

Fourth Joint Arctic SAR TTX



2019 EXERCISE REPORT



Association of
Arctic Expedition Cruise
Operators

AECO 



Title: Report from the Fourth Joint Arctic SAR Workshop and TTX

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Summary: The Fourth Joint Arctic Search and Rescue (SAR) workshop and table-top exercise (TTX) was held April 9–10, 2019 in Reykjavik, Iceland. The event was organized by the Association of Arctic Expedition Cruise Operators (AECO), the Icelandic Coast Guard, and the Joint Rescue Coordination Centre (JRCC) North-Norway. The event included presentations, group work and the tabletop exercise.

The Joint Arctic SAR TTX 2019 “Stranded!” was developed and led by the Canadian Coast Guard. The exercise focused on determining challenges and opportunities for passengers and personnel to survive a period of time stranded on land away from the cruise vessel and to evaluate and execute options for self and assisted rescue. Further aims for the TTX were to assess survival equipment, creating and evaluating survival plans, and maintaining effective communication and working relationship between the expedition leaders, the ship and the rescue authorities. The exercise groups included tour operators, ship operators, responders and rescue authorities.

Cover photo by Canadian Coast Guard.

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List of acronyms

ACGF	Arctic Coast Guard Forum
AECO	Association of Arctic Expedition Cruise Operators
ARCSAR	Arctic and North Atlantic Security and Emergency Preparedness Network
EL	Expedition Leader
EU	European Union
IMO	International Maritime Organization
JRCC	Joint Rescue Coordination Centre
LNG	Liquefied Natural Gas
O-VRAT	Off-Vessel Risk Assessment Tool
RCC	Rescue Coordination Centre
SAR	Search and Rescue
SMC	Search and Rescue Mission Coordinator
SOLAS	International Convention for the Safety of Life at Sea
SOP	Standard Operating Procedure
SRR	Search and Rescue Region
SWOT	Strengths, Weaknesses, Opportunities, Threats
TTX	Table-top Exercise
VHF	Very High Frequency

1 EXECUTIVE SUMMARY

The fourth Joint Arctic Search and Rescue (SAR) workshop and tabletop exercise (TTX) was held April 9-10, 2018 in Reykjavik, Iceland. The event was initiated by the Association of Arctic Expedition Cruise Operators (AECO) and the Icelandic Coast Guard in 2016 and is a cooperation project between AECO, the Icelandic Coast Guard and the Joint Rescue Coordination Centre (JRCC) North-Norway. The event is composed of presentations by experts in the field of SAR, Arctic cruise industry, and the academia, and a tabletop exercise where all participants contribute to the solution of a specific scenario. The event is unique in bringing together a broad group of experts from the cruise industry, the Arctic SAR community and academia.

The Joint Arctic SAR TTX 2019 “Stranded!” was developed and led by the Canadian Coast Guard. The exercise focused on determining challenges and opportunities for passengers and personnel to survive a period of time stranded on land away from the cruise vessel, and to evaluate and execute options for self- and assisted rescue. Further aims for the TTX were to assess survival equipment, creating and evaluating survival plans, and maintaining effective communication and working relationship between the expedition leaders, the ship and the rescue authorities. The exercise groups included tour operators, ship operators, responders and rescue authorities.



Photo 1: All participants at the Arctic SAR TTX

1.1 Main take-aways

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

Survival plan	Communication	Coordination and cooperation
SOPs should be established for shore survival and stranding scenarios.	Opinion on early alarming and calling for external assistance was somewhat different between the operators and the rescue authorities.	Important to utilize EL's situational understanding and knowledge of the passengers' condition during response.
Available survival equipment and shore stranding kits should be listed, reviewed and evaluated. Limitations of the available equipment could also be discussed in more detail.	Rescue authorities emphasized that they want to be notified as early as possible in order to assess the correct level of response.	Need for the rescue authorities and operators to better understand how the other assesses the seriousness of a given situation.
A detailed plan on how to establish a camp site on shore could be developed further.	Important to discuss in further detail the situational reports between the ship and the rescue authority, and between EL and ship.	Operators felt that they need to be self-reliant, rely on their skills and training.
It is important that the expedition leaders take on a leadership role, divide tasks, ration food and water, and keep people moving. This is crucial for good morale.	Limitations with communications equipment, i.e. battery life, require planning and a back-up plan.	Operators wished to know more about how they can assist the responders, for example with preparing shore-based landing sites for helicopters and doing triage.
The authorities found reassuring that the operators have good competence on this and were surprised by the amount of equipment on-board.	Planning for next exercise should focus on specific gaps in communication and pose targeted questions to the participants.	Need to give more time to discuss these point in future exercises, so that procedures and protocols can be reviewed and evaluated.
The exercise timeline and structure did not allow the participants to fully discuss survival and self-rescue plans. These should be discussed further in the next TTXs.		

1.2 Next TTX

The Fifth Joint Arctic SAR Workshop & TTX will be held April 15th – April 16th, 2020 in Reykjavik, Iceland. Please see <https://www.aeco.no/events/> for program and registration.

2 Summary of presentations

The workshop was opened by Iceland's minister of Tourism, Industry and Innovation, **Pórdís Kolbrún R. Gylfadóttir**. She pointed out the importance of bringing all relevant actors together, with the common goal of increasing safety for those who navigate in the Arctic waters. The pressure on the Arctic Ocean is increasing, with increased tourism and infrastructure. With that in mind, safety and SAR is extremely important.



Photo 2: Icelandic minister of Tourism, Pórdís Kolbrún R. Gylfadóttir opened the workshop

After sponsors welcome, **Frigg Jørgensen** from **AECO** presented facts and figures on the Arctic cruise tourism. There are 30 more expedition cruise vessels in production, and this will introduce both new operators and activities in the Arctic waters. These new vessels will have both submersibles, drones and other equipment with them. Further, the guidelines for AECO-members were presented, including the new site-specific and community specific guidelines. AECO has a lot of activities that enhance safe and environment friendly cruise traffic in the Arctic Ocean.

The Icelandic Coast Guard, represented by **Captain Auðunn Kristinsson**, had a presentation on the activity in the Arctic Coast Guard Forum (ACGF). The ACGF was established in 2015 and have had several achievements, including increased cooperation between the member countries, development of common standards and procedures, and several common exercises.



