D6.5 Improved Route Handling/Exchange Capabilities in ArcticWeb

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Authors

Name	Organisation
Christopher Anderberg	Chalmers University of Technology
Cajsa Jersler Fransson	Swedish Maritime Administration
Scott N. MacKinnon	Chalmers University of Technology

Document History

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1	9.10.2017	SNM	Review of Presentation
2	12.10.2017	SNM	Review of Presentation
3	18.10.2017	CJF/CA	Presentation at Conference
4	1.2.2018	SNM	Renewal of Report

Review

Name	Organisation
Scott MacKinnon	Chalmers University of Technology
Christopher Anderberg	Chalmers University of Technology

"This project has received funding from the *European Union's Horizon 2020 research and innovation programme* under grant agreement No 636329".

Contents

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1 Introduction

The ArcticWeb was first developed as an in-house demonstration by the Danish Maritime Administration in 2012. Since then, it has undergone several iterations and was evaluated in EfficienSea2 through a series of simulated search and rescue scenarios allowing for virtual ships to exchange route information (¨liveposition¨). This allows relevant stakeholders access to this information instead of retrieving it from satellite AIS, which can be delayed for several hours.

The ArcticWeb could potentially demonstrate an increased capability to improve maritime safety in the arctic and could also be used as a complement to meeting some of the requirements of the Polar Code. Previous SAR exercises from an Arctic perspective have clearly indicated that lack of situational awareness is a limiting factor and creates limitations within emergency response chain. The ArcticWeb may be a solution to overcoming these deficits.

2 Experimental Work

A human factors analysis and practical testing of the ArcticWeb were conducted at Chalmers University of Technology between the 15th and 18th of August, 2018. The main foci of these simulations were to assess performance of safe navigation in polar regions and evaluation of a self-organizing (3 vessels) search and rescue event utilizing the function of the ArcticWeb.

Test participants were experienced in ice navigation and the majority had undergone recent polar operations (Swedish ice breaker crews). During the first day, functionality and usability of the ArcticWeb tool was undertaken. Also, participants unfamiliar with the ECDIS interface were trained in its efficient use. This was followed by three days of SAR exercises. Data collection included naturalistic observations, ArcticWeb usage and extensive debriefings at the end of each day.

3 Results

In general, the experimental results were favourable. The tool increased the situation awareness of the participants on the three vessels involved in the SAR activities. There was improved information exchange and reduced workload between the participants. However, more work has to be done on the interface to improve its usability.

4 Demonstration Activity

A demonstration of the ArcticWeb and presentation of experimental findings was completed at Ocean Innovation – E Navigation Underway North America, 2017 in St. John's, Canada. The presentation slides are included with this report (see Appendix 1).

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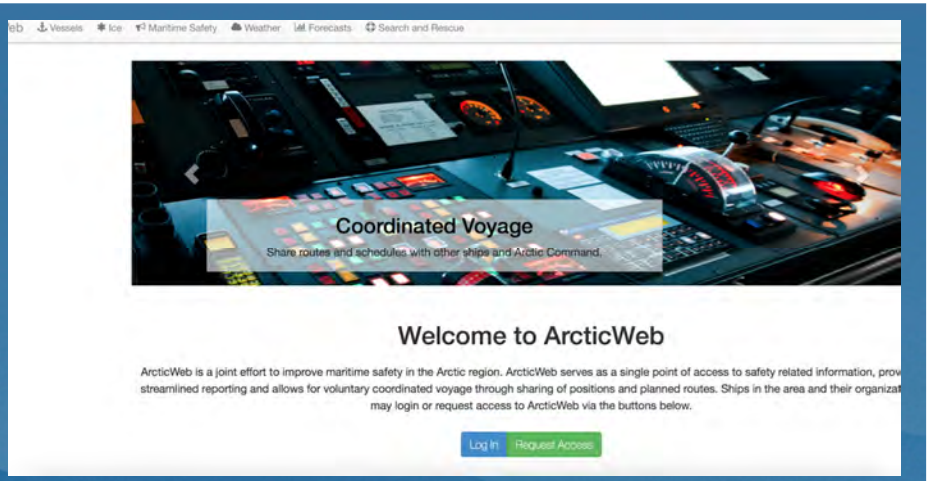


ARCTICWEB

A web-based platform supporting maritime safety in polar regions

18-10-2017 Ocean Innovation – E Navigation Underway North America, 2017

Cajsa Jersler Fransson - Swedish Maritime Administration
Christopher Anderberg - Chalmers University of Technology

This project has received funding from The European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement no. 636329

