

# Autonomi i havrommet

(og om hvordan bevare mennesket i loopen)



KONGSBERG

## Norsk Forum for Autonome Skip

Oslo 4.oktober 2016



KONGSBERG



Thor Hukkelås, M.Sc.

Principal Engineer Marine Operations  
Business Development, Kongsberg Maritime AS

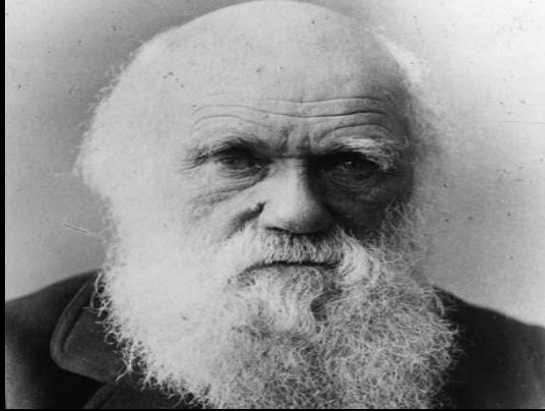


KONGSBERG









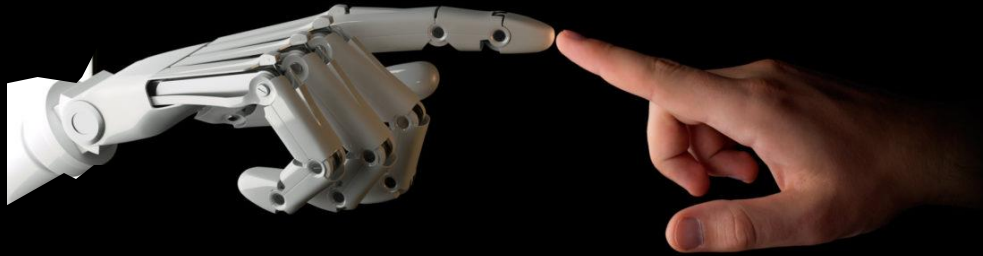
KONGSBERG

Has the evolution of man's cognitive abilities kept pace  
with the development of technology?



KONGSBERG

# Are we loosing control of the machines?



Man vs Machines = Conflict?

or

Man + Machines = Partners?



KONGSBERG

“En automatisert industri kan gi oss  
overskudd og tid til å sitte og beundre  
solnedgangen”

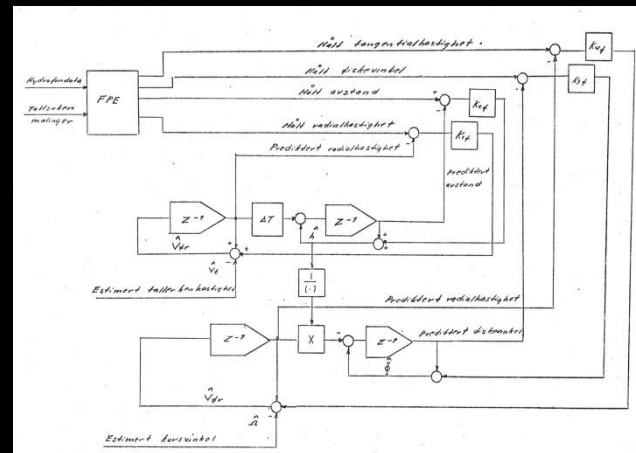
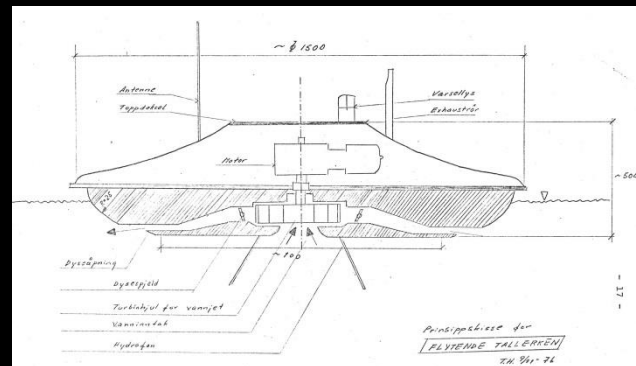
Interview in newspaper:  
Fædrelandsvennen, mars 1965



