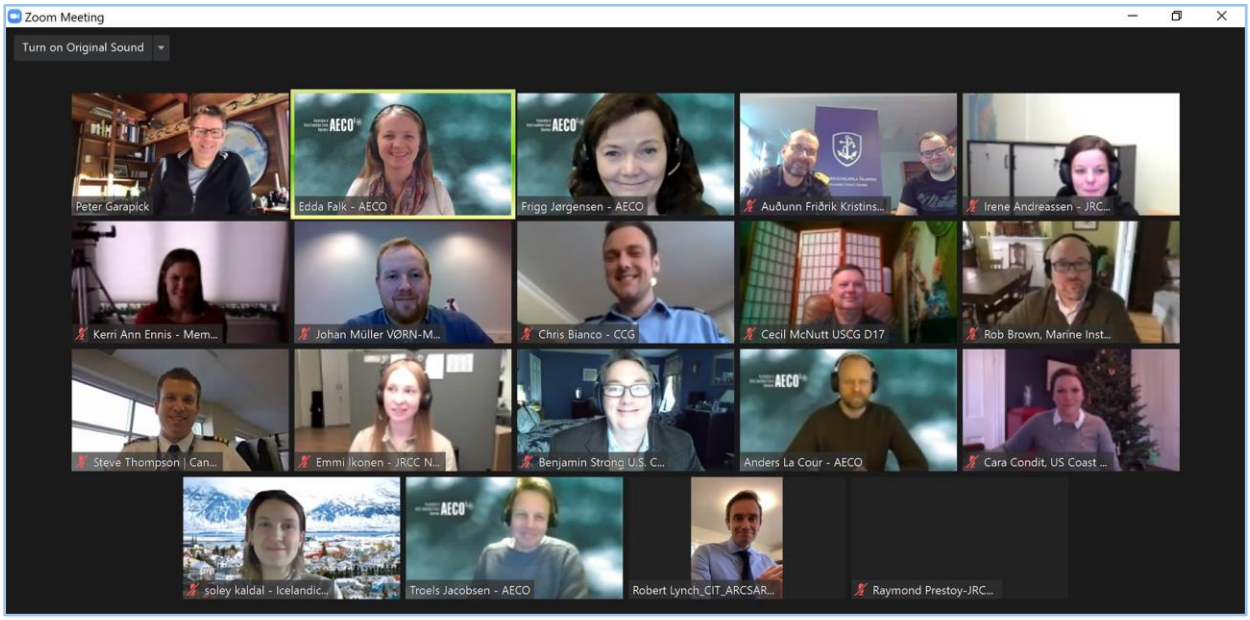
For the fifth year in a row, the Arctic expedition cruise industry, search and rescue sector and academia gathered for a joint tabletop exercise. The exercise was a two-day event arranged 2.-3. December 2020. This year, the exercise was organized as a fully virtual event, gathering nearly 130 participants from across the world. The Joint SAR TTX was attended by 26 AECO members and SAR entities from Canada, Iceland, Greenland, Faroe Islands, Svalbard, mainland Norway, USA, Finland, UK, and New Zealand.

The participants were invited to play out a scenario, in which an expedition cruise vessel temporarily loses steering and grounds on a submerged shelf in a remote part of the Arctic. As the scenario progressed, the players were challenged to evacuate the unstable ship and establish a beach camp on shore. The 175 passengers and 120 crew and staff were to be kept safe while awaiting rescue, initially by an expedition cruise vessel and eventually by professional search and rescue (SAR) responders. The participants were asked to consider procedures and means of communication, collaboration and coordination, abandon ship procedures, crowd management techniques, efficient use of equipment, survival strategies, camp layout, and much more. Groups consisting of SAR responders, rescue coordination centre staff, ship officers, expedition staff, and the cruise operator home office collaborated to determine the challenges, constraints and opportunities involved. The academic audience was invited in the exercise as observers.

The Annual Joint Arctic Search and Rescue Tabletop Exercise (SAR TTX) is organized by the Association of Arctic Expedition Cruise Operators (AECO), the Icelandic Coast Guard (ICG) and the Joint Rescue Coordination Centre North Norway (JRCC NN). The overall objective is to enhance safety and preparedness in the Arctic maritime domain through strengthened collaboration between the Arctic expedition cruise industry, SAR entities and authorities.

The event was organized under the umbrella of the Arctic and North Atlantic Security and Emergency Preparedness Network (ARCSAR) with funding from the European Union's Horizon 2020 research and innovation programme.

Picture 1. Virtual group picture of organizers, moderators, and note-takers.



1.2 Main take-aways

Table 1. Summary of the main take-aways from the tabletop exercise.

Coordination and Command	Communication and Cooperation	Equipment and Training	Preparedness and Planning
Captain will have the overall responsibility until all passengers and personnel are evacuated to rescue ship or safe haven.	Important for SAR authorities to know about the incident early even if it is under control.	Discussion on whether the expedition staff or expedition leader should have STCW training and can they be used in the emergency response on-board.	There are gaps in current procedures for survival camps, which must be identified and find solutions to create best practises for shore evacuation.
Role, responsibility, and term of the On-Scene Coordinator (OSC) should be clarified to all parties.	Nexus of the captain-RCC-beach site important.	Some companies are looking into the training of expedition staff and understanding if they can have a broader role in emergency response.	Making AECO guideline on what the beach/survival camp could look like was suggested.
Roles, structure and terminology of the Unified Command and Incident Command System (ICS) good to understand.	Cooperation between the crew and expedition staff is essential. The expedition staff have a good skill set, used to survival on beaches and know how to set up camps.	Suggestion to have an EL and ship crew training seminar including SAR terminology.	Many groups were stressing the importance to start assessing the environmental damage and planning the response early on.
Some ELs pointed out that when the professional SAR responders come to the scene, it is a huge relief for them, the crew, and the passengers.	Home office is a huge information asset and can take away pressure from the captain by liaising with the RCC; conference call between RCC-home office-captain beneficial.	Utilizing life rafts as a shelter on shore was deemed to be a good idea. It was pointed out that life raft tents should be secured.	
Big operators may have emergency operations centres that run in parallel.	Passengers will most likely contact next of kin and post on social media if there is connection, open communication with passengers extremely important.	Most groups decided to use Zodiacs to transport passengers to shore for this scenario. They are used in daily operations and guests are more familiar with them.	
Role of the expedition staff in the emergency system/operations on board unclear.	Home office has best practices for contacting next of kind; i.e. Hurtigruten's SMS system.	Zodiacs are not normally used for evacuation as they are not lifesaving appliances and there are no formal procedures it.	
Most groups appointed the Expedition Leader to oversee the beach camp set up and coordination on shore.	Visits between SAR authorities and companies recommended.	In the case of emergency using Zodiacs, having the power to operate them is essential. Need to have generators for Zodiac cranes with emergency diesel in case of a black-out.	
Keeping track of passengers and crew is essential, both for the vessel and for rescue authorities.	Different players use different terms to describe the people needing assistance (Victim/casualty/passenger/patient)	When operating in the Arctic, mandated to have group survival kits; innovation from Ponant called the Ice Cube.	
		There is still a gap in development and adoption of passenger tracking technology.	

2 Findings from the previous Joint Arctic SAR TTXs

In 2019, the Fourth Joint Arctic SAR TTX presented and introduced a section in the report on key findings from previous Joint Arctic SAR TTX events, in order to identify lessons learned and points to improve for future planning. Following last year's example, this chapter identifies main take-aways from previous years' reports categorizing them into three topics: communication and coordination, collaboration, and equipment. The main take-aways for each topic are collected based on findings that occurred the most in the reports. The final chapter of this report introduces example recommendations for further action based on these previous take-aways and findings from this report.

Table 2. Main take-aways from previous Joint Arctic SAR TTX reports

Challenge	Main take-aways
Communication and coordination	**Early alarming** and calling for external assistance is crucial. Rescue authorities wants to be notified as early as possible in order to assess the correct level of response.
	Not overload captain/bridge with request for information. The captain needs to concentrate on managing the situation on the vessel.
	Limitations with communications equipment, battery life, coverage, availability. Needs a back-up plan (*also relevant for equipment category*)
	Clear communication to avoid misunderstandings
	Pax manifests and tracking (keeping track of) casualties/evacuees have been recurring issues – especially when SAR responders gets involved. It may be an equipment issues, as well as system and communication
	Language/terminology challenges can pose problems, and standardisation of terminology is a way to cope with this. (i.e. time zone, Latitude and Longitude format, SAR language)
	Need for informing the passengers – language issues to be considered (using native language speakers)
	Need for text based operational systems to avoid misunderstandings
	Practicing and training communication aspects within the organization
	Social media – both advantageous and disadvantageous
Collaboration	**Common exercises** with rescue authorities and operators to better understand how the other assesses the seriousness of a given situation.
	Common exercises to understand the roles and knowledge of the vessel crew, expedition crew and the rescue authorities
	A need for learning on how expedition crew can assist the responders, for example with preparing shore-based landing sites for helicopters and doing triage.
	A need to discuss in further detail the situational reports between the ship and the rescue authority, and between EL and ship (*relevant for communication category*).
	Utilization of cruise ships as OSC
	Liaison between the Home office and Rescue authorities in operations
	Visits/work exchange between Cruise operator/home office and RCC
Equipment	**A need for development of new technology** – especially on life rafts/lifeboats. Challenges in boarding and disembarking life rafts/boats, especially in bad weather. Bulky equipment. Challenges in transferring to another vessel.
	Equipment appropriate for age (old and young age)

	Need for standardisations of equipment
	Challenges to meet the 5 days polar code requirement
	Raising regulatory standards in IMO/SOLAS is challenging
	Mass evacuation operations needs specific technology. This can be for transferring passengers to another vessel/helicopter or to keep the count on the evacuated passengers
	One-stop-shop for available and new technology. A need for the available rescue technology to be collected in a single place

3 Conduct of exercise

The main objective of the Fifth Joint Arctic SAR TTX was for the AECO members, SAR professionals and academic experts conduct a TTX in order to determine the challenges, constraints and opportunities involved in the evacuation of passengers and personnel from a vessel that is aground but unstable, to nearby land. There, the exercise participants were to establish a short-term base camp to ensure all can be safe and protected until rescue arrives. Rescue was initially and for the most part in the form of another expedition cruise vessel but eventually was supported by professional SAR responders.

The participants were challenged to consider procedures and means of communication, collaboration and coordination, abandon ship procedures, crowd management, efficient use of lifesaving appliances and other equipment, and survival strategies. Based on lessons identified from last year, this year's exercise also concentrated on roles, responsibilities and collaboration between the ship's crew, expedition staff and the SAR responders. Groups consisting of SAR responders, rescue coordination centre staff, ship officers, expedition staff, and the cruise operator home office collaborated to meet these objectives and tasks.

In this chapter, we present the delivery of the exercise, the process of transferring the live TTX into an online TTX, and summarize actions taken and discussions had in the breakout groups on both days. For day 1, the group discussions are summarized chronologically for each inject. As the groups on day 2 were divided based on professional roles, the focus for each group discussion was slightly different. Therefore, we summarize the discussion for each group for day 2.

