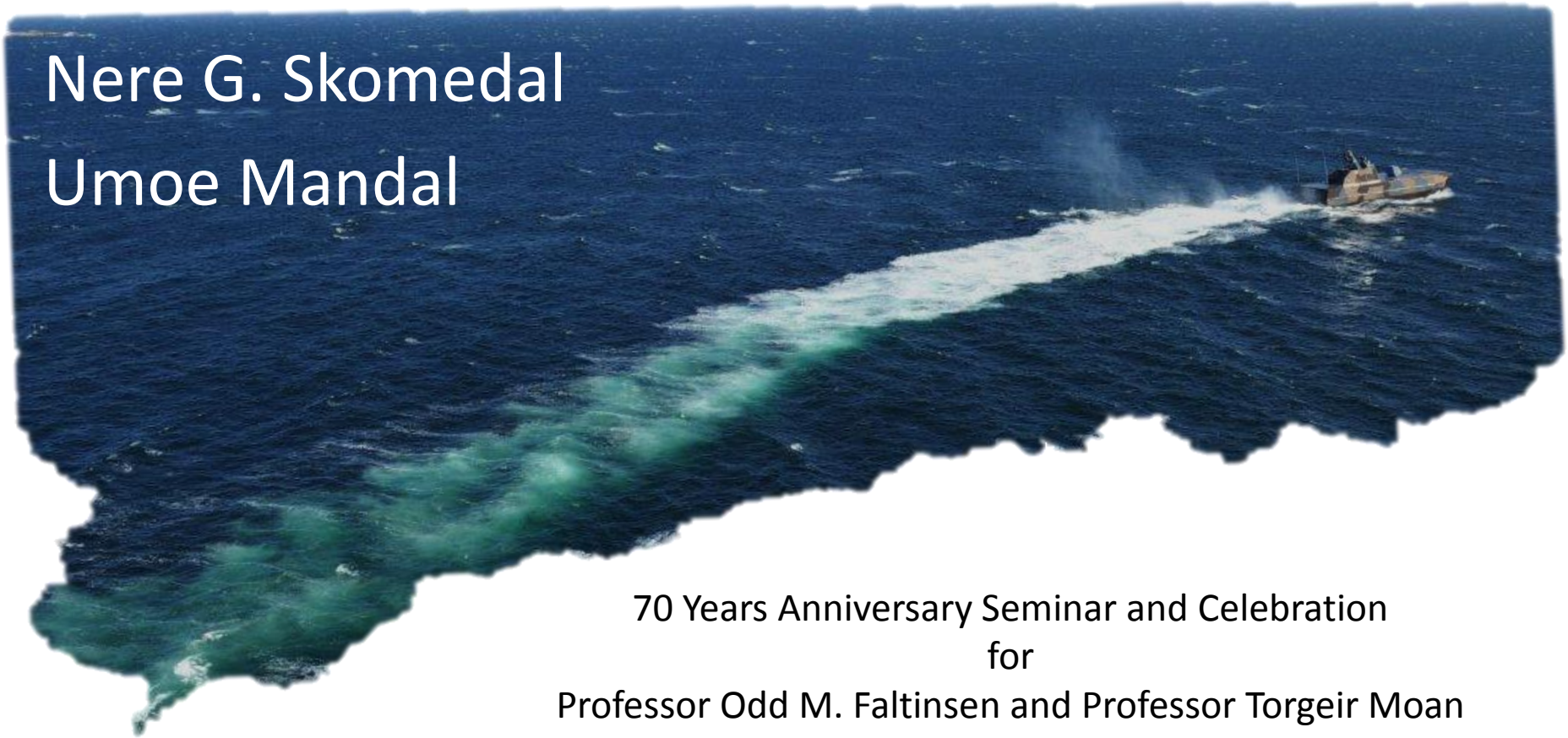
High speed craft technology - from theory to 58+ knots in service

Nere G. Skomedal

Umoe Mandal



70 Years Anniversary Seminar and Celebration
for
Professor Odd M. Faltinsen and Professor Torgeir Moan
May 2014

PhD: Application of a vortex tracking method to 3D flow past lifting surfaces and blunt bodies

1982-1985

- 3D generalization of Faltinsen/ Pettersen vortex tracking method to model separated flow
- The vortex sheets behaved unstable after a short time
  - due to Helmholtz instabilities
  - growth of numerical inaccuracies
  - Limited computer capacity (ND 500)
- Now “easily” modelled with modern computers/commercial CFD software

