MUNIN-Prosjektet: En konseptstudie for fullt ubemannede skip.

NFAS Oppstartskonferanse – 4. oktober 2016

Ørnulf Jan Rødseth – seniorforsker, MARINTEK
OrnulfJan.Rodseth@marintek.sintef.no

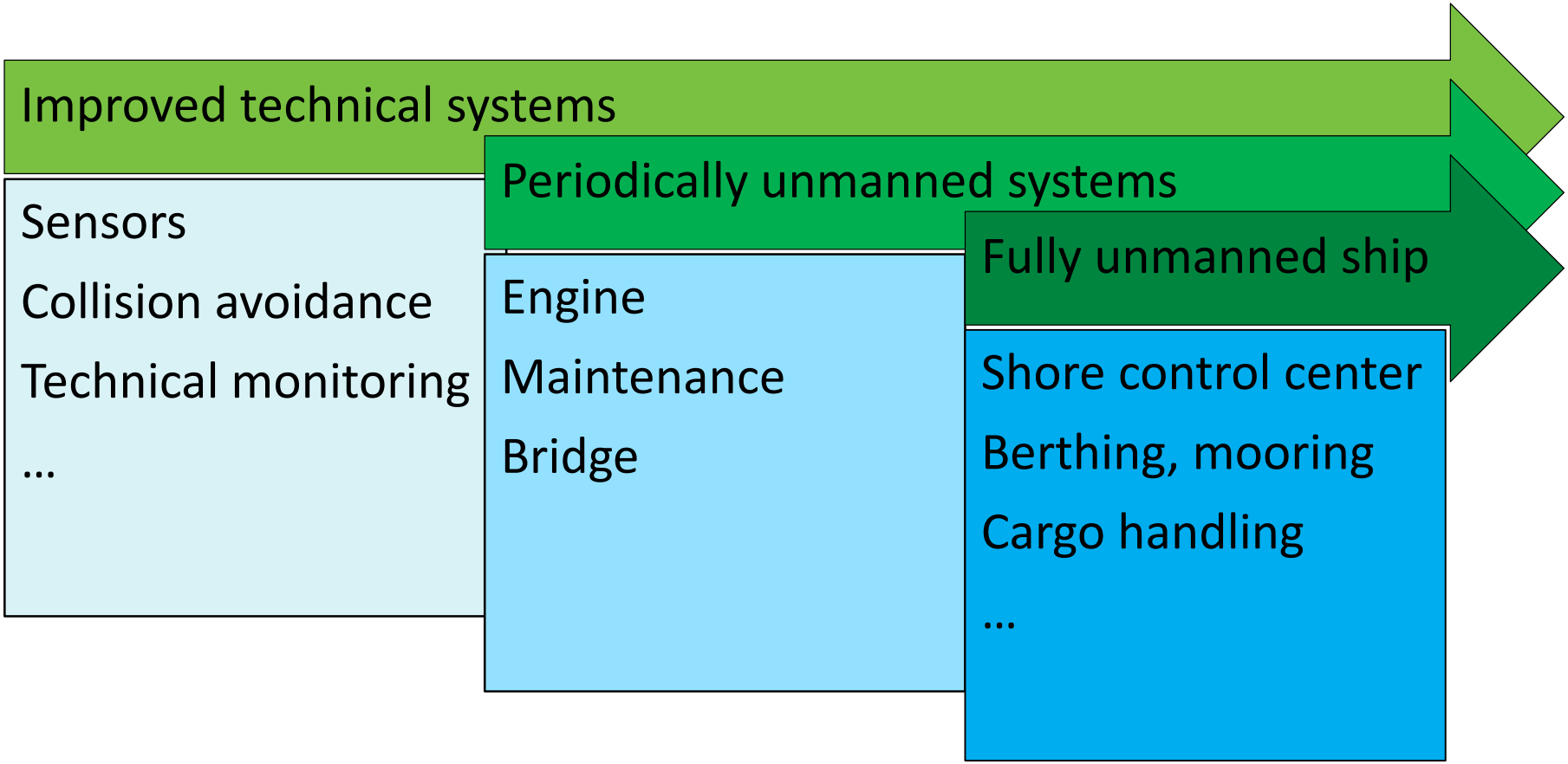
MARINTEK
Norsk Marinteknisk Forskningsinstitutt

SINTEF

A concept study for a fully unmanned handymax dry bulk carrier on an intercontinental voyage.

