

HMS utfordringer i Nordområdene

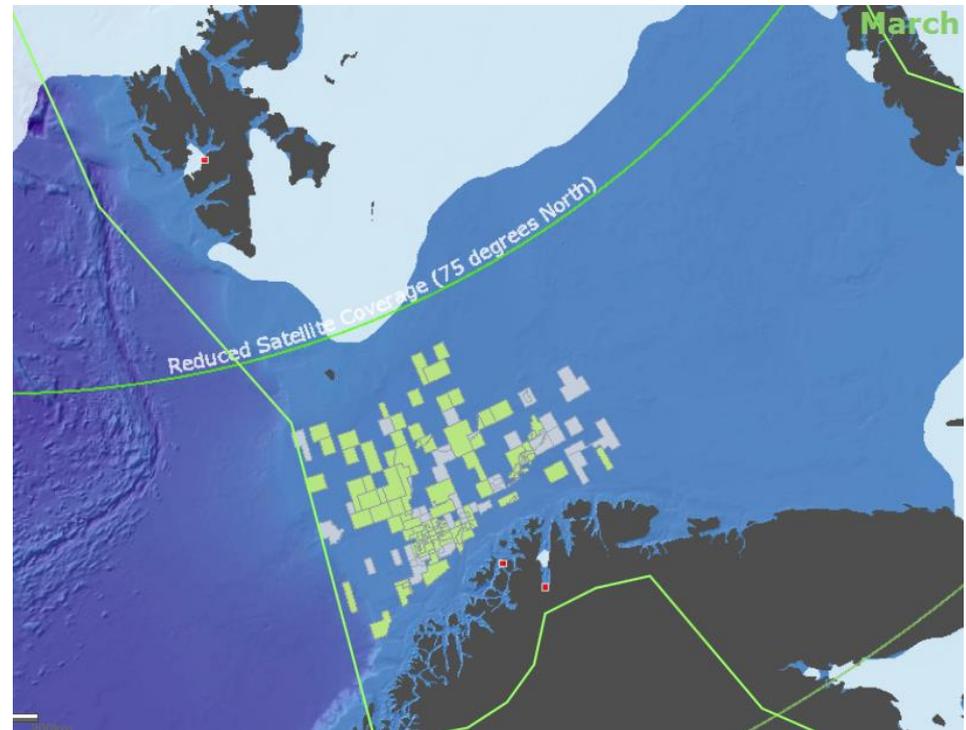
Ice Management som barriere

2014-06-17

Ice Management – Challenges for the Barents Sea

- Low probability of ice
- Reliability of information
 - Uncertainties in annual frequencies of sea ice and icebergs
 - Reduced satellite coverage
- Distances and infrastructure
- Lack of experience

DNV GL – Arctic Risk Map



The concept of Ice Management

- Overall philosophy
 - To improve operability (availability of facility)
 - To limit design ice actions and improve operability
- If latter philosophy is chosen, ISO 19906 provides following guidelines (8.2.7 Operational procedures to reduce ice actions):

Operational procedures may be used to mitigate ice actions on fixed, floating and subsea structures provided that it can be shown that, in combination with structural resistance, the intended level of reliability is achieved.

