



UNIVERSITY OF
NORDLAND

BODØ GRADUATE SCHOOL OF BUSINESS

OFFSHORE OIL AND GAS OPERATIONS IN ICE INFESTED WATERS

**-resource configurations and
process management demands**

**Odd Jarl Borch
and
Norvald Kjerstad**

Background

- Interest for oil resources in High North sea areas
- Oil and gas exploration and exploitation a high complexity activity
- Special challenges in High North regions:
 - Remoteness from infrastructure
 - Unpredictable weather
 - Fluctuating ice conditions
 - Less researched area
 - Limited experience



Research questions

1. Different patterns of resource configuration:
 - a) Vessel categories
 - b) Vessel functionality and capacity
 - c) Competence of running vessels
2. How the context of ice infested waters and High North location of activity influence on resource configuration
3. The influence of context and resource configuration on operational process management
 - a) Logistics
 - b) Ice handling
 - c) Emergency preparedness



Methodology

- Design
 - In-depth studies of exploration drilling in two sea areas:
 - Disco Area, Baffin bay, West coast of Greenland
 - Kara Sea, North West Russia
- Data collection
 - observation studies
 - Interviews
 - Reports, document studies
- Analyses
 - Comparing technical specifications of vessels
 - Qualitative assessment of capabilities in the two sea areas



Analyses –context and vessel resources

	West Greenland	Kara Sea
Number of licenses	Limited	Limited
Number of operators	One	Two
Experience of operator	Low	High
Government demands	High	Mediocre
Nature	Fog, icy bits, icebergs	Drift ice, ice bergs
Infrastructure-distance to base	Aasiat-15 hours	Murmansk-four days
Infrastructure – helicopter bases	One hour	none
Drilling rigs (ice class)	Two (no ice class)	One (no ice class)
Anchor handling vessels (AHTV)	Four	Six
AHTV with ice breaker capacity	Four	Four
Depot and hospital vessel	One	one
Platform supply vessels (PSV)	Three	Three +AHTVs
Emergency response/oil recovery vessels	Two + AHTV/PSV+heli	One+AHTV/PSV
Surveillance plane	None	one
Totalt number of units	11 (2 rigs, 9 vessels)	14 (1 rig/13 vessels)

VESSEL RESOURCES WEST-GREENLAND SUMMER 2010



MPSV TROMS Vision VS 495 Kleven



PSV TROMS Pollux VS 485 Hellesøy



ERRV Esvagt Don/Challenger



Drilling ship Stena Forth
+ Stena Don semi-sub.