- Duration: 01.09-2012 – 31.08.2015
- Funding: 2.9 million EUR of budget 3.8 million EUR
- Activity code: SST.2012.5.2-5: E-guided vessels - the 'autonomous' ship

Different forms of autonomy



In this presentation we will mainly look at fully unmanned ships.

Contents

- **Driving factors and risks**
- Critical design factors
- Some possible examples of unmanned ships
- Conclusions and summary

Increasing automation in all areas

Safety

NOAA Office of Response and Restoration

Own ship: No crew that can be harmed

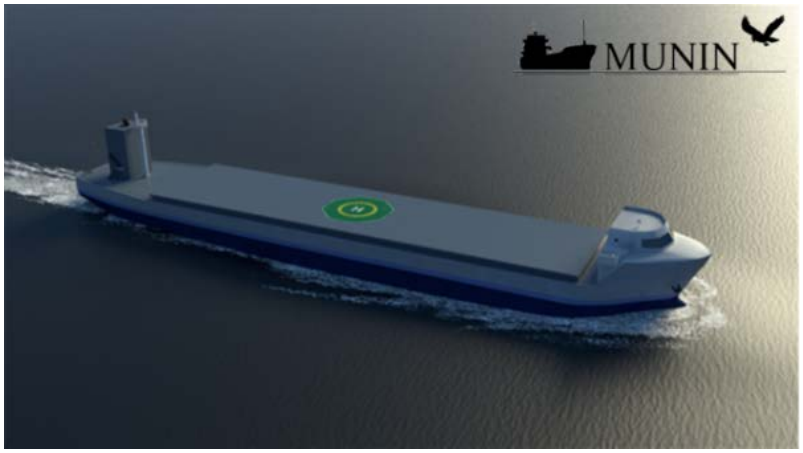
Exxon Valdez Oil Spill Trustee Council

Other ships and environment:Less human errors

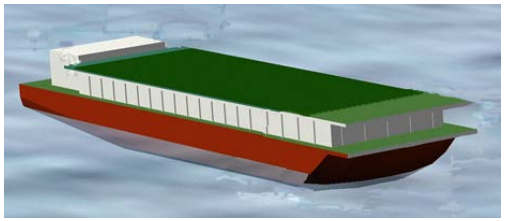
Better maintenance reduces accidents

© Vard

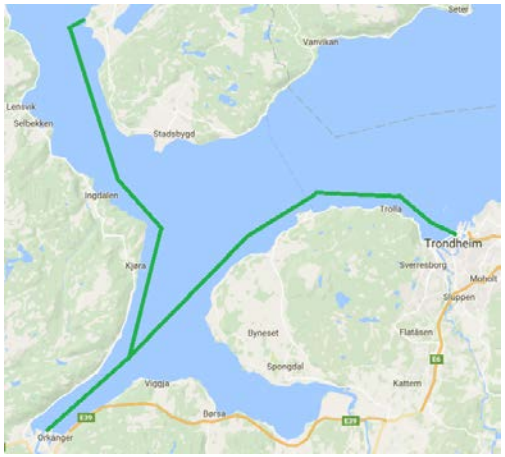
Environment

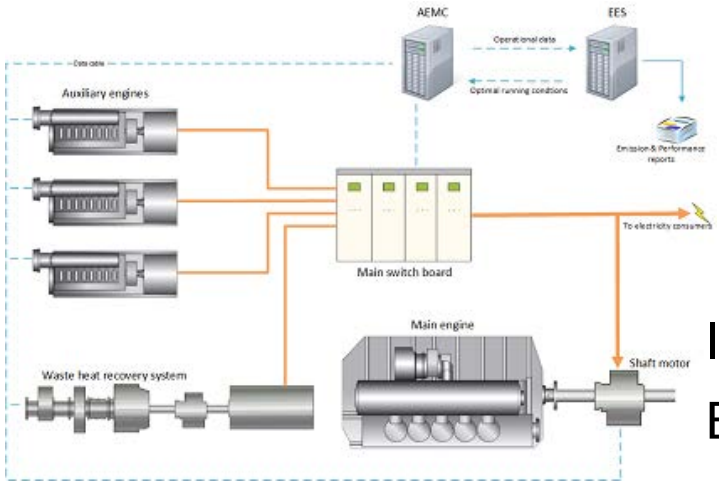


No hotel and no crew:
Less energy, more optimal voyage



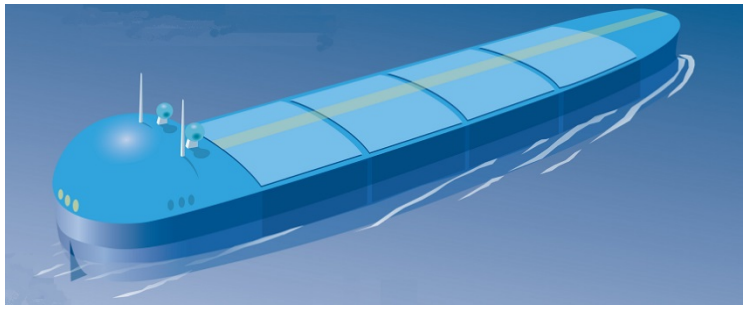
Completely new transport systems:
Compete with road





Improved automation:
Better technical efficiency

Reduced costs?



