

# 2<sup>nd</sup> Joint Arctic SAR TTX

## Reykjavik April 5-6, 2017

### EXERCISE REPORT



LANDHELGISGÆSLA ÍSLANDS  
ICELANDIC COAST GUARD

Association of  
Arctic Expedition Cruise  
Operators **AECO** 



Hovedredningsentralen  
JRCC-BODOE

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## List of acronyms

AECO	Association of Arctic Expedition Cruise Operators
SAR	Search and Rescue
JRCC	Joint Rescue Coordination Center
RCC	Rescue Coordination Center
TTX	Table Top Exercise
MIRG	Maritime Incident Response Group
CRO	Company Response Organisation
NM	Nautical Miles
EEZ	Exclusive Economic Zone
ETA	Estimated Time of Arrival
PAX	Passenger

## Executive Summary

The second AECO joint Arctic SAR Workshop and TTX was held during the days of April 5<sup>th</sup> and 6<sup>th</sup>, in Reykjavik Iceland. The event is a co-operation project between AECO, the Icelandic Coast Guard and JRCC-Northern 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 SAR community and academia.

### Main takeaways<sup>1</sup>

Main takeaways and lessons learned can be summarized under four headlines:

Communication	Technical	Fire-fighting	Tracking and recovery
Need for proactive sharing of information	Limited bandwidth in high Arctic areas – need for improved coverage starting with testing innovation	Need for improved equipment	Need for improved routines for evacuation
Need for improved communication between RCC and operator/vessel – shared hotline suggested	Physical gap between lifeboats and rescue vessels – need for standardization, contingency plans and crew training	Need for standard firefighting procedures (such as MIRG)	Need for better tracking and recovering
Need for contingency when the bridge is inaccessible	Life rafts and life boats limitations challenging five days survival in cold climates – need for re-evaluation		Consider implementation of passenger tracking technology
Need for proactive information from RCC to vessel			Improved life boat tracking systems
Need for improved and proactive communication between pax and crew			
Need to standardize communication to media, family, authorities			
Need for communication exercises			
Need for a network for responders, industry and regulators			
Need for greater awareness of surrounding vessels and their cap/cap			

<sup>1</sup> A table containing *Problem identified* and *Improvement suggestion* found in Annex 1

## Resumé of presentations

### DAY 1, presentations

- The Icelandic minister of Justice Sigríður Á. Andersen; Rear Admiral Georg Kr. Lárusson, Icelandic Coast Guard; Kjell Johansen, JRCC Northern Norway and Erna Kristjánsdóttir, Icelandic Ports/Faxafloahafnir welcomed and opened the conference.
- Erna Kristjánsdóttir, Marketing & Quality Manager with Icelandic Ports/Faxafloahafnir presented the growing number of cruises in Reykjavik and Iceland and Cruise Iceland's and Icelandic Ports/Faxafloahafnir's work.
- 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. Frigg Jørgensen also gave an overview of AECO's work related to considerate, environmentally friendly and safe cruise tourism in the Arctic, and presented several current industry projects and tools – especially SAR related.
- 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.
- Knut Espen Solberg, Researcher and engineer with SARINOR presented measures to improve mutual situational awareness in Arctic Search and Rescue. The presentation included a presentation of SARINOR, its main goals, partners, and project structure.
- Bjarte Odin Kvamme, Graduate from University of Stavanger presented a number of challenges connected with vessel evacuation in cold climates. Bjarte Odin Kvamme presented results from a live exercise where passengers had been evacuated to standard life-boat/rafts to examine vulnerability to these resources. The exercise showed that low sea- and air temperatures together with the passengers' possibility of moving/stretching while in the boats, would have high influence on survival ability over time.
- Kelvin Murray, Director Expedition Operations from Expedition Voyage Consultants (EVS) presented EVS efforts to plan and conduction the "Crystal Serenity" North West Passage voyage in the summer of 2016. The presentation included details about the planning of the voyages the initial feasibility analysis and went into depth regarding ice navigation, SAR, soundings and charts, community consent and landing logistics, prevention of oil pollution, emergency and contingency planning etc.
- Sølve Tanke Hovden, former rescuer with JRCC Northern Norway and author of the book 'Maksim Gorkiy – the rescue' presented the case of Maksim Gorkiy. In 1989 Maksim Gorkiy, with 575 passengers, mostly elderly Germans, hit an ice floe at 77.30 North, resulting in several large holes in the broadside. The vessel took in water and was close to sinking. Passengers were evacuated to life boats, life rafts and ice flows. Calm weather and SAR response resulted in a rescue of all passengers, and the vessel.