AHTS icebreaker Balder/Vidar
Viking KMAR808 Havyard



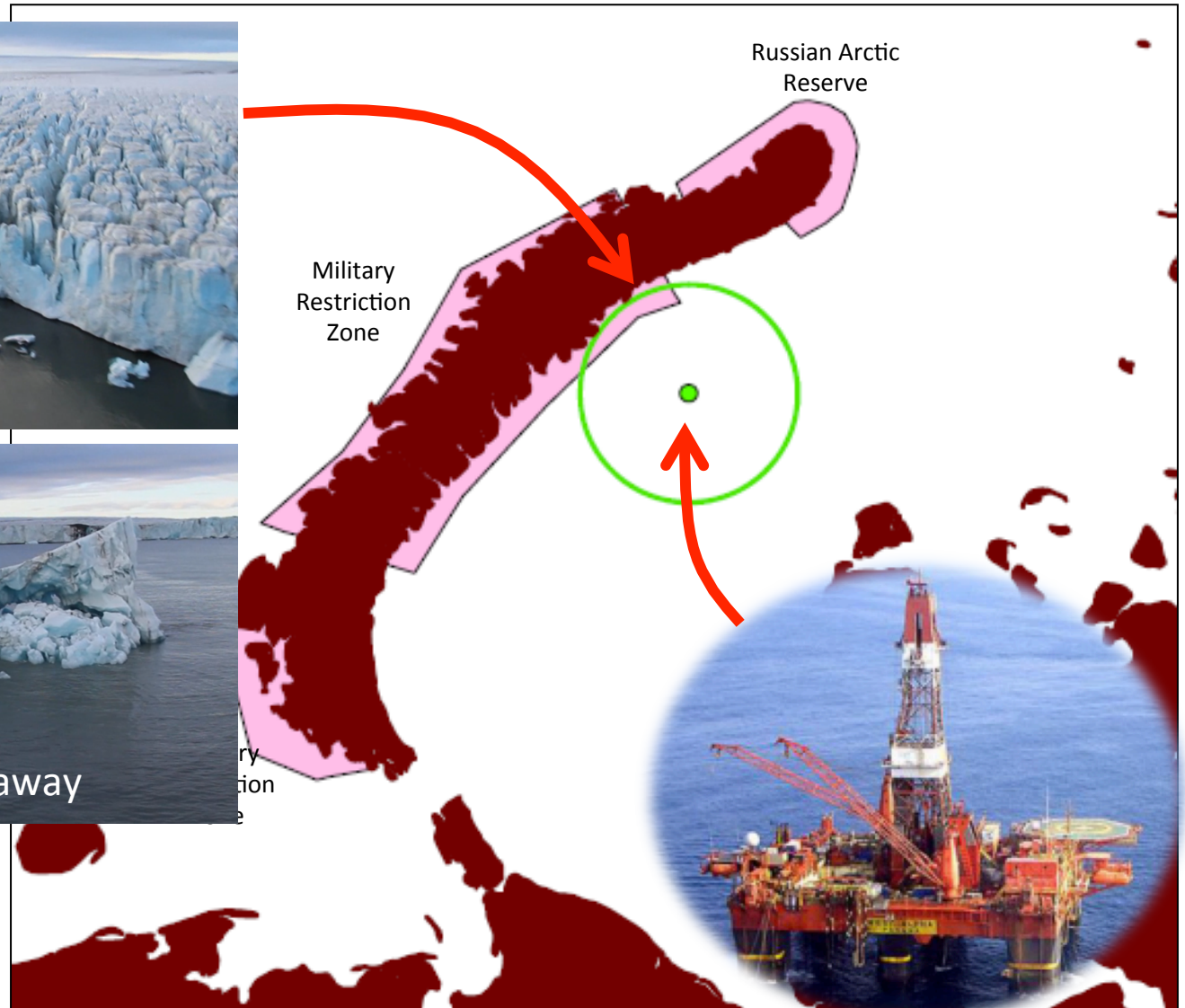
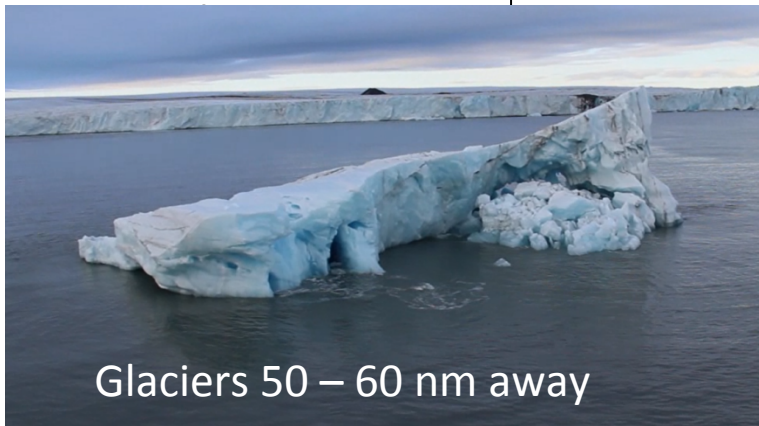
AHTS Loke Viking VS4622 Spain



