



D6.7 ArcticWeb expanded to include self-organised emergency response capabilities

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Review

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1 Background

Search and Rescue (SAR) operations in Arctic regions are difficult due to the harsh environment, communication limitations, remoteness/distance to rescue resources and other vessels, etc. These factors influence the successful execution of SAR operations and tools supporting the calculation, communication and vessel management are important, including capabilities to self-organize the emergency response.

The SAR Tool is building on promising results from development and tests conducted during the EfficienSea and ACCSEAS projects and has been developed, assessed and implemented in ArcticWeb in close cooperation between EfficienSea 2 and the Nordic Council of Ministers flagship project 'ArcticWeb'.

Communication, timely and correct, between parties during a Search and Rescue operation is of utmost importance. Today information is primarily exchanged via different ways of voice communication which is both time consuming and contains a great risk of misunderstandings. The SAR tool is a tool envisaged to optimize communication and improve situation awareness during SAR operations. Important relevant information required to be exchanged is, amongst others: search areas, search patterns, datum, drift calculations, and areas searched. This important information is exchanged electronically/digitally between parties, both onboard and ashore, and is presented graphically on vessels' and coordinators' displays. The coordinators are the SAR Mission Coordinator (SMC) or the On-Scene Coordinator (OSC).

The overall idea of SAR Tool concept includes the following:

- Calculation of search areas and patterns (based on the ICAO/IMO IAMSAR Manual)
- Import of SAR Data from Commercial drift calculators
- Communication of search areas and patterns from SAR Coordinators ashore (SMC) or at sea (OSC) to Search and Rescue Units (SRU)
- Search and Rescue Unit tracking and management
- Geographic presentation of search areas/patterns, including areas effectively searched
- Shared log functionality and short text communication

The tool consists of 3 modules:

- 1) a calculation and presentation module

- 2) a communication and management module, incl. shared log functionality
- 3) a positioning module

where 1) and 2) has been in focus during this implementation.