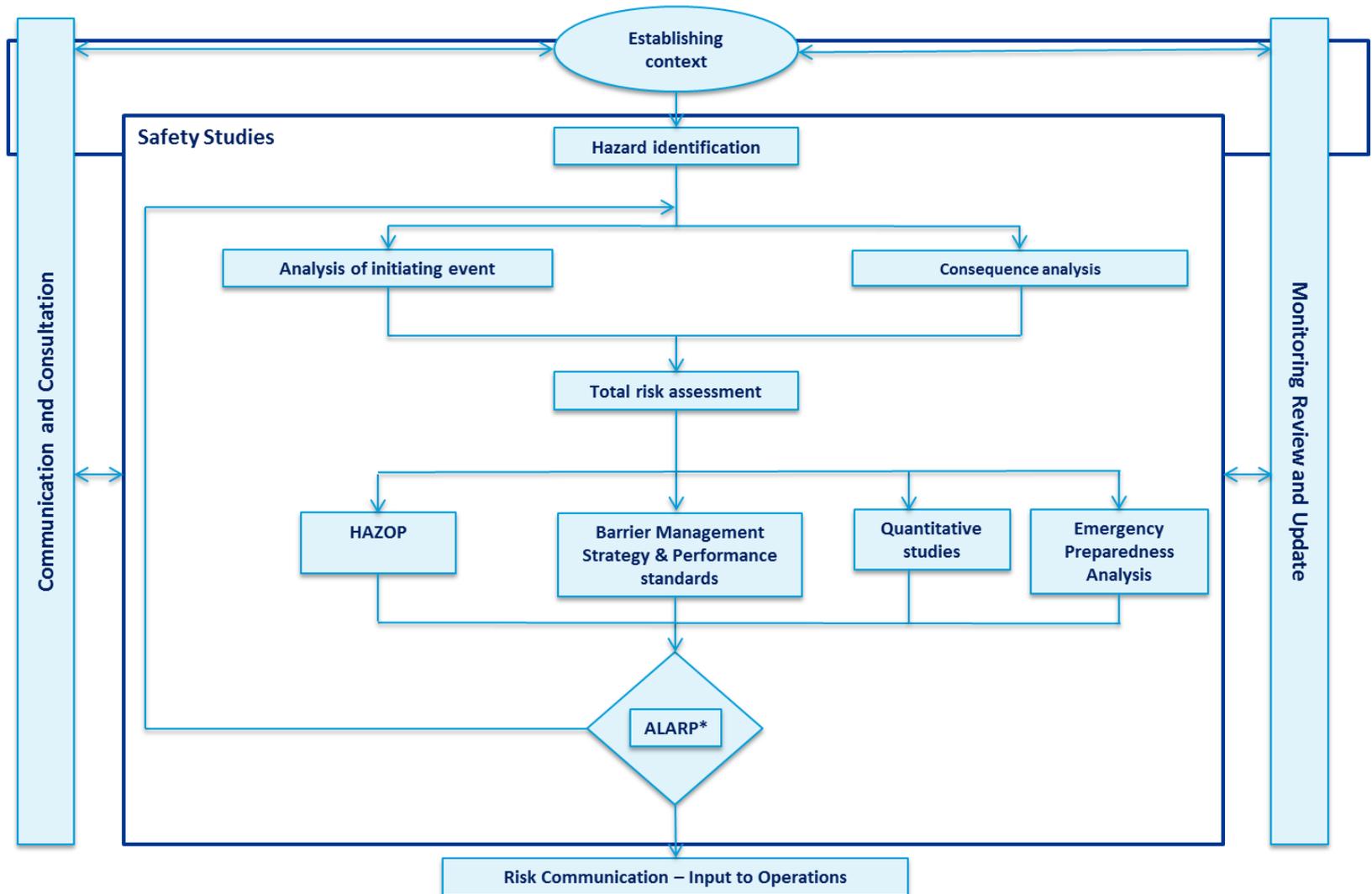
ISO 19906 – 17.2.3 Characterization of ice management performance

Where ice management is used for reducing the applied ice actions on an offshore installation, the following provisions apply.