**Jens. G. Balchen (1926-2009)**  
**Founder of Institute of Engineering Cybernetics, 1954**



# Diplomoppgave NTH 1976, Thor Hukkelås





KONGSBERG

# KONGSBERG Group

## Autonomy

2016 (40 years later..)





## Extreme Performance for Extreme Conditions

# Applied Engineering Cybernetics - KONGSBERG



KONGSBERG



## Air

- JSM, NSM, Penguin, UAVs



## Land

- RWS, UGVs



## Sea surface

- DP, Man. Ctrl, Autopilot



## Sub surface

- AUVs, ROVs

# Kongsberg Maritime Ocean Space



KONGSBERG

## Smart Maritime Transport



Autonomous Ships

Smart Ships

Smart Routing

Smart Ports

Smart Logistics

Green Shipping

## Exploring the Deep



Marine Robotics

Envir. Monitoring

Underwater Mapping

Ocean Research

Naval

Deep sea mining

## Smart Marine Operations



Seismic

Drilling

IMR

Heavy Lift

Misc Oil&Gas Oper

Wind farms

## Clean Ocean Energy



Wind

Waves

Current

Others

## Sustainable Seafood



Fisheries

Aquaculture

Ships Equipment

Logistics & SW

# Kongsberg Maritime Ocean Space



KONGSBERG

Smart  
Maritime  
Transport



Exploring  
the Deep



Smart  
Marine  
Operations



Clean  
Ocean  
Energy



Sustainable  
Seafood



Navigation systems, Integrated bridges



Dynamic Positioning systems (DP)





# The autonomous ship has been here for a while..



KONGSBERG

**Dynamic Positioning (DP)** is a computer controlled system to automatically maintain a vessel's position and heading by using its own propellers and thrusters (i.e. without the use of anchors).





