



Rigg tilpassing polare strøk

Norsk Olje & Gass
20 mai 2014 Selbusjøen

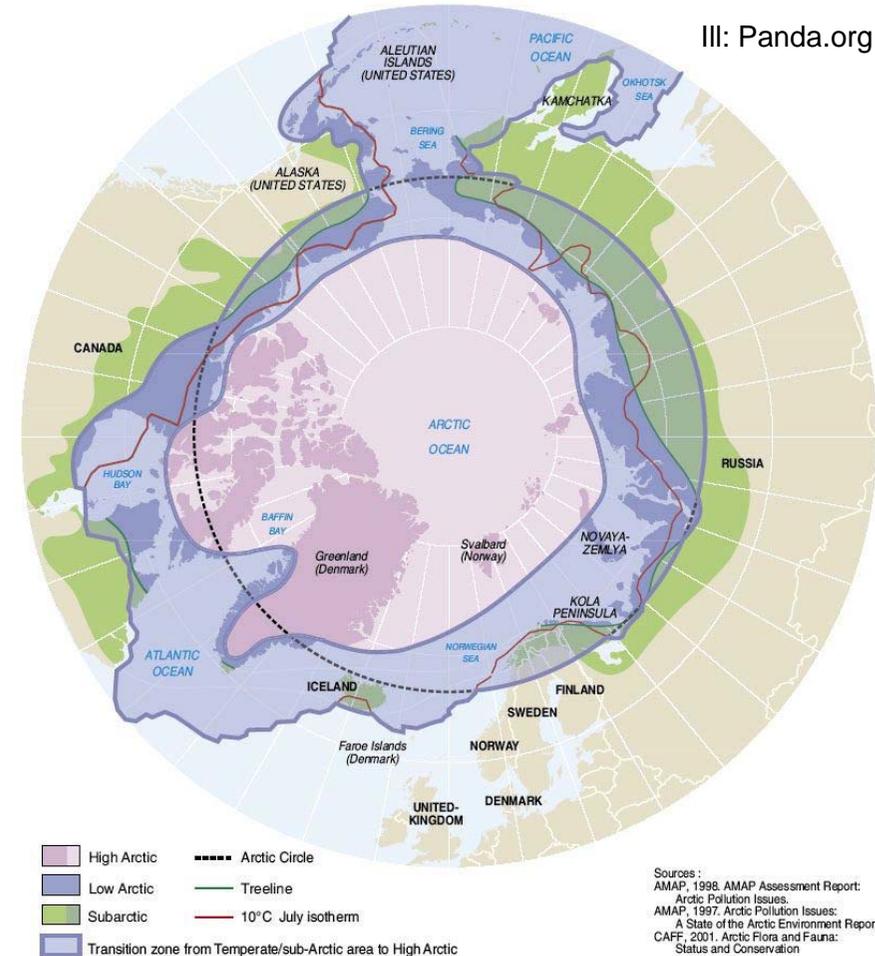
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Contents