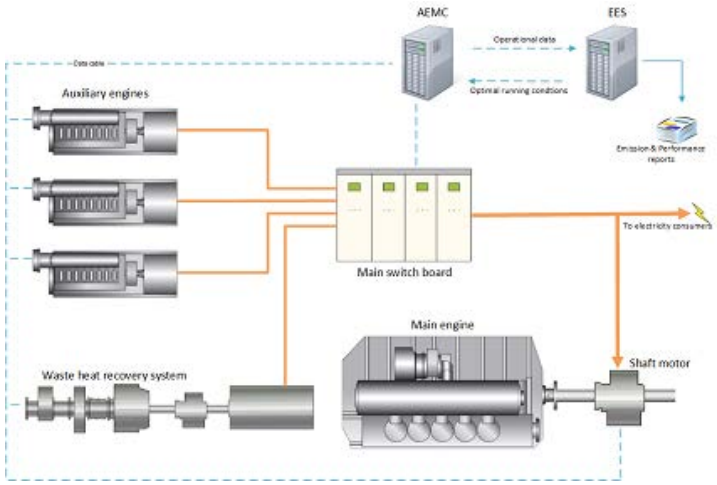
No accommodation

Less power

More cargo

No crew

No crew related costs



Improved technical systems

Less off-hire

Better efficiency

Societal

European maritime competitiveness

European employer attractiveness

Improved transport systems

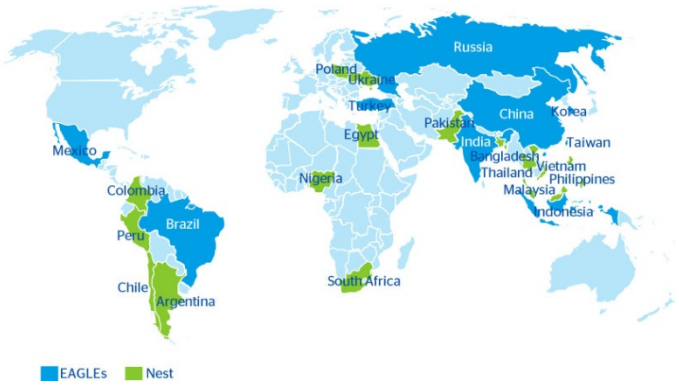
Less dangerous work

Periodically unmanned bridge

Shorter stays away from home

More interesting work

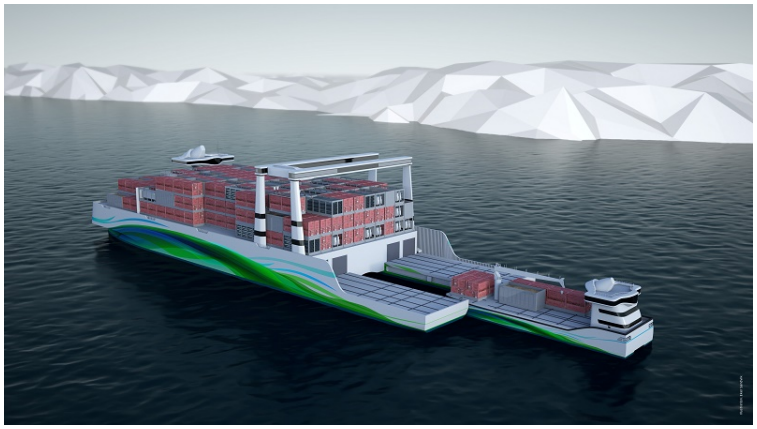
strangecosmos.com



The world's need for

low cost transport

New business models



NCE Maritime Clean Tech & NCL

Mother ship and unmanned drones

Low operational cost short sea / last mile shipping

godsfergen.no

Risks?

Cost-benefit

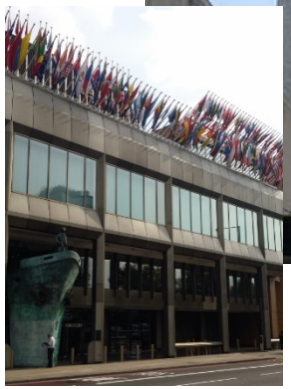