3.1 Delivery

This event was delivered virtually in Zoom. All participants gathered in a common plenary session to kick-off the exercise with an introduction to the TTX and to the TTX scenario. The chief moderator gave an overview of the TTX objectives and gave tasks for the participants and moderators for their breakout room sessions. Each group ran through the same scenario and discussed the actions that would be taken, and the challenges and opportunities that the scenario presented. At the end of the day, all participants gathered back in the plenary session for a round-up presented by the breakout room moderators and a summary of the day. See detailed agenda in Annex 1.

AECO was the technical host for the event, and their technical team made sure that the transitions from plenary to breakout rooms went smoothly. Peter Garapick, the creator and the chief moderator of the TTX, kept an overview of the TTX and the discussions by observing each breakout room. All groups had a moderator and a note-taker for both days.

Day 1 of the 2020 TTX played out the scenario and the injects. The participants were divided into four geographic areas, based on the nations indicted below, with the focus on how an emergency situation could, would and/or should unfold in that area. There were eight breakout rooms in total for day 1:

Norway 1 (Port)	**Norway 2 (Starboard)**	**Iceland 1 (Port)**	**Iceland 2 (Starboard)**	**Greenland 1 (Port)**	**Greenland 2 (Starboard)**	**Canada 1 (Port)**	**Canada 2 (Starboard)**

Each group had relevant participants playing the following roles: Ship Officer, Ship Expedition, Ship Home Office, SAR RCC, SAR Responder, SAR Air/Mariner, and SAR Expert. The group had varying numbers of participants for each role. Each group also had several observers from universities, research institutions, government organizations, companies, and other relevant entities.

The starting point of the scenario was presented on day 1 in the plenary before breaking into the breakout rooms. This day was the traditional TTX format with injects presented by the moderators at certain time for each breakout room and participants discussed action to be taken in such a situation. The next part of the chapter summarizes the actions taken by the groups in general for each inject.

On **day 2** of the TTX, the participants were divided into breakout groups based on their professions and expertise to discuss the actions taken on day one from their like-minded perspective. Day 2 had the following breakout groups:

Operator groups:	**SAR authority groups:**
Ship home office 1	SAR responders
Ship home office 2	SAR exercise officers
Ship officers	Rescue Coordination Centre (RCC)
Ship expedition staff	

The idea for day 2 was to revisit the discussions and decisions from day 1 for each inject and consider if the group felt those were the best decisions or if they were better than they expected from their now common perspective. The last part of this chapter summarizes the discussions had in each group.

3.2 Hosting a Joint Arctic SAR TTX event virtually

The Joint Arctic SAR TTX 2020 event was originally planned as a live, in-person event; however, due to travel restrictions, the event was transferred into an online event using Zoom. Zoom was selected as the ideal platform due to the virtual Breakout Rooms, which allowed participants to convene all together in a main meeting room and then be divided into small groups.

During the registration for the event, participants were asked to agree to the non-disclosure agreement; thereby agreeing to not record or live-stream the event or disclose any sensitive information. Prior to the event, a reminder of this agreement was emailed to registered participants and was posted in the Zoom Waiting Room. Participants were also sent instructions on how to use Zoom prior to the event.

The Zoom meeting was passcode protected. The Zoom links were emailed to registered participants within 24 hours of the start of the event. This procedure was used to reduce the risk of security issues and cyberattacks.

Prior to the event, specific roles and tasks were assigned to individual AECO Secretariat members. These roles were in part assigned to specific individuals due to the technical limitations determined by their Zoom status as either Host or Co-Host. Certain functions could only be performed by the Host and not the Co-Host.

At the start of the event, there was a short presentation on the technical logistics of the event, which informed participants how to change their screen names, how to ask questions and what to do should they experience technical problems.

While the Breakout Room sessions were in progress, reminders at previously agreed upon times were broadcasters to the Breakout Rooms, indicating that it was time to inject new information into the SAR TTX scenario. In addition, prior to the health breaks a request for participant to not to exit the Zoom

meeting but to turn the video and microphone off during this time was broadcasted to the Breakout Rooms.

While most of the technical logistics for this event worked flawlessly, there were a few minor glitches. For example, the pre-assignment of participants to the Breakout Rooms did not work well; requiring the manually assign of participants to their designated Breakout Room at the beginning of the event, which took some time and caused some delays. Additionally, there was some confusing regarding the terminology for a virtual event. For example, there was some confusion among participants between being in the same physical room versus being in the same virtual Breakout Room. Participants who were supposed to be in different virtual Breakout Rooms joined the event while sitting in the same physical room, recruiting last minute changes to the Breakout Room participants.

A more detailed description of the preparations and lessons learned from the technical hosting can be found in Annex 2.

3.3 Scenario

3.3.1 Starting point

It is early in the day and the ship is proceeding up a long fjord-like narrow inlet planning to reach its anchoring site just after breakfast. With the sun shining above, visibility is slightly restricted due to low level fog. The ship is making 8 kts, using radar and GPS and its marked charts. Some obvious landmarks can be seen, and the captain is confident of the vessels' position, mid channel.

Picture 2. Photo by Dr Sam Crimmon, Quark Expeditions

The captain gives the order to alter course to starboard 20 degrees and the helmsman reacts accordingly, but the ship does not respond. Without steering response, the captain orders engines stopped and astern. Before the propellers can take effect, there is a crash and the vessel veers up onto a submerged shelf, heels to starboard and grinds to a stop.

Vessel Specifications:

Name - Polar Proponent

Length 125m / Beam16m / Draft 5m

Ice Class 1D

Diesel Twin Engines, 7500 horsepower

Cruising Speed 16 knots

Crew & Staff 120 / Guests 175

Lifeboats 2 fully enclosed/1 each side

Life Rafts 10-25 person covered

Zodiacs 16 Mark V

Other Asset Specifications:

Any other assets that were involved in TTX were relative to the geographic group and the SAR technical person and/or moderator defined those details. For example, helicopter size, crew complement, CG ship size, complement, etc.

3.3.2 Scenario development

***Inject #1:* 0700h Grounding Occurs**

After loss of steering control, vessel impacts shoal and drives itself up onto a ledge, coming to rest with a list to starboard, bow out of the water and hard aground. Water ingress forward and mid hull. Stability of the vessel is a concern - might it slip off the ledge? Multiple casualties reported, crew, staff and passengers with injuries ranging from minor bruises to cuts, broken bones, burns (galley) and concussions. Wx - calm winds, 2 degrees C, clear skies, fog dissipating.

NOTE - second Expedition Cruise vessel is 170 nm away - ETA 2300h; land based Helo restricted from taking off due to weather at base - ETA 0200h; CG ship based helo out of range at this time, ship is 250 nm distant - helo ETA 0200h / ship ETA 0600h.

Summary of actions taken:

All groups indicated that the initial actions would be to contact the relevant rescue coordination center (RCC) to inform about the situation and request assistance and contact the home office or ship operator, as well as to assess the situation on board the vessel. For means of communication, the groups mentioned satellite phone, GMDSS, normal phone, VHF channel 16 and HF radio, depending on the location. Proper assessment should be made in order to determine, whether it is safe to stay on board the ship as it is the safest to stay on the ship as long as possible. The captain is in charge of the ship, operations, safety of the passengers and decisions made. One group noted that from past experience it is important to not rush to evacuate straight away but assess the situation first, which all groups seemed to agree upon.

Quote: *"First thought is to notify the JRCC and the managing company and start preparations of the muster station."*

Many mentioned that the crew should start immediate damage control, find where the damage is, try to stop any leakage, secure the ship, and run through the procedures for stability assessment. Some mentioned specific measures, such as closing the watertight doors, checking engine control room, closing main emergency valves, engine control group should check fuel tanks, and that fresh water and ballast tanks are secured. One captain mentioned that it is important to follow the ship specific measures. In one group, the option of contacting Classification Society to assist with stability calculations in early stages was mentioned.

All groups indicated that they would inform the passengers about the situation, some groups mentioning the PA system. In some cases, the expedition leader (EL) would be in charge of making the announcements to the passengers. Passenger safety was priority number one and most groups also noted that there is a need to keep the passengers calm. One group discussed the need to manage passenger expectations on what "rescue" means. For example, passengers can be rescued and brought to safety without being returned all the way home. Few groups discussed that the expedition staff is best suited for talking to the passengers as they know the passengers well. Approximately half of the groups discussed that it would be best to have the EL on the bridge with the captain to keep an overview of the situation, while in other groups the EL would be talking to the passengers and helping out to organize crowd management. It was agreed that the expedition staff and EL has an important role in communications. It was noted that in some companies, the expedition staff is not involved in emergency management/procedures and it would only be the captain and the captain's crew formally involved in emergency operations.

Most groups mentioned that they would gather the passengers together to a muster station and start triage to identify whether there are any injured passengers and the potential severity of the injured. Some groups mentioned that medical professionals would help the injured. One group mentioned that it is important to keep the families together.

Few groups stressed the importance of continuous communication with the RCC and the home office. The home office can give the RCC important information about the vessel, passengers, SAR plan for the vessel, next of kin, and so on and take some of the burden off the bridge. Some groups also noted that the home office would activate their mass media plan, make a press release, and ask media to contact them for information. The home office does not want to interference with the situation but would like regular updates from the bridge. The home office representatives in few groups mentioned that they would launch the Incident Command System (ICS) or similar.

RCC representatives in most groups said that they would start checking resources and other vessels around the area and want regular updates from the bridge. One group stressed that, although this is not a MAYDAY situation yet, the RCC would want to start moving assets to the scene as it may take a long time for them to arrive. RCC will be gathering information including intentions, capability of vessel/lifeboats, manifest, what immediate assistance is required, triage and what medical capacity the ship has. RCC also needs to be flexible as situations can change quickly and surprisingly.

Other initial actions mentioned were to send someone to look for possible beaching, start preparing life raft and lifeboats, finding possible equipment to take on land if the situation requires beaching, and checking for possible oil spills.

Inject #2: **0800h Assessment and Decision**

The ship is settling aft and listing to starboard; stability uncertain; decision required to preserve passenger and crew safety. Based on ETA of response resources, it is decided to abandon ship and move people to a nearby beach, 1 nm away. There a "camp" can be set up to ensure people are safe, that causalities are best cared for until rescue can arrive. However, the lifeboat on port not useable due to rocks, lifeboat on starboard may clear the rocks in the shallow waters just below it. There are 10-25 person life rafts (no propulsion, could be towed). There are 10 Zodiac Mark V excursion boats. Wx - winds 7 kts NE, seas clam, 2 degrees C, and clouds building.

Summary of action taken:

Half of the groups indicated that at this point they would decide to abandon the vessel and make a plan to transfer people to the beach. The other groups had either already decided this during the first inject or did not specifically mention the decision as it was embedded in the inject itself but discussed the plans, preparations, and execution of evacuation. When proceeding ashore, consideration must be given to ensuring that the passengers will be transported to a location, which will facilitate easy access for local/shore side resources. It was noted that from previous experience, evacuees can scramble to the first point ashore that they can see, which can be inaccessible. Part of the evacuation process/plan should therefore consider the establishment of a suitable point ashore.

