



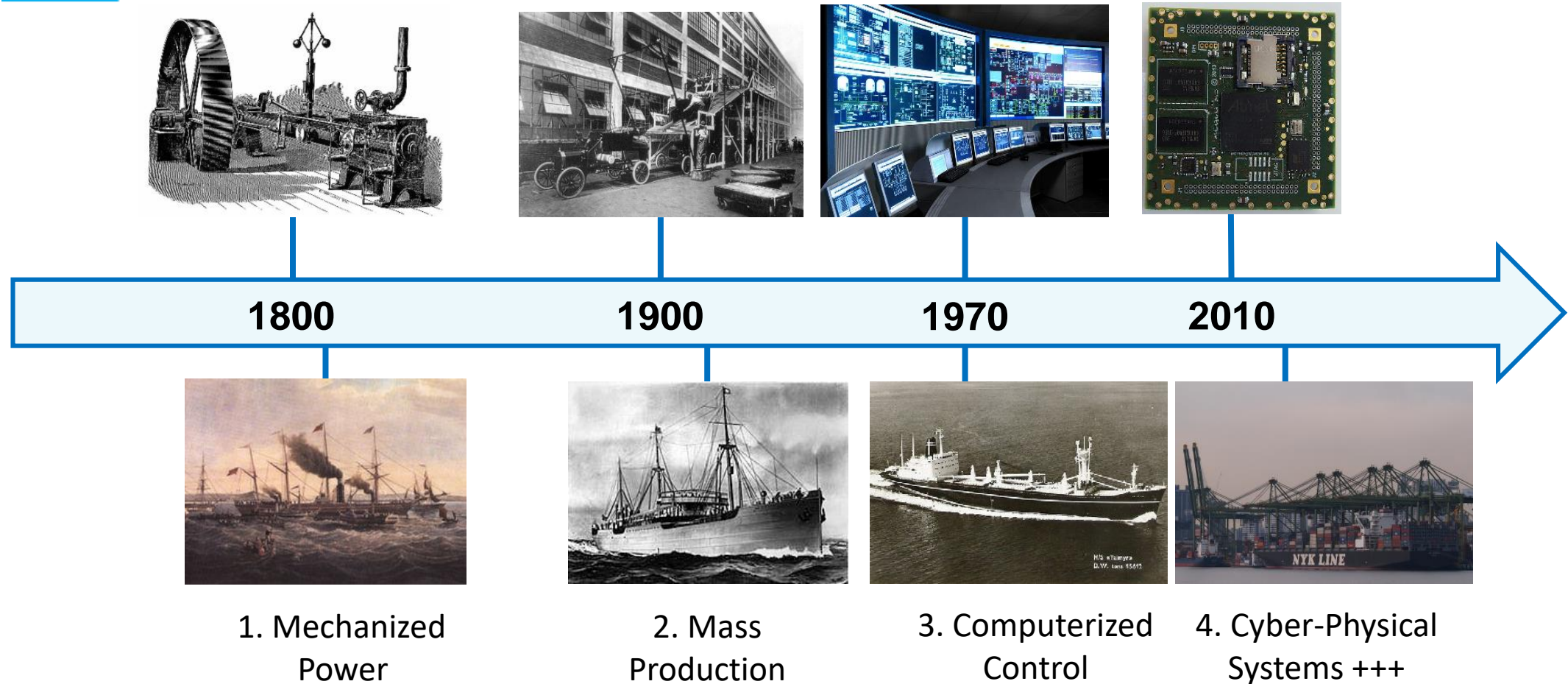
NORSK FORUM FOR AUTONOME SKIP – NFAS

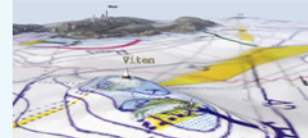
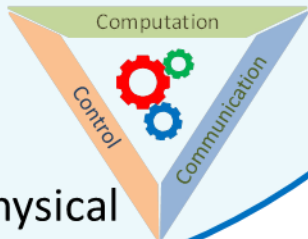