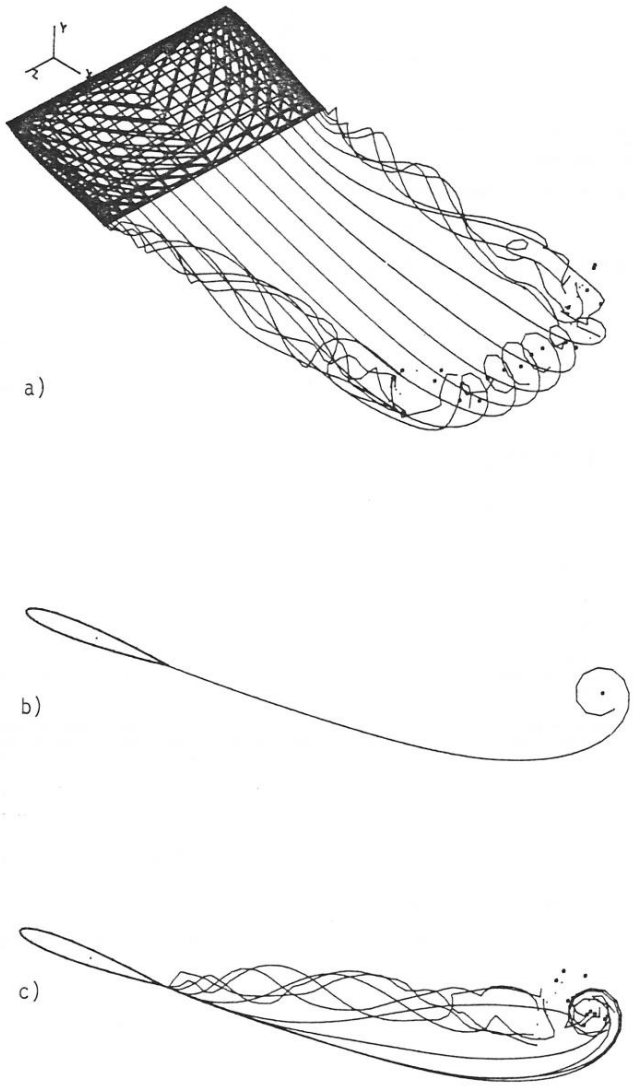


Figure IV.24 (a-c).
Rectangular wing in impulsively started flow. α= 20 deg
a) Perspective view, b) Cross-section at z = 0.0.
c) Sideview.

After the PhD:

1985-1990:

DNV/Veritas Research

1990-: Kværner/Umoe Mandal

R&D/Design/management

60 Years of Naval Shipbuilding in Mandal

The high speed aluminum passenger catamaran invented in Mandal….

Hydrofoils built since 1962…

The first aluminum catamaran: Westamaran 1973…

Fjellstrand 38 1987…

Brødrene AA introduced carbon fiber catamarans 2001….

Continued by…

The fast ferry industry “bubble” collapsed around year 2000

- Most high speed passenger routes are in decline or operate with reduced speed
  - A few yards still survive in a meager market
- Why did the high speed ferry era end so soon?
  - Passengers will not pay added cost for reduced travel time
  - CO_2 emissions and climate change effects
  - Fuel costs
  - and thanks to Ryanair and Norwegian Airshuttle

(Low priced air travel)

Now sent to scrapping…..

Still a market for high speed vessels?

- The naval market is «a (safe?) haven» for high speed craft technology
  - Significant tactical advantages of high speed and low signatures
- Offshore O&M wind power crew transfer might be an new market
  - Because windfarm owners will pay for reduced transit time to maximize energy production
  - Cannot afford helicopters

Umoe Mandal: Proud builders of

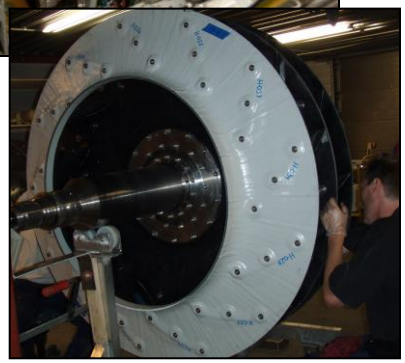
Probably the most complex ships designed and built in Norway

6 in operation with RNoN

6 in operation with RNoN

25 years with air cushion vehicles

- Umoe Mandal is the world leader in Air Cushion and Surface Effect Ships
- Extensive experience in design and construction of naval composite structures
- Leading experience in high speed craft gas turbine applications
- Leading supplier of advanced high capacity lift fans and SES/ACV equipment



Skjold Class Corvette – the world's fastest military vessel in operation

Main data Skjold-class

Displacement	: 274 t
Length	: 47,5 m
Speed	: 60 kn
Range	: 800 nm / 40 kn
Crew	: 20 (13/4/3)

Main armament

NSM
76 mm OTO
Mistral MANPADS

In service for the Royal Norwegian Navy

P961	KNM Storm	2010
P962	KNM Skudd	2010
P963	KNM Steil	2011
P964	KNM Glimt	2012
P965	KNM Gnist	2012
P960	KNM Skjold	2013

NSM

KNM Storm

Built by Umoe Mandal

3 Skjold class corvettes can replace 12 conventional FPBs*

After 12 hours transit:

Significant manning and cost reductions achieved

NSM

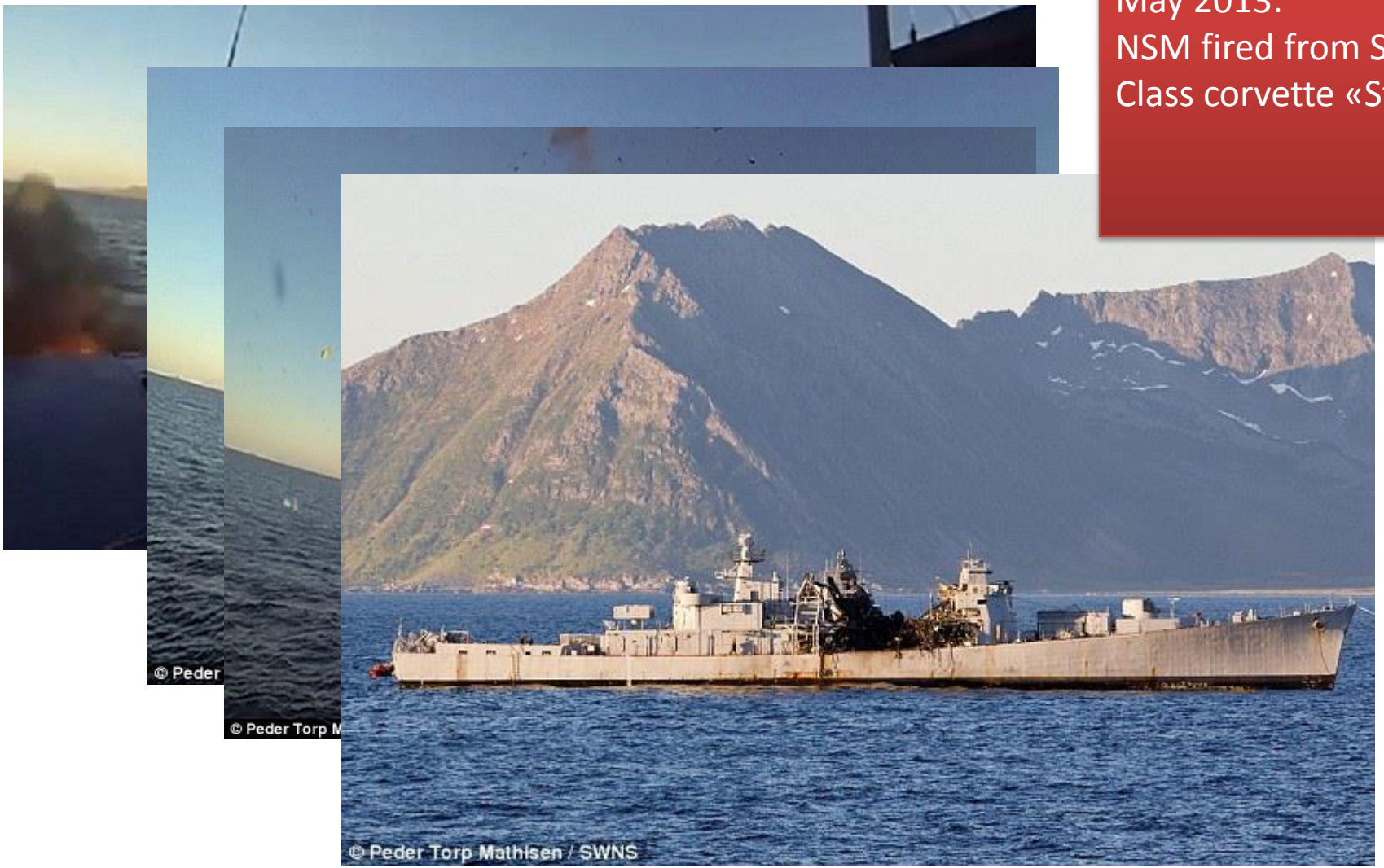
165 nm
3 hours at 55 kn

330 nm
6 hours at 55 kn

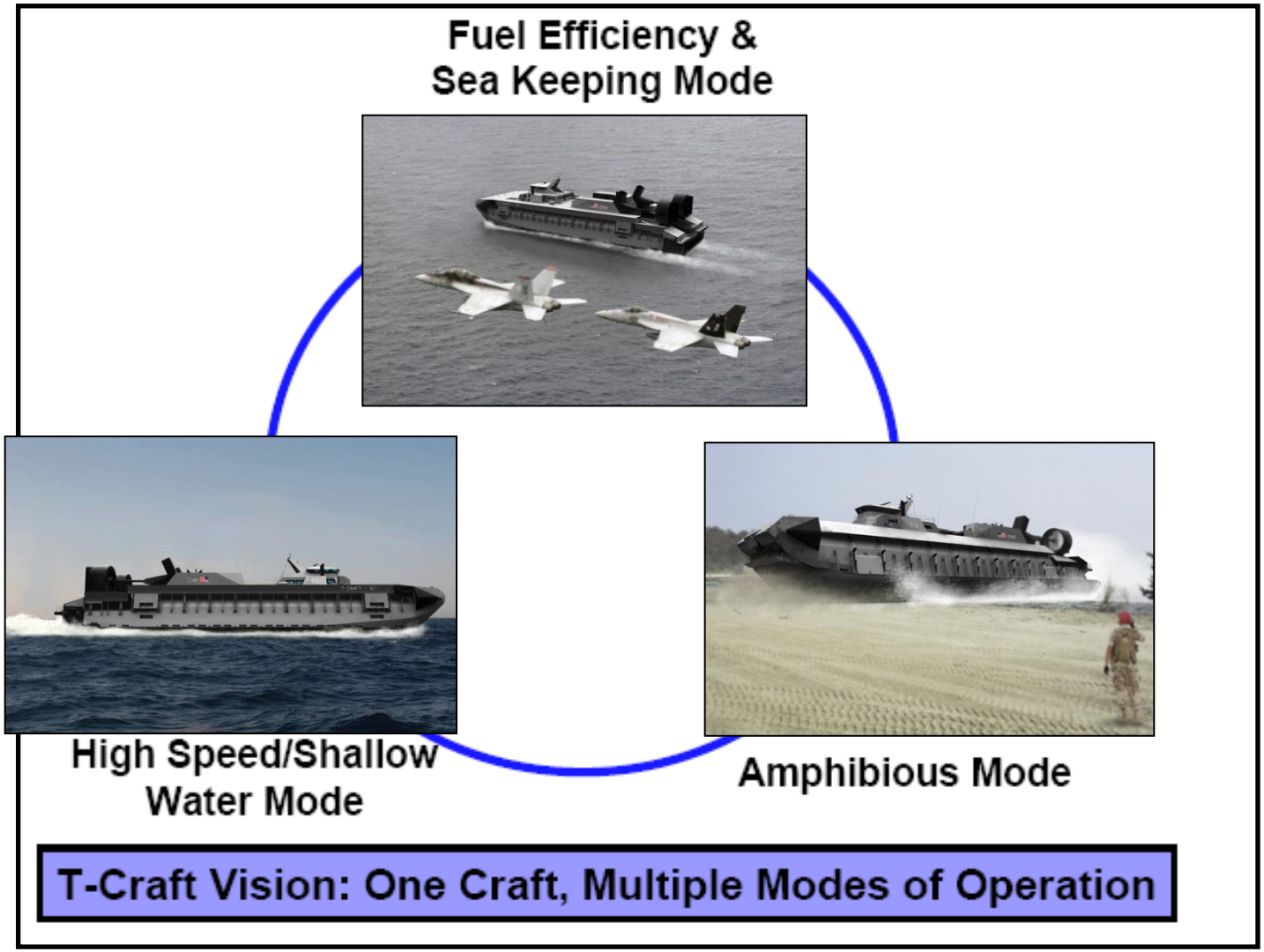