Agenda

History of Arctic Web

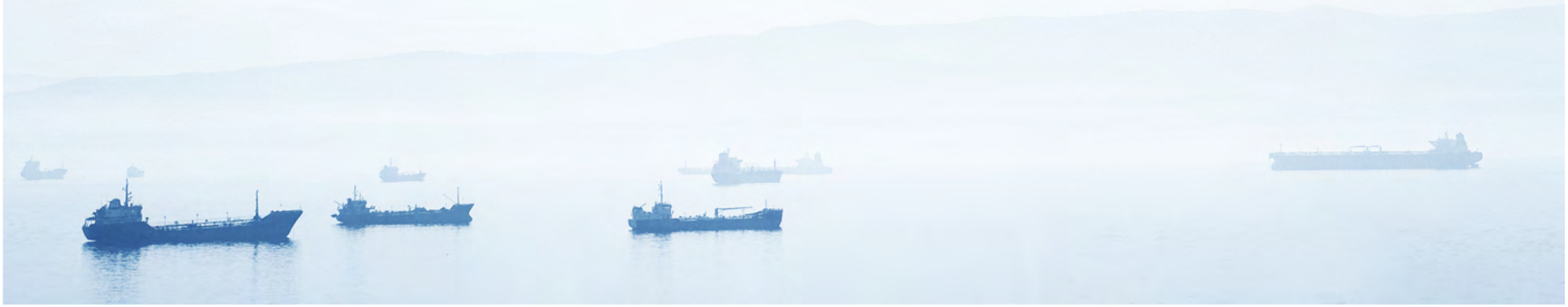
What EfficienSea2 adds to Arctic Web

Self-organizing response and decision support in ice navigation

Practical tests with the ArcticWeb in a simulated environment

The Result from the study

Conclusions



Arctic Web

DMA
Built a demonstrator inhouse

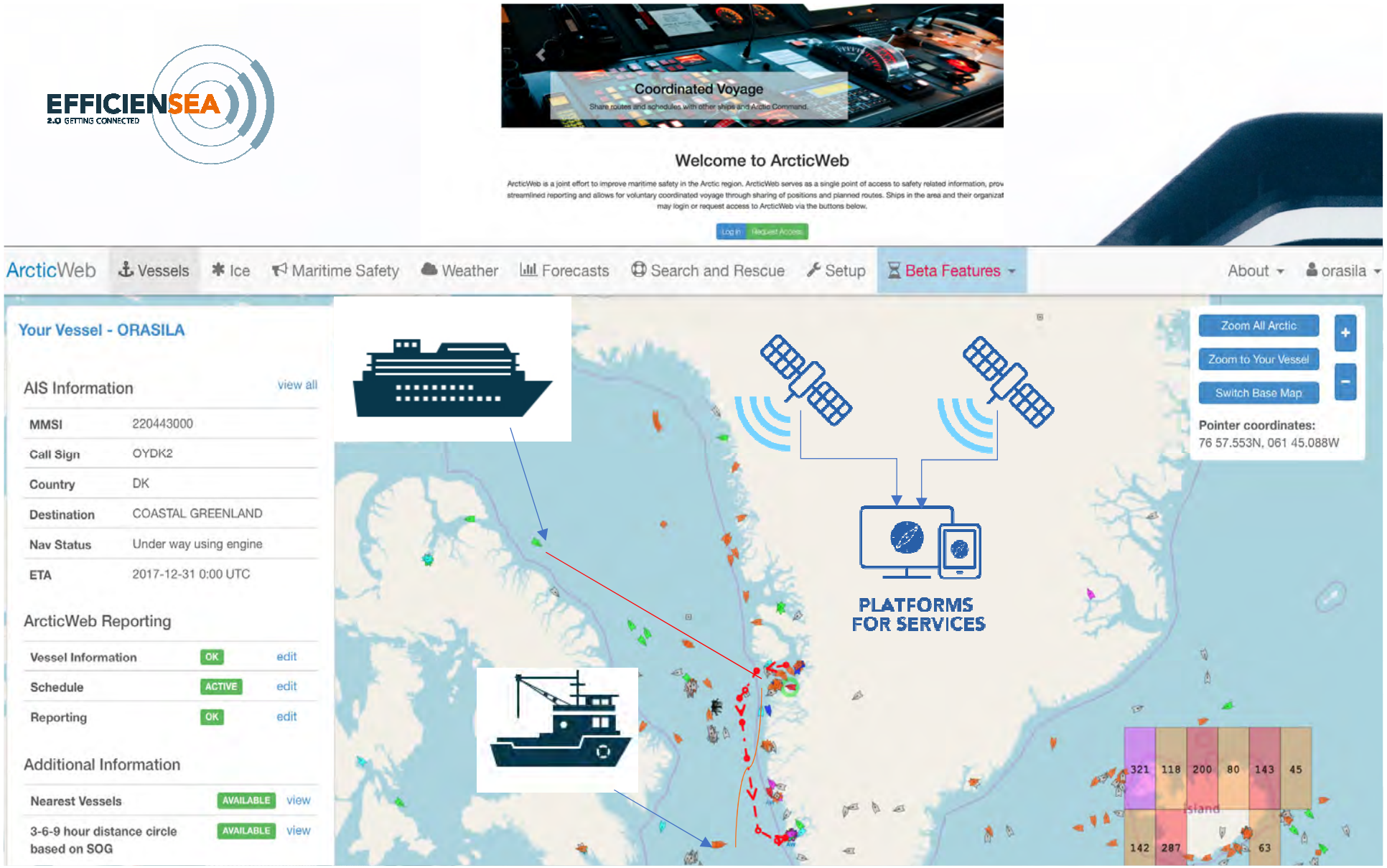
DMA+Danish Ministry of Defence

DMA+ Nordic Council of Minisers

EfficienSea2
EU funded project led by DMA

?