- Challenges
- Operations in Ice
- Winterization issues

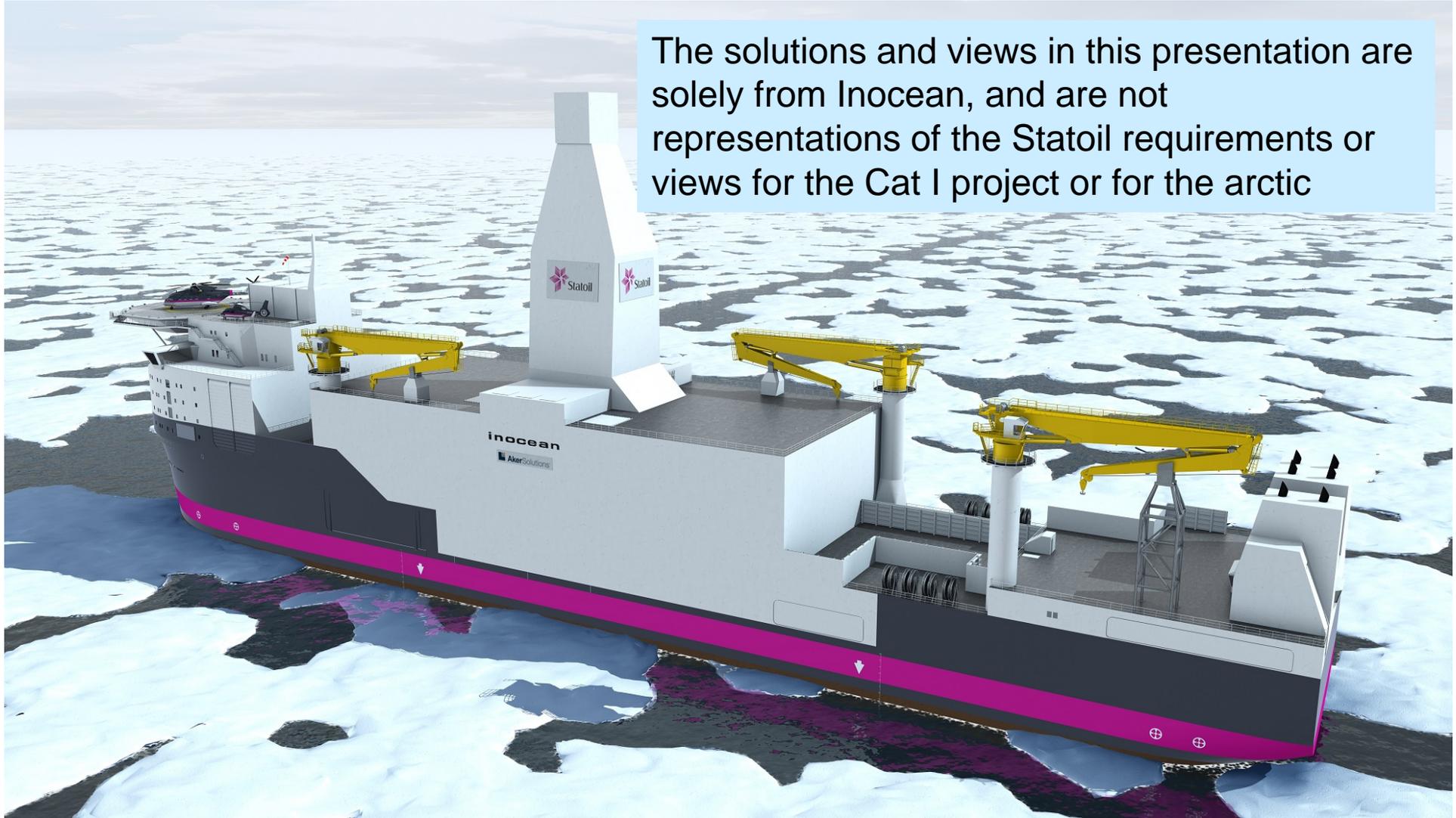
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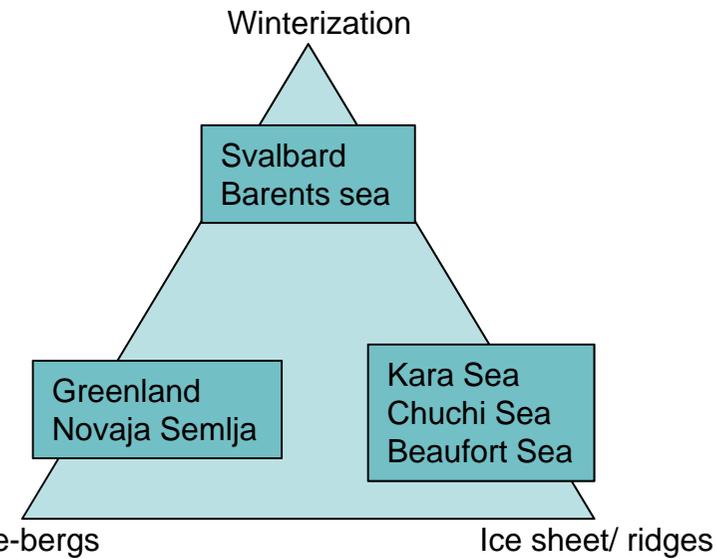
Cat I – Inocean proposal

The solutions and views in this presentation are solely from Inocean, and are not representations of the Statoil requirements or views for the Cat I project or for the arctic