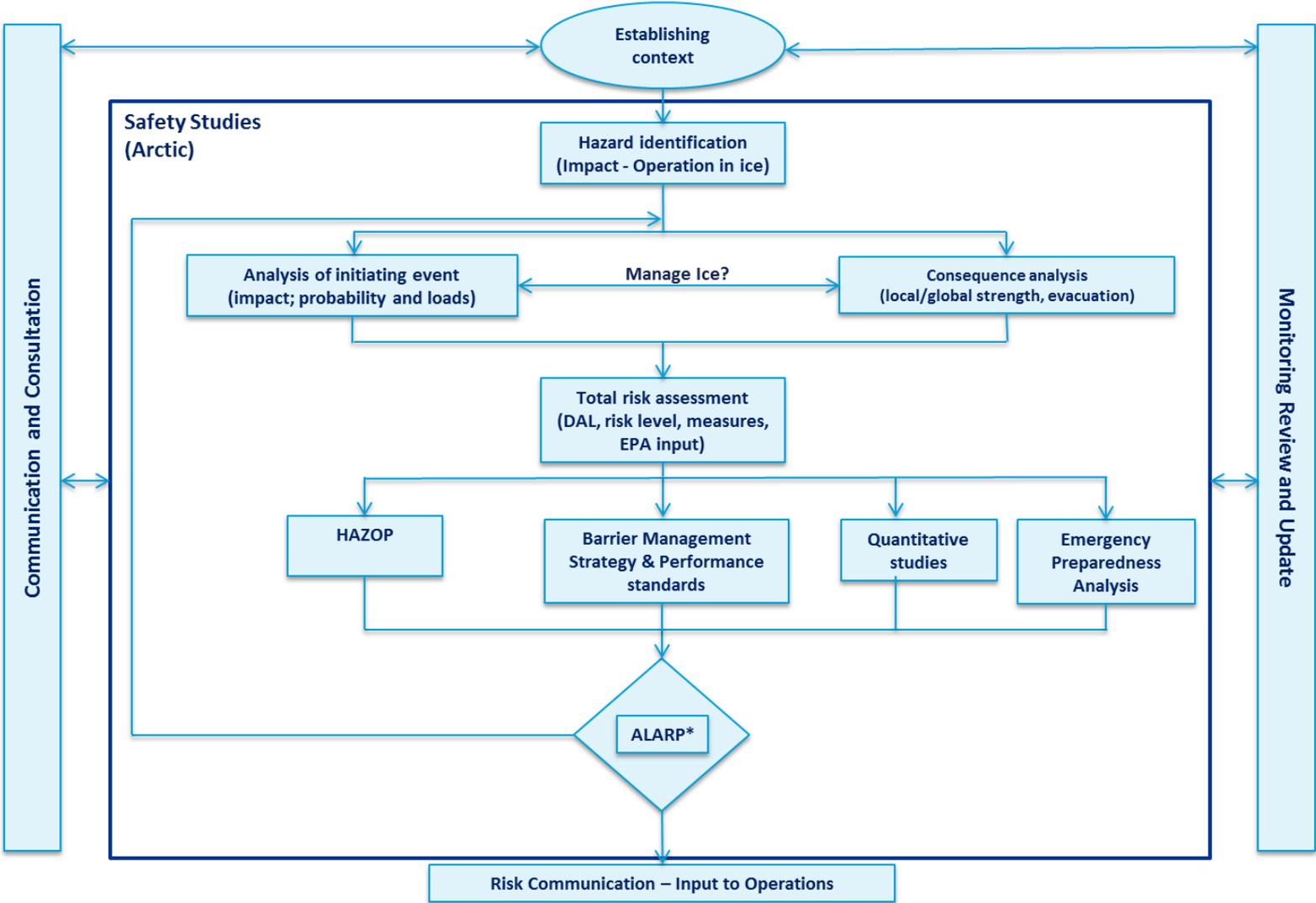
- a) The expected performance of ice detection, tracking and forecasting capabilities and the associated uncertainties shall be documented, and should reflect the actual performance of the types of systems or devices that can be used in the context of expected metocean conditions, visibility and offshore operations.
- b) The expected performance of physical ice management approaches that are planned and the associated uncertainties shall be documented, and should reflect actual performance of the types of vessels and systems planned for use in the context of expected metocean conditions, visibility and offshore operations.
- c) The overall performance of ice detection and management systems shall be characterized in terms of their ability to reduce or alter the frequency and nature of adverse ice events, and should reflect the influence of the other ice and physical environmental factors that can be associated with these events.

Ice Management as barrier

NORSOK Z-013: Risk and emergency preparedness assessment



Manage Ice = Yes



PSA - Management regulation – Section 5 Barriers

Barriers shall be established that:

- a) reduce the probability of failures and hazard and accident situations developing,
- b) limit possible harm and disadvantages.