- No hotel
- No crew
- Improved efficiency
- Less off-hire
- New business model

- Dual propulsion, no HFO
- Shore Control Centre
- Longer dockings
- Costlier instruments
- Existing business model

Legal and liability issues

- Contracts
- Insurance

- UNCLOS
- SOLAS



- Liability

wikimedia.org/paolodefalco75

Hostile (cyber) attacks

- Terrorist hijack e.g. by GPS spoofing

University of Texas at Austin

- Pirate attack

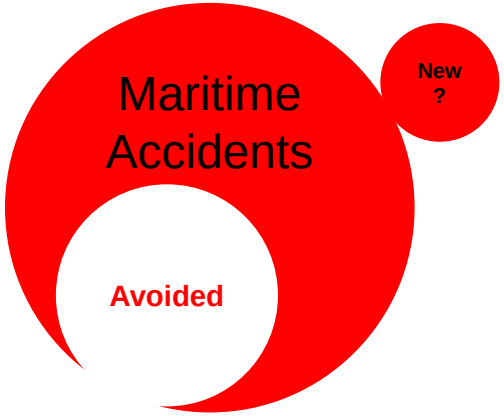
IMO

- Governmental backdoor

Wikimedia.org/Caricato da Makki98

"Autonomy assisted accidents"

First radar assisted collision: Andrea Doria and Stockholm off Nantucket in 1956

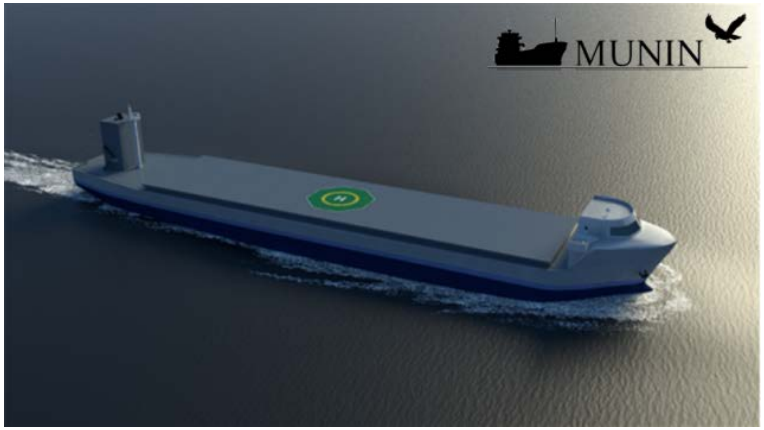


New accidents create problems for social acceptance!

