Major accident collision risk management of Dynamic Positioning (DP) marine operations

Safety 30 Piper Alpha's Legacy: Securing a Safer Future
5th–6th of June 2018
AECC, Aberdeen

Olav Sæter, Equinor ASA

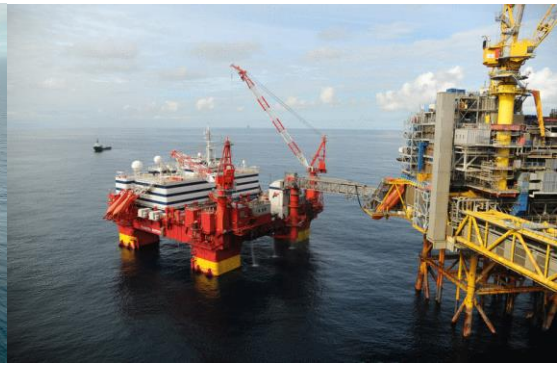
Content

- Major accident risk potential
- Regulatory (Norway & UK)
- Risk criteria
- Risk model
- Risk treatment (examples)

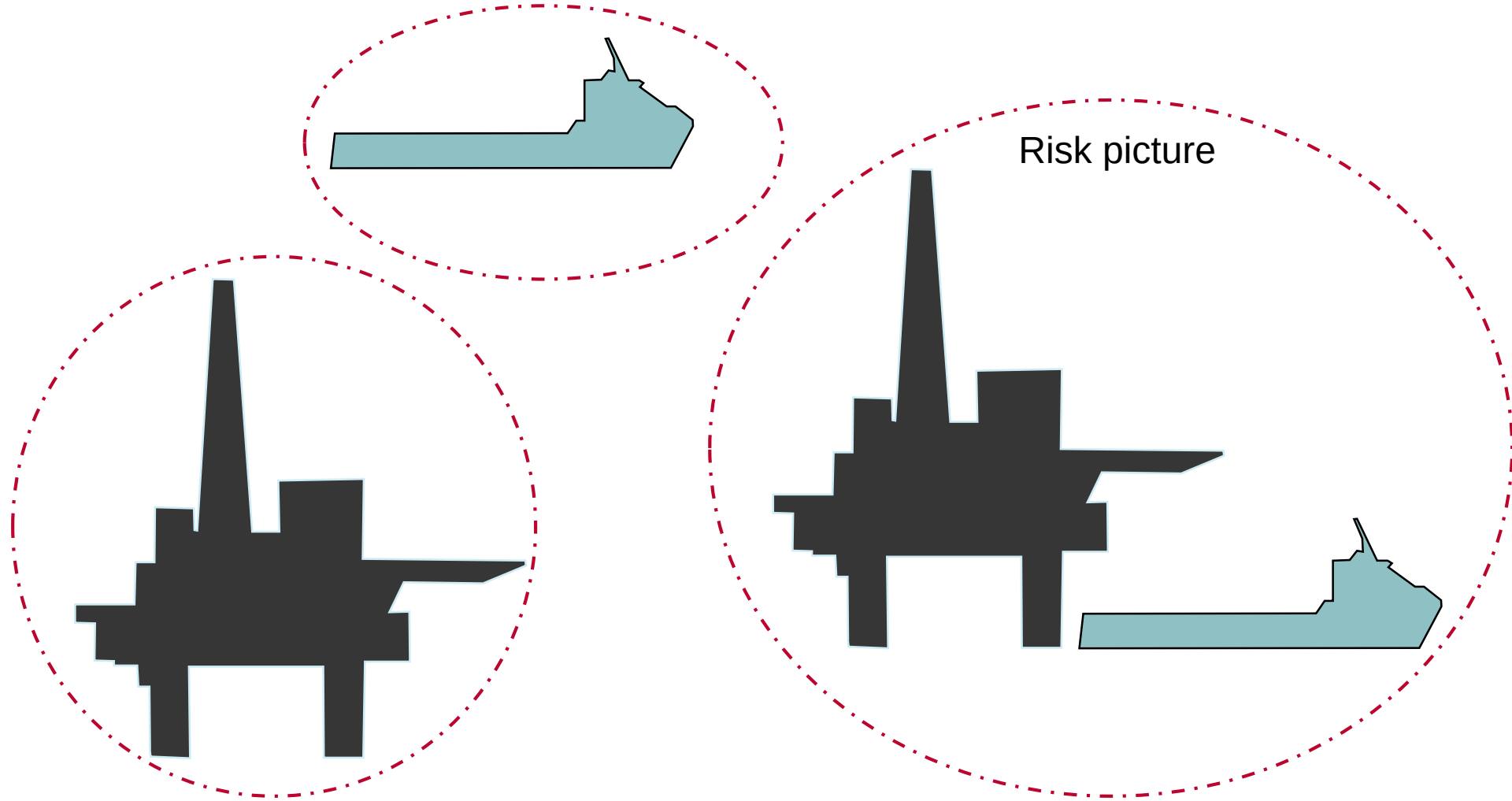
The use of Dynamic Positioning (DP) technology