2012 2013 2014 2015 2016 2017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Coordinated Voyage
Share routes and schedules with other ships and Arctic Command.
Welcome to ArcticWeb
ArcticWeb is a joint effort to improve maritime safety in the Arctic region. ArcticWeb serves as a single point of access to safety related information, prov
streamlined reporting and allows for voluntary coordinated voyage through sharing of positions and planned routes. Ships in the area and their organizat
may login or request access to ArcticWeb via the buttons below.
Log in
Request Access
ArcticWeb
Vessels
Ice
Maritime Safety
Weather
Forecasts
Search and Rescue
Setup
Beta Features
About
orasila
Your Vessel - ORASILA
AIS Information
view all
MMSI 220443000
Call Sign OYDK2
Country DK
Destination COASTAL GREENLAND
Nav Status Under way using engine
ETA 2017-12-31 0:00 UTC
ArcticWeb Reporting
Vessel Information OK edit
Schedule ACTIVE edit
Reporting OK edit
Additional Information
Nearest Vessels AVAILABLE view
3-6-9 hour distance circle based on SOG AVAILABLE view
PLATFORMS FOR SERVICES
Zoom All Arctic
Zoom to Your Vessel
Switch Base Map
Pointer coordinates:
76 57.553N, 061 45.088W
321
118
200
80
143
45
142
287
63

The platform is intended for use by:

Ships

Shipping companies operating vessels in the area.

Arctic Command

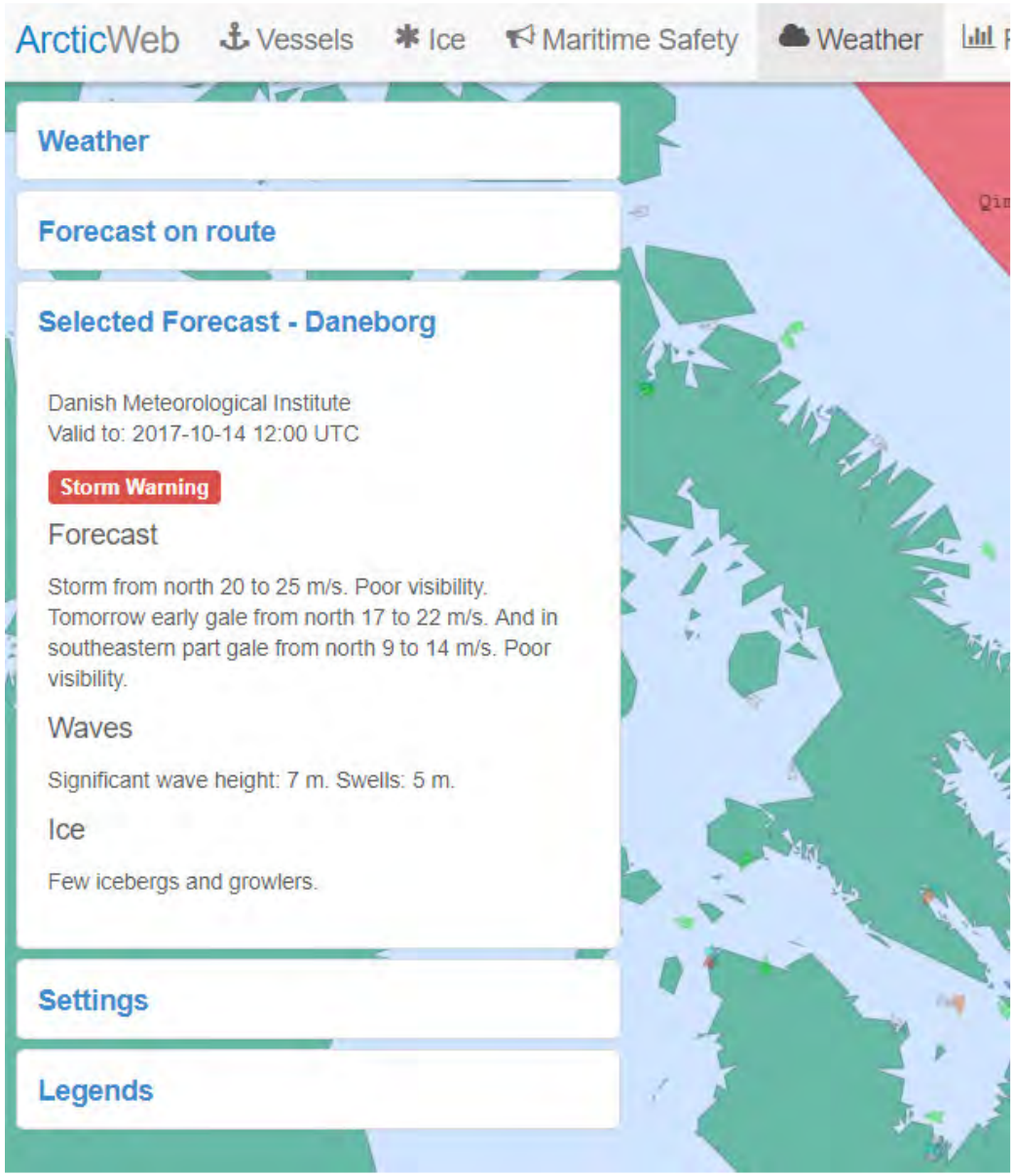
Other shore authorities/organizations (RCC etc)

