Overview

- Introduction
- Deliverables
- Gap Analysis
- Recommendations
- Pilot Projects
- Summary
Introduction

Objective
Make a contribution to the international Arctic community by providing recommendations for guidelines to enhance safe, reliable and sustainable operations in the Arctic.

- Budget € 550,000
- Dutch subsidy € 236,000
- 16 Companies
- Kick off February 2012
- Close out December 2013
Introduction

International Operating Participants

- Offshore contractors
- Knowledge institutes
- Engineering companies
- Arctic consultants
- Class society & Oil Company

Introduction

Marine Operations

- Transport and Installation of fixed, floating and subsea units
- Dredging & trenching
- Pipe laying
- Floating oil/gas production
- Vessel operations
Introduction

Marine Operations
- Common Operational Aspects
  - Weather monitoring & forecasting
  - Logistics
  - Equipment preparation
  - Training
  - Stakeholder management
  - HSE management

Arctic Operations Handbook Scope

- Gap Analysis
- Prioritize Gaps
- Provide Recommendations
- Deliver Report

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Deliverables
Arctic Marine Operations Challenges & Recommendations Report

- Comprehensive overview of issues
- Project requirements

Deliverables
Arctic Marine Operations Challenges & Recommendations Report

1) Main Report
2) Gap Analysis Study Matrix
3) IceStream - Pilot Project
4) Environmental Impact - PP
5) Marine Icing - Pilot Project
**Deliverables**

**Arctic Marine Operations Challenges & Recommendations Report**

1) Main Report  
2) Gap Analysis Study Matrix  
3) IceStream - Pilot Project  
4) Environmental Impact - PP  
5) Marine Icing - Pilot Project

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**Gap Analysis**

- Investigation of operational Codes & Standards  
- Formation of work groups  
- Identifying Arctic conditions and their severity  
- Set priorities

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Existing Standards  
Safe Arctic Standards  
Recommendations  

"What's different in the Arctic?"  
"What's the Impact of Arctic Conditions?"
Gap Analysis

- Investigation of operational Codes & Standards
- Formation of work groups
- Identifying Arctic conditions and their severity
- Set priorities
- Identify knowledge gaps
- Initiate future JIP’s (Later)
- Provide recommendations to bridge gaps

- Thawing soil conditions
- Real-time ice loading
- Field observations ice accretion

Recommendations

- Transport and Logistics
- Station Keeping in Ice
- Offloading
Transport and Logistics

- Implement Arctic Shipping guidance into the Marine Operations ISO

- Short tow lines
- No synthetic rope
- Protect people and equipment
- Tow Plans

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Transport and Logistics

- Implement Arctic Shipping guidance into the Marine Operations ISO
- Weight Control and Stability
  - Icing threat
  - Contingency factor

Transport and Logistics

- Implement Arctic Shipping guidance into the Marine Operations ISO
- Weight Control and Stability
- Ballasting Operations
  - High salinity seawater
  - Heating and circulation
  - Winterization
Transport and Logistics

- Implement Arctic Shipping guidance into the Marine Operations ISO
- Weight Control and Stability
- Ballasting Operations
- Logistics

Station Keeping in Ice

Ice Action

Operational Ice Level

- Temporary Moored or DP Vessel
- Structural Capacity
- Station keeping Capacity
Station Keeping in Ice

Ice Environment → Ice Action

- Operational Ice Level
  - Temporary Moored or DP Vessel

- Ice movement & Metocean conditions

Structural Capacity → Station keeping Capacity

Operations Manual
Monitoring & Forecasting

Ice Management?
Offloading

Operational aspects that need development

- Real-time prediction of Ice Loads
- Risk analysis models
- Remote sensing techniques
- Maneuverability capabilities
- Impact of ice management on the workability

Pilot Projects

- IceStream
- Environmental Impact
- Marine Icing

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IceStream – Pilot Project

- Ice Floe Simulation Model (in real time)
  - Egg Code
  - Voronoi tessellation based algorithm

- Dynamics of an Ice field
  - Behavior Ice Floes:
  - Wind Waves Current & Ice pressure
Environmental Impact - PP

- Generic Framework
  - Intensity of pressures
  - Vulnerability of ecosystem

Prioritization Methodology
Marine Icing – Pilot Project

- State of the Art Review
  - Small vessels Capsize
  - Large vessels loss of Safety & Functionality

- Sea Spray Icing
- Atmospheric Icing

- Icing Prediction:
  - ship size, speed, headway, air and water temperature, wind velocities and sea state

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Marine Icing – Pilot Project

- State of the Art Review
  - Sea Spray Icing
  - Atmospheric Icing
- No-reliable common approach

Summary

Support further development of:

- ISO 19901-6 : Marine Operations
- ISO 19906 : Arctic Offshore Structures (ISO/TC67/SC8)
- ISO/TC67/SC8 : Arctic Operations

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Summary

Support further development of:

- ISO 19901-6: Marine Operations
- ISO 19906: Arctic Offshore Structures (ISO/TC67/SC8)
- ISO/TC67/SC8: Arctic Operations
- Future JIP's
  - SALTO
  - IceStream 2
  - Ecological Impacts Arctic

Summary

Arctic Marine Operations Challenges & Recommendations Report

- Overview Codes & Standards
- Considerations for safe arctic operations
- Guidance & Knowledge gaps
- Recommendations
- Pilot Projects

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Questions?