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**S01.03**  
*Innovate the Concept of Rescue and Salvage, Enhance Win-Win Cooperation and Work Together to Build a Community of Shared Future for Mankind*

**Mr. Wang Zhengliang**

1. China Rescue and Salvage, Beijing, China

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**S01** - SAR in the Pacific, East Ballroom BC,  
June 16, 2019, 9:30 AM - 11:00 AM

After more than 60 years of development, China Rescue and Salvage has always adhered to the “people-centered” development ideology, achieved leap-forward development in building its professional response teams and developing its operation technology and equipment, and played its due role and made outstanding contributions to the protection of human life, environment and property at sea. At present, the safety situation of maritime shipping is grim. Facing the new era and new requirements, CRS will continue to make efforts to build an all-weather and all-round rescue and salvage system capable at the deep and far sea with capability of rapid response and efficient disposal. CRS actively supports the course of international marine rescue, and establishes APRC with the IMRF to promote the development of regional maritime SAR. Based on the actual situation of the rescue and salvage industry, Mr Wang Zhengliang will put forward relevant initiatives focusing on the joint efforts to build a community of shared future for mankind in a new era.

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**S01.04**  
*RCCNZ – Work in the Pacific*

**Mr. Kevin Banaghan**

1. Rescue Coordination Centre New Zealand (RCCNZ), Lower Hutt, New Zealand

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**S01** - SAR in the Pacific, East Ballroom BC,  
June 16, 2019, 9:30 AM - 11:00 AM

Major maritime and aviation search and rescue missions in the Pacific are coordinated by New Zealand’s national search and rescue organisation, the Rescue Coordination Centre New Zealand (RCCNZ).

The centre’s search and rescue area spans 30 million square kilometres of the Pacific Ocean stretching from the mid-Tasman Sea, down to the South Pole, halfway across to Chile and almost up to the Equator, making it one of the largest SAR areas in the world.

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**S01.05**  
*SAR in the Pacific and Niue*

**Mr. Tony Edwards**

1. Niue Police, Niue

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**S01** - SAR in the Pacific, East Ballroom BC,  
June 16, 2019, 9:30 AM - 11:00 AM

Our country is small and our hazards are many—we must be prepared and ready to manage any threat to our beautiful nation of Niue. With this in mind, I am very pleased to be able to talk about how the Strategic Roadmap for Emergency Management in Niue (SREM). I am encouraged that the emergency management sector has taken the initiative to work together to learn about and consider the Pacific region’s ‘best practice’ and adapt their findings to suit Niue’s unique circumstances.— Niue ke monuina – a prosperous Niue
Working with Member States and other NGOs in both these fora, we have been active advocates for SAR and have contributed significantly to IMO and ICAO SAR guidance, and to the IMO’s technical cooperation work in the area of SAR development.

This presentation will briefly summarise some of this work, and will encourage future input from IMRF member organisations and others in the SAR community. It will also promote the 2019 edition of the joint IMO / ICAO publication, the International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual - both as the primary source of SAR guidance internationally and as an example of the IMRF’s work in helping to improve its contents.

CS01.02
SAR Development in Africa
Jared Blows

1South African Search and Rescue, Cape Town, South Africa

Following on from the IMO Florence meeting in 2000, Africa was divided into 5 SAR regions. These regions each have a Regional Maritime Rescue Coordination Centre (RMRCC). Morocco, Liberia, Nigeria, South Africa and Kenya have taken up the function. The role of these RMRCC is to first support the countries within it’s designated region from an operational perspective and then to further assist with the development of SAR services within their regions. These efforts are aimed at improving the SAR capability around the African continent and thereby enhancing any needed response by seafarers who find themselves in peril.

As part of this regional set up, the RMRCCs meet every two years to look at what are the common challenges across the regions and how to resolve them. These meeting also allow for the identification of gaps.

Through cooperation with IMRF and the IMO many of the training gaps within the 5 regions have been identified and various projects have kicked off specifically within the artisanal fishing sector to try and close the gaps.

The presentation will highlight some of the challenges and the efforts being made to enhance SAR services around Africa. It is hoped that through discussions new ideas will rise on how we together can help the situation. It is further hoped that other countries and regions facing similar challenges will be able to take onboard some of the lessons learnt and thus together improve SAR services worldwide.

CS01.03
Governmental and Small Non-Governmental Organizations in Maritime SAR: Competing Against – or Complementing Each Other?
Mr. Jorge Diena

1International Maritime Rescue Federation,
Montevideo, Uruguay

To obtain the best results, it is critical for the success of maritime SAR to find the right way to combine the work of the different stakeholders. Sometimes problems arise between governmental and non-governmental organizations that work against achieving this common goal.

Points to be discussed:
- Driving force of each organization
- How the misunderstandings begin
- Perception of the other one as a threat
- Rotation of Heads of Departments
- Recognising the strong points of each organization
- Sharing of master plans
- The way forward together

CS02.01
Going the Extra Nautical Mile
Mr. Matthew Fader

1Swedish Sea Rescue Society, Gothenburg, Sweden

Sometimes when searching possibilities seem exhausted, dedicated rescuers go above and beyond the call of duty exerting critical thinking, situational awareness and local knowledge. We look at several case studies that resulted in positive outcomes against the odds. Including the miraculous rescue of 7 year old Stella who was went missing the day before Christmas Eve and was saved from the freezing water with a body temperature of only 13 degrees C.
CS02.02
Improving Maritime Search and Rescue Services at Malaysia Offshore Oil & Gas Operation Area
Ms. Zalina Sungip¹, Mr. Shamsol Efendi Dismal¹, Lieutenant Commander Maritime Suzanna Razali Chan², Captain Syahfrilhaidi Abdul Rahman³, Mr. Mohd Afzaini Mamat @ Nawi⁴
¹Petronas, Kuala Lumpur, Malaysia, ²Malaysia Coast Guard, Putrajaya, Malaysia, ³Weststar Aviation Sdn Bhd, Malaysia, ⁴Weststar Aviation Services Sdn Bhd, Malaysia

This paper focuses on an attempt of collaboration between the Malaysia Coast Guard as the maritime search and rescue coordinator in Malaysia and offshore oil & gas industry lead by PETRONAS in ensuring efficiency and effectiveness of search and rescue operation for offshore personnel within Malaysia Maritime Zone.

Due to majority of oil & gas activities are quite a distance from shore where some of the oil rig platforms are located up to 200 nautical miles, deployment of an immediate response from National Search & Rescue assets for maritime distress call could be a challenge to Malaysian Coast Guard.

Under the Emergency Response for Health, Safety & Environment, PETRONAS make it a requirement for manned oil & gas platforms to be equipped with vessel that are able to execute search & rescue operation. The intent of this collaboration is for Malaysia Coast Guard to leverage on these nearest vessels to act as the first responder during offshore maritime incident.

Based on a series of workshop done between Malaysia Coast Guard and PETRONAS, Joint Maritime Search & Rescue Standard Operating Procedure (SOP) is developed where the content is divided into three areas; Command, Coordination & Communication. The SOP was tested in a search and rescue exercise table-top and it shows that it is a realistic and an applicable effort. One of the resolutions from the table-top exercise is the establishment of Offshore Joint Search & Rescue Working Group where the main function of this working group is to continuously assess the true effectiveness of training and the operational efficiency and competency of the offshore maritime search and rescue.

It is believed that this collaboration will be able to increase the probability of saving lives by providing immediate response effectively during any maritime incidents.

CS02.03
Ms. Rosemary Hanna¹
¹Simon Fraser University, Burnaby, Canada

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Sharing SAR Lessons Through Personal Experience: ‘Hidden Lessons from an Amateur’ is an intriguing graphic presentation inspired by the overarching theme of the 2019 World Maritime Rescue Congress ‘Learning from the Past; Looking to the Future – Maritime Search and Rescue in a Dynamic Operational Environment’. Contents highlighting an amateur’s personal maritime rescue experience are derived from on-going Pacific Coast community research projects. Safety afloat, forever critical to mariners’ lives and livelihoods, coast-dwellers and temporary fly-in-fly-out workers, is exemplified throughout one riveting land-sea rescue encounter. Here, a lone SAR amateur, tasked with managing an industrial accident ashore and marine transport, faces multiple, intricate decision-making challenges. Contextualized to support maritime SAR leaders’ core functions linked to public safety, education and communications, complex lessons are revealed sequentially, via four primary objectives: establishing situation and marine resources; recounting events; reviewing and critiquing decisions and outcomes vis-à-vis situational variables; and finally, visually charting two contrasting SAR models. The resulting counterpoint - Professional Team vs. Amateur Team-Building-Under-Duress – graphically demonstrates the absolute superiority of professionally trained and coordinated maritime SAR teams, notwithstanding the role of emerging amateur heroes. At the nexus of ocean and wilderness, the case presented underscores significant amateur knowledge/experience gaps. Yet, a gulf that can surely be bridged by leading Canadian Maritime SAR organizations and air/land joint operations partners (e.g. RCMSAR, RCMP, CCG, RCN, RCAF, North-Shore SAR). In conclusion, the hope and expectation is that future maritime safety and preparedness missions will engage and train ‘amateur’ mariners at pre-tragedy
stages. How will SAR leaders extend their embedded knowledge after scrutinizing and transforming amateur lessons into innovative value-added learning beyond dockside and social media? SAR leaders are invited to review, illuminate and disseminate amateur lessons to emphasize the imperatives of maritime life-saving and communications ventures; and to inspire future volunteers.

CS03.01 & P3.14
IMRF Future Technology Panel
Mr. Tim Robertson1, Mr. John Dalziel4, Mr. Hans Van der Molen3, Mr. Martin Fuhr Bolstad2, Mr. Rieghard Janse Van Rensburg6, Mr. Thomas Luebcke5
1Royal National Lifeboat Institution (RNLI), Poole, United Kingdom, 2Norwegian Sea Rescue Society (RS), Oslo, Norway, 3KNRM, IJmuiden, Holland, 4Dalhousie University, Halifax, Canada, 5German Maritime Search and Rescue Service (DGzRS), Bremen, Germany, 6Sea Rescue South Africa (NSRI), Cape Town, South Africa

CS03 - Tech Developments I, East Ballroom C, June 16, 2019, 11:45 AM - 12:45 PM
P3.14 - Poster Sessions, East Exhibit Hall B, June 16, 2019, 12:45 PM - 2:15 PM and June 17, 2019, 1:15 PM - 2:30 PM

This presentation introduces the ‘Future Technology Panel (FTP)’ of the International Maritime Rescue Federation to attendees of the WMRC, highlights its activities and benefits, as well as encourages other Maritime Rescue organizations and individuals to get involved.

The FTP is a technical group representing a number of Maritime Rescue organizations from around the world. Its aim is to promote sharing and collaboration on various technical initiatives, activities and research, allowing member organisations to benefit by learning from each other’s activities. This collaboration will result in a future increase in maritime safety, as well as staying in touch with rapidly developing technology.

The FTP has an informal structure, with monthly virtual meetings, utilising ‘Microsoft Teams’ for meetings, document sharing, archiving and informal discussions. This approach minimizes cost and disruption to schedules. Occasional ‘face to face’ meetings have taken place, albeit not the norm. Topics under discussion include the following; The potential application of UAV’s [drones] in SAR, with the outcomes of demonstrations large and small being shared. Legal restrictions and implications were also discussed.

The pros and cons for the application of Unmanned Marine Vehicles (UMV’s) to maritime SAR.

Occupational Health & Safety issues, such as the significance of whole body vibration experienced by RHIB crews, including examples of studies undertaken to measure their long-term effects.

The dangers of RIP currents for swimmers, along with experiments to measure and monitor these on a real-time basis.

The incident rate of marine stings for swimmers.

The FTP would like to:
Make attendees at the WMRC aware of its existence.
Encourage more organizations to participate in the monthly electronic meetings and to share research, experiences and developments.

Invite attendees at the WMRC to interact with FTP representatives.

CS03.02
Small Drones Beyond Line of Sight for Early Situational Awareness
Mr. Fredrik Falkman1
1Swedish Sea Rescue Society, Gothenburg, Sweden

CS03 - Tech Developments I, East Ballroom C, June 16, 2019, 11:45 AM - 12:45 PM

The Swedish Sea Rescue Society (ssrs.se) is exploring safer and more efficient sea rescue operations by providing rescue crews with early live aerial images of a situation using remotely launched drones. In this presentation, we will describe the benefits we foresee this system will give, what we have tried so far and the choices we have made.

Since this kind of operation is dependent on flying beyond line of sight - which is currently highly restricted globally, the SSRS has initiated and has been involved in a number of technical and regulatory initiatives to enable regular beyond line of sight operations. Many of these initiatives may also be viable outside our Swedish and European environment. The presentation will include an overview of this work.
(To date we have logged a number of test flights beyond line of sight in restricted airspace. With some luck we’ll have a permit for regular operations during the spring - which would give us even more to share!)

**CS03.03 & P3.07**  
**Supporting Maritime SAR Missions with Unmanned Aerial Systems**

Mr. Thomas Luebcke¹, Mr. Philipp Gorczak²  
¹German Maritime Search And Rescue Service (DGzRS), Bremen, Germany, ²TU Dortmund, Communication Networks Institute, Dortmund, Germany

CS03 - Tech Developments I, East Ballroom C,  
June 16, 2019, 11:45 AM - 12:45 PM  
P3.07 - Poster Sessions, East Exhibit Hall B,  
June 16, 2019, 12:45 PM - 2:15 PM and  
June 17, 2019, 1:15 PM - 2:30 PM

Maritime search and rescue missions are always time-critical operations and rescue personnel often have to deal with wrong or incomplete information. Efficient decision-making, mission planning, and proper execution are therefore essential for saving lives at sea. While commercial shipping is equipped with communication technologies according to the GMDSS, skippers of pleasure crafts rely increasingly on their smartphones—even though consistent cell reception is not a given.

The presentation introduces LARUS, an R&D project that addresses this problem and aims to develop an unmanned aerial system (UAS) that can provide support for maritime search and rescue missions. The proposed UAS can approach the distress position at high speed and be deployed over shallow waters, mud flats, reed belts or any other areas that are hard for surface rescue units to navigate. Its payload includes a multi-sensor visual system and radio-based localization to increase coverage and shorten the time needed for detection. Once people in distress have been found, the UAS can be used for initiating contact to them through an onboard cellular base station; it can also be deployed for data communication with rescue forces (telemedical services) and for aerial on-scene monitoring. This approach to developing the LARUS system focuses on four aspects: protection against harsh weather conditions; technical and regulatory measures for automated operation; reliable long-range communications; and mission-specific sensors and data processing. The presentation introduces the project and reports on its progress so far.

An air display will round out the presentation: Preliminary results of this ongoing R&D project, namely an airworthy demonstrator of the LARUS drone, exemplifies the developments made by the project team, emphasize the advantages of the new system in a sample scenario, and impart the technical readiness level of the LARUS UAS.

**CS04.01**  
**Focusing on Promoting the Capacity Building of Mass Rescue Operation to Promote the Development of Maritime Rescue in the Asia-Pacific Region**

Mr. Huang Jinyu¹  
¹Donghai Rescue Bureau China Rescue and Salvage, Shanghai, China

CS04 - Global SAR Development II, East Ballroom B,  
June 16, 2019, 2:15 PM - 3:15 PM

In recent years, large-scale maritime emergencies in the Asia-Pacific region have occurred frequently, like the sinking of the passenger ship “SEWOL” in South Korea, the sinking of the “Oriental Star” passenger ship in China, and the tragedy of the collision of the Iranian oil tanker “Sanchi”. These accidents pose many challenges in dealing with mass rescue cases, regardless of the scale of the accident, the number of people in danger, and the difficulty of handling.  