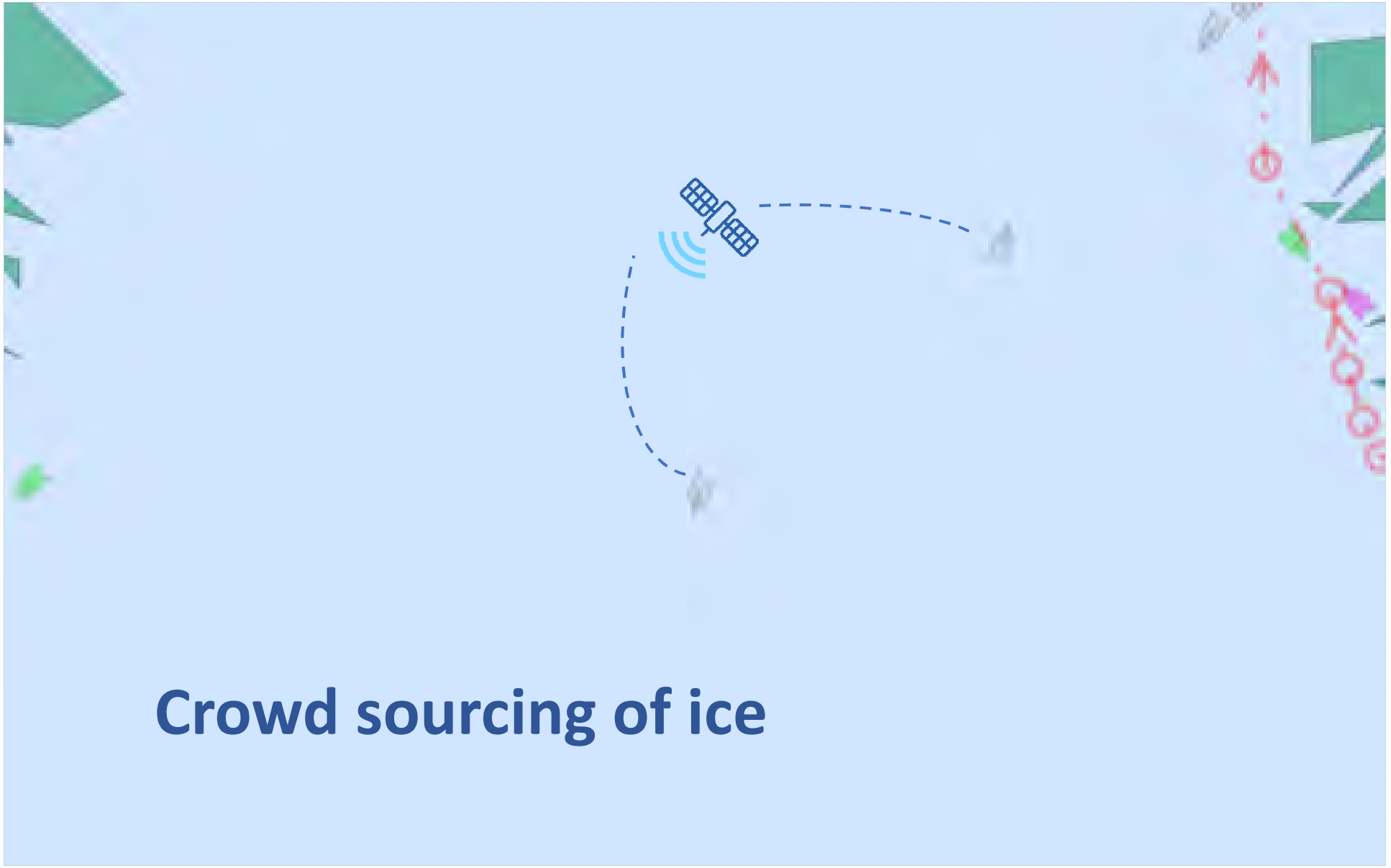
Optimizing route according to ice thickness/ resistance

