

CONTRIBUTORS

This project has been made possible by support from the Ministry of Foreign Affairs – via the Section for the High North, Polar Affairs and Marine Resources – and the project partners. The specialist content is based on contributions from the leading actors in search and rescue, in addition to actors that are experienced and active in these areas. This encompasses the entire rescue chain, including everyone from equipment suppliers to the Joint Rescue Coordination Centre. The following companies/institutions have contributed to this project:

Partners and financial contributors to the project:

ConocoPhillips
DNV GL
ENI Norge and the Norwegian Seafood
Research Fund (FHF)
Joint Rescue Coordination Centre Northern Norway
The Norwegian Coastal Administration
Lundin
Maritime Forum North
Norwegian Shipowners' Association
Norwegian Officers' Union
Norwegian Seafarers' Union
Norske Shell
Norwegian Hull Club
Statoil (WP1)

Project participants:

Admiral Makarov State University of Maritime and Inland Shipping
Christian Michelsen Research (CMR)
GMC Maritime AS
Nord University Business School
Hansen Protection
Harding Safety
The Norwegian Coast Guard
Lufttransport
The Norwegian Marine Technology Research Institute (MARINTEK)
Memorial University of Newfoundland
Nord University
Nordland County Council
The Norwegian Fishermen's Association
Norsafe
Norut Northern Research Institute
Polar Safety Systems
SINTEF
Tromsø Skippers' Association
The University of Stavanger
The University of Tromsø
The University Hospital of North Norway
Viking Life-Saving Equipment
Viking Supply Ships
133 Air Wing
No. 330 Squadron RNoAF



THE ROADMAP TO NORWAY'S ARCTIC POLICY

SARINOR MAIN FINDINGS – A SUMMARY
2016

There are additional challenges associated with search and rescue operations in the High North. Long response times and tough climatic conditions are to be expected most of the year.



CONTENT

| | |
|---|----|
| SARiNOR – the roadmap to norway’s arctic policy | 05 |
| Norway’s emergency preparedness in the high north today..... | 06 |
| A tough climate for SAR..... | 08 |
| Alerting and notification..... | 12 |
| Search | 14 |
| Shared situational awareness..... | 16 |
| Survival in a cold climate..... | 18 |
| Main findings of the SARiNOR project..... | 21 |
| Main finding 1 – Survival at the accident site..... | 22 |
| Main finding 2 – Rescue and emergency preparedness..... | 24 |
| Further work..... | 28 |



“In Norway’s Arctic Policy, the strategy document of the Solberg government, the High North is defined as one of Norway’s most important foreign policy areas. However, tough climatic conditions, great distances and poor communications coverage pose a number of problems. All of these must be addressed if Norway is to realise its vision of becoming a world leader in search and rescue (SAR) in the High North. SARiNOR identifies these challenges, proposes concrete measures and, in many ways, drafts a roadmap of how development towards this goal should progress. Even if the way is long and the goal is difficult to achieve, the map has been drafted and the course is set for the North.”





SARiNOR – THE ROADMAP TO NORWAY'S ARCTIC POLICY

Norway's Arctic Policy leaves no room for doubt that this is one of Norway's most important foreign policy areas of interest. In this respect, SARiNOR is a roadmap which offers direction for how Norway can become a world leader in the planning, co-ordination and implementation of SAR operations in the North.

In accordance with the Arctic Council's agreement regarding search and rescue in the Arctic ("the SAR Agreement"), the entire Arctic region is divided appropriately into rescue regions which outline a binding rescue co-operation between the parties. Approximately 80% of all ship activity in the Arctic takes place in Norway's region, which represents 90% of the Norwegian maritime zone. An increase in activity in the Arctic in general – and in our region in particular – brings with it an increased risk of major sea accidents involving a loss of human life and property, as well as consequences for the environment.

SAFETY IS KEY

The 2011-2012 white paper on the High North states: "The Government will maintain and improve Norway's capability for effective search and rescue to ensure that Norway can carry out search and rescue operations in its own and adjacent SAR regions." It then states: "Responsibility lies with individual companies and their industry organisations to work systematically to reduce the risk of accidents, and to ensure that they are able to manage crises themselves to a greater extent than is required in other waters." SARiNOR is a direct response to this decree. In this, private sector companies have come together in a joint project to address a national challenge.

Safety and emergency preparedness are critical to the exploitation of the resources found in the High North. It is a prerequisite that there be confidence and trust in the fact that emergency preparedness mechanisms are in place. Good safety and emergency preparedness at sea are therefore vital prerequisites for further economic growth in the High North.

THERE MUST BE JOINT INITIATIVES

For this reason, in 2013 Maritime Forum North took the initiative of establishing the SARiNOR project, which has taken the form of financial co-operation between public and private actors. The different actors represent a significant combination of knowledge, expertise and experience, and all parties involved have the desire to contribute to creating a good search and rescue service in the High North. SARiNOR's purpose is to analyse and outline the current status of Norwegian SAR in the High North and to identify critical points for improvement with regard to the current SAR situation.

The collective knowledge from work on the SARiNOR project has led to the development of a "roadmap". It offers concrete suggestions on how to achieve SARiNOR's vision for Norway to become a world leader in the planning, co-ordination and implementation of SAR operations at sea in the High North. The main findings and recommendations from the project are described in this summary report. The reports from the different work packages can be found in the compiled report.

As an extension of this, the SARiNOR2 project is now being put into action. It will focus on the protection of the environment and the recovery of assets at the accident site after the rescue of any persons in distress.

Tor Husjord, Chairman, Maritime Forum North

NORWAY'S EMERGENCY PREPAREDNESS IN THE HIGH NORTH TODAY

The Norwegian rescue service's operations are performed through co-operation between government agencies, voluntary aid agencies and private companies which have dedicated resources for support services. This model works well, but it is in need of renewal and improvement, especially in the North, which presents particular challenges due to its weather and geography.

In Norway, the Joint Rescue Coordination Centres have the overarching operational responsibility for search and rescue operations. The co-ordination of operations takes place either directly, from one of the two Joint Rescue Coordination Centres (JRCCs), located in Bodø and in Sola near Stavanger, or through one of the local rescue co-ordination centres (LRSs) in each police district and on Svalbard. The area of responsibility is split between the JRCC Northern Norway and the JRCC Southern Norway at 65 degrees north, along the border between Nord-Trøndelag and Nordland counties. The JRCC registered 8,655 incidents in 2015, of which 2,772 incidents took place under JRCC Northern Norway's jurisdiction. JRCC Northern Norway has registered a steady increase in its number of operations in remote areas over the past five years.

GREAT DISTANCES ARE A CHALLENGE

JRCC Northern Norway's SAR region extends right out into the North Sea and all the way north to the North Pole. This is a region characterised by sparsely developed infrastructure, great distances, demanding weather and icy conditions, as well as a lack of satellite and radio communications coverage.

As a result of the great distances, it can take a long time for rescue resources to reach the accident site and rescue any persons in distress. The ability to survive until aid arrives is crucial; particularly the ability to keep dry and warm.

The government's declared SAR ambition is to be able to commence the rescue of up to 20 persons in distress at any point up to 150 nm from the sea boundary within two hours. In addition, it should be possible to rescue two persons in distress right at the outermost boundary of Norway's SAR region. This is providing that it will be possible to transfer the persons in distress to a secure place on land. This level of ambition is the basis for the procurement of new AW101 rescue helicopters, which are expected to replace the more than forty-year-old Sea King rescue helicopters before 2020.

The new helicopters have a much better load capacity, speed and range than the Sea King, and will meet the government's rescue ambitions, which the old Sea King helicopters do not.

SPECIAL EQUIPMENT REQUIRED

The climate in polar regions demands special equipment and training for anyone planning operations in these areas. This is also true of emergency preparedness resources. The helicopters must, among other things, have a de-icing capacity to prevent in-flight icing, and must be equipped with good sensors so that they can find persons in distress in darkness and in storms generating high waves and poor visibility.