The International Maritime Rescue Federation have established its Asia-Pacific Regional Centre in Shanghai in association with the China Rescue and Salvage. The purpose of the Centre is to promote cooperation and exchanges between search and rescue agencies in the Asia-Pacific region, to promote the exchange of rescue technologies and enhance the professional skills of search and rescue personnel, and to improve regional maritime rescue capabilities. In the future, the Centre will focus on promoting the construction of mass rescue operation capabilities to further enhance the communication and exchange between search and rescue agencies in the region, and continuously improve the overall ability of the region in responding to large-scale maritime rescue events.
CS04.02
Aegean Refugee Crisis: The Impact on the Hellenic Rescue Team
Mr. Odysseas Tompoulidis
1Hellenic Rescue Team, Thessaloniki, Greece

CS04 - Global SAR Development II, East Ballroom B, June 16, 2019, 2:15 PM - 3:15 PM

About us (2’)
- Structure / Volunteers / Branches (chart+map)
- Sea rescue stations and Lifeboats (map)
- Refugee crisis in the Aegean (2’)
- Refugee flows in the Aegean Sea (map)
- MROs features in the Aegean
- Annual change of the incoming flows (chart)

Our response (4’)
- HRT’s “Aegeas” program
- IMRF’s “Members Assisting Members” program
- Five supporters, IMRF’s members
- The assistance (Boats, Equipment, Training, Procedures, Standards Fuel, Main office/Headquarters)
- Recognition of our work -> Awards

The outcome (3’)
- How we have changed (fleet, procedures, reports, standardization)
- New possibilities, new challenges
- Increased costs for management /maintenance / operation
- Homogenization of training
- Non-uniform development of branches

Future prospects (2’)
- Unification-Integration of stations network
- Volunteer Coastguard
- Trainings for safety at sea - work at sea
- Cooperation with emerging petroleum industry at East Mediterranean

The work intends to present the Brazilian legal system for search and rescue operations, at first elaborating a diagnosis of the current situation in Brazil and the objects will be delimit ed as national and international both guarantors of the safeguard of human life at sea. Following the sinking of the RMS Titanic ocean liner, the international maritime community has developed protocols and the SAR International Convention on Maritime Search and Rescue, that in 1979 set an strategic legal mark, specifying the minimum requirements for countries to be able to deal with accidents in their SAR areas. Brazil is a coastal country, and uses the sea for various purposes, the movement in public ports and private terminals totaled 1,117 billion tons in 2018 registering a growth of 33% since the year 2010. Despite the benefits of growth, the maritime sector registered 751 accidents and shipping incidents in 2018, resulting in 179 fatalities and 38 missing persons. The Brazil as signatory has established the SAR within your jurisdiction and commits itself to the SAR through the National Defense Strategy, where it cites in its guideline number 20 that improving the means and training of SAR personnel is a priority task of the country. This presentation will guide the audience through the actual structure of SAR in Brazil and point the challenges that the country will face ahead.

CS05.01 & P2.01
From the ICU to the SRU: Lessons Learned by a Registered Nurse
Mr. Eric Bellinger
1Royal Canadian Marine Search and Rescue Station 35, Victoria, Canada, 2Island Health, Victoria, Canada

CS05 - Case Studies II, East Meeting Room 11, June 16, 2019, 2:15 PM - 3:15 PM

P2.01 - Poster Sessions, East Exhibit Hall B, June 16, 2019, 12:45 PM - 2:15 PM and June 17, 2019, 1:15 PM - 2:30 PM

The local volunteer search and rescue unit draws crew from a diverse and skilled population. These crew members bring talents and experiences which can enhance the capability of the search and rescue unit. In many cases, lessons learned in volunteering and training with marine SAR conversely provide valuable guidance in the member’s own career.

Over the course of the past year, the presenter has documented and reflected on three distinct areas of learning provided by RCM-SAR which affect his day-to-day
work in the local hospital. These areas are communication styles, staff retention, and novel education strategies. Each area of learning is linked to real-world examples and case reports of professional growth.

The presentation will cover each of these lessons learned in detail, as well as provide an interactive space for conference attendees to reflect and share which lessons they have learned for life back on dry land. The presentation will be engaging and actively involve digital crowdsourcing to elicit feedback from all attendees.

**CS05.02**
**Canadian Coast Guard Inshore Rescue Boat Service (IRB)**

Mr. Stephen Pitman¹, Mr Trent Tabor¹  
¹Canadian Coast Guard - SAR Programs, Victoria, Canada

**CS05 - Case Studies II, East Meeting Room 11,**  
June 16, 2019, 2:15 PM - 3:15 PM

The Canadian Coast Guard (CCG) Inshore Rescue Boat Service (IRB) is a national program which employs college and university students from across Canada during their summer break. For over 50 years, the IRB program has been meeting the increased seasonal demand for marine search and rescue services. The paper and presentation regarding the IRB will discuss aspects of the program touching on all three subsidiary themes of the World Maritime Rescue Congress: 1. “SAR Operations Today” (e.g., meeting operational demands in remote locations and promoting women in SAR); 2. “Sharing SAR Lessons” (e.g., IRB in social media and news); and 3. “The Future of SAR” (e.g., IRB as a training and recruitment tool, staffing partnership with the Royal Canadian Navy and win-win financial benefits of strategic seasonal staffing of students). Statistical support will be provided by the CCG Risk-based Analysis of Maritime Search and Rescue Delivery (RAMSARD) Department. Media support will be provided through Canadian Coast Guard archives and CCG social media accounts. The authors share IRB experience in both the CCG Western Region and Central Region, and are able to speak from personal experience regarding the program.

**CS05.03 & P2.04**
**Updating the Finnish SAR Volunteer Training System: Lessons Learned From the First 10 Years**

Mr. Jaakko Heikkilä¹  
¹Finnish Lifeboat Institution, Helsinki, Finland

**CS05 - Case Studies II, East Meeting Room 11,**  
June 16, 2019, 2:15 PM - 3:15 PM  
**P2.04 - Poster Sessions, East Exhibit Hall B,**  
June 16, 2019, 12:45 PM - 2:15 PM and  
June 17, 2019, 1:15 PM - 2:30 PM

Any marine rescue organisation needs vessels to operate with, people to man the vessels, and skills for the people to operate the vessels effectively and safely. Training is a necessary requirement for manning the boats and carrying out the rescue missions. Adequate training is both a legal and a safety issue.

In Finland, a nationwide training system, based on the ILF standard, was launched in 2007. It included training plans for six training levels from a trainee to a coxswain, and a related training card for following the progress to each training level. The training plans set out the minimum requirements that need to be mastered at each level.

In 2015 came a time to start updating the system to better suit the needs and learn from the past. This paper describes the main shortcomings of the first training system and how those shortcomings were addressed in the update process. The updated version became operational at the beginning of 2017.

The main improvements in the update included total rewriting of the training plans in order to make the system simpler and easier to use. This included narrowing down the number of training plans from six to two (deckhand and mate/coxswain training plans). The system of recognising outside training was updated. Sections on verification of required skills and maintenance of those skills were added.

To operate on a boat, the crew member also needs to get a boat familiarisation for that boat, area and station. Therefore, the updated system was accompanied with a guide for boat familiarisation in late 2017. It was also accompanied with an updated compatible training scheme for youth members (aged 9-15 years) in 2018. The paper also addresses deploying the training system to the stations and the next steps in developing the system to suit future needs.
CS06.01
Autonomous Search and Rescue of In-Water Victims with Unmanned Aerial Vehicles in Marine Environments
Dr. Mae Seto, Mr. Alan Parslow
1Dalhousie University, Halifax, Canada, 2Deep Vision Inc., Dartmouth, Canada

CS06 - Tech Developments II, East Ballroom C, June 16, 2019, 2:15 PM - 3:15 PM

When people are unexpectedly overboard from a ship, it becomes an emergency incident. The International Maritime Organization stipulates that efforts must be applied to localize and rescue the victim(s). Usually, a timely rescue is difficult as the man overboard is discovered late. Then, time is required for the vessel to execute the man-overboard maneuver, localize the victim(s), muster the rescue crew, deploy a rescue vessel, and perform the rescue itself. There are further delays if the victims are in a high sea state, hypothermic waters, or the dark. They often succumb by drowning from exhaustion, hypothermia or exposure.

There are no economical and quickly deployable autonomous in-water victim detection tools to rapidly localize the victims - especially tools that can be immediately engaged as the ship turns around.

The presentation will report on research and development towards an unmanned aerial vehicle (UAV) capability with intelligent on-board search and rescue abilities.

The UAV is enabled with on-board machine perception tools and sensors that target victims in the water under a variety of environmental conditions. This is achieved with a developed machine learning tool applied to the streaming on-board camera imagery. This is possible on-board as the results of the tool were ‘distilled’ so that it can execute on an embedded system like an UAV. Additionally, the UAV in its search performs a novel exploration trajectory at-altitude to rapidly localize the victims. Once the victims are detected, the UAV informs the ship to make a bee-line to their location. This ultimately results in more timely detection of in-water victims.

Given Canada’s extensive coastlines and the time to mount land-based search and rescue efforts, this capability may be of interest to marine search and rescue, the cruise industry, Coast Guard, and Department of National Defence as well as offshore rigs and larger vessels.

CS06.02 & P3.15
Mr. Arrash Shekari
1Embry-Riddle Aeronautical University, Port Orange, United States

CS06 - Tech Developments II, East Ballroom C, June 16, 2019, 2:15 PM - 3:15 PM
P3.15 - Poster Sessions, East Exhibit Hall B, June 16, 2019, 12:45 PM - 2:15 PM and June 17, 2019, 1:15 PM - 2:30 PM

Approximately 4000 individuals perish due to drowning incidents every year in the United States, 50-75 percent of which perish in open water environments (Branche & Stewart, 2001). To reduce the number of annual deaths caused by drownings in the United States and around the globe, it is proposed that a small unmanned aircraft system (sUAS) solution integrated with remote sensing technology, computer vision and prediction, and drowning intervention equipment be utilized for near-shore ocean rescues. This article attempts to provide a comprehensive overview of the nature of rip currents and the morphological forces that create them, current near-shore ocean rescue techniques, unmanned aircraft systems, remote sensing of the coastal environment and human targets, computer vision and prediction, and command, control, communications, computers, and intelligence (C4I) functions for unmanned systems. The purpose of the review is to show that the knowledge and technology needed for a comprehensive sUAS solution going beyond current models of a platform carrying a flotation device after human detection of an emergency already exist but have yet to be interlinked to create an optimally effective solution. Future research and development work should be focused on how to practically integrate these technologies and concepts into the ‘ideal’ framework for a near-shore ocean rescue sUAS solution.
CS06.03
UAVs for Marine Search and Rescue: Tips for Data Processing and Automating the Mission Cycle
Mr. Dean Hintz
Safe Software, Surrey, Canada

CS06 - Tech Developments II, East Ballroom C, June 16, 2019, 2:15 PM - 3:15 PM

Unmanned aerial vehicles (UAVs) have the potential to extend the reach and reduce risks for maritime search and rescue responders. Learn how SAR operations can benefit from this data collection technology, and how software can be used to automatically process data related to UAV operations. We will share what we learned from conducting surveys and test searches in hard-to-reach tidal areas on the BC coast, plus discuss software approaches to automating the UAV mission cycle, including flight and safety planning, and post-processing large volumes of collected data. We will also discuss several examples from other contexts where UAVs have been used for storm damage assessment and disaster response. Attendees will learn about how to integrate drone imagery with geospatial data, generate map visualizations with key information, georeference and mosaic imagery and point clouds, index large data volumes, analyze results, and automatically distribute data to decision makers. Finally, we will explore emerging trends in the use of UAV and remote sensing to support emergency and disaster management, including machine learning to automate object identification.

CS07.01
The United Kingdom’s Overseas Territories Search and Rescue Capability Project - Working Together to Improve SAR Services in the Caribbean and South Atlantic Region
Commander Phil Bostock, Commander Robert Scotland
Maritime and Coastguard Agency, Southampton, United Kingdom

CS07 - Global SAR Development III, East Ballroom B, June 16, 2019, 4:00 PM - 5:00 PM

The main aim of the presentations is to highlight the important role well established SAR services play in developing SAR capabilities around the globe, as well as the benefits of cooperation for both sides. As a secondary aim, the presentations intend to generate awareness of the UK’s activities in the Caribbean and South Atlantic and promote cooperation with the SAR services of other states within the region as well as non-governmental organisations and industry partners.

The first presentation outlines the United Kingdom’s Search and Rescue (OTSAR) Capability Project from the point of view of the UK. Describing the drivers for this project, the findings of the review phase and the actions of the capability sharing and capacity building stages, the presentation focuses on what a well-established SAR service can do to build, develop and improve SAR services in small and remote communities.

The second presentation looks at the project from the point of view of one of the Overseas Territories, the importance of providing an effective SAR service for the local community and the impact of the OTSAR project on the Territory’s SAR services.

The UK OTSAR Capability Project and its activities are funded through the UK Conflict Stability and Security Fund (CSSF).

CS07.02 & P1.01
Indigenous Mariners and Canadian Coast Guard: The Nexus of Indigenous Knowledge and Modern SAR Technology.
Mr. Geoff Carrow
Canadian Coast Guard, Victoria, Canada

CS07 - Global SAR Development III, East Ballroom B, June 16, 2019, 4:00 PM - 5:00 PM
P1.01 - Poster Sessions, East Exhibit Hall B, June 16, 2019, 12:45 PM - 2:15 PM and June 17, 2019, 1:15 PM - 2:30 PM

Since time immemorial coastal first nations have been mariners, knowledge keepers and guardians of the waters surrounding what is now known as Canada. Each nations knowledge of their territories marine environment is immense in scope, history, and intricacy due to inter-generational knowledge that has been handed down for thousands of years. This knowledge ranges from inland waters and currents to advanced boating skills. All of which have assisted countless mariners in trouble, saving many lives. Through relationship building with coastal Indigenous nations, the Coast Guard is able to draw on this knowledge of the waters we operate in. In exchange, Coast Guard provides resources, equipment and
training to improve the search and rescue capacity of our partner nations. This combination of localized expert knowledge and increased capacity is improving our ability to more effectively reach mariners in distress. The result is a stronger, synchronized operational environment for response across nations, the Coast Guard and maritime SAR partners, with effective and efficient shared guardianship of the sea and all who travel in it. This paper highlights the growing partnership with the Ahousaht Nation along the west coast of Vancouver Island.

CS08.01
Maritime SAR and Consequence Management
Captain Clay Evans

Canada's Coast Guard, Victoria, Canada

CS08 - The Improvement Cycle, East Meeting Room 11, June 16, 2019, 4:00 PM - 5:00 PM

The aim of this presentation is to discuss how organizations which deliver maritime SAR, either as their sole mandate or as one of several mandates, can best develop agency and inter-agency frameworks for overall marine emergency response during large-scale incidents, from the alerting phase through to the salvage phase.

The contents of this presentation will be on best practices and lessons learned in the Canadian maritime environment derived from actual large-scale maritime emergencies and exercises as well as relevant case material from the USCG and other international partners. In addition, a brief analysis of how the Incident Command System (ICS) works - or doesn't work - in the maritime SAR environment will be discussed.