# Marine Operations: DP-more than just station keeping



KONGSBERG



Diving Support



Heavy Lifting



Drilling



Platform Support Vessel



Dredging



Cable lay & Repair



Anchor Handling



Offshore Loading



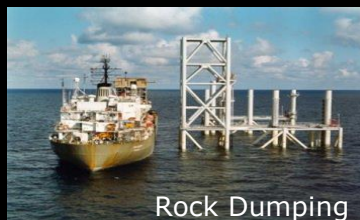
Pipelaying



Trenching



Clamp-On DP



Rock Dumping



Rocket Launcher



Mine hunting



Submarine Rescue

# Kongsberg Maritime Ocean Space



KONGSBERG

Smart  
Maritime  
Transport



Exploring  
the Deep



Smart  
Marine  
Operations



Clean  
Ocean  
Energy



Sustainable  
Seafood



Underwater navigation and Control



AUVs, ROVs & Subsea monitoring



Seabed mapping





# Kongsberg Maritime Ocean Space



KONGSBERG

## K-IMS

KONGSBERG Information Management System

- Remote support
- Remote operation
- Services



GLIDERS



AUVs



USVs



VESSELS



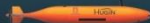
RIGS



Gliders



AUVs



K-Lander



Transponders

SUBSEA MONITORING

Transponders

Assets



SUBSEA CONSTRUCTION

ROVs



HIPAP



Echo Sounders



Sonars



HIPAP

Transponders



BOP & ACS

DRILLING

# Kongsberg Maritime Ocean Space



KONGSBERG