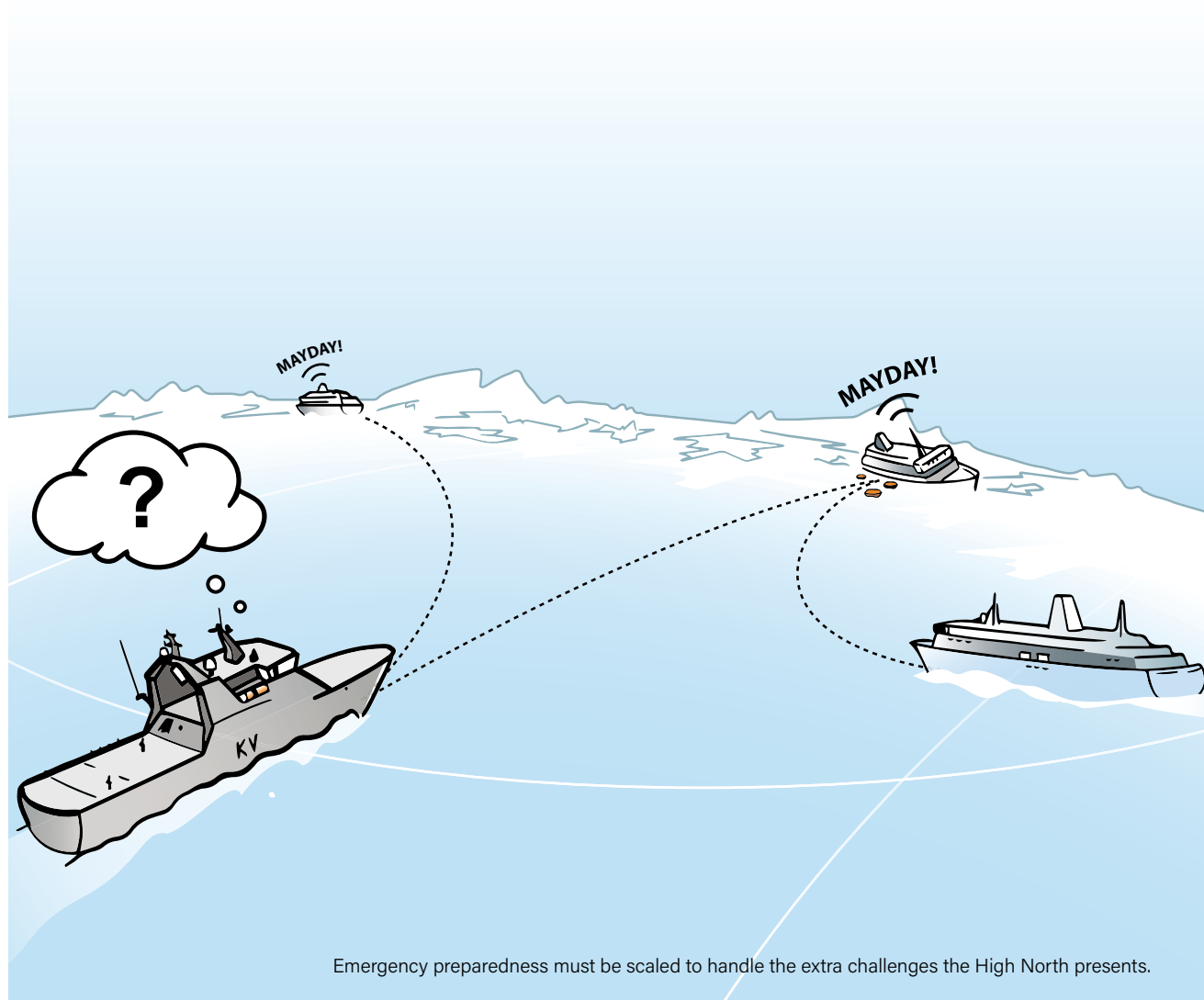
The current equipment for alerting and notification is good, but there is a real need for better radio and broadband coverage in northern sea areas. Broadband coverage via satellite is completely lacking north of 75 degrees north. This is a real challenge for any actor operating in this area. We must introduce better communications solutions in order to co-ordinate rescue operations more effectively and to be able to share more information with different rescue actors.

The greatest challenge that polar regions present is the combination of large distances with very few rescue resources. It is vital that requirements be imposed upon commercial actors in this field so that persons in distress are in a better position to survive until help arrives. This introduces completely unique demands for rescue and safety equipment. There is still a long way to go in this field before the technological solutions can be considered entirely satisfactory as concerns survivability in polar regions.

NORWAYS JOINT RESCUE COORDINATION CENTRES (JRCC)

The Norwegian rescue service is our shared responsibility. If we are to make use of the natural resources our country has at its disposal, we must have a rescue service that offers us the appropriate and essential level of quality. Through its work, SARiNOR has shown that success is possible. What started as an idea is now a reality which is gaining more and more recognition both domestically and internationally. Our route going forwards as well as our next goals should be to continue to find good solutions through which the state upholds its responsibility as the overarching authority, in co-operation with other important actors such as SARiNOR. Together, we can ensure safety on land, along the coast and out at sea.

Jan Arild Ellingsen, member of the Parliament, Standing Committee on Justice



Emergency preparedness must be scaled to handle the extra challenges the High North presents.

A TOUGH CLIMATE FOR SAR

The northern sea regions cover huge geographical expanses which have little infrastructure and few accessible resources. This creates a whole range of special conditions which help to make SAR operations in these areas more challenging.

LIKELIHOOD OF SURVIVAL = SURVIVABILITY AT THE ACCIDENT SITE + EMERGENCY PREPAREDNESS

INCIDENT

Alerting and notification > Search > Rescue

SURVIVAL IN A COLD CLIMATE

SHARED SITUATIONAL AWARENESS

TRAINING AND SKILLS DEVELOPMENT

A tough climate, characterised by cold, snow, ice, darkness in winter and regular mists in summer, makes rescue operations difficult, contributing to lower survival rates following an accident. The limited communications possibilities in the Far North mean there are fewer opportunities to share critical information. SARiNOR has identified some additional challenges associated with SAR operations in the North and proposes measures that can streamline the different phases.

ALERTING AND NOTIFICATION

The first thing to happen after an accident occurs is that the person in distress raises the alarm to notify others. Current technology and procedures ensure that this notification is effected swiftly and that the Joint Rescue Coordination Centre can rapidly put a rescue operation into action. Nevertheless, some challenges have been identified in relation to current technology, including the lack of confirmation once a distress signal is sent, among other things. A two-way form of communication for distress signals via VHF would therefore be preferable.

SEARCH

Position is currently part of the standard information given in alerting and notification. Therefore the need to search for the accident site is limited, although it may be necessary to

search for survivors locally around such a site, as it can be easy for people to be separated during a chaotic evacuation.

RESCUE

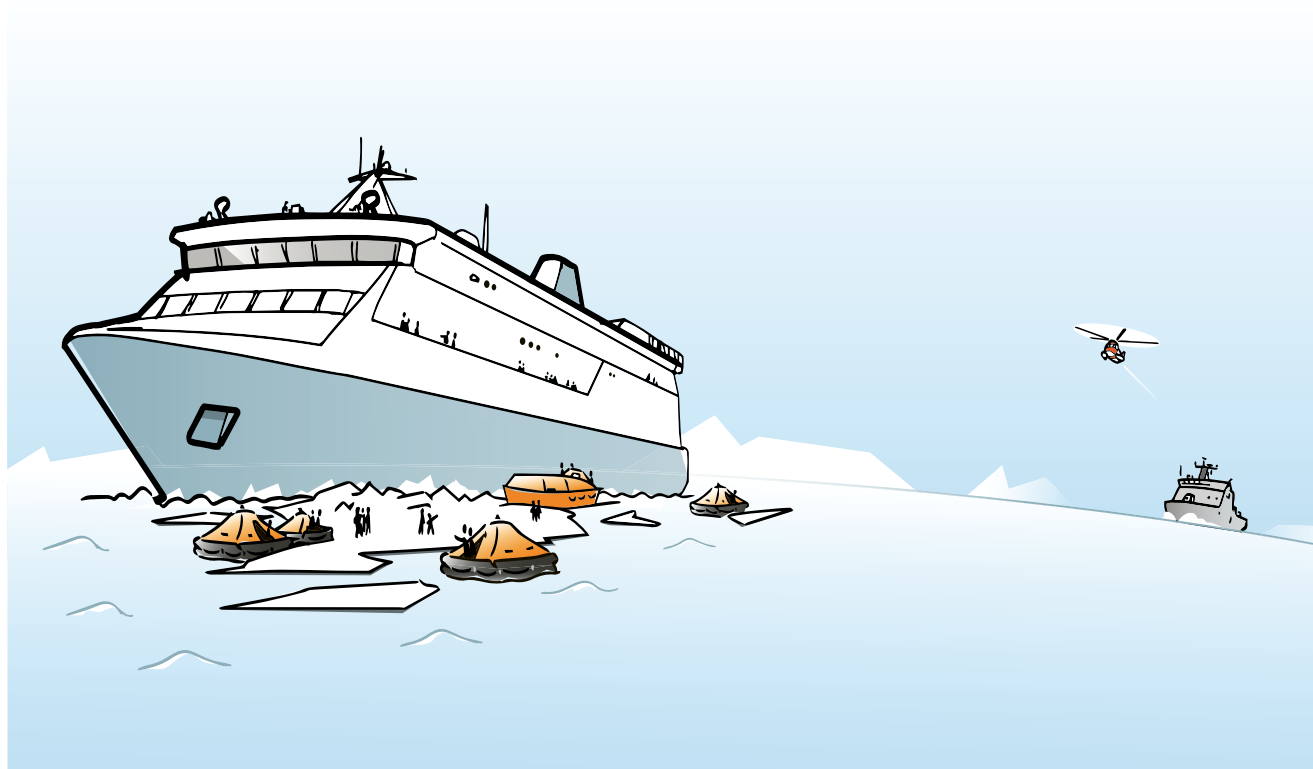
Rescue can take place locally using the resources available at the accident site, or one can wait for external aid. This can take a long time, due to the great distances involved and the limited rescue resources in polar regions. Survival in such a cold climate is a key challenge, both in the short term during the evacuation, and while awaiting external aid.