Photo 3: Paul Craven, RCCNZ, presenting a ship in distress, trapped in sea ice in the Antarctic Ocean

Paul Craven from the **rescue coordination centre New Zealand** presented SAR in the Antarctica. New Zealand has a very large search and rescue region, hence New Zealand "winning" the competition on area coverage. They are responsible for 30 million square kilometres, equal to the area from the North Pole down to the middle of Africa, covering the complete European continent. He presented examples on rescue missions and the limitations in assets they have in the Southern Ocean. Rescue by helicopter is not an option in the Antarctica and icebreakers are few, if any. This makes SAR in these areas

extremely challenging. RCC New Zealand is meeting these challenges by a system showing all activity in this area, mapping all possible ships of opportunity, and a high focus on training and exercises.

Torry Sakkariassen presented the new hybrid ships from **Hurtigruten**. These ships are built for expedition cruises that let the passengers get closer to nature and wildlife experiences. They have large battery packs, which enables them to go silent and emission free for long periods. With regards to SAR, he presented the "Safe Return to Port" (SOLAS requirements) and the technology and equipment the ship has to meet to fulfill these requirements.

Edda Falk presented a new risk assessment tool, called Off-Vessels Risk Assessment Tool (O-VRAT). This is a mobile application, developed by **AECO**. This app allows you to do risk assessment offline, and is linked to site-specific aspects. It also takes the human factor in account. Edda demonstrated the app and the different functionalities that “forces” the user to think about different risk elements. This could be for instance weather aspects, passengers’ language, environmental aspects and polar bear danger. The O-VRAT app will be tested during 2019 cruise season.



Photo 4: Snorre Hagen is showing photos of the icing on the shrimp trawler «Northguider»

Pilot **Snorre Hagen** from the helicopter company **Lufttransport**, presented their mission with the shrimp trawler *Northguider*. This ship grounded at Hinlopen strait on the north side of the archipelago, between Spitsbergen and Nordaustlandet. It was 28th of December, meaning polar night – complete darkness and temperatures around -26°C. In addition to being in an area with scarce or no coverage on either iridium, VHF or mobile, the conditions for the rescue mission were extremely challenging.

Professor **Ashraf Labib** from **University of Portsmouth** took the audience through some cases on “learning from failures” and techniques for decision analysis. This has been a topic for a previous workshop in the EU-funded project ARCSAR. He talked about using these techniques to analyse oil spill disasters like Piper Alpha and Deep Water Horizon and for large fires, groundings and nuclear disasters. With learning from failure, we can improve procedures and incorporate techniques that can prevent similar incidents in the future.

The cruise operator **One Ocean Expeditions** presented a case where their cruise vessel had been involved in an incident. The operations director, **Aaron Lawton**, told the story of their cruise vessel *M/V Akademik Ioffe* that grounded in Canada’s Northwest Passage. They got assistance from their sister ship, *M/V Vavilov* and they had direct communication with the Canadian Coast Guard during the rescue mission. Lawton highlighted lessons learned, where communication is the key. Speaking directly to the rescue authorities was helpful. In addition, they were dependent on the evacuation to the sister ship – so vessel pairing is a good thing. He also highlighted that social media, like WhatsApp, can be an important resource to get information like photos and similar from the people on site.

Next presentation addressed the same incident, but from the rescue authority’s perspective. **Chris Armor** from the **Canadian Coast guard** took the audience through the timeline of this incident from the operational point of view.

Bård Rannestad is working as a Chief Physician in the Norwegian Arctic, working for the **University Hospital Northern Norway**. He gave a presentation on an incident where a passenger vessel crashed into the quay at Barentsburg in Svalbard. There was a large number of injured people; over 125 people were involved. With very scarce resources for the doctor, this was a very challenging task. Luckily, no lives were lost in this incident, but Mr. Rannestad asked the question, what if this had been a cruise vessel with ten times the passenger number?

The Governor of Svalbard’s chief police inspector **Espen Olsen**, presented the preparedness in Longyearbyen settlement. “Plans are worthless – but planning is everything”. Longyearbyen has established a preparedness council of Svalbard, including both public and private actors in Longyearbyen. They have conducted several risk and vulnerability analysis and are training frequently. Concerning the question on the cruise vessel incident at the end of the previous presentation, Mr. Olsen also timely asked the question: are we preparing a small community for the impossible?

Peter Garapick, Superintendent for the Arctic program at the **Canadian Coast Guard** presented their work on involving Indigenous people in the Canadian Arctic for local Search and Rescue. They are fixing local problems with the local people, by steps such as making training material in Inuktitut language, meet with the local community leaders, focusing on training the youth, having community boat programs, and creating career opportunities in the Coast Guard for the local inhabitants.



Photo 5: Lonnie Wilms and Klaus Kuch Jensen from Greenland Oil Spill response showing examples on engaging local people in oil spill contingency

Greenland Oil Spill Response presented their work, and similar to the previous presentation; they had a program for involving the local community. Local knowledge can lead to shorter response time, and they had established a volunteer oil-spill response organization, that involve the communities.

Cato Isene Stoll from **Miko Marine**, presented a plaster polar kit, an innovation for repairing damage to ship hulls. This innovation is to follow up on the IMO Polar Code requirements, and to be self-sufficient in the Arctic.

Johan Mannsåker presented the recent incident with the cruise vessel *Viking Sky*, which lost engine power in Hustadvika, Western Norway. Mr. Mannsåker is working as an SMC at **JRCC South Norway**, which coordinates SAR

in Southern Norway search and rescue region (SRR). JRCC SN was the rescue authority responsible for this large rescue operation. There were 1375 passengers on board the *Viking Sky*, and the JRCC coordinated and mobilized the resources for the evacuation of the passengers by helicopter. Almost at the same time and in the same area, a cargo ship *Hagland Captain* sent out a distress call, as they were losing engine power as well. Thus, the JRCC had to coordinate evacuation and helicopter rescue of the crew on board *Hagland Captain* simultaneously as the evacuation of the *Viking Sky*.