Smart  
Maritime  
Transport



Exploring  
the Deep



Smart  
Marine  
Operations



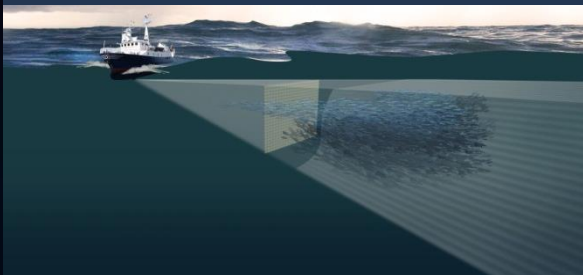
Clean  
Ocean  
Energy



Sustainable  
Seafood



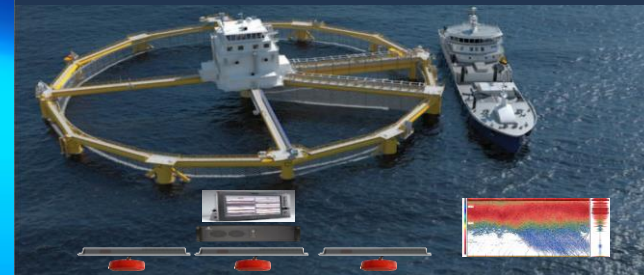
Fishfinding sonars, trawl monitoring



Fish cage & environment monitoring



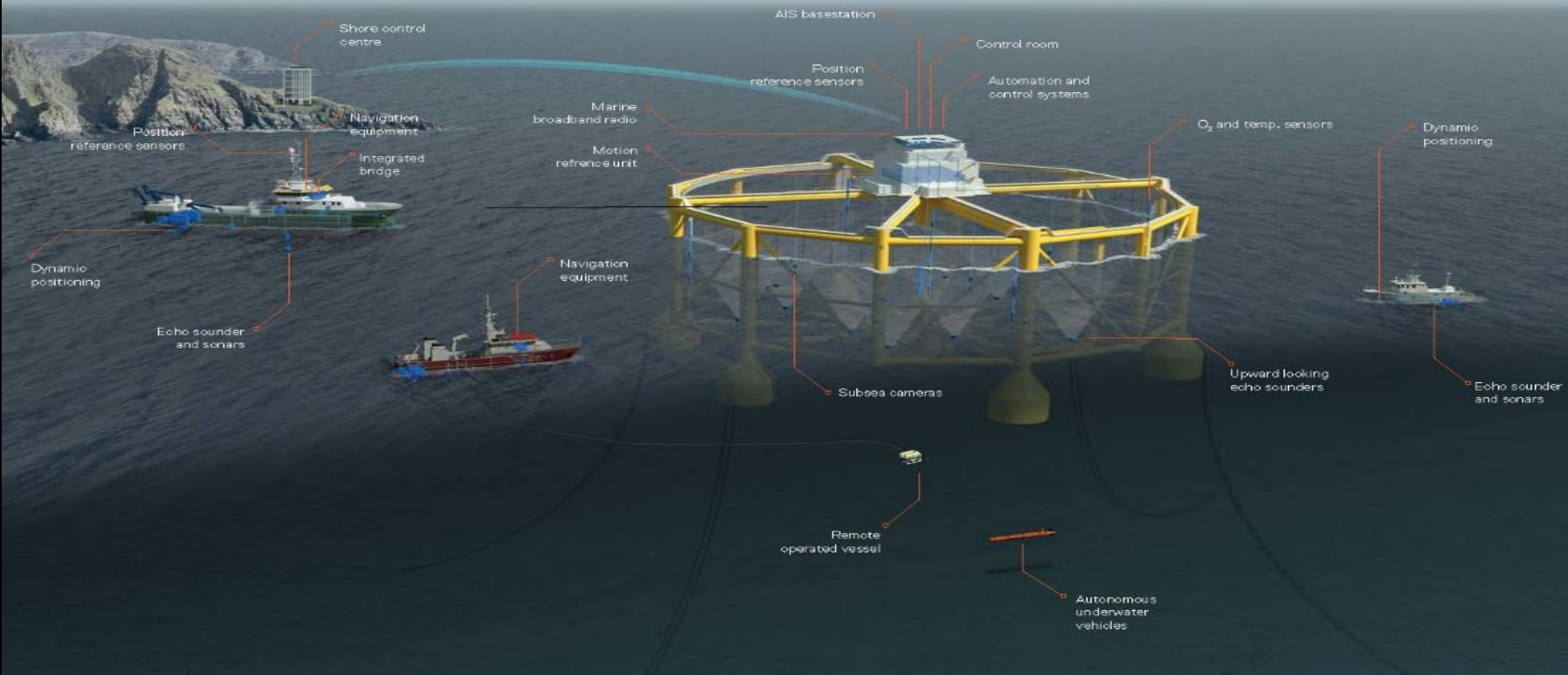
Offshore fish farming solutions



# Fish & Ships & Chips - FISC



KONGSBERG







KONGSBERG

# Autonomy & Decision Support



KONGSBERG

Should we rather talk about the need for  
**Decision Support**  
(for humans & machines) instead of Autonomy,  
Automation, Digitalisation, Big Data etc.?

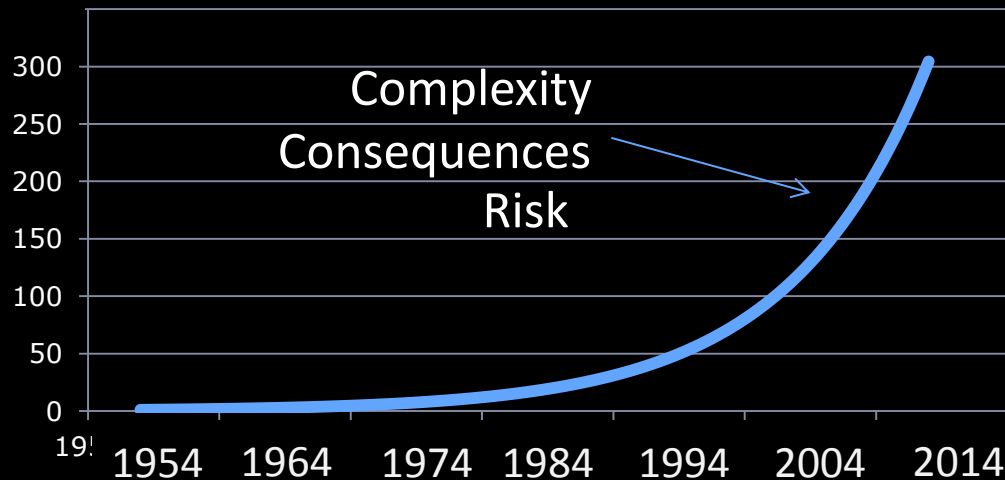


KONGSBERG

# The Paradox of Automation

- Says that the more efficient the automated system, the more crucial the human contribution of the operators.
- Humans are less involved, but their involvement becomes more critical.

**Efficient automation makes humans more important, not less.**



# Dynamic Positioning (DP) of Diving Support Vessel



KONGSBERG



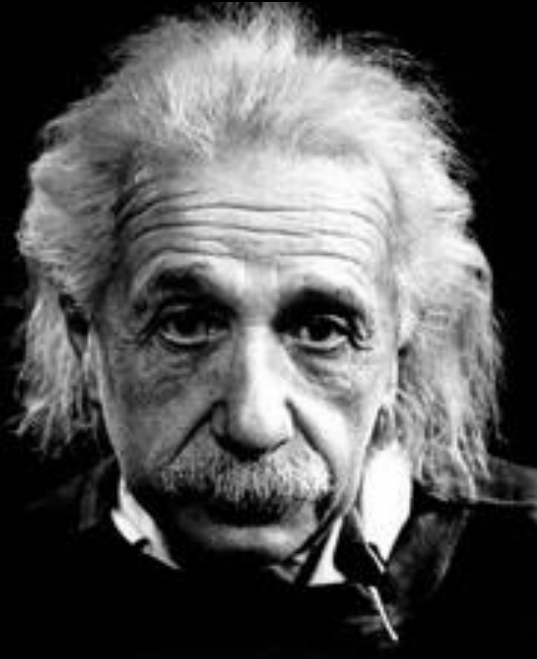
The Loop



«DP is 99% boredom and 1% panic»