Optimizing route for weather and ice conditions

New method for finding icebergs and waves

Minimising connection time/cost





Crowd sourcing of ice

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Space Weather Forecast

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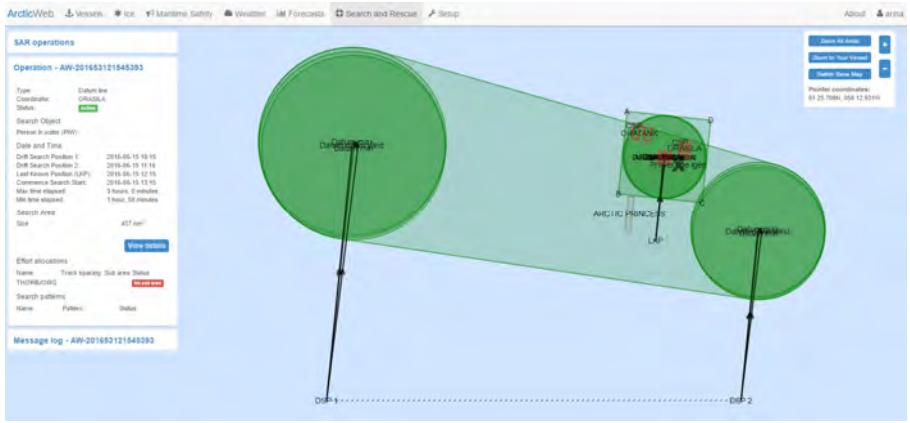
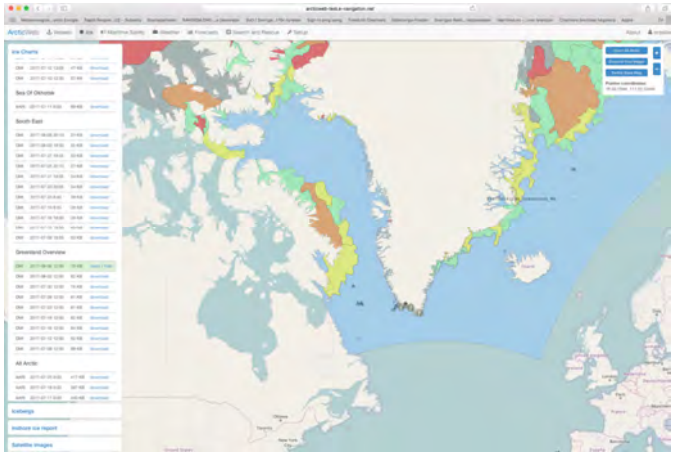
Space Weather Forecast

Capabilities ArcticWeb



- Ice and iceberg information, specific areas
- Weather information specific areas
- Route optimization, route planning, intended routes
- Position reports
- AIS feed of vessels – establish situational awareness (Satellite AIS)
- SAR capabilities – search pattern etc (Based upon IAMSAR protocols)
- Web based.. Limitations



ArcticWeb combines and provides information from:

- AIS data by **national and commercial satellites and base stations in the Arctic region.**
- **GREENPOS and COASTAL CONTROL** reporting.
- Coordinated Voyage through of **sharing of routes and schedules.**
- Sharing of **routes and schedules with Arctic Command**.
- **Ice charts** from **Danish Meteorological Institute (DMI).**
- **Inshore ice reports** from **Danish Meteorological Institute**.
- **Satellite images from NASA** provided by Danish Meteorological Institute.
- Navigational warnings from **Arctic Command and Danish Maritime Authority**.
- **Weather forecasts from DMI** including weather forecasts for a planned route.
- **Forecasts for ice, current and waves** provided by DMI and Defense Centre for Operational Oceanography (FCOO).

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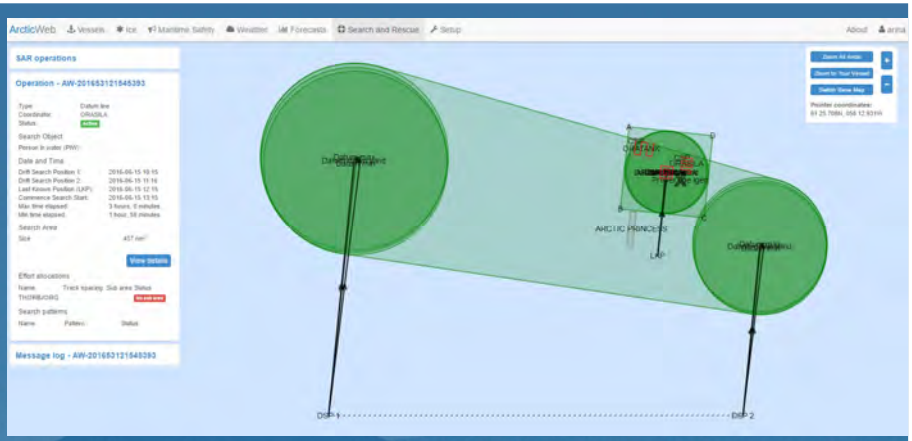

ARCTICWEB - Human factor evaluations and Practical tests

Conducted at Chalmers University of Technology, Gothenburg Sweden, between August 15th to18th

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ArcticWeb – Evaluations and Practical Tests

Purpose

- Evalaute **functionalities and usability**
- Evaluate the **SAR (Search and Rescue) capabilities**

Main Focus

- Support for **safe navigation in polar regions**
- **A common operating picture in a SAR situation** for OSC (On Scene Commander), RCC (Rescue Coordination Centre) and other involved resources
- Could **you self-organize** in a SAR event with ArcticWeb