The ARCSAR project, funded by the European commission, is the first network of Safety and Security in the Arctic and North-Atlantic area. **Bent-Ove Jamtli**, general director of **JRCC North Norway** and the project coordinator of ARCSAR presented the network and the activities in ARCSAR. The ARCSAR project aims to address the safety and security threats resulting from increased commercial activity in the Arctic and North Atlantic Oceans. The project has 21 partners from 13 different countries from Arctic, Europe and New Zealand. The main goals are to monitor research and innovation projects, to recommend uptake or industrialization of the results, to express common requirements to fill capability and other gaps, and to indicate priorities, requiring more standardization. It is possible to join this network as an associated partner, and more information is available on www.arcsar.eu.

3 ARCSAR Breakout session

Information, research, and innovation needs to enhance SAR

Professor **Ashraf Labib** from **University of Portsmouth** led this workshop. Each table had 6 topics to discuss and the tables had to construct a SWOT-analysis on each topic. The main takeaways are presented in the table below. Detailed notes from the workshop are available in section 7, [Annexes](#).

Table 2: *Highlights from the group discussions.*

Topics	Main takeaways from the discussion
Communications	Clear communication to avoid misunderstandings is of utmost importance. Text based systems can meet these challenge. However, there is scarce coverage in Arctic areas/high latitudes, and there is a pronounced need for new technology and satellites to cope with this. Language challenges can pose problems, and standardisation of SAR language is a way to cope with this. Social media and other media coverage of SAR operations could be both a threat and an opportunity.
Lifesaving appliances	There is a need for development of new technology – especially on life-rafts/life-boats. There have been challenges in boarding life-rafts/boats in bad weather – no chance of using them in certain conditions. Raising regulatory standards in IMO/SOLAS is challenging, as this is a large organisation and it takes time to introduce changes in regulations. 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.
Navigation	There is a lack of reliable hydrographic charts above a certain latitude as previous ice covered areas are becoming open water. New technology and crowd sourcing of data is an opportunity. This could also pose a threat, as cruise managers are always pushing the limits on where they sail. Another opportunity is to use a buddy system with coordinated itineraries, to have access to a “vessel of opportunity” at any time.
Personnel and training	There is a pronounced need for area specific training for the personnel on-board. The Arctic requires knowledge and experience that you will not have in other areas, for instance handling weapons for polar bear guards and using zodiacs in Arctic waters. There is a lack of international standards for these types of operations. Language and cultural differences on-board can also pose a threat, and any training needs to consider this in order to build a safety culture.
Pollution	Oil contaminated water is a challenge. There are already regulations for this, but still a lack of technology that can deal with this problem. Heavy fuel oil ban is important to minimize the risk of acute pollution in the Arctic. There is a need for building infrastructure in the Arctic for handling waste disposal and fuelling for battery powered or hybrid vessels and LNG ships.
Vessel	The vessels are getting more and more complex/automated, this can pose a threat, and the systems must be possible to override. The ships must be redundant and built to be the safest place to be in case of emergencies. In house capacity is important in the Arctic, this goes for both medical and surgical capability as well.

4 Findings from previous Joint Arctic SAR TTX reports

Lessons learned approaching this year's TTX

This chapter presents findings from previous Joint Arctic SAR TTXs. It is important to note, that all the relevant findings have been brought up, and therefore are based on the exercises only. They are mostly key subjects that have been the center of discussion during the exercises. Citations are all taken from the previous reports.

Communication in general

These are practical, easy to follow instructions that apply to everyone. Communication must be spot on, since time is the utmost importance. The first finding from the exercises is: *"Send CLEAR messages"*. Keeping that in mind when communicating with each other, whether it is within your own organization or to a third party, and make sure that both parties understand each other. Practicing and training communication will help that goal.

In situations where it is possible, one should always: *"Take advantage of opportunities of proactive information sharing, that could be between crew and passenger, but also between and through organisations and events."* Talk about contingency plans, safety measures, evacuation procedures, and other relevant topics when meeting each other at events.

Communication - Vessel in distress

Communication between the responders and the vessel in distress is a crucial part of any operation. Therefore, *"the captain must know that help is on the way and that RCC understands the nature of the emergency"*. *"Getting correct and accurate information from the vessel is essential. There might be misinformation because of language problems, stress, and poor communication. This might lead to miscommunication"*. There were also different views on alarming and understanding on how the other assesses the seriousness of a given situation.

This also relates to the first finding; be clear in your communication. The solution to this might be, as described in the 2017 report, to *"Switch to a text-based system where short messages can be exchanged. That way RCC is more likely to get right info."*

Preparedness

Preparedness can be described as actions that can be taken in advance of a SAR incident to ensure appropriate response to the relief and recovery from an incident; it can also be actions performed to eliminate the need for last-minute actions. In short - what to consider when making a contingency plan.

The findings from the exercises point to the obvious, however should still not be left out from the contingency plan, such as *"capacities and capabilities are limited"*. And therefore: *"Operators should consider if measures can be taken to be more self-reliant."*

Preparedness - Exercisable actions

These should be understood as actions that can be merged into the contingency plan and practiced through exercises. One of the most mentioned words in the previous reports is communication. Therefore, as mentioned before, one of the take-aways is to practice how to communicate.

"Clear contingency plans that everyone is aware of. More emphasis on making sure existing plans are set up and distributed before events take place. Practice plans through exercises. Training training"

training! Don't just check the boxes, follow up and make sure that crew knows how to seal spaces, signal alarms, turn of ventilation. Have the crew touch the piece of equipment that they would use. Manual training and not just conceptual."

The 2017 TTX scenario concentrated on firefighting. One specific recommendation to this was: *"Training should include all methods of fire extinguishing. Practice scenarios with fire in different areas of the vessel. "*

Making sure that the crew is very well trained in the initial steps of fire extinguishing will be the most important action to stop the fire from spreading. One should also consider how these different events overlap and affect each other. For example, *"Could the communications center be compromised by the fire? On a small ship, the communications center would be on the bridge. So the answer is probably "yes". Then what's the plan?"*

Needless to say, that communication is the keyword and something that will have to be trained continuously. In the last section of this report, findings from this year's and last years' reports will be discussed and compared.