Contents

- Driving factors and risks
- **Critical design factors**
- Some possible examples of unmanned ships
- Conclusions and summary

Critical Design Factor 1 - 4



No crew or accommodation

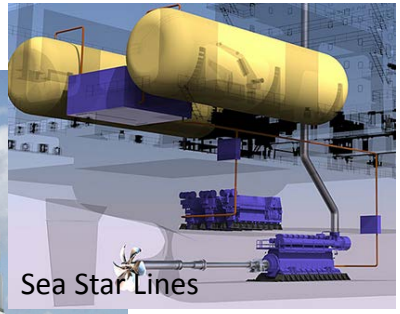
Trade-off between technical and operational complexity

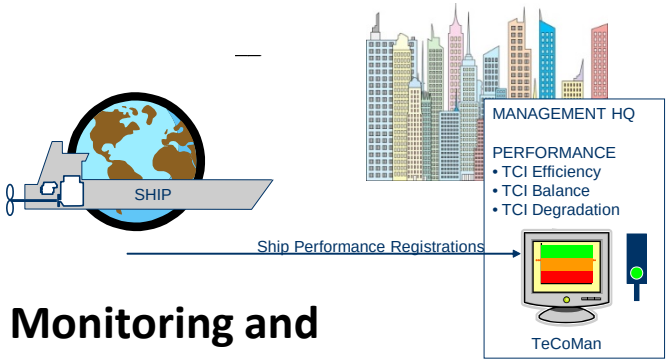
Shore support infrastructure

No onboard cargo intervention

Critical Design Factor 5-8

Highly reliable technical systems





Monitoring and maintenance planning

Sufficient redundancy

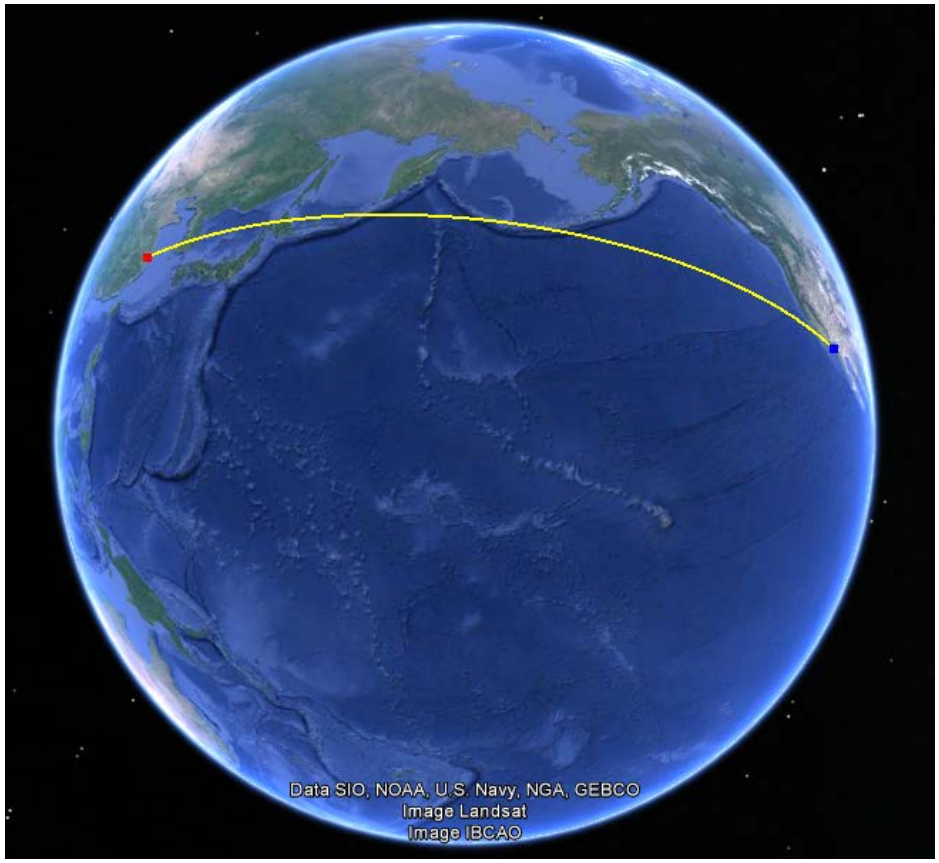
Rapid repair

Contents

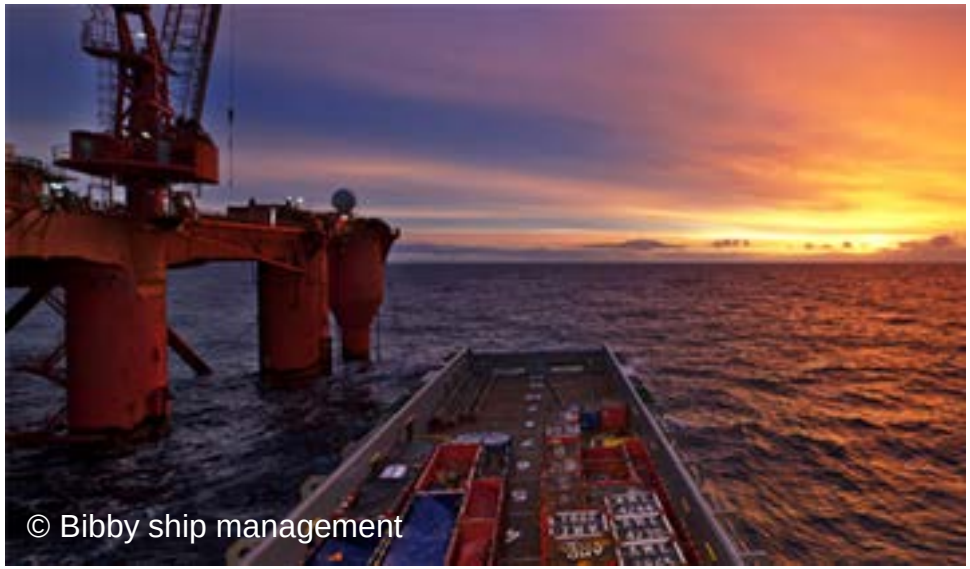
- Driving factors and risks
- Critical design factors
- **Some possible examples of unmanned ships**
- Conclusions and summary

Deep sea

- 10 000 TEU container vessel
- Shanghai – Los Angles
  - Two states involved