The captain and EL would likely assign few people to set camp on the beach. Most groups decided to launch and use Zodiacs to transfer people to the beach however some groups also mentioned that they would try to use and tow the available lifeboats and life rafts with Zodiacs. It is important to keep the passengers dry and it is very difficult to disembark life rafts and lifeboats with dry feet. It was mentioned that the easiest and most comfortable way for the passengers to evacuate would be on Zodiacs, as most expedition cruises do this procedure few times a day and the passengers are familiar

with these procedures. One moderator noted that in a way, this would be a controlled disembarkation and not evacuation. The majority indicated that they would anyway start preparing the life rafts for tow as they can be used for shelter on the beach.

Quote: ***"We have a procedure for lifeboats, but not for evacuation through Zodiacs. Will it work the same way?"***

Few groups noted that if the captain decided to launch Zodiacs, they need to ensure that the crane is working, especially if there is a blackout on the vessel. The expedition staff would most likely be assigned on shore to prepare the shore side, camp, and guests' arrival. Some group sent the EL on shore while some groups said the EL would stay on the bridge with the captain to make sure everything flows well. Passenger and casualty tracking at this point is extremely important, including keeping multiple manifests, and counting people many times i.e. in muster stations, during disembarkation and at the beach. Already at this point, some groups discussed the importance of crowd management on shore.

When it comes to the equipment taken ashore, there is normally survival equipment both in the Zodiacs as well as the life rafts and the staff would start looking for other equipment and necessities from the boat including food, water, shelter, medical supplies, blankets, clothes, satellite phone, contact list, and extra batteries for radios. For the groups in Svalbard, Greenland and Canada, polar bear protection, firearms and setting up a polar bear watch were discussed. Most groups decided to use the life rafts as extra shelter on the beach.

Communication between the ship and the RCC is important. The RCC would be in contact with the bridge team and also the home office. And the captain or the bridge would then be in contact with the team and camp on shore. Many agreed that it is better to maintain the RCC-ship communication from the bridge as long as possible.

Only few groups went through the procedure of informing the RCC when the decision to abandon the ship was made. One RCC representative noted that when captain decides to abandon, it would be a good time to get the ship's rescue plans and investigate whether there are local mass rescue operations plans.

Inject #3: **0900h Camp Creation/Abandon Ship**

It is decided to use the Zodiac fleet to ferry passengers/crew/staff to beach. Muster stations are called. Beach Camp construction begins. Abandon ship procedures reviewed and modified to involve Zodiacs operated by expedition staff. There are 175 pax and 120 crew and staff onboard; Zodiacs can hold 8-10 people per trip. Wx - winds 7 kts NE, 3 degrees C, becoming overcast.

Summary of action taken:

Quote: ***"The evacuation is all about teamwork."***

The evacuation would be organized according to normal abandon ship procedures. As long as it is safe to stay on board, the ship is considered the safest place to remain. The captain has overall responsibility for ship evacuation, with certain tasks delegated as outlined in formal mechanisms such as muster lists and shipboard procedures. The captain and a skeleton crew would remain on the vessel to carry out essential tasks as long as it is safe to do so. It was noted that there should be sufficient life rafts left on the vessel to evacuate the remaining crew and these should be ready in case the crew need to take them out.

Some groups stated that the order of evacuation of injured and uninjured people will be decided in consultation with the ship doctor based on triage classification. The normal procedure is that the ship is considered the best place for injured people until shore camp has been set up. If the vessel is considered to be unsafe, evacuation must happen as quickly as possible. It is important to keep in mind that passengers are not trained like mariners and evacuation can take time. While evacuation is ongoing, crew not engaged in essential tasks can start preparing additional resources for the beach camp, such as hot beverages and food items.

Before abandoning ship, it is important to ensure that passengers are dressed warmly and have travel documents and medicine with them. A designated crew or staff members is responsible for ensuring that passengers bring essential items.

Passenger tracking can be challenging, and double lists and paper backups should be available in case of technical failures and limited battery power. Double lists are used to track who leaves vessels and who arrives on beach, and these lists can be cross-checked using radio. Some companies use tablets/readers and RFID cards or bracelets, while others make use of paper manifests. One participant mentioned that an ideal system would be that passengers had RFID bracelets that also contained their personal information, medical information, and GPS tracking. Usually, an expedition staff member would keep track of each group. RCC can be updated with a list of evacuated passengers and personnel by a lower level officer at a suitable time. One thing to notes as well, is that the players all refer to people needing assistance with different terms i.e. the cruise industry would use *passengers*, SAR responder *victims* or *casualty*, shore-side first responder or medical teams *patients*, and so on.

Several participants emphasized that Zodiac operations are part of the vessel's daily routine and therefore easy to coordinate. Responsibility for managing the Zodiac fleet will vary from operator to operator. For some operators, the Zodiac fleet is under expedition leader's care. Some operators noted that the captain and EL work together to decide who will drive the Zodiacs. It can be beneficial to use expedition staff for evacuation tendering since passengers are used to these staff members and trust them. Another benefit of using expedition staff is their extensive experience with these kinds of operations and familiarity with the Zodiacs used on the voyage. The expedition leader can ask the captain to consider this option if it is not the default procedure. For other operators, ship officers, for example a senior officer such as a Chief Officer, can take charge of coordinating the fleet.

Few groups pointed out that it is important to consider, whether the Zodiac operators need to change drivers from the expedition team to ship crew, for example to allow expedition staff to undertake tasks on shore. It was noted that while it is possible to go fast with Zodiacs, it could be wise to avoid an accelerated pace as this could be unsettling to passengers who may already be agitated.

Beach camp setup and management may be delegated by the captain to the EL. In this case, the EL and the expedition team would manage passengers, establish camp, set up protection measures ashore against local challenges such as polar bears. Weather forecast would have to be taken into consideration when choosing landing site and camp location. Some groups said that if the EL remains on the bridge while the assistant EL goes ashore to start preparing the camp setup, the EL would go ashore halfway or end of the embarkation when everything is flowing well.

While the EL would often be in charge of beach operations, having ship officers ashore is useful as people are more likely to respect their authority due to rank and insignia. This can help mitigate against over-enthusiastic passengers trying to take charge. If there is a great of turnover in ELs, and they do not have formal training in ship evacuation, the established crew would remain in charge.

It was noted that teamwork is important when carrying out an evacuation and that expedition staff needs good support from the crew. All the crew is normally involved in the preparation of evacuation.

Crew occupied with muster and evacuation-related tasks can assist ashore once their tasks on the vessel have been completed. Crew will be involved in work to maintain vessel stability; it may therefore be beneficial to involve hotel personnel instead of crew. Hotel team can also provide equipment and prepare warm drinks and snacks.

The beach camp setup would vary from operator to operator. One operator would have two different types of tents with different shapes and organizations, set up in a village setup. It was pointed out that life raft tents should be secured. On the beach, watches for the wildlife control must be established. A wildlife perimeter might need to be setup farther away because of the fear factor of passengers in the event of an incident.

All passengers and medical team would be brought onshore. If the shelters do not have capacity to accommodate everyone, a triage would be carried out shore side to determine who need access to shelters and tents. Beach camp staff would also need to get an overview over medical condition and other consideration that should be kept in mind. Some people may end up partially wet and there should be a procedure for warming and drying people off.

Toilet facilities should be established ashore. Some would bring ashore portable toilets lined with garbage bags. It is also possible to improvise rudimentary constructions from driftwood. Procedures for using toilet facilities should be established.

When setting up the camp, emergency kits, water, provisions, fuel, tents, all necessary equipment would be transported from the ship to the landing site. Additional equipment mentioned includes blankets, garbage bags, food, hot drinks. Drinking water is an essential resource. One participant mentioned that it was possible to look for water sources on shore in order to conserve emergency water rations. Food is also important because a lack of food over time will have a negative impact on energy levels, ability to stay warm and morale. Depending on distribution of crew and staff, it may be possible to continue to provide food prepared on the ship. One participant mentioned the possibility of bringing a gas BBQ that can be used on shore.

One should plan for the possibility of staying at the beach camp for a considerable about of time. One participant noted that there should be rotations of all roles to keep people alert. Several mentioned that the people ashore would be divided into groups. One participant stated that every shelter has a leader and must report to command tent and medical tent. A space to keep 295 pax is a large area and management of the area is important, along with distribution of equipment and communications. Some operators would carry out continual headcount on passengers and where they are located.

Psycho-social issues are going to set in after some time and the team needs to be prepared for this. The team also needs to identify leaders and special skills sets within the groups, such as nurses, paramedics, doctors, hikers, etc. Some groups noted that when the beach camp is being established, it can be useful to give passengers simple, supervised tasks, such as carrying tings that will keep them occupied. It was mentioned in one group that if there are uncooperative passengers, crew and staff will have to use best practices.

It was mentioned that it may be possible for an airplane to do an airdrop to provide shelters and supplies needed on the beach. In some regions, voluntary rescue services have portable camps that can be brought within 5 hours. For the time being, it would still be possible to shuttle between beach and vessel.

Inject #4: **1200h Camp Management**

The ferry operation continues and it is nearing its end as the beach is getting full with passengers and hotel staff and other non essential personnel. Camp Management Strategy required; people need to be fed, kept warm and able to use "toilets". Medical concerns (hypothermia, trauma, diabetic shock, etc.). The ETA for the rescue ship, a fellow expedition ship, is 2200h. Wx - 3 degrees C, winds 7 kts NE, overcast.

Summary of action taken:

The captain maintains the overall responsibility of beach camp operations. For legal and insurance purposes and since the beach camp is still a maritime undertaking, the captain is still in charge until all passengers are rescued. Essential crew still remain on the vessel as long as it is safe to stay. In some groups, the ship crew and expedition staff would form a combined team on shore. Other participants would retain the same organizational structure onshore as on-board. Most likely, the hotel department would go ashore, and hotel manager is in command of them there. It was noted that in some cases, the EL is a qualified member of the crew. ELs on smaller operators will not have defined roles and will be responsible for a wide range of tasks. It was also noted that passengers tend to respond better to other passengers, therefore involving them would be beneficial for morale and effective organization.

In some parts of the Arctic, voluntary rescue services may arrive on scene at some point. In such a case, their initial efforts would be coordinated by the JRCC and may take on more responsibility once they arrive on the scene.

Quote: *"As soon as you have misunderstanding, things will go south."*

As a general rule, the captain maintains communication for the SAR operation and communicates with the shore-side. The shore team will typically have handheld satellite radios for external comms and handheld walkie-talkie for contact with the vessel. The EL will often be in direct communication with the home office emergency management team. It was pointed out that the beach team will use handheld iridium phones and that the battery life will not last if there is an 8-10-hour operation with many calls. One participant suggested turning off 60% of the available radios and keep radios warm to extend battery live. If the Zodiacs are communicating due to full abandon ship situation, they would talk to EL via walkie-talkie or long-range portable radio. Some would bring VHF ashore in addition to satellite phones.

The JRCC will try to establish communication to vessel, basecamp and rescue assets, and the home office. Communication with RCCs should be prioritized. Some SAR sector participants were comfortable with several parallel lines of communications. Others would prefer an open conference line with all the involved parties. Another benefit of keeping lines open is to avoid the risk of dropped calls. One option is that a VHF connection with the vessel can be put on a speaker next to the conference line to keep everyone on the loop.

Keeping passengers informed will be important. Some would set up periodic comms with the guests, for example by informing passengers that they will receive updates every hour. This gives time to communicate with vessels and externals to gather information that will be conveyed to passengers. Some would operate with one dedicated information source per group to ensure good communication flow, noting that it is hard to address 300 people on shore.