5 Tabletop exercise

The Joint Arctic SAR tabletop exercise 2019 “*Stranded!*” was developed and led by the Canadian Coast Guard. The exercise focused on determining challenges and opportunities for passengers and personnel to survive a period of time stranded on land away from the cruise vessel and to evaluate and execute options for self and assisted rescue.

Further aims for the TTX were to assess the survival equipment that can be used to survive stranded on land, creating and evaluating survival plans, identifying leadership skills of the expedition leaders, and maintaining effective communication and working relationship between the expedition leaders, the ship and the rescue authorities. The exercise was moderated by Peter Garapick from the Canadian Coast Guard.

The exercise participants were divided into teams to represent the following countries:

- Norway
- Iceland
- Faroe Islands
- Canada/US



Photo 6: Peter Garapick from the Canadian Coast Guard going through the exercise objectives.

Each team composed of Tour Operators, Ship Operators, Responders and Rescue Coordination Centres (RCC). Non-Team members in audience were encouraged to listen, learn, challenge the teams, and identify possible learning points.

The exercise scenario developed continuously as the TTX moderator injected further details into the scenario making the situation more complex and increasingly difficult to handle without assisted rescue. Each team were asked to comment and discuss the relevant actions to be taken from the tour and ship operator, responder and RCC point of view after each inject to the scenario. The report will summarize actions taken during the scenario, and in the end, identify whether the learning objectives were met.

5.1 Exercise scenario

5.1.1 Starting point

On Tuesday August 13, 2009, a shore-side excursion involving 8 zodiacs, each with 10 passengers and 1 driver leaves after lunch from the cruise vessel for a 3-hour, 5-nm trip up a narrow, steep sided inlet. Their destination is a scenic and environmentally unique beach and tundra area that is just beyond a glacier that is on one side far up the inlet.

The weather is sunny, 5 degrees Celsius, light breeze out of the NW and the sea state is calm with small ice chunks drifting in the waters near the ship and in the inlet. The nearest community is over 200 nm away.



Figure 1: Scenario locations in Svalbard, Iceland, Canada and Faroe Islands (Ill.: CCG)

5.1.2 Scenario development

Earlier in the day, the staff zodiac travelled up the inlet and set up the shore camp. After departing the ship at 1300h, the zodiac fleet is 3 miles up the inlet and has rounded some high cliffs to a stop beside a water fall to allow passengers to walk the shore at the adjacent beach area.

The senior expedition leader checks in with the ship using her handheld VHF radio and finds the connection poor with static and often broken-up. Back on the ship, the bridge watch starts seeing more ice pans and bergy bits moving from the east to the south as the wind veers. Soon there is a lot of ice around the ship and moving into the inlet. With the mouth of the inlet becoming choked with ice, the ship decides to have the zodiac flotilla make a speedy return to the ship before the waters become impassable. The ship radios the EL on the zodiac flotilla, however, now that the group is further up the inlet with the high cliffs around them, VHF contact is not working.

The groups were asked to consider all options for communication with the ship and the EL.

- Every zodiac has a handheld VHF radio, the expedition leader has a handheld Iridium satellite phone with extra batteries
- Each zodiac also has a tracker signal
- Cellphones will not play a role, call with an Iridium phone
- One company mentioned the use of drones for getting a better situational picture to the ship

The groups were asked to consider what the ship and the ELs are doing.

- Do not want to be stuck on ice and surrounded by ice, got to get the zodiacs back to the ship, easier to move the ship to the ice than zodiacs back to the ship if ice comes in

The EL decides that as soon as a boat is ready to go, they are to depart. The first two boats arrive at the mouth of the inlet and start looking for leads in the ice to exit the inlet. The ship watches the 2

vessels and hears over the radios that the other 6 are also at the mouth of the inlet. By this time the ice movement has created a ridge that has jammed against the two sides of the inlet and the narrow mouth. The 6 remaining boats get stranded on the other side of this ridge with no option for beaching and getting to land to set up some sort of camp. The first two boats are outside the inlet and have to haul up on the beach as ice is not letting them get to open water.

What does the Captain and ELs do?

- It's very late and the assessment is too late for the situation, no other equipment on board to help them
- Started looking at other vessels, is there anyone on the other side of the ridge and see if you can make a passage with the ship to some of them
- 6 boats on the side should stick together
- The ship is trying to go into the ridge
- The two outside on the ice ridge can rescue people to land and the ship can get more people to the shore side to help them
- Some EL and captain would consider this a critical situation and call for help
- Some operator would consider this a self-sufficient incident, getting close to stress, would not call JRCC yet, would at least make the situation aware at the office
- The RCCs stress that the ship should call the rescue authority sooner rather than later and the authorities would like to at least be aware of the situation

The group of 22 people from the 2 zodiacs are considering if they can walk the 1.5 km along the beach and over a hill to the bay that has no ice but the group is unable to make the trek over the headland due to the mobility of some of the members. The senior EL and Captain have decided to have that the other group make their way back up the inlet to the beach and where their land base remains, and to start preparing for spending the night there. They have agreed to have hourly situation reports via their working communications devices. The captain has contacted the rescue authority (Coast Guard/RCC) and reported the situation and asked for support.

How has the captain contacted the rescue authority?

How are the rescue authorities preparing?

- The captain would ask RCC for assistance, especially if the situation is dangerous for the passengers and ask to prepare for possible evacuation, bringing supplies and additional equipment.
- Contacting RCC or other emergency number using satellite phone in most of the countries.
- One operator mentioned that they would have contacted via NORDREG, at this point they do not think they have a crisis yet. Making sure that passengers are safe and think long term
- RCC would ask for all the information possible; how many people, what gear they have, how they will get through the night and so on.
- The rescue authorities in Norway note that the situation does not seem like a crisis yet but crisis is developing. They would like to start planning and preparing how to make sure that the group can survive the night on land and how to get more supplies on shore.
- The rescue authorities would start preparing helicopters, they cannot take the chances for self-rescue, although they recognize that the ship and ELs are prepared for it.
- The Canadian rescue authorities noted that they would always assess how to respond, although the situation would not be a crisis yet. Might, for example relocate some helicopters so that they are available if needed or arrange for dropping of extra equipment.

- Authorities would also prepare to send technicians or guides who are experienced in these kind of scenarios.
- The rescue authorities emphasize that they would never blame anyone for calling them early. There are various levels of response.
- *“It is the RCCs job to think the worst that could happen”*
- One authority representative mentioned that the captain does not always have to agree with the emergency services.