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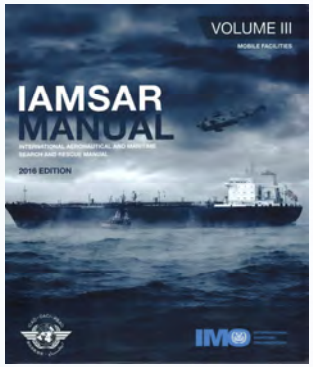
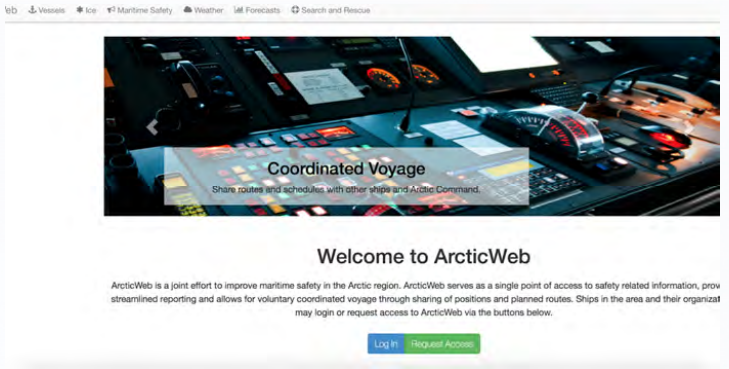
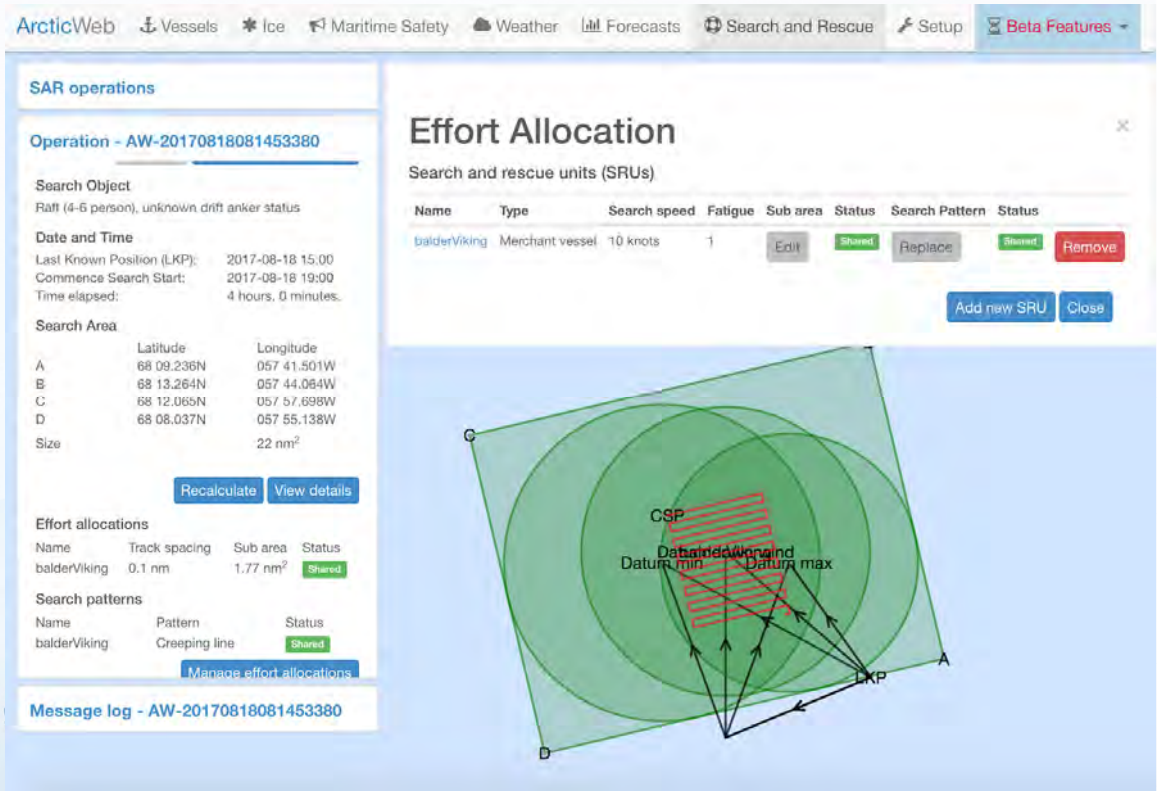


The SAR tool

- Organize **search areas**
- Allocate **Resources**
- Assign SRU to **search pattern**
- **Communicate**
- Monitor **progress**

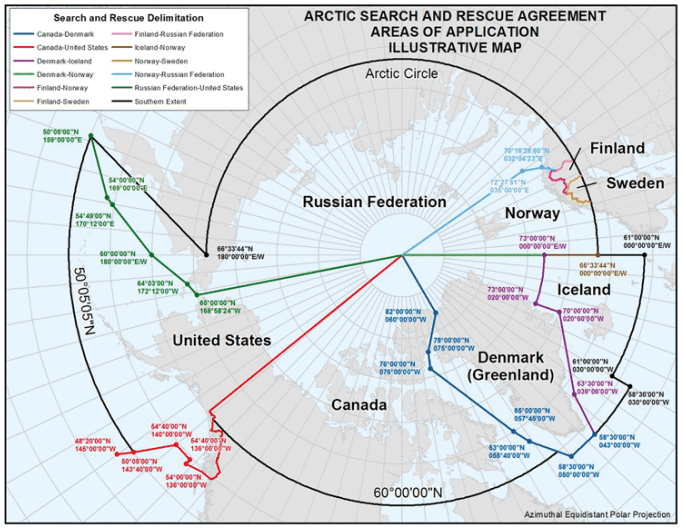
- **Common operating picture**
- **….Could we self-organize???**





Polar regions/remote areas Increased need for self-organizing?