### DAY 2, presentations

- CIV Cecil D. McNutt Jr. from the US Coast Guard gave a presentation about the US Coast Guards Arctic Chinook, Alaska and Northwest Passage Exercise outcomes, take aways and lessons Learned.
- Petteri Leppanen from the Finnish boarder Guard presented an overview of a number of recent International SAR projects launched by the Finnish Boarder Guard, such as the Baltic Sea

Maritime Incident, the Vessel TRIAGE Projects, The Baltic Sea MIRG Project, ChemSAR and SARC ("SAR at Arctic")

- Henrik Ramm-Schmidt, CEO in Fleetrange presented Fleetrange which gives a shared situational picture for ships, operators and authorities in real time.
- Peter Garapick from the Canadian Joint Operations Command (CJOC SAR) with the Canadian Coast Guard gave an overview of the North-West Passage 2017 Table Top Exercise, and additional information about the Canadian Coast Guards role, responsibility, services and resources.
- Tomi Kivenjuuri from the Finnish Border Guard gave an overview of the upcoming Finnish Arctic Council Chairmanships plans and priorities for the years to come.

### Next SAR TTX

Likely dates for the next Joint SAR TTX is April 10<sup>th</sup> and 11<sup>th</sup> 2018. The location will be Reykjavik.

## Summary of TTX

### PHASE 1

#### THE SCENARIO (FICTIONAL)

4<sup>th</sup> of June, the passenger vessel Arctic Glory is on the way from Ísafjörður (Iceland) to Svalbard. The vessel is sailing in sea ice, showing the passengers the wonderful wildlife of the Arctic. Arctic Glory is a Panama flagged vessel operated by Greenlandic company carrying 260 people (180 passengers+80 crew). The vessel is sailing between drift-ice at low speed. At 13:00 UTC, the fire alarm on the bridge indicates smoke in several cabins on main deck. The vessel emergency plan is activated and the fire fighting team prepared. There seems to be a fire in an air duct from the kitchen on lower deck. At 13:04 UTC the captain contacts JRCC Iceland and informs that there is possible fire on board. The crew is evaluating the situation but everything is under control at the moment. The vessel is traveling at low speed in position 71°10'N / 013°30'W which is west of Jan Mayen, inside Norwegian EEZ, about 2 NM from the Greenlandic EEZ and within the Icelandic SAR region. Weather is typical, 4°C, light easterly breeze, intermittent fog, partly cloudy, sea state 2-3. At 13:15 UTC, Arctic Glory sends a distress signal and calls May-Day. Fire is in main deck cabins and extends from main lower deck to top deck. The smoke divers are evacuating the passengers to the theater area on upper deck and fighting the fire. The vessel is heading towards an ice-free area at low speed. JRCC Iceland, JRCC Bodo and JRCC Nuuk have all received the distress signal and JRCC Iceland alerts vessels in the area by May-Day relay.

#### STATUS OF ASSETS

##### JRCC ICELAND/JRCC NUUK

###### Rescue assets

- 1 x Danish Navy vessel with helo – ETA 20 hours
- 1 x ICG coast guard vessel – ETA 24 hours
- 1 x ICG fixed wing aircraft – ETA 3-4 hours
- 2 x ICG helicopters – ETA 6-7 hours

###### Vessels of opportunity

- Passenger vessel Arctic Explorer is about 10 hours away (220 crew and pax)

###### Other assets

- Twin Otter (airborne research aircraft) from US Navy operated from Ísafjörður

##### JRCC NORTHERN NORWAY

###### Rescue assets

- C-130J en route to Jan Mayen – ETA 3 hours
- CGV “NORDKAPP” on patrol – ETA 12 hours
- P3C “ORION” on patrol equipped with SKAD unit – ETA 2 hours