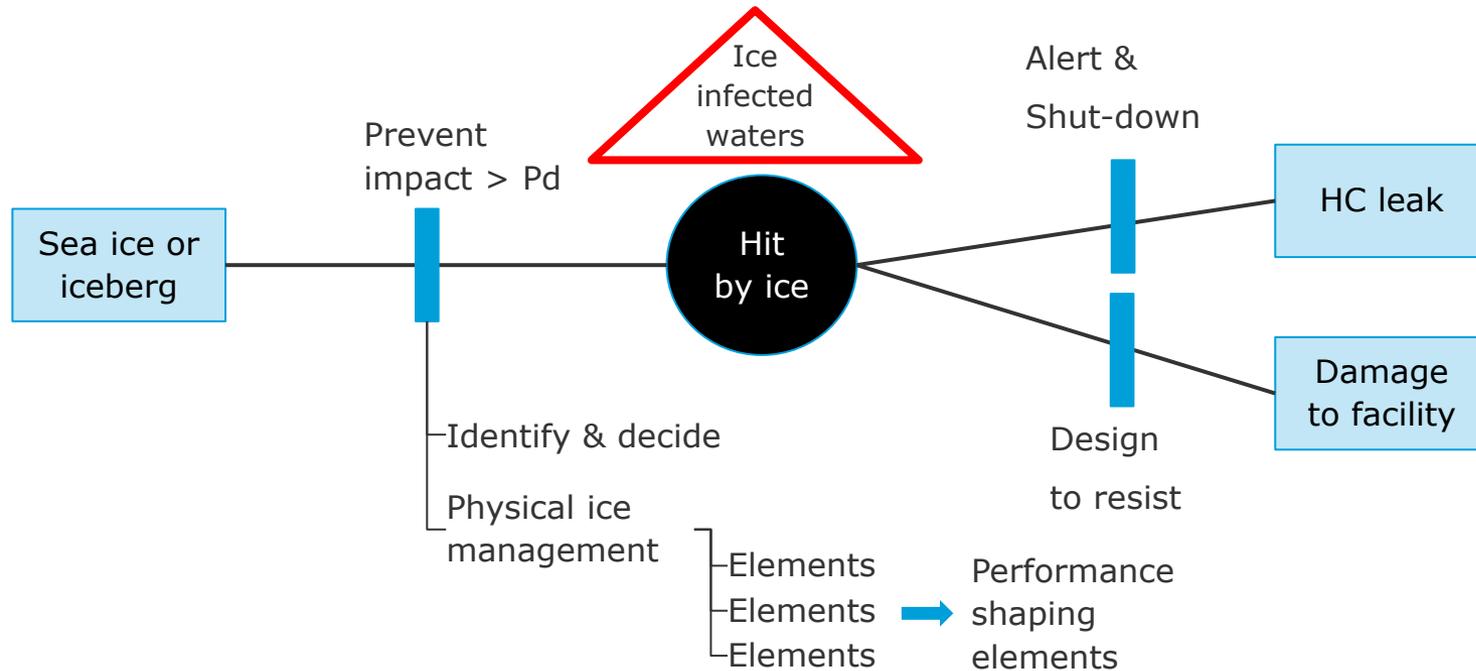
Where more than one barrier is necessary, there shall be sufficient independence between barriers.

The operator or the party responsible for operation of an offshore or onshore facility, shall stipulate the strategies and principles that form the basis for design, use and maintenance of barriers, so that the barriers' function is safeguarded throughout the offshore or onshore facility's life.

Personnel shall be aware of what barriers have been established and which function they are intended to fulfil, as well as what **performance requirements** have been defined in respect of the technical, operational or organisational elements necessary for the individual barrier to be effective.

Personnel shall be aware of which barriers are not functioning or have been impaired. The responsible party shall implement the necessary measures to remedy or compensate for missing or impaired barriers.

Ice Management as barrier



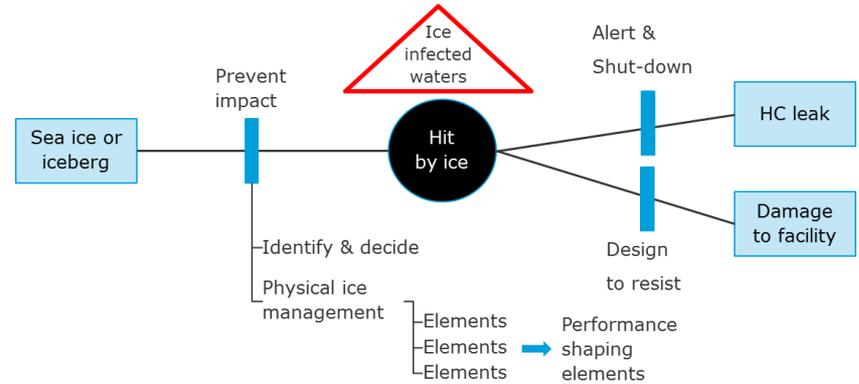
NORSOK Z-013

- **Barrier function:** Function planned to prevent, control, or mitigate undesired or accidental events
- **Barrier system:** System designed and implemented to perform one or more barrier function
- **Barrier element:** Physical, technical or operational component in a barrier system
 - *I.e. The elements/components that constitute a barrier system. Part of a barrier, but not sufficient alone to achieve the required overall function.*