- DP provides a flexible platform for marine operations which features amongst others excellent maneuverability, quick relocation and setup and considerable versatility operation-wise
- Used for sensitive operations often in close proximity to assets (e.g. heavy lift, riser replacement, flotel, tandem offtake by shuttle tanker, pipe layers and logistic operations)





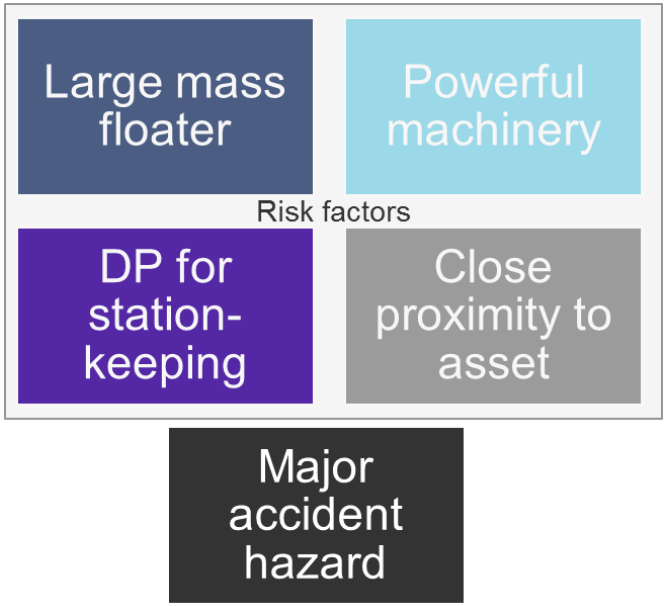
Perception of risk – context dependency



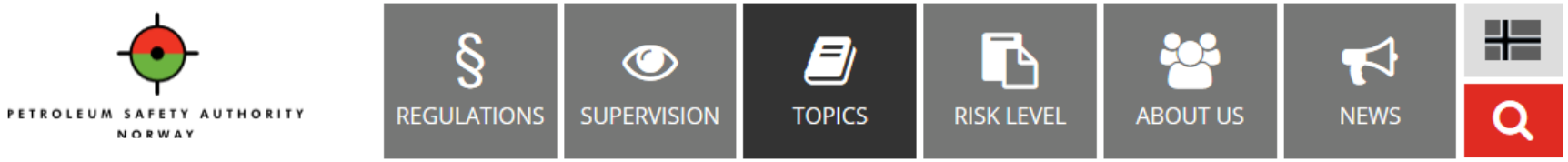
DP loss of positions do occur

- Loss of position (LOP) and/or heading is said to occur when the vessel's position and/or heading is outside the set limits for the operation in progress
- The probability of LOP is not negligible even if the DP vessel is equipped with the latest technology and DP2/DP3, and is manned and operated by competent personnel
- Incidents show that the LOP risk is inherent to all DP operations, and an accident may occur if the DP operator is unsuccessful in timely recovery of the LOP