The conclusions of this presentation are general in scope as almost all coastal states vary in terms of how their maritime SAR and overall marine emergency response systems operate, including for consequence management regulations and procedures for environmental response, port of refuge and salvage. That said, there are common risks, the primary one being that, during large-scale maritime incidents, maritime SAR agencies need to think beyond the delivery of “pure SAR” to their inter-relationships with these other elements and both plan and exercise for these operational continuums.

CS08.02
SAR Operations - When Things Go Wrong, What Are the Learnings and How Can We Build the Learnings to Improve our Safety Management Systems
Mrs. Anna Classon
Royal National Lifeboat Institution, Poole, United Kingdom

CS08 - The Improvement Cycle, East Meeting Room 11, June 16, 2019, 4:00 PM - 5:00 PM

Aim - To share an RNLI Operational incident with the audience, its follow up investigation and to gain feedback on how others are using investigation outcomes to review their Safety Management Systems in an SAR operational environment.

Content - Video of incident, follow up actions, influence of incident on current thinking re Design intent and Safety management, gaps and how we the RNLI needed to change to improve and to keep our people safe.

Safety Management systems and how they should prevent incidents and the value of reporting. How can we make sense of all of the data and what the data is telling us.

Conclusions
Safety Management systems matter in the SAR operational environment.

We can learn from each others incidents and investigations, how can we create the forum to do this?

CS08.03
Easy, Fast and Useful - Unified Post Operational Reporting
Mr. Duncan Ferner
New Zealand Search and Rescue, Wellington, New Zealand

CS08 - The Improvement Cycle, East Meeting Room 11, June 16, 2019, 4:00 PM - 5:00 PM

New Zealand has developed a new post - SAR operational reporting and analysis tool. Called SARdonyx, this cloud-based software is based on a unified data standard which describes a common way of inputting and managing data for both coordinating authorities. The system is designed to be intuitive for users with
clear logic pathways, user assistance and built-in data verification. It also allows for selected fields to be entered by expert SAR volunteers and an approvals process for managers.

SARdonyx provides a collated, land, sea, air SAR picture for New Zealand’s vast 30 million km2 search and rescue region. Built in reporting allows a variety of views and options suitable to inform resource allocation, SAR prevention, trend analysis and a host of other management requirements.

CS09.01
The Application of Unmanned, and Optionally-Manned, Marine Vehicles to Maritime Search and Rescue - Safety of SAR Personnel and Remote Region Response
Prof. John Dalziel1, Dr. Ronald Pelot1
1Dalhousie University, Halifax, Canada

CS09 - Tech Developments III, East Ballroom C, June 16, 2019, 4:00 PM - 5:00 PM

The technology supporting Unmanned Vehicles, land, sea and air is rapidly improving. These vehicles are becoming more affordable, and much more capable. Unmanned vehicles, land and air, are making inroads into Search and Rescue (SAR) response. Unmanned Marine Vehicles (UMVs) are already under evaluation, and in service, for military applications.

UMVs will likely also play a significant role in Maritime SAR response. Their role could encompass a range of duties, for instance providing SAR resources in locations where these would otherwise not be available: working with air dropped personnel and resources; a place of temporary refuge; first response in a Man Overboard Situation; assisting local first responders (fire services, police) in rescue and recovery operations. In addition, a UMV could be launched in conditions where it might not be safe to launch a manned rescue boat and proceed into conditions (such as surf zones) which may be dangerous for a manned boat.

This presentation looks into the question: ‘Do Unmanned Marine Vehicles have a potential role in Maritime Search and Rescue?’ and if so, ‘What roles might they best fulfill?’.

It will look at SAR resource needs, at Unmanned (and Autonomous) technologies, their advantages and disadvantages, operational and technical hurdles and solutions. One or more scenarios will be outlined; including UMVs and their control technologies, and clarify how these fit into an integrated SAR response system.

Building on previous presentations over the past two years to the IMRF-FTP, Royal Institution of Naval Architects, London, Transport Canada, and others, the focus will be on the Safety of SAR Personnel, and also on Remote Region Response (such as the Labrador Coast of Canada, and the New Zealand, Australian & Chilean SRRs). Statements of requirements, and conceptual designs will be considered.

CS09.02
Lessons Learnt From UKSAR3D: A Technology Demonstrator for Search and Rescue
Mr. Tim Robertson1, Ms. Hannah Nobbs1, Dr. Will Roberts1
1Royal National Lifeboat Institution, Poole, United Kingdom

CS09 - Tech Developments III, East Ballroom C, June 16, 2019, 4:00 PM - 5:00 PM

Aims:
This presentation will take conference attendees through a collaborative journey setting up, planning and executing a large technology demonstration of unmanned air systems (UAS). We shall tell an honest story so that IMRF members can learn from our mistakes and some of our successes and perhaps inspire them to conduct their own challenge. It will be told from the perspective of a small team with little resource trying to influence and enable large organisations to experiment and learn without it costing the Earth.

We hope to increase our return on investment in this project by allowing other organisations to learn from our experiences around these technologies.

By being open with the knowledge we create, we build trust with our partners.

Content:
Over the past 3 years, the RNLI have been working on a collaborative programme exploring the potential impact of unmanned air systems (UAS) on UK search and rescue capability.

The work has involved significant engagement with
regulators, operators, government, industry and academia. It has resulted in a coherent vision for the use of UAS in the UK SAR sector and a recent technology demonstration challenge involving the use of UAS across a variety of realistic operating scenarios.

Conclusions:
It is envisaged that the recommendations made as a result of this work will result in the use of UAS on a small scale by the RNLI and its trusted partners in the next 12-18 months.

CS09.03 & P3.08
Automated Transcription of Maritime VHF Radio Communication for Search and Rescue Mission Coordination
Mr. Thomas Luebcke1, Mrs. Aylin Goezalan1
1German Maritime Search And Rescue Service (DGzRS), Bremen, Germany

Precise operational documentations are an elementary basis for successful rescue missions. All levels in a command structure – on board of the rescue units as well as in the Maritime/Joint Rescue Co-ordination Centre – are obliged to document operational information continuously and in a comprehensible manner. This is the foundation of proper decision-making. Regularly the dynamics of a rescue operation claims all personnel resources with negative impacts on the operational documentation – information getting lost. However, to follow the high communication density of a complex SAR missions with lots of involved rescue units leads to a demanding task for all rescue forces involved. Primarily crews of smaller rescue vessels are challenged to make handwritten notes of mission relevant VHF communication. Poor transmission quality, foreign dialects, and noise exposure on board entail the risk that important information gets lost or is misunderstood.

The R&D project ARTUS addresses this issue. It aims to develop an integrated solution for automated VHF communication transcription that assigns the sender of a radio message to its unit. In contrast to common speech recognition systems that require an internet connection, the project strives to develop an offline solution due to the lack of internet availability on sea. Furthermore, common systems depend on one speaker; the new technology will be able to work with different speakers and several dialects and accents. New algorithms for radio direction finding will make the target system a potent tool on the bridge, in coastal radio stations and rescue centers.

The presentation will give insights into the recently started R&D project ARTUS, its approach, and related research questions.

NOTICE: The ARTUS project is supposed to start 1 March 2019 subject to funding.

CS10.01
SAR Pods: Building Relationships with SAR Partners Through Maritime Training at the Local Level.
Mr. Thomas Kerr1
1Canadian Coast Guard, Victoria, Canada

The Canadian Coast Guard, Western Region, receives over 3,000 requests for maritime assistance each year. Vital to its response capability is the use of primary and secondary maritime SAR resources. The family of SAR resources available to the Canadian Coast Guard to use in time of need includes dedicated volunteer organizations such as the Coast Guard Auxiliary, other federal and provincial agencies, First Nations communities, commercial operations and civil response organizations. Building relationships with these partners is primarily accomplished through intensive training regimes that exercise in over 20 locations each year along the coast and train over 400 marine first responders. The success of these on the water SAR exercises lies in the Canadian Coast Guard’s ability to develop effective two-way relationships where we learn about the capabilities of our partners and our partners learn how to work effectively within the federal maritime SAR environment.
CS10.02
The ARCSAR Innovation Project – The First Formal Arctic and North Atlantic Security and Emergency Preparedness Network
Mr. Bent-Ove Jamtli

Joint Rescue Coordination Centre North-Norway, Bodo, Norway

This project will establish the first formal Arctic and North Atlantic Security and Emergency Preparedness Network. The ‘ARCSAR’ network will be primarily for professional security and emergency response practitioners operating in the Arctic and the North-Atlantic region.

The ARCSAR network will address the Arctic and North-Atlantic (ANA) region, preparing to cope with the security and safety threats that will result from increased commercial activity in the region including traffic through the Northern passages, cruise traffic, and offshore oil and gas activity.

ARCSAR - EU Horizon 2020 SEC 21
Arctic and North-Atlantic network for innovation and development of procedures, methods and technology.

JRCC North-Norway lead partner, Budget 3,5 mill EUR over five years.

Aim and objectives
Establish and support a new Arctic and North Atlantic Security and Emergency Preparedness Network for practitioners involved in front-line security and emergency response, directly involving practitioners, existing networks, stakeholders in universities, research centres, and industry, and those involved in governance, and policy-making.

Gain an increased understanding of target areas for improvements in security and emergency capabilities

Monitor innovation and research including ideas, projects, products, services or systems for better security, disaster risk and crisis management

Investigate more efficient use of competence development infrastructure for practitioners and other actors

Identify critical barriers, gaps in capacity, competence and infrastructure of professional security and emergency response practitioners.

Identify common platforms and opportunities for joint emergency response

Stimulate partnership for sufficient response capability

Proactively disseminate the project results and communicate the project activities to relevant end-users and stakeholders.

Expected result
Improved and more efficient emergency response capabilities, technology, procedures and methods across borders and sectors in the Arctic and North-Atlantic region.

CS10.03
Community-Based Leadership: Royal Canadian Marine Search And Rescue’s Model For Multi-Jurisdictional Support
Mr. Ralph Mohrmann

Royal Canadian Marine Search and Rescue, Sooke, Canada

As a community-based volunteer organization, RCMSAR’s core function is marine search and rescue across coastal British Columbia. Over 1,000 volunteers and 33 RCMSAR stations maintain a 24/7, 365 days a year crew availability to support the Canadian Coast Guard in marine search and rescue taskings, assisting in an average of 30 percent of coastal BC marine incidents. However, our crews now also have the ability to support local governments and provincially mandated response agencies in their respective emergency jurisdictions on a request for assistance basis. It had been a longstanding desire of RCMSAR’s members to be able to do more than a singular function and better support the broader range of public safety needs in their communities. In 2016 RCMSAR embarked on a strategy that focused on increasing its relevance across the wider public safety spectrum while still maintaining its core function as a priority.

This presentation will describe how RCMSAR has achieved this intent by entering into agreements with specific response agencies to support their
activities when requested. This presentation will also outline the key instruments and enablers that allowed RCMSAR to achieve this balanced expansion of support. It may serve as a template for other volunteer marine SAR organizations that seek to expand their relevance and impact without exceeding capacity or means.

RCMSAR recognized the opportunity to leverage our success and build new capability to support public safety, improve our search and rescue service, and create meaningful new partnerships. With strong governance and management supporting the capacity and dedication of our volunteers, we continue to make a significant impact in strengthening the network of public safety in British Columbia.

We reached out to those large suppliers to work with us on our goals and use their reach, audiences and brand power to give our prevention messages a new boost thus making them more sustainable. Alongside our key strategic partner Helly Hansen we will take you on the journey to develop those relationships and ways we are both leveraging the partnership through message advocacy, above the line campaigns, partnership communications and practical and effective targeted interventions.

The paper will discuss three key areas we’ve benefitted by using an evidence-led approach, and how it’s been effective to help amplify successful prevention campaigns.

1. Understanding your audience & defining shared KPI’s
2. Developing and refining shared campaign messaging and goals
3. Understanding what a true strategic partnership means and how to embed it in both organisations

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**CS11.01 & P2.03**  
**The Charity and the Corporate: From Supplier to Partnership - Working Together to Achieve One Common Goal. Leveraging the Power of your Key Suppliers by Working in Partnership to Make your Prevention Effort More Effective and More Sustainable**  
Mrs. Anna Classon¹

¹Royal National Lifeboat Institution, Poole, United Kingdom

**CS11 - Funding & Messaging, East Meeting Room 11,**  
June 17, 2019, 8:45 AM - 9:45 AM

**P2.03 - Poster Sessions, East Exhibit Hall B,**  
June 16, 2019, 12:45 PM - 2:15 PM and  
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Relation to the Congress’s main and subsidiary themes:  
Theme 3: Strategies for supporting sustainable prevention efforts  
• Evaluate advocacy, public awareness & strategic communication initiatives

Detailed summary of the papers content
The RNLI has always kept their supplier relationships just that – basic procurement and supply. At the start of 2017 we decided that we would leverage these relationships to a achieve a more sustainable approach to our objectives and goals - we would open up the world of true strategic partnership working in order to save more lives. This meant that through all large tendering processes the value of advocacy, strength of amplification of message and a shared responsibility to our goals was heavily weighted alongside value of money and quality of goods.

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**CS11.02**  
**“Trossen” - Hawser**  
Mrs. Cia Sjöstedt¹

¹Swedish Sea Rescue Society, Gothenburg, Sweden

**CS11 - Funding & Messaging, East Meeting Room 11,**  
June 17, 2019, 8:45 AM - 9:45 AM

The Swedish Sea Rescue Society is fully financed by membership and charitable donations. 25 years ago, SSRS created a service for our members called “Trossen” or Hawser. In non-emergencies, paid members can receive help; if they run out of fuel, get a line in the propeller, or need towing to a safe haven free of charge. This has resulted in fewer SAR alarms by taking preventative action before the situation becomes serious. This sea safety service has also created a strong financial base and a steadily increasing membership, covering a majority of the operational costs for our organization.
CS11.03
Building a Case for Support
Caroline Jupe¹
¹International Maritime Rescue Federation, Stonehaven, United Kingdom

CS11 - Funding & Messaging, East Meeting Room 11, June 17, 2019, 8:45 AM - 9:45 AM

Caroline will give an overview of how to build cases for support using her examples of doing this at the IMRF across a range of income streams and for different projects. Broadly speaking a case for support is about having a clear and compelling ask. Having a strong case for support can lead to fundraising successes for your organisation.

12.01
Mr. Tim Robertson¹
¹Royal National Lifeboat Institution, Poole, United Kingdom

CS12 - Tech Developments IV, East Ballroom C, June 17, 2019, 8:45 AM - 9:45 AM

Aims:
Advances in the emerging field of Augmented Reality represent a significant opportunity for Safer Navigation on small high-speed SAR craft. This talk will describe how the RNLI developed a low-cost technology demonstrator / prototype that was built and tested in 2018 using Microsoft Hololens technology. If SAR operatives can access navigational and other data whilst remaining 'heads up' and visually connected to their environment then situational awareness should be improved and better / safer decisions made as a result, reducing risk to SAR operatives and increasing the effectiveness of SAR operations for casualties.

Presentation would include “Point of View” (POV) video of the device in use and imagery of the RNLI decision makers and influencers experiencing the device.