Arctic areas – very different localities



Water depths – from very shallow to very deep

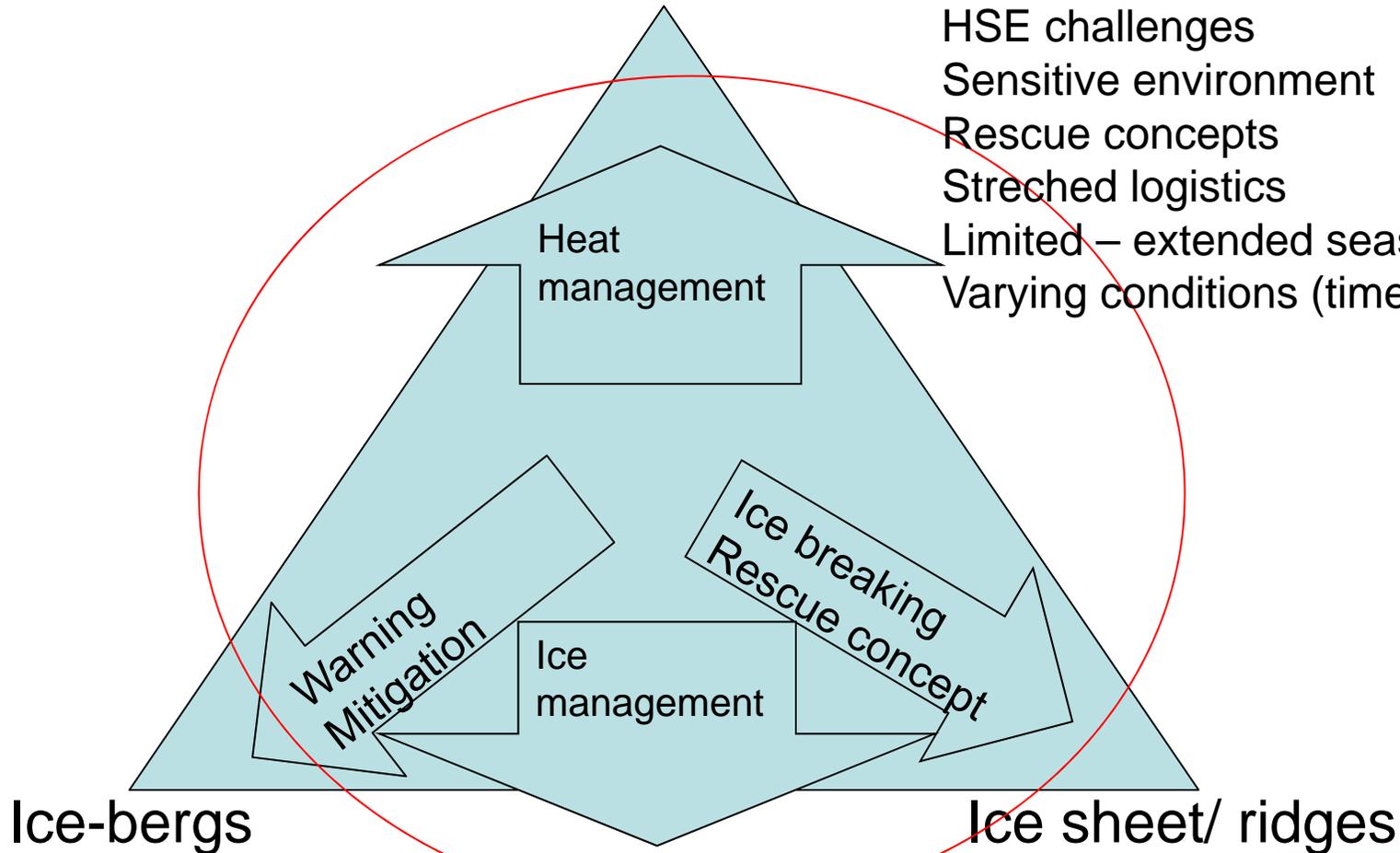


Operation & technology

Winterization

Common:

- HSE challenges
- Sensitive environment
- Rescue concepts
- Stretched logistics
- Limited – extended season
- Varying conditions (time/ space)





Ice management principles (1)

Challenges:

- Ice bergs
- Large ice floes
- Level ice
- Ice ridges

Methods:

- Towing
- Ice breaking
- Ice breaking
- Dispersal

And:

- Surveillance
- Warning

The time factor is important:

