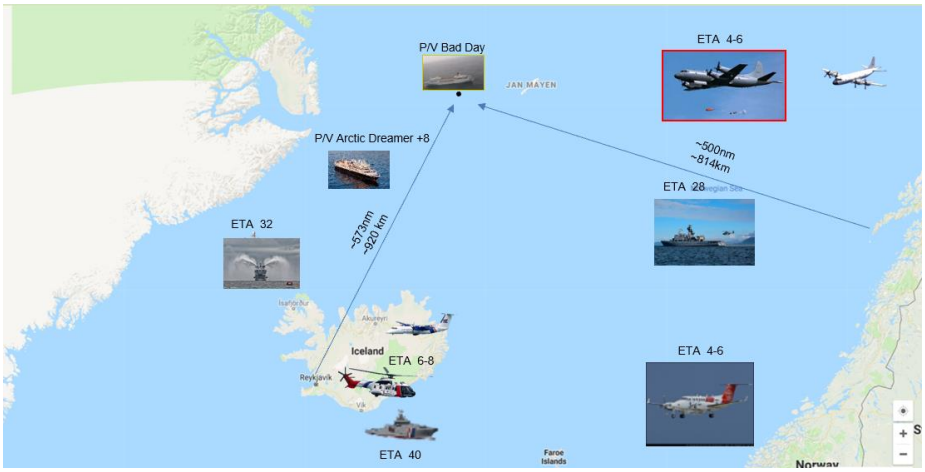
Third Joint Arctic SAR TTX



2018 EXERCISE REPORT

Association of Arctic Expedition Cruise Operators AECO

Title: Report from the Third Joint Arctic SAR TTX

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Summary:
The third joint Arctic SAR Workshop and TTX took place April 10-11, 2018 in Reykjavik, Iceland. The event was initiated by AECO and the Icelandic Coast Guard in 2016 and is a cooperation project between AECO, the Icelandic Coast Guard and JRCC North-Norway and is a combination of presentations by experts in the field of SAR and Arctic shipping, 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. In 2018, the TTX scenario was developed by the US Coast Guard, with input from the organizing parties. In the scenario, a cruise ship ~110nm West of Jan Mayen experiences an engine room fire and loses propulsion. The closest vessel of opportunity is another cruise ship approximately 8 hours away. The focus of the 2018 workshop and TTX was communication and cooperation across organizations, as well as the role of passenger ships as vessel of opportunity and on scene coordinator.

Cover illustration by US Coast Guard.

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List of acronyms

ACO	Aircraft Coordinator
AECO	Association of Arctic Expedition Cruise Operators
CRO	Company Response Organization
DAMEX	Damage Control Exercise
DPA	Designated Person Ashore
EEZ	Exclusive Economic Zone
EL	Expedition Leader
EPIRB	Emergency Position Indicating Radio Beacon
ETA	Estimated Time of Arrival
HIFR	Helicopter In-Flight Refueling
JRCC	Joint Rescue Coordination Center
JRCC-NN	JRCC North-Norway
kn	Knot
MIRG	Maritime Incident Response Group
NM	Nautical Miles
OSE	"On-Scene" Estimated Time
OSC	On Scene Coordination
PAX	Passenger
RCC	Rescue Coordination Center
SAR	Search and Rescue
SIMEX	Simulation Exercise
SMC	SAR Mission Coordinator
SOP	Standard Operating Procedure
TTX	Table Top Exercise
VOO	Vessel of Opportunity
VD	Vessel in distress

Executive Summary

The third joint Arctic SAR Workshop and TTX took place April 10-11, 2018 in Reykjavik, Iceland. The event was initiated by AECO and the Icelandic Coast Guard in 2016 and is a cooperation project between AECO, the Icelandic Coast Guard and JRCC North-Norway and is a combination of presentations by experts in the field of SAR and Arctic shipping, 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. In 2018, the TTX scenario was developed the US Coast Guard, with input from the organizing parties. In the scenario, a cruise ship ~110nm West of Jan Mayen experiences an engine room fire and loses propulsion. The closest vessel of opportunity is another cruise ship approximately 8 hours away. The focus of the 2018 workshop and TTX was communication and cooperation across organizations, as well as the role of passenger ships as vessel of opportunity and on scene coordinator.

Main takeaways

Main takeaways and lessons learned can be summarized under the following headlines:

Communication	**Utilization of assets**	**Knowledge exchange**
Need for communication strategies to reduce strain on captain/vessel	Need to optimize the utilization of the limited assets available in the Arctic, including cruise vessels.	Need for SAR entities to gain better overview of the resources and capabilities on board cruise ships, e.g. through ship visits and information exchange.
Need for proactive sharing of information, before, during and after incidents.	Need to raise awareness about the suitability of cruise vessels as a platform for OSC.	Need for SAR entities and vessel/operator to better understand each other's reasoning and procedures.
Need for improved communication between RCC and operator/vessel – shared hotline suggested	Need for RCCs to involve cruise operator home office to support efforts related to communication, media and needs of passengers and next of kin. Home office can also provide ship drawing, passenger lists, etc.	Need for SAR entities and vessel/operator to better understand how the other assesses the seriousness of a given situation.
Need for a network for responders, industry and regulators	Need for standardization to avoid situations where resources cannot be utilized because equipment from different sources is incompatible (e.g. stretcher does not fit in helicopter)	Need to include non-SAR entities (e.g. environmental agencies) in relevant exercises.
Need for proactive information from RCC to vessel.	Need for continued cross-border cooperation on SAR, preferably involving all relevant nations.	Need for SAR entities to gain a better overview of available infrastructure and assets (e.g. locations for helicopter fuelling).
Need for improved and proactive communication between pax and crew	Need for robust agreements and cooperation platform that can withstand changes in political and diplomatic environment.	Need for unified system for sharing and accessing vessels specifications, vessel SAR plan, passenger lists and voyage plans.
Need for strategies to overcome challenges related to language and cultural differences.	Need for information, training and resources to prepare cruise vessels to take on the role of OSC.	Need to involve more masters in relevant exercises and forums.

Next Joint Arctic SAR workshop and TTX

The next Joint Arctic SAR workshop and TTX will take place April 9 – 10, 2019 in Reykjavik. Please see https://www.aeco.no/events/ for program and registration.