Possible approach

Establish an overview of actions/measures in an ice emergency situation

Establish bow-tie with actions and measures (barrier elements) categorized per barrier function

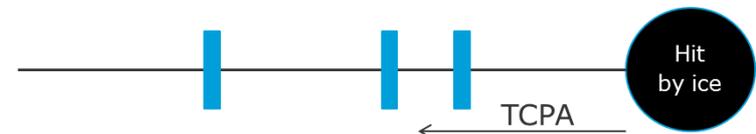


Validate technical and operational assumptions relevant for design basis with operational resources

Ice management assumptions and performance requirements linked to the barrier functions

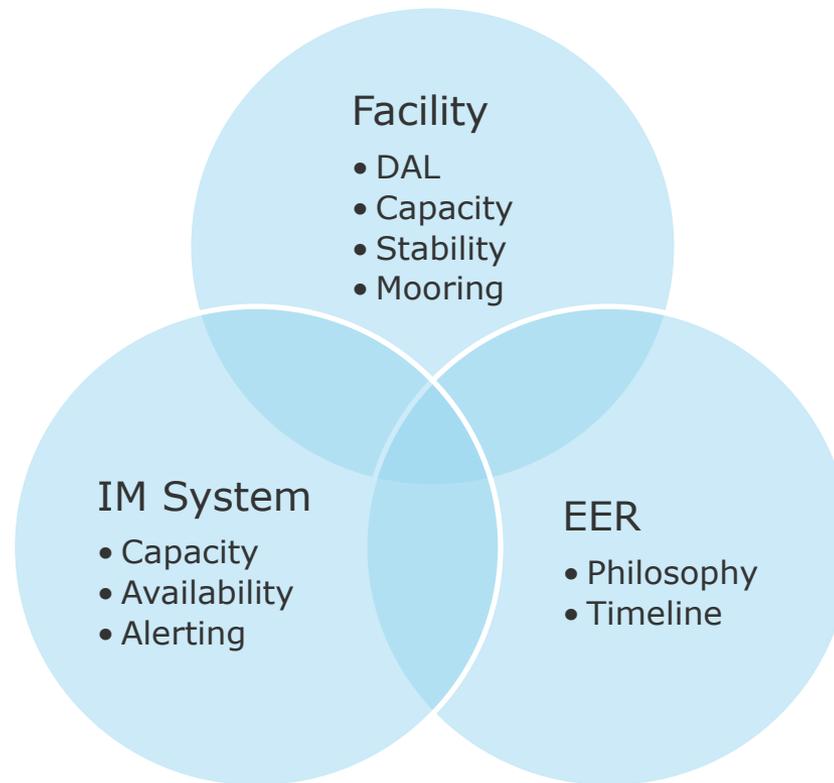
Establish time line

Distribute actions, measures and assumptions (barrier elements) identified in the bow-tie to a timeline



Incorporate in installation specific performance standard and emergency preparedness plans

Challenge: Early alignment of functional requirements and assumptions



Challenge: Uncertainties

- Annual frequency of sea ice and icebergs
- Design ice conditions. Sea ice/iceberg properties
- Translating facility design limits to ice properties (e.g. maximum acceptable global force on mooring system)
- Reliability/availability of systems for detection and tracking; quality of information
- Reliability/availability of systems for physical ice management
- Threat assessment and alerting criteria and timeline
- Defining characteristics for IM vessels (e.g. logistics, number, mobilisation time)
- Achieve training needed to build experience in areas of uncertainty (degree of successful physical ice management proportional with experience)

Summary

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- Region, location and installation specific characteristics must be taken into account in the design of an Ice management system
- Inter disciplinary functional requirements and assumptions must be aligned
- When applied Ice Management must be acknowledged as a barrier functions and included in the scope for risk assessment to define:
 - Functions
 - Elements
 - Performance shaping factors
- Uncertainties must be identified and dealt with when developing and documenting the expected performance of the Ice Management system.
- Training will be essential (limited experience to draw upon, limited amount of experienced personnel, location specific challenges)

Takk for oppmerksomheten

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