*at 33 knots

The formidable firepower of the Skjold class

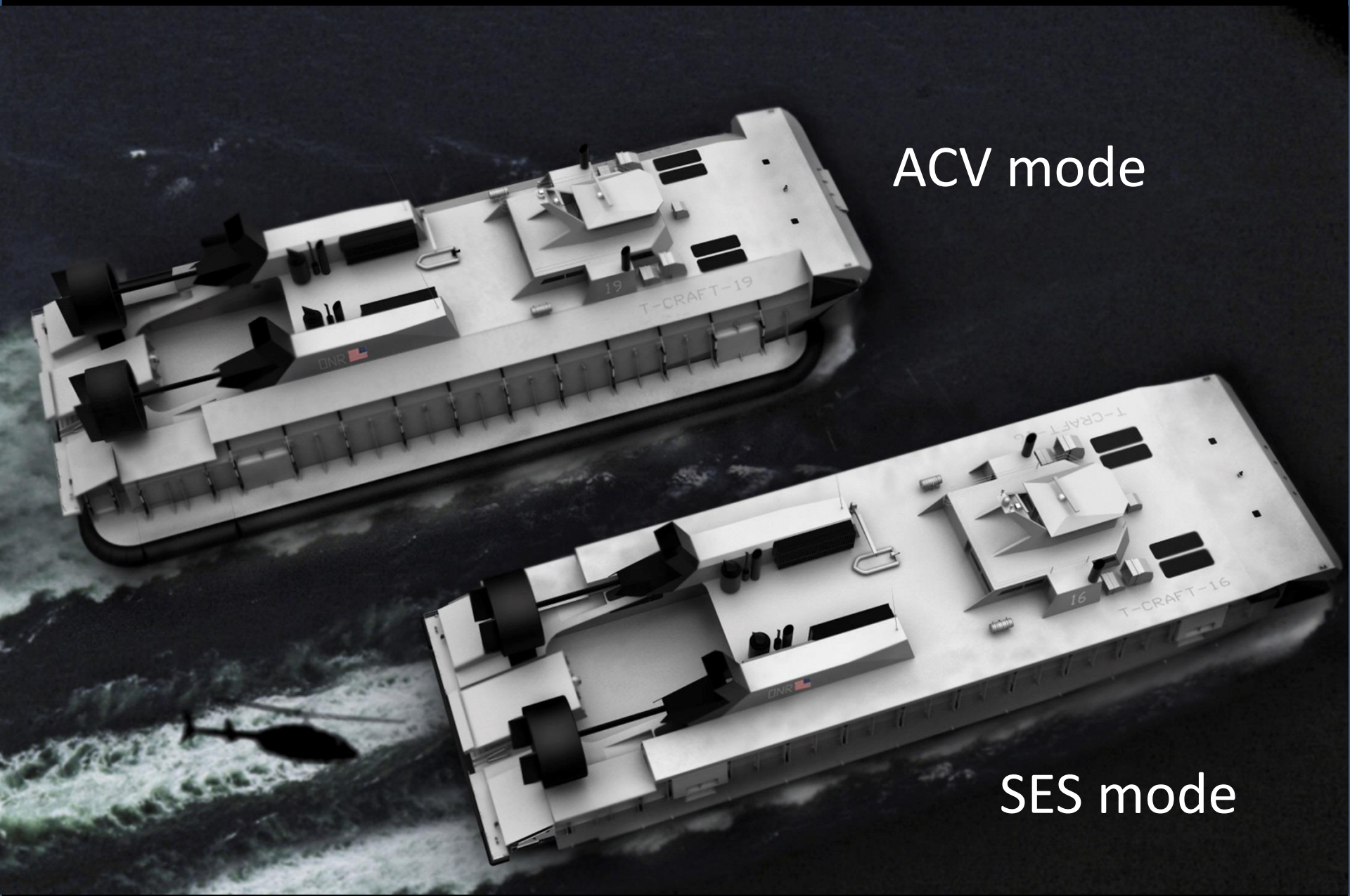
May 2013:
NSM fired from Skjold Class corvette «Steil»