For the home office, it is important to be on top of external communication. Keeping communication and updates flowing is valuable, even if there are no significant updates or changes. The home office should ensure that consistent messaging and correct information goes to the press and is available on a dedicated web landing page. Regular updates and consistent messaging can also help mitigate rumours and media output from the passengers.

The passengers may also have the means to communicate with people back home and the media. Some participants stated that passengers should not be cut off from communications, while some stated that limited passenger internet access could be considered. Other suggested that it could be beneficial to talk to passengers who are posting social media updates and ask them to consider the confusion such posting can cause.

The different parties involved in the response have different information needs. The home office will want updates on the status of the ship, the condition of the camp setup, mental situation of the passengers and the medical casualties. The captain would be interested in information on how to prepare when the help arrives.

Caring for medical casualties is high on the list of priorities. Participants suggested establishing separate medical tents some distance away to avoid disturbance from other passengers. A medical team would be designated to care for casualties. Vessels often have a ship doctor, nurse or other medical personnel. Vessels often have a well-equipped medical bay. Equipment can be brought ashore including first aid gear, more advanced medical equipment, equipment for hypothermia management, automatic CPR machine, etc.

Different types of arrangements allow the ship doctor to consult with medical contacts shoreside. Medical team would also report medical assessments to JRCC. Critically injured may be airlifted to the closest medical facility. Rescuers can also bring additional medical equipment.

Inject #5: **2300h Expedition Rescue Ship Arrives**

The sun is going below horizon, dusk conditions, but the weather remains favourable - clear but damp, variable light winds, cool. A Ferry operation from shore to ship can start but there is concern for visibility and safety in the dusk/dawn like conditions.

Summary of action taken:

All the groups were again highlighting the importance of keeping an updated manifest for tracking the passengers, and copies for each stage of transfer. Also keeping a logbook was brought up, from the beginning of the incident. Some suggested that a person on the Captain's team could be assigned to this role and it would continue until everyone were evacuated to a rescue vessel. Documentation is important, also for the aftermaths and salvation of the vessel.

Most groups stated that the captain of the distress vessel should maintain as the on-scene coordinator (OSC), and rest was suggesting this should be transferred to either the vessel of opportunity (VOO), the Coast Guard or JRCC.

Quote: ***"We keep the structure as it is. We start as we begun, shipping people back to the vessel"***

The transfer to the rescue vessel was not considered to be a huge challenge, even in low visibility. Majority would decide to transfer with the Zodiacs and pointed out that the Zodiacs have lots of extra equipment, AIS, GPS, lanterns, VHF radios and more. Also utilising the ship horn or use the vessels search lights to guide the Zodiacs from shore, were suggested as possibilities. There were few comments on using lifeboats for the transfer instead of Zodiacs, as lifeboats are part of the emergency procedures whereas Zodiacs are not. Some also recommended transferring life-saving appliances from the vessel in distress to the rescue vessel to mitigate the increased number of persons on board.

All groups agreed on the prioritization/order for evacuating passengers from shore to the rescue vessel. Injured and wet/cold people go first. Then then older and then younger in order of the muster

list, then remaining crew. For airlifting, the most injured and the ones suffering from hypothermia go first.

The groups mentioned several strategies for keeping the passengers and the crew in good shape as mentioned in the previous inject. It was pointed out, that the hotel staff may not be accustomed to extreme environments and one should consider survivor's guilt to be valid for the crewmembers. Another important aspect raised was to keep the guests informed all the time on the decisions made, so they knew what to except for the coming hours.

The home office representatives would start preparing for the passengers to arrive to a safe harbour, looking for hotels for available places for passengers, establish communication with airlines to allow passengers to fly to their homes, also in operators point of view, establish communication to the next passengers/next voyage.

***Inject #6: 0200h Rescue Helicopter Arrives on Scene and* 0600h Coast Guard Vessel Arrives on Scene**

The majority of people have been evacuated from the beach to the second expedition vessel. The rescue helo with an advanced first aid medic onboard and 4-8 person capacity arrives at beach. Nearest airfield and small hospital is 2 hours away, possible jet medevac from there. CG ship is now a 1 hour flight time away as it steams to towards the beach camp site.

The evacuation from the beach is complete with the majority of people from the Polar Proponent now crowded on the second expedition vessel. A number of people have been air lifted by the helicopter for urgent medical care.

Summary of action taken:

At this point, more groups wanted to change the OSC to the Coast Guard vessel or the VOO. However, some still wanted to keep the captain as OSC. One of the arguments for keeping the same OSC, was to avoid misunderstandings. However, as also pointed out, civilian vessels will often want to transfer the OSC task to SAR responders as soon as possible.

There was some discussion in the groups on whether or not to transfer the injured passengers to the rescue ship. Another consideration was that it can be traumatic for people to be hoisted to a helicopter, especially for people with limited mobility. Also, the capacity of the helicopters is decreasing with the severity of the injuries.

Quote: *"Depending on the severity of the injured people, we are able to carry 4-5 patients (with helos). If less injured, we can take up to 20 persons. If there are life-threatening situations, they are the first priorities and we need to fly them to the hospital. This will keep us away for several hours."*

Another option suggested was to send available personnel from the hospital or volunteers such as Red Cross for first aid treatment with the helicopter to the site. The safety of the responders was also a concern at this point.

Communication is still a critical point, especially on how to keep good information flow between the passengers and the crew. The passengers need to be informed all the time on the plan for the evacuation from shore and the next steps. There is also a need for continuously updates to the RCC and the home office on the evacuation plan. Someone noted that the groups should keep in mind that when the helicopter is around, you cannot hear anything, so there is a need for a plan to use hand signal communications.

There was a discussion and some confusion in the groups about the terms and roles of an *on-scene coordinator* and *on-scene commander*. The groups were not harmonized on who was in charge at the beach at this stage. Some suggested the expedition leader should be the *on-scene commander*, this person knows where the helicopter-landing site will be. Some stated it should remain the same person all the time to be able to keep track of the people and who is going where. The rescue authorities noted that the OSC or *on-scene coordinator* for them is an official role or a person who is in charge of coordinating the rescue operation on-scene, including all assets and vessels. *On-scene coordinator* is the official term used in the IAMSAR manual. Some stated that from the moment responding assets (GG vessel) arrive, they should take over the official command.

Tracking of passengers is still a major concern at this stage. Guests and crew are being split into many directions making passenger tracking very challenging. Regarding the care of the passengers and the crew, it was mentioned that the final stages of rescue are the hardest, everyone is getting tired, and it is important to recognize that the distressed expedition staff are tired and need a break. However, the relief of no longer being alone is significant. The home office representative mentioned that you need to do some mental support/debrief for the passengers and suggested to take them all to a hotel, charter a flight to an area to gather them all for a joint debrief.

Quote*: "We cannot send all home at once, that will be irresponsible."*

It was discussed that some consideration should be given to site restoration and clean up. Some of the groups suggested that if the expedition team were doing fine, they could stay behind and sort out the beach and transfer later with coastguard vessel. Others were strongly disagreeing to this, and stated that the priority is safety of passengers, followed by safety of the crew, followed by safety of the ship and environmental concerns.

Captain would need to assert the technical condition of the vessel and if it allows minimum crew on board, also think about pollution, contingency, need to see how things are developing. If it is not life threatening, some crew will remain on board and maintain the ship as much as possible. Actions and responsibility in relation to environmental response would be considered and implemented.

3.3.3 Day 2 discussion

Discussion day 2 with a summary of each group.

Ship officers

Quote: *"We look at both ship integrity and passenger safety at the same time."*

This group discussed that ship officers will follow established procedures in the case of an incident. Roles and responsibilities are established according to SOPs. The captain maintains overall responsibility and can delegate tasks. As per SOLAS/ISM Code, the captain has an overriding authority to act in an emergency in accordance with their best professional judgment and may choose to deviate from SOPs if this is deemed necessary.[1] Expedition staff may be part of the crew. Expedition staff may

[1] SOLAS Chapter IX Management for the safe operations of ships: "5 Master's Responsibility and Authority [...] 5.2 The Company should ensure that the SMS operating on board the ship contains a clear statement emphasizing the Master's authority. The Company should establish in the SMS that the master has the overriding authority and the responsibility to make decisions with respect to safety and pollution prevention and to request the Company's assistance as may be necessary."

be given tasks such as Zodiac driving and setting up beach camp, allowing ship officers to focus on other tasks.

For some operators, SOPs indicate that officers are responsible for setting up shore camp. If beach camp management is delegated to field staff, it may be useful to have ship officers on shore. Their presence may have a positive effect on passengers, who may feel more reassured and respect their authority. Teamwork and communication are essential for every step on the way.

Captain and essential crew will remain on board as long as it is deemed safe. Damage control and vessel rescue will be important tasks for ship officers. The home office can assist remotely with information and interpretation of ship data. Officers are also responsible for maintaining comms with SAR responders and situational awareness.

Home office (groups 1 and 2)

Quote: ***"It is important for the home office to assist without interfering with the Captain's role onboard."***

Throughout the discussion, participants underlined that the home office may provide support and advice, but the captain remains in charge and makes all decisions pertaining to the ship and passengers. The home office can assist with vessel information, stability calculations, information gathering and communications.

The cruise operators may also own the vessel, but this is not always the case. As a result, there may be multiple companies and home offices involved in a response. The expedition staff may or may not be part of the crew, and there may be a need for emergency drills that incorporate non-crew expedition staff. In general, training and drill were highlighted as important.

Quote: ***"If you trust the captain to handle your ship and be responsible for your passengers, you need to trust his/her judgement if there is an incident; and support his/her decision."***

The home office would be kept up to date on development on the vessels and on the beach camp. Different operators have different setups for maintaining communications, ranging from computer-based emergency response programs to conference lines. Communication may be on fixed schedules or through an open line where all involved parties can listen in. Having home office staff with seafaring experience will help the home office understand what is actually happening on the vessel. There may be informal communications as well, e.g. expedition leader contacting home office directly. Ideally, all the affected departments of the home office would get together in one room to ensure that information from different channels end up on the same desk.

Quote: ***"We would not question the expedition leader in the field. You do not distrust your people in the field."***

Home office will generally handle external communications with next of kin and media. Since they will fulfil this role, it is essential that the home office is kept up to date on the status of passengers, casualties, and evacuees. Ideally, home office would coordinate press releases with SAR authorities. Many operators have a dormant webpage prepared in case of incidents and will establish a point of contact for media and next of kin. Some have automated notification systems for next of kin. Posting regular updates helps control messaging. Home office would also carry out media monitoring. In general, home offices underlined that passengers should not be cut off from communications, as it would do more damage than good.

In general, the captain's responsibility ends once the passengers are onboard the rescue vessel. From this point on, the home office will be responsible for the next steps. The home office must prepare logistics of bringing passengers home.

Home office representatives stressed that they would trust and support the decisions of both the captain and the EL. Home office participants noted that this exercise demonstrated how valuable Zodiacs are as a rescue resource. However, operators may face challenges when using Zodiacs as they may become banned or heavily regulated in some regions.

Expedition team

The group was discussing on when the expedition leader (EL) starts the communication with the passengers. All agreed on that the first communication comes from the captain on the ship, he/she is going to be calling for muster. After that, there needs to be a familiar voice to the passengers on the calling system, with extra reminders on bring the gear and their medicines etc. On-scene it's always the expedition team who is in contact with the passengers. They only hear the captain's voice concerning emergencies.