KONGSBERG



"If I had an hour to solve a problem I'd spend 55 minutes thinking about the problem and 5 minutes thinking about solutions."



# The Innovation Challenge



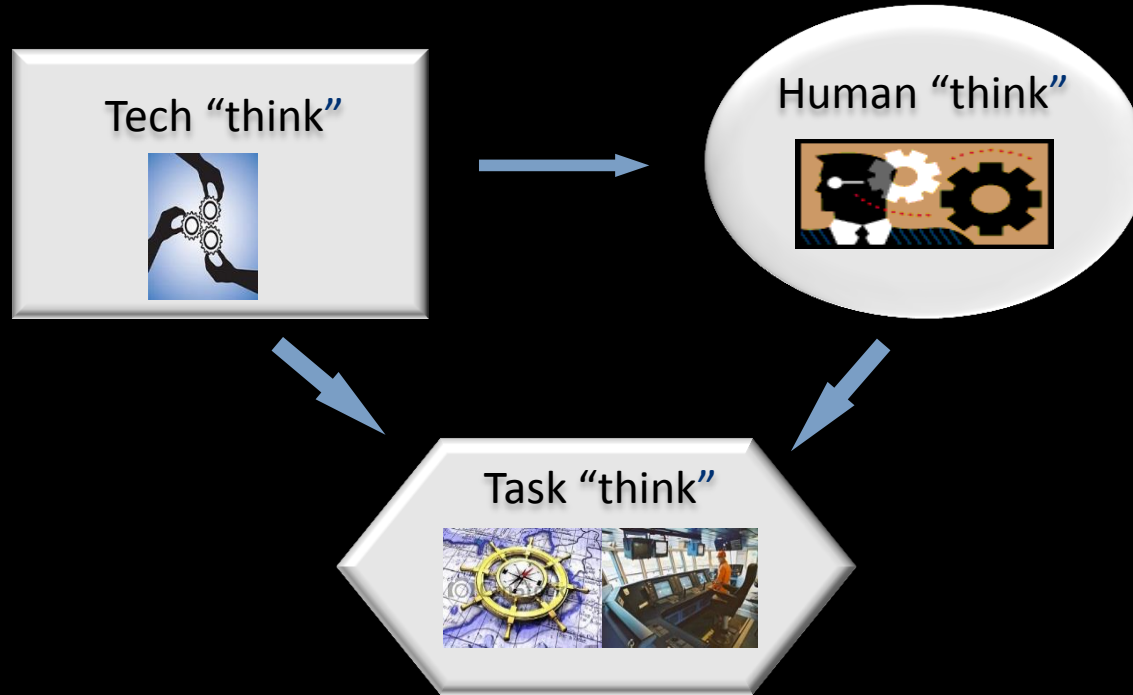
KONGSBERG

- Being engineers, we often end up with a solution looking for a problem
- (Well, we became engineers because we love to build these fantastic machines, didn't we?)
- But, perhaps should we rather identify problems looking for a solution?





KONGSBERG



Technology should adapt to humans, not the other way around!