Vessels of opportunity

- Sealer “HAVSEL” – ETA 4 hours

Other assets

- Group of seiners Jan Mayen NE – Distance 200NM

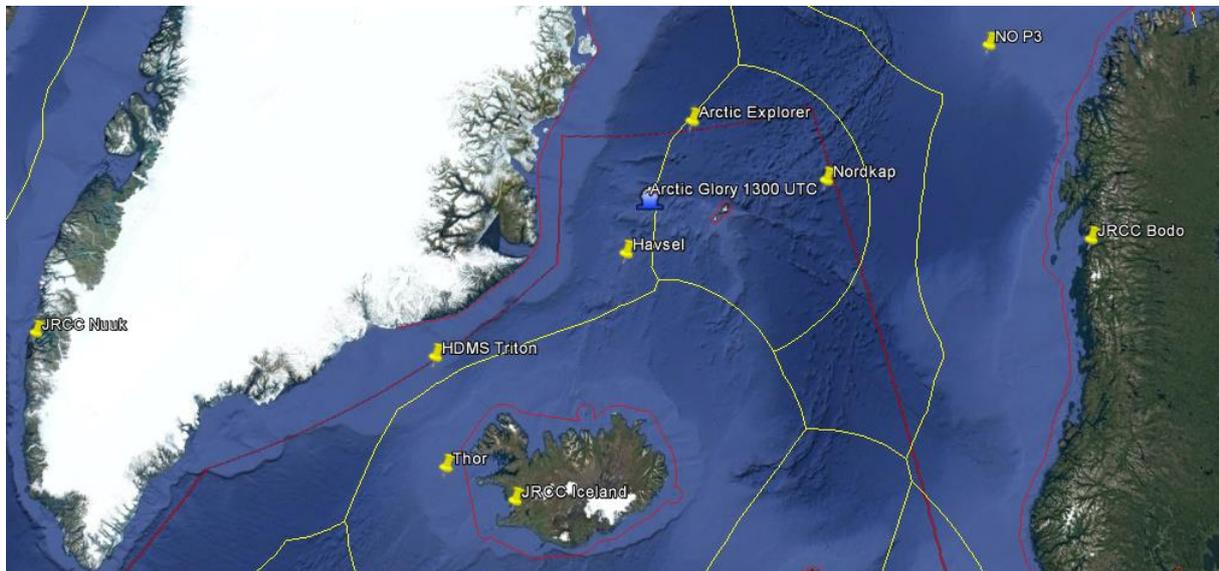


Figure 1: Location of Resources

### WORKING GROUPS FIRST PROJECT

Participants were divided in groups of about eight people on eight different working tables. Groups were mixed so that representatives from the search and rescue community, industry and academia were present at each table. The first project presented to the working groups was:

***What do you consider the three main or most interesting challenges?***

The groups had 40 minutes to discuss the question and arrive at a conclusion. Each group chose a spokesperson to give a brief summary of the group’s findings.

### FINDINGS

*TABLE 1 – THREE CHALLENGES*

- 1) Information sharing. Making sure RCCs, industry and crew are on the same page.
- 2) Passenger survival in open waters. Hypothermia and rescue equipment.
- 3) Passenger tracking and recovery. Embarkment and disembarkment.

*TABLE 2 – THREE CHALLENGES*

- 1) Vessel firefighting capability.
- 2) Medical evacuation and first aid.
- 3) General evacuation.

*TABLE 3 – THREE CHALLENGES*

- 1) Evacuation.
- 2) Passenger recovery.
- 3) Passenger tracking and transport to shore. Reception at shore.



At 1500 UTC, the fire on the main deck has escalated and the smoke reaches the bridge. The captain has to shut down the vessel and leave the bridge. The vessel is now drifting close to large patches of old ice close to the main ice edge.

#### WORKING GROUPS SECOND PROJECT

Participants returned to the same groups and were tasked with a second project:

***What happens at RCCs?***

***What happens on scene?***

***What happens at CROs? (Operator office – company response organization)***

***Identify gaps and give improvement suggestions.***

The groups had 50 minutes to discuss the questions and reach a conclusion. Each group again chose a spokesperson to give a brief summary of the group's findings.

#### TABLE 1

**What happens at RCCs:** The RCC must continually reassess information received.

**What happens on scene:** Captain is off bridge and planning how to best organize to abandon ship. Captain and crew must ensure that passengers wear appropriate clothing, take notice of drifting sea ice and weather.

**What happens at CROs:** The company response organization is building an emergency room.

**Gaps:** Communication. It is difficult for RCCs and CROs to uphold communication with the captain when the bridge is no longer accessible. It is also difficult for the captain to speak to RCCs and CROs separately.

**Improvement suggestion:** One hotline that links Captain, RCC and CRO together on an open communication line.

**Gaps:** Passenger control and comfort. Passengers in shock or panic.

**Improvement suggestion:** Set an *emergency communications protocol* and introduce it to passengers beforehand. Might be that captain addresses passengers hourly at fixed times. Captain and crew speak frequently to passengers in groups and individually – even when there are no new information, then inform of that. Inform passengers of latest updates and let them know that SAR assets are on the way and that CRO is in contact with their families and embassies.

**Gaps:** Social media protocol. Passengers might overload the Wi-Fi and/or give misleading information through their smart devices.