→ Loss of position do occur – they are not hypothetical concepts



The Regulator's Perspective (NCS)



TOPICS

- Valuing safety choices
- Main theme 2017
- Safety Forum
- The far north
- Risk and risk management
- Barriers
- HSE management
- Well integrity
- Structural integrity
- Aging and life extension

Risk of collisions with visiting vessels

PTIL.NO › TOPICS › STRUCTURAL INTEGRITY

Greater attention

The PSA is of the opinion that training and organisational factors should receive more attention and the technical failure rate must be reduced. Improved quantification of the risk entailed by collisions is also necessary. The PSA has not identified a need for changes in the regulations.

The PSA expects there to be reasonable agreement between performed collision analyses and actual experienced collisions on the facilities on the Norwegian shelf. Good collision analyses will not increase safety if they become only an academic exercise. There is little detail in the assessed risk analyses of collisions with visiting vessels. Several failure modes have not been identified or analysed. The analyses are rarely used as a basis for reducing risk. Here, we see a need for improvement.

The Regulator's Perspective (UKCS)

Some Fundamentals

HSE

- It is credible that a Ship/Platform collision could be catastrophic.
- Although there are concerns regarding collision probability; collisions can be regarded as 'reasonably foreseeable'.
- The majority of collision risk is from attendant vessels. Attendant vessels cause around 10 times more 'severe' damage collisions than 'passing' vessels & can result in 'catastrophic' losses.

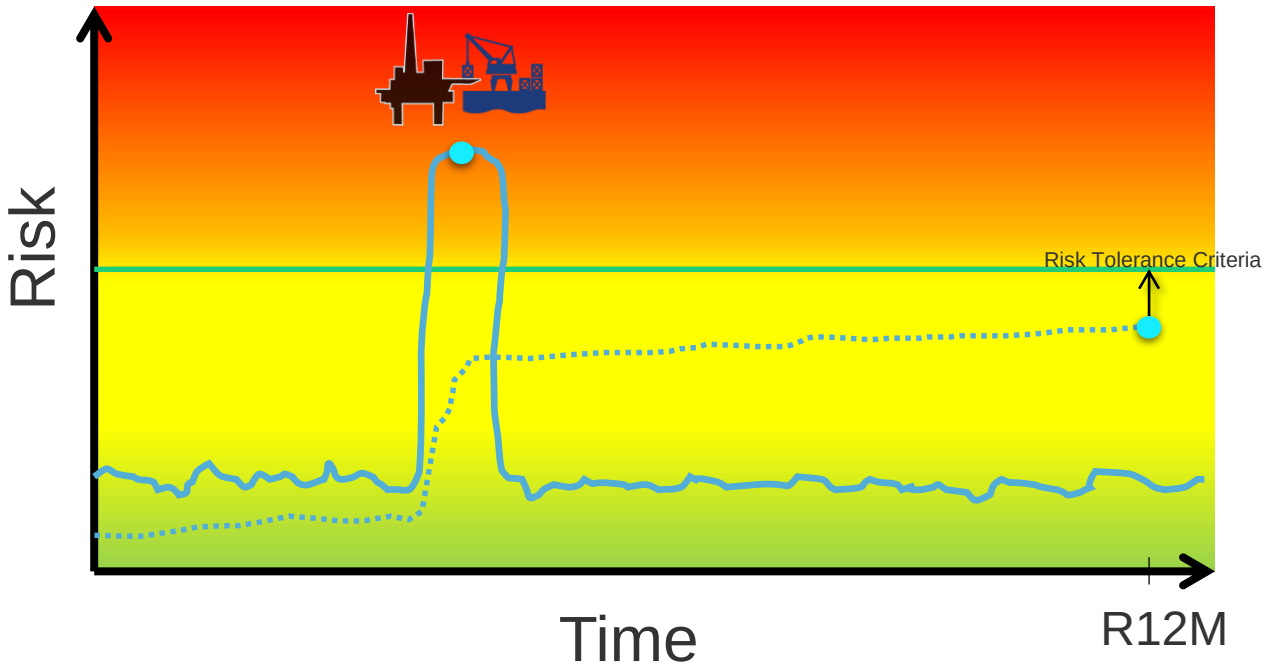
DP loss of position incidents 2017 – 2018