# A new discipline?



KONGSBERG

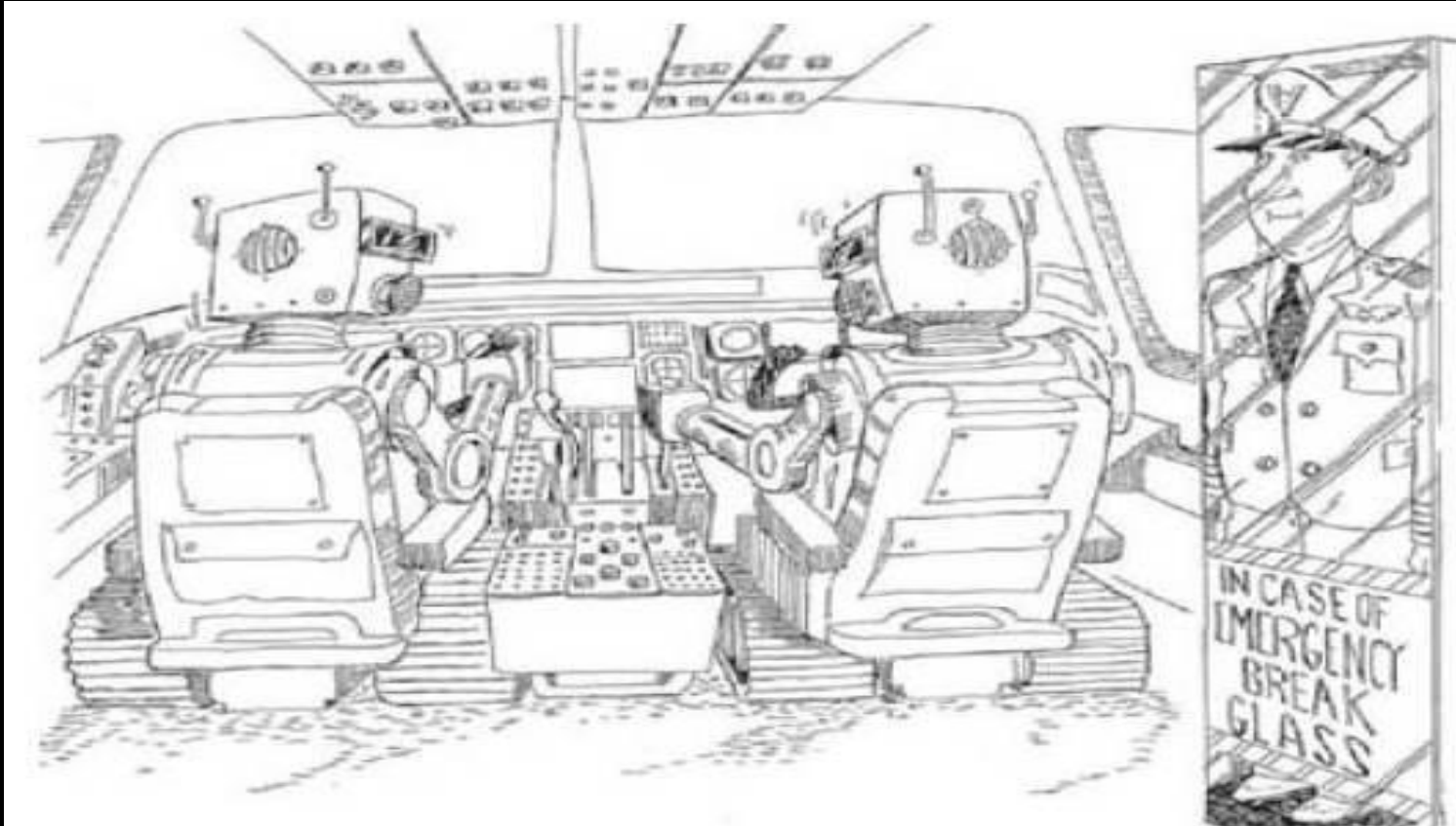
Engineering Cybernetics + Cognitive Psychology =  
**Cognitive Cybernetics**