**Improvement suggestions:** Set an *emergency communications protocol* and introduce it to passengers beforehand. Inform passengers that internet access will be limited during emergency in order to keep SAR communication lines open. Direct passengers on how to communicate in order to reduce misinformation spreading. Captain should encourage positive messaging so as not to make rescue work more difficult. CROs prepare press briefings with messages they want to get across. Have a joint press release from RCC and CRO. Keep operations and information transparent.

#### TABLE 2

**What happens at RCCs:** Maintaining communication between RCCs, Captain and CRO.

**What happens on scene:** Maintaining communication between RCCs, Captain and CRO.

**What happens at CROs:** Establish emergency operations center and work closely with RCC. Go through safety checklists. Start preparing for receiving people on shore.

**Gaps:** Tracking of souls, both when abandoning ship and when coming on shore.

**Improvement suggestion:** Build a communications bridge between offshore rescue and on-shore rescue.

**Gaps:** How to get people off ships. Disembarkment of ship and embarkment of lifeboats or rescue vessels.

**Improvement suggestion:**

**Gaps:** Chain of command between owner and operator. Vessel owner might not be the managing operator and flag state might be a third link. Ship owner is in charge of the vessel but expedition operator is in charge of crew and passengers. How is communication established between these actors?

**Improvement suggestion:**

#### *TABLE 3*

**What happens at RCCs:** RCC must strive to get big picture and maintain it.

**What happens on scene:** Captain and crew must be proactive and think one-step ahead.

**What happens at CROs:** Company must quickly establish a joint information center and should have clear communications with all emergency response partners, such as owners, flag state and RCCs.

**Gaps:** Situational awareness for responders. Lifeboats might be separated in fog and ice and it is difficult to keep track of survivors.

**Improvement suggestion:** Opportunity for innovation in passenger tracking.

**Gaps:** Communications.

**Improvement suggestion:** Establishing a network of response actors, industry and regulatory bodies.

**Gaps:** Distance to other resources:

**Improvement suggestion:** Encourage greater awareness of surrounding vessels. Figuring out a way of synergizing constant vessel traffic so captains can know exactly how the closest vessels or infrastructure is.

**Gaps:** Survival equipment.

**Improvement suggestion:** Opportunity for innovation in survival equipment and survivors recovery.

#### *TABLE 4*

**Gaps:** Communication weaknesses. Upholding clear communication on all levels, especially ensuring smooth transition when captain leaves bridge and communication coordination moves from bridge to SAR aircraft.

**Gaps:** Communication between RCCs and CROs should be examined or exercised. RCCs and CROs should keep statements to public coordinated.

**Gaps:** Distance to nearest ship is a large concern. Especially for major medical situations.

**Gaps:** Transfer of guests between ship and liferafts and from liferafts and rescue vessels can be difficult and expect more physical ability than passengers have.

**Gaps:** Figuring out a good toilet or seasickness relief.

**Gaps:** Keeping passengers calm and oriented in lifeboats.

**Improvement suggestion:** Consider cultural background of passengers and distribution of passengers in lifeboats before the expedition is started.

**Gaps:** Tracking lifeboats.

**Improvement suggestion:** Aircrafts should track lifeboats through improved technology.

#### TABLE 5

**What happens at RCCs:** RCC must provide proactive information to on-scene coordinators. RCC must also try to make sure that information received is accurate.

**What happens on scene:** Captain must control information flow and be as accurate as possible. Too much information, especially if passengers provide information through smart devices can lead to confusion and mistakes.

**What happens at CROs:** Before commercial operators send their ships on expeditions, they should ask themselves: „How many passengers do we have? How many people can we rescue?“ If the answers do not match, the expedition should be cancelled.

Improvement suggestion: Opportunity for innovation in cold water survival equipment and rescue.

Improvement suggestion: Learn from repeated mass rescue operations in Mediterranean for the last few years. How did survivors manage to embark rescue vessels? What problems did they meet?

Improvement suggestion: Make sure that rescue gear is according to Polar Code in all vessels that are subject to it. Train and exercise with the actual rescue gear that is on board the commercial vessels. Is five-day survival realistic? Is thermal protective gear on board? Is the gear on board only there because of regulation requirements or has it been thought out? Does the crew know the equipment and how to use it?

Improvement suggestion: Use safety as a marketing tool.

#### TABLE 6

**What happens at RCCs:** RCC must increase manpower by bringing in more staff. RCC must immediately contact CRO and optimally bring someone in from the CRO team. Prepare information for next of kin.

**What happens on scene:** Captain must inform passengers. Some captains have procedures every 10 minutes to tell passengers newest updates and when next update will arrive. Captain must request equipment or resources that could provide relief to passengers with incoming aircrafts. Captain and crew must start head counts immediately and have a clear evacuation-and-abandon-ship plan.