Content:
1) Initial identification and prioritisation of a real-world SAR issue (Poor situational awareness leading to collisions / allisions / groundings on SAR operations potentially exacerbated by provision of multiple navigation data sources on screens) via RNLI Future Lifesaving Innovation structures and process
2) Developing and agreeing problem statements and hypotheses
3) Understanding the technologies available through horizon scanning
4) Agreeing the scope and purpose of a technology demonstration with the sponsor. What would success look like?
5) Identification and securing of a technology partner with the right skills, motivation and business model.
6) Building and testing of a minimum viable prototype system at lowest cost / risk / time that will achieve the desired purpose
7) Demonstrating the technology to decision makers and opinion leaders in a familiar and relevant SAR context.
8) Outcomes

Conclusions:
1) Software for basic useful mixed reality can be commissioned now affordably
2) Daylight viewable, lightweight & ruggedized head-worn hardware is not yet available
3) The effect on humans of mixed reality at sea requires further investigation to understand technological distraction and motion sickness issues

CS12.02
Innovative Autonomous Wide Area Search System Transforming Maritime Search and Rescue
Mr. Simon Olsen¹
¹Sentient, Port Melbourne, Australia

CS12 - Tech Developments IV, East Ballroom C, June 17, 2019, 8:45 AM - 9:45 AM

For decades, the challenge of SAR has been largely beyond the realm of technical progress. Beacons and other forms of locator transmitters have certainly made a significant difference in narrowing down the search area, for those lost at sea that have them. However even in this instance, the search is still often
over many nautical miles of water using the human eye. Even in these optimal scenarios the search will often take half an hour in a situation where minutes can save lives.

VIDAR, visual detection and ranging, is an innovative autonomous wide area search capability that was the only sensor to autonomously detect 100% of SAR objects during a recent operational evaluation conducted by the USCG. Evaluated as a part of an assessment of next generation sensors, USCG evaluators noted in a subsequent report that VIDAR “... is perhaps one of the most significant technological breakthroughs for UAS operating in the maritime domain in the 21st century.” The International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual recommends a track spacing for a visual search for a person lost at sea of 0.1nm. The incorporation of ViDAR extends this to a 2.5nm track spacing while simultaneously increasing probabilities of detection; transforming SAR operations. This critical presentation will break the technology down by providing insight into the operational incorporation of ViDAR into both fixed and rotary wing SAR operations.

CS12.03 & P3.13
Evolution of Radio Direction Finding and Location Systems for Search and Rescue
Mr. Ventura Rigol
1RHOTHETA, Plantation, United States

CS12 - Tech Developments IV, East Ballroom C, June 17, 2019, 8:45 AM - 9:45 AM
P3.13 - Poster Sessions, East Exhibit Hall B, June 16, 2019, 12:45 PM - 2:15 PM and June 17, 2019, 1:15 PM - 2:30 PM

Traditionally direction finding (DFing, DF, or RDF) refers to the use of specialized instruments, antennas, and methodologies to determine the physical location of a source of RF energy or “target”. DF systems successfully provide accurate and reliable DF and location data for civil and military applications and are considered essential tools for SAR operations in air, land, and sea. Regulatory guidelines from IALA, NSS-IAMSAR, SOLAS, USCG Rescue 21, ICAO/IMO and others, clearly define present and future essential roles of DF technology.

Since Heinrich Hertz discovered the directivity of antennas in 1888, and a specific application for determining the direction of incidence of electromagnetic waves was proposed by Scheller in 1906, DF-ing has evolved very substantially: from narrowband to wideband, from single-channel to multi-channel and multi-band, from processing analog signals to digital processing and decoding, from tracking one type of signal to tracking multiple types, from antenna-coaxial -receiver configurations to integrated compact units, from needle displays to awareness enhancing GUIs and moving maps, from SAR to special mission and law enforcement functions, from bearing and triangulation to maximum likelihood estimation and GPS coordinates; ultimately DFs have incorporated location capabilities becoming de-facto DFL or RDFL systems.

Recent and relevant examples of such dynamic RDFL developments are the incorporation of AIS and of COSPAS-SARSAT MEOSAR and 2G beacons in DFs operating on 406 MHz, including the adoption of CDMA (spread spectrum) processing.

A presentation at WMRC 2019 will discuss development trends of RDFL technologies –hardware and software –and how it responds dynamically to increasingly demanding missions of rescue and law enforcement organizations and the need to improve the efficacy of their airborne, shipboard, land based, and portable platforms and sensors.

CS13.01
Crossroads in the Aegean Sea, an Observation of Political and Operational Realities in the Refugee Crisis.
Mr. Shawn Corrigan
1Calian, Nanaimo, Canada

CS13 - Pressure Points I, East Ballroom B, June 17, 2019, 10:30 AM - 11:30 AM

This presentation is a narrative of the author’s experience as a volunteer with RCMSAR Station 27 in Nanaimo and Refugee Rescue, an NGO marine SAR group operation from the island of Lesvos in Greece. The aim of this paper is to provide context regarding the middle east refugee crisis from the perspective of a volunteer within an NGO Search and Rescue Organization and to contrast that experience with a north American SAR perspective.

There is a complex operational picture across the Aegean sea. Many thousands of refugees from various areas of the Middle East and Africa have
flooded the area for several years. The primary route from Turkey into the European Union is a stretch of open water to the island of Lesvos, Greece. Resources in Lesvos are strained and the relationship between various government agencies, NGO groups, refugees, and local residents is badly strained. The initial response to this crisis included many government and volunteer and NGO responders. This flood of resources was necessary to meet the need but proved difficult to regulate. More recently, the response has shifted away from volunteer groups and toward military and police driven SAR effort within the European Union. Additionally, support has been provided to Turkey to step up their efforts to stem the flow of refugees crossing the Aegean Sea. Reports of human rights issues are common, conditions for refugees on both sides of the sea are very poor, and fatalities continue to occur.

Conclusions of this presentation include lessons observed in each organization, recommendations for improvement of Search and Rescue operations, and a call to action.

CS13.02
Mass Rescue at Sea: Legal Loopholes of the SAR Regime and their Political Manipulation
Ms. Alina Miron1,2, Ms. Emilie Hetreau1,2
1 SOS Méditerranée, Marseille, France, 2 Law University of Angers, Angers, France

CS13 - Pressure Points I, East Ballroom B, June 17, 2019, 10:30 AM - 11:30 AM

The presentation at the WMRC Congress would focus on the political movement of criminalization of rescue at sea and of rescuers. This concerns both rescue by NGO’s, but also rescue by civil boats (commercial, fishing etc).

In recent months, the Italian, Maltese and Greek authorities have initiated several proceedings against persons (NGOs or private individuals) who have provided assistance at sea. The European Union Agency for Fundamental Rights has recently drawn up a summary picture of this, while at the same time expressing concern about these abuses.

Most often, the accusation is that of smuggling migrants, directly or indirectly. In addition, there is sometimes illegal entry into the territory, false invocation of distress, failure to comply with orders from the authorities.

The question is: can these actions be sustained in international and european law? The relevant legal framework is twofold: while the Protocol against the Smuggling of Migrants by Land, Sea and Air, supplementing the United Nations Convention against Transnational Organized Crime (also known as the Palermo Protocol and ratified by 147 States and the European Union) requires criminalizing the smuggling of migrants, the EU is focused on combating illegal immigration: an essential gap exists between the 2002 Facilitation Directive and the Protocol, which it has been poorly adapted.

European States are using this hiatus for political purposes. The result is harassment of captains, seafarers and NGO’s who engaged in SAR operations, complying with their legal obligations and moral duties? How can seafarers be protected against this manipulation of law by States?

CS13.03
Coastal State SAR System Responsibilities
Richard Button1
1 United States Coast Guard, Washington DC, United States

CS13 - Pressure Points I, East Ballroom B, June 17, 2019, 10:30 AM - 11:30 AM

Mr. Button’s presentation will discuss Coastal State foundational responsibilities concerning implementation of the global search and rescue system, international law and search and rescue, and the challenges associated with maritime migration.

CS14.01
Searching for Answers in a Sea of Data: How the U.S. Coast Guard Uses Data Visualization and Enhanced Data Discovery Tools
Mr. Charlie Epperson1,2, Mr. Christopher Kimrey3
1 U.S. Coast Guard, Washington DC, United States, 2 ERT, Inc. / NOAA

CS14 - Working the Data, East Meeting Room 11, June 17, 2019, 10:30 AM - 11:30 AM

Operationalizing data is foundational in any mature SAR program. For nearly 150 years, the U.S. Coast Guard has been using operational data to make more informed
choices about SAR execution. In its contemporary form, visual analytics of mission performance has enabled the U.S. Coast Guard to draw previously undiscovered insights from over 100,000 SAR cases over six years. Decision makers now have better awareness of how maritime SAR has evolved and what areas may require future attention to improve mission performance. The proposed paper examines the values and challenges in data discovery using several recent trends derived from Coast Guard SAR case data.

The second part of this presentation is a more granular view on how visual analytics led us to understand that an increase in recreational SAR activity was occurring. A demonstration of how geanalytics helped to decipher dynamics of recreational activity by specific regions and communities. And, by using a comparison of two recent kayak cases, we see an indication that recreational activity will continue to present unique challenges to SAR authorities.

**CS14.03 & P2.02**

**Understanding the Functional Performance and Operability of Personal Locator Beacons and their Influence on SAR Effectiveness**

Dr. Robert Brown¹, Mr. Joshua Ryan¹

¹Offshore Safety and Survival Centre, Marine Institute, Memorial University of Newfoundland, St. John's, Canada

**CS14 - Working the Data, East Meeting Room 11, June 17, 2019, 10:30 AM - 11:30 AM**

P2.02 - Poster Sessions, East Exhibit Hall B, June 16, 2019, 12:45 PM - 2:15 PM and June 17, 2019, 1:15 PM - 2:30 PM

Personal locator beacons (PLB) are used by individuals to improve their likelihood of detection by search and rescue (SAR) resources following emergency egress to the water. The PLB emits radio signals that can be detected by SAR resources and used to locate the individual in distress so that rescue to be carried-out more efficiently than might be the case without the technology.

Understanding the performance characteristics of PLBs – both from a signal detection point of view and usability in cold ocean conditions will help ensure the most effective design so that the devices can be activated and signals successfully detected. This paper will present research by the authors to quantify PLB detection performance characteristics in rough sea conditions (compared with optimal performance in calm conditions) as well as in near-shore applications where geographical features may block or delay signals from being detected.

Given that PLB users in maritime settings will be exposed to cold water during an emergency, this may affect their ability to feel and depress activation buttons. The authors will discuss an experiment designed to examine whether PLB users would likely be able to feel and activate the devices in situations where their hands might be cold. The research will be discussed in the greater context of search and rescue effectiveness and how PLB use is important to improving that effectiveness.

**CS14.02**

**Hypothermia Research and Application to CG Protocols**

Mr. Trent Tabor¹, Mr. Shane Norhaug

¹Canadian Coast Guard, Victoria, Canada

**CS14 - Working the Data, East Meeting Room 11, June 17, 2019, 10:30 AM - 11:30 AM**

Discoveries made by Canadian researchers such as Dr. Gordon Giesbrecht have advanced the field of hypothermia awareness and treatment remarkably. The Canadian Coast Guard (CCG) has reacted to these accomplishments by successfully altering the protocols used by Search & Rescue assets in the marine environment which are responding to Hypothermia incidents. The Canadian Coast Guard responds to over a thousand calls every year in water under 10°C and many which involve hypothermic or potentially hypothermic patients. Our Rescue Specialist program has newly created guidelines for dealing with such patients that maximizes their chance of survival. This paper will explore some of the key findings from Canadian researchers and how the CCG is implementing them into our first response. Selected case studies will further assist in analyzing our approach to hypothermia.
CS15.01
Planning Maritime Rescue Resources in a Changing World- An Environmental Perspective.

Dr. John Davis
1Government Of Canada (retired Scientist) and RCMSAR, Ladysmith, Canada, 2Royal Canadian Marine Search and Rescue Station 29, Ladysmith, Canada

CS15 - Future Challenges, East Ballroom C, June 17, 2019, 10:30 AM - 11:30 AM

Maritime rescue organizations are required to plan rescue vessel fleets, equipment, facilities and training needs in the face of a changing and sometimes uncertain future. With the anticipated impact of global climate change, population increases, a changing energy environment, growing marine transportation and environmental impacts, and political and social change, planning must be done in the context of this changing world. These factors may be of particular significance to maritime rescue organizations dealing with increasingly severe weather fluctuations, human social and political unrest, marine pollution and environmental risks, and the need to adapt to changing and potentially more challenging circumstances. This paper will provide an overview of these future challenges from the perspective of assisting organizations in anticipating what is to come and how this may influence fleet, crew training and readiness, as well equipment and infrastructure needs to best adapt to a changing and uncertain world.

CS15.02 & P3.03
The Future of SAR: How Coastguard New Zealand is using the Smartphone and Cloud Computing to Improve Boating Safety and Modernise its Operations

Mr. Callum Gillespie
1Coastguard New Zealand, Auckland, New Zealand

CS15 - Future Challenges, East Ballroom C, June 17, 2019, 10:30 AM - 11:30 AM

P3.03 - Poster Sessions, East Exhibit Hall B, June 16, 2019, 12:45 PM - 2:15 PM and June 17, 2019, 1:15 PM - 2:30 PM

In 2018 Coastguard New Zealand launched ‘The Boaties Best Mate’, a smartphone app aimed at improving boating safety and becoming ‘the Number One Tool for Kiwi Boaties’. In a country where 1 in 3 adults have a boat and 8 out of 10 adults have a smartphone there’s a compelling logic for an organisation like Coastguard to offer its stakeholders such a service.

Faced with a variety of sourcing choices Coastguard NZ elected to develop its own solution. Working with its development partner Coastguard NZ built not one but two cloud-based systems, to achieve a paradigm shift in the service it offers the New Zealand Boatie.

In this presentation Coastguard NZ’s Northern Region CEO will tell his organisation’s story of the vision behind this exciting project, share insights gained during the project and explain how the end solution is making a real difference to boating safety and to Coastguard New Zealand’s customers and volunteers.

CS15.03 & P3.16
Rescue of Persons Trapped in Capsized Vessels - A New Response

Mr. Michael Stacey
1CM Technologies, Inc., Victoria, Canada

CS15 - Future Challenges, East Ballroom C, June 17, 2019, 10:30 AM - 11:30 AM

P3.16 - Poster Sessions, East Exhibit Hall B, June 16, 2019, 12:45 PM - 2:15 PM and June 17, 2019, 1:15 PM - 2:30 PM

Introduction:
While incidents involving persons trapped in air pockets of capsized vessels are rare, they are often lethal. They can also severely impact first responders. The intent of this presentation is to summarize conventional search and rescue (SAR) responses and their limitations and to introduce an innovative new rescue system that addresses some of those limitations.

Conventional SAR Responses:
"Trapped in air pocket" incidents involve mortal danger for victims, and potentially great risk for responders. In addition to hypothermia and drowning, victims face suffocation as air is depleted, escapes or is fouled by contaminants, often in panic-inducing total darkness. Rescue divers risk entanglement in rigging, entrapment in boat compartments and damage to breathing equipment by panicked survivors. Bubbling air up from underneath may contaminate the air pocket when bubbles breaking through a fuel slick generate oily fumes. Air bubbled up may also collect in unintended spaces, degrade the vessel’s stability and allow it to roll, lose its air pocket and sink. Righting a vessel or towing it to shallow
water may also result in the vessel sinking if the air pocket is compromised during the procedure.

Proposed Innovative SAR Response:
The patented CAPSAVE™ Salvage & Rescue System, developed in Canada by CM Technologies, Inc., features an airtight, controlled breach of the exposed overturned hull (allowing no escape of air throughout the procedure). The CAPSAVE™ System is designed to enable first responders to deliver life-saving air and light to trapped persons and to control the vessel’s buoyancy - keeping trapped persons alive and the vessel stable pending extrication of victims.