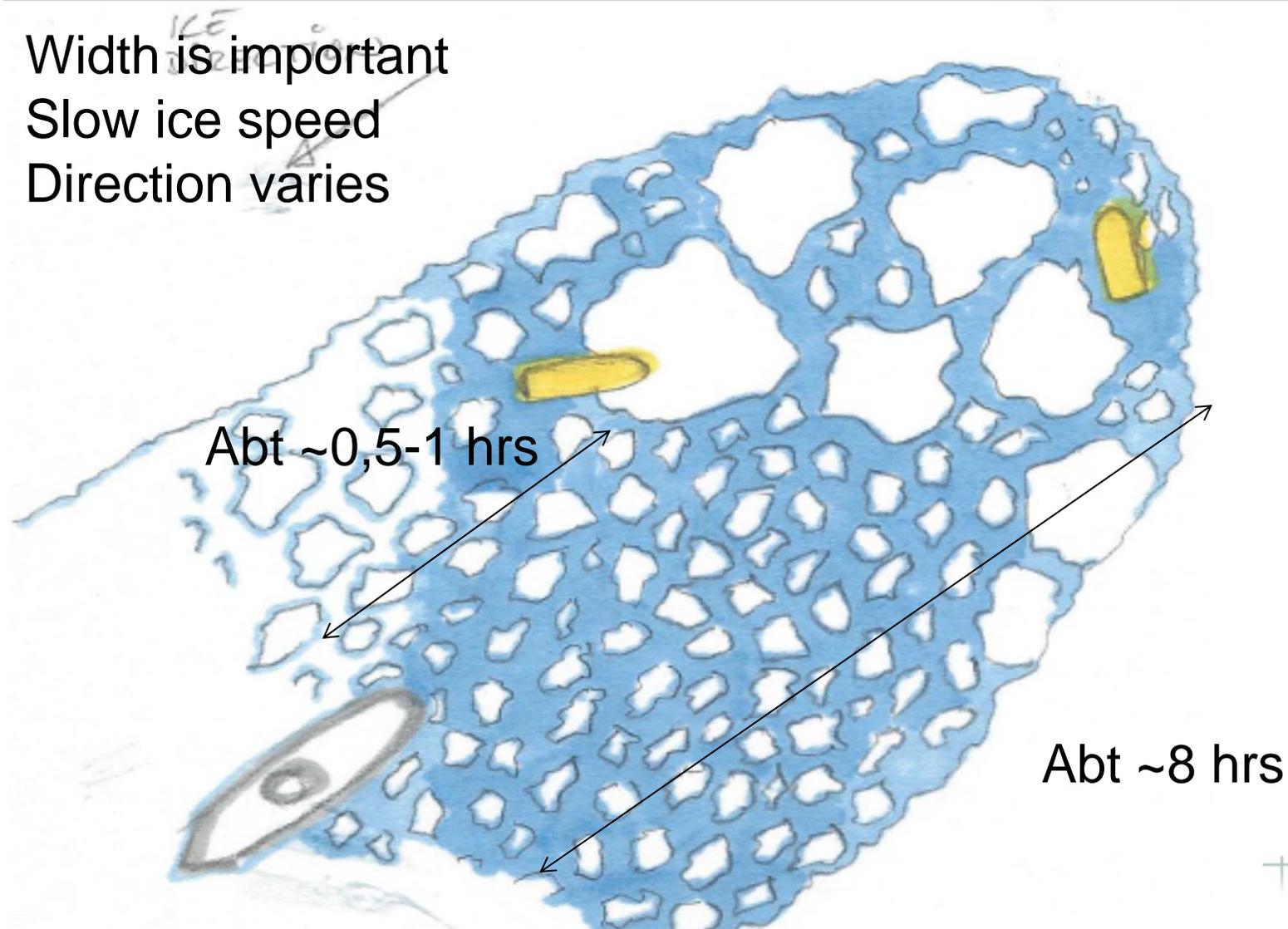
- Time to manage the environment ...
- Time to plan and execute mitigative actions





Ice management principles (2)