**What happens at CROs:** Keeping up with information flow between RCC and captain.

**Gaps:** Tyranni of distance and time.

**Improvements:** Developing realistic SOLAS minimum requirements. Expecting passengers to survive five days on rescue equipment from ship is impossible.

#### TABLE 7

**What happens at RCCs:** RCC must plan for a long operation, taking into consideration adding of personnel and fatigue due to the complex nature of MRO's. Maintaining a continuous coordination of resources and efforts is essential. Putting additional resources on board available SAR equipment might be necessary. RCC must continuously gather information, bring up satellite feeds, weather forecast and ice drift models and feed the information to captain and others on-scene. RCC must confirm on-scene coordination and smooth transition from bridge to mobile co-ordination.

RCC must contact hospitals and other land-based rescue teams and determine what supplies are needed as well as contact CRO to get passenger manifests.

**What happens on scene:** Emphasis on personal safety and reassure passengers that help is on the way.

**What happens at CROs:** CRO must cooperate with RCC to manage communication to families and media. CRO should also start communication with insurance companies of their equipment and gather information necessary for passengers to contact their own insurance companies.

**Gaps:** Maintaining communication when captain loses bridge.

**Gaps:** Transfer people long distances.

**Improvement suggestion:** Continue ship design improvement.

**Improvement suggestion:** Opportunity for innovation in vessel fire systems, such as isolated areas, secondary control systems and possibly remote controlled fire systems.

**Improvement suggestion:** Keep active relationships between RCCs and commercial operators, through conferences, workshops and exercises.

#### TABLE 8

**What happens at RCCs:** It is important that the RCC and captain understand each other's situation. RCC needs to understand what's going on in the head of the captain on the ship. The number one priority of the captain is saving lives and controlling passengers. The captain cannot be too busy checking radars, ice drift or weather forecast, so RCC must be proactive in giving information.

RCC also has to answer to higher authority, a governmental organization or ministry, so RCC must also keep superiors informed. Elected officials or heads of organizations are the one that will be in front of the camera, so it's very important that those people receive accurate information and training in how to give information in state of emergency.

RCC and CRO must cooperate with emergency organizations on land. Who will provide medical assistance and support on shore? How will passengers be distributed? When is time for environmental response?

**What happens on scene:** Captain must know that help is on the way and that RCC understands the nature of the emergency. Captain must cooperate with RCC to ensure smooth transition of on-scene coordination when leaving the bridge, for example through relay stations on airplanes.

**What happens at CROs:** The CRO must follow the shipping company contingency plan and make sure that RCC and captain are aware of plans that are already in place. The CRO must also have clear procedures for what happens to the ship if there's a towing requirement.

## PHASE 3

### WORKING GROUPS THIRD PROJECT

For the third phase of the TTX, participants were asked to shift their perspectives away from the scenario and towards the highlighted challenges. Participants were allowed 50 minutes to discuss in more detail one specific challenge and all the aspects of that challenge. Participants chose their own group based on their preference and interest for a specific challenge.

The challenge groups were the following:

- Embark – Disembark
- Passenger control
- Arrival on shore and outbound communication
- Operational communication (two groups)
- Firefighting
- Survival equipment and Resources

The groups were asked to identify gaps, make improvement suggestions and state their main take-aways and lessons learned from the TTX.

## FINDINGS

### *EMBARKMENT – DISEMBARKMENT*

#### **Gaps:**

- Launching of liferafts and lifeboats in bad weather. Transfer of people from liferafts and lifeboats to rescue facilities arriving on scene.
- There are no common methods and standardization for embarkment and disembarkment.
- Fitness of the passengers, especially aging passengers, is a limiting factor in embarkment and disembarkment.

#### **Improvement suggestions:**

- Enforcing that abandoning vessel is the last thing you want to do, because it can lead to „out of the frying pan and into the fire“, especially in Arctic conditions.
- Working on ways to completely segregate fire and people to keep passengers safe while on board for as long as possible.
- Try to take out the weak link of survival raft.
- The best way to get passengers from survival craft and to a rescue vessel is to pick up the whole survival craft. Modern technology allows that but is not being used. Further, improve methods of taking whole survival crafts on board rescue vessels.
- Standardization should be general practice in multiple areas, not least in training of crews.
- Improve netted scooping systems.

#### **Main takeaways and lessons learned:**

Standardization on crew training and contingency plans is lacking when it comes to embarking and disembarking during an emergency.

There is still a big physical gap between a lifeboat and a large rescue vessel.