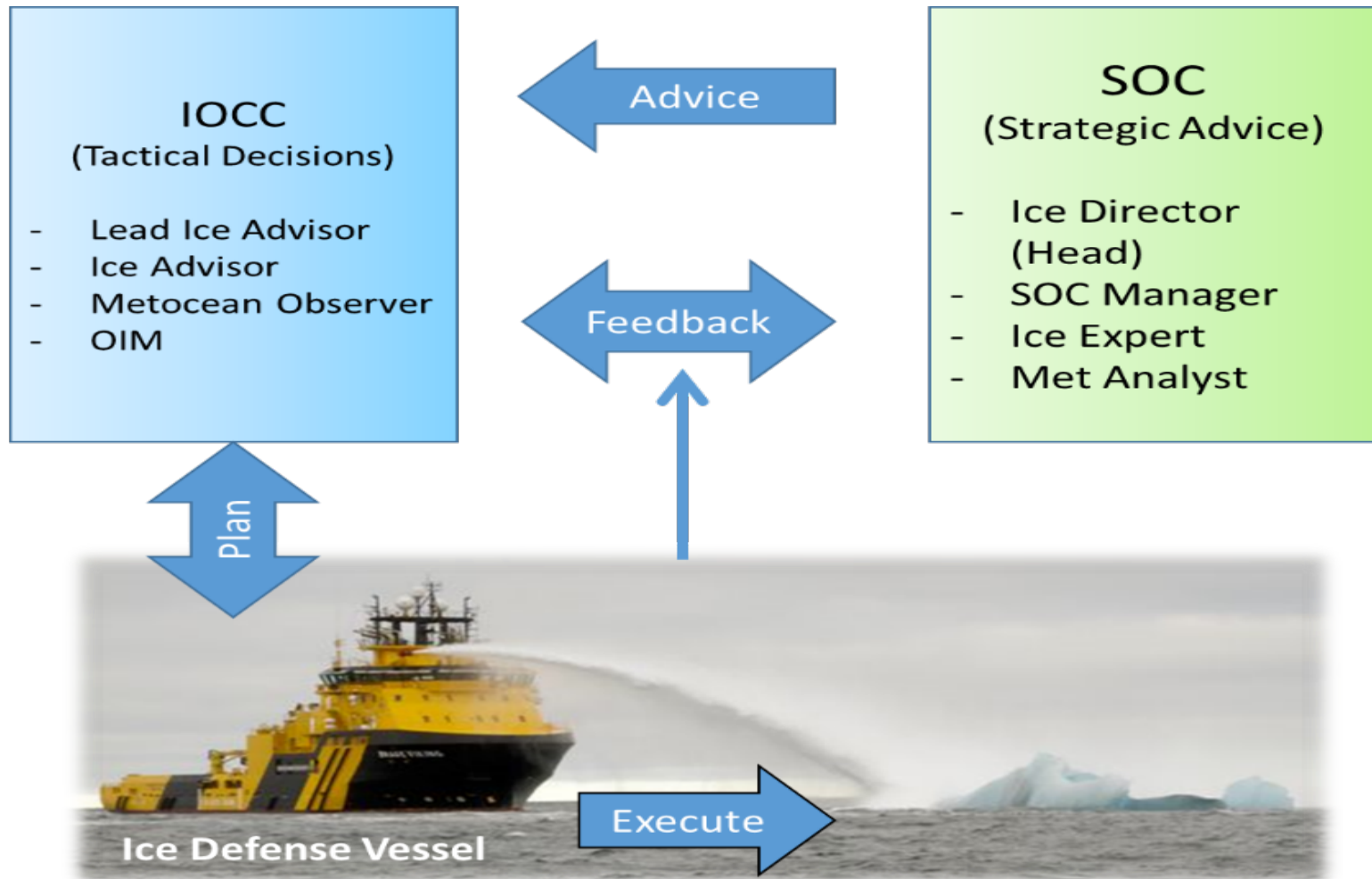
Greenland –fog 30% of time in Summer months- visibility 0,5 nm