Quote: ***"The Captain can say whatever on the speaker, but it needs to be translated into the language of the guests."***

On the muster station, the guests are first recognising the expedition team. The communication flow between the different departments in the ship (crew, hotel staff, exp. team) regardless of what contract you belong to, is the key to keeping the guests calm, using the expedition team to secure this. The guests will also have a known face and the language skills from the expedition team. Some suggested it should be the assisting EL in charge of the communication, as the EL will be coordinating the transferring from boat to shore. He/She needs to be "fluid" and several places at the same time.

The group pointed out that early in the scenario, there will passengers are on social media, telling their friends/family what is happening. There is a possibility of blocking the bandwidth, to secure the comms from the ship. Based on previous scenarios, there is always someone that thinks that there is a conspiracy and keep digging out dirt. One solution is to cut the Wi-Fi on board until the levels of excitement goes down, to avoid media panicking. However, it was mentioned that one needs to alert people, that this is done to secure the bridge bandwidth and that Wi-Fi will be turned on as soon as it is possible.

The EL representatives agreed not to use the life raft, but rather move people from the muster station to the Zodiacs, in a calm way. All agreed that Zodiacs are the most suitable vessels for most cases and argued that one cannot think about the regulations when you need to evacuate people fast. Some of the groups suggested to lower the lifeboats, to secure the safety equipment in case the ship went down. Another aspect that was raised is that it is faster to get the Zodiacs on the water than lifeboats. In the exercise scenario, participants were informed that evacuation was the preferred course of action, but the vessel was not in immediate danger. Based on this information, many participants suggested that evacuation by zodiac would be the most practical solution. However, SOLAS requires a maximum of 30 minutes for evacuation of a vessel once the signal to abandon ship is given. Had there been an urgent need to evacuate, participants could have come to a different conclusion and prioritized speed over other considerations such as passenger comfort. Some of the groups suggested to bring the life rafts to shore as shelters. The ELs thought this was a great idea but were discussing that they are very heavy and not easy to get off the ship, so it might not work in real-life situations.

Some thought they were abandoning the ship way too early. The ship was still floating, and they were keeping communication control on the ship bridge. This should be controlled from the ship as long as possible, and not jumping to abandoning the ship. An important highlight is that this will always be the Captains decision for the timing of the evacuation.

When on shore, the operation would be run as an excursion, bringing everyone including the crew. The group discussed the importance of a unified command also for shore.

The passengers are normally designated to a Zodiac team on the whole duration for the cruise. All wanted to utilise the Zodiac groups on shore, to keep the guests in smaller groups. They discussed the need for specific stations in each group, for shelters, water, hygiene, food etc. It is important to give potential meaningful jobs for the guest to keep up the camaraderie. It was suggested to make the guests build water and hygiene centre as examples. One can expect fatigue in all positions on the shore side by the end of the exercise and there is only one expedition leader, so it will be important to share the load between the crew and use the capacity of the guests, they have lots of skills.

The importance of keeping track of people back onshore was highlighted. The polar bear threat was discussed, and setting up safe parameters for the camp, including bear guards.

Some in the group were concerned for not having enough shelter or shore survival equipment for everyone. In addition to the communications equipment, even with extra battery, some of the handheld equipment would die. One solution discussed was to bring a small portable fuelled generator for ongoing electricity. This is not part of the shoreline equipment or polar code. Another piece of equipment that was considered to be very useful in this situation were inflatable tents. These specific tents were used at the SAREX-live MRO exercise in 2019, and several of the ELs were participating at this exercise and testing these tents.

Regarding procedures, it was pointed out that the expedition teams do not have a perfect plan for this kind of situation on the beach operation. The ground level organising will be difficult to establish beforehand. The rest of the line (ship – home office) would follow normal procedure.

Quote: ***"If home office reading the plans, have a round table discussion, they don't know what they don't know. It opens up a lot of thoughts to be discussed, with the operations team on board. They probably did not think of having three deep commanding structure."***

All agreed that these kinds of TTXs are one of the best tools to managing stuff, they do not cost a lot of money, especially online versions.

The role of the expedition team in this type of incident was discussed. On some vessels, ELs are not designated on the muster list with a defined purpose. On other vessels, expedition staff are assigned as muster personnel to assist passengers. The marine operations side from the ship's crew, fall under the safety management system, expedition activity falls under the expedition side. An explanation for this is that the expedition team has a high turn-around rate, so the ship crew don't rely on the expedition team for the emergency procedures.

Some argued that the expedition team are more field trained also concerning emergency procedures, some of the procedures should be relayed to them. They also wanted to clarify the role of the EL team in the crisis, and training of the expedition team with handling crisis was suggested.

RCC group

The importance of communications was discussed in this group a lot, the RCC representatives suggested they would like to see changes for JRCC SOPs, suggesting multi-user teleconference set, including ship, home office, shipping company, etc. Also adding early warning SOPs to get good situational awareness.

Several were recognising challenges with the language used – for example *on-scene commander* and *on-scene coordinator* mean something different to each party involved, and it could be an issue if someone is not quite understanding the terminology.

Some people from the ship's crew, and some people from the ship's staff had very different approaches (conflicting approaches at times). The RCC needs to know with whom they are talking at the time of the incident, and they need to know who the main point of contact is in the group once on shore.

One aspect brought up, is that an early classification of the incident would enable the mass rescue operations plan to be applied. It is easier to escalate in early stages and pull back later, than to escalate later. With an early warning, the RCC could send a fixed wing aircraft in the area. It was mentioned that in one of the groups there was an experienced master/captain that was reticent about the severity of the incident. There is a need for the ship to broadcast mayday right away.

Quote: ***"If I hear that this type of vessel is aground, captain gets to declare whatever he wants, but I would make this a mass rescue operation immediately."***

It was suggested to set up a calling schedule, in order to preserve battery life, and open communication lines. There could be changes to SOPs regarding communications plan. Maintaining direct communications from RCC to the ship as long as possible, having ship to shore communications on a separate line, so that unless the situation changes drastically, the shore crew is not burning finite battery life on their satellite phones. Master/Captain could be point of communications, with EL directing camp operations.

Another important point made, is that lack of communications is normal – eg. EPIRB activation. However, the SAR operation does not stop because there are no communications, but the better info you have about the situation, the better decisions you can make. The group suggested that it is good to get the ship's voyage plan early – this would include lists of all the communications equipment and numbers. However, communications with persons on shore would not change the need to have assets on scene. If it is not possible to get a surface vessel or aircraft there early, there is an option to send a fixed wing to act as a communications platform.

RCC would not try to micromanage the organization of the evacuation but would leave this to the ship's captain. They might ask for reasoning for certain actions from the captain.

All agreed that they would immediately want a crew manifest. There was also some discussion regarding casualty tracking mechanisms. Some companies have electronic versions of this whilst some have old fashioned printouts. There is an identified need for checkpoints at each step – casualty tracking at each reception point for the passengers and crew, also as they arrive on the beach. Some pointed out that passengers are to be considered as resources, there can be passengers that can be of use (medical background etc.), and they should be able to capture this in the manifest. If you have an understanding of the passenger makeup and the nationalities, this makes liaising with embassies easier.

Another aspect regarding the evacuation, was using the Zodiacs as evacuation means over life rafts. The RCCs points out that evacuation by Zodiacs is not SOP, the SOPs are based around lifeboats/life rafts. Under SOLAS, the ships will be required to have a certain amount and type of lifeboats. The group also pointed out that some groups were considering they could evacuate via Zodiac in only 30 mins, whilst other groups decided evacuation via Zodiacs would take about 3 hours.

Quote*: "30-minute evacuation by Zodiac is probably unrealistic"*

Regarding this, the group pointed out that muster station areas are designed to accommodate all passengers for evacuation, so there might be a bottleneck at the Zodiac launching point. This will make the evacuation take a lot longer. Another drawback is that the ship will not have the staff to run all Zodiacs. However, the expedition leaders were suggesting using the Zodiacs because passengers were already comfortable with this method however there may not be an urgent need to get off the boat in 30 mins. There was clearly a disconnect between the expedition staff wanting to use Zodiacs and ship safety officer wanting to use lifeboats according to SOPs.

SAR Exercise officers

The group agreed that communication needs to be considered in every inject. The focus early on was on, which conversations are happening at an early stage and whether intentions are being conveyed effectively with SAR operators/stakeholders. This allows the SAR coordinators to plan more effectively.

There are multiple stakeholders to be contacted. RCC, vessel operators, home office etc. Some cruise operators will be in contact with vessel owners before contacting RCCs. Cruise operators typically have checklists and SOPs for emergencies and carry out regular trainings and drills for specific scenarios. The home office can assist the vessel with these emergency procedures and checklists.

The topic of STCW requirements in relation to ELs was discussed as well as their variances between companies. CLIA (Cruise Line Industry Association) set a lot of standards in relation to vessel and crew/employee requirements. While the CLIA compendium of policies does not include standards for STCW training, the model of an industry driven approach for setting standards could be a source of inspiration. This could evolve into a best practice type approach, which could feed into policy.

The Polar Code suggests that you need to be able to survive for 5 days. This implies that you need extra knowledge to survive. Some would say that these requirements have been addressed. The methodology is to abandon ship, enter a life raft and survive. You cannot fulfil the 5-day requirement without extra knowledge. A lack of understanding in relation to what survival actually means from a passenger/customer perspective is also a critical point, which needs further outlook.

Quote: *"The key issue is alignment. The processes on the ship, shore side and with RCCs are aligned to certain degree. Different terminologies pose a number of challenges."*

Challenges were raised in terms of cruise industry knowledge gaps within the senior segments of shore side cruise operators. Senior managers may not be familiar with incident command and management systems. There may be scope and or an opportunity to host industry workshop events designed to educate cruise ship operators on the basics of ICS. The shore side management are a critical component of the rescue process, and consideration should be given to educating these critical stakeholders. Previous TTX's have highlighted the challenges around differences with terminology,

approaches, and understanding of language. Achieving common understanding continues to be a challenge.

Passenger tracking technology was also discussed, and one example was brought up from the Finnish Red Cross, which can facilitate more effective tracking. The need for backup systems such as traditional paper manifests are deemed to be of critical importance as a redundancy measure. The Coast Guard perspective is that, traditional paper lists will continue to be used until a more robust and reliable technical solution is developed. Introducing mandatory measures will always be a challenge, as this will incur additional costs from an industry perspective. In general, there is a challenge here, which needs to be solved. A research innovation is needed, which strikes a balance in facilitating a certain level of robustness and reliability, while also embracing low-tech solutions. More traditional analogue technology could add value here. The scientific community are eager to engage in challenges such as this.

SAR responders

The initial discussion in the group assessed the alerting phase. The group agreed on the value of an early warning, as a lot of tasks will happen with preparations at the base, getting medical team ready and so on. All trusted that the RCCs had a good overview and evaluation of the situation. The group also discussed who to bring to the incident site, keeping most of the medical team either at the helo base or at the hospital, to be able to evacuate as many casualties as possible at once.

Quote: "Communication is always the problem, even if you have the best plans."