#### *Highlights of discussion*

- Common methods and standardization

- Fitness of passengers
- Segregating passengers and problem (i.e. abandon as last resort)
- Whole lifeboat pick-up methods for rescue vessels
- Physical gap between lifeboats and rescue vessels

### *PASSENGER CONTROL*

#### **Gaps:**

- Tracking passengers
- Keeping passengers calm and avoiding panic

#### **Improvement suggestions:**

- Must train both crew and passengers so everyone is familiar with contingency plans and emergency procedures.
- Make safety and security a part of everyone's day. People get nervous and can become silly when they are stressed out. When crew and passengers are familiar with plans, people have confidence in that they will work and that minimizes panic.
- Proactive information sharing with passengers. Be honest and update them regularly. Get everyone together and let them know what's going on and what's the next step.
- Make sure to keep families together.
- Look for passengers in silly places, such as under beds, to make sure that no-one's hiding. Consider tracking people with bracelets or through other modes of modern technology.
- Clear able people off deck first. Clear the good and healthy first out of the way and then attend to the slow and hurt. Slow and hurt are last on liferafts.

#### **Main takeaways and lessons learned:**

Opportunities in proactive information sharing, i.e. giving information before the start of an expedition; both between commercial operators and RCCs (contingency plans, passenger manifest, vessel information, sailing route schedule etc.), and between crew and passengers (contingency plans, safety measures, evacuation procedures etc.)

#### *Highlights of discussion*

- Proactive sharing of contingency plans
- Minimize panic
- Head-counts: emergency tracking bracelets
- Share information
- Honesty and regular updates
- Clear able people first

### *ARRIVAL ON SHORE & OUTBOUND COMMUNICATION*

#### **Gaps:**

- Communicating consistently and efficiently.
- RCC knowing whom to contact: shipowner, operator, sub-charger, flag-state. Who is the main contact?
- Who is responsible for numbers of guests and their movements? Helicopters are lifting some passengers, others are saved on board vessels of opportunity or rescue vessels. Passengers might be going to different countries, but who is responsible for the tracking throughout the whole process?

### **Improvement suggestions:**

- More forums for information sharing such as this workshop and TTX
- Improve communication between commercial operators and RCCs
- Clear contingency plans that everyone is aware of
- CROs should have a set communications officer that works with the communications officer at RCC. A clear unified message to the media.

### **Main takeaways and lessons learned:**

More emphasis on making sure existing plans are set up and distributed before events take place. Practice plans through exercises.

The importance of communication between SAR organizations and commercial operators throughout all aspects of operations. In emergencies, communication should start immediately and statements should be a cooperative effort. A joint statement should be given regularly, informing people when the next statement will be given.

### Highlights of discussion

- RCCs know WHO to contact at Industry level
- Have set communication officer at company emergency response team in close co-operation with set communication officer at RCCs.
- WHO is responsible for head-count when passengers are scattered on various rescue units and heading to different locations?
- Regular proactive updates. Inform on time of next update and keep schedule.
- Proactive sharing of contingency plans

### *OPERATIONAL COMMUNICATIONS*

#### First Group

#### **Gaps:**

- Communication between captain and RCC on first moment of emergency, especially language barriers. Even though captain speaks English, it might be more broken in distress situations and that might reduce the quality of information between captain and RCC.
- When to abandon. The absolute last option is to leave the vessel. When abandoning vessel the captain must remember range of communication to lifeboats is limited because of VHF. Captain and RCC might both lose contact with the lifeboats. If there is no airplane managing on-scene coordination, the passengers might be drifting in complete silence. Then panic sets in.
- It might take rescue vessel more than 12 hours to approach the scene of emergency, but lifetime of a phone battery, especially in cold weather, is less. Phones and other communications devices are as important as water and food to the modern passenger.
- Interruption in the line between RCC and on-scene coordinator because of technical challenges in the Arctic and high north.

#### **Improvement suggestion:**

- Lifeboats should be fitted with SARTs (search and rescue radar transponder) and AIS so they can be located in range of 40 miles for ships in vicinity.
- Equip ships with iridium battery phones. Have two batteries per VHF phone.

#### **Main takeaways and lessons learned:**

Lack of capabilities in linking RCC, CRO, captain and possible aeronautical or marine on-scene coordinators.

#### Second group

##### **Gaps:**

- Getting correct and accurate information from the vessel. There might be misinformation because of language problems, stress, and poor communication. Might lead to miscommunicating position.
- RCCs receive a lot of false alerts and false relays. Staff might not be as alarmed, as they should be because of the volume and distance of distress signals.
- The telephone is old fashioned and out dated. Text messaging and e-mail is more accurate, but there's lacking an official recipient of text messages and e-mail might be blocked or go to spam folder.