# Keep the human in the loop!

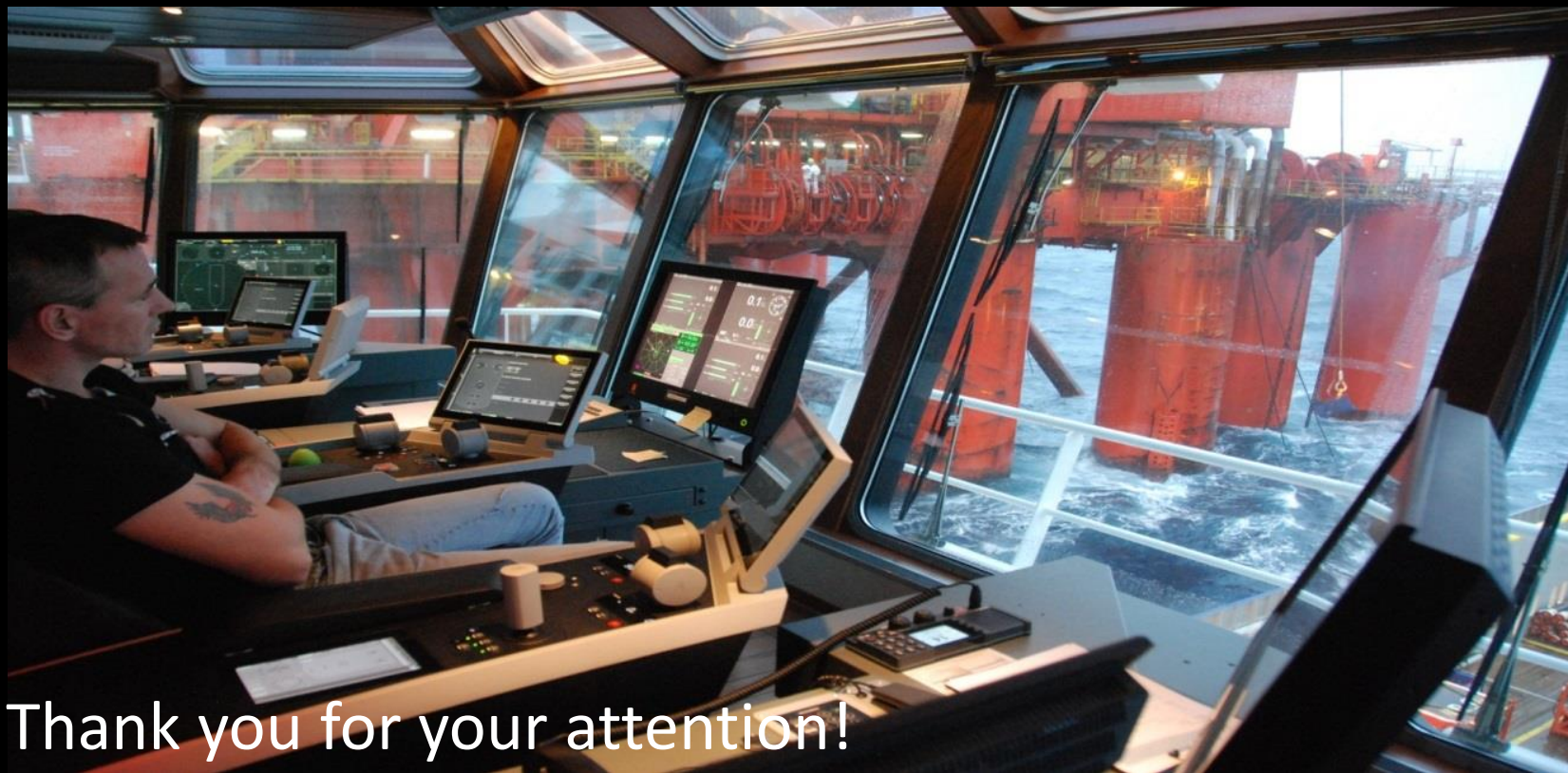


KONGSBERG





KONGSBERG



Thank you for your attention!