Interested persons are invited to attend WMRC2019 Booth D to view a static display of the CAPSAVE™ Salvage & Rescue System and to discuss how it might be integrated into future maritime SAR response capabilities.

CS16.01
The Importance of Crowd Control in Mass Rescue- Lessons Learned From Offshore Operations in the Central Mediterranean Associated With Migration: Procedures Put in Place That Could Benefit Other SAR Professionals.
M. Orlando Avis, M. Basile Fischer
1SOS Méditerranée, Marseille, France

CS16 - Pressure Points II, East Ballroom B, June 17, 2019, 12:15 PM - 1:15 PM

SOS Méditerranée is a European civil maritime rescue association, it has rescued in excess of 29'000 people from the central Mediterranean since 2016.

At the beginning of operations the organisation found itself responding to a new type of offshore mass rescue challenge. Specifically large volumes of migrants, in unseaworthy vessels, which routinely, vastly outnumbered rescue capability. These risks were largely unappreciated and undocumented. Three years later the organisation has learned from its mistakes and has developed techniques and procedures that have enabled it to significantly reduce the main risks within its influence and control, namely the arrival of the rescue team on scene and its consequences.

As a result the organisation constantly modified its operation’s based on risk and believes it has improved both the potential for survival whilst reducing the risk to rescuers. This has been achieved by prioritising crowd control, as a fundamental requirement, in order to adequately manage large volume of casualties and prevent already life threatening situations from rapidly escalating.

In this paper we will discuss the lessons learned and mistakes made as well as the resultant changes to our operational procedures, casualty prioritisation, management of operational risk, training and equipment.

An additional benefit is that the organisation has found itself in a position to draft guidance documentation for offshore mass rescue operations associated with migration.

Therefore, we will ask about their relevance to the management of mass casualty offshore rescues for other actors, whether a pleasure craft, a SAR asset or cargo vessel and their supporting resources.

CS16.02
Hopes, Dreams and Lives Left in the Wake: Search and Rescue and the Dead
Mrs. Megan Bassendale
1Forensic Guardians International Consulting Inc., West Vancouver, Canada

CS16 - Pressure Points II, East Ballroom B, June 17, 2019, 12:15 PM - 1:15 PM

The expectation of most search and recovery (SAR) missions are to recover and help survivors. Sadly, in increasing numbers, SAR teams are facing situations where in addition to survivors, there are large numbers of dead. The number of annual maritime fatalities reported in the Mediterranean alone has more than doubled in the last two years, a phenomenon closely linked to the increase of migrants attempting to reach Europe via the Mediterranean. This is a trend that is likely to continue and potentially increase in years to come in the Mediterranean and elsewhere. It has serious implications for SAR teams that traditionally, have focused their efforts on the living.

Recovery and management of the deceased with the objective of eventual identification, is also an essential aspect of SAR efforts. While some may feel that recovery of human remains is beyond the purview of SAR, this presentation will explore the perspective
that this activity should be included within SAR missions in some respect. Those that have perished have family members and friends that are waiting for news and to hear that their loved one has made the crossing successfully. If they do not receive news, they assume the worst and often times, the worst has happened. This presentation will explore the problem of death at sea, particularly in large numbers such as the case of migration. It will look at the implications of this for SAR teams and the consequences this has on communities that are affected in the target and the home lands, as well as the effect on the families of those awaiting news. Solutions that can be taken to address the issue of will be presented.

CS17.01
Mass Rescue Operations - Lessons Learned from the Aegean
Mr. Matthew Fader
1Swedish Sea Rescue Society, Gothenburg, Sweden

CS17 - Mass Rescue Operations I, East Meeting Room 11, June 17, 2019, 12:15 PM - 1:15 PM

Mass rescue operations challenge rescue crews’ capability in numerous ways. Situations with countless variables in an unknown environment with limited resources tested our organization like never before. The ability to adapt to the conditions in cooperation with multiple agencies proved to be a success with many lives saved and invaluable experience gained.

We look at specific SAR operational lessons and the development of rescue methods and procedures during a crisis.

CS17.02
Establishing an Integrated Regional Rescue Coordination Centre for Association of Southeast Asian Nations (ASEAN) Countries + China and developing Regional SAR Capabilities and Cooperation in South China Sea.
Major RMAF (Rtd) Murali Bhaskaran
1Global SAR Resources Sdn. Bhd., Kuala Lumpur, Malaysia

CS17 - Mass Rescue Operations I, East Meeting Room 11, June 17, 2019, 12:15 PM - 1:15 PM

Aviation and Maritime disaster can happen anywhere in the oceans and the unpredictable South China Sea region is no exception. As we are aware, a large volume of cargo transit through the South China Sea. Not only that, the airspace over the South China Sea also experiences a high volume of air traffic bound from regional and international as well as trans Pacific to the United States. It is obvious that South East Asia is an accident prone region, the disappearance of MH370 over the South China Sea on the 8th March 2014 and the air crash of Air Asia QZ8501 in December 2014 en route from Surabaya, Indonesia to Singapore, not forgetting the tsunamis, storms and typhoons over the waters of South China Sea.

Given these conditions, the probability of accidents and incidents involving ships, aircraft and vessels is high and require an effective and reliable Regional Rescue Coordinating Centre as well as search and rescue support. Hence, establishing and developing a framework of an integrated Regional Rescue Coordination Centre is of most significance even though states do have regional cooperation, bilateral exercises and multi level exercises. There is cooperation amongst the littoral states, however the capability gaps is still wide among the ASEAN states. This can be enhanced with the involvement of China as they are well equipped with resources, facilities and large number of aviation and maritime assets. Therefore, they will be the best “First Responders” over the South China Sea. All regional states should also have an open channel of communication and integration of regional Search and Rescue capabilities.

By having the ASEAN+China cooperation in the Regional RCC, it will enhance the effectiveness, efficiency of the regional interoperability capabilities in Search and Rescue over the South China Sea.

CS17.03 & P2.06
A Mass Retrieval Operation in Polar Waters
Mr. Martin Löfstedt
1Swedish Sea Rescue Society, Öckerö, Sweden
2Chalmers University, Gothenburg, Sweden

CS17 - Mass Rescue Operations I, East Meeting Room 11, June 17, 2019, 12:15 PM - 1:15 PM
P2.06 - Poster Sessions, East Exhibit Hall B, June 16, 2019, 12:45 PM - 2:15 PM and June 17, 2019, 1:15 PM - 2:30 PM

With the melting of the Polar Ices creating new shipping routes like the Northeast passage and exotic cruise destinations, this leads to more traffic in these Remote Areas which creates the overhanging risk of
an accident of mass proportion to happen with one of these Cruise vessels. The Cruise vessels tended for Polar cruises is getting bigger, instead of 500 – 1200 persons onboard we now look at up 7500 persons onboard.

The big sailing distances and the lack of Search and Rescue vessels in the Polar areas, leading to that the rescue has to be done by Vessels of Opportunity. This thesis is an exploratory Case Study to show that the Marine sector needs to decide and legislate on methods for making the Retrieval easier and safer for Vessels of Opportunity especially for the Polar Regions. What this thesis shown is that the methods available and used today is not very safe and it is time to change this.

CS18.01
Technology for Crew Training and Skills Assessment – Case Studies in Effective Training and Crew Readiness
Mr. Murray Goldberg
1Marine Learning Systems, Vancouver, Canada

Never has training and assessment been more important than it is now in the maritime industry, especially within search and rescue. Hardly a day goes by without a new story about a maritime incident, invariably causing us to wonder what role training played.

Traditional classroom and job-shadowing training methods lack consistency and can lead to dangerous practices. In addition to training issues, structured methods and tools to measure skills are hard to find. The matter is complicated with the dynamic, team-based scenarios that are often present in search and rescue activities. It is nearly impossible to extract objective metrics to drive improvement. A wealth of information is lost, and there’s an incomplete view of crew abilities and skill proficiency.

From eLearning to new mobile applications, this paper will go over practical and available technologies that can help provide consistency and structure to training and assessment.

The paper looks at the current state of training and skills assessment in the maritime industry and how it can be improved. It will detail the research supporting eLearning and blended learning, and how it can significantly improve training outcomes, resulting in increased performance. It will also explore how new technology can help ensure objective and consistent assessment of skills, and what new insights can be gained from using these methods.

The paper also discusses the real-world results of successful implementations of these technologies in the maritime industry. It presents the challenges created by operational contexts, and what the tools have done to address these challenges.

CS18.02
From Growing Rescuer to Junior Instructor
Dr. Martina Capriotti1, President Raffaele Perrotta1
2Federazione Italiana Salvamento Acquatico, San Benedetto Del Tronto, Italy

Helping behaviors in children seems to be innate, as they appear early, before parents start the education of polite behaviors. Later, the rescue action could be driven by other factors, like selfishness. In this regard FISA believe that beginning the rescue training in early age, permits to obtain more efficient results in adult age.

Rescue establishes bridges between self and others. However, this connection seems deeper when children are asked to take the role of facilitators. In this regard FISA created the figure of “Junior Instructor”.

In our study a set of young individuals have been trained. They have been exposed to practical and theoretical modules.

Practical modules consisted in:
• Swimming lessons;
• Water rescue sessions;
• Marine water sessions;
• Basic Life Support lessons (drowning insights included);
• Simulations.

Theoretical modules consisted in:
• Principles of Basic Life Support;
• Principles of injuries caused by marine life;
• Principles of maritime sphere;
• Permitted and prohibited actions in marine environments;
• Prevention of drowning.
Training events have also been periodically characterized by communication and leadership skills development, with the aim of raising the teaching tendency.

The overall training aimed not only to acquire techniques and procedures, but also to raise a consciousness of the risk and the attitude to rescue.

As results we observed, best physical execution of rescue techniques, a natural predisposition to provide help (not only in aquatic environment but also in terrestrial environment) as well as a predisposition of saving individuals without social or ethnic prejudices, that could influence the rescue approach. Communication and leadership have been useful modules to evidence the natural “leaders” and to develop the sense of verbal expression, management of the group and problem solving. Interesting results have been detected in nowadays young adult individuals, that are currently conduction lifeguard courses.

• Lack of standardised documentation, such as detailed training manuals
• IMRF members’ collaboration in the region was good, but the responding organisations could have done more to share with each other what they were doing, especially around training. As different training regimes can confuse recipients
• Training materials developed beforehand were sometimes found to be in need of improvement

How standardisation was achieved within the IMRF
• Numerous IMRF members who are involved in delivering International SAR training agreed to form a collaborative working group
• The working group created a manual entitled: Basic Rescue Boat Operator and a set of SAR check cards, which were based on the IAMSAR Volume 3 content
• An IMRF member from the North West African region was also part of the working group. Their role was to ensure that the manual and SAR cards were fit for purpose for the recipients
• The Secretary General of the IMO has endorsed the training materials and has recommended them as best practice for any organisation looking to introduce basic training in Rescue Boat SAR operations

CS18.03 Developing a Consolidated SAR Training and Delivery Framework for Low Resourced Countries. Sharing the Benefits and Lessons Learned From a Collaborative Project Between IMRF Members With a Case Study of the North West African SAR Region.

Mr. David Whiddon1, Mr. Darren Williams2
1Royal National Lifeboat Institution, Poole, United Kingdom

CS19.01 The RNLI’s Lifesaving Framework
Mrs. Anna Classon
1Royal National Lifeboat Institution, Poole, United Kingdom

The RNLI is committed to saving lives at sea and reducing UK and Ireland coastal drowning by 50% by 2024. Additionally, to ensure drowning is recognised as a global and local problem which can and should be prevented. But in order to target our rescue and prevention resources as effectively as possible, a plan was needed, based on evidence that could be a central point of reference for our work. Effective measurement of our actions was also needed.

So, the Lifesaving Framework was devised. It centres on 4 key objectives that are based on breaking The Drowning Chain. But key objectives alone are not enough, more detail was needed. Therefore, secondary objectives with a clear rationale were identified. Only then could work activities, to support the objectives, be designed.
This method of constructing a framework and therefore a plan, helped to answer questions such as exactly how effective is the wearing of lifejackets? And how much effort should the RNLI invest in promoting their use? The answer is simple: we know lifejackets save lives. But how can we ensure the public and fishermen are aware of this and persuade them to automatically wear lifejackets as a part of ‘what they do’? The evidence base helps make a compelling argument and The Lifesaving Framework gives structure to our thinking and helps us record and evaluate our effort.

This presentation will describe how the Lifesaving Framework was developed, discuss the key objectives, supporting objectives and some of the work activities in order to share knowledge and learning. Discussions concerning the Lifesaving Framework and feedback from the IMRF will contribute to its improvement. That helps all of us, to use our limited resources to save even more lives than we do today.

CS19.02
BePA – A Process to Measure the Effectiveness of Preventative Activities
Mr. Duncan Ferner¹
¹New Zealand Search and Rescue, Wellington, New Zealand

CS19 - Improving Survival Rates I, East Ballroom B, June 17, 2019, 2:30 PM - 3:30 PM

How do we measure the effectiveness of preventative activities to bring about behaviour change that produces better SAR outcomes?

NZSAR research to benchmark preventative activities established a process to better understand the range of preventative activities and their impact - the Benchmarking Preventative Activities Report –“BePA Report”.

The purpose of this report was to establish a baseline of consistent information across the SAR sector which would “capture and report on sector performance, highlight key areas which require focus and showcase sector best practices [relating to recreational safety]”. The report proposes a process for benchmarking initiatives and actions (BePA) that has behaviour change as the central goal. The BePA model identifies four classifications: Compliance, Education, Equipment and Infrastructure.

It is envisaged that organisations with a role in SAR prevention can map their initiatives against these four classifications - illustrating the breadth (or narrowness) of work underway and where there might be gaps. Money spent could also be included to identify into which quadrants money is or is not being invested.

Key benefits of the framework:
1. Ability to consider impact over time: the report could analyse the impact of the findings year-on-year individually and cumulatively.
2. Opportunity to use multi quadrant strategies: multiple ‘hits’ may be more effective than the sum of individual ‘hits’
3. Use of information to map ‘desired’ future state: Organisations could use the framework to map “where you are now” as well as “where you would like to be”.
4. Ability to compare with SAR data: this data provides activity participation rates and assessment of preparedness.

The BePA process may be of use to other countries to help understand and focus their SAR prevention activities.

CS19.03 & P3.09
Next Generation SafeTrx Technology. Applying Internet of Things Tracking and Alerting Technology to SafeTrx
Mr. John Murphy¹
¹8 West, Cork, Ireland

CS19 - Improving Survival Rates I, East Ballroom B, June 17, 2019, 2:30 PM - 3:30 PM
P3.09 - Poster Sessions, East Exhibit Hall B, June 16, 2019, 12:45 PM - 2:15 PM and June 17, 2019, 1:15 PM - 2:30 PM

Searching for sailors of small vessels like kayaks and kiteboards has historically been a challenge for Coast Guard organizations and marine Search and Rescue agencies. But thanks to SafeTrx, a Microsoft Azure–based system that allows tracking and monitoring of even the smallest vessels, rescue organisations have more knowledge at their fingertips, empowering rescuers to act quickly and deploy operations in a rapid, targeted way.

Designed to take the search out of Search and Rescue and developed in collaboration with SAR and Coast Guard organisations around the world, the SafeTrx
system includes vessel registration, tracking and alerting capabilities. The system is robust, reliable and popular with watersport users and SAR organisation around the world with hundreds of successful SAR missions and hundreds of thousands of end users.