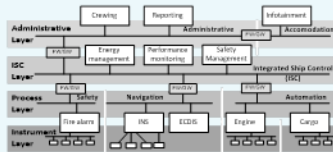
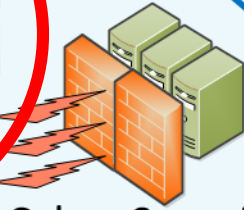
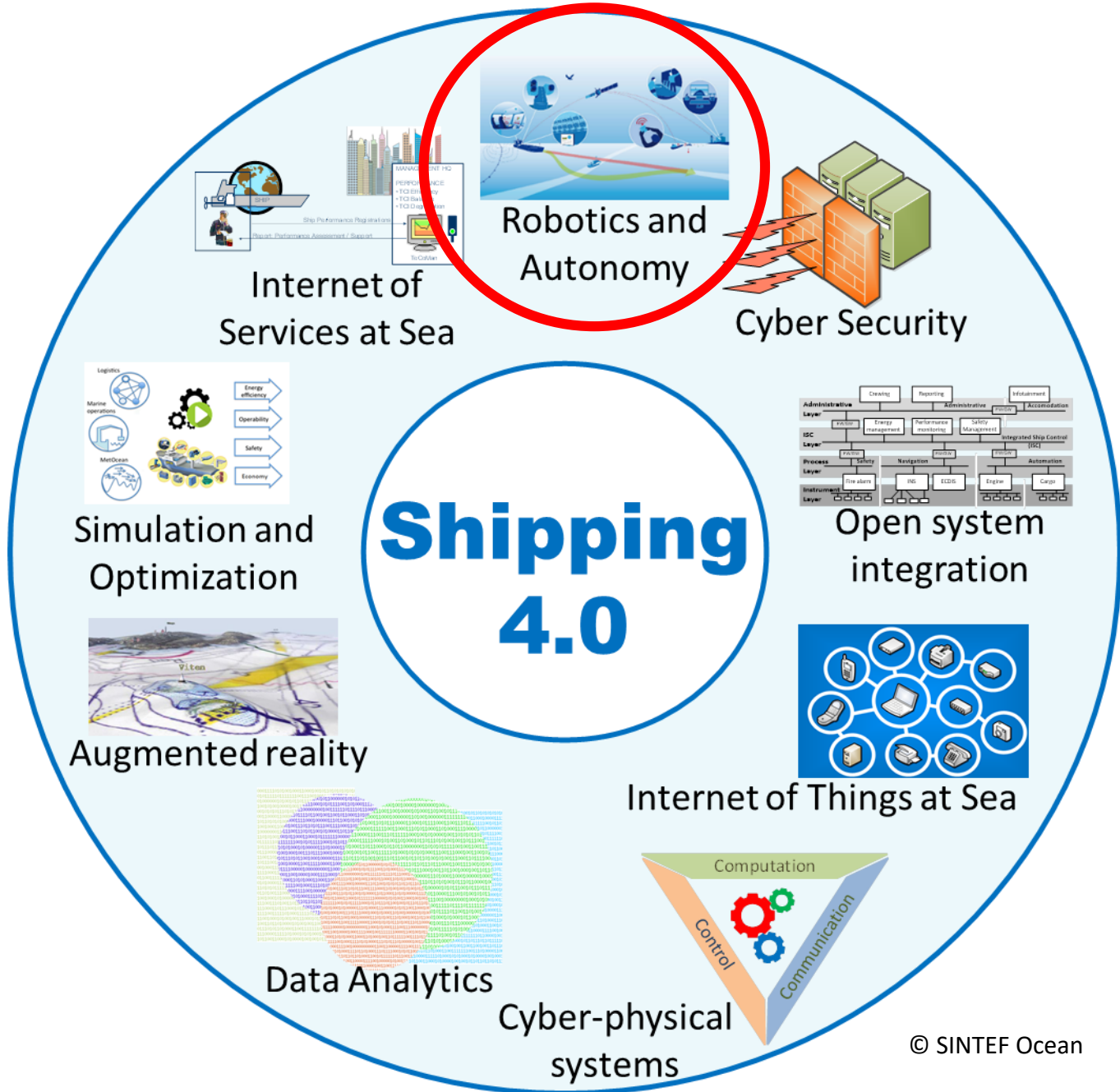
GCE NODE SEMINAR "AUTONOME SKIP" 12. MAI 2017