##### **Improvement suggestions:**

- Switch to a text based system where short messages can be exchanged. That way RCC is less likely to get wrong info.
- Have broadband connections available in the Arctic. 99% of commercial operators information exchange is through internet, but Arctic is unique in poor internet capabilities.
- RCC should contact CRO immediately. The CRO has information that RCC needs from the ship and can quickly and easily communicate with RCC, so there isn't need to disturb the captain if the operator can give 95% of the information.
- Update telecommunications technique to new standards.

##### **Main takeaways and lessons learned:**

The importance of finding optimal means of communication. What technology is available? Explore options for innovation.

#### Highlights of discussion

- Switch from spoken communication to text-based communication
- Explore new technologies in situational awareness
- Establish sustainable links between involved actors
- RCC's contact operators as soon as possible for information (takes the load of the captain and crew)
- Take account of battery lifetime in cold weather
- Outfit lifeboats with iridium phones or AIS tracking

#### *FIRE FIGHTING*

##### **Gaps:**

- Most commercial operators have older vessels so they don't have the best equipment on board such as high powered extinguishing systems in the engine room.
- Lack of retrofitting current designs.

##### **Improvement suggestions:**

- Initial response training to crew in high risk areas of the vessels. Use various modes of fire extinguishing.

- Having a good fire extinguishing system on board is a cost that is far outweighed by the benefit of saving lives and ship.
- 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.
- Training should include all methods of fire extinguishing.
- Use common terms and make sure everyone understands. Get a „yes“ while asking „Do you understand what I mean?“.
- Practice scenarios with fire in different areas of the vessel.

#### **Main takeaways and lessons learned:**

- Preventing fire from igniting as much as possible. Fire proof all aspects of operations. Double check whether all fire safety procedures are being followed, for example with cleaning out waste oil etc.
- Make sure that crew is very well trained in the initial steps of fire extinguishing – the most important thing is to stop the fire from spreading.
- Exercise realistic scenarios, where crew and fire fighting teams are really challenged.

#### Highlights of discussion

- Prevent! – double check safety measures. Multi-layer risk management
- Training training training!
- Especially train initial steps in fire containment
- Realistic scenarios. Do actual exercises where crew is challenged. Actually use the equipment so crew is physically familiar with procedures
- Outfitting vessels with proper firefighting equipment is economically sensible because the preventive cost is less than loss of ship

#### *SURVIVAL EQUIPMENT AND RESOURCES*

##### **Gaps:**

- Survival equipment is generally lacking when it comes to Arctic conditions.

##### **Improvement suggestions:**

- Innovation in thermal protective equipment. Look to outdoor clothing industry, such as skiing apparel, and build on the technique used in winter sport equipment.
- Industry should provide more adequate protective equipment, full suits instead of just blankets etc.
- Develop system that uses the diesel engine of a lifeboat to heat the boat. Simultaneously work on ventilation and alarm systems if air quality or oxygen levels are dropping.
- Thoroughly go through SOLAS requirement for rescue boats, in order to give improvement suggestions. The SOLAS kit is not adequate. There are for example fish hooks, lines and tiny can openers that people will not use in polar waters.
- Iridium phones in all lifeboats.
- Work on innovation on rescue boats. Boats that can be used in bad weather and swell without capsizing.
- AIS fixed equipment in lifeboats that would allow them to see nearby traffic.
- Space on lifeboats for everyone.

- Better design of closed lifeboats with regards to airlifting of passengers. Currently the door is on the sides, is that optimal for airlifting?
- Improve and extend airdropped gear. Share information on where it is stored so RCC and CRO know exactly where it is.

**Main takeaways and lessons learned:**

The need to go through actual equipment on board passenger ships and their lifeboats. Do exercises to test the equipment in order to highlight strengths and weaknesses.

Make better kits in lifeboats.

Is the crew's level of training and survival in cold climate enough?

Is the staff trained in taking care of people and surviving several days and nights?

**Highlights of discussion**

- Significantly improve thermal protective equipment
- Lifeboat heating, insulation and ventilation – possibly using existing mechanical gear
- Test and challenge SOLAS and Polar Code requirements
- More robust lifeboats
- Better communication equipment on board lifeboats, AIS
- Improve and update survival kits
- Develop air dropped gear such as pallets, tents, clothing – AND know where they are stored
- Outfit lifeboats for hoisting activity – WHERE is the best location for exit?