Example of innovative SES/ACV design: T-Craft for ONR



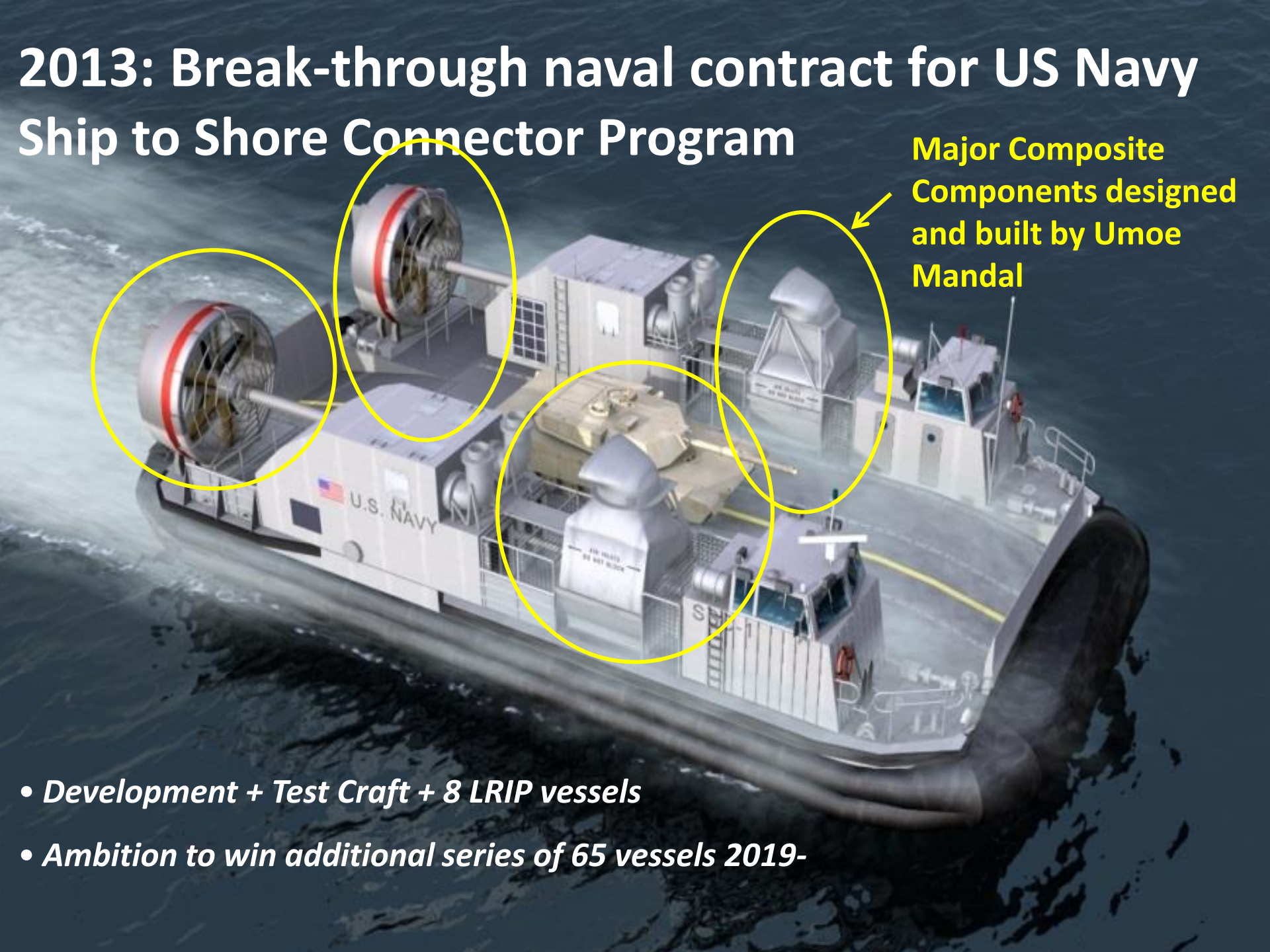
Long range good seakeeping and high speed shallow draft mode: SES


ACV mode
T-CRAFT-19
19
DNR
T-CRAFT-16
16
SES mode

The UM T-Craft…..
T-CRAFT 23
23
…delivering the cargo dry feet on the beach…..