Describe the set up and plans for the evening stay.

- SOLAS standard stranding kits with food, water and other equipment
- ELs setting up a base camp, using and rationalizing the food they have, get one of the ELs to keep up the good spirit, and stay close together to stay warm
- Setting up shelters with zodiacs and bivvy bags, start dividing tasks
- Making a fire, if possible
- Should have enough cooking fuel. Fuel from zodiacs can be used to fuel stoves with right equipment
- Polar bear guards with a fire arm, setting up watch rotations, everyone using whistles
- Rationalizing the use of water, trying to find more water sources
- Identify a place for a toilet on shore, hand sanitizers
- Reach out to the ship and communicate, set a schedule with the bridge on how often to communicate, switch the radios and phones off to minimize the usage of battery



Photo 7: Groups discussing the scenario development and solutions during the TTX

The rescue authorities have determined that the earliest an ice breaking capable ship can arrive on scene is 0400h the next day. As the overcast conditions increase and a low moves into the area, they

have determined that the ceiling is going to remain at 100m and visibility will be 500m until the next morning. The shore-side group has actually made it overland to the beach and been shuttled back to the ship where they have received the appropriate medical attention, warm clothes, food and water.

At the inlet site, 2 of the group of 54 are experiencing medical distress. The sun is getting lower on the horizon. The hourly check-in with the ship sees batteries on the communication devices getting weak. The condition of the people on shore is deteriorating due to cold, discomfort, lack of food and anxiety due to the creaking glacier and reports that polar bears have been seen.

What actions are taken by the EL?

- Passengers need a lot more care in emergency. Let people know they are preparing for the emergency, and letting them know what and how they are dealing with it.
- Normal first aid kit on zodiacs
- Normally a nurse or doctor on board the boat but they might not be onboard the zodiacs
- Operators identified issues with passengers bringing sufficient amount of medication
- Some operators do advise passengers to take extra medication
- EL usually learn about passengers and their conditions so know who needs extra attention.
- No procedures for getting medicine
- Drones could possibly deliver medicine, for those who have access to drones
- Stay away from glaciers
- Trying to keep up good morale and effective crowd management
- Adjust communication time with the captain if batteries are getting weak
- Use life vest for warmth, and get seated somewhere else than bare ground
- If you already know what time you are going to be picked up, tell the passengers that, make them comfortable by using all resources and make sure that everyone are fed.

What actions are taken by the ship?

- Ship will monitor the situation all the time – always considering if they can go in
- Looking for leads in ice to the beach. If there is a lead, they will send more people from the boat to help them out and prepare to leave
- Preparing to receive passengers when the icebreaker arrives

What actions are taken by the rescue authority?

- Rescue authorities are preparing aerial assets (helicopter and fixed wing) and assessing, whether the weather is good enough for helicopter operations
- Considers sending an aircraft as radio-relay and communications hub
- Planning to drop more medical supplies
- Could have been air assets overhead, also have polar bear watch because they have a thermal camera on the aircraft

The rescue centre confirms the ETA of the ice breaker is in 2 hrs at 0400h and helicopters are en-route to the inlet beach camp.

What actions will be taken by ship/EL?

- Ship doing whatever they can
- Prepare food on board and be ready for the passengers
- One of the most important thing is that the EL is keeping up with rotation and tasking, making sure that no one is freezing or sitting still, get people moving

- ELs should start preparing landing sites, companies do not have a set procedure for it
- A lot of the ELs might have background with helicopter operations
- The ship would prepare additional EL/guides to go to the beach – so that the ones that are tired do not have to drive the zodiacs back to the boat

Actions taken by the rescue authority?

- RCC would be in continuous communication with the ship, they would like to know what the status of the people were and where they need to go.
- Has still not been a mayday, only assistance
- Doctor can be sent to the site on board a helicopter or the ice breaker
- In Svalbard they are preparing for the worst case scenario, evacuation of people to another location such as the hospital
- The authority has been working on a plan B, in case things do not work out

The ice breaker has arrived and has been able to move ice and create a lead for the waiting zodiacs to move through and reach the ship. Helicopters have been able to land at the beach site and bring in supplies and load persons in an array of critical conditions.

Who is managing the triage at the beach and who on the ground would facilitate rescue?

- Rescue authority:
 - o most likely ask the Coast Guard, police or other responder on-scene to go to the beach to facilitate rescue (incident commander or if on sea, on-scene coordinator)
 - o use the doctor from helicopter to do the triage
 - o send Red Cross or other medical professionals to do triage
- Companies:
 - o if there is a lead to the beach, the ship can send more people to help them out and to be prepared to leave, need more guides to drive the zodiacs back
 - o the ship feels responsible and want to bring more people from the ship to assist
 - o EL can also do triage, as some of them have education and the passengers are more comfortable with the EL
 - o They would apply the regular medevac procedures at this point, have done these procedures many times

Who is the eyes on the ground?

- ELs are the key source of information on land and have a lot to offer when it comes to coordinating rescue of the passengers
- Police or other authority can set up a joint command post, and would ask some of the ELs to help coordinate

What process will be used to bring people back to the ship?

Where will passengers go?

- Unless life threatening, the passengers (yellows and greens) should be brought back to the boat because they have all their personal belonging and medical supplies there
- Should be a discussion between the responders, ship and the EL

- If transported elsewhere, try to get their personal belongings from the ship, all of that is part of the normal medevac procedure
- Company will prepare the paperwork and required documents for evacuees. The ship would also notify home office so that they could prepare for meeting the guests at the hospital.
- The company wants the guest to be comfortable and not in a foreign environment
- If need be, helicopters can take most critical to the hospital in the nearest town
- In the Canadian scenario location, taking passengers to another medical facility would not be an option, the next facility would be 700km away

All persons are evacuated and safely off the land and water and on the expedition ship, ice breaker or in a helicopter.

5.2 Exercise objectives and findings

The exercise was given strategic, operational and tactical objectives. This report concentrates on identifying key learning points for each objective. The key findings are therefore summarized under each objective. The focus of the exercise was very much on the tactical objectives.