Summary of presentations, day 1

- Georg. Kr. Lárusson, director general, Icelandic Coast Guard; Bent Ove Jamtli, general director, JRCC North-Norway; and Frigg Jørgensen, executive director of AECO welcomed and opened the conference.
- Conference sponsors Cruise Iceland and North Atlantic Agency delivered a greeting to the participants of the event and a short summary of their organization's activities.
- Frigg Jørgensen, executive director, Association of Arctic Expedition Cruise Operators (AECO), gave an Arctic Cruise tourism overview, which included trends in the Industry. AECO expects a further increase in cruises in the Arctic in the years to come, following the launch of at least 25 new polar class expedition cruise vessels in 2018-2020.
- Auðunn Kristinsson, deputy chief of operation from the Icelandic Coast Guard presented SAR Capacities & Capabilities in the Arctic - the overall picture: Search and rescue areas, trends, activities and assets. Kristinsson also presented experiences and lessons learned from Arctic Guardian 2017, a joint combined communication and collaboration exercise conducted for the first time by the eight members of Arctic Coast Guard Forum. Arctic Guardian included a Damage Control Exercise (DAMEX) where multinational teams were tasked with tackling simulated incidents under realistic conditions. Kristinsson noted that it would be beneficial to also include industry partners in an exercise such as Arctic Guardian.
- Finn Tore Sortland, SAR Mission Coordinator at JRCC North-Norway presented the international framework that governs SAR operation in the Arctic, with emphasis on the IAMSAR (International Aeronautical and Maritime Search and Rescue) manual. Sortland described criteria for appointing an OSC, underlining the importance of SAR experience and having sufficient personnel to keep up with the duties of OSC, especially if the operation lasts several days. He noted that the Coast Guard is the preferred OSC in Norway and that the role can be given to a civilian ship if the Norwegian Coast Guard is unavailable. He also noted that JRCC-NN can do the task of OSC until a ship can take over the role.
- Ilja Leo Lang, assistant director of AECO, gave an overview of how passenger ships can act as vessels of opportunity in Arctic SAR operations, pointing to the expedition cruise industry's presence in and local knowledge of Arctic waters. Lang described the resources available on cruise vessels and their usefulness in SAR operations. The presentation underlined the value of contact between SAR responders and operator in the case of an incident and highlighted the competence and capability of the operator's main office in handling incidents.
- Tomi Kivenjuuri, commander and senior policy adviser, Finnish Border Guard gave an update on the activities of the Arctic Coast Guard Forum and possibilities for educational cooperation, including an Arctic SAR Training Module that could be implemented by each country within their own training. Kivenjuuri highlighted the benefits of simulator training and exercises (SIMEX) as a cost effective and efficient way of training responders. The training can be organized in separate locations and allows for cooperation with commercial cruise operators.

Breakout session - On Scene Coordination

Kimmo Ahvonen, lieutenant commander and SAR advisor, Finnish Border Guard, led a breakout session on On Scene Coordination (OSC). After an introduction to On Scene Coordination, the participants were divided into two groups: AECO members (1) and SAR entities (2).

Group 1 (AECO members) was asked to discuss the following questions:

1. What are your expectation about OSC collaboration?
2. Are there any Arctic challenges to meet the expectations of the OSC role?
3. From your point of view, could you handle OSC duties right here and right now?

Group 2 (SAR entities) was asked to discuss the following questions:

1. When should OSC be designated? (keeping in mind the Arctic point of view.)
2. What are the main challenges of SAR Mission Coordinator (SMC) – On Scene Coordinator (OSC) cooperation in Arctic environment?
3. Concerning those challenges how would you share the workload between SMC – OSC?

Findings from Group 2 (SAR entities)

Table 1

- OSC should be designated when the first capable assets are on scene or approaching scene.
- The main challenge is communications.
- Distribution of workload between SMC and OSC would depend on how well the OSC/vessel is equipped. Ship with competent crew and good communications can take on a bigger workload. If the OSC is not capable of taking on certain tasks, SMC would have to put more staff and or support on land.

Table 2

- The designation of OSC should be delayed until the vessel of opportunity arrives. In the meanwhile, the vessel in distress can take on some tasks such as communications and situational awareness.
- When it comes to distributing the workload between SMC and OSC, SMC can maintain a lot of responsibilities depending on what is available on scene.

Table 3

- When designating an OSC, RCC, SMC should ensure that the OSC is able to communicate with RCC. There may be translation issues, and it is also important that the OSC understands the language of SAR. When taking on the role of OSC, there is a difference between expedition cruise and conventional cruise operators. For example, expedition cruise staff have experience with small boat operations and landings in addition to cruising with larger vessels. The OSC should have sufficient time and crew capacity to take on OSC duties. At least three people should manage the OSC duties. In addition, OSC and rescuer(s) have different roles to play. The OSC should not be directly involved in the rescue. If there are only one or two vessels at the scene, one can question whether an OSC is really needed.
- The main challenge will often be related to helicopter range and limitations. Distances are a challenge. In the high season in Antarctica, it would normally take a maximum of 8 hours before

a vessel arrives on the scene. This is better than some parts of the Arctic, such as the Canadian Arctic.

- With regards to SMC - OSC distribution of workload, SMC can decide how many tasks to assign the OSC so as to not overwhelm them. Another thing to consider is whether the OSC should stay at the scene if the weather situation can put the OSC at risk. In such a scenario, one must consider helicopter and small boat operations in the current weather conditions. When assigning tasks, the SMC must consider how much responsibility the captain can handle.

Table 4

- Vessels of opportunity should take on the role of OSC if it is offered, because there may not be other alternatives. The task of OSC can and should be handed over to another vessel as soon as a ship with better capabilities shows up.
- A main challenge will always be communications. Another challenge is the fact that equipment may not be compatible. For example, a stretcher may not fit in a helicopter that is assisting in the rescue operation. Having responders from several nations participate in in a rescue depend on good political relation between the countries and the diplomatic situation. For example, there exists an oil spill agreement between Russia and Ukraine, but it is unclear whether it would be honored in the current political climate.
- Several assets may arrive at the scene, and if there are multiple helicopters, it can be challenging to coordinate. A cruise ship could handle this task, but if there is a SAR responder in the area, they may be better equipped to handle it.

Findings from Group 2 (AECO members)

1. What are your expectation about OSC collaboration?
2. Are there any Arctic challenges to meet the expectations the OSC role?
3. From your point of view, could you handle OSC duties right here and right now?

Table 1

- Language was highlighted as a possible challenge related to the OSC role, for example in the case of Russian captains sailing the Canadian Arctic. Cultural differences should also be considered. Experiences have shown that some nationalities of mariners may be hesitant in reporting incidents and requesting assistance due to fear of costs. It is important to inform captain as soon as possible that there will be no cost associated with receiving assistance.
- One operator stated that they are unsure if their captains would be willing to take on the role as OSC.

Table 2

- One expectation about OSC collaboration is that the vessel would take a few hours or even days to arrive on scene. This time should be used to get organized on board the vessel of opportunity and prepare equipment for assisting the vessel in distress. The time should also be used to think ahead and get as much information as possible across between the involved parties. It would be especially beneficial if the RCC could communicate with the captain on the vessel of distress and convey this information to others. It would also be useful if the RCC had access to a database with relevant information about the vessel.

Table 3

- One operator stated that they would not expect their captain to take on the role of OSC. The table also highlighted the importance of education and training for crew that are responsible on ships.