Ørnulf Jan Rødseth, Seniorforsker, SINTEF Ocean
Daglig leder, Norsk Forum for Autonome Skip

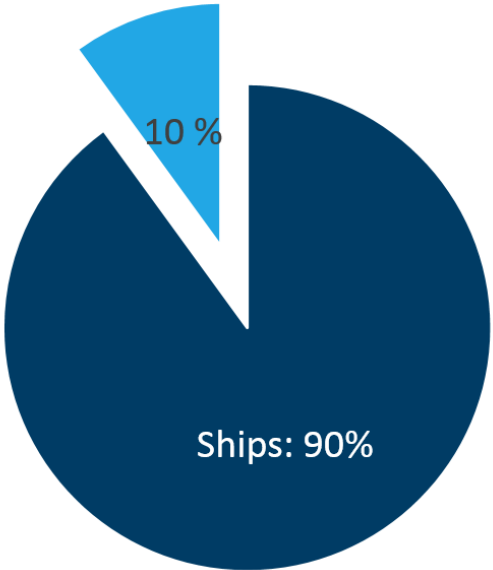
Hvorfor autonome skip og hvorfor Norge?

The fourth shipping revolution is on





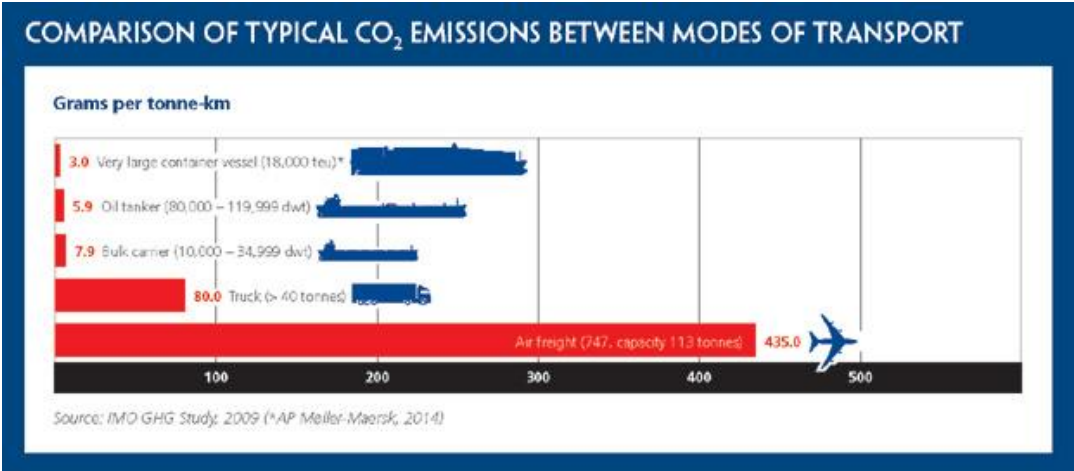
Why ships?



90% of world trade



... but aim is to make it 50% more effective by 2050



Extremely efficient

Why autonomous ships?



Wikimedia Commons/

Fewer accidents



Exxon Valdez Oil Spill Trustee Council

Fewer oil spills



Sjøfartsdirektoratet

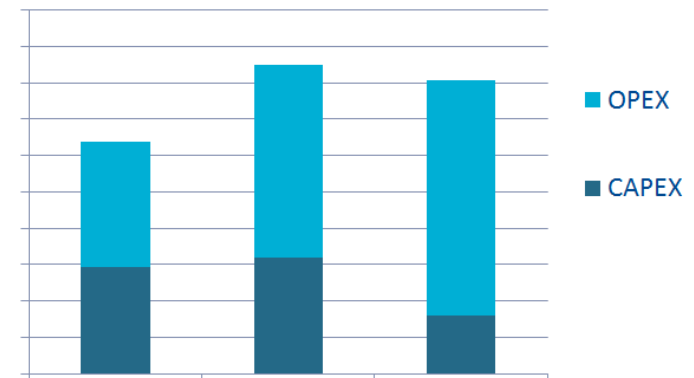
Working conditions and crew



Lower emissions



Fully unmanned!