SURVIVAL IN A COLD CLIMATE

Hypothermia is the greatest risk to which one is exposed to in the event of an evacuation. In consequence, one's capacity for self care is compromised, reducing the likelihood of survival. In addition, wet clothes drain the body of warmth and lead to increased risk of hypothermia.

IN POLAR REGIONS, THE GREAT DISTANCES MEAN RESCUE TIMES CAN BE LONG; THE BIGGEST CHALLENGE IN SURVIVING THIS PERIOD WILL BE AVOIDING HYPOTHERMIA.

The great distances mean that it takes a long time for rescue resources to reach the site; survival for this length of time will be the greatest challenge faced by the persons in distress. The new IMO Polar Code sets a range of functional requirements to increase the likelihood of survival after an accident. Any measure that can help to reduce the time it takes for the persons in distress to be rescued will increase the likelihood of more people surviving. The vessel that reaches the accident site first will likely have limited medical emergency preparedness and possibilities for treatment on



board. . Even coastguard and military vessels have a limited capacity for medical treatment. Medical treatment can not generally be expected before reaching a hospital on dry land. Interim facilities for medical treatment in the vicinity of the accident site could help to save more lives in the event of a major accident.

SHARED SITUATIONAL AWARENESS

Sharing information is a prerequisite for an effective rescue operation in which many different parties are involved. Modern high-resolution images, maps, and chat functions are available to some, but sharing possibilities are limited by the use of incompatible systems and the poor broadband coverage north of the 75th parallel. Improvements here will require further development of satellite-based solutions and common communications interfaces.

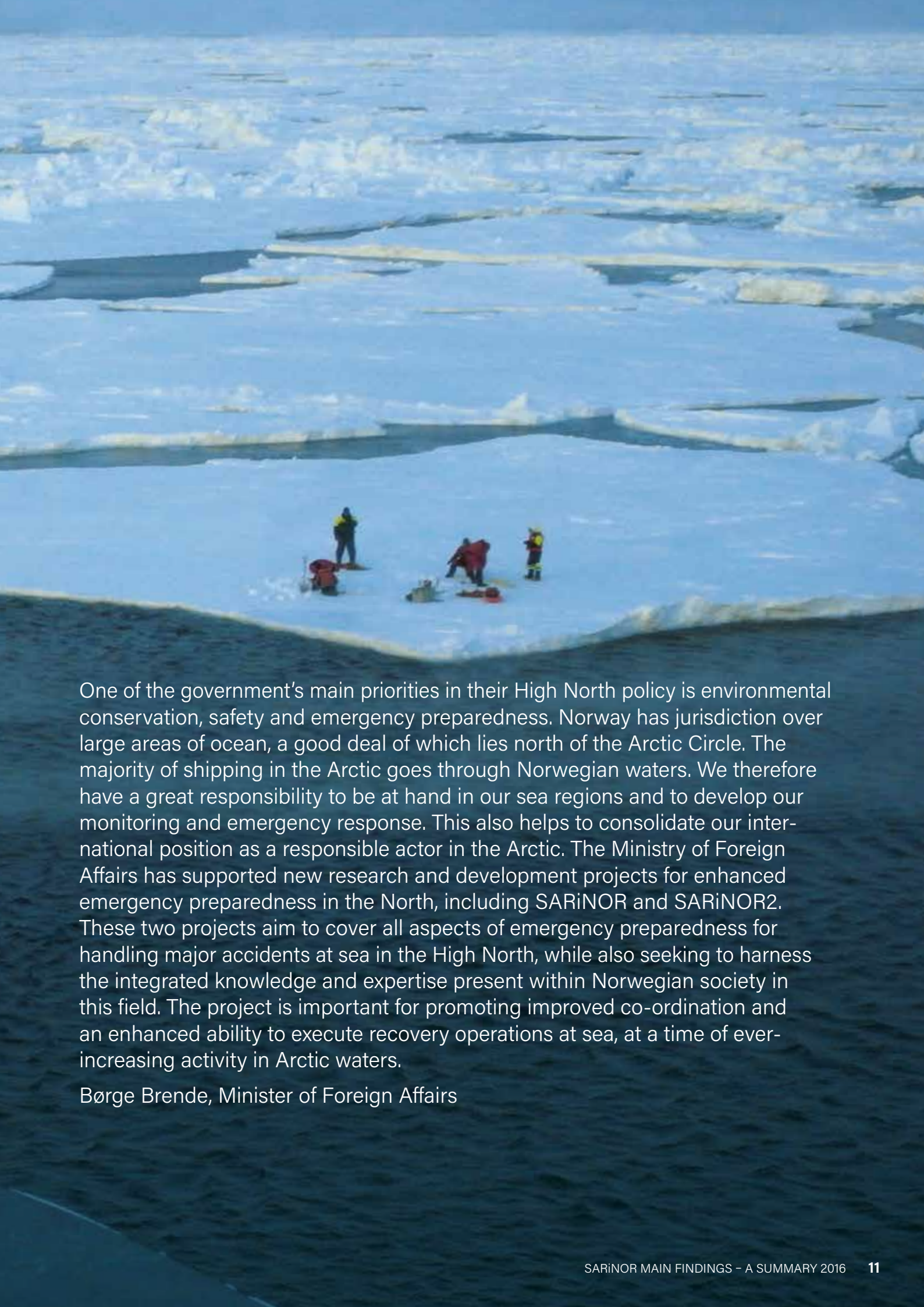
TRAINING AND SKILLS DEVELOPMENT

The need for training and skills development has been identified as an important element in ensuring the

effectiveness of future operations. The need for new courses – and for existing courses to be developed further – will be important for ensuring that the various actors can operate effectively within their own fields and that they can co-operate effectively with others.

Training in the form of larger drills in which all relevant organisations participate – with subsequent debriefings and plans to implement findings – will be important for streamlining future rescue operations. All actors have identified a need for more training and skills development.





One of the government's main priorities in their High North policy is environmental conservation, safety and emergency preparedness. Norway has jurisdiction over large areas of ocean, a good deal of which lies north of the Arctic Circle. The majority of shipping in the Arctic goes through Norwegian waters. We therefore have a great responsibility to be at hand in our sea regions and to develop our monitoring and emergency response. This also helps to consolidate our international position as a responsible actor in the Arctic. The Ministry of Foreign Affairs has supported new research and development projects for enhanced emergency preparedness in the North, including SARiNOR and SARiNOR2. These two projects aim to cover all aspects of emergency preparedness for handling major accidents at sea in the High North, while also seeking to harness the integrated knowledge and expertise present within Norwegian society in this field. The project is important for promoting improved co-ordination and an enhanced ability to execute recovery operations at sea, at a time of ever-increasing activity in Arctic waters.

Børge Brende, Minister of Foreign Affairs

ALERTING AND NOTIFICATION

The emergency response mechanism is put into action when an alert is received from a vessel in distress. It is therefore crucial that vessels in distress are able to notify the appropriate parties as soon as possible so that a rescue operation can be put into action.

In the event of an emergency, the vessel will initiate its standard alerting and notification procedures. SARiNOR has identified gaps in alerting and notifications, and has introduced several suggestions for improvements. Notification can take place through visual signals, mobile VHF (voice/DSC), satellite telephone, mobile phone or EPIRB. Upon receiving the alarm, the Joint Rescue Coordination Centre will inform and co-ordinate the relevant actors in the rescue chain.

BETTER COMMUNICATION SAVES LIVES

In the High North, alerts from emergency locator beacons will normally go through the Cospas-Sarsat system. This system has good coverage, but it sends only a one-way notification and gives no confirmation to the sender that the alarm has been received. Two-way communication is therefore desirable here, as it offers the possibility to communicate information beyond standard notifications.

By receiving updates on the progress of the rescue operation, the persons in distress are given a better idea of how best to use the resources available at the accident site. Knowing that help is on the way can also help to encourage optimism and boost morale among survivors, as compared with a scenario in which they send out distress signals without knowing that these have been received.

Over the longer term, it is desirable to further develop satellite-based solutions, even if it is expensive and demanding and will require co-operation between different actors, in addition to a lengthy wait for implementing such a system in the industry.