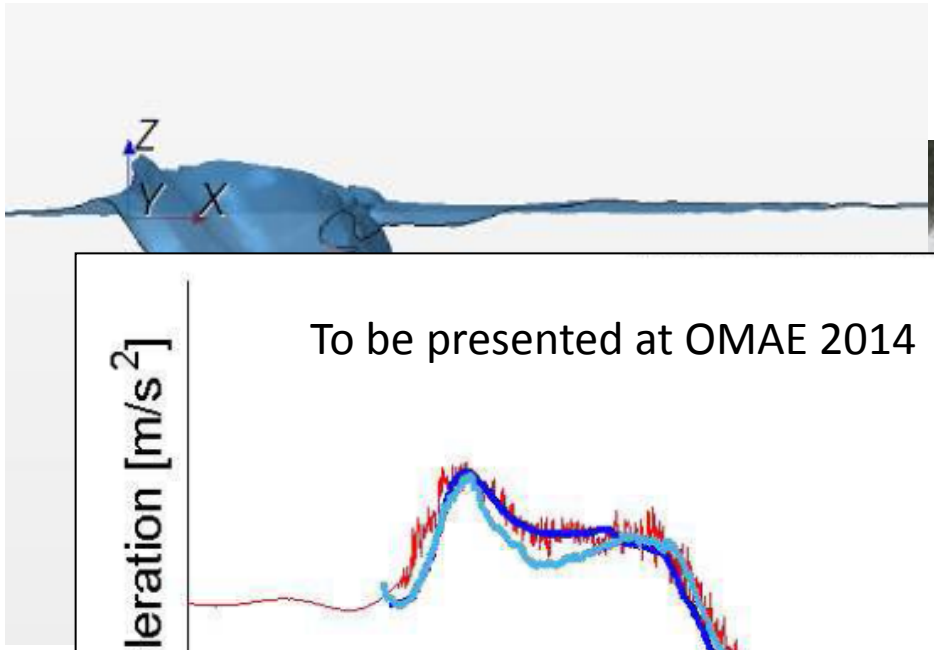
2013: Break-through naval contract for US Navy