- 11 LOP incidents during operation with DP class 2 and 3 vessels in 12 months
- Actual consequences include personnel injuries, delays, equipment damage and damage to Equinor's assets
- Causes include (the list is not exhaustive):
  - Hidden failures which defeat the redundancy concept
  - Insufficient testing and quality assurance
  - Inadequate procedures and decision making
  - Insufficient knowledge, lack of training and familiarization

Risk management

Context → Risk Assessment → Decision → Treatment

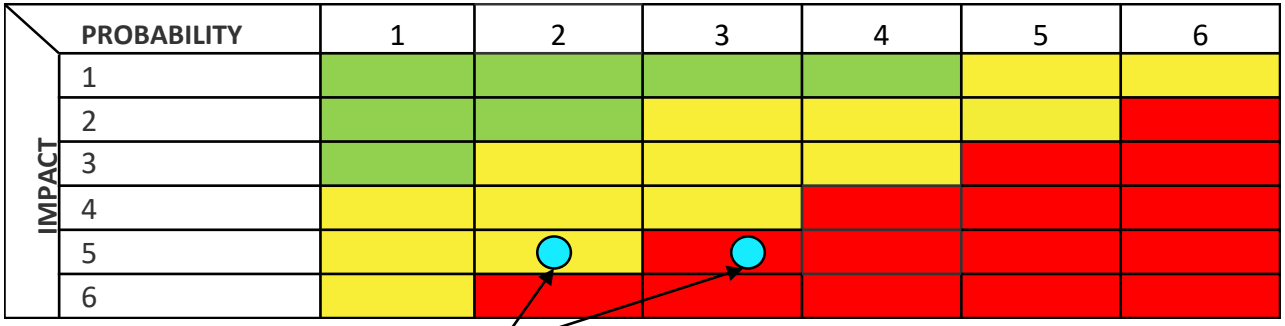
Risk evaluation for single operations/activities with short time duration



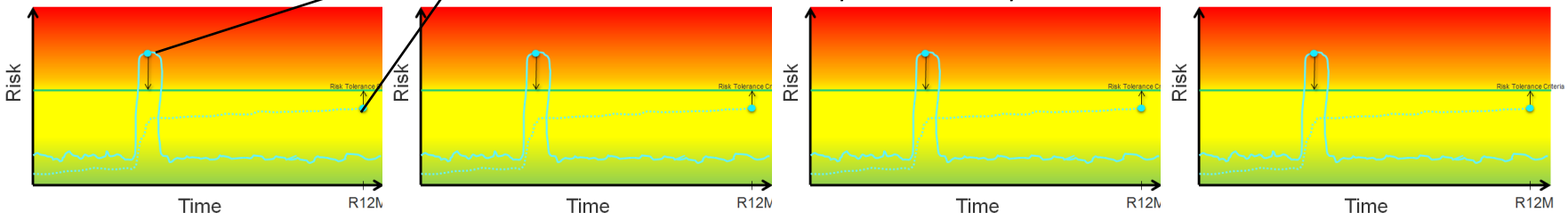
Risk management

Context → Risk Assessment → Decision → Treatment

Risk evaluation for single operations mapped into a risk matrix (probabilities assigned on annual basis)