In 2018, 562 SAR assistance and rescue missions were tasked by boat users using SafeTrx. In the Netherlands over 10% of all lifeboat missions were triggered by SafeTrx while in Norway over 12% of all lifeboat missions were triggered by SafeTrx. 8 West is now testing new SafeTrx low power, long range, waterproof radio devices that use the latest Internet of Things (IoT) technologies. Fully compatible with the existing SafeTrx ecosystem, these new devices will not need to be tethered to a Smartphone to work and will have much longer battery life that the current generation of Smartphones.

This new SafeTrx IoT solution can scale to connect thousands of remote products and people, and monitor all of them in one central location—leading to swift reaction, and action. When rescuing someone in distress, every minute counts—and in this presentation, we will present how this new technology can achieve this.

The presentation will also discuss the next generation/iteration of the CasTrack System. With the advancement of rugged and robust technology, the next generation will take advantage of barcode/QR code tagging, along with cellular networks and robust database systems. The new iteration will designed to electronically track an individual from the incident scene to the final reception location. It will create a database that will be populated by the same information as is currently being collected. However, the database will be able to be accessed by assisting agencies, so that they can have immediate knowledge of the scale and scope of the incident, and access to information about specific individuals that they will be receiving (i.e. the number of red category patients entering the health care system).

The presentation will report on the first operational trial of the system that will be undertaken during the WMRC Congress 2019.

CS20.01
CasTrack - Survivor Accountability during Mass Rescue Operations
The Current Status of the Canadian Coast Guard’s Casualty Tracking System
Mr. Nathan Webb

CS20 - Mass Rescue Operations II, East Meeting Room 11, June 17, 2019, 2:30 PM - 3:30 PM

The Presentation will discuss the current status and implementation protocols for the CCG’s Survivor Tracking System (CasTrack). It will demonstrate the system, it’s training program and real-world deployments. The CasTrack system is a pen and paper based system designed for the harsh environment of Maritime Search and Rescue. The system tracks survivors, by attaching a large number tag to each individual that is easy to see and verify. These numbers are tracked by a Transport Officer, with the assistance of transport vessels and receiving Liaison Officers at Landing sites. The system generates tracking sheets that permit Joint Rescue Coordination Centre personnel to know where each individual’s location, their medical status/triage condition, transport status, and planned destination. The system is then able to check out survivors as they are delivered to responsible agencies ashore.

Cruise ship incidents are headline news around the world. Whether it is a migrant rescue, a man overboard or a more catastrophic failure, cruise lines must be ready to respond globally in real time. Emergency readiness is part of our day to day work. A 24/7/365 Fleet Operations Center is a critical component of any emergency plan. Maned by licensed deck officers, the Fleet Operations Center at the corporate office helps the ships avoid dangerous weather conditions and coordinate last minute itinerary changes to keep our guests and crew safe. With specialized systems, the Fleet Operations Center can also stand up the entire Shore Emergency Response Organization. In a matter of minutes, trained responders from all corporate departments, media, commercial & fleet operations, can be communicating with and supporting the ship. These responders train quarterly and participate in interagency drills with checklists guiding their individual work and decisions. They also rigorously
test ship systems replicated shore side for situational awareness. Shore side drills are designed to handle a variety of different types and sizes from the small cruise ships to nearly 6000 guest and crew onboard. Whether it is resolving a technical issue or dispelling misinformation in the media during an incident, a comprehensive emergency response plan for all types of incident is essential.

**CS20.03**  
Viking Sky – A Case Study  
Mr. Asbjorn Viste

JRCC Stavanger, Sandnes, Norway  
CS20 - Mass Rescue Operations II, East Meeting Room 11, June 17, 2019, 2:30 PM - 3:30 PM

Abstract to be confirmed.

**CS21.01**  
“Help Me Think” – Creating Effective on Scene Coordination During Search and Rescue  
Mr. Lars Axvi1, Mr. Fredrik Forsman1

1Chalmers University of Technology, Göteborg, Sweden  
CS21 - SAR People: Training, Assessment, Support II, East Ballroom C, June 17, 2019, 2:30 PM - 3:30 PM

Maritime Search and Rescue (SAR) can be described as trying to solve an enigma. A life-threatening situation and shortage of time creates the backdrop for a variety of factors, known or unknown, that makes the solving of the enigma everything from easy to complex. This paper discusses the success factors for efficient search and rescue operations focusing on the action on scene. A structured observation followed by an analysis of two identical, but geographically divided exercises, conducted on the Swedish west coast, constitutes the results of this paper. The scenario for the exercises was that a few lobster fishermen was reported missing after an evening pleasure excursion. The paper gives an account of the exercises and lists lessons identified by the participants. The analysis of the exercises is focusing on the on scene coordination and we use the concept of joint activity to describe the coordinated behavior during SAR operations. The analysis exemplifies how search and rescue personnel achieves or fails to achieve effective coordination, looking in detail at three primary requirements. The ad hoc team, consisting of search and rescue specialists and or mariners on board ships of opportunity being close to the scene and able to assist, created for the SAR operation have to be unpredictable, they have to have sufficient common ground, and they have to be able to redirect each other. We use our understanding of these features of joint activity to develop training programs and adjust procedures making SAR more efficient with the goal of saving lives.

**CS21.02**  
Practice Makes Permanent: Resilience Through Exercises  
Mr. Shawn Corrigan

1Calian, Nanaimo, Canada  
CS21 - SAR People: Training, Assessment, Support II, East Ballroom C, June 17, 2019, 2:30 PM - 3:30 PM

It is well recognized that one of the most effective ways to prepare and confirm readiness of an organization and its plans is to conduct exercises. Unfortunately, it is also true that exercise is often neglected or misdirected in in many emergency management and response programs. How many organizations have a fully funded, multi-year exercise program? Who has an exercise program linked to performance metrics and can track the return on investment for every dollar spent on training and exercise? Who works for an organization where leaders are reluctant to push the envelope for fear of looking unprepared during an exercise? Who has been stuck in the infamous lessons learned trap?

Would you be shocked to learn that many organizations misunderstand the nature of exercises as a training tool, have adopted a flash in the pan approach, and have no dedicated and qualified resources to support the planning and conduct of exercises.

In this presentation Shawn Corrigan will share his personal experiences, offer best practices, and will point out some challenges and trends while sharing strategies to get the most from your investment in exercises. Further, he will show how an investment in training and exercises can contribute to building resilience in your organization.
**CS21.03**  
**Brief/Debrief – How to Use This Tool to Improve Procedures, Personal Performance, Operational Safety and Work Environment**  
Major Oskar Haugli Norderval\(^1\)

\(^1\)Royal Norwegian Airforce, Lakselv, Norway

**CS21** - SAR People: Training, Assessment, Support II, East Ballroom C, June 17, 2019, 2:30 PM - 3:30 PM

I work as the leader of, and as a pilot for the 330 squadron SAR helicopter unit in northern Norway. One of six units in Norway. Our area of responsibility is the northernmost mainland of Norway, and 1.3 million square kilometer of the Barents Sea. We brief every mission we fly, and debrief them afterwards. During the debrief all crew members are allowed to say anything about how the others performed and how the mission was solved. Criticism or boasting regardless age, rank, experience and crew position. We are objective, and after the debrief we are again good colleagues regardless the “temperature” in debrief discussion. This is a tool we have used and developed in several years, and we see that it brings constant improvement of procedures, personal performances, operational safety and work environment. For us it is a culture. I would like to have a presentation explaining how other organizations can implement this tool. First to make it a structure, then a culture.

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**CS22.01**  
**The Swim Reaper – An Unconventional Approach to Influencing a High-risk Group**  
Mr. Jonty Mills\(^1\)

\(^1\)Water Safety New Zealand, Te Aro, New Zealand, \(^2\)FCB New Zealand – The Change Agency, Wellington, New Zealand, \(^3\)The New Zealand Search and Rescue Council (NZSAR), Wellington, New Zealand, \(^4\)The Accident Compensation Corporation (ACC), Wellington, New Zealand

**CS22** - Improving Survival Rates II, East Ballroom B, June 17, 2019, 4:15 PM - 5:15 PM

Background / Aim  
Young ‘Kiwi’ males aged 15-34 years make up 14 percent of the population in New Zealand, yet 28 percent of all preventable drowning fatalities. A culture of over estimating ability and under estimating risk, this group has traditionally been resistant to conventional water safety messaging to effect change in their behaviour around water, as many young males believe they’re ‘bullet proof’. So how do we get through to them?

This paper provides an overview of an innovative and confronting social media campaign Water Safety New Zealand has employed over the past 3 summers to change the minds of young men about water safety.

Methods / Implementation  
The Swim Reaper was launched on social media channels in the summer of 2016. A somewhat confronting character, the Swim Reaper represents the consequence of bad decisions and posts sarcastic messages, videos and material in a reverse psychology approach to reach the target audience. Based on dark humour and a unique personality, The Swim Reaper’s counter intuitive safety messages are designed to be shared and encourage wide spread engagement.

The campaign is specifically delivered via the channels through which young males communicate and in a language that resonates with them. A cost-effective programme, using social media and influencers to high effect with the ability to geo-target high risk locations and activities.

Results / Evaluation  
Now in its third year, this multi-award winning campaign has attracted a cult like following and achieved phenomenal cut through, exceeding all expected metrics. Over 400,000 Instagram followers, 70% of the target audience reached and over 10m impressions with 1.7m likes in its first year.

Part of the 2018/2019 campaign is to measure how the engagement and awareness raised by The Swim Reaper over three years has led to attitude and behaviour change within the target audience.

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**CS22.02**  
**V-Pass System: A Key Tool for Managing the Safety of Small Fishing Vessels in Korea.**  
Mr. Kiboom Do\(^1\)

\(^1\)Korean Coast Guard (on assignment with CCG), Victoria, Canada

**CS22** - Improving Survival Rates II, East Ballroom B, June 17, 2019, 4:15 PM - 5:15 PM

The V-Pass System was developed by Korea Coast Guard to support safety of life at sea for small vessels. V-Pass is an inexpensive alternative to other rescue alerting devices. V-pass device is as cheap as car navigation. It also can be applied to leisure boats.

After the Korean War, all fishing boats had to report to the coast guard when they set sail and enter the port for the national security like identification of spy ships.
Korea Coast Guard developed V-Pass for convenience of fishermans.

The principle of operation of V-Pass is to install a location transmitter on a fishing vessel and allow the coast guard to automatically obtain the location information so that they can check vessel’s entering or leaving the port without reporting the location in real time.

Although the initial purpose of V-Pass was automatic check in out system, the scope of V-Pass’s operation gradually expanded to various fields such as the use of location information for rapid search and rescue in the event of a maritime accident, prevention of smuggling and illegal entering.

It is now used as a key tool for managing safety of small fishing vessel in Korea.

V-Pass can operate the SOS distress call switch in a one-touch when it’s in an emergency on the sea. Recently, the portable V-Pass was developed and distributed for the crew to carry in case of an emergency escape from a fishing boat. Fishing vessel equipped V-Pass can inform rescue agencies of faster and more accurate location information in case of emergency. V-Pass System have assisted to save 984 lives in 311 cases since its development.

The IMRF has over the last decade within their MRO project produced guidance papers, conferences, workshops and courses with the objective to increase awareness and knowledge about, probably the most challenging Search And Rescue (SAR) operation in order to be able to save lives. One of the steps was the creation of a course (MRO – Subject Matter Expert course) for personnel having responsibility for complex incident planning and training at a national or on a major organizational level. The learning objectives for the course which is described in detail in this paper includes an enhanced ability to identify, analyze and understand the problems, and to propose solutions. The scale, complexity and rarity of a MRO calls for a thorough understanding of the preparatory needs. In this paper we discuss preparedness using the Cynefin framework as a theoretical backdrop looking at different decision making processes present during MRO planning and execution.

CS23.01
Preparation to be Unprepared – Training for Mass Rescue Operations
Mr. Lars Axu1, Mr. Fredrik Forsman1, Mr. David Jardine-Smith2
1Chalmers University of Technology, Göteborg, Sweden, 2International Maritime Rescue Federation, Stonehaven, United Kingdom


“Preparing to be unprepared” might be considered as a contradiction in terms, but is in the case of maritime mass rescue operations (MRO) vital to be able to save lives. The international Maritime Organization defines MRO as “…the need for immediate response to large numbers of persons in distress, such that the capabilities normally available to the search and rescue authorities are inadequate”. This paper recognizes the work on MRO carried out by the International Maritime Rescue Federation (IMRF) and provides a theoretical framework on how to understand the complexity of such an operation.

CS23.02
MRO Planning: Why do we still struggle?
Mr. Tom Gorgol1
1United States Coast Guard, Woodbridge, United States


A discussion based session, as part of a MRO workshop.

This session will focus on some common issues and barriers that seem to be present when SAR services undertake MRO planning processes. Some issues/barriers for discussion are: 1) MRO Planning not being viewed as a “Whole of Government” approach. Many SAR services attempt to carry the entire load when it come to plans and plan development. 2) Lack of building off of Lessons Learned from Real world events. Do we, as an MRO community, need to do a better job of sharing lessons learned? 3) Understanding that workshops/ seminars may be more valuable than conducting Full Scale exercises. This discussion based session is an opportunity to hear from other SAR services / States on where they are struggling, or what seems to be working well, in regards to MRO planning.
CS24.01
The Development and Implementation of an Audit and Assurance Programme for a Community Based Maritime Search and Rescue Organisation

Peter Dawes\textsuperscript{1,2}
\textsuperscript{1}Royal National Lifeboat Institution, Poole, United Kingdom, \textsuperscript{2}Sunderland University, Sunderland, United Kingdom

CS24 - SAR People: Training, Assessment, Support III, East Ballroom C, June 17, 2019, 4:15 PM - 5:15 PM

Background
The maritime industry and in particular the SAR community operate in an often dynamic and high-risk environment. Failure to implement, monitor and maintain adequate control measures can have severe consequences and inadequate risk management continues to feature as a major contributory cause of accidents in the maritime sector.

Aim
The aims of this research project were to investigate the development of an audit and assurance programme for a community based maritime organisation, and to determine its effectiveness driving improvement and informing compliance thinking in decision making.

This research focusses on the audit and assurance of the community based maritime search and rescue activity delivered through the lifeboat stations and in particular the self-assurance being reported at the SAR unit level.

The research included a literature review of current models of audit and assurance and investigated the confidence in the implementation of an audit and assurance process through looking at the positivity of responses to a question set and feedback from focus groups to inform the research project.

Key findings included determining the level of confidence that user groups had that the information reported through the audit and assurance systems would lead to improvements and the extent to which information gathered was being used to inform and drive decision-making.

The research was able to gain insights into how the audit and assurance process was being implemented and provide recommendation for future developments and improvements with wider lessons learnt that would be applicable to the SAR community.

CS24.02 & P3.10
Critical Incident Stress Management for Maritime SAR Personnel: A Holistic Approach

Ms. Kyra Nabeta\textsuperscript{1}
\textsuperscript{1}Canadian Coast Guard, Victoria, Canada

CS24 - SAR People: Training, Assessment, Support III, East Ballroom C, June 17, 2019, 4:15 PM - 5:15 PM

P3.10 - Poster Sessions, East Exhibit Hall B, June 16, 2019, 12:45 PM - 2:15 PM and June 17, 2019, 1:15 PM - 2:30 PM

Many first-response organizations have patchwork wellness programs in place. While well-intentioned, they do not fully address the needs of an employee with an operational stress injury (OSI). The Canadian Coast Guard’s Western region (CCG Western) is building a holistic approach that considers physical, mental, emotional, social, and occupational recovery.