TECHNOLOGICAL FAILINGS LEAD TO FALSE ALARMS

In 2013, approximately 1,800 notifications were registered in the category of distress signals. 95% of these could be characterised as false. The majority of false alarms are attributed to either technological failings or procedural failures on the part of the user.

The key information communicated should be picked up automatically from the vessel's existing systems and communicated through internationally standardised protocols to minimise the chances of failure. Automatically generated information that can typically be relevant in a rescue operation includes co-ordinates, air and water temperature and wind speed and direction.

BETTER KNOWLEDGE AND SHARED UNDERSTANDING ARE IMPORTANT

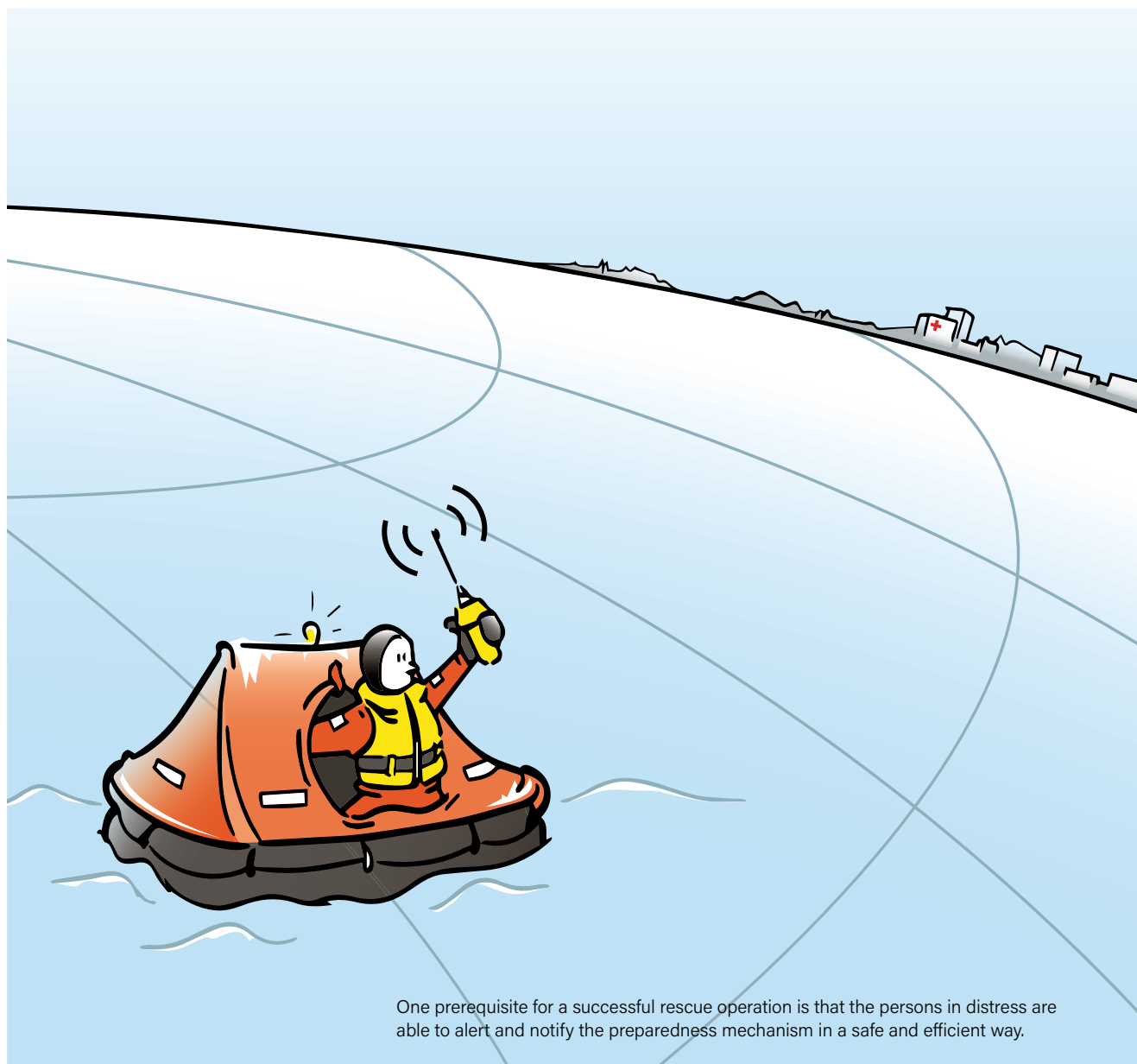
There is much variation between different sectors with regard to their knowledge of notification procedures and the level of emergency reached before notification is initiated. This inconsistency represents a level of uncertainty for actors in the rescue chain. Improving users' knowledge of rescue capacities and the challenges associated with these will create a better mutual understanding of the issue. A better understanding of notification procedures on both sides, in addition to a knowledge of emergency preparedness/rescue operations in general, is therefore desirable. This can be achieved by training the relevant users.

THE NORWEGIAN COAST GUARD

The Norwegian Coast Guard is a key resource in attending to Norway's rights and obligations as a coastal state, in accordance with the UN Convention on the Law of the Sea.

It exercises authority over a sea region equal in size to the Mediterranean. Its area of operation and jurisdiction includes two international sea regions (the Loophole and the Banana Hole) which are regulated by international agreements. Another important role it plays is in search and rescue, for which Norway's area of responsibility extends from the North Sea to the North Pole and from the Prime Meridian to the 35th meridian east. The monitoring of fishing and hunting, with the increase in scope of these practices, requires a constant presence over an ever-growing number of areas. In addition, there is a high level of activity along the entire coast. This calls for a flexible and well-adapted coastguard structure that is able to handle the activity in our sea regions.

Steve Olsen, Norwegian Coast Guard



One prerequisite for a successful rescue operation is that the persons in distress are able to alert and notify the preparedness mechanism in a safe and efficient way.

SEARCH

Limited resources, great distances and inadequate infrastructure in the High North all lead to an increase in response time – something which lessens the likelihood of finding and rescuing survivors.

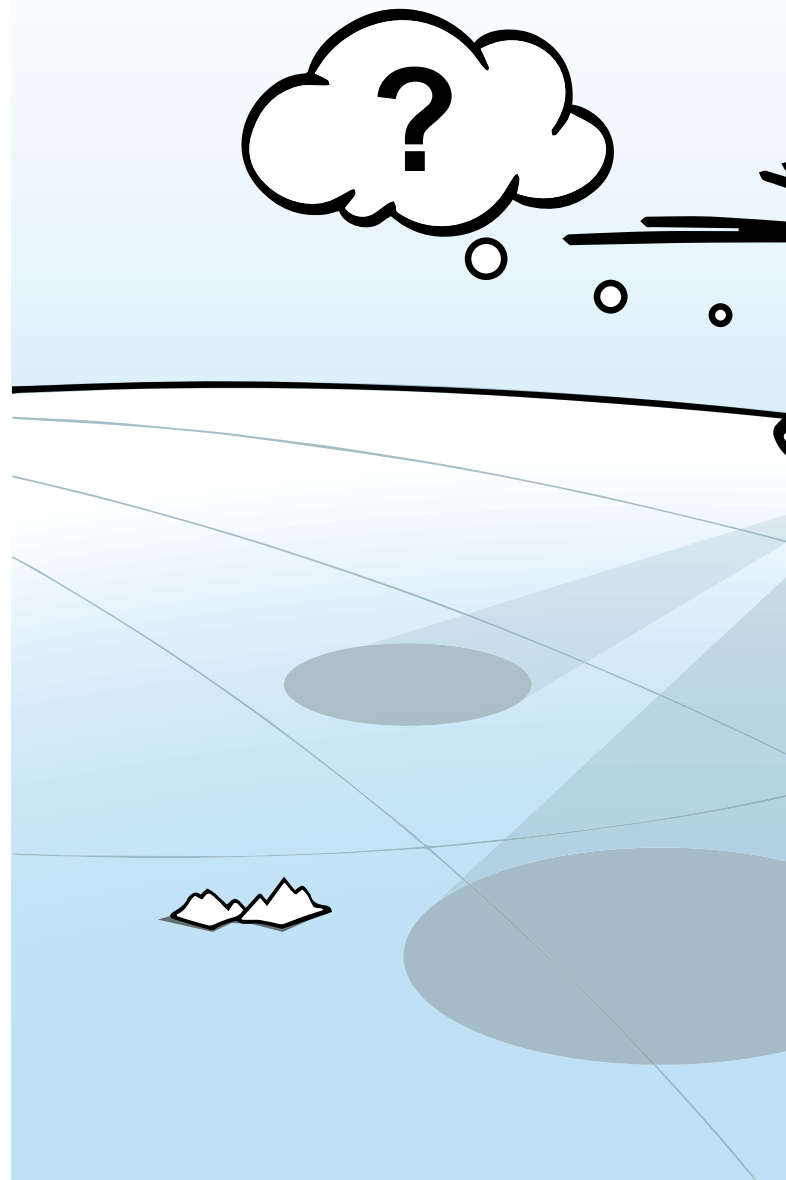
Locating persons in distress is defined as the "search." In situations where survivors have access to emergency locator beacons and means of communication, this task is relatively simple. If this type of resource is not available, the search will often consist of visually exploring an area to find survivors, who may be spread over a limited space. Where available, this task is initially performed with airborne resources, as these are often the first to reach the accident site.