- Lack of SAR resources and infrastructure
- Response time..
- Remote – involvement of RCC?
- Environment and weather
- Local conditions – RCC limitation – OSC better overview?
- Could local communities be involved?
- Communication/technical limitations..

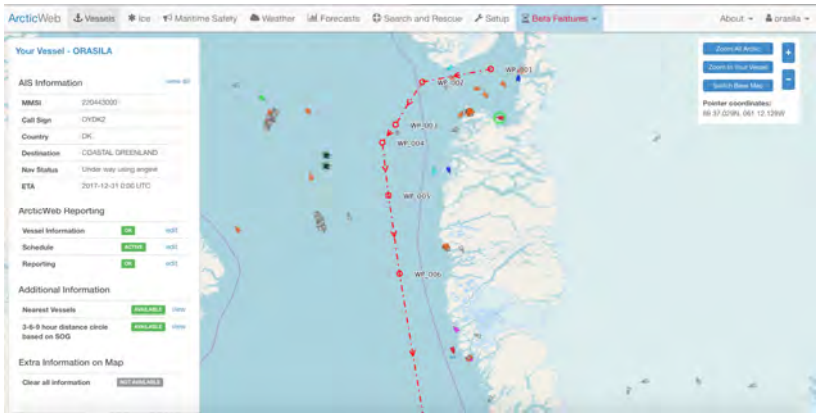


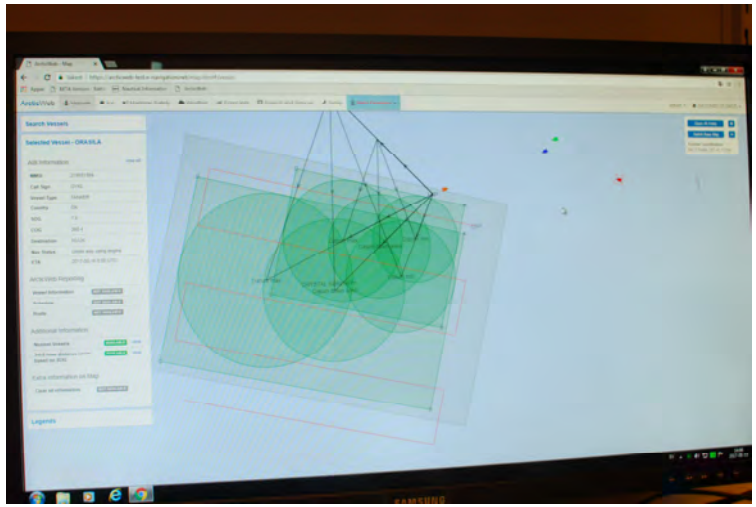
Set-up and structure of the simulations

- Conducted in full mission bridge simulators: **3 vessels**
- Test participants – **all experience from ice navigation** and the majority **experience from Polar operations** (Swedish ice breaker crews)
- **3 days of simulations** – Focus on SAR response and self-organizing
- **1 day functionality and usability evaluation. Familiarization** with SAR tool
- **Data collection:** Naturalistic observations – examining progress – Long debriefings

Areas and Scenario

- **Area**: West Greenland – west/southwest of Disko Bay
- **One baseline scenario (normal response)**, SAR with RCC coordination, OSC – **No ArcticWeb**
  Fishing vessel collides with growler, ingress of water
- **Three self-organizing scenarios with ArcticWeb**, OSC leading/organizing response, little involvement from RCC
  Vessel collision with growler x2 / Sailing yacht not under Command, drifting, unclear LKP (Last know position)
- **Simplified scenarios: In Focus: SAR and Self-organizing capabilities**
- **Technical:** Assumed full access to AIS data/no disturbances in data traffic





Observed results baseline scenario

How a SAR response is organized today…

- **RCC responded in a traditional way** - calculation of **drift/search areas**
- **Appointing OSC** – organizing search pattern and the search – difficult
- **Increased communication** between OSC and RCC
- **Increased communication** between OSC and SRU's
- **Shared operating picture** - ECDIS/Radar, AIS..

Results SAR – Self organizing

- The ArcticWeb provides a tool **to self organize**
- **With training** – organize search areas and designate SRU's with specific search pattern – **common operating picture – shared SA**
- **Improved information exchange** between SRU's - reduce **open communication**
- A designated OSC could **command and control** multiple SRU's at the same time
- **Increased workload** for the OSC
- A SAR involving **- known LKP (Last know position) –** good response
- **Uncertain LKP** - **difficult to self-organize**, need assistance from a RCC

Learnings from previous Arctic SAR exercises; ARCTIC SAR TTX in 2016 and Arctic Zephyr exercise in 2015. Where can ArcticWeb fit in?