  - 6000 nm, open sea
  - No channels
  - Short port approach
  - Remote control to port
- Dual propulsion systems
- Two stroke diesels
- Biofuel, methanol …



Offshore supply



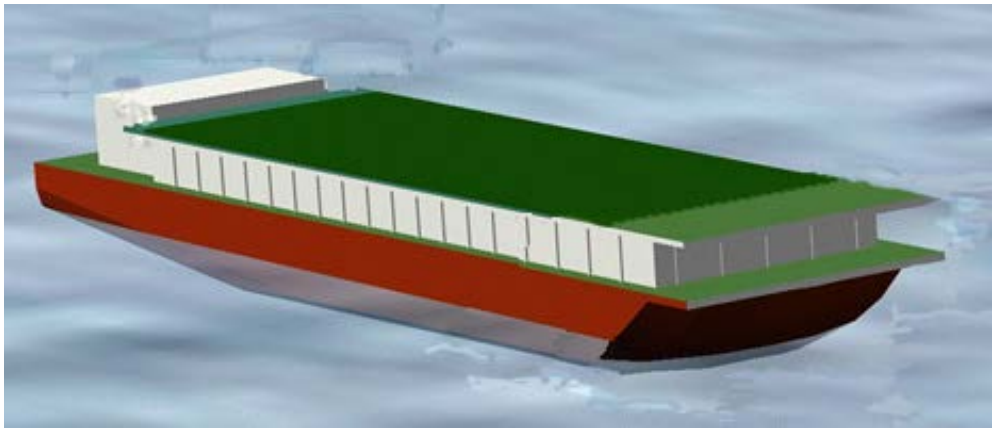
- Offshore supply vessel
- North Sea, Mexican Gulf
  - One state involved
  - 3-6 day roundtrip
  - Base near open sea
  - Infrastructure at base/rig
  - Remote controlled at base/rig
- Dual propulsion systems
- Diesel-electric
- LNG, biofuel, methanol …

Short sea automated transport

- Transport between small ports
- National/Regional
- 24/7 port calls
- Legs 4-12 hours
- Fully automated cargo handling
- Automated berthing
- Hybrid, LNG, biofuel, methanol …

Inland waterways

- Short voyages
- 12-50 TEU
- Inland, fjords/sheltered
- Low cost: Wait in port
- Legs 4-12 hours
- Port cranes
- Automated berthing
- Batteries