Of the ships available, the Norwegian Coast Guard strives to have a helicopter carrier ship in the conservation area around Svalbard all year round. The Norwegian Coast Guard has experience and expertise in conducting searches as an on-scene co-ordinator.

A coastguard vessel can also help increase the range of SAR helicopters from land, as it allows them to refuel. Distances can be great in the Arctic, and transportation to and from the accident site is limited by fuel capacity. Refuelling will improve the ability to use helicopters in the search. Polarsyssel, the Governor of Svalbard's new ship, has a helideck and the capacity to refuel helicopters during the nine months in which the ship is operative at Svalbard. The Norwegian Coast Guard and Polarsyssel have different fixed tasks, which affect both where they can offer emergency response and their response times.

NEED FOR TECHNOLOGY UPGRADES

Co-ordinating larger operations in the High North is difficult. This is mainly due to poor system integration between the different SAR resources and a narrow bandwidth. For example, it is currently not possible to send search co-ordinates digitally between the Joint Rescue Coordination Centre and rescue helicopters. Co-ordinating and communicating with rescue helicopters and other resources on search missions is therefore generally restricted to voice communications.

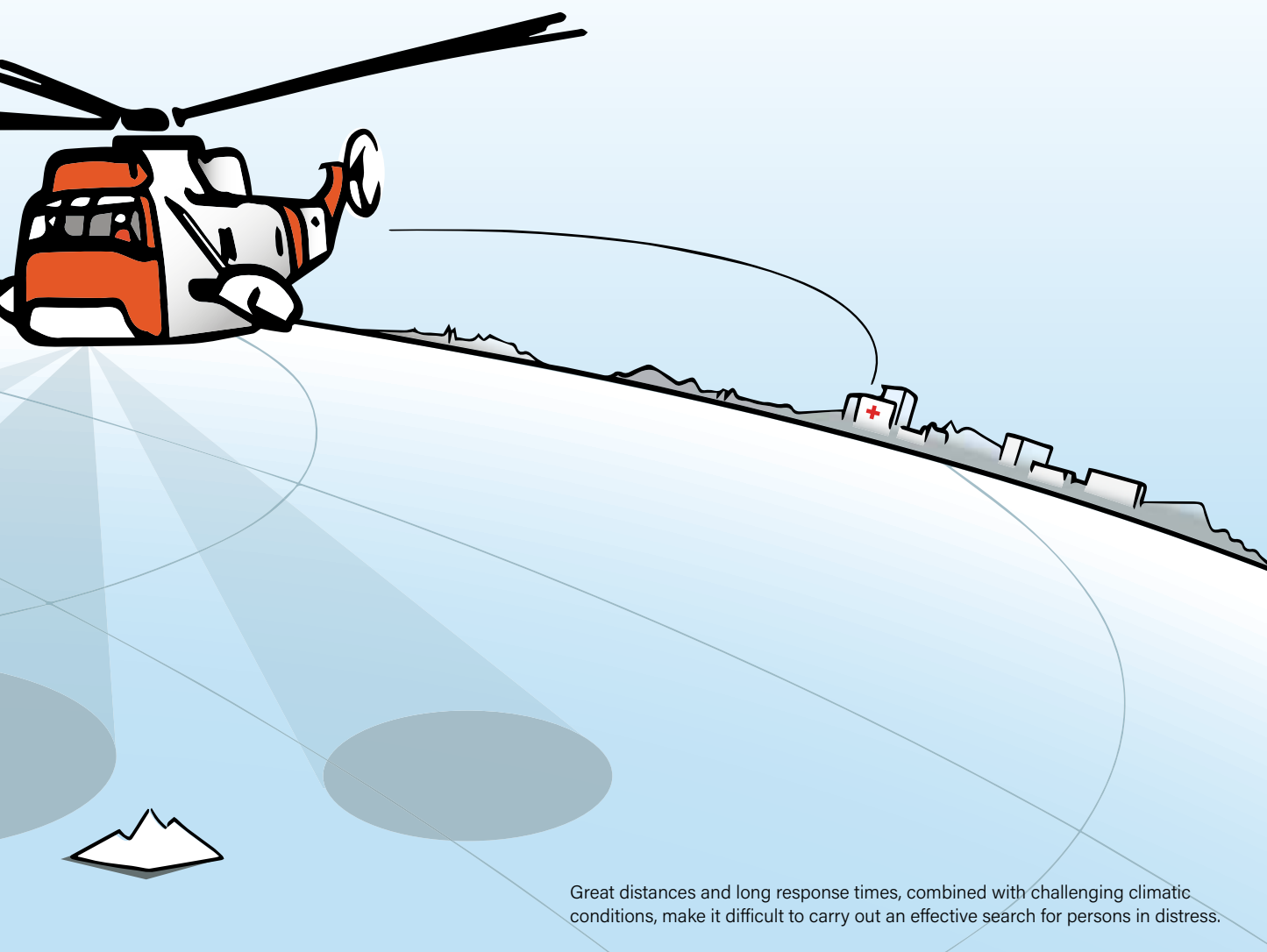


ENI NORGE

ENI Norge is an important actor in the Barents Sea and has therefore been involved in SARiNOR. We believe that interdisciplinary co-operation between different industries, authorities and research institutions is vital for establishing the expertise to handle a major accident involving a full evacuation in these demanding waters.

Due to short survival times in cold water, future evacuation solutions must focus on dry evacuation to sheltered areas. Life-saving appliances must be developed to enable dry evacuation and give those evacuated sufficient protection against the cold until they can be rescued. Good solutions must be developed in co-operation with private sector actors, employee organisations, authorities, research environments and equipment suppliers.

Liv Nielsen, ENI Norge



Great distances and long response times, combined with challenging climatic conditions, make it difficult to carry out an effective search for persons in distress.

SHARED SITUATIONAL AWARENESS

Shared situational awareness means that everyone involved in an incident has the same understanding of the task at hand and can thereby administer their own resources in the best possible way with regard to their instructions from the SAR manager.

SAR resources need information and the possibility to communicate with other actors participating in an operation. Communication will help to achieve a better understanding of the task at hand. SAR resources also need to communicate with other SAR resources – be they maritime, airborne or personnel at the incident site – to carry out concrete tasks in an effective and appropriate manner.

THERE IS NOW A GREAT TECHNOLOGICAL POTENTIAL FOR SHARING TEXT AND IMAGES AND ALSO FOR LIVESTREAMING WITHIN THE SAR FIELD.

SHARED PLATFORMS WILL BE AN IMPORTANT TOOL

There is now a great technological potential for sharing text and images and also for livestreaming within the SAR field. However, lack of technological co-operation across services limit the possibility of sharing data between different systems. We propose that a common standard interface be established between the C3I systems (command, control, communications and information) for SAR in the different services.