5.2.1 Tactical objectives

Table 3: Main Take-aways in regards to tactical objectives

TACTICAL OBJECTIVES	
TO1: Expedition Leader/Ship establishes an effective survival plan.	<ul style="list-style-type: none"> - All country groups established a plan to take care of the passengers and survive until rescue arrives - The participants described on some level the equipment they have, some actions to be taken, what were the priorities and what kind of resources were important for survival, however details on the plan and a full list of equipment was not presented by any group. - Limitations on survival equipment and resources such as food and shelter, and how serious the situation can get was not fully discussed. - The exercise timeline did not allow the participants to fully discuss the survival plans. - The exercise did not push participants to paint a full picture of the campsite and list the use, knowledge and limitations on all equipment. <ul style="list-style-type: none"> o Perhaps sketching out the camp site on paper might have helped. - No comprehensive procedure for this scenario but ELs have checklists on what to do - The EL needs to take on a leadership role <ul style="list-style-type: none"> o Extremely important for survival and morale o Need to divide tasks

	<ul style="list-style-type: none"> ○ Important to consider safety on land and plan a rotation for polar bear watch
<p>TO2: Expedition Leader/Ship establishes an effective self-rescue plan.</p>	<ul style="list-style-type: none"> - Participants were discussing several options, but did not put together a comprehensive self-rescue plan or discuss further options, also because they knew the icebreaker was coming. - The scenario did not give enough incentive to the participants to make a full self-rescue plan. - The operators were discussing options on how to be rescued by the mothership. I.e. doing a hike in order to be picked up from another site. - If there is a lead to the beach, the ship would send more people from the boat to help them out and be prepared to leave <ul style="list-style-type: none"> ○ Discussing on how to use a drone to find other possible ways out from the ice - Ship will monitor the situation all the time – always considering if they can go in
<p>TO3: Ship/Coast Guard (rescue authority) establish effective working relationship.</p>	<ul style="list-style-type: none"> - A working relationship and communication was established between the ship and the rescue authorities but only on official level. In-depth connection and dialogue was not established. - The operators and the rescue authorities seemed to have a different mind-set and view on what is a crisis and when to ask/notify external assistance <ul style="list-style-type: none"> ○ Some operators felt that they need to be self-reliant, rely on their skills and training and that they need to start thinking about other ships of opportunity, not a lack of trust in the authorities but the realities of the Arctic remoteness ○ Because it was not a crisis, external help not necessarily needed ○ Views were also differing according to the region/country ○ Rescue authority wants to be notified as early as possible in order to assess the correct level of response - Gap in working relation/mind-set between the rescue authority and the operator during the rescue operation phase <ul style="list-style-type: none"> ○ The responders were discussing using professional rescue personnel to coordinate rescue and triage however did not, at first, discuss utilizing the ELs situational understanding and knowledge of the passengers' condition ○ The ship feels responsible and want to bring more people from the ship to assist ○ The company highlighted that the ELs have been with the passengers for the whole trip and know

	<p>them well, guests feel the most comfortable with ELs</p> <ul style="list-style-type: none"> - The exercise timeline did not give the groups enough time to discuss this in detail - Effective/fluent working relationship was therefore only partially established and this objective was not met in its full capacity
<p>TO4: EL/Ship/Coast Guard maintain effective communications and coordination.</p>	<ul style="list-style-type: none"> - The opinion on early alarming and calling for external assistance was different between the operators and the rescue authorities. <ul style="list-style-type: none"> o The rescue authorities emphasized the importance of early alarming and making them aware of the situation, so they can start preparations and planning. - Plan for communication: <ul style="list-style-type: none"> o ELs are in contact with the ship. Establish scheduled calls. o Ship is in contact with the RCC. Establish hourly calls. - RCC want to be in continuous communication with the ship – they want to know the status of the passengers, their condition, what they need etc. This however, was not emphasized from the operator’s side and the rescue authorities did not take direct contact with the operator either to ask specific questions. - Communication between the EL and the ship was well established – a reporting system at specific times <ul style="list-style-type: none"> o They discussed that battery life of the phone could be a limitation, and schedule might have to be changed. - Objective was not met in its full capacity. Perhaps more time should have been dedicated to establishing communications.
<p>TO5: Ship/Coast Guard establishes an effective rescue and evacuation plans.</p>	<ul style="list-style-type: none"> - All groups established a plan and this tactical objective was met. - RCC sending an icebreaker, aerial assets and rescue personnel to the beach - Discussed also dropping in additional equipment and technicians to help with the situation - Ship preparing for medevac according to SOPs - ELs helping to prepare landing sites and do triage - Unless life threatening, passengers (yellows and greens) should be brought back to the boat - This objective was well covered and discussed

5.2.2 Operational objectives

Table 4: *Main Take-aways in regards to operational objectives*

OPERATIONAL OBJECTIVES	
OO1: Evaluate, set or reconfirm communications equipment standards and procedures.	<ul style="list-style-type: none"> - Communication equipment standards: Evaluated and re-confirmed. All operators were aware of international and national standards, procedures and also limitations of the equipment. Some operators have drones, which were discussed as an option for achieving better situational awareness. - As a recommendation, all existing equipment and their limitations should be listed, reviewed and discussed. - The mind-set between the operators and the rescue authorities was varying when it comes to early alarming and procedures on notifying authorities.
OO2: Evaluate, set or reconfirm safety and emergency equipment that is onshore with landing parties.	<ul style="list-style-type: none"> - Equipment standards: All operators are equipped with standard SOLAS equipment. <ul style="list-style-type: none"> o Shore stranding kit o Operators emphasized that the kit should be more comfortable than the SOLAS standard minimal o Although, adding more equipment to the stranding kit will take up more space, it will be essential for the guests morale and comfort o Water will be the first to run out - The authorities were surprised how much equipment they have on expedition vessels. However, the exercise should have used more time for evaluating and establishing a comprehensive overview on the safety and emergency equipment that the operators have, how to use it, how to improvise with it and what the limitations of the equipment were. This might have also brought out critical gaps in available equipment and the SOLAS requirements. - The participants did not establish a full overview on what the camp should ideally look like, how to best use the equipment available, and what the specific tasks of the ELs were. - The exercise could have had more emphasis and time dedicated for this objective.
OO3: Evaluate, set or reconfirm effective survival procedures for persons stranded on land due to unforeseen circumstances.	<ul style="list-style-type: none"> - Some of the operators have procedures, but maybe not as specific as this selected scenario. - All operators had a clear idea on how to handle the situation, setting up a camp, taking leadership, dividing tasks, helping passengers etc. However, detailed procedure was not found during the exercise. - The authorities found re-assuring that the operators have good plans for this.