Width is important
Slow ice speed
Direction varies



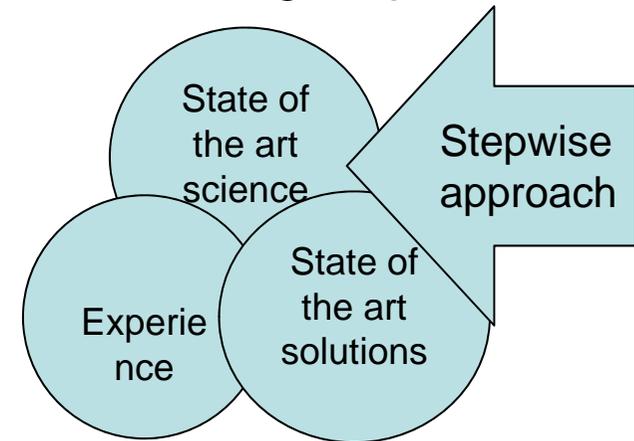


Rules and regulations framework

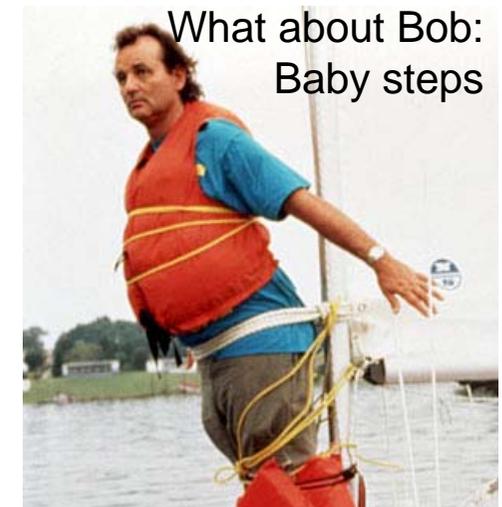
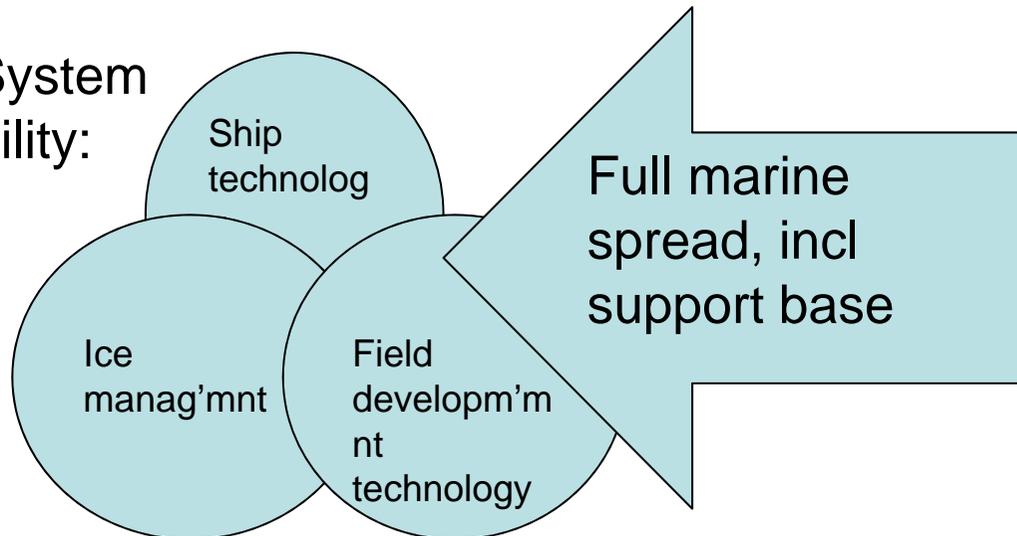
Maturity of framework is variable - not a lot of experience backing it up:

- Some requirements are too slack
- Some requirements are too tough
- Some requirements are poorly defined

Experience is needed – stepwise approach advised



Total System Capability:





Arctic Rescue and Evacuation concepts – not a review!



Many concepts – none cover all scenarios/ conditions – neither do traditional concepts
More will come ...



Arctic Rescue and Evacuation concepts – not a review!



Why use the above –
when you can be
cozy here?

Challenge: Bad
weather and some ice

...