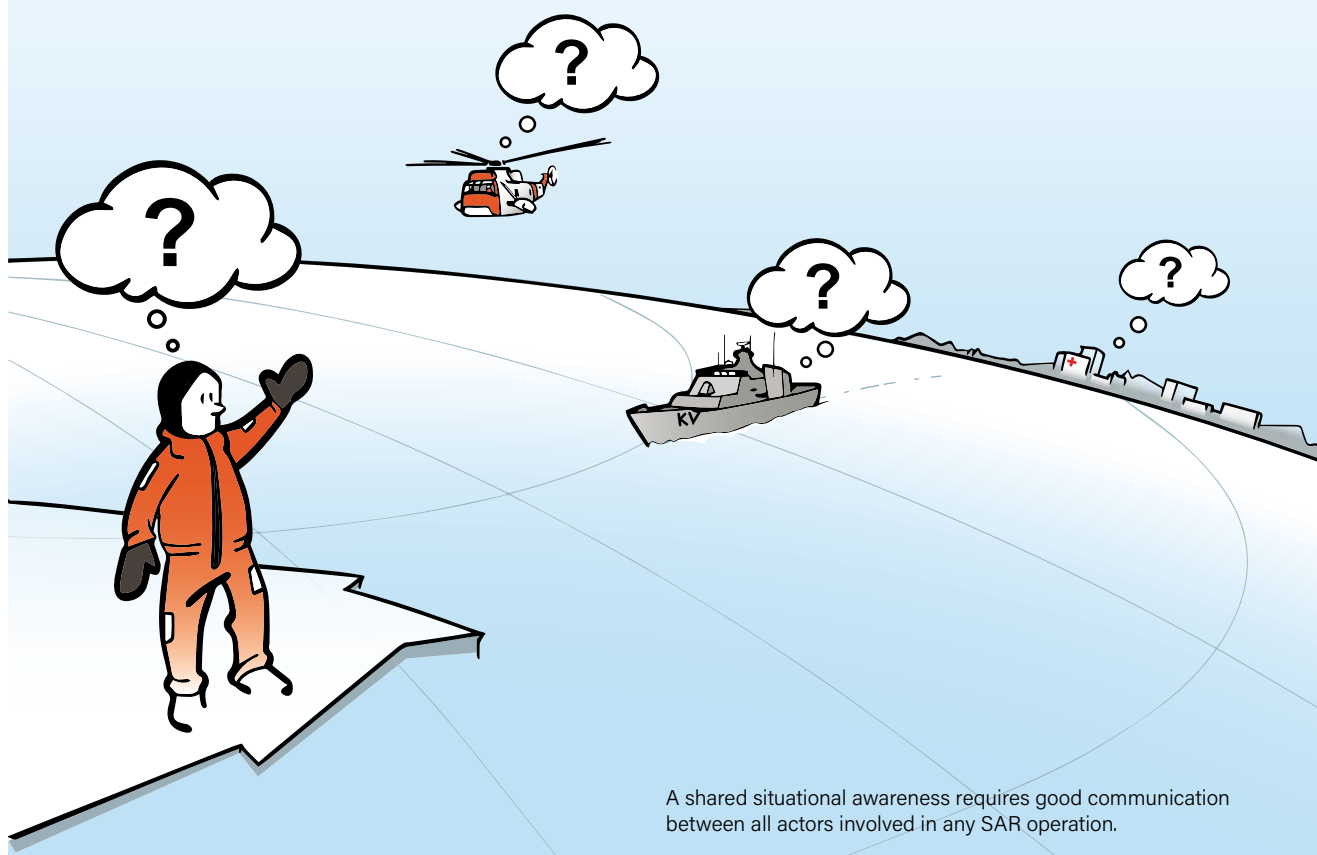
MORE AND BETTER DRILLS

Drills are important for establishing and developing a shared situational awareness. Co-operation in joint drills provides practical training in task resolution. Joint drills involving different actors also makes it possible to learn about each other's organisations, roles and responsibilities. The different actors currently tend to run drills individually, as limited time, finances or resources are put towards conducting joint drills. Conducting more joint drills between different services will increase awareness of the different services' expertise, roles and responsibilities, while helping to promote a mutual understanding of planning work, concepts and terminology.

THE CO-OPERATIVE PRINCIPLE – JRCC'S STRATEGIC RESPONSIBILITY

The co-operative principle involves implementing communications and co-ordination between the emergency services that ensure that combined resources are made available as a unit in the case of incidents that demand the involvement of more than one such service. JRCC has, on behalf of the Ministry of Justice and Public Security, the strategic responsibility for this co-operation, as well as for helping to improve a shared knowledge base across services.

The Ministry of Justice and Public Security's overarching responsibility does not include the Norwegian Armed Forces, an important actor in SAR emergency preparedness. JRCC's strategic responsibility can therefore be further developed in a favourable manner to include resource administration for tasks such as the establishment of a common forum for the revision of planning work between services, and the establishment of common standards for interoperability between C3I systems.



A shared situational awareness requires good communication between all actors involved in any SAR operation.

EXPERTISE

It is important to have expertise in the challenges related to polar operations: challenges in the organisation of emergency response as well as on board commercial vessels. This expertise must be harmonised between the relevant actors so that there is a common understanding of the concepts and problems. It is important to establish common guidelines and standards, both for those in the emergency response chain and for commercial actors.

It is also important to implement improvements after incidents and drills. The ability to co-ordinate, and to translate experience into development and improvements into quality, demands both structural and organisational measures on an overarching level.

Odd Jarl Borch, Nord University

SURVIVAL IN COLD CLIMATE

For a successful rescue, it is a prerequisite that the persons in distress survive until help arrives. The IMO's Polar Code requires life-saving appliances enable survival for a minimum of five days. This means that the Polar Code sets functional requirements which go beyond the minimum requirements of the Life-Saving Appliance Code.

NOT ALL PARTS OF THE RESCUE CHAIN ARE EQUALLY IMPORTANT

The requirements laid out in the Polar Code are performance based. It is therefore important to take a holistic approach and evaluate the entire rescue chain so that more equipment combinations can satisfy these performance-based requirements. Central to the issue of surviving for five days is the human capacity to survive in polar conditions.

EXPERIENCE SHOWS THAT CONDITIONS IN THE HIGH NORTH MAKE IT DIFFICULT FOR SURVIVORS TO REGAIN A NORMAL BODY TEMPERATURE ONCE ALREADY WET OR COLD.

The human capacity to produce heat over longer periods determines the need for thermal protection, for space that allows for movement and for energy intake/nutrition. Our current knowledge of the physiological processes of shivering (muscular heat production) for over 24 hours is marginal. This will require more studies and better knowledge before we can say anything specific about the effect of the aforementioned measures.

Studies have shown that conventional life rafts will probably not offer sufficient physiological support to enable survival for five days. This is due largely to a lack of thermal protection, particularly when combined with the potential for water ingress. People who have survived accidents in the High North in life rafts or lifeboats tell us that if one is already wet or cold, it is difficult to regain a normal body temperature in the prevailing conditions.

OPERATIONAL CHALLENGES

The use of life-saving appliances in polar regions will require an adaptation of the operation to reflect the specific ice and weather conditions. This must be outlined in procedures, such as those involving the use of and launching of life-saving appliances in ice. The handling of life rafts and lifeboats in polar conditions must also be included in the safety training given to crews. All of the challenges associated with maintaining life-saving appliances for a minimum of five days must also be included as part of the obligatory training.

ENERGY INTAKE

The existing performance-based requirements of emergency rations can be a cause of, or contributing factor to, reduced survival time. One study has shown that the current nutritional content and size of emergency rations can be sub-optimal for ensuring a sufficient shiver response should one's body temperature drop.

HOLISTIC APPROACH

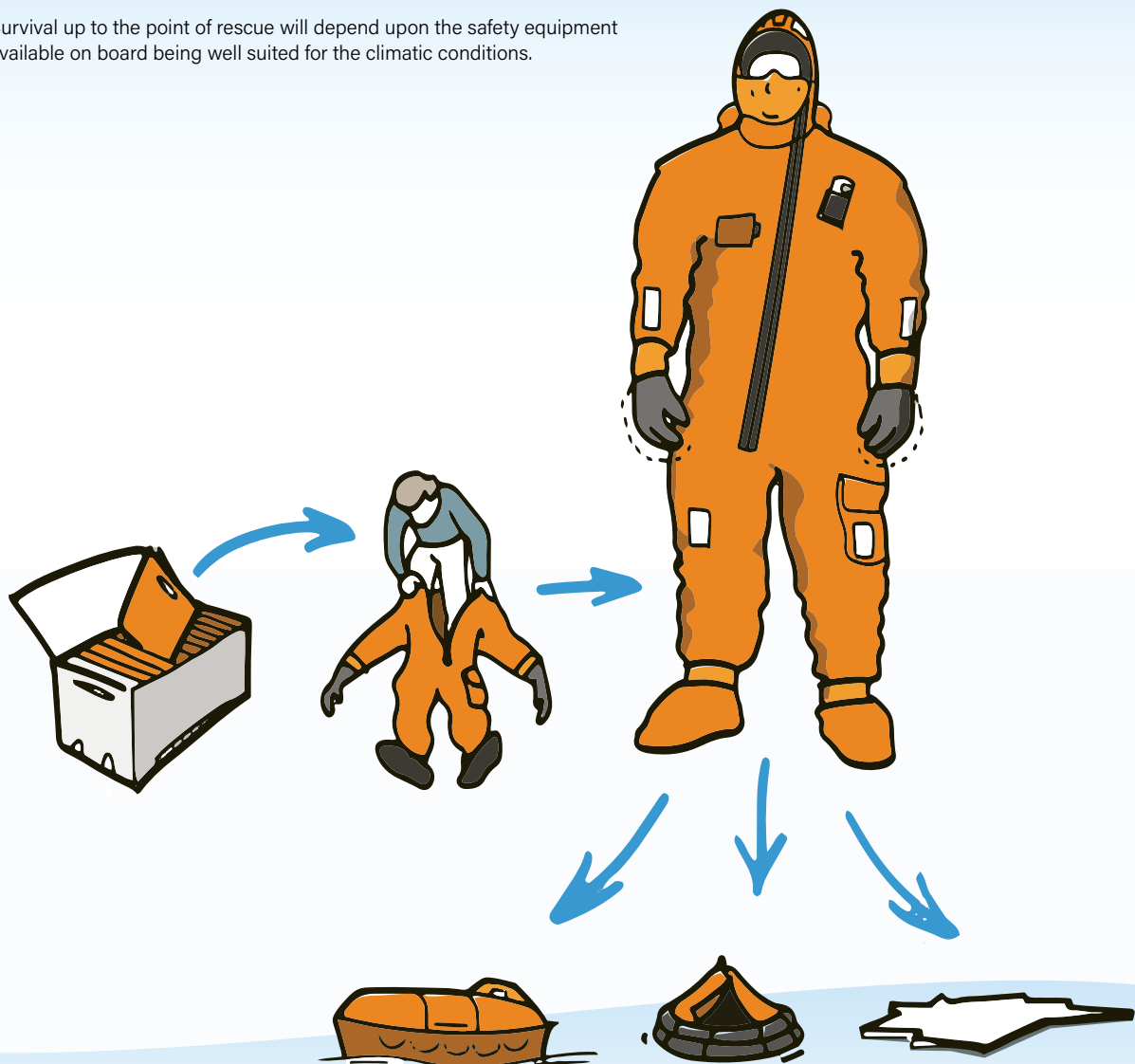
To meet the five-day survival requirement, it is important to evaluate the entire rescue chain, as the performance of individual components will depend upon their compatibility with the rest of the chain.