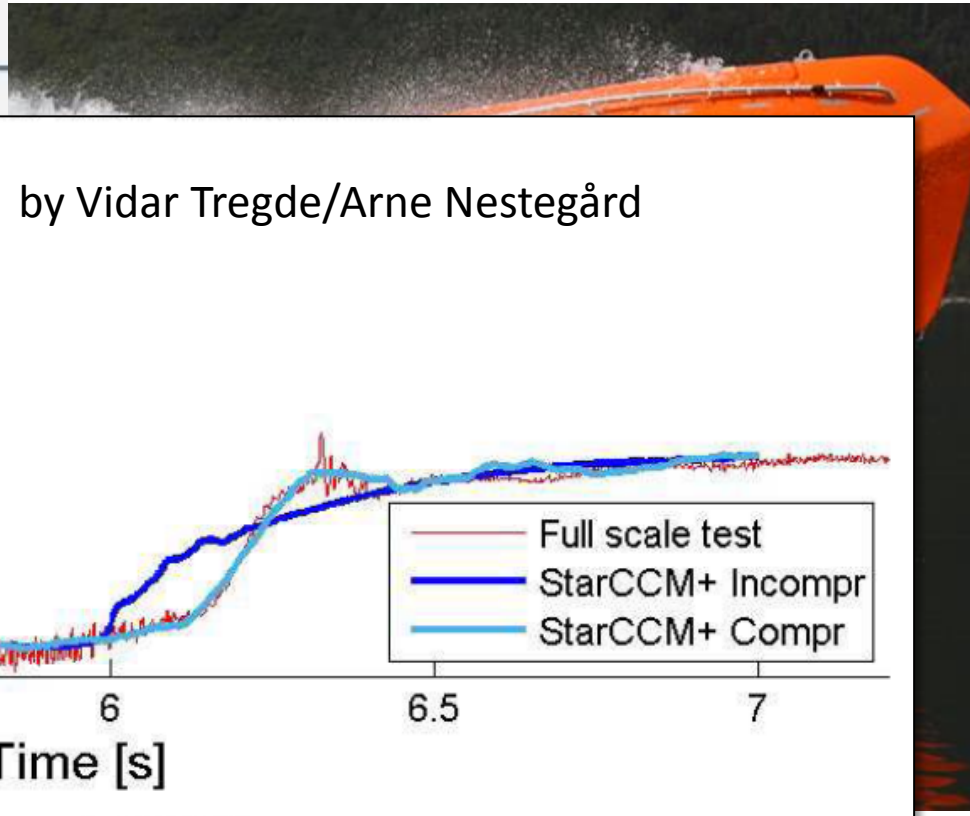
Ship to Shore Connector Program



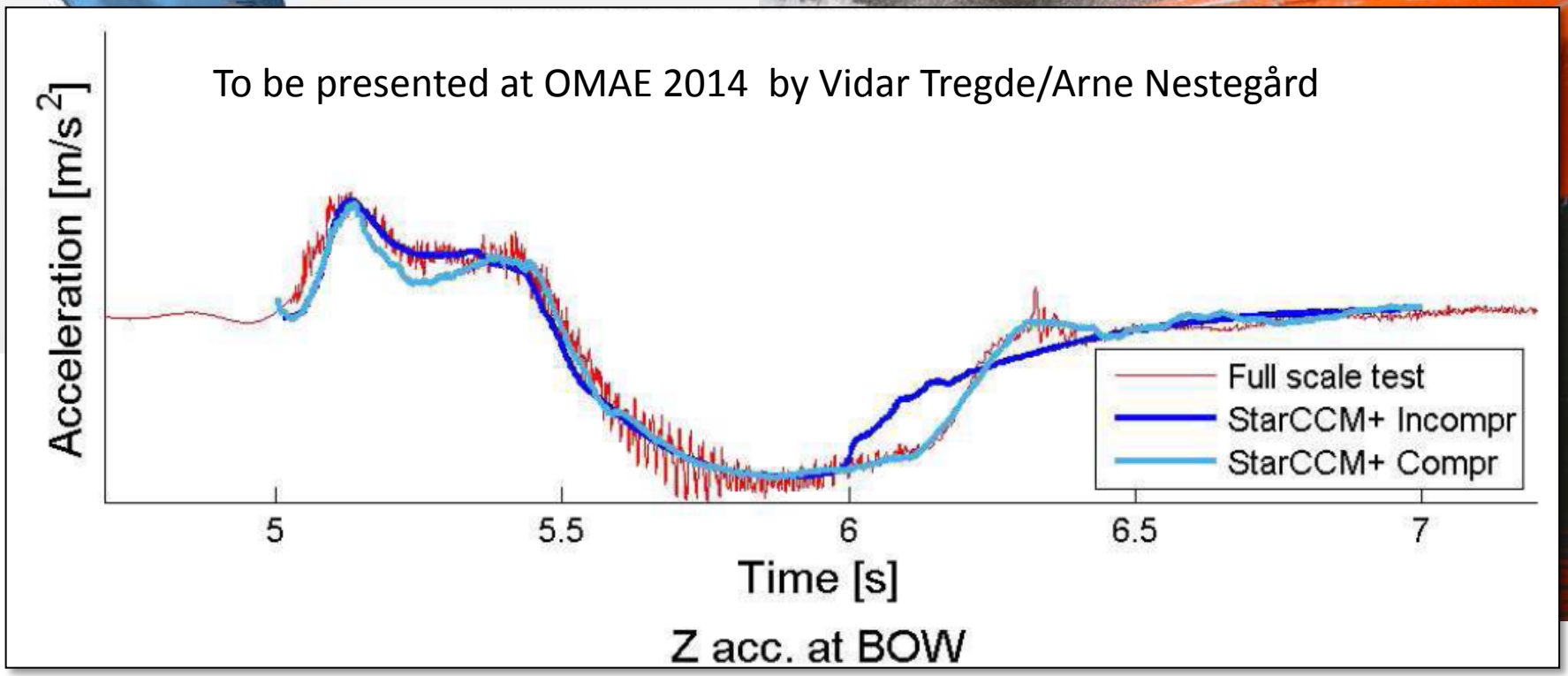
- *Development + Test Craft + 8 LRIP vessels*
- *Ambition to win additional series of 65 vessels 2019-*

Extensive CFD capabilities



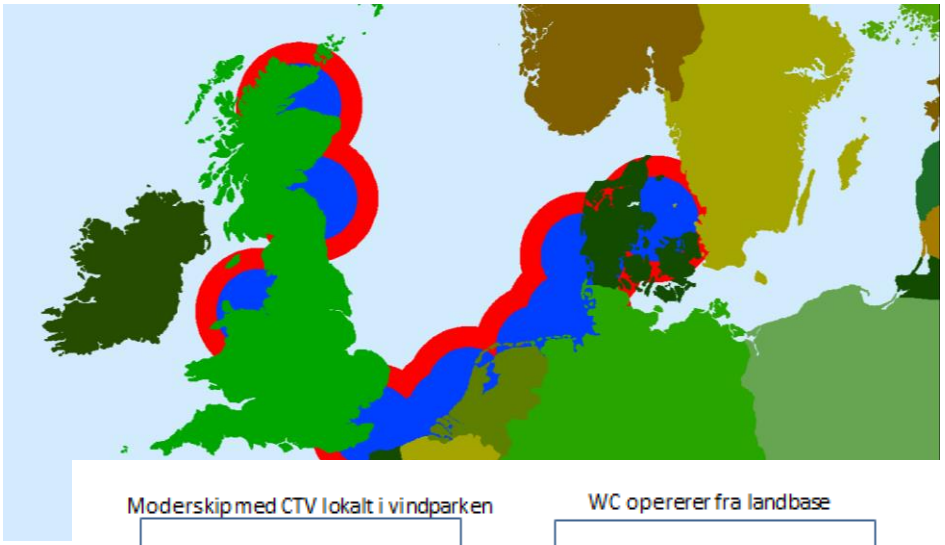


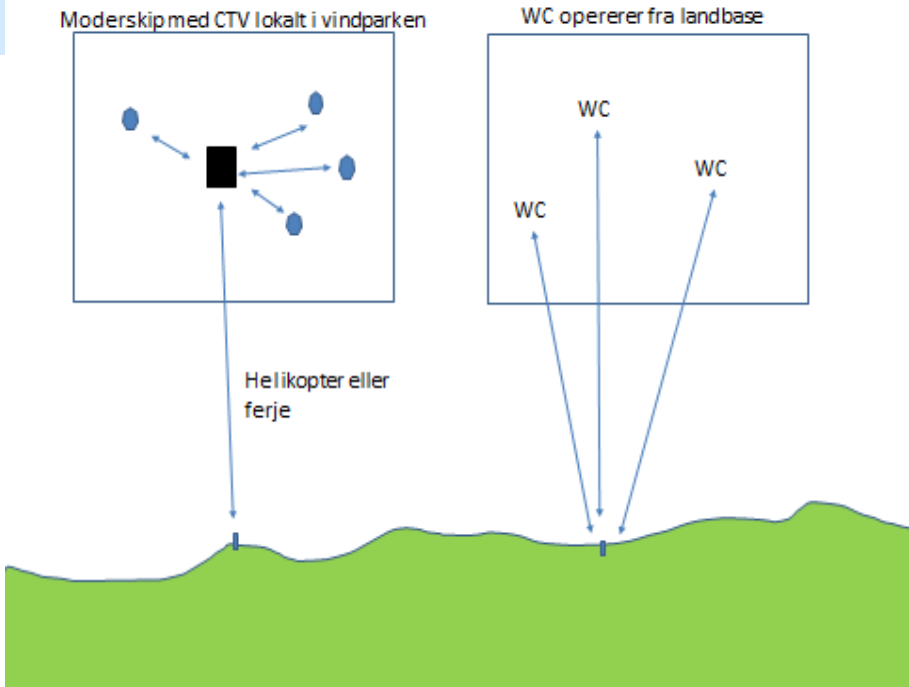
To be presented at OMAE 2014 by Vidar Tregde/Arne Nestegård