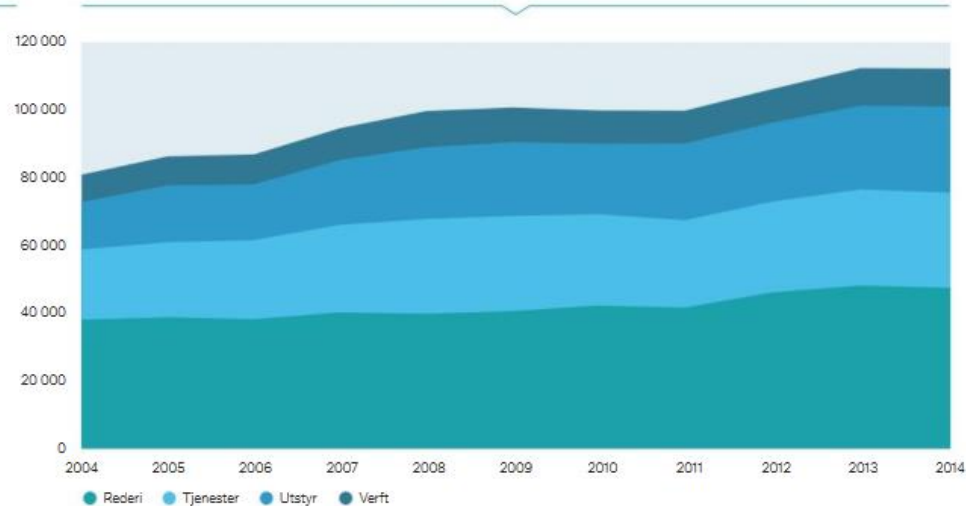


Lower costs

Why Norway?

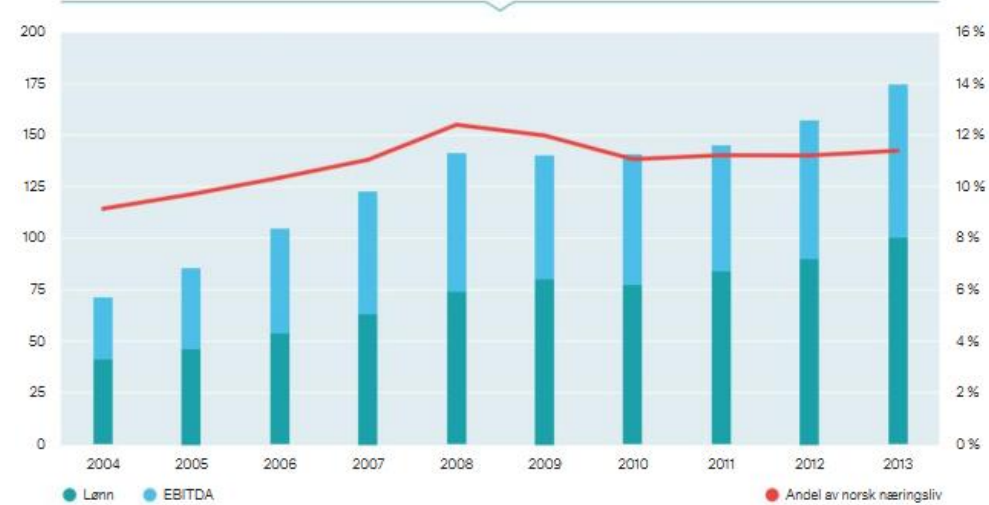
Maritim Verdiskapingsbok 2015, Maritimt Forum, Norge

Figur 2-4: Antall ansatte i maritim næring i Norge fordelt på fire hovedgrupper 2004-2014. Kilde: Menon/Bisnode