Many challenges and questions



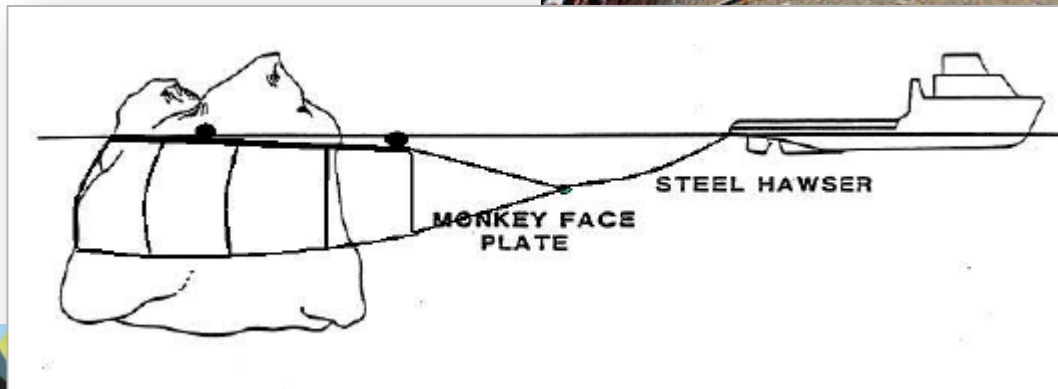
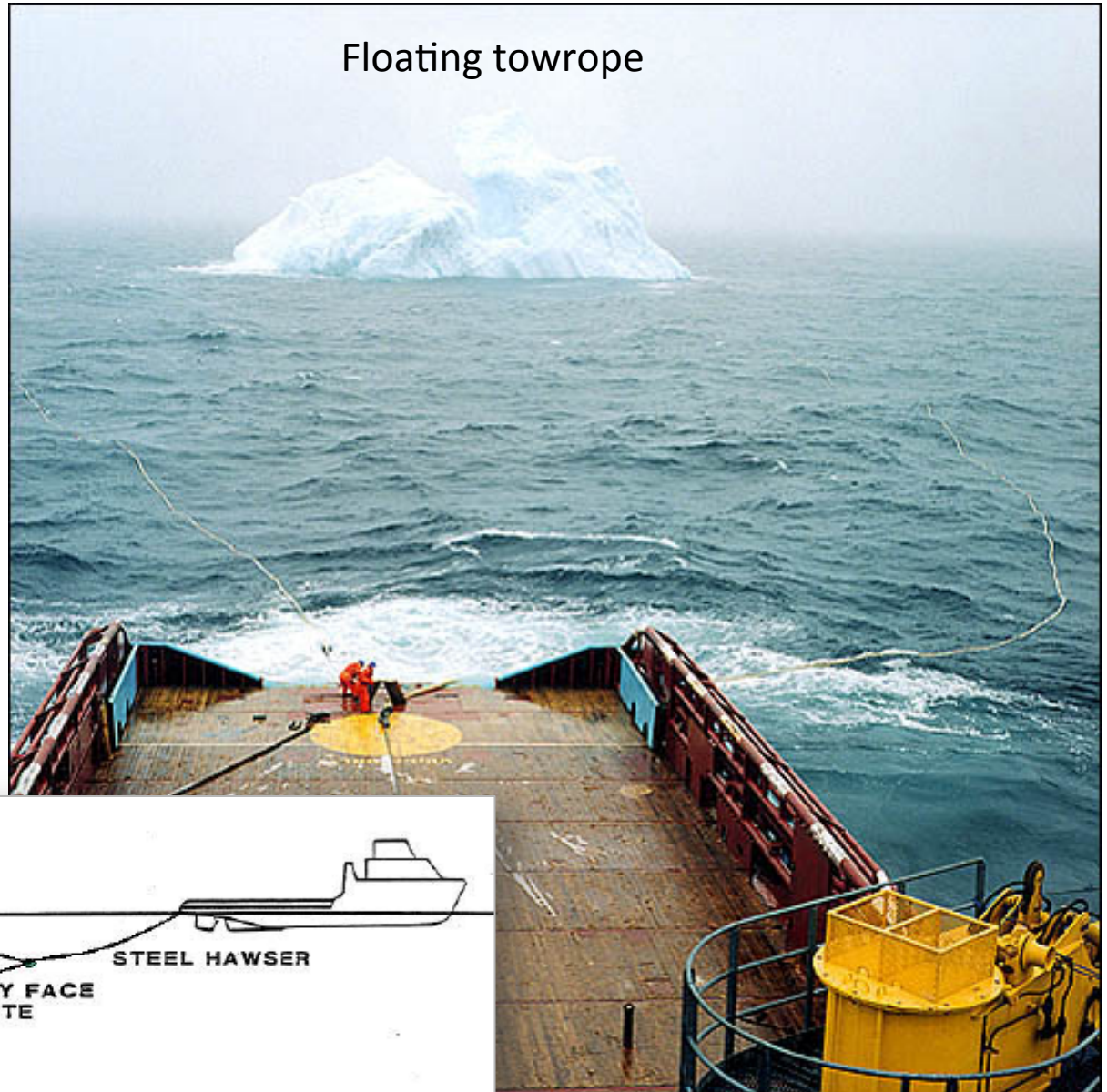
Ice defense process management