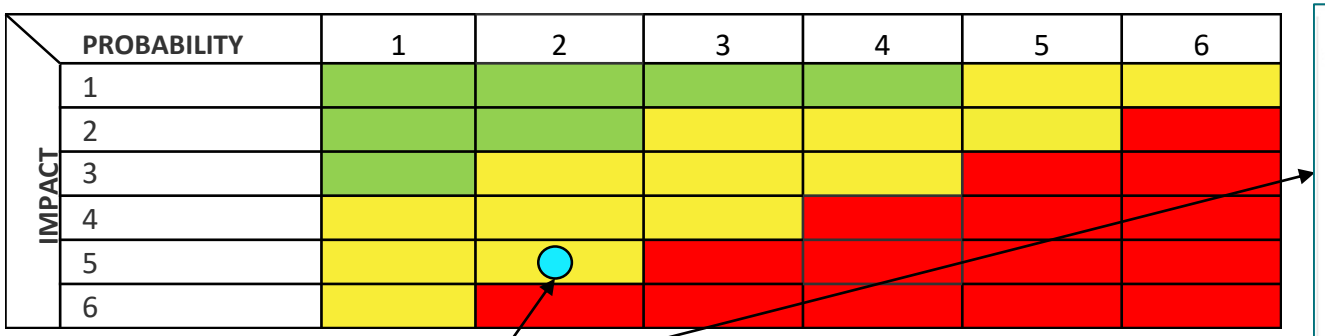
Repeated operations

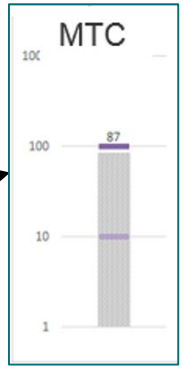


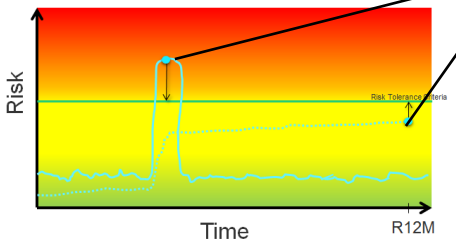
Risk management

Context → Risk Assessment → Decision → Treatment

Risk evaluation for single operations mapped into a risk matrix (annual basis)





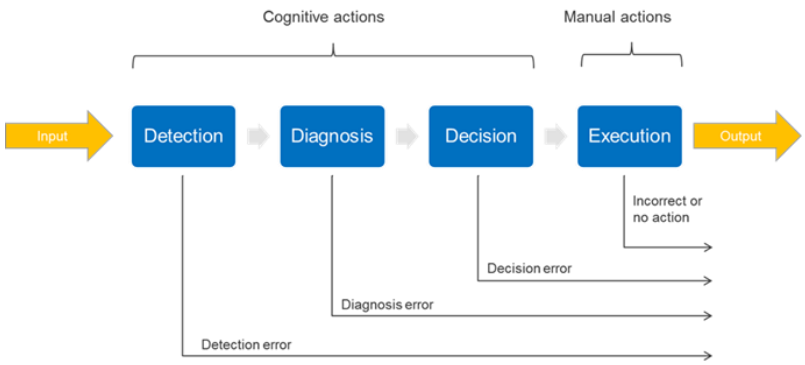


Introducing MTC (Multiple of Tolerance Criteria) as an additional criteria for decision support

Risk management

Context → Risk Assessment → Decision → Treatment

"Risk model"; 8 steps



Human Reliability Analysis ; SPAR-H

Low frequency → poor prediction for humans

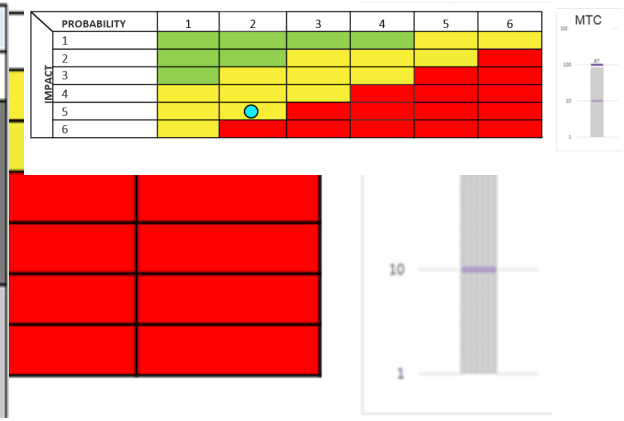
Time available → critical

Risk management

Context → Risk Assessment → Decision → Treatment

Decision support; risk picture and uncertainty assessment

		Lack of knowledge				
		High	Medium	Low		Criticality
Impact on risk picture	Large		1			High
	Medium	3	2	4 5		Medium