Points made in plenary discussion

- Good communication in all phases is essential.
- It is important that operators and SAR entities communicate before incidents occur.
- SAR responders need to understand the operations, procedures and concerns of cruise lines, and vice versa.

Breakout session - The conspiracy of unlikely events

Rasmus Dahlberg of the Royal Danish Defence College gave a presentation entitled “The conspiracy of unlikely events”. Dahlberg gave a brief history of some of the world’s worst maritime disasters, their causes and theories around accident prevention and management.

The Swiss cheese Model

Dahlberg outlined “The Swiss cheese model”, which likens human systems to multiple slices of swiss cheese, stacked side by side, in which the risk of a threat becoming a reality is mitigated by the differing layers and types of defenses which are "layered" behind each other (design, procedures and behavior). Therefore, in theory, lapses and weaknesses in one defense do not allow a risk to materialize, since other defenses also exist, to prevent a single point of failure. However, as each defense layer has holes in it, the situation might arise where the holes align and a threat reaches through all defense layers and manages to cause damage.

Pandora Cell

Dahlberg also presented the Pandora Cell concept developed by Danish Emergency Management Agency (DEMA). The concept is described by DEMA as an add-on feature to crisis management staffs. The aim is to provide near-term foresight during crises that are already unfolding. To achieve this, a separate cell is tasked with looking back at lessons learned, looking around to pick up on weak signals in our surroundings, and looking ahead to anticipate what will happen next. The cell is isolated from the remaining crisis management organization but provides the crisis leadership with regular output from the analyses.

Dahlberg’s presentation served as a starting point for a breakout session where participants were asked to discuss the following questions:

1. Share your stories about emergencies and use the Swiss cheese model to discuss how latent “holes” in the design and procedure slices contributed to the incident together with active failures (behavior).
2. Discuss if and how the “Pandora cell” approach could be useful in crisis management in your organizations.

Findings

Table 1

- Unforeseen risk is an important factor. It is necessary to have the resources available to deal with unexpected risks.
- In an Arctic environment, you must expect the unexpected, especially now with climate change disrupting historic pattern.
- As the Arctic is changing, we have to assess what constitutes reasonable risk.
- It is important not to spend all energy and capacity in the beginning of a crisis, because the crisis can develop further.
- Example of incident: One operator gave an example where failures on several levels cause a delayed response to a fire in the engine room. For a period of time, the fire detecting system on the ship gave false alarms every other day. The captain and shipowner did not fix the problem, and as a result, the crew started taking the fire alarm less seriously. When an actual fire occurred, the response was delayed, and the crew took ten minutes to assemble. This was caused by a mistake in design (defective fire panel) and human error (disregarding the alarm).

Table 2

- Example of incident: One operator told about an incident where a ship, sailing at 1,5 – 2 knots, was moving through an area where it had to maneuver between two icebergs. The ship bumped into one of the iceberg, causing the ship to move into the other berg. The foot of the iceberg came up under the ship, causing movement. The gap between the bergs was closing because of tide and current. When deciding to maneuver between the icebergs, it was not clear to the bridge that the gap was closing fast, and the captain made the decision to move through. The operator considers this a near-miss and will have a hot wash with the captain when he returns. Another participant asked whether radar was used to track the icebergs and noted that redundancies should be worked into the system.
- If you want to measure risk, look at how you talk about a near-miss. It should be used as an opportunity to learn and improve.

Table 3

- One mariner told the story of a pirate attack off the coast of Somalia. The ship had high sides and it was not easy to climb on board. Therefore, the risk was perceived to be low and few measures were in place to prevent pirate attacks. When the ship was in fact attacked, the pirates focused on the aft part of the vessel, where a ducktail made it quite easy to board. The crew responded by wagging the stern to create waves, making it more difficult to put a ladder against the skip. As the pirates attempted to board, they fired at the ship with automatic weapons. The shooting lasted for two hours. In the aftermath of this event, armed guards were put in place. Ultimately, it was human behavior that prevented boarding, since the crew kept moving and wagging the stern.

Table 4

- One participant gave an example of an incident involving a vessel in the Barents Sea. The ship had a shallow freeboard of less than a meter. All the piping was in the freeboard and it was hard to do maintenance, therefore it was not done for years. When a pipe broke, the freeboard filled fast because it was shallow. The crew used the pump, but it was not strong enough to pump the

water outside. After these failures of the level of design and procedures, behavior also failed to adequately tackle the situation. The crew panicked, and 50 people abandoned ship. In the end, the ship was flooded, but did not sink.

- The organizational culture is the level between procedures and behavior.

Table 5

- One participant described how a cruise operator has made extensive changes in their policies to ensure a robust bridge. The operator avoids single nationalities on the bridge and takes cultural aspects into consideration. Other measures taken to ensure a well-functioning bridge is psychological testing of masters and the implementation of a function-based bridge (as opposed to a rank-based bridge). In such a setup, the master is often operations director, standing at the back and watch the officers do all the maneuvering. Pairing a group of experienced officers with fairly junior masters is another way of preventing a culture where captains can make poor decisions without being questioned. The participant also noted that when a situation intensifies, manning should be increased.

Table 5

- One participant noted that in a crisis, you can expect that 50% will follow orders, 25% will take initiative in the situation and 25% will freeze and be unable to act. This is true even for trained personnel.
- One participant shared a near miss incident as a vessel was leaving a Greenlandic harbor. The crew was ready to let go of the last mooring line, but the person in charge almost forgot to give the order. The incident was discussed with crew afterward. Since everyone saw the near miss, it was especially important to address it.
- One participant notes that 9/11 was a wakeup call, as they realized that they had not reviewed their crisis management plans recently.
- It is difficult to change behavior, because you have to eliminate old behavior first.
- The key to success is to analyze the situation as it unfolds, not just rely on plans.

Table 6

- In the cruise industry there are a lot of pressures, such as time, finances and guest experience. Near misses are often a consequence of behavior reacting to pressure. It is important to fall back and rely on procedures.

Table 7

- One participant gave an example of an accident wherein tanks containing chlorine and acid were mixed by accident, causing hazardous gas. The person handling the tanks followed routine but did not read the label. On the design level, the problem was that the containers were identical, apart from the label. On the procedure level it was taken for granted that it an identical container would contain the same substance same. On the final level of human behavior, person could have paid more attention and checked the labels.
- When an incident occurs, instead of assigning blame to the person, one should plan for the future and ask: Why did it seem like a perfectly good idea for that person at the time?

Table 8

- Systems are affected by cost cutting and the availability of resources. It is not always easy to find experienced people. Changes can be small, the change in safety seems small, or change is not perceived, but the accumulative effect means that safety does decrease.
- Safety can be viewed as a cost or as an investment.

Break out session – Sensemaking

Morten Thanning Vendelø from Copenhagen Business School gave a lecture on organizational sensemaking. Vendelø explained how organizational members create and maintain a sense of meaning. Sensemaking is about connecting extracted cues and salient mental models to create an account of what is going on. Sensemaking is driven by plausibility rather than by accuracy.