Furthermore, the group considered who should be in charge of talking to the RCC from the beach. Some suggested that it should be the captain talking to RCC, to eliminate any error in the conversations. However, if there was a capable EL who had established the camp and is the person in charge of the situation, the EL could be leading the team and help with the medical issues.

When the responders arrive, they should try to seek the one person that is in charge on the beach and has control on the beach and people with the manifest to get the whole picture. One participant mentioned that, if they bring a police officer from Longyearbyen, he would try to establish incident command and keep control of the situation together with the expedition staff, ship's crew and the helo crew. When it comes to running the beach, the incident commanders are trained for it and show strong leadership, but it is to not to step on the ELs toes and their leadership with the guests but the incident commander would also coordinate helo evacuation, coast guard arrival, and bringing doctors and Red Cross personnel. The whole camp set up might change when you bring in new people and help, and the incident commander is in a good position to be in charge of the command structure together with the health personnel that are brought in. The group also agree on the importance of acknowledging the EL that has established leadership and camp on the beach and utilise the valuable information this person has gathered.

The group also discussed the role and appointment of On-Scene Coordinator (OSC) and if the role was necessary for the SAR responders. From the SAR responder's point of view, the OSC role was not necessary, they would communicate with the captain of the distress vessel and the RCC. While this viewpoint was expressed by some participants, it is important to keep in mind that the role of OSC is clearly stipulated in established procedures and manuals, such as the joint IMO's and ICAO's IAMSAR Manual Vol. III, where the position is defined as a "person designated to coordinate search and rescue operations within a specified area."

Something to consider is also the role of an Aircraft Coordinator (ACO). The ACO would be able to do that from one of the helicopters in cooperation with the governor's office if there are multiple aircraft involved.

The group noted that it is important for the SAR responders to get certain type information before going into the scene. First, they wish to find out if any patient is deteriorating, in order to ready the rescue crew on what they are walking into, but also the number of patients and possible cases with hypothermia is of interest. The weather conditions and changes from previously reported conditions is another factor to report to the helicopter pilots.

4 Evaluation

4.1 Initial review and feedback

Following the breakout group sessions on both days of the TTX, the groups convened in the plenary session to review the actions taken and identifying any immediate lessons, best practices, and challenges from the group discussions. All of the exercise participants were also asked to respond to an evaluation survey sent by AECO. This part of the chapter summarizes the feedback from the initial review as well as lessons learned, and best practices found from the evaluation form.

Coordination and command
Captain will have the overall responsibility until all passengers and personnel are evacuated to rescue ship or safe haven.
Role and responsibility of the On-Scene Coordinator (OSC) should be clarified to all parties. - Term On-Scene Coordinator meant different to the SAR authorities and to the expedition group. - Some used the term *on-scene commander,* some *on-scene coordinator*. - Some groups transferred the OSC role when VOO or CG arrived, some kept the same. - SAR responder group noted that perhaps OSC was not necessary to appoint in this case.
Roles, structure and terminology of the Unified Command and Incident Command System (ICS) would be good to understand. - ICS is a standardized hierarchical structure for a cooperative response by multiple agencies - Organize and coordinate response activities without compromising the decision-making authority of local command. - Suggestion to have a seminar to the operators arranged by AECO and SAR authorities on ICS.
Some ELs pointed out that when the professional SAR responders come to the scene, it is a huge relief for them, the crew, and the passengers. - Eases the decision-making. - Some preferred the responders to take over the command.
Passenger/casualty tracking was discussed in all groups. - Several copies of the manifest needed. - Counting passengers several times important, at the muster station, during embarkation, at the beach etc. - Different players/professions use different terms to describe the people needing assistance (Victim/casualty/passenger/patient)
Big operators may have emergency operations centres that run in parallel.

- Important for the SAR authorities to know the role and responsibilities of the home office but also to note that the home office might run its own operations centre.

Cooperation and communication
Importance of early warning - The authorities highlighted the importance of early warning this year too. For the SAR authorities it is important to know about the incident early even if it is under control, so they can start planning as early as possible. Especially in the Arctic as distances are huge, the authorities might start moving assets closer.
Nexus of the captain-RCC-beach site important - Who is in charge of what? - Dissemination of information and communication lines between the three important, who speaks to whom. - Procedures for maintain communications if the vessel is abandoned. Making sure checklists have questions about other forms of communications on-board and capabilities onshore.
Cooperation between the crew and expedition staff is essential. - The captain and crew would most likely rely heavily on expedition staff. - The expedition staff have a good skill set, used to survival on beaches etc. - Staff management is important, so people won't get tired. - Capable passengers can be given tasks. - When everybody is helping out is a motivational point for the other passengers.
Conference call between RCC-home office-captain - One suggestion for more fluent communication and situational awareness was to establish a conference call between the RCC-home office-captain if the connections allow it.
Cooperation between RCC and home office - Home office is a huge information asset and can take away pressure from the captain by liaising with the RCC. - Home office will know what resources they have on board the vessel, how the crew will manage things on board, where the other ships are in the area and what the others have on board too. - Early consultation between SAR organisation and home office on preparations for landing / care / repatriation of casualties to avoid duplication of effort. - Home office will start crisis line for next of kin and streamline information to the public. Home office crisis line for the next of kin will make families more comfortable. - Calling a liaison from the home office to the RCC if possible.
Visits between SAR authorities and companies - Visits between SAR agencies, RCCs and the companies were suggested again this year. - It would be a huge resource if the SAR authority could go on-board the expedition vessels and talk about what resources there are, what procedures does the ship and SAR authority have and so on. Also, a visit to the home office would be beneficial. - The SAR authorities also welcomed the operators to come visit the RCCs or at the moment do conference calls. - The operator participants indicated that the SAR agency and company affairs could be something to formalize in this industry. - Need for regular exercising with SAR entities in countries you go to as a tour operator.

- Have SAR Exercising Officers present on their programs and opportunities for exchanging virtual business cards with AECO members.

Owner-operator-charter relationship

- How are the responsibilities split between owner-operator-charter?
- Depending on the company and business model.

Communication and public affairs

- Ethical discussion on whether to strict bandwidth from passengers, might be relevant if the connection is needed on the bridge.
- Challenge in the Arctic as there is no connectivity, must rely on iridium and what is on the ship. Important to have dedicated comms channels to the operational crew on the ship. Have to be very careful because nowadays people expect to get hold of their loved ones.
- *Best practice from Hurtigruten*: SMS system where they send SMS to the next of kin before they call them, people get anxious so they have time to understand that they might have to wait, calms down the home office pressure when people understand that they will be called, don't need to have an app.

Equipment and training

Training requirements for the expedition staff

- Discussion on whether the expedition staff or expedition leader should have STCW training and can them be used in the emergency response on-board.
- Some thought that the EL would typically not be a member of the crew and not a trained sea farer, so providing them with STCW training would not necessarily make a difference.
- Some companies are looking into the training of expedition staff and understanding if they can have a broader role in emergency response.
- Some said that EL would play a huge role on the beach above the captain, but then some felt that no this would not be it; captain would be in charge.
- Suggestion from the TTX was an EL and ship crew training seminar
- Highlighting this EL training gap to IMO important in order to bridge the gap between the regulations.

Utilizing life rafts on shore

- Most groups agreed that towing life rafts on shore to be used as a shelter was a good idea.

Evacuation with Zodiacs

- Zodiacs vs. lifesaving appliances. Zodiacs are not normally used for evacuation as they are not lifesaving appliances and there are no formal procedures for using Zodiacs for evacuation.
- Most groups would use the Zodiacs as the expedition staff and crew know how to operate them, guests are more comfortable with them and they would be a better alternative for evacuation to shore.
- Would be a major difference if this situation happens to an expedition cruise ship or a normal cruise ship. The places expedition vessels go, they know them well, they do the Zodiac operations twice every day, however with the big cruise ship it would be a different situation.
- Suggestion from operators to highlight this gap to IMO and other regulating bodies.

Having cranes for Zodiacs that operate during blackout

- Need to have generators for Zodiac cranes with emergency diesel. In the case of emergency using Zodiacs, having the power to operate them is essential.

Survival kits

- When operating in the Arctic, mandated to have group survival kits. One operator stressed that they already have equipment to deal with situations like this, shouldn't create other sets of equipment that might not fit on the ship. - *Best practice from Ponant:* Ponant has been developing something called the Ice Cube, which is a container that can be lowered into the water, towed, and brought/slid on ice, beach or any ground. In the Ice Cube they have a lot of equipment to survive up to 5 days, specific shelters to carry 60 souls, food and water, equipment to produce water in several ways and making sure it doesn't freeze, cooking sets, comms equipment, PLBs for several days, satellite phones, etc. They have 8 ice cubes, linked to how many guests and crew on board.
Passenger tracking - Passenger tracking technology was discussed and found that there is still a gap in development and adoption of this technology. - Vessels do not normally have PLBs so these are not typically used on board as tracking systems.
Use of drones - Drones could be used overhead to improve communications, act as a repeater or beaming Wi-Fi, or used for better situational awareness.

Preparedness and planning
Survival camp management guidelines - There are gaps in current procedures, which have to be identified and find solutions to create best practises for shore evacuation. - Beach rescue plan for on shore operations, some companies did have that, other companies did not, and most of them committed to follow up on that and find what duties they have for ship's crew. - Evacuation to beach or ice plan that is focused on giving crew members specific tasks as well. - Some pointed out that during the covid-19 situation, this would be a good time to do a smaller TTXs on this and have AECO do guidelines on emergency management camp, input from ELs and other professionals. - Making AECO guideline or a standard was suggested on what the beach camp could look like.
Environmental response - Many groups were stressing the importance to start assessing the environmental damage and planning the response early on.

4.2 Exercise objectives and findings

The exercise was given strategic, operational, and tactical objectives. This part aims to assess whether the exercise objectives were met and discussed during the exercise. The key findings are summarized under each objective.

4.2.1 Strategic objective

Table 3. Main take-away to the strategic objective

STRATEGIC OBJECTIVE

SO1: AECO members, SAR professionals and Academic experts conduct a TTX in order to determine the challenges, constraints and opportunities involved in the evacuation of passengers and personnel from a vessel that is aground but unstable, to nearby land. There, a short-term base camp must be established to ensure all can be safe and protected until rescue arrives. Rescue is initially and for the most part in the form of another expedition cruise vessel but eventually it is supported by professional SAR responders.	The strategic objective of the exercise was met. The AECO members, SAR professionals and Academic experts successfully conducted and participated the TTX and identified challenges, opportunities, and standardization gaps for establishing a short-term survival camp to nearby land.