Common barriers to treatment are the stigma and misinformation associated with mental illness. Frontline employees often resist seeking help because managers and assistance programs are unfamiliar with the demands and culture of operational environments. When OSIs are reported, measures taken by the employer can be inappropriate if shore-side personnel do not understand trauma or normal physiological/behavioural reactions to traumatizing events. Similarly, catch-all services designed for office-based workers may not be able to properly identify an OSI or provide the resources needed for recovery.

Currently, CCG Western has a deployable Critical Incident Stress Management peer support team that can provide injured employees with immediate support, in addition to an Employee Assistance Program for short-term professional counselling. We are also implementing two education programs (Trauma Resiliency Training and Road to Mental Readiness) that teach both operational and non-operational personnel about normal reactions to distressing events and about effective social responses.

In development is a contained case-management approach in which individuals will be supported by a dedicated team that can facilitate timely treatment and a personalized return-to-work program. We have also partnered with Wounded Warriors Canada to provide employees with access to established individual, group, and family treatment programs.
Together, these measures are intended to encourage early access to mental health care. By addressing the unique concerns of operational employees at an organizational level, we hope to improve short-term performance and long-term mental health, which will in turn promote retention and minimize attrition.

**CS24.03**

**Trauma Risk Management: Evaluation of the RNLI Pilot**

Sarah Healey\(^1,2\)

\(^1\)RNLI, Poole, United Kingdom, \(^2\)NatCen Social Research

**CS24** - SAR People: Training, Assessment, Support III, East Ballroom C, June 17, 2019, 4:15 PM - 5:15 PM

This paper relates to evaluation of the Trauma Risk Management (TRiM) programme piloted in 2016-17. The evaluation involved a literature review, a survey of staff and qualitative case studies. The evaluation was carried out by NatCen on behalf of the RNLI.

The types of search and rescue activities undertaken by staff and volunteers can expose them to traumatic incidents and physical danger. The RNLI uses post-incident team debriefing as a way of processing such experiences. There is growing awareness of mental health issues generally, and post-traumatic stress in particular. Research has focused on the difficulty of asking for support, particularly when people see themselves as responsible for “rescuing” others.

The pilot set out to:

- provide a support structure to help the RNLI cope with the aftermath of traumatic incidents;
- deliver effective support to those who needed it after such incidents; and
- increase the ability of staff and volunteers to cope with post-traumatic stress.

The aims of the evaluation were to:

- Understand the outcomes of TRiM support for RNLI crew and lifeguards;
- To assess implementation; and
- To review the interaction between TRiM and other sources of support.

Most respondents, had experienced potentially traumatic incidents in the course of their RNLI work. Study participants described other factors that could make incidents traumatic for those involved, including unpredictability, personal relevance and outside scrutiny. The accounts of participants supported the findings of previous research suggesting that ability to cope with post-traumatic stress is improved when feeling supported.

Research participants were generally positive about their experiences of TRiM, praising, the sense of connection they felt when talking to a TRiM practitioner and the ways in which the structured approach and training of practitioners had helped them to provide a different level of support to that offered by everyday colleagues.
**P1.02**  
**Spotlight on Safety – Why Accidents Are Often Not Accidental**  
Dr. Ronald Pelot\(^1\), Captain Don Marcus\(^1\), Prof John Dalziel\(^2\), **Captain John Loftus\(^1\)**, Captain George Quick\(^1\)  
\(^1\)International Organization of Masters, Mates & Pilots, Baltimore, USA, \(^2\)Dalhousie University, Halifax, Canada

The best SAR response is the one that does not have to take place. IMO & IMRF recognize that PREVENTION is a key function of rescue organizations. Lives are saved, pollution averted, costs and risks to SAR personnel reduced, if the number of incidents (sometimes called ‘accidents’) are reduced.

IMO, ILO, national and private Regulatory Organizations provide a Regulatory Regime which, if followed, substantially reduces the risk and severity of Incidents. However, in many serious maritime Incidents the problem was not the Regulatory Regime, but non-compliance with it. There is an inherent conflict between shipping economics; commercial pressures often conflict with the Regulatory Regime.

The General Maritime Law that governs international shipping has effectively insulated Upper Management from the consequences of regulatory non-compliance, provided they can deny knowledge. The ISM Code with the provision to report deficiencies to a Designated Person Ashore is designed to inform management and bring them within the circle of responsibility. Modern technology now provides ship operators with the capability to have immediate knowledge of conditions aboard ship, as well as compliance with regulatory standards. However, there is a tendency to discourage reporting to maintain Management’s immunity from personal liability. It is difficult to establish a shared safety culture between the Ship and Management when master’s and crew’s future may depend upon not sharing safety information with Management.

Exacerbating the problem, Regulatory Organizations can be subject to ‘Regulatory Capture’, marine inspectors may be pressured to ‘look the other way’ by their superiors.

With modern technology, the burden of responsibility can, and must, effectively extend to ship operators, ship owners, Class and the flag-state.

In this presentation the ‘International Organization of Master, Mates & Pilots’ outlines this issue; the authors also give their personal experiences in attempting to maintain safety standards. Possible solutions will be explored.

**P1.03**  
**AIS-DMB: Adapting Technology to Provide an Improved Search and Rescue Tool**  
Mr. Alistair Duncan\(^1\), **Mr. Boudewijn Neijens\(^2\)**  
\(^1\)Royal Canadian Marine Search and Rescue - Station 1, West Vancouver, Canada, \(^2\)Royal Canadian Marine Search and Rescue - Station 1, West Vancouver, Canada

Datum Marker Buoy - DMB are a core search and rescue tool. Traditionally DMB are deployed, the location recorded, and the DMB retrieved some time later. The deployed and retrieved longitude and latitude are analyzed to determine Course over Ground - COG and Speed over Ground - SOG. The search parameters are then updated to reflect the likely movement of the object or person in the water based on tide and currents.

Over the past 4 years, members of RCMSAR Station 1 in West Vancouver have adapted and applied AIS technology to create an AIS based DMB that is displayed on navigation displays without being visible to non-SAR vessels. The AIS-DMB provides real time SOG and COG which means search activity can be updated in a more timely manner to reflect real time actual conditions.

In addition to the benefit of real time movement data, the AIS-DMB is a lower cost system to acquire and install than traditional tone VHF units. The exact location of the SIS-DMB is known (within its’ operating range) which virtually eliminates loss and the AIS-DMB can be easily tethered to other SAR training tools such as MOB dummies and MOB poles to ensure recovery and retrieval in all operating conditions.
**P1.04**

*A Compact Dual-Band SWIR Imager for the Discrimination and Imaging of Plastic Objects for SAR Applications*

*Dr. Charles Hibbitts*¹, Dr. Marc Kolodner¹

¹*John Hopkins University Applied Physics Laboratory, Laurel, United States*

**P1.04 - Poster Sessions, East Exhibit Hall B,**
June 16, 2019, 12:45 PM - 2:15 PM and
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We have developed and tested a compact two-camera, dual-band sensor for detecting plastics objects, emphasizing imaging over spectroscopy and implementing on-camera processing to achieve near real-time, partially autonomous detection and imaging of plastic objects. The sensor has proven successful in discriminating and imaging several plastics such as fiberglass, styrene, and acrylics from background materials such as grass, dirt, rocks, and brush by leveraging the ubiquitous presence of the ~1.7-micron harmonic of the ~3.4-micron fundamental absorption feature in plastics. The 1.7-micron band is also in a spectral region free of telluric and almost all geologic absorption features, making its presence in a reflectance spectrum almost a unique marker for plastics. Plastics stand out even more strongly against water, which is completely absorbing, and thus black, at both these wavelengths. The sensor is challenged by certain plastics, especially thin, transparent and thus black, at both these wavelengths. The sensor is strongly against water, which is completely absorbing, a unique marker for plastics. Plastics stand out even more strongly against water, which is completely absorbing, and thus black, at both these wavelengths. The sensor is challenged by certain plastics, especially thin, transparent and thus black, at both these wavelengths.

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**P1.05**

*Project Life Ring: What is a Life Worth?*

*Ms. Jane Macdonald*¹

¹*Royal Canadian Marine Search and Rescue - Station 12 Halfmoon Bay, BC, Halfmoon Bay, Canada*

**P1.05 - Poster Sessions, East Exhibit Hall B,**
June 16, 2019, 12:45 PM - 2:15 PM and
June 17, 2019, 1:15 PM - 2:30 PM

Station 12 is located in a remote area of British Columbia with two bodies of water and multiple access points for our water-loving community of recreational swimmers and boaters. Response time for our two rescue vessels can be in excess of 20 minutes to the locations of our 9 local government docks and wharves, where countless young children and families go swimming without any lifeguard stations. An article in the local newspaper describing a young family’s near drowning tragedy mobilized Station 12 to step in to assist with tried and true water safety tools: A life ring with throw lines for all docks.

Working in partnership with local municipal government and regional representatives, Station 12 raised all the funds and then provided the man & woman power to order SOLAS approved life rings and throw lines, develop a weather durable model, conduct all material measures, then design, build, paint and create promotional signage for 10 life ring boxes on the Sunshine Coast.

The project accounting vs. risks of a fatal drowning accident made the Station’s sales job to government pretty easy: How much is a life worth?

This workshop will provide step-by-step exercises to help SAR teams and local municipalities can work together to implement a similar project in their home ports of call.

**P1.06**

*Where the Best Intentions Meet the Worst Consequences: Law of the Sea, Irregular Migrants and Non-Government Organizations*

*Mr. Raymond Messier*¹

¹*Royal Canadian Marine Search and Rescue - Station 02 North Vancouver, North Vancouver, Canada*

**P1.06 - Poster Sessions, East Exhibit Hall B,**
June 16, 2019, 12:45 PM - 2:15 PM and
June 17, 2019, 1:15 PM - 2:30 PM

The gulf between what is legal in the milieu of migrant sea rescue is always at the mercy to what is politically acceptable between state actors. It is in these discrepancies where the worst losses of life at sea occur, largely owing to hesitation among rescuers and uncertainty of consequences for their potential rescue actions. Non-Government Organizations (NGOs) and other frontline workers see this reality in everyday. The permeation of state power to enforce control through regulations, “voluntary codes of conduct” as well as inter-state commitments and cooperation agreements creates an environment where answerability and liability are diffused through domestic laws and ratification processes. The dichotomy between what is palatable to international lawyers and what is preferred to often volatile domestic and international state politics presents a balance of choices. This essay will first present a review of the relevant international conventions pertaining to sea rescue and their respective flaws to frame the legal
consensus. Then in juxtaposition, this review will turn towards migrant specific issues such as the principle of non-refoulement and state responsibilities for vulnerable persons in the maritime environment. In culmination, this review will place migrant focused NGOs into the sea rescue climate to interrogate where non-state actors and other third parties figure in this dichotomy. Throughout this review, the author will use current events from regions such as the Greek and Italian frontiers to support claims of the separation between De Jure and De Facto realities regarding sea rescue law.

P1.07
Sidestepping ‘Security’ to Engage Security Actors: The Arctic Council, Search and Rescue Cooperation and ‘Defense Diplomacy’
Mr. Raymond Messier¹
¹Royal Canadian Marine Search and Rescue - Station 02 North Vancouver, North Vancouver, Canada

P1.07 - Poster Sessions, East Exhibit Hall B, June 16, 2019, 12:45 PM - 2:15 PM and June 17, 2019, 1:15 PM - 2:30 PM
The Arctic Council, limited by their founding document, the Ottawa Declaration, is barred from playing any role in Arctic Security Affairs officially, but they have not stepped away from the topic entirely. Originating as an ecological protection strategy, the Arctic Council has expanded its engagement of regional security actors – those being the Defense officials and Foreign policy representatives of its member states - under the justification of Search and Rescue coordination. While possibly in contravention of the founding declaration’s footnote excluding ‘security issues’, I will argue that this is not necessarily a negative development as there are currently no formally tasked or well-suited security oriented actors already dealing with Arctic security issues at present. Alternatives for security management are outside this essay’s scope of analysis but provide an interesting area for further research.

This essay will examine to what extent is the Arctic Council, as an institution, engaging its member-state security actors under the 2011 Search and Rescue (SAR) Agreement. This is of significant benefit to the academic body of literature on Arctic affairs as I was unable to find a diverse base of scholarship understanding Search and Rescue Cooperation and Coordination as a new avenue of “defense diplomacy”, much less with an Arctic focus.

By first establishing the role of the Arctic Council and its limitations, then examining the foundations of ‘defense diplomacy’, this essay will reflect on SAR cooperation to date and conclude with arguments surrounding the future of the defense diplomacy within the auspices of the Arctic Council and its role in security governance for the polar region. Throughout this essay, I will pay specific attention to the participant state’s foreign policy objectives and concerns to understand their respective positions on Arctic defense/cooperation issues.

P1.08
Empowering Women in Maritime Search and Rescue: A Basic Mapping of the Challenges in Malaysia
Mrs. Suzanna Razali Chan¹
¹Malaysian Maritime Enforcement Agency, Putrajaya, Malaysia

P1.08 - Poster Sessions, East Exhibit Hall B, June 16, 2019, 12:45 PM - 2:15 PM and June 17, 2019, 1:15 PM - 2:30 PM
Until now, limited attention has been afforded to the role of, and challenges faced by women involved in Maritime Search and Rescue. In line with the World Maritime Day theme for 2019 “Empowering Women in the Maritime Community”, this study mainly focuses on addressing the challenges imposed by gender inequality.

This study explores and identify current challenges that face the women interested in the maritime sector, focused in various positions in Maritime Search and Rescue such as the Search and Rescue Coordinator, Search and Rescue Mission Coordinator, On Scene Coordinator and Search and Rescue Unit in Malaysia. In addition, this study also exposes additional skills for women to qualify in the Maritime Search and Rescue field nationally and globally. The results provide a basic initial mapping of the current situation in Malaysian Maritime Enforcement Agency, the lead for Maritime Search and Rescue operation in Malaysia, the challenges and recommendations that would assist in the empowerment of women in Maritime Search and Rescue field. In conclusion, this study provides an insight thought on how to vastly recruit and transform the mind-set from conventional spectrum to a capable paradigm in empowering women in the maritime community, which can contribute to the society and nation needs.
Safety technology continues to evolve across the industry, world. Still mandated safety equipment for vessels all over the world, distress flares, and this is reflected in the fact that they are or device that replaces the specific functions of marine more than a century. To date, there is not a single system in distress offshore and has been saving lives at sea for sky is still the most universally recognised signal of a vessel however, the sight of a pyrotechnic flare illuminating the sky is still the most universally recognised signal of a vessel in distress offshore and has been saving lives at sea for more than a century. To date, there is not a single system or device that replaces the specific functions of marine distress flares, and this is reflected in the fact that they are still mandated safety equipment for vessels all over the world.

Safety technology continues to evolve across the industry, including many advances in pyrotechnics. Today, modern flares are smaller, burn more efficiently and have less explosive content. This makes them more reliable and easier to use than ever before, whilst still operating to the same high standards mandated within the SOLAS regulations. For example, Red Handheld flares function as day and night distress alerting signals, as well as being one of the most effective ways of pinpointing a position, and Orange Smoke signals help pilots to assess the conditions at the surface of the water during a SAR operation in daylight.