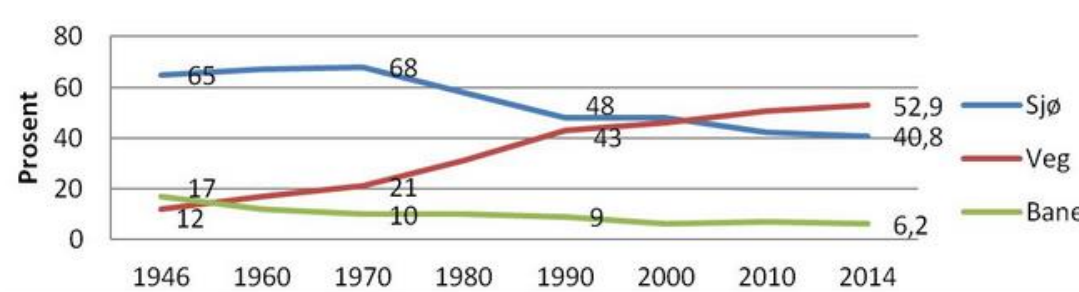


> 100 000 employees – 4% of workforce

Figur 2-1: Maritim verdiskaping og næringsandel av norsk næringsliv 2004-2013. Kilde: Menon/Bisnode

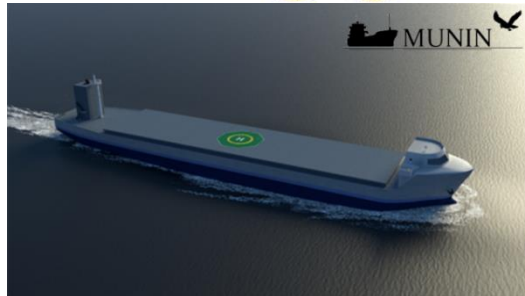


14% of value creation from businesses
38 % of export (ex HC)



Still a big role in inland cargo transport –