RESCUE

Should a major accident occur and consequently require mass evacuation in a cold climate, it is important that the evacuation be effective, to minimise survivors' exposure to the cold and to avoid direct contact with the sea. Today there is not much equipment that is specially adapted for cold climates and that enables the efficient evacuation of many people – for example, in transfers between ships or from life rafts/lifeboats to other vessels. Emergency preparedness plans for major accidents north of the 80th parallel, and the mass evacuations associated with these, must be established and integrated into the existing planning framework.

Knut Espen Solberg, SAREX

Survival up to the point of rescue will depend upon the safety equipment available on board being well suited for the climatic conditions.







MAIN FINDINGS OF THE SARiNOR PROJECT

The current level of emergency preparedness in the High North does not reflect the activity levels of today and tomorrow, nor does it meet the ambitions of government agencies. SARiNOR has identified the significant factors that can help to increase the likelihood of survival and reduce the time it takes to rescue survivors, and has proposed concrete measures. Beyond the range of rescue helicopters, the likelihood of surviving a major accident at sea is considerably lower than within regions closer to the coasts. Great distances, limited infrastructure and demanding climatic conditions lead to long mobilisation times, which present a significant risk for those whose work or travels bring them to these areas.

The likelihood of surviving after a major accident in remote polar areas can be categorised according to two main findings: the ability to survive at the accident site and the availability of rescue response. The ability to survive at the accident site following an evacuation is crucial, as a range of factors impair one's ability to survive, the most significant being hypothermia. At the same time, it can take a long time – up to several days – for a rescue to be completed.

MAIN FINDING 1

SURVIVAL AT THE ACCIDENT SITE

AVOIDING HYPOTHERMIA

Following an evacuation, the first prerequisite of survival is avoiding hypothermia and remaining in a position to look after oneself until rescued. If the body's core temperature begins to sink, one's capacity for self-care is reduced, and the negative development can escalate further. The surroundings and equipment for preventing hypothermia are therefore crucial to increasing the likelihood of survival. The preconditions for survival in the time leading up to rescue will be the life rafts/lifeboats being in a position to maintain a habitable environment that ensures survival over a longer period of time. The Polar Code sets out requirements for a "ventilated environment that will protect against hypothermia, as well as food and drink for a minimum of five days".

TRAINING AND EXPERTISE AFFECT RESULTS

Survivors' physical and psychological state, both before and after an accident, will also affect their ability to stay alive. The capability of the individuals concerned, together with their training and expertise, will affect how this phase is tackled. Crew members on a merchant vessel who know one another, are aware of the procedures and have carried out regular drills will have better prospects for coping in these situations than will cruise ship passengers. Evacuation onto land or even ice, as an alternative to remaining on a life raft/lifeboat, is a real option and is described in the Polar Code. However, this requires extra equipment, and in cases where this is considered to be a probable scenario in advance, a list of suggested equipment in the form of packets of personal survival equipment and group survival equipment is described in the Polar Code. In the case of accidents in areas outside of helicopter range, the current P3 Orion aircraft has shown itself to be effective in searches, establishing communication between survivors and the Joint Rescue Coordination Centre, and dropping off extra equipment.

STAYING DRY IS CRUCIAL

Dampness reduces the insulating characteristics of clothes. When combined with the cold, dampness reduces the body's ability to regain its normal temperature – something which is a prerequisite for survival over time. There is a likelihood of becoming wet during an evacuation from a ship in distress. Dry evacuation improves the chance of survival. It is therefore important to have evacuation solutions that prevent direct contact with seawater. In addition, personal equipment should prevent people from becoming wet, with a good enough insulation ability to maintain body temperature. For those who do end up in the water, a prerequisite for survival is gaining quick access to a lifeboat/life raft, dry clothing and the essential heat. Today's lifeboats/life rafts are not particularly well-equipped for this type of rescue, and at this stage outside aid is not to be expected.



Survival at the accident site up to the point of rescue will require expertise and additional equipment that is suited to the often extreme challenges present in the High North.



MAIN FINDING 2

RESCUE AND EMERGENCY PREPAREDNESS

RESPONSE TIME IS CRUCIAL

After the evacuation itself, the time it takes for rescue resources to arrive on scene is crucial in determining how many people survive. In outlying polar regions, the time it takes to be rescued will be long – considerably longer than the introductory phases of alerting, search and notification. Experience from previous accidents has shown that during this time hypothermia is a real difficulty, especially given the cold climate. Any measure that can help to prevent hypothermia and reduce the time spent waiting for rescue will help more people to survive. The rescue response times are dependent on the presence of rescue resources in the region, particularly ships. This means that a deliberate positioning of rescue vessels in areas with marine activity – be it fishing, transport or the extraction of hydrocarbons – will help to reduce response times considerably. As the geographical areas involved are great, allocating rescue vessels across the entire region will require considerable resources. The resources should therefore be allocated to the areas with the most traffic.

MEASURES IDENTIFIED IN THE SARINOR PROJECT:

Any factor that can cause delay and thereby increase the rescue time must be identified. All measures identified must be evaluated and prioritised to make the rescue chain more efficient. Examples of the measures identified are:

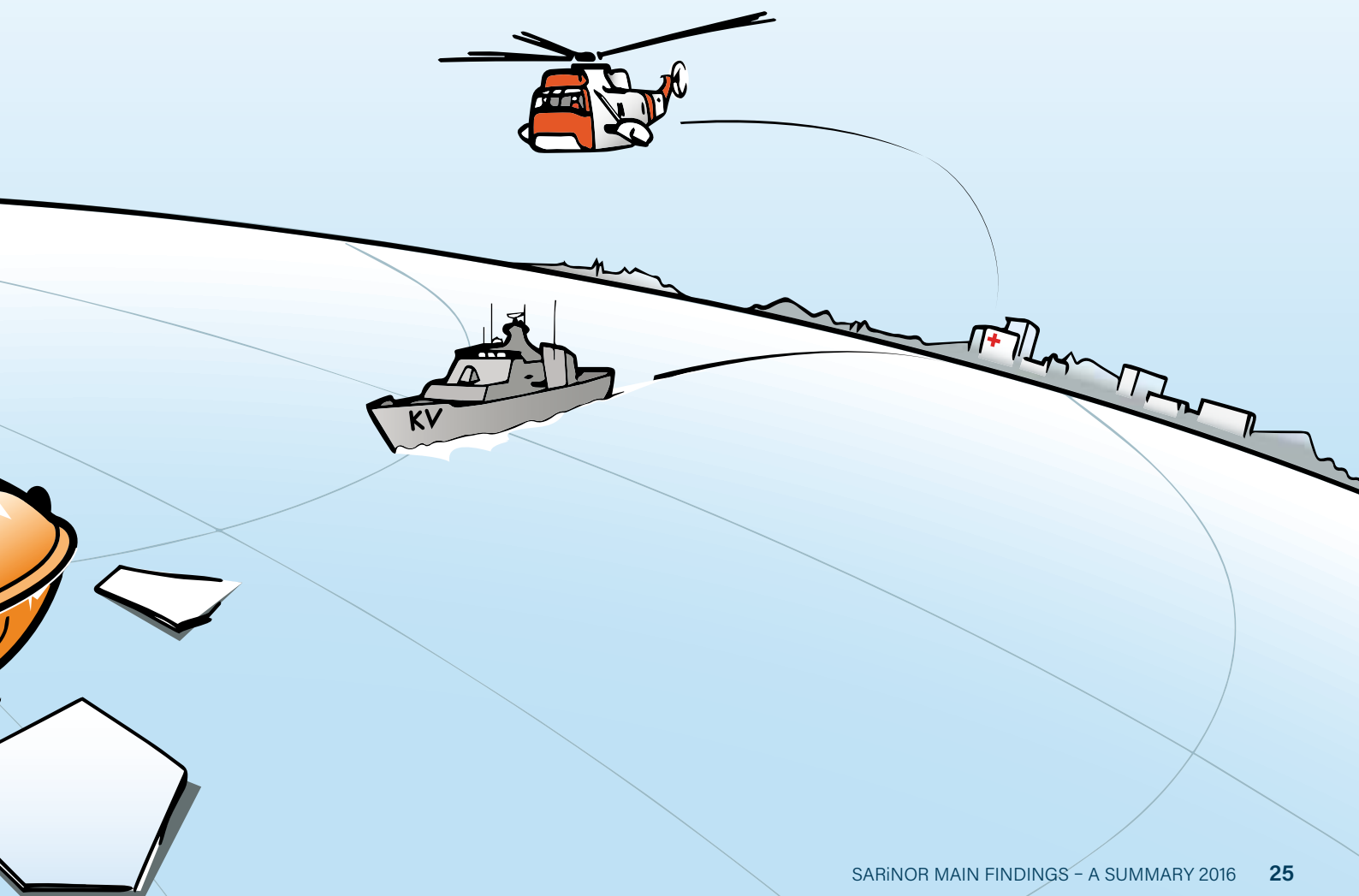
- Improvements to infrastructure – including communications and broadband coverage.
- Advance storage, establishment of equipment depots that are suited to operational needs.
- Emergency medical preparedness, including the use of telemedical equipment, must be improved.
- All categories of response personnel must be identified to ensure swift mobilisation, including the use of the Norwegian Armed Forces' special forces units (rostering systems will be evaluated).
- Establishment of a task force specially trained for demanding and "long-term" operations in cold climates.
- Evaluation of the setup for airdrops of rescue personnel and equipment in the case of major accidents.
- Improvements to R&D to make rescue operations more efficient, by putting new and modern equipment into use, including the use of drones, Arctic rescue equipment, improved search and monitoring, etc.

THE NEXT STEP WILL BE TO IMPLEMENT THE FINDINGS AND RECOMMENDATIONS THAT HAVE BEEN RAISED:


- Future emergency preparedness must be efficient, risk based and truly proportionate to the actual activity taking place in the different geographic areas.
- A risk-based socio-economic evaluation of the different findings must be conducted to document how these are prioritised. The most socio-economically beneficial options should then be put into practice through a political will to implement the measures that will contribute to better safety in the High North.



It is important that emergency preparedness be scaled to correspond to the maritime activity being conducted in the High North, to ensure that response times are short. This will increase the likelihood of finding survivors at the accident site.







**GREAT DISTANCES, LIMITED INFRASTRUCTURE
AND DEMANDING CLIMATIC CONDITIONS LEAD TO
LONG MOBILISATION TIMES, WHICH PRESENT A
SIGNIFICANT RISK FOR THOSE WHOSE WORK
OR TRAVELS BRING THEM TO THESE AREAS.**

FURTHER WORK

An increase in activity in the High North also brings with it an increased risk of major accidents, significant loss of human life and damage to the environment. Often this increased risk is not reflected in the procedures and plans currently used by the different emergency preparedness organisations. SARiNOR has indicated several areas in which Norwegian emergency preparedness can be improved and highlights the importance of taking this work forward through concrete measures.

Major accidents in polar regions are scenarios that are rarely trained for, so it is only after a major accident actually occurs that one can see how well the emergency preparedness mechanism works. Current drills often focus on elements of an incident and are executed by one individual actor or by a few together. Training to cope with major accidents is costly, and the various actors do not have the resources for this sort of joint training.

Emergency response capacity should be based more on risk assessments and the cost/benefit of different measures, to avoid subjective prioritisations and investment in the wrong equipment. It is always difficult to define and agree upon the right level of emergency preparedness in different areas, just as it is difficult to verify whether the emergency preparedness in place is proportionate to the desired levels before an accident occurs.

that these findings be taken forward and prioritised, as there are major differences in effects, costs and implementation times. Subsequently, this subject must be raised in the political arena, so that government authorities can allocate resources to close these gaps and ensure that there is an acceptable level of emergency preparedness in northern waters.

Unfortunately, development in the maritime industry is in many ways retroactive, and changes come only as a result of undesirable incidents. A major accident in the High North could mean a great loss of both human life and property. The political process takes time. This means that we must get a handle on this problem right now and put it on the agenda in order to meet the needs of an increase in activity.

WORK IN SARINOR HAS HELPED TO IDENTIFY SEVERAL GAPS IN THE NORWEGIAN EMERGENCY RESPONSE MECHANISM.

Norway is currently bound by the Ilulissat Declaration, by which we must co-operate with the other Arctic countries in the case of an incident. However, this declaration does not address requirements for response times, which resources we must have at our disposal or the scope of the emergency response mechanism. This is up to each individual country to determine.

SARiNOR has helped to identify several gaps in the Norwegian emergency response mechanism. It is important

Co-operation across organisations, resources and expertise must continue to be developed to ensure that Norway has a rescue chain that increases the chances of survival in the aftermath of an accident in the High North.



NORWEGIAN SHIPOWNERS' ASSOCIATION

It is crucial to ensure that heightened activity in the High North takes place in a sustainable and reasonable manner. This requires extensive investment into infrastructure and a further development of the relevant expertise and technology. More particularly, there is a pressing need for a greater capacity and a better emergency preparedness for search and rescue.

Today, 80% of all Arctic sailing takes place in regions where Norway is responsible for emergency preparedness for search and rescue. Norway is one of the world's biggest and most advanced maritime nations, and we have time-honoured polar traditions. This gives us a particular advantage when seeking to exploit the opportunities offered by the region. This also gives us a particular obligation to help ensure its secure and sustainable development.

The SARiNOR project is an important step towards more secure development for those who live, work and travel in the High North. The project will also help to confirm Norway's position as a world leader in search and rescue in Arctic waters. Both of these aspects hold great importance for the Norwegian Shipowners' Association, which gives its full support to this important project.

Sturla Henriksen, Norwegian Shipowners' Association





SEARCH AND RESCUE IN THE HIGH NORTH (SARiNOR)

The SARiNOR project's vision has been to help make Norway a world leader in search and rescue in the High North. Safety on the seas is vital, and it is also a prerequisite for the creation of further economic growth within the maritime industry and oil and gas operations in the North.

The Ministry of Foreign Affairs has stated that Norway, as a coastal Arctic state with jurisdiction over large ocean areas, has a real responsibility to reinforce maritime safety and emergency preparedness in the High North.

This project has provided an arena for collaboration between private and public search and rescue actors, and it has identified a number of suggestions for technological and organisational improvements that could increase the likelihood of saving more lives in the aftermath of accidents in Arctic regions.

SARiNOR2

The main focus of the SARiNOR project has been the survival and rescue of people following an accident in Arctic regions. An extension of the project, which focuses on reducing the risk of environmental pollution and salvaging material assets at the accident site after all survivors have been rescued, is now being put into action with the launch of the SARiNOR2 project.

SARiNOR2 will ensure that the measures and recommendations identified in both projects are evaluated and implemented with a view to reinforcing the entire emergency preparedness and rescue chain. All resources must be able to interact and be integrated swiftly and efficiently with each other, on both a national and an international level. In addition, performance requirements must be introduced that measure the quality of the entire rescue chain.

Together, SARiNOR and SARiNOR2 will encompass all aspects of the emergency preparedness that will be essential to managing a major accident at sea in the High North.

Should you be interested in taking part in the SARiNOR2 project, or for more information on the SARiNOR project, please contact:

Tor Husjord, Chairman

Phone: +47 76 94 15 20/+47 908 85 512

tor.husjord@maritimt-forum.no

Maritime Forum North, Havnegata 28, 8514 Narvik

All reports from the SARiNOR project can be found at www.sarinor.no. Here you will also find an introductory video, Arctic Mayday, which demonstrates some rescue scenarios for a hypothetical major accident in the High North.

"The roadmap to Norway's Arctic policy" has been produced by DNV GL in collaboration with Maritime Forum North.

Design: 07 Media, 1608-022

Printing: 07 Express, 500 psc. 10/2016

Illustrations: Ole Petter Næsgaard, SINTEF

Photos: Cover, pp. 20 and 30 © Norwegian Armed Forces; pp. 4, 10 and 26 © Knut Espen Solberg

Contributors: Text p. 8, Bent-Ove Jamtli, Joint Rescue Coordination Centre