After the lecture, the participants were asked to discuss the following questions:

- Share your experiences from/stories about Arctic emergencies where useful observations/information was discarded, or undiscovered misunderstandings happened.
- Thinking about Organizational Sensemaking, discuss:
    - Why do you think observations/information were discarded?
    - How you think these misunderstandings evolved?
    - What might be done in order to make future repetitions less likely?

Participants were divided in mixed groups for discussions. Photo: AECO

Findings

<u>Examples of incidents</u>

- One participant gave an example where a high-ranking person convinced the crew to disregard certain standard operating procedures to accommodate their wishes. As a result, the safety was compromised.
- One representative from a SAR entity recalled an episode where SAR responders ended up searching for a ship that did not exist, due to communication issues.
- One participant from a SAR entity gave an example of an incident where another authority has assisted a small boat that had hit ice, causing two people to be injured. Almost all the information the SAR entity received was inaccurate. There were language issues and differences in the organizational culture of the two entities that were involved.
- An operator told about an incident that took place during a landing. The incident was handled by staff, but there were issues with the information flow after the incident. It took 48 hours

before the head office learned of the incident, and the three different reports gave three different version of what had happened. Some observations were discarded in the initial reporting. Misunderstandings evolved and were eventually resolved by head office asking more questions. This reporting issues around this incident led to operational changes. Incident reporting was changed to make it more descriptive and ask specific questions. The operator debriefed the whole incident at staff gathering.

- One representative of a SAR entity gave an example of a man over board exercise. One of the standby vessels moved in to search but encountered difficulties because they had not taken the time to make a risk assessment.
- One participant gave an example of an explosion on a vessel operating in a high-risk environment where it was hard to get information about what had happened. It was later discovered that the accident was caused by a component that should have been condemned but was kept in service to save cost. The lesson learned was that one cannot cut corners to keep costs down, especially when operating in a high-risk environment.

Reflections on organizational sensemaking

- Having someone to discuss your position with can be an important corrective when making sense of a situation.
- Sometimes, an organization can receive information about a possible incident when no incident has occurred. Checking all the information takes a lot of time, and if there is indeed an incident, it might be too late to act.
- When carrying out an exercise, the organizers should consider inserting false information into the scenario. Intentionally introducing false information may not be necessary, as misunderstanding and false perceptions often occur.
- Pressure and time constraints is one of the reasons why lack of communication and misunderstandings occur. Between the ship and shore side, there will often be different perception of why it occurs and the severity of the situation. Sometimes the feedback is that the ship should have informed head office earlier so that they could have helped. Other times, the ship feels that a situation is grave, but it turns out that it is not as dramatic as they thought. After an incident, it is important to share lessons learned.
- If people assume that an operation will be easy, they may become less alert and disregard signs that should cause them to exercise extra caution.
- Information that comes in initially paints a picture of the scenario and one builds a bias against information that contradicts the original information. Likewise, one allows information to pass if it aligns with the perceived scenario. In order to avoid this, one should take in information with an open mind and reassess the old information.

Summary of presentations – Day 2

- Bent-Ove Jamtli, JRCC North-Norway, gave a presentation on lessons learnt and future perspectives on communication in SAR operations. The presentation outlined existing infrastructure for high Arctic communications and ongoing projects for networking, development and innovation within Arctic SAR.
- Nick Hughes, Norwegian Meteorological Institute, gave an update on ice and met information, outlining what's available and what's on the horizon.

- Robert Brown, Marine Institute, Memorial University gave a presentation on how cold temperatures and water effects ability to utilize equipment. Brown gave an overview of the cold climate specific challenges associated with evacuation, survival and rescue.
- Kári Logason, Hefring Marine Solutions, gave a presentation new technology for wave slam monitoring and high-speed boat crew protection.
- Fred Schancke Hansen, Arctic Safety Center, University of Svalbard, presented the programs and activities of the Arctic Safety Center. Hansen also outlined how industry tailored Artic safety education can be developed and structured.

Tabletop exercise

The 2018 Joint Arctic SAR tabletop exercise was developed and led by the US Coast Guard. The exercise focused on identifying the potential role Vessel of Opportunity may have in management of on-scene coordination and efforts. The TTX also focus on communication and cooperation across organizations. The exercise was moderated by Cecil McNutt of the US Coast Guard.

Cecil McNutt presenting discussion questions. Photo: AECO

The exercise participants were divided into groups and allocated the following roles:

- Captains (playing the roles of the vessel in distress and vessel of opportunity)
- Entities that provide oversight over RCCs and MRCCs
- Owners and home office management
- Expedition leaders
- RCCs and entities that own vessels used in SAR (i.e., Navy and Coast Guard)
- Passengers on vessel in distress

Exercise scenario (fictional)

Casualty

June 5, 2018, the cruise ship M/V Bad Day experiences an engine room electrical fire. The engines went silent and the ship has no propulsion. The bridge crew feel a shudder, all electricity goes out and the alarm goes off. After 60 seconds the emergency generator kicks in. At 21:17, the vessel is dead in water adrift ~110nm West of Jan Mayen (~ 71°10´N / 013°30´W). The closest airport is at Jan Mayen at a distance ~110nm.

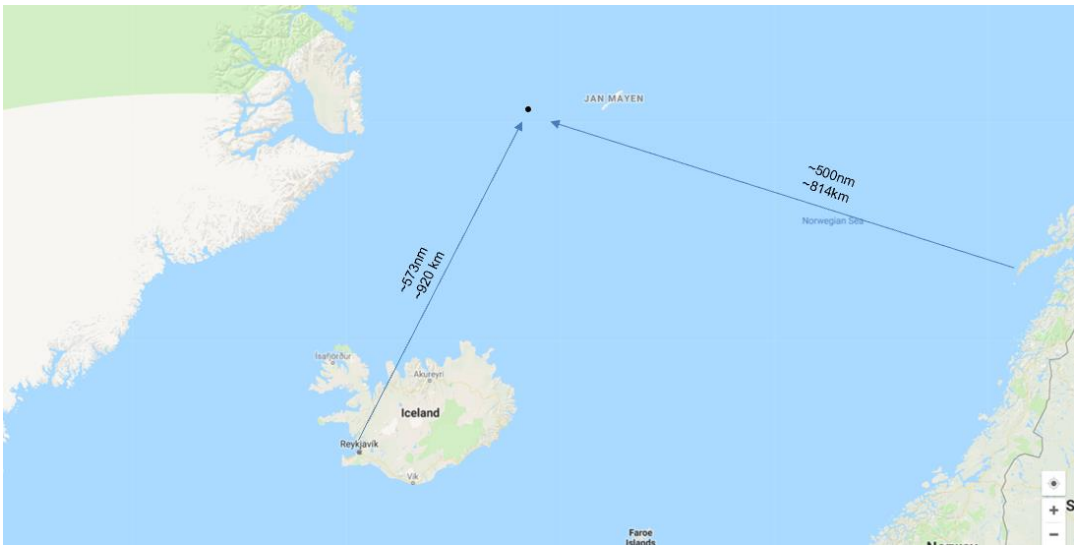
Vessel specification

The vessel is 665 ft long, has a deadweight of 10352 GT and is carrying 405 passengers and crew. She is equipped with 4 lifeboats and 2 tender lifeboats, 6 life rafts and 14 zodiacs. Only 10 of the zodiacs are functional on the day of the accident. The on-board language is German.