that needs to be increased

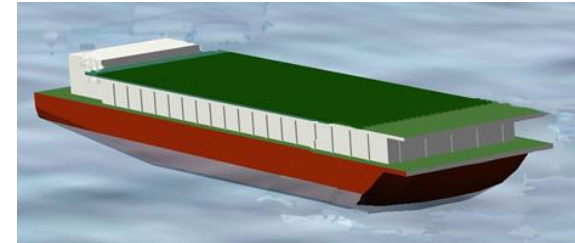
Why autonomous ships in Norway?



Yards and equipment



Shipping & services



New transport systems

Hva foregår i Norge?

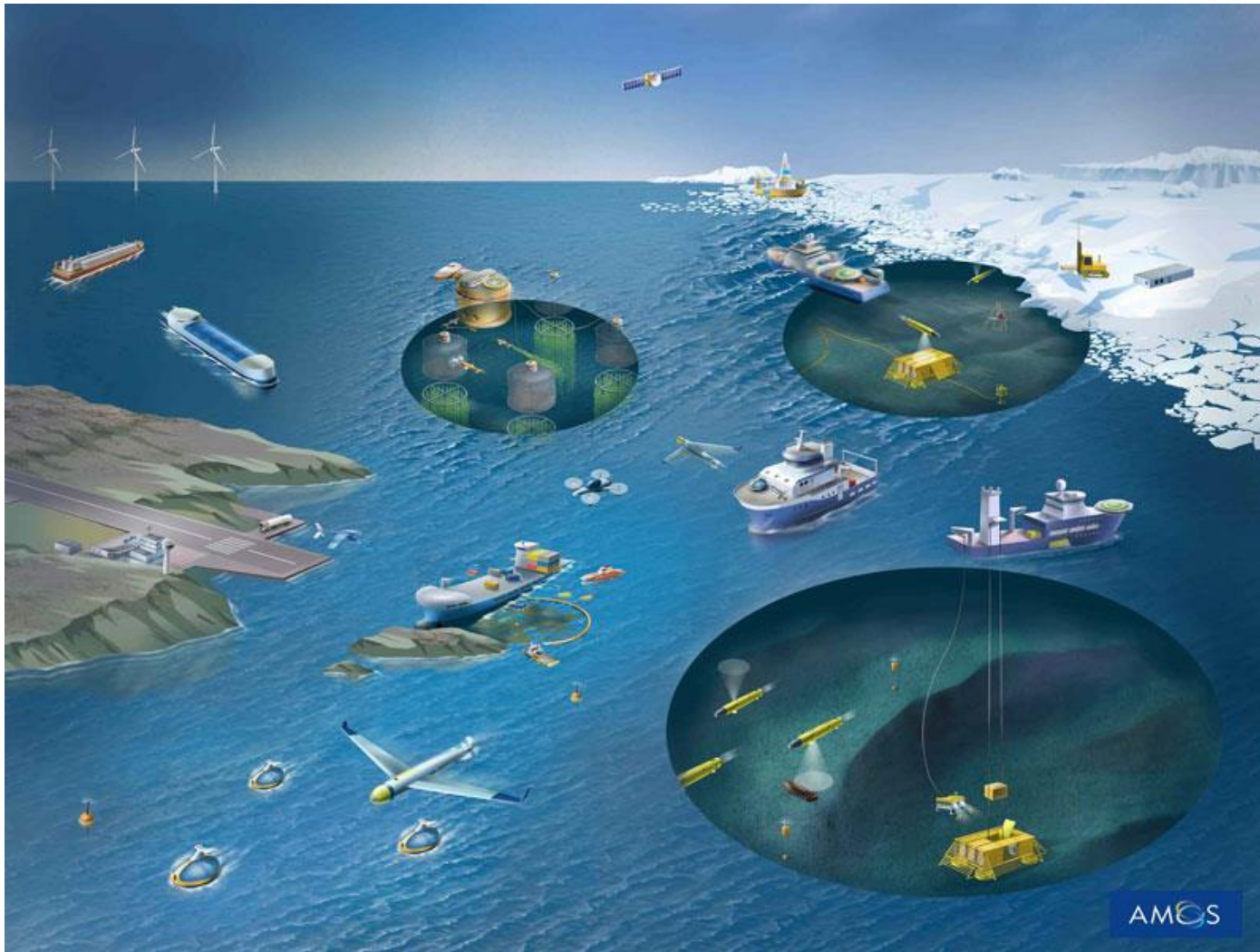
MUNIN: A concept study for a fully unmanned handymax dry bulk carrier on intercontinental voyage.