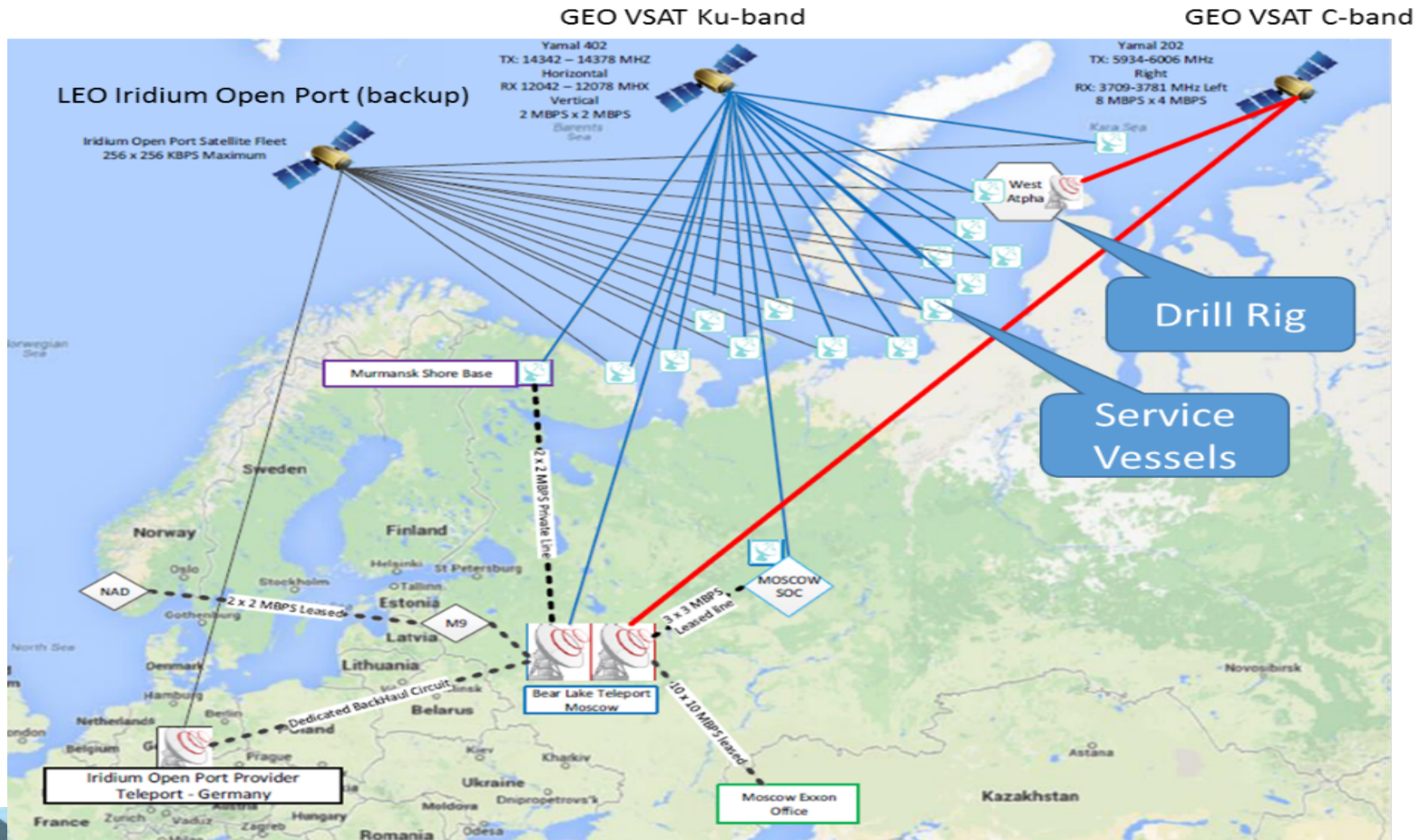
Ice Defense

- Towrope
- Townet

Floating towrope



Organization and communication between units in the Kara Sea operation



Process management

	CASE 1 WEST GREENLAND	CASE 2 KARA SEA
THE LOGISTICS PROCESS	<p>Coordination through local logistics personnel</p> <p>Use of local distributor for base-to-base transport</p>	<p>Much planning to secure all resources available.</p> <p>Had to take care of everything within operation</p> <p>Long distance and cross border customs difficulties</p>
THE ICE HANDLING PROCESS	<p>Challenges related to transport due to bergy bits in transport lanes</p> <p>Heavier icebergs a challenge for less experienced AHTVs</p>	<p>Challenging to plan operation due limited drift ice dynamics data (start / end of season)</p> <p>Exclusion from glazier fronts due to military regulations</p>
THE PREPAREDNESS PROCESS	<p>Limited capacity on oil spill preparedness. Limited government capacity</p>	<p>Limited local capacity on all levels.</p> <p>Limited government capacity</p>

Findings (1):

Context and resource configuration

1. ERRV-Positive relation between a) lack of government preparedness infrastructure, b) public and government awareness and emergency preparedness on SAR and oil spill risk reduction (ERRV and multi-functional AHTV and PSV vessels)
2. AHTV-Positive relation between a) ice risk, b) lack of oil rigs with ice strengtening and AHTV with ice breaker capacity
3. PSV-Positive relation between a) number of rigs, b) distance to base and technical service resources, c) fog and icy bits/flakes and the need for a) PSVs and b) depot vessel capacity
4. Rig- Positive relation between stakeholder conflicts and the need for additional rig capacity due to delay risks



Findings (2):

Context, Resource configuration and Business process management

1. The High North context (nature and stakeholders) together with high spec. resource configuration increases a) complexity and b) unpredictability of operation
2. Complexity and unpredictability call for additional business processes with overlap and redundancy
3. Special coordination units have to be developed to integrate processes at shore and ashore
4. The increased unpredictability calls for a) increased capability for process adaptation b) a high degree of bottom up management with autonomy and c) improvisation skills



Conclusion

- Operation in the High North is «not business as usual»
- Resource configuration is a technical specification challenge and costly
- Need for high tech vessels with multi-functionality (ice strengthened, emergency functions (SAR, Fi-fi, ORO), communication equip., storage, crane, ROV, hotel)
- Important business process management areas include logistics, ice handling and emergency preparedness
- There is a need for competent teams with specialized qualifications and a well-functioning task force organization



Implications

- Long range planning and training crucial for the operators and subcontractors
- Limited amount of vessel resources available
- Has to be prepared for the unknown through broad knowledge and training of personnel
- The government has to introduce safeguarding measures in the interests of the different stakeholders of the area (owners, crew, environment, communities) well in advance
- Need for more intensive research and knowledge development before accepting access to new licenses in ice infested waters