4.2.2 Operational objectives

Table 4. Main take-aways to the operational objectives

OPERATIONAL OBJECTIVES	
OO1: Identify, evaluate and confirm communications means used and procedures followed with rescue services and between ship-based personnel, vessel, small boats and shore camp personnel.	This objective was met. Communication means and procedures were addressed and processed during the discussions. Recommendations were made, see the final chapter of this report.
OO2: Identify, evaluate and confirm abandon ship procedures as they relate to authorities and support roles for ship crew and field staff	This objective was met. The participants identified the persons in charge, evaluated and discussed different procedures and options from authorities', ship crew's and field staff point of view.
OO3: Identify, evaluate and confirm the use of lifeboats, life rafts and/or Zodiacs for the transportation of passengers and crew from a stricken vessel to safe shore location.	This objective was met. Benefits and challenges with the use of each transportation mean were considered and evaluated.
OO4: Identify, evaluate and confirm the safety and emergency equipment that can be transported to and used at the shore base camp.	This objective was met. There may be gaps in equipment on board, but also constraints on space and effectiveness. The effectiveness of the Polar Code requirements was also brought up.
OO5: Identify, evaluate and reconfirm effective survival procedures and rescue strategies for persons stranded on land due to unforeseen circumstances and responding non-government rescue parties	This objective was met and was one of the major topics of the discussions. Recommendations were made as to developing a standard procedure. The industry, academia and responders continue to evaluate and address these guidelines.
OO6: Identify, evaluate and confirm effective cooperation and collaboration protocols between all parties in incident	This objective was met. The design of the TTX itself allowed this objective to be fulfilled. One of the major recommendations again this year, was to continue

response – ships' crew, expedition staff, rescue professionals.	advocating for pre-season meetings and exercises between the companies and the rescue authorities.

4.2.3 Tactical objectives

Table 5. Main take-aways to the tactical objectives

TACTICAL OBJECTIVES	
TO1: Ship's Crew contacts Rescue Coordination Centre in a timely manner using predetermined communications equipment and protocols and ongoing communications strategy is established.	In most cases, the RCC was contacted quickly and effectively, although different viewpoints were discussed again this year and the authorities stress the importance of early alarm even if not yet an emergency. In most cases, ongoing communication strategy was established.
TO2: Ship's Crew in collaboration with Field Staff, carry out an effective ship abandonment process – mustering and movement of persons and survival materials from ship to shore.	This objective and topics were extensively discussed, and recommendations can be found throughout the report.
TO3: Ship's Crew and Field Staff manage an effective and efficient passenger and crew tracking system.	Gaps found in the tracking systems. On-going challenges show that through collaboration and cooperation, a technical and administrative solution must be pursued.
TO4: Field Staff with Ship's Crew establish a base camp for all persons providing shelter, warmth, food and water as well as predator protection and medical services.	Having the materials, resources, and standard procedures available to establish a functional basecamp for a large number of people remains a challenge. On-going discussion and evaluation must take place.
TO5: Field Staff, Ship's Crew, RCC and Rescue Parties collaborate to plan a survival and rescue strategy	Through established communication, various players collaborated to coordinate an effective survival and rescue strategy.
TO6: Ship's Crew, Field Staff and Rescuing Vessel Personnel carry out effective secondary evacuation of persons from shore base camp and accommodate them aboard while en-route to nearest port.	Discussed extensively and appropriate evacuation plans were presented.
TO7: Home Office, Local Liaison and others discuss logistics of moving passengers and crew south, but first to a larger community to await third evacuation.	The home office clearly recognized their support role for the captain and EL as experts on site, and their focus was on providing options and solutions once passengers were on shore and required accommodation and travel home.

5 Recommendations and way forward

Based on the key takeaways from this and last year's exercises, the report recommends that the organizers and participants review the findings occurring in the TTX reports and draft initiatives to

follow-up on these lessons. For next year's TTX or for future learning, it would be interesting to survey, which of these lessons have been learned and implemented, and what the major barriers for uptake are.

One of the main highlights from this year when it comes to operator and authority cooperation, was the suggestion for the SAR authorities to visit the operators and companies and go aboard their vessels to discuss equipment, procedures, roles, and capabilities. The SAR authorities also welcomed the operators to visit their RCC facilities. With the current pandemic situation, one idea could be to arrange virtual tours of the AECO partners' vessels to explain the capabilities to the authorities. When it comes to cooperation and communication between the RCC and home office, one suggestion from this TTX was to establish a conference call between the RCC, tour operator and vessel owner, to keep the communication lines open. This could be done as a short command post exercise (CPX) between the companies and the SAR authorities to review the procedures and evaluate the SAR cooperation plans.

In previous years, the joint Arctic SAR TTX event has also included workshops and presentations as a part of the event before the actual exercise. For the next event, one idea could be to address the education needs, namely Incident Command System and STCW, identified in this exercise with workshops prior to the TTX. Furthermore, if the survival camp set-up is still of interest, perhaps AECO could arrange a live streaming from a smaller exercise based on an AECO model/guideline as a part of the TTX that the participants could comment on.

It is important that the lessons learned from these exercises do not end up on the shelf but are being reviewed by the operators, SAR authorities and AECO. Therefore, this year's report introduces few recommended action points based on the findings from this year's and previous years' reports.

5.1 Recommended action points

Operators

- Take advantage of improved internet coverage and bandwidth to enhance communications, improve access to text based operational systems, and access to tools and resources such as ice maps.
- Consider backup alternatives (e.g. printed material and manual checklists) that can be used if electronic equipment cannot be used.
- Consider need for additional redundancy and alternatives to supplement communications equipment, e.g. duplicate equipment, multiple technologies, relay possibilities.
- Review SOPs in light of rescue authorities' wish be notified as early as possible in order to assess the correct level of response.
- Review or consider SOPs and equipment for survival camps.
- Consider whether current SOPs and training of crew and staff are optimal when it comes to ensuring information flow and emergency response on-board (e.g. between bridge and expedition crew, vessel and SAR responders, home office and SAR responders, with consideration of the high demand on the Master's time and availability for comms)
- Invite SAR entities on board vessels learn more about vessel capabilities and procedures.
- Engage in dialogue and exercises with SAR entities.
- Consider the provisions outlined in IMO MSC.1/Circ.1184 on "Enhanced contingency planning guidance for passenger ships operating in areas remote from SAR facilities".
- Be part of live exercises where equipment is tested in realistic conditions.

- Testing and familiarization of survival equipment - Expedition staff, crew, and passengers as routine part of operations.
- Ensuring emergency power for cranes to lower Zodiacs.

SAR entities

- Consider how to take advantage of improved internet coverage and bandwidth to enhance communications with vessels.
- Visit expedition cruise vessels at port and meet with home office representatives to learn more about vessel capabilities and procedures.
- Engage in dialogue and exercises with industry.
- Be part of live exercises where equipment is tested in realistic conditions.
- Consider possibilities for how expedition crew can assist the responders.
- Consider possibilities of interaction (such as conference calls) with the home office about external communication plans regarding an ongoing incident.
- Consider opportunities for exchanging virtual business cards with AECO members.
- Recognize that SAR Exercising Officers may be one of the best avenues to carry over lessons learned from TTXs from one year to another, to implement them immediately and distribute lessons learned widely.
- Have any reports distributed to others within SAR families so that this information is more widely distributed than only those attending the AECO TTX.
- Bring in more academics that are studying these issues (ie. Maximum expected time of rescue, etc.) so that they are better informed with regards to studying and interpreting SAR challenges in Polar environments.

AECO

- Facilitate platforms for dialogue and cooperation between operators and SAR entities.
- Facilitate exchange of knowledge, best practices, and information about technological advances within the industry.
- Liaise with SAR entities, policymakers, and academia to ensure that procedures, research, and policy is informed by expertise and lessons learned.
- Develop recommended standards for beach camp/survival camp SOP.
- Organize seminars between the SAR authority and the companies on topics/gaps identified in these exercises (i.e. Incident Command System, STCW etc.).
- Consider possible topics for projects and find possible funding instruments and partners in the network for any key findings that arise from the TTX reports.

6 ANNEXES

6.1 Agenda

6.2 Details for technical hosting of the TTX

The Joint Arctic SAR TTX 2020 event was originally planned as a live, in-person event. However, due to the COVID-19 pandemic and a standstill in international travel, it was decided by the event organizers to host the event virtually. AECO managed the technical logistics of hosting this event. The following chapter outlines AECO's experience with transferring the Joint Arctic SAR TTX 2020 into a virtual event.

Selecting an online meeting platform

Various online meeting platforms were considered (e.g., GoToMeeting, Cisco WebEx Meeting Center, etc.) for the Joint Arctic SAR TTX 2020, however; the final decision was to use Zoom Video Communications (referred to as "Zoom" from this point on). This decision was made for several reasons, including: the need for Breakout Rooms, the connectivity (e.g., ability to use dial-in for audio should internet connection fail) and the popularity of Zoom (many people are already familiar and comfortable with the platform which would enable a smoother meeting).

Terminology

It's important to understand that there can be some confusion regarding the terminology. In order to have a successful virtual event, it is essential that all participants understand the terminology. For this chapter, the following terms will be used:

- Host - The person who created the Zoom meeting link and is responsible for overseeing the technical functions of the meeting behind the scenes. There is only one Host of the meeting.
- Co-Hosts - Those with technical responsibility, although these roles have limited technical abilities compared to the Host. At the start of the meeting, the Host assigned all the AECO Secretariat as Co-Hosts.
- Moderator - The person leading the meeting and, for example, giving instructions and direction.

The AECO Secretariat had the roles of Host and Co-Hosts for the Joint Arctic SAR TTX 2020 and the lead Moderator was Peter Garapick (Quark Expeditions). Each Breakout Room was also assigned a moderator and notetaker, referred to here at the "Breakout Room Moderators" and the "Breakout Room Notetakers".

Registration

Participants registered for the event on AECO's website. Participants were asked to input their name, title, and email. Participants also had to consent to their personal information being stored in accordance with GDPR and agree to the non-disclosure agreement; thereby agreeing to not record or live-stream the event or disclose any sensitive information.

Participants were also informed that they would need to have a Zoom account for this event. Typically, you do not require a Zoom account to join a Zoom meeting, however; in order for participants to be pre-assigned to a Breakout Room, having a Zoom account was necessary. Unfortunately, the Breakout Room pre-assignment did not work as well as anticipated, see the "Lessons learned" section for more information.

Information sent to participants prior to the event

Zoom instructions for participants

When a participant registered for the Joint Arctic SAR TTX 2020, they were sent an email reminder to sign up for a Zoom account (free) and a document outlining how to use Zoom. This document was sent to participants a second time a few days prior to the event and contained the following information:

- A link to Zoom's Help Center for instructions on how to join a Zoom meeting and how to create a free account
- When to expect to receive the Zoom link and password
- How to change the screen name
- Request to have the video on during the meeting
- Notification that a Waiting Room must first be entered prior to joining the meeting
- How to ask a question or making a comment using Zoom's 'raise hand' function and in-meeting chat
- What to do if technical issues are experienced during the meeting

Zoom meeting link and password

Access to the meeting was passcode protected - a different meeting link and password was sent for the first and second days of the event. These links were emailed to registered participants within 24

hours of the start of the event. This procedure was used to reduce the risk of security issues and cyberattacks.