Learnings (Some)

- **Available information about SAR resources** was in some **instances found to be inadequate**.
- ***Poor communication, lack of situational awareness and logistical support…***
- **Vessels of opportunity** - best option for responding to a mayday, and will often be on scene before the RCC can manage to organize other resources
- **Vessels of opportunity and local communities** constitute resources that can be implemented in a response.

Conclusions

- SAR and maritime safety in Polar regions are complicated
- **There exist a need for a platform**, where local maritime units could trigger a response – **common operating picture with RCC**
- How to assess the best **"Vessel of opportunity"**
- Further research/evaluation in the concept of **"Self-organizing"** in remote areas
- Communication/technical limitations ?
- Polar vessels, act as OSC.. **Need for training?**

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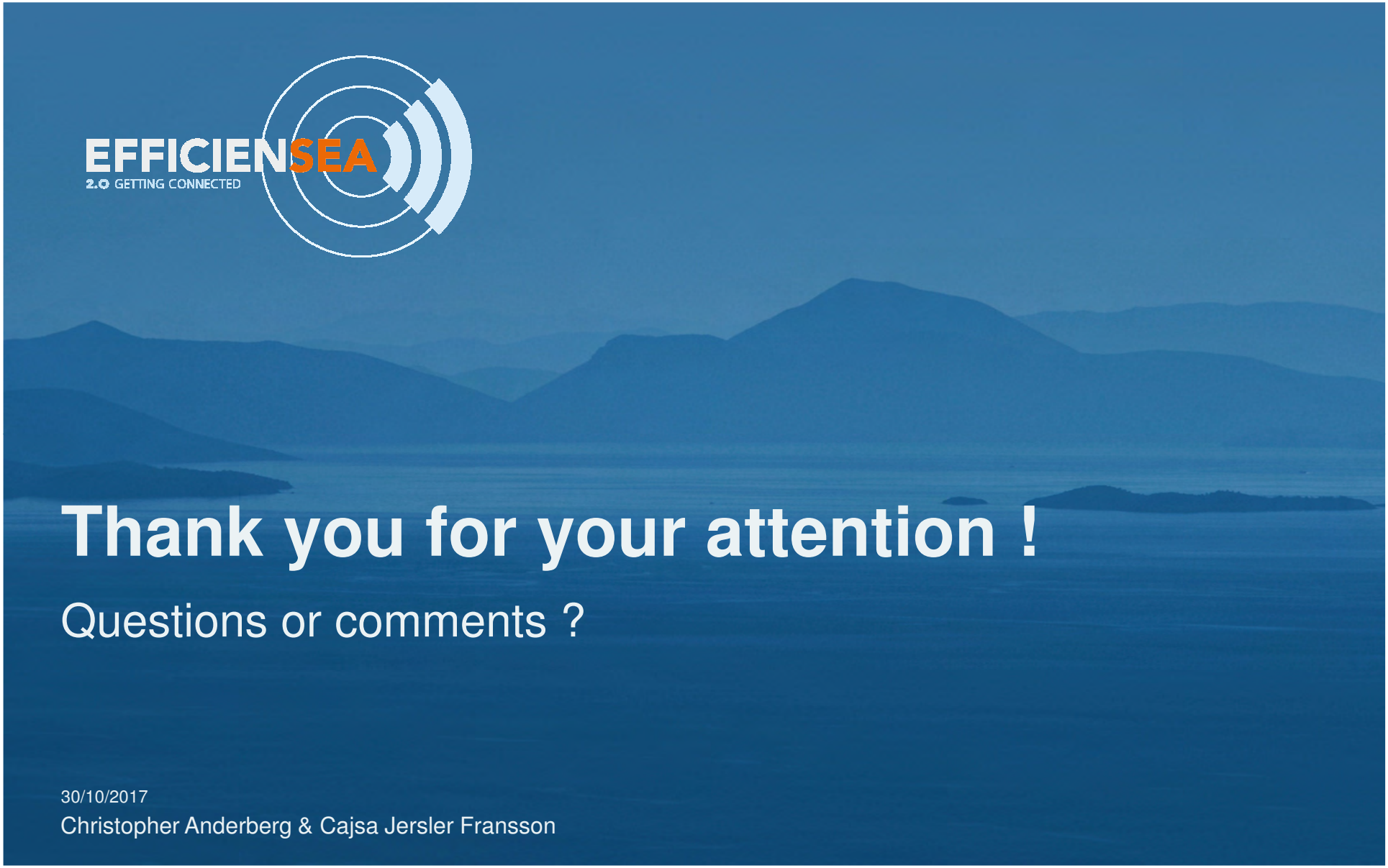
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Thank you for your attention !
Questions or comments ?
30/10/2017
Christopher Anderberg & Cajsa Jersler Fransson


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Questions popped up after?
Contact us:
Christopher Anderberg: christopher.anderberg@chalmers.se
Cajsa Jersler Fransson: Cajsa.jerslerfransson@sjofartverket.se