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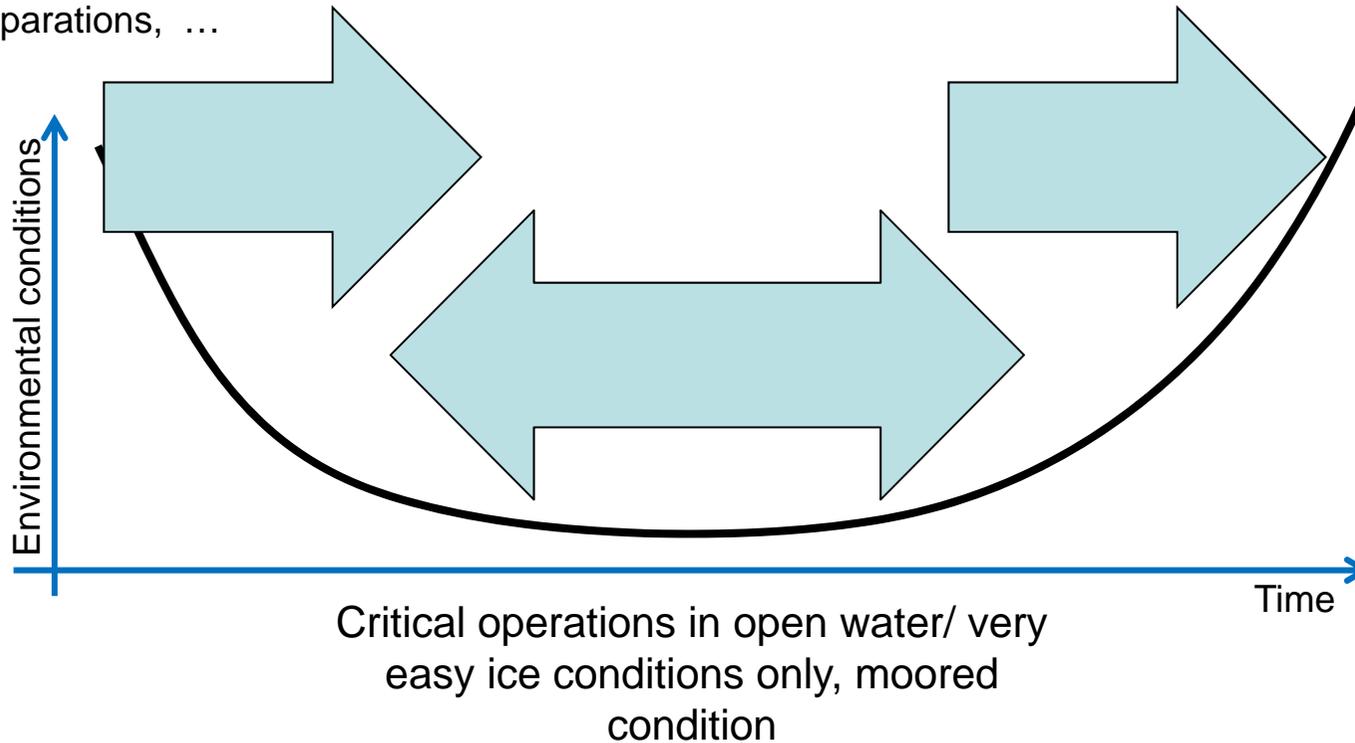




Arctic Drilling Operational Capabilities

Early entry: Transit in ice, DP operations, Hook-up, Preparations, ...

Late Exit: DP operations, Disconnect, Clean-up, Transit in ice, ...