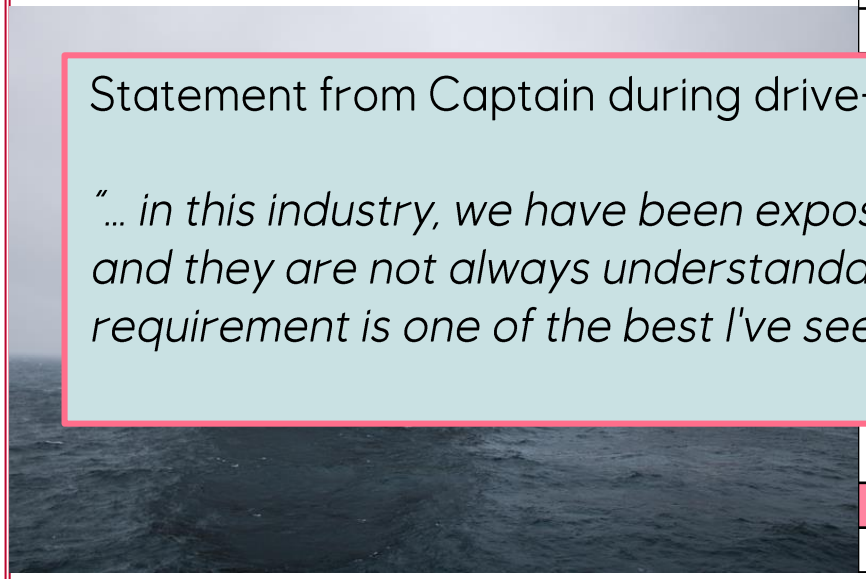
The PSA's definition is: **risk means the consequences of the activities, with associated uncertainty.**

sk picture associated with
ical uncertainties needs
itious management!

Risk management

Context → Risk Assessment → Decision → Treatment

Flotel operations



RISK REDUCING MEASURES IN DP FLOTEL OPERATIONS (GENERIC)	
Location of gangway landings x 2, protecting risers, LQ exposure	
Secure evacuation etc	
Compliance with DP equipment class 3 (IMO MSC 645)	
Engine room capacity as a function of weather	Favourable heading relative to weather direction
Drive-Off Prevention	Open bus-ties
	Blackout recovery procedure

Statement from Captain during drive-off training:

"... in this industry, we have been exposed to many strange requirements and they are not always understandable, but this new Equinor DP requirement is one of the best I've seen"

Risk management

Context → Risk Assessment → Decision → Treatment

Special marine operations (heavy lift, riser replacement, pipe laying, SIMOPS,….)

Separation distance maps

- Change operation

Concluding remarks

- The presented methods recognize the concern raised by the Regulators
- The risk management approach gives suitable support to the decision making processes
- The method is operationalized and a simplification initiative is started

We have experienced limited risk awareness to this topic amongst some marine contractors

Our ambition is that the marine community together with the risk owners work to increase risk awareness and efficient risk management

Major accident collision risk management of Dynamic Positioning (DP) marine operations

Olav Sæter, Leading advisor safety risk assessment

© Equinor ASA

This presentation, including the contents and arrangement of the contents of each individual page or the collection of the pages, is owned by Equinor. Copyright to all material including, but not limited to, written material, photographs, drawings, images, tables and data remains the property of Equinor. All rights reserved. Any other use, reproduction, translation, adaption, arrangement, alteration, distribution or storage of this presentation, in whole or in part, without the prior written permission of Equinor is prohibited. The information contained in this presentation may not be accurate, up to date or applicable to the circumstances of any particular case, despite our efforts. Equinor cannot accept any liability for any inaccuracies or omissions.