SES for Offshore Wind O&M Crew transfer?

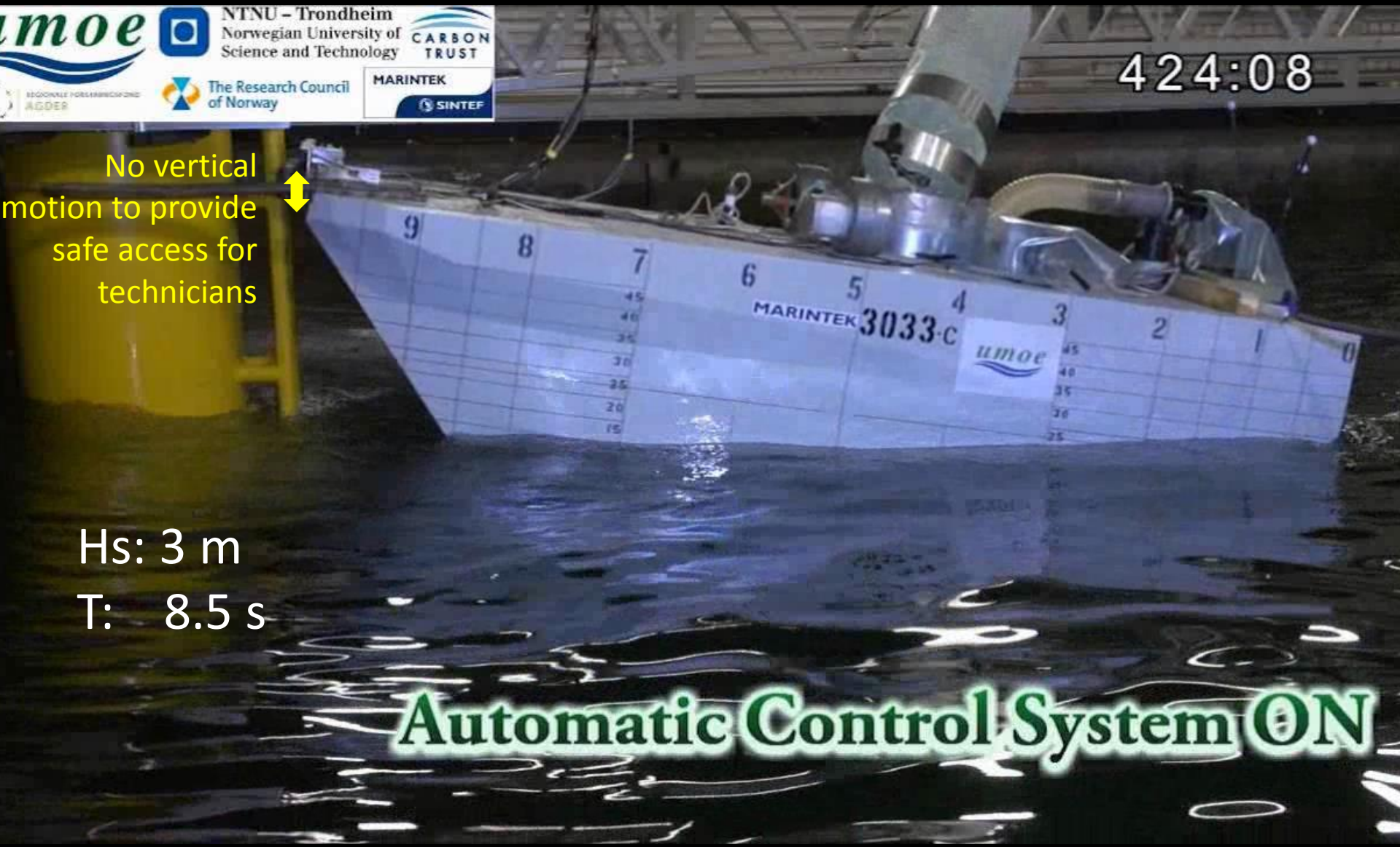
- Double speed – halved transit time
- Increased transit comfort
- Pressure control of air cushion to improve access to wind turbines
  - Reduce heave motions by ~50%





Making offshore wind more profitable
Under contract, to be delivered January 2015
umoe
RESCUE ZONE
WAVECRAFT
S E S
Next generation SES for
Speed, Access, Comfort

The bow is pushed against two vertical cylinders:



A great “thank you” to Odd Faltinsen and all
the best from us in Mandal
Full speed ahead!
Vidar and Nere