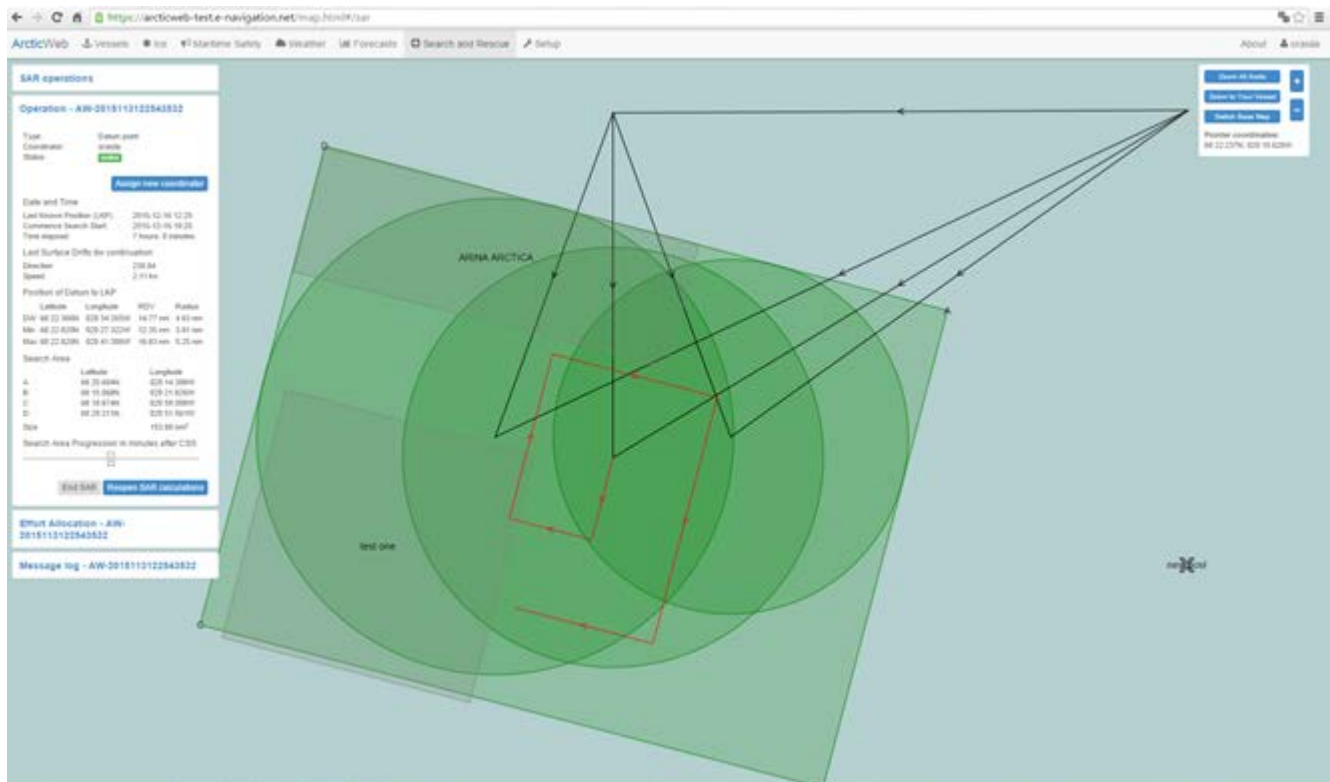


Figure 1: Presentation of search areas and patterns

The ArcticWeb SAR tool will make it possible for vessels and shore authorities to calculate search areas and search patterns. The calculations are based on recommendations and calculations provided in the ICAO/IMO IAMSAR manual (International Aeronautical and Maritime Search and Rescue Manual). Integration of drift information from existing commercial systems, e.g. Saris, will be investigated further in 2017.

Functionality to transfer search and rescue information from one ArcticWeb user to another via internet has been developed, with the potential to improve information sharing and situation awareness.

The ArcticWeb SAR tool also provides shared log functionality where relevant text information is shared between parties (information on searched object, location of debris, weather information, etc.).

The SAR tool is in the beginning of 2017 being tested by SAR Authorities in Greenland and Iceland and results will be included in report and possibly input paper to IMO NCSR Sub-committee at a later stage.

The SAR Tool will be implemented in BalticWeb later in 2017.

2 Portrayal and functional description

When a serious accident occurs at sea, human lives will be at risk. This might be an aircraft performing an emergency landing at sea, a vessel taking in water, a man overboard or a small boat lost during a storm. In such incidents, a Search and Rescue (SAR) operation is initialized by the government with jurisdiction over the specific areas in which the accident has occurred. This operation helps to locate people and vessels in risk and rescue persons in distress.

An operation such as this requires key coordination of a number of vessels and personnel ranging from fishing boats to dedicated Search and Rescue vessels and navy vessels. As the ocean is constantly changing, so does the area which needs to be searched which adds to the complexity of the rescue operation. To rescue someone at sea, access to all possible information, regarding wind, sea currents, ships available for the search and the movements of the ocean are all vital.

The SAR Tool seeks to solve these issues by allowing automatic distribution of relevant SAR data to all relevant participants. The SAR Tool allows for seamless and automatic sharing of relevant data. The SAR Tool follows the organizational structure of the current standards, allowing an On Scene Coordinator (OSC) or a SAR Mission Coordinator (SMC) the tools to distribute and coordinate any participating Search and Rescue Units. Once an operation is underway the OSC can monitor the progress for participating vessels and electronically update the search areas. The SAR Tool allows the OSC to calculate SAR data using the built-in SAR calculator or import the SAR data from commercial drift calculation systems.

The following functions have been developed and implemented:

2.1 Ability to calculate Search and Rescue Areas

When an incident occurs, the first steps in a SAR operation is to calculate the likely place that the search object is located. This is done by applying wind and current information to the drifting object to establish a likely search area. The SAR TOOL applies the theory outlined in the International Aeronautical and Maritime Search and Rescue Manual (IAMSAR) and

presents the user with an intuitive interface. Once the user enters the necessary data the software performs the calculations and the SAR area is then displayed directly in ArcticWeb.

2.2 Ability to calculate Effective Search Areas

Once the SAR area has been calculated, an effective search area for each Search and Rescue Unit (SRU) can be calculated. This is a statistical calculation that determines the maximum track spacing for a given vessel to maximize their likelihood of finding an object under certain weather conditions with a given search speed. Each participating SRU gets their own calculated Effective Area. Using the calculated track spacing and the selected search time, an area can be precisely calculated. These areas can then be selected and moved / resized (length vs width, area size will as default remain the same, if user changes the area size the Probability of Detection (POD) will change as well) to better cover the calculated search area.

2.3 Ability to create search patterns

With the search area and the effective SRU search areas created the OSC/SMC can create individual search patterns for the participating vessels. The SAR Tool allows creating of the common search patterns outlined in the IAMSAR Manual, e.g. Parallel Sweep Search, Expanding Square Search, etc.. Each pattern functions as a route for the selected vessel thus the OSC/SMC or the SRU can change the route to accommodate their current position and any possible hazardous terrain.

2.4 Transfer of data and monitoring

With the SAR operation created the OSC/SMC can keep track of the participating vessels/SRU's as they proceed with the search. The OSC can re-transmit updated information while automatically receiving the status of the search route for each vessel.

2.5 Sharing of common log and messaging functionality

The ArcticWeb SAR Tool also allows for text based communication and log keeping. At any point during an on-going operation the OSC/SMC or SRU's can share data via a common text log. This log is automatically transferred to everyone creating a group chat. Vessels will automatically receive and store the received messages with timestamps and sender of said message.

3 Test demonstration

For test purposes, presentation and a closer look at the ArcticWeb SAR Tool implementation, access the ArcticWeb [TEST] site.

<http://arcticweb-test.e-navigation.net>

Vessel login: arina/1qa2ws3ed (case sensitive in both User name and password)