Zoom set up (pre-event)

Settings

When creating the Zoom link, the appropriate Zoom settings were selected based on the requirements of the Joint Arctic SAR TTX 2020 event, including:

- Creating a Waiting Room (see the "Zoom waiting room" section)
- Requiring a meeting passcode
- Making all participant's videos turned on when joining the meeting
- Making all participants automatically muted when joining the meeting (i.e., microphone off)
- Allowing participants to chat with everyone in the meeting
- Disable screen sharing for participants and enabled screen sharing for the Host and co-Hosts
- Alternate Host was selected (see the "Contingency planning" section)
- Breakout Rooms (see the "Zoom Breakout Rooms" section)

Zoom Waiting Room

Prior to joining the meeting, participants entered a "Waiting Room" which included a reminder of the non-disclosure agreement and proper etiquette that participants were expected to follow. The text was as follows:

> *As a common courtesy, the organizers kindly ask:*
> *- Your screen name to include your name and affiliation*
> *- Your video to be ON*
> *- Do not disclose, record, or stream non-public information shared in connection with this meeting*
> *- Do not providing access to this meeting to anyone not registered*

Zoom Breakout Rooms

The pre-assignment of participants to the virtual Breakout Rooms should have allowed for an easy transition from the main meeting room to the Breakout Room. A designated file format, using the template offered by Zoom, was used to create the virtual Breakout Rooms and pre-assign participants to these rooms. Unfortunately, this pre-assignment did not work as expected and is not recommended for future events (see the section on "lessons learned").

It should be noted that Zoom Breakout Rooms can be created, edited, and managed during a meeting, however; it was decided to pre-assign participants to the Breakout Rooms due to the large number of participant and time it would require to manually assign individual participants to their designated room during the meeting.

Meeting with the Note-takers and Moderators (pre-event)

A meeting with the lead Moderator and the Breakout Room Moderators as well as the Note-takers was held to review the technical logistics and ensure that everyone was informed.

Roles and tasks of the AECO Secretariat (during the event)

Prior to the event, specific roles and tasks were assigned to individual AECO Secretariat members to take on during the event. Details regarding these roles and tasks are outlined below.

Admitting participants from the Waiting Room into the meeting

Both Host and Co-Hosts have the technical capabilities of admitting people from the Waiting Room into the meeting. A participant list was shared with the Host and Co-Hosts prior to the meeting and only participants who had a screen name which matched the participants list were allowed to enter the meeting. When a participant in the Waiting Room did not have a recognizable screen name, a chat massage was sent to the Waiting Room with instructions on how to change their screen name and instructions to email aeco@aeco.no if they were having technical problems in changing their screen name. AECO could then use email verification to confirm a participant's identity. The task of messaging the Waiting Room as assigned to one co-Host and the task of monitoring AECO's email was assigned to a different co-Host.

Asking participants to change screen name and turn video on

One Co-Host was responsible for sending a direct message to participants who had missing information from their screen name (e.g., affiliation) or did not have their video on. To make this quicker, a standard massage was drafted in a word document and copied to the chat.

Advising the Moderator when the meeting is ready to begin

Admitting participants from the Waiting Room can take some time, therefore; one person was responsible for informing the Moderator when the majority (approx. 80-90% of the participants) had been admitted into the meeting from the Waiting Room. At this point the Moderator could begin the meeting. At the Joint Arctic SAR TTX 2020 this role was assigned to the Host.

Managing questions from participants

Participants had two options should they wish to ask a question or make a comment: use Zoom's 'raise hand' function to indicate that they would like to speak or send an in-meeting chat to the Host of the meeting. Therefore, the Host of the meeting was responsible for copying the questions/comments in the in-meeting chat and sending them to the Moderator using a direct in-meeting chat. The Host also sent a direct in-meeting chat to inform the Moderator of any 'raised hands' (although this role could technically be performed by any of the co-Hosts). This method was very successful for a few reasons. Firstly, with a large quantity of chat messages, it was important that the Moderator was focused on facilitating the event and did not spend time reading through the chat messages. Therefore, having only one person (in this case, the Host), send only the relevant information to the Moderate ensured that the Moderator could focus on the conversations and questions. Also, using this method ensured that the Moderator had the correct order of participant's questions/comments based on the time they were asked via the chat or raised hand function available in the chat.

Technical logistics PowerPoint presentation

Someone from the AECO Secretariat was responsible for giving a PowerPoint presentation at the start of the Joint Arctic SAR TTX 2020 on the technical logistics of the event. This presentation outlined similar information as was emailed to participant prior to the meeting (see the "Zoom instructions for participants" section). A detailed presentation was given on the first day of the event and a short version was given on the second day. A key point here was a reminder to participants was to not exit the Zoom meeting during the health breaks but to simply turn the video and microphone off. If participants were to exit the Zoom meeting it would require a re-admission from the Waiting Room and a re-assignment to the appropriate Breakout Room, which would be lengthy.

"Watch dog"

Four AECO Secretariat staff were assigned the role of “Watch dog”. On occasion, during larger and/or longer online meetings, people can get distracted and forget that their video is on. Therefore, the aim of this role was to observe for any inappropriate behavior or activity. The Co-Hosts assigned to this role cycled through the videos of the participants every few minutes. If something inappropriate was witnessed, the Co-Host would turn the video of this participant off and send a direct message to the participant. Should there be any difficulties in turning the video off, the Co-Host was prepared to send the participant to the Waiting Room or remove them from the meeting.

Assigning participants to their designated Breakout Room

Only the Host role of Zoom meetings has the technical ability to manage the Breakout Rooms, therefore; the task of ensuring participants have been assigned correctly to their designated Breakout Room must be done by the Host.

The Host also ensured that an empty Breakout Room was created which could be used by the Breakout Room moderators and note-takers. The Host moved the Breakout Room moderators and note-takers to this extra Breakout Room during the breaks.

Sending reminders to the Breakout Room Moderators

The Breakout Room Moderators were responsible for injecting information into the SAR TTX scenario at specific times. In order to keep all group on track and on time, the Host of the meeting broadcasted a message to the Breakout Rooms at the specific inject times informing the Breakout Room Moderators to add new information. Only the Host has the technical ability to broadcast messages to the Breakout Rooms; therefore, Co-Hosts could not take on this role.

The Host also broadcasted a reminder to the Breakout Rooms prior to the health breaks to remind participants not to exit the Zoom meeting but to turn the video and microphone off during this time.

Technical issues

Participants were informed (in the document that was sent by email prior to the meeting and during the Technical logistics PowerPoint presentation at the start of the event) to either email AECO or send an in-meeting chat to the Host should they require technical assistance. One AECO Secretariat was responsible for monitoring the aeco@aeco.no email and the Host was responsible for monitoring the in-meeting chat.

On one occasion, participants in a Breakout Room used the Zoom function which asks the Host to enter the Breakout Room and assist.

Contingency planning

A contingency plan was made prior to the event which included plans for:

Issues with the Breakout Rooms

Should issues with the Breakout Rooms arise during the meeting, separate Zoom meetings would be created, and the Zoom links would be emailed to the participants. For this reason, a list of the participants and their assigned Breakout Room was sent to all participants prior to the meeting. It would not be possible to send individual Zoom link to each participant; therefore, participants would have to know which Breakout Room they were supposed to be in and could access the appropriate Zoom link, should the Breakout Rooms fail.

Issue with Moderator joining the meeting

Should the Moderator have connectivity issues, the Moderator would call into the meeting using the dial-in function. A backup Moderator was appointed should this also fail.

Technical issues experienced by the Host/Co-Hosts

An alternate Host was inducted in the Zoom settings when the meeting was created, and this person was prepared to take on the tasks of the Host should the Host have technical issues. All Co-Hosts were prepared to take on the role/task of another Co-Host should a Co-Host experience technical issues.

Backup communication

The Host and Moderator as well as the Host and Co-Hosts agreed to communicated using Zoom's in-meeting direct chat. However, there were concerns that the in-meeting chat would be 'busy' since participants could ask lots of questions or have lots of technical problems, which would also appear in the chat. Therefore, it was agreed that urgent chat messages would be sent using Skype, if need be.

Lessons learned

Breakout Room pre-assignment

The pre-assignment of participants to the Breakout Rooms did not work well; only about 20% of participants ended up being automatically assigned to their designated Breakout Room. This required the Host to manually assign participants at the beginning of the event which took some time and caused some delays. The reason behind this is still unclear, it's possible that restrictions on government employees to use Zoom meant that many participants did not register for a Zoom account. It also possible that a technical glitch occurred where participants not signed into their Zoom accounts caused those participants to not be 'recognized' by the Zoom pre-assignment. On the second day of the event, there was about 30 minutes where all participants were in the Main Room, prior to joining the Breakout Rooms. This was enough time for the Host to manually assign participants to their designated Breakout Rooms. An important note here is that this manual assignment was challenging for any participants who did not have a screen name matching their registration name.

Recommendation: It is not recommended to use Zoom's Breakout Room pre-assignment function. The recommended option is for the Host to do this manually at the start of the meeting and develop an agenda for the event which has enough time to allow the Host to do this. For an event with 80 participants this would take approximately 30 minutes. Should this method be used, it would be beneficial to inform participants prior to the meeting to ensure that their Zoom screen name matches the name they used in their registration. It is recommended to start the event with a presentation in the plenary session which would allow time to assign participants to Breakout Rooms.

Changing the Zoom screen name in the Waiting Room

Several participants had difficulties changing their screen name in the Waiting Room. This required participants to exit the Waiting Room, log into their Zoom online account to change their name and then re-join the Zoom meeting link. It is much easier and simpler for participants to change their screen names once they are admitted to the meeting.

Some participants reported that they were unable to change their screen names in the Waiting Room using the method described above. In these cases, AECO asked participants with unidentifiable names to email AECO to confirm their identity. Once their identity was confirmed, they were admitted into the event and could change their screen names using a much simpler method.

Recommendation: Admit people with first names that could plausibly be a participant at the meeting. For example, if there are multiple people with the first name "John" registered to attend and there is a "John" in the Waiting Room, admit this person (using your judgment) and once admitted, send them a direct message to change their screen name to include their full name an affiliation. If they do not change their name and if their video is off and their identification cannot be confirmed, this person should be sent back to the Waiting Room.

When a name in the Waiting Room looks computer generated or is not plausible based on the registration list, a message should be sent to the Waiting Room with instructions to email AECO to confirm their identity.

Confusion with terminology

When organizing a virtual event, a key foundation is to ensure that everyone understands the terminology and there is no confusion between what is virtual and what is real. For example, when participants are asked to "raise their hand", this means that participants should use the 'raise hand' function and a virtual hand symbol will appear on the video screen, however; some participants may raise their actual hand which may not be noticed in a large meeting. Additionally, in the Joint Arctic SAR TTX 2020, there was some confusion among participants between being in the same physical room versus being in the same virtual Breakout Room. Some participants joined the Joint Arctic SAR TTX 2020 together with their colleagues while sitting in the same room/office (i.e., there were multiple people on one video screen and joining via one Zoom account). This proved to be a problem for the participants who were assigned to different Breakout Rooms. Last minute changes to the Breakout Room participants were needed to be made.

Recommendation: Information regarding terminology and in-meeting functions should be communicated to participants prior to the meeting and in a presentation at the start of the meeting. Should another Joint Arctic SAR TTX event be organized digitally; it should be required that each participant join alone or provide more clarity that participants joining together must be part of the same Breakout Room.

Sending an iCal appointment to participants

When attending a Zoom event, participants typically receive a meeting invitation via email which is automatically inserted into a calendar (e.g., Outlook Calendar or Google Calendar). For this event, a meeting invitation was not sent due to it being GDPR non-compliant. However, it has since been learned that an "iCal appointment" can be created for the event and emailed to participants, which does not conflict with GDPR regulations. Part of the importance of doing this is to ensure there is no confusion when converting zone times.

Recommendation: Email an "iCal appointment" as an attachment to registered participants to ensure the date/time is properly indicated in participants personal calendars.