	<ul style="list-style-type: none"> - The operators encourage their staff to have wilderness survival and medical training, but it is not a requirement or a standard. - ELs usually have a checklist and field operations manual - ELs need to rely on their personal skills and training - Perhaps there should be an SOP on this for all operators in the Arctic?
<p>OO4: Evaluate, set or reconfirm rescue strategies.</p>	<ul style="list-style-type: none"> - The biggest concern of the operator is to make sure their passengers are safe and survive until the rescue comes or situation can be solved by the ship/ELs - Operators drive to be self-sufficient, the rescue authority wanted to be notified in order to assess the best way to respond and come up with a rescue strategy. - The operators emphasized knowhow and skills to prepare for evacuation. They wished to know more on how they can involve the ELs in order to assist the rescue authority and responders, for example on preparing landing sites and doing triage.
<p>OO5: Evaluate, set or reconfirm effective cooperation and collaboration protocols between all parties in incident response.</p>	<ul style="list-style-type: none"> - The responders did not utilize the ELs knowledge and situational awareness to its fullest capacity. - There were differences in evaluating the seriousness of the situation, which in turn affected effective collaboration and cooperation protocols. - Cooperation and collaboration protocols were established between the ship and the rescue authority, but only on an official basis. - Dedicating more time to this part of the exercise and discussing the protocols would be important.

5.2.3 Strategic objective

Table 5: *Main Take-away in regards to the strategic objective*

STRATEGIC OBJECTIVE	
SO1: AECO members conduct a TTX in order to determine the challenges, constraints and opportunities for passengers and personnel to survive a period of time stranded on land away from the cruise vessel and to evaluate and execute options for self and assisted rescue.	<ul style="list-style-type: none">- The strategic objective of the exercise was met. The AECO members and rescue authorities successfully conducted and participated the TTX and discussed challenges, opportunities and development ideas when it comes to passenger and personnel survival on land.<ul style="list-style-type: none">○ The AECO members had a good idea on how to respond to this kind of a scenario and what the limitations were for self-rescue.○ The rescue authorities emphasized the need to contact the authorities early, whether or not there would be a need for assisted rescue.○ More time should have been dedicated to discuss the survival procedures and the limitations of the safety equipment for survival on land for a longer period of time.○ The importance of building a good working relationship and an effective communication plan between the ship, the company, and the rescue authority is an important learning point from the exercise.- Overall, there should have been more time dedicated to the exercise and discussion in each group after each step taken in the scenario, in order to fully reach the objectives of the TTX.

6 Recommendations and way forward

Overall, the TTX received good feedback from the participants and they view the event as a good opportunity to build partnerships with diverse groups of professionals, companies and academia, and understand each other's reasoning, procedures, and capabilities better.

The fourth Joint Arctic SAR TTX had a very different, yet equally important, scenario to previous years. The exercise identified key learning points, especially when it comes to reviewing and evaluating on-shore survival equipment and plans, addressing importance of early alarming, communication between the rescue authorities and the operators, and cooperation between the responders and the expedition leaders.

Comparing this year's learning points to the lessons learned from previous years, few findings repeat the lessons from before;

- There is a need for SAR entities and operators to better understand how the other assesses the seriousness of a given situation.
- The rescue authorities emphasize the importance of early alarming and making them aware of the situation, so they can start preparations and planning.
- Need for SAR entities and operator to better understand each other's reasoning and procedures when it comes to alarming, communication and response.
- Building a relationship with the rescue authorities is important for the operators and the cruise industry in general.

The reports from previous years emphasized that the operators should consider if measures can be taken to be more self-reliant, as the capacities and capabilities in the Arctic are limited. This year, however the operators highlighted the fact that they drive to be self-sufficient when it comes to survival on land and rely a lot on their skills and training.

6.1 Recommendations

Based on the key learning points from this and last year's exercises, the report recommends the next year's exercise to build on the previous findings, focus on specific gaps in communication and pose targeted questions to the participants on why and how they assess the seriousness of a given situation differently, and discuss the procedures and protocols for communication and coordination for early alarming and actions during response. The report also recommends the operators to contact the rescue authorities and vice versa to arrange small communication exercises, invite the authorities to visit the vessels, and build a good working relationship. This would also open up opportunities to have open dialogue about communication, survival plans, cooperation and coordination with safety and rescue, and their possible challenges and limitations.

Based on the exercise objectives, the report recommends the ship and tour operators to review and evaluate survival procedures for on-shore survival scenarios and arrange small-scale exercises on land or small tabletop exercises as a part of training to go through survival plans, self-rescue plans and available equipment. This year's exercises did not give enough time for the operators to fully list and utilize the equipment that they would have on-board and paint a comprehensive picture on how to set up a camp on land, and therefore the report recommends to list and discuss possible limitations of the equipment in order to find out gaps and opportunities for shore-stranding kits. In reference to this, the reports suggests the operators to familiarize themselves with findings from the SAREX Svalbard exercises to find gaps in the Polar Code required survival equipment. As the operators wished to get

more instructions on how to prepare landing sites on-shore for possible evacuation, the rescue authorities and AECO could cooperate to create simple instructions for this.

6.2 Next steps for the TTX

Based on the feedback and key findings from the TTX, next year's TTX should dedicate more time for the exercise in order to make sure that all participants understand the scenario and immerse themselves into the exercise. If the participants can have more time to discuss the issues and scenario development within each group, perhaps procedures, plans and use of equipment could have been covered more thoroughly.

It is important to address the lessons learned from previous years, as was done during this year's workshop, and build upon them for the future exercises. Food for thought for the next year's TTX organizers, would be to find recommendations for systematic follow-up on the lessons identified and consider how to ensure that the valuable knowledge and best practices from the exercises are shared to a wider international fora and decision-makers as well.