- 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



<http://www.unmanned-ship.org/munin/>

NTNU AMOS



- Supported by Norwegian Research Council
- Norwegian "Centre of Excellence"
- Established 2013
- Planned for 10 years
- Total budget approx. EUR 80 million

Test area Trondheimsfjorden



- Established September 30th 2016

- Industry, university, research
- Port of Trondheim
- Norwegian Maritime Administration
- Norwegian Coastal Administration



- Area covers Trondheimsfjorden

- Permits
- Instrumentation and communication
- Exchange of experience

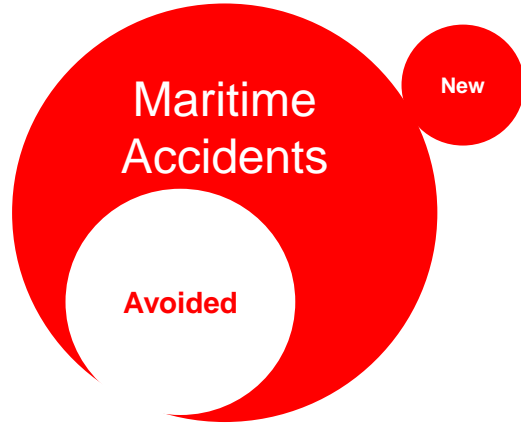
<http://navtar.no/>

Testområde Grenland

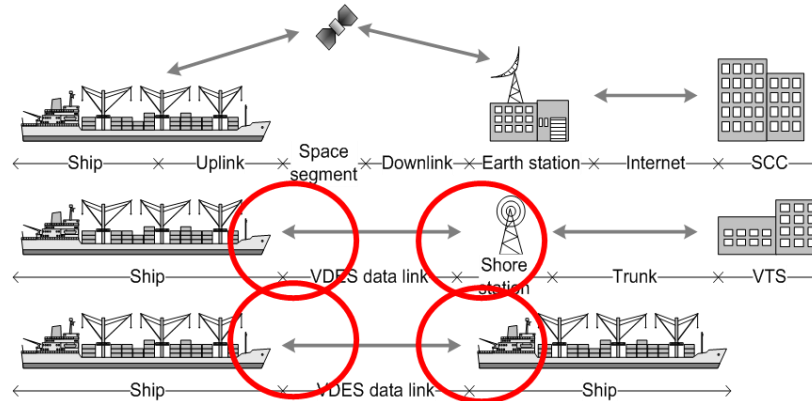


Under etablering

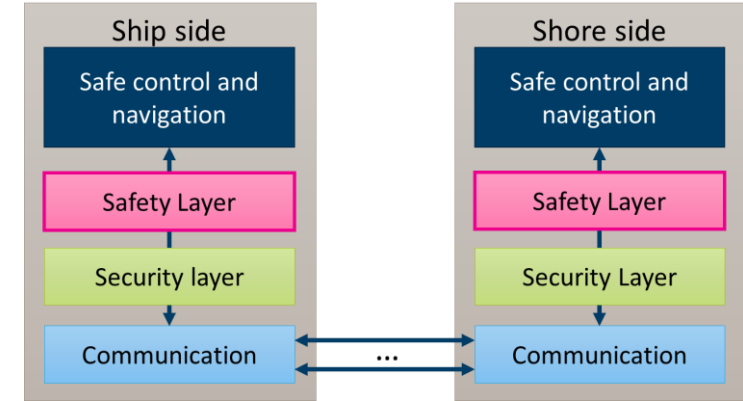
Projects are already developing technology



SAREPTA: Risiko og akseptkriterier



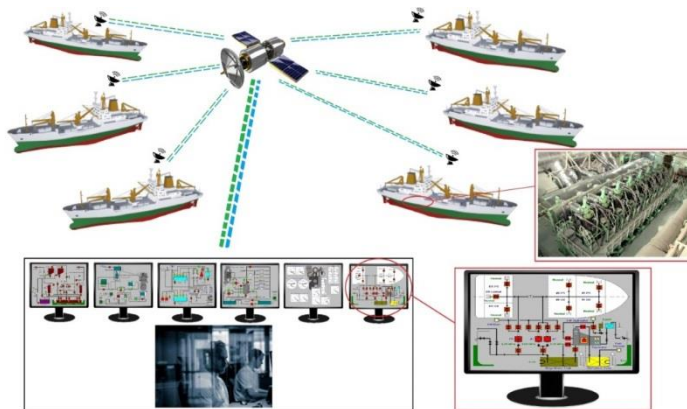
CySiMS: Cyber Security



Safe communication



AutoSea: Sensorer og navigasjon

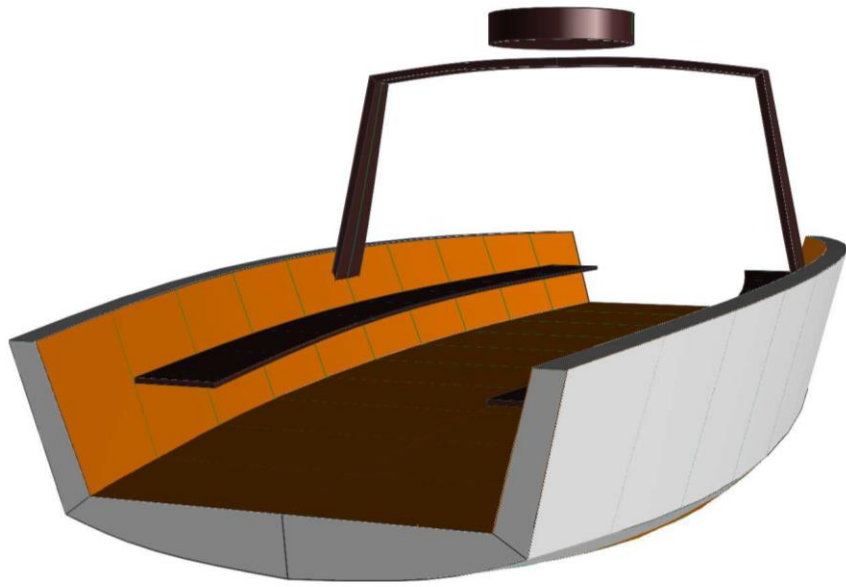


ROMAS: Remote engine control