Ice testing



Test 5120, DP



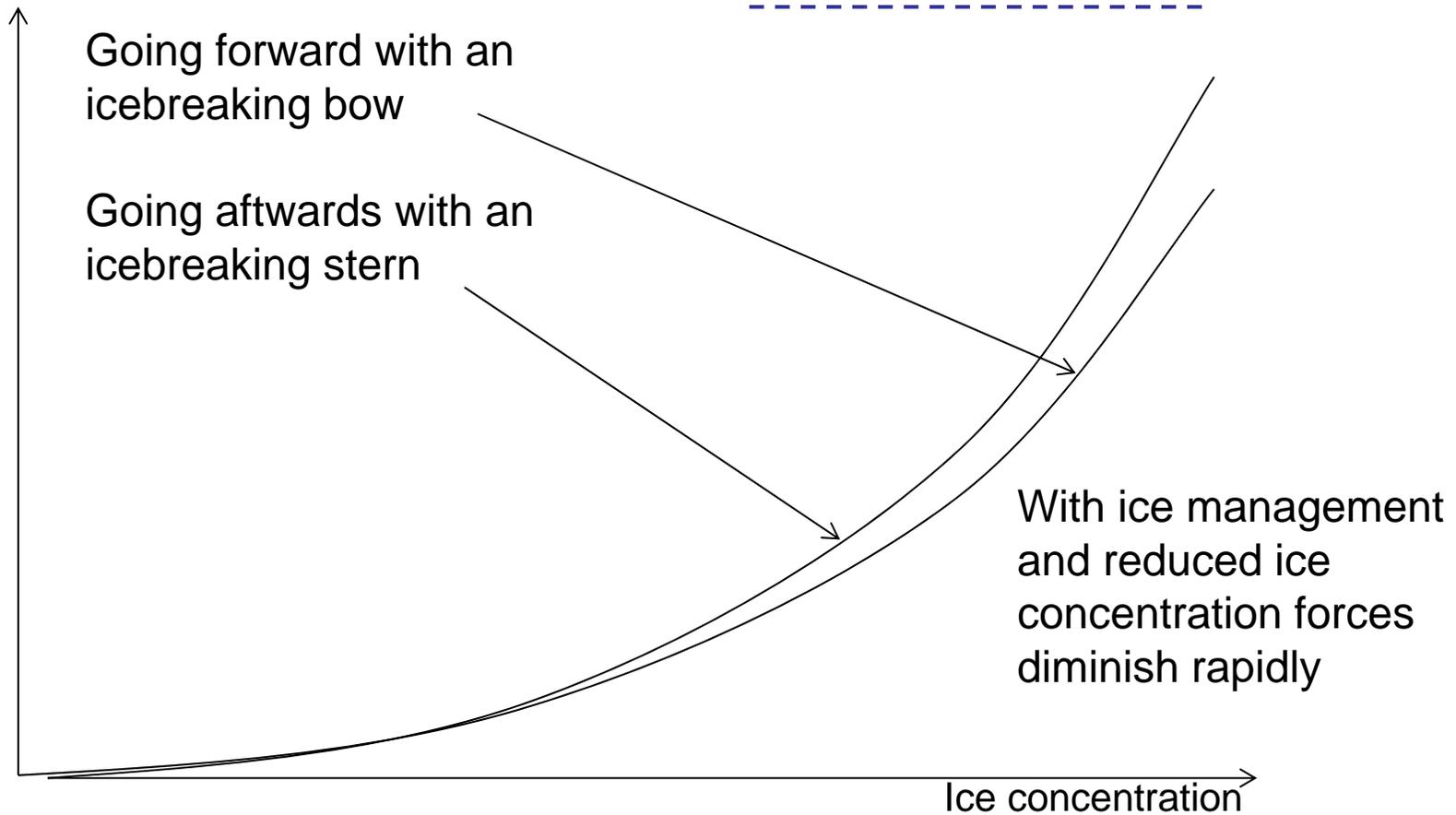
Test 4160, moored





Managed ice resistance - example

Level/ unmanaged ice resistance





Inocean Marotec Giant 10k Winterization

- Operation in Arctic winter conditions -30°C
- No compartment with temperature $< +5^{\circ}\text{C}$ (for external -25°C)
- Derrick with cladding
- Drillfloor/cellar-deck/pipe-rack shielded and heated by fan-coil heaters and infrared heaters
- Escape routes and helideck heated
- Pump rooms arranged with fan-coils (used for both heating or cooling)

Green platform:

- Compliance with rules and regulations for all environmentally sensitive areas
- Zero discharge with closed drain system
- Large capacity waste fluid tanks
- NO_x reduction 85%-95% with Urea injection
- Very high energy utilization w/ waste heat recovery





Winterization - Anti-/De-icing of areas and equipment

Differentiated approach to icing:

- Safety equipment – no functional degradation due to ice build up (ice free = anti-icing)
- Operational equipment – de-icing can provide functional state after icing
- Some operational equipment may have safety functions ... E.g cranes
- Snow builds up in cold weather – but not in extreme temps; frosting may be a challenge
- Ice build up from sea spray only happens in the lower part of the vessel

Work Environment:

- Temperature alone is not the biggest challenge - Wind shielding imperative
- Coverage of equipment for operation – also for utilizing COTS

Heat management:

- Utilize all heat sources
- No heat loss to sea or air
- Co-locate heated areas
- Cover and shield work areas – but not heated
- Limit exposure to air temp (BW)
- Low CO₂ footprint for normal ops
- Capacity for extremes



Opportunities in the arctic

There is a lot of attention towards the arctic

- Even with gradual amelioration of conditions it will remain a challenging area
- Specialized vessels and tailored operations will continue to be needed
- A full maturity of necessary technology and requirements will need to be developed in parallel with a stepwise approach to operations



A NAUTICAL MILE AHEAD



1996 - 2011

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