7 ANNEXES

7.1 Workshop

Detailed notes from the workshop (summarized in section 3) are presented here:

7.1.1 Communication

- We need technology that is operational and working in the arctic
- We need to get from talking to action – The ARCSAR network can take the “talking” to research and innovation
- High frequency (VHF) – has not good enough coverage. It is cheap to do something to this – by placing more base stations in Arctic areas.
- Opportunities to use different communication means
- Need to develop standards on communication. For instance, international standard on how to call mayday. To rule out the “lingo” issue. One other example is to ask the question: “anchor up/down” instead of using long sentences that can be easily misinterpreted from people that do not have English as native language. To be sure, to transmit the messages correctly – there is a need for standardised language!
- Iridium are not reliable at high latitudes. There is a need of technology that can build on the existing iridium that is text based and secure
- One person on board (communication officer) – will be the only one typing to avoid misinformation
- Using the radio – could be problematic due to language – you have to rely on the ones typing and giving messages
- Idea to produce a map including all communication coverage, mobile, satellite coverage, VHF coverage etc. (further than xx latitude, no communication possible except radio etc.)
- Communication should preferably be text based and secure
- Industry : Maritime VHF – same frequency for land and maritime
- To shut down the Wi-Fi on ships is an opportunity to avoid misinformation going out from passengers
- In regards to communication out (media etc.) in incidents: Need to have a good plan, the more complex the scenario the more complex it is to communicate it out. It is important that everyone exercise the plan and coming up with a common message is important
- It is important to identify who has the communication responsibility, coming up with a common message
- A weakness in the media contact is that all the team members and partners need to point out one person and communicate one common message. They can all talk about the own tasks and experiences but not the whole incident in general
- Opportunities:
 - o Being proactive is a big opportunity in media communication, start early to relay all the messages to a one dedicated source
 - o Be ahead of things and you can control the situation
 - o Hand-on rescue having good communication
- Threat: media is contacting absolutely everyone, and someone in the chain is a bound to break and then there can be challenges of someone talking to the media about the operation that is not the actual dedicated person
- A possible strengths is to have company and police handing the media contact

7.1.2 Lifesaving appliances

- Smaller life vests – can be a problem with bulky vests in combination with ships/helicopters
- Systems for transferring people from ship to another ship or helicopters (lifting systems etc.)

- Raise regulatory standards on the lifesaving appliances - IMO and SOLAS is a large machine. It is challenging to introduce changes in the regulations
- How are we handling the age range we are working with?
- How can we get passengers from on vessel to another?
- Demand higher industry standards
- Weaknesses – the design on the life boats and life rafts are old fashioned.
- Equipment – you cannot place it everywhere.
- There is a lot of fatalities related to life boats challenges – opportunities to design these better. Some life rafts are being ripped off the ship in bad weather. No chance of using commercial life boats in certain conditions
 - o There are some life raft units that can be shot out
- There is pieces of technology here and there – it need to be collected in a single place (one-stop-shop)
- Counting passengers – keeping track on all the passengers in an operation is very challenging – need for new technology. Must be a standardised system or check-list that all SAR units are understanding and using.
 - o When are the vessel emptied of passengers?
 - o This system cannot run on power, must be manual system
 - o Make an easy way to check-out on emptied cabins

7.1.3 Navigation

- Coordinated itineraries (“buddy system”)
 - o No ship with more than 5 hours away from another
 - o If you have only one ship, you are isolated. Possible to think outside the box to have access to other vessels as “vessels of opportunities”.
- Opportunity: Crowd sourcing of hydrographic charts and data. There is a weakness in lack of hydrographic charts. Threat: If you share this, and are chartering all the waters – you are also pushing the limits on how far you can go.
- There is a lack of ice navigators with experience.
- Cruise managers are pushing the limits. New land emerging but little mapping in these areas.
- Technology is taking over systems and you cannot override the machines if necessary. This makes people looking too much at the computer, and not on the radar or visual observations. The equipment is only good when people are using it correctly.
- Human factor and human element, someone always makes the decision. What guidelines do they have with navigation?
- Do the captains have clear-cut authority to go where they want? It’s always someone who makes the decision to go to an area or a zone that could be dangerous, also an example of “Costa Concordia”

7.1.4 Personnel and training

- Lift transport – the crew and operator on the vessels need hands on training on air-training
- Video training for polar code to have on-board the ships
- Training for handling weapons and zodiacs in Arctic water. There is a lack of international standards for these types of operations. There is a major difference as an expedition leader for cruises to Hawaii and in the Arctic – so the training need to be specific for the area the ship is operating.
- Lifesaving equipment is only good when people are using it correctly.
- Not only fire drills but also a need for security drills on the crew and passengers

- A challenge is that the personnel on board the ships are coming from different cultures and speak different languages. How does the training take this into consideration. The safety culture needs to be understood by everyone, it seems to be done, but we still need to make sure that the cultural differences do not collide.

7.1.5 Pollution

- There is a need for an easier system to bunker out oil contaminated water without polluting. There is a lack of infrastructure to handle this.
 - o Regulations are there – but how can we meet it?
 - The law is idealistic
 - Compliances are challenging
 - Need for new technology to meet this challenge
- Ban heavy fuel oil will minimize the risk for pollution in the Arctic. Knowledge sharing is important. Weakness and threats: Increasing traffic and a new type of oil that is not possible to collect from sea surface.
- Need for regulations on disposal of waste.
- Opportunities:
 - o Electrification/hybrid ships
 - o LNG ships (natural gas) - Limitations on the fuel stations
 - o Power infrastructure in remote areas is not sufficient to fuel electric ships
- Green diesel
- More energy efficient ships

7.1.6 Vessel

- It must be possible to override the vessels abilities – they are getting too complex. Some systems need to be simplified and with a possibility to go “old school” if necessary
- Strength - ice class. Weakness: polar code
- When building a big ship – you should always count on the ship to be the safest place to be
 - o Different sections of the vessel, to “lock out” areas with fire/leak etc. Passengers could be safe in other areas of the ship until rescued.
- Vessels need to have in-house capacity in handling incidents independently, need to have surgical capability
- Redundancy is essential – need to be self-sustainable in the Arctic areas
- Need for a dynamic risk management – the conditions are changing