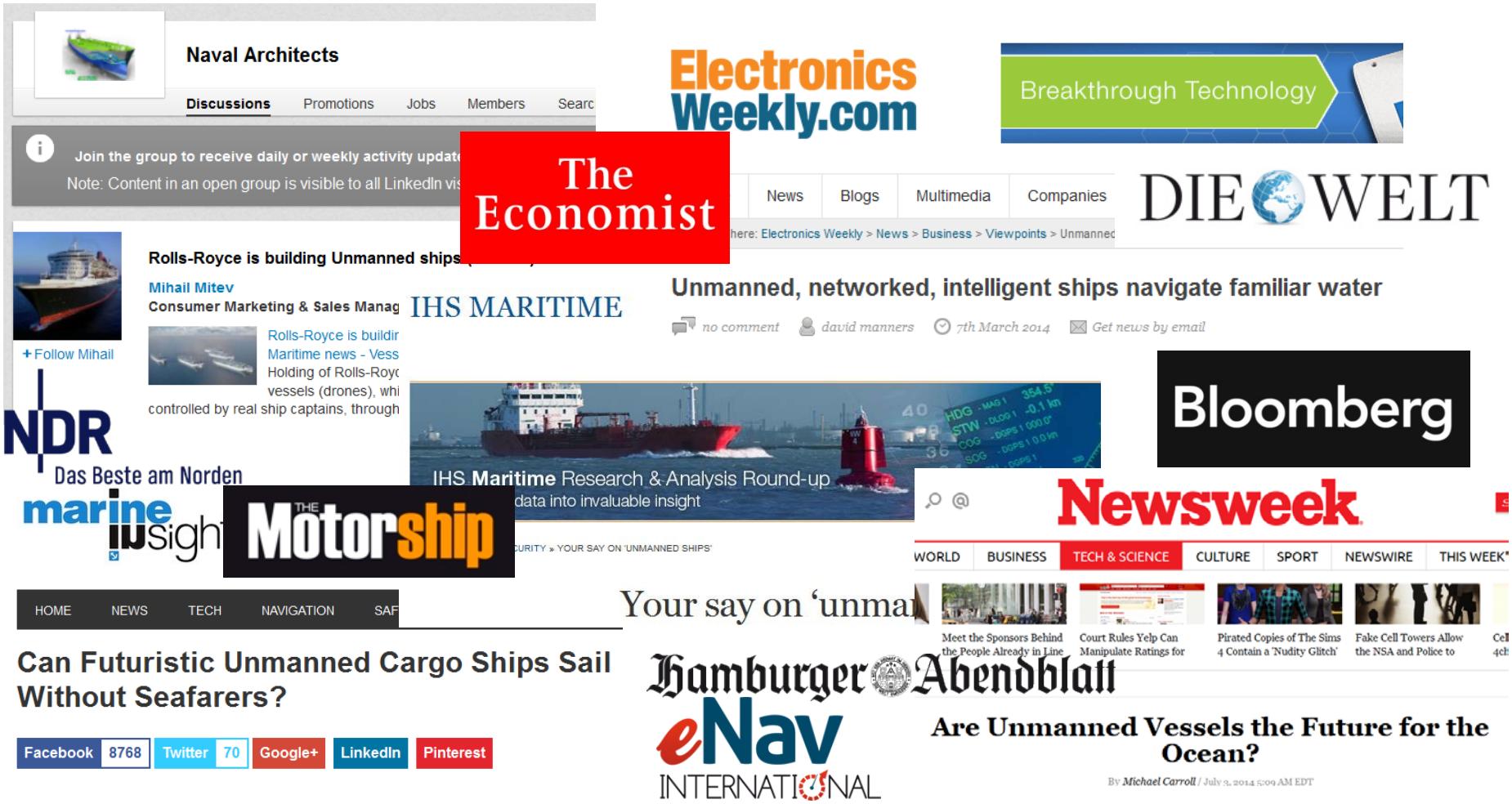
Contents

- Driving factors and risks
- Critical design factors
- Some possible examples of unmanned ships
- **Conclusions and summary**

Conclusions and summary

- Largest unmanned ship study in Europe is completed.
- Overall conclusion is that the unmanned ship will come – no long term show stoppers.
- There are design factors that needs to be considered for successful implementation.
- In addition, the business case must be sound!

High public interest



Thank you for your attention!

SST.2012.5.2-5: Grant no. 314286
E-guided vessels: The 'autonomous' ship

http://www.unmanned-ship.org

SEA TONOMY