WesCom Signal and Rescue is the world’s leading marine distress signal manufacturer, with the largest international network of distributors. Its comprehensive range of marine distress signals and safety systems are trusted for their reliability by the world’s navies, lifeboat and rescue services, merchant fleets and airlines, as well as by fishing vessels and leisure crafts.

For more information about WesCom Signal and Rescue, please visit: www.wescomsignal.com.

P1.10
Airplane Crash at Sea on Santa Catarina State / South of Brazil - Case Study for Maritime Rescue Operations; Lessons and Perceptions.
Mr. Marcelo Ulysséa1, Mr. Jonatan Paziani2

1Sea Angel’s Brazil Institute, Itajai, Brazil, 2Sea Angel’s Brazil Institute - SABI, Balneário Camboriú, Brazil

P1.10 - Poster Sessions, East Exhibit Hall B, June 16, 2019, 12:45 PM - 2:15 PM and June 17, 2019, 1:15 PM - 2:30 PM

This SAR event was emblematic for review how relevant cooperation is for the Local and Regional SAR Stakeholders in South Brazil for unfold positive results in complex missions in large areas of the Sea. The experience revealed how delicate and difficult is the communication between NGO’s and military institutions working in parallel on SAR Missions. From the first call to the current days a complete narrative, step by step, of a plane crash on coastal area that did not have an end revealed. The presentation will cover the equipment used, the search area, the engaged institutions and lack of communications that took place to help the mystery to keep unfolded. The victim’s family interaction, the media exposure and way of cover, weather conditions and all the details that helped on the partial result at the end. The sides and impressions from the SAR personnel, their training, experience and tolerance to the environmental stress during day and nighttime. At the end the audience will understand the critical point on working as a team for the resolution as best as possible for the challenges complex SAR Events may force SAR Community to face worldwide, leaving aside ego, uniform color and life believes.

P1.11
Multi Agency Cooperation on Planning, Preparedness, Emergency Attendance and Mitigation Regarding Flood Events and SAR Missions. GRAC Group Innovation and Development in Santa Catarina, Brazil
Mr. Marcelo Ulysséa1,2
1Sea Angel’s Brazil Institute, Itajai, Brazil, 2Proteção e Defesa Civil, Itajai, Brazil

P1.11 - Poster Sessions, East Exhibit Hall B, June 16, 2019, 12:45 PM - 2:15 PM and June 17, 2019, 1:15 PM - 2:30 PM

The oral presentation will focus on cooperation between governmental and non-governmental institutions regarding preparedness and mitigation for future environmental disasters with catastrophic potential during severe flood events and maritime rescue in south Brazil. Using the Civil Defence National Plan developed after the 2008 flood disaster as reference, the presentation will expose the development state of the cooperation organization from two different angles, the governmental side and the NGO perspective, showing the importance of
complementary points of view, the struggles faced by the different sides and a road map to get the communication flow positive in the will of getting a multi-agency group motivated, equipped, trained and coordinated to respond maritime mass rescue operations, coastal line cities evacuation in extreme weather conditions, environmental disasters and complex emergencies at Sea. The GRAC from Santa Catarina is seeing an increasing numbers of large passenger ships working with tandem boats spread over Santa Catarina State without well-developed touristic receptive structures are increasing the risk of a massive emergency at sea that the creation of this organized group can help to mitigate and make the difference. Key words on this oral presentation will be cooperation, sharing, learning lessons, planning and preparation.

P2.05
Line of Duty Deaths in Water Rescue Environments, What Needs to Change!
Mr. David Jephson
1Terrace Search and Rescue, Terrace, Canada, 2Dive Rescue International, Fort Collins, USA, 3Life Saving Society, Vancouver, Canada

P2.05 - Poster Sessions, East Exhibit Hall B, June 16, 2019, 12:45 PM - 2:15 PM and June 17, 2019, 1:15 PM - 2:30 PM

In the last 8 years there has been many rescuer deaths involving water rescue activities in Canada. Five of these were during training events. 2 Deaths were during ice rescue courses, one was in a swift water exercise and 2 RCMSAR members in 2012 while conducting ocean drills. After reviewing all of the evidence and having been involved as an Expert witness on one of them, there is a clear lack of responsibility and respect for the water on 3 of these deaths. Many departments have some level of water rescue ability, but does it meet any standard. During the training deaths we have seen no standard followed and material just being made up and presented to students to make the program “cool” or challenging. Surface Ice Rescue and Swift Water Rescue are two different disciplines; each carry inherent risks, both have claimed rescuer lives on actual rescue calls.

There seems to be a disconnect on the differences between these two disciplines, whether it is the training or the equipment. Equipment used for each discipline must be for the correct activity, Sar commanders and Instructors all need to understand that when they are presenting a course to their students, standards must be followed, manufacture instructions on equipment and course material must be followed. It is unfortunate that lives have been lost because trainers have deviated from these issues.

With recent deaths there needs to be a review of what water rescue level should be followed and also what standards need to be followed. There is currently one lawsuit in progress of a department who did not follow NFPA 1670. Does this standard cover all water activities, that is up for each department to decide, but they must choose an accepted standard so more lives are not lost.

P3.01
SAR Simulation and Training Developments for the Future SMART Marine Environment
Mr. Neil Bennett1, Mr. Timothy Park2
1Wartsila Voyage Solutions, Melbourne, United States

P3.01 - Poster Sessions, East Exhibit Hall B, June 16, 2019, 12:45 PM - 2:15 PM and June 17, 2019, 1:15 PM - 2:30 PM

As the Smart Marine Ecosystem becomes the industry’s preeminent operating model, big data analytics will optimise both maritime movements and vessel management, while intelligent vessels will enable automated and optimised processes. Through the expanded adoption of digitalisation and new levels of connectivity, the Maritime Industry is undergoing a wave of transformation, first ‘connected ships’ with advanced decision support tools and fleet monitoring via shoreside operations centers, then towards greater operational control from ashore with semi-autonomous and potentially autonomously operated vessels. The disruption in the industry and the effects of these changes on the requirements for SAR will be significant, with a need for future mariners and SAR personnel with potentially quite different skills than those of today. Simulation and Training tools are developing rapidly to support the requirements of future SMART Marine Learning with advances in levels of realism and immersion through the use of latest technologies. Today’s simulation hydrodynamic and physical modeling provides a high degree of accuracy in adverse environmental operating conditions, and allows for new applications of training for complex maritime operations. Connected and embedded simulators offer expanded common operational platforms for joint operations and large scale exercises, as well as innovative research studies to assist operational and contingency planning for emergency procedures. With simulation becoming available via the Cloud, advanced simulation training can be delivered ‘on demand’ with trainee control over time, place, path and/or pace of learning.
There presently exists commercial sources of data that could be more effectively utilized for SAR applications. In particular, the commercial imaging satellite WorldView-3 (WV-3), operated by Digital Globe, collects high resolution 8-band multispectral imagery (MSI) in the visible and near-infrared (VIS/NIR) that could be used to detect man-made signatures over water, specifically painted aluminum and fiberglass used on most aircraft and watercraft. This paper tests the detectability of these materials by processing 31 WV-3 VIS/NIR MSI data sets collected in 2015-2016 over a 3-meter diameter NOAA moored buoy off the coast of San Diego. To do this, a commercial software program called Environment for Visualizing Images (ENVI) was used to capture a reference signature of the buoy collected in 2014 and then apply both a manual and automated spectral detection procedure to the subsequent data sets. Strong autonomous detections of the buoy were achieved with a low false alarm rate under clear skies and calm water conditions. Under partially cloudy skies or rough water conditions, moderate autonomous detections occurred with an acceptable false alarm rate. Based on the results of this analysis, this approach could serve as a valuable compliment to existing SAR efforts.

P3.05
Atlantic Pacific’s Lifeboat in a Box: Empowering Local Communities in SAR
Ms. Kate Sedwell1, Mr. Robin Jenkins1, Mr. Adrian Lee1
1Atlantic Pacific International Rescue, London, United Kingdom

P3.05 - Poster Sessions, East Exhibit Hall B, June 16, 2019, 12:45 PM - 2:15 PM and June 17, 2019, 1:15 PM - 2:30 PM

Following the devastating Tsunami in 2011, towns and cities were destroyed in the north east coast of Japan. Communities who lost family, friends and colleagues were struggling with the reality of such an event. One such community was located in Kamaishi, Iwate. 5 years later, that community received Atlantic Pacific’s first Lifeboat in a Box. A uniquely designed unit that has a RHIB, workshop and changing room inside a 40ft container and can be located anywhere to operate as a SAR asset. Today they have 8 trained and committed volunteer crew and operate to safeguard events like the annual triathlon and other swimming events in the bay.

This presentation will use Kamaishi as a case study of how empowering local communities to help themselves in times of emergencies and disaster, offering them the
equipment and skills to run their own disaster response units, not only provides a valuable rescue asset, but also helps in recovery from major traumas as well as resilience for the future.

Mozambique is next on the list to Atlantic Pacific’s Lifeboat in a Box, hoping that this project will both reduce the drowning rates in Maputo, but also provide a new industry for the capital, and enable the community that receives the asset and skills to grow the service and facility in the right way for Maputo and Mozambique.

The presentation will conclude with thoughts on how AP plans to give Mozambique its SAR facility and the benefits of empowering local communities to develop their own services in advance of disaster or to reduce their own drowning epidemics.

P3.06
Saving Lives in the Mediterranean. SAR in the Current European Political Climate.
Mr. Adrian Lee¹, Mr Robin Jenkins¹
¹Atlantic Pacific International Rescue, London, United Kingdom

P3.06 - Poster Sessions, East Exhibit Hall B, June 16, 2019, 12:45 PM - 2:15 PM and June 17, 2019, 1:15 PM - 2:30 PM

The so called “Refugee Crisis” taking place in the Southern Mediterranean has resulted in the deaths of thousands of innocent people who are simply looking for a more secure and safer existence. The efforts to rescue these desperate people has been mainly left for NGO’s and amateurs to resolve. The European response has been to try and criminalise the act of rescue and to try and cover up the atrocities taking place in their place of disembarkation: Libya.

Atlantic Pacific is a non-political organisation that believes that nobody deserves to drown. Our main activities involve the design and manufacture of Lifeboats and mobile Lifeboat Stations, however we also train crew, many of whom go on to volunteer on rescue ships in the Med and as shoreline support in the Greek Islands. We have trained over 120 people in the short 4 years of our existence and we have become a well-recognised provider of expert crew and have been involved with countless SAR events taking place in this devastating crisis.

The aim of the presentation is to outline the background and current situation of SAR in the Refugee Crisis, explain the current political responses and actions to SAR vessels in the Mediterranean and present case studies on research that has been developed as a response to NGOs working in the crisis and how to identify, locate and manage mass casualty recovery at sea.

Conclusions will be made from the presentation about the next steps and viability of the SAR operation in the Mediterranean, given that all ships are currently impounded, and open out a discussion on the developments made in the crisis in SAR technique and policy.

P3.11
Njords - A Self-sufficient and Portable Weather Station for the Public to Safely Navigate and Visit the Sea
Mr. Max Näsström¹
¹Independent Designer / Swedish Sea Rescue Society, Stockholm, Sweden

P3.11 - Poster Sessions, East Exhibit Hall B, June 16, 2019, 12:45 PM - 2:15 PM and June 17, 2019, 1:15 PM - 2:30 PM

According to statistics from the Swedish government agency, two out of three accidents occurring at Swedish seas can be connected to harsh weather.

Njord is an innovative weather station that monitors the local weather of an area, with real time weather information. The gathered weather information consists of numerous parameters and a live stream that’s presented through a free online application. Njord is portable, flexible, robust and reliable weather station that can be easily transported to a desired location. The aim is to reduce boating incidents due to harsh weather.

The weather station was originally design for the Swedish archipelago in a master thesis assignment for the Swedish Sea Rescue Society, to complement their current weather application with more specific local weather conditions. The weather station has been designed to fit the Sea Rescue line of work and the environment it will be placed in and be a future asset in providing users with lifesaving information.

The weather station is ideally placed at the highest point of an island, where measurements are then done at a height of three meters from the ground to obtain local weather information that is then presented and accessible through the weather app. The weather station consists of a two-part structure, uniquely and innovative designed to facilitate the transportation, and make it possible for one person alone to easily carry and install the station onto a
specific spot.

The poster presentation will include a brief of the need for the weather station, the different features and functions that makes this product unique and innovative, and explanatory visual illustrations.

Njord makes a great asset for many purposes for the future innovation of SAR and can also find many other areas of use.

P3.12
Marine Engineer
Mr. Bahne Ngwa¹
¹Regional Maritime University, Accra, Ghana

-P3.12 - Poster Sessions, East Exhibit Hall B,
June 16, 2019, 12:45 PM - 2:15 PM and
June 17, 2019, 1:15 PM - 2:30 PM

The conventions aim to develop an international search and rescue plan in order to help in the rescue of persons in distress at sea, wherever the accidents happens, through the co-ordination with SAR organizations.

-A specify requirements for seafarer training related to search and rescue operations.

-Operators should ensure that any single person on board their vessel, is familiarized with vessel’s characteristics, equipment and procedures, related with their duties and also including those in case of emergency.

-All vessels should have a specific procedures and plans that should be followed if SAR operations are needed. More to that, search and rescue drills should be conducted periodically on board, to ensure personnel’s familiarization.

The Future marine service is dependent on securing a sustainable funding.

-The option of a rescue levy would provide a secure future for organizations with dramatically improved boats and other assets and a coast wide VHF radio network.

-A rescue levy on boat licenses and registrations is a fair way of ensuring rescue services are efficient and ready when needed. The levy would provide certainty and viability for Marine rescue. Better boats, better radio monitoring and better training education for boaters will mean every trip is safer.

THE ACTIONS TAKEN TO ENSURE EFFECTIVE SAR OPERATIONS WITHIN A WORKSHOP SHOULD BE NOTED.

-On receipts of distress call, a fix own position, calculated distance and steaming time to distress position should be noted.

-Communications with the RCC and scene coordinator and other SAR units.

-Emergency boats, ladders, nets should be ready and prepared with the crew for rescue operations

-Medical officers should be prepared for medical treatment of survivors and provisions of hot food and drinks to safe lives.

-The GMDSS officers on board should continuously listen and pay attention to watch the relaying distress signals.

-A notification to interested parties should be done and report to the office

Thanks for your attention

A1.01
Drowning Prevention, Rescue, Treatment – 2nd Edition
J. J. Bierens
Editor

-Explains prevention strategies, organizational aspects of rescue, and rescue techniques

-Describes pre-hospital and hospital treatment in detail

-Includes sections on diving, water-related disasters, and the investigation of drowning accidents

Since the first edition of the Handbook on Drowning in 2005, many epidemiological data have confirmed the burden of drowning in several parts of the world. Studies have increased the understanding of effective drowning prevention strategies, rescue techniques, and treatment options. Much has been learned about submersion and immersion hypothermia, SCUBA-diving injuries, the life-saving preparations of water-related disasters and how to deal with forensic investigations.

In this updated second edition, experts from around the world provide a complete overview of current research data, consensus statements and expert opinions. The book provides evidence-based practical information and has a unique informative value for various groups with tasks, duties and responsibilities in this domain. In addition, the book may be an inspiration for future networks and research initiatives.

The IMRF is able to offer this very important reference work for only £20 (c. Can$ 34, US$ 24, € 23) plus postage & packing. This represents a very significant discount: the IMRF believes that this book should be widely read within the SAR community.

You may obtain your copy from the IMRF’s online bookshop at https://imrfbookshop.org or www.international-maritime-rescue.org / shop. Please note that stocks are limited.
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