## List of participants

Industry	
One Ocean Expeditions	Aaron Lawton
CMI	Scott Will
Hurtigruten	Capt. Benny Didriksen
Albatros Travel	Malik Milfeldt
Poseidon Expeditions	Anja Erdmann
	Dr Michaela Mayer
	Jonathan Zaccarias
	Denis Cheprasov
Salen Ship Management	Håkan Admarker
Oceanwide Expeditions	Mark van der Hulst
Grand Espaces	Christian Kempf
	Christopher Bassous
	Lydie Lescarmontier
Lindblad Expeditions	Capt. Leif Skog
Silversea Cruises	Vitaliy Tsylye
	Ivana Harajdova
Ponant	Sylvie Boudart
	Olivier Marien
Arctia Offshore	Tommy Berg
AECO	Frigg Jørgensen
	Ilja Leo Lang
IAATO	Lisa Kelley
RCC	
Arctic Command of the Danish Defence	Andres Johansen
Canadian Joint Operations Command (CJOC SAR) Canadian Coast Guard	Kevin Toone
	Robert Brooks
	Sheyla Dussault
	Peter Garapick
	Colin Glover
Finnish Border Guard	Petteri Leppanen
	Tomi Kivenjuuri
JRCC Northern Norway	Bent Ove Jamtli
	Kjell Johansen
JRCC Southren Norway	Asbjørn Viste
	Hans G. Christensen
Norwegian Coast Guard	Rune Stenevik
Swedish Coastguard	Oskar Feltenstedt
US Coast Guard	CIV Cecil D. McNutt Jr
Amver Maritime Relations/US Coast Guard	Benjamin Strong
MRCC Tórshavn	Hallur Fróðin Bech
	Jóhan Óli Múller
	Thorbjorn Hansen
Icelandic Police, Civil Protection Dep.	Friðgerður B. Jónsdóttir
	Friðjón V. Pálmason

	Ágúst Gunnar Gylfason
ICE-SAR	Guðbrandur Örn Arnarson
	Dagbjartur Kr. Brynjarsson
	Sigurður R. Viðarsson
Icelandic Coast Guard	Asgrimur L. Asgrimsson
	Audunn Kristinsson
	Soley Kaldal
	Einar Ingi Reynisson
	Gudmundur Birkir Agnarsson
	Baldur R. Gudjonsson
<b>Speakers</b>	
Sigríður Á. Andersen	Ministry of Justice
Erna Kristjánsdóttir	Cruise Iceland
Kelvin Murray	Expedition Voyage Consultants
Sølve Tanke Hovden	Former rescuer NCG
Knut Espen Solberg	SARINOR
Henrik Ramm-Schmidt	FleetRange
Bjarte Odin Kvamme	University of Stavanger
<b>Others</b>	
Odd Jarl Borch	University of Nordland
Penelope Wagner	Sea Ice Researcher, Norwegian MET
Ashraf Labib	University of Portsmouth
Natalia Andreassen	Nord University
Kathryn Donnelly	Nord University
Teemu Leppälä	FleetRange
Jessica Shadian	University of Akureyri
Hallur Árnason	Harbor of Reykjavik
Gísli Jóhann Hallsson	Harbor of Reykjavik

## Annex 1

Findings from TTX set up as *problem identified* and *improvement suggestion*

<b>Problem identified</b>	<b>Improvement suggestion</b>
<u>Embarking and disembarking</u> during an emergency: There is a big physical gap between a lifeboat and a large rescue vessel.	More emphasis on standardization concerning crew training and contingency plans for embarking and disembarking. Joint cooperation between industry and rescue providers in the field of training and planning.
<u>Gaps in communication</u> between <u>commercial operators</u> and <u>RCCs</u> .	Proactive information sharing and connectivity capabilities improvement. Communication exercises between commercial operators and RCCs. Test and develop technical innovations in the field of connectivity.
Room for improvement in <u>passenger tracking</u> and <u>emergency communication</u> between <u>crew</u> and <u>passengers</u> .	Proactive information sharing between crews and passengers. Further implementation of passenger tracking equipment.
<u>Communication</u> from commercial operators & RCCs to <u>other stakeholders</u> , including media, families and governments, embassies etc.	Establish a unified communication strategy. Conduct communication exercises between commercial operators & RCCs with other stakeholders.
<u>Fire fighting</u> and <u>fire proofing</u> .	Improve and upgrade firefighting equipment on board passenger vessels. Rescue providers to standardize response procedures accordingly among fire brigades in the Arctic (such as MIRG).
<u>Survival</u> and rescue <u>equipment</u> for <u>polar conditions</u> is inadequate.	Reevaluate survival equipment in liferafts based on Arctic environment.