Environment:

Winds in the area are 5-15 kn, sea/swells are 2-4 ft and the water temperature is 38-40° F / 3-4° C. There is no sea ice in the area, nor is the ship close to any shallows.

Location (Illustration by US. Coast Guard)



TTX session 1 - Captain work session

The group of captains (vessel in distress) were given 10 minutes to discuss the following questions, while the other exercise participant listened to their discussions.

- What are your actions concerns?
- Briefly explain who would do what onboard (fire crew, expedition, extra bridge management, etc.).
- What are your immediate concerns? Why?
- Where is your communication hardware located (internal/external)?
- What do you have for external coms? Who normally operates it?
- How does your bridge/crisis management work on vessel?
- What are the 6-10 most important things to accomplish?
- What are your uncertainties?

After a few minutes of discussion, the group was given the following scenario input:

The chief engineer has sealed the engine room and initiated CO2 after conferring with master mariner. The release was successful, but the fire is not out. The dept at the current location is 1700 meters, so it is not possible to release anchor. The wind is from southwest. There is heat and smoke up to bulk head deck, but not above. There is smoke and paint peeling above that.

Later the group was given additional scenario input:

The fireteam is isolating and cooling the fire site and the passengers are mustered. It is time to consider preparing lifeboats. The five following days will have fair weather.

Visual aids used during TTX: Photo: AECO

Action concerns

Situational awareness and response

- Get to bridge ASAP.
- The first question to ask oneself is whether we will survive this.
- Situation should be considered a general emergency right away.
- Important to assess whether the fire is spreading.
- Raise alarm to alert crew.
- Direct crew to emergency stations.
- Assess area around ship and identify potential danger, e.g. ensure that ship is far from shallows.
- Assess the location of the restaurant (where most passengers are located) in relation to engine room. The fire alarm system should provide that information.
- For smaller ships (e.g. a tall ship), the concern would be the spread of smoke. Even if water tight compartments are closed and ventilation stopped, passenger accommodation would be filled with smoke within 2 – 3 minutes on a 100-meter ship.
- Consider releasing anchor.
- Bridge needs reports that all affected places are empty.

Firefighting

- Smoke/fire team should be on their way, as per SOPs. The fire team should move in ASAP. Most likely, the fire would not spread beyond the engine room. It takes 3 minutes to get fire team ready, and as they are getting ready, a meeting point is decided upon.
- A ship of that size would have 4 -5 fire zones. The captain would need to find out what is going on from the chief engineer.
- Fire crew size and capability vary by vessel. One ship has three fire teams consisting of two people plus a dresser. Some fireteams are equipped for fire boundary cooling but not heavy firefighting.
- Determine whether CO2 release was successful and whether fire team is still needed.
- The main concern is to get ship to where she can survive. The fire can be boxed.
- Scenario input indicates that CO2 did not work, but more information is needed.

- Ventilation should be shut down, if it is not already disabled by emergency power system.
- The staff captain is responsible for firefighting teams on board.

Managing passengers

- PA broadcast to passengers.
- Keeping passengers safe is a priority.
- Passengers should be assembled and organized. At this time of the evening, most passengers will be in the dining room.
- The muster station can be compromised if it is located in the same fire zone. If that is the case, crew should consider moving passengers.
- The expedition team is briefed to muster and prepare to assist hotel operations with passengers.
- Hotel operations manages evacuation. The hotel director manages passengers.
- A smaller vessel would prepare life boats. Other ships have davit-launched lifeboats which are loaded before launch in water. We do not want to announce that we are abandoning before we have to.
- The expedition leader is down with hotel team, dealing with passengers. The EL would not be involved in other tasks for time being.
- Pax crew ratio is usually between 1:1 and 4:1, depending on the ship.
- For some operators, the EL uses PA system to give information to passengers unless the incident escalated to a point where the captain would communicate directly to passengers. On some ships, the PA would be on the bridge in order to use the PA system, on other ships, the PA system can be accessed from other locations.
- Some operators have system where the captain taker over communication with passengers right away, either via PA or in person.
- A guide or translator would translate when needed.

Communications

- Could the communications center be compromised by the fire? On a small ship, the communications center would be on the bridge.
- All captains agreed that they would send out a PAN-PAN (urgency signal, but no immediate danger to life or to the continued viability of the vessel itself).
- The PAN-PAN would be picked up by ships in area and the station on Jan Mayen. There are many flights through the area, but they may not be listening on the same station.
- As soon as first response on board has been set up, the ship will contact company to activate emergency response. Can be done by satellite phone if nothing else is available. There is officer on duty who will pick up phone. The SOP is to notify company and/or Designated Person Ashore.
- Handheld VHF will normally work even if there is a power failure.
- Some ships have relays, booster stations or servers near engine room that could be affected by an engine fire, but not all.
- The main radio is on the bridge. In addition, here are EPIRBs outside the bridge.
- The staff and crew can communicate via VHF on all areas of ship. This system has been tested.

Prioritized tasks

At the end of the discussion session, the group was asked to summarize the most important things to accomplish.

- Broadcast to passengers, get passengers organized.
- Send out PAN-PAN.
- If satellite phones are operational, vessel would call relevant RCC directly.
- Contain fire and smoke, get fire team on site to find out more.
- Contain situation on ship to make it possible to step back and communicate.
- Notify home office.
    - This was considered less urgent by some, whereas others would give this priority.
    - It was argued that the person making the call would not be involved in firefight, the call can be short and there is a risk of losing communications at a later stage.
    - Some argued that others will have heard the PAN-PAN and can notify home office.
    - Some suggested that there is a difference between ELs and captains because the order of priority for the latter would be to respond to the incident, navigate and communicate, in that order.
    - If the ship was a charter, one would have another party involved (vessel owner).

Uncertainties

The group was also asked what their uncertainties would be at this point in time.

- Has PAN-PAN been heard, acknowledged, and relayed?
- Is fire contained?

Captain work session. Photo: AECO.

Exercise scenario update

Casualty update

The moderator provided participants with a scenario update. At this point, the scenario has lasted for two hours and the situation is as follows:

Damage

- Engine room electrical fire.
- Vessel is disabled, listing 05° port.
- No hotel services, smoke damage to some living spaces.
- Emergency power only (lighting, comms, lifeboat davits, etc.).
- Some injuries have occurred.

Initial assessment and on-scene actions

- Captain reports large electrical fire in engineering spaces not under control.
- Vessel adrift DIW ~71°10´N / 013°30´W with only partial emergency power. Drifting SW at .2kts.
- All attempts to extinguish fire have been unsuccessful although contained in machinery spaces. Smoke and heat damage to deck three has occurred.
- There are 4 injured in medical room.
- RCCs got the call and confirmed receipt.
- Iceland was notified by JRCC because the incident occurred in Icelandic SAR region.

Injuries

- 2 fire crew sustained smoke inhalation and first and second-degree burns.
- 2 passengers (1 male 1 female, aged 77 & 75) sustained smoke inhalation: difficulty breathing.
- All injuries categorized as code yellow (intermediate or urgent care needed).

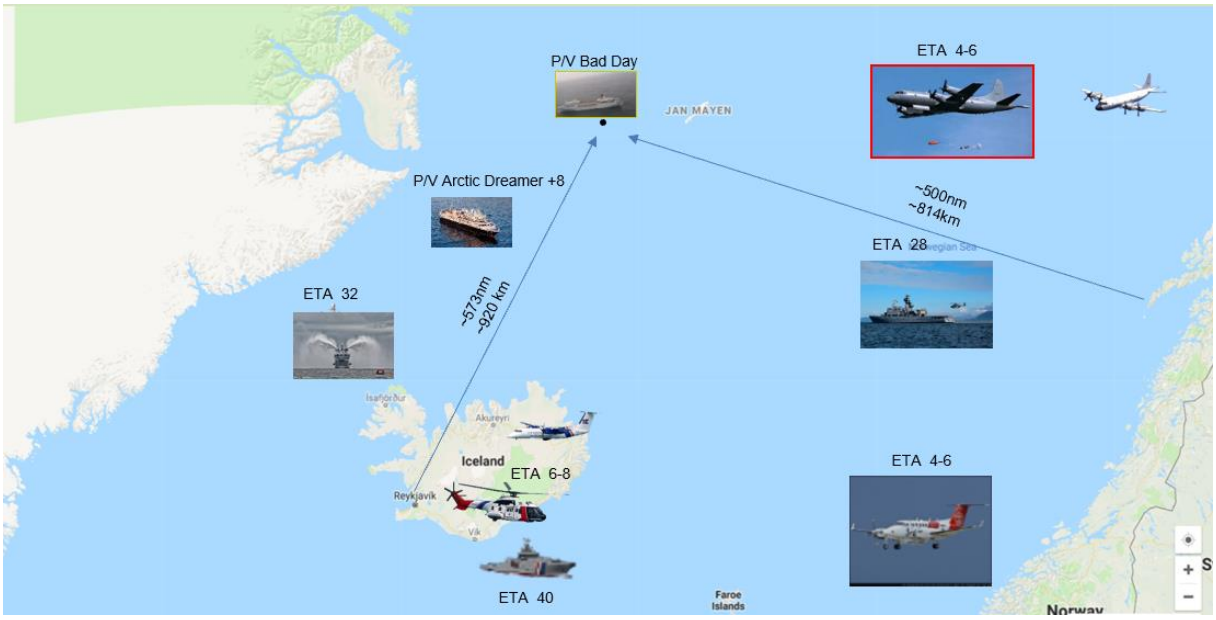
Known/potentials

- Onboard medical facilities dealing with injured.
- Everyone notified.
- Several passengers and crew experiencing seasickness.
- Vessel is stable; habitability is deteriorating.
- There is no running water, no toilets, no way of cooking food.
- The only available drinking water is whatever has been brought in bottles.
- Master anticipates removal of passenger/crew needed.
- Anticipate request for assistance.
- Expect global media interest.
- Before power was someone got a message out. Media knows that there has been a distress call.
- Company to mobilize resources(?).

Closes vessel of opportunity

The closest vessel is Arctic Dreamer, a cruise ship carrying 220 crew and pax. Arctic Dreamer is 8 hours away. VOO has confirmed that they can assist and are on their way. Arctic Dreamer is on day 3 of a 13-day cruise.

Distance to assets in hours: (Illustration by US Coast Guard)



Asset	OSE	Capability
Danish Navy vessel Triton	32 hrs	Evacuation – HIFR – SAR
ICG vessel Thor	40 hrs	Evacuation – HIFR – SAR
NCG Nordkapp	28 hrs	Evacuation – HIFR – SAR
C-130J	4-6 hrs	On-scene coordination – Rescue equipment drop
P3C "ORION"	3-6 hrs	On-scene coordination duration on-scene
ICG Dash8	4-6 hrs	On-scene coordination – duration on-scene
Arctic Dreamer (pax)	8 hrs	Evacution – On-scene coordination (220 crew and pax)
ICG Helo	6-8 hours	If no refuel option, cannot fly

TTX session 2 - Group work sessions

All groups were given 10 minutes to discuss the questions listed below. The captain group was asked to play the roles of both the vessel in distress and the vessel of opportunity.

- What do you think your role is here? Explain (support vessel, passengers/crew, contact lawyer, etc.).
- What are your priorities? Rank them by order and explain why.
- What actions will you take? Why?
- How will you communicate? How often? Who?
- What are your info needs? Why?
- How will you get info? Explain.
- What are you concerned about?

MRCC group

Captain group (as vessel of opportunity)

- VOO is in contact with RCC after RCC called VOO.
- VOO are already on the way and have informed RCC about ETA, resources on board, tender boat capacity etc.
- VOO has contacted vessel in distress to let them know their ETA.
- The priority is to keep safe. Pax and crew can still be inside the ship, which is considered safe for now since the vessel in distress only has a 5-degree tilt.
- VOO informed passenger that they are diverting from course.
- VOO is preparing equipment to give to vessel (bottles of water, blankets, etc.). The packages are being packed on tender boats and will be delivered by tender boat drivers.
- VOO is briefing EL, expedition team and tender boat drivers.
- EL can relay concerns from expedition team to bridge.
- The captains maintain online communication (staying on the line).
- VOO knows how many passengers the vessel in distress has in case they have to be brought on board. The number of pax is manageable and will not compromise VOO stability or total weight.

MRCC group

<u>Coordinating response</u>

- Role is coordinating response.
- Once PAN-PAN goes out, coast radios station puts out relay using all methods available.
- VOO (Arctic Dreamer) responded, but MRCC also puta out broad net to any other vessels that may assist.
- Priority: talk directly with vessel in distress, assess level of urgency, confirm information, find out intention (abandon ship or stay on board).
- The vessel in distress has only issued PAN-PAN (not mayday call), but from MRCC viewpoint it is a high alert situation.
- Needs: Situational awareness, information about injuries on board. There is often trained crew on board that can deal with situation, but MRCC will monitor.

<u>Managing assets</u>

- MRCC wants fixed wing asset (C-130 Hercules) on scene helping with communications and confirming situation.

- Most vessels are 1+ day away. Air assets will be saved for now, helicopter is on standby. Forward deploying of helicopter to Jan Mayen if infrastructure allows.
- No need for medevac for now.
- Communicate with VOO in case situation gets worse.

Communication

- Communications schedule every 2 hours with both vessel in distress and vessel of opportunity. In addition, if the situation changes, MRCC wants to be notified right away.
- The captain group objected that 2-hour intervals is too long and would prefer a 1-hour communications schedule, both with vessel in distress and VOO.
- Vessels are talking on MF radio, MRCC will be listening.
- Confirm with captain that all communication should go through MRCC. Information should be passed through MRCC as much as possible to ease the load on the ship.
- MRCC will reach out to head office of cruise company because if they communicate directly on satellite phone with ship, it limits communication with MRCC. MRCC will get information directly to head office, e.g. list of passengers.
- One captain argued that the corporate contact point uses a separate line of communication and does not restrict communication with MRCC. MRCC group points out that it is a question of time and staff capacity onboard vessel in distress.
- RCCs communicate with each other. In this case, Norway and The Faroe Islands would be notified. Canada would not be notified because the area does not border to Canada's SAR area.

MRCC group discussing response and priorities. Photo: AECO

Owners and home office management group (vessel of opportunity)

- This group's role is management of VOO.
- It is the captain's decision whether to assist or not following a PAN-PAN. The home office would not interfere with the captain's decision.
- Had the vessel in distress sent out an actual distress signal, all vessels that receive the call are obliged to respond, unless fuel limitation or danger prevents them from doing so. RCC can ask them to stand down if their assistance is not needed.
- The home office would get a call to a 24/7 watch telephone to inform them about what goes on. The home office would ask VOO for updates when things change, when there are news and when VOO arrives on scene.

- Captain group interjects that if VOO needs something, they will ask the hear office. There is no need to communicate if not needed.
- VOO probably has capacity to communicate while steaming to assist vessel in distress.
- Home office wants to know how situation affects voyage and itinerary, becaue they will eventually have to heal with it. Home office can start mobilizing internally, e.g. when it comes to passenger care and information.
- When the VOO passenger vessel, RCCs know that there are outside pressures.
- Ownership structure varies by company. Some companies are both owner and operator, other operators use chartered ships. The owner of the vessel has overriding authority.
- The operator is a charter party of the VOO, the captain will notify vessel owners which notifies charter party. The EL has independent communications (e.g. satellite phone or fleet broadband) and can notify charter party (operator). Depending in the vessel policy, the EL may be permitted to use bridge communications to talk to charter party.
- Charter party will talk to EL and get information on how the situation will affect itinerary. Operator will consider whether to change passenger flights or bring in charter flights.
- Operator can discuss these matters directly with EL, and the captain can decide how much time to spend communicating with charter party.
- The designated person ashore can also be given the task of dealing with charting (party operator).
- Findings from previous exercises show that VOO captain can get overwhelmed by communications with multiple interested parties and get distracted from the actual VOO tasks.
- On smaller ships, the captain would also spend time informing passengers. Passengers are reassured when captain speaks directly to them. This is the case both for VOO and vessel in distress.

Owners and home office management group (vessel in distress)

- The vessel in distress notifies owner or home office.
- Activate emergency response team, first call to DPA, get technical drawings together, follow SOPs.
- Priorities: Status of ship and people on board, who has the ship contacted, what are the resources on board.

Communications

- Touch base with captain, agree on initial update after 30 minutes using shared conference number.
- Try to use shared lines and calls with RCCs.
- RCCs will talk directly with captain on radio, one to one, and will talk to operator on a separate line.
- Shoreside can give a lot of information to operator, who wants to know what is going on on the ship.

Entities that provide oversight over RCCs

- 100% confidence in responders, our jobs is to keep others out of their hair and see how we can start moving things for them.

- Handle media.
- Mobilize on land and water.
- Liaise with government agencies, etc.
- Will not infringe on operator issues such as charter flights.
- RCC gives situation report when needed.
- Prepare for the worse and assume that passengers will land in Jan Mayen.
- Work on relieving responders, calling in people on vacation etc.
- Follow unified command structure, use conference calls.
- Fly medical equipment and health personnel to possible landing site.

Passengers on vessel in distress

- Have received little information, unsure if they will survive.
- One passenger only has 4 days of life saving medications, does not know how long situation will last.
- One passenger has their own satellite phone and calls next of kin who then notifies media.
- If there is are journalist on board they will be taking notes.

Exercise participants listen as the moderator questions captain group. Photo: AECO

Conclusion of TTX

Due to time restraints, the TTC concluded before scenario was played out to its end. The next sessions would have focused on whether to evacuate passengers. The options would have been to stay on ships, put passengers in tender boats or life boats, transport passengers to Jan Mayen or VOO. The TTX dedicated considerable attention to communications because it has been identified as an important focus area in previous exercises.

Hot wash – feedback on TTX organization

Moderator Cecil McNutt of the US Coast Guard invited participants to share what they liked about the TTX and what could be improved. The feedback can be summarized as follows:

Value for participants

- The exercise demonstrates how complex an incident response it.
- The exercise identified gaps, expectations and topics that should be explored further.
- The exercise made it clear that everyone involved wants to speak with captain. This was an eye-opener for some participants.
- For some participants, it was surprising to see the knowledge gaps that the exercise revealed.
- Bringing together masters with different backgrounds and ships made it possible to cover different aspects and nuances.
- Game concept was interesting, and the visualization board was useful.
- A captain noted that the event is very useful for masters, and more masters should be encouraged to participate.
- The exercise gives participant perspectives and insights that they can bring back to their own organization and integrate in internal exercises.
- It is good to get people from different sectors gathered in the same room, talking about practical issues and discussing a situation that could happen tomorrow. Unlike some other events, there is a focus on real life challenges. This forum is a platform for creating industry best practices that will eventually work its way into Polar Waters Operations Manuals.

Fostering dialogue and understanding

- The first work session with captains was useful because the other participants could listen to the perspective and reasoning of the captains. This highlighted the difference on how the ship and SAR responders assess and respond to a situation. For example, the captains only sent out a PAN-PAN, and they should understand that more aid can be mustered if a distress signal is sent out. From the responder perspective, the situation may be worse than what the captain is telling them. It takes time for RCC to get their assets together. There should be more communication between VD and responder so that the correct conclusions are drawn. It is important that masters are not afraid to provide all relevant information to responders.
- One captain noted that it was great to have such high attendance from responders and shore support. Captains learned much about what responders expect and want from the vessels. It would also be good for responders to come onboard commercial ships to learn more about operations and capabilities. A representative from SAR entity responded that they had learned a lot from going on board cruise ships. He encouraged others to take the opportunity to go on board while the vessel is in port and to accept invitations from ships.
- Before a ship starts her season, the ship should be in contact with RCCs so that they know who the contact point will be.

Group setup

- The groups were made up by representatives from the same sector, and the different groups did not communicate with each other except during plenary summaries. This setup does not take advantage of the other sectors' perspectives. An alternative setup could have been groups of 3-4 people that represent the different sectors. In discussions, a representative from each sector could share their perspective while the rest of the group listens. Alternatively, the TTX could have been organized in a way that allowed for more team work across groups.

- Some felt that the passenger role was underexploited and that the scenario could have given more detail about the passenger situation. Passengers have comfort and information needs, and in a real incident, they would have interrupted and even tried to contribute to other groups. One participant commented that the crew and staff would have been trained to handle crowds and that captain are trained in crisis management. Another participant commented that a crisis leads to a shift of focus. On a luxury cruise, the passengers usually get everything they want. In a crisis, they are not considered customers but human beings, and their survival is more important than their customer needs.
- Some of the groups alternated between playing VOO and VD. It was sometimes difficult to distinguish which role the group was playing during discussions and plenary summaries.

Practicalities

- The discussion in groups was sometimes cut short when the conversation was at its most interesting point. Smaller groups and fewer questions per session could have facilitated more thorough discussions.
- Some participants wished that more time could have been set aside for the TTX portion of the event. The 2018 TTX lasted for 3 hours and 15 minutes. Some participants would have preferred that there were fewer presentations and that a whole day was dedicated to the TTX.
- The rearranging of groups and tables could have been made more efficient, e.g. by marking the different tables with flags with the name of the group and providing information in conference packages ahead of time.
- The acoustics of the room made it sometimes difficult to hear what was being said.

Other feedback

- It is important to take into consideration that crew would have behaved completely differently in a real emergency, regardless of training.

Other findings

Below is a summary of other findings that came up during the 2018 Joint Arctic SAR TTX workshop and TTX.

Cooperation across organizations

- Entities that would be called upon in an actual crisis (e.g. environmental agencies) are not necessarily included in exercises. Including such entities in exercise would be beneficial.
- Only 5 Arctic nations are responsible for Arctic marine SAR, and the number of nations included in cooperation forums varies. For example, some forums do not include Russia.

Information sharing

- There is currently no unified system for ships to send relevant information such as vessel specifications and SAR plan to RCCs at the beginning of the season. Likewise, there is no established system for sharing voyage plans and passenger lists with RCCs. Some ships send information to RCCs on their own accord. A centralized platform for information sharing could facilitate the flow of information. The UK has a database where vessel specifications and SAR plans can be found.

Lack of knowledge of cruise industry's capabilities and resources

- SAR entities do not have a full overview of the equipment and resources that cruise vessel have on board.
- The Icelandic Coast Guard and SAR entities in other countries have started going on board ships to learn how they operate and which resources they have available on board. During some of these visits, SAR responders have been surprised at the ship's resources and capabilities.
- Cruise ships are excellent platform for OSC, since the ships often have good communications and often have extra staff. In regions like Iceland where there are limited Coast Guard assets, responders are likely to use vessel of opportunity as a base for On Scene Coordination. A Coast Guard representative could be transported to vessel by helicopter and run operations from there.

Industry lacks knowledge about the procedures and preferences of SAR entities

- One operator asked whether SAR entities would prefer to bring in their own damage control team in the case of hull breach. The operator has a damage control team, but the SAR entity may have better equipment.

Industry and SAR entities may assess a situation differently

- The TTX releveled a discrepancy between how the vessel in distress and SAR responders assessed and responded to the situation. The scenario presented an engine room fire resulting in loss of propulsion. In the exercise, the vessel in distress sent out an urgency signal, but waited to send out a distress call. From the MRCC viewpoint it is a high alert situation.
- The MRCCs began mobilizing assets in anticipation of a distress call. Had a distress call been sent out by VD right away, more assets could have been mobilized at an earlier stage.

Summary and way forward

Frigg Jørgensen, executive director of AECO, thanked contributors, partners and sponsors and informed participants about the next Joint Arctic SAR workshop and TTX, which will take place April 9 – 10, 2019 in Reykjavik. The organizers are in conversation with the Canadian Coast Guard regarding their possible involvement as a partner. There are also plans for stronger cooperation with the Arctic Coast Guard Forum and ARCSAR network. It is important to coordinate with relevant organizations and initiatives to facilitate synergies and prevent competition between Arctic SAR events.

For the third year in a row, the Joint Arctic SAR event has identified gaps and needs, but it is still unclear how those needs will be met. AECO has led efforts in other areas where joint efforts and pressure from various stakeholders have given concrete outputs. Optimized nautical charting, meteorological and ice services and are some examples of what has been achieved by bringing together cruise industry, government agencies and other stakeholders. The Joint Arctic SAR event can be a forum for identifying how gaps should be closed and advocating for these improvements with a unified voice.

Jørgensen reminded participants from the SAR community that they practically have an open invitation to visit AECO members vessels with advance notice. She also pointed to the fact that small LIVEXes are being organized in Iceland.

Bent Ove Jamtli, general director of JRCC Northern Norway thanked the US Coast Guard for developing and leading the tabletop exercise.

Audunn Kristinsson, deputy chief of operations, Icelandic Coast Guard thanked everyone involved and invited participants to come with feedback and suggestions. He also underlined the importance of short exercises that involves industry, such as firefighting exercises on board ships. He also told participants that cruise captains are welcome to come on board Icelandic Coast Guard vessels to learn more about their operations.

Participants

The following organizations were represented at the event:

AECO and AECO members AECO Adventure Canada Aurora Expeditions Grand Espaces Hurtigruten Lindblad Expeditions Noble Caledonia One Ocean Expeditions PolarQuest AB Ponant Poseidon Expeditions Quark Expeditions Scenic Cruises Silversea Tallship Company The World Residences at sea **Other industry** IAATO	**SAR entities** Arctic Command of the Danish Defence Canadian Coast Guard Canadian Coast Guard, JRCC Halifax Environment Agency of Iceland Finnish Border Guard JRCC North~~-ern~~ Norway JRCC South-Norway Norwegian Coast Guard Norwegian Joint Headquarters Swedish Coastguard US Coast Guard 17th District, Alaska US Coast Guard 7th District, Miami FL Icelandic Coast Guard Red Cross Iceland Iceland Transport Authority MRCC Tórshavn
Invited speakers Copenhagen Business School Hefring Marine Marine Institute, Memorial University Norwegian Ice Service Royal Danish Defence College University of Svalbard/Arctic Safety Center	**Others** Gára ehf Helse Nord RHF. Hybrid Air Vehicles Laurea University of Applied Scineces Nord Universitet North Star Group Umeå University University of Akureyri
Sponsors	

Cruise Iceland Cruise Iceland North Atlantic Agency	

Participants of the 2018 Joint Arctic SAR workshop and TTX. Photo: AECO

The next Joint Arctic SAR workshop and TTX will take place April 9 – 10, 2019 in Reykjavik.

Please see https://www.aeco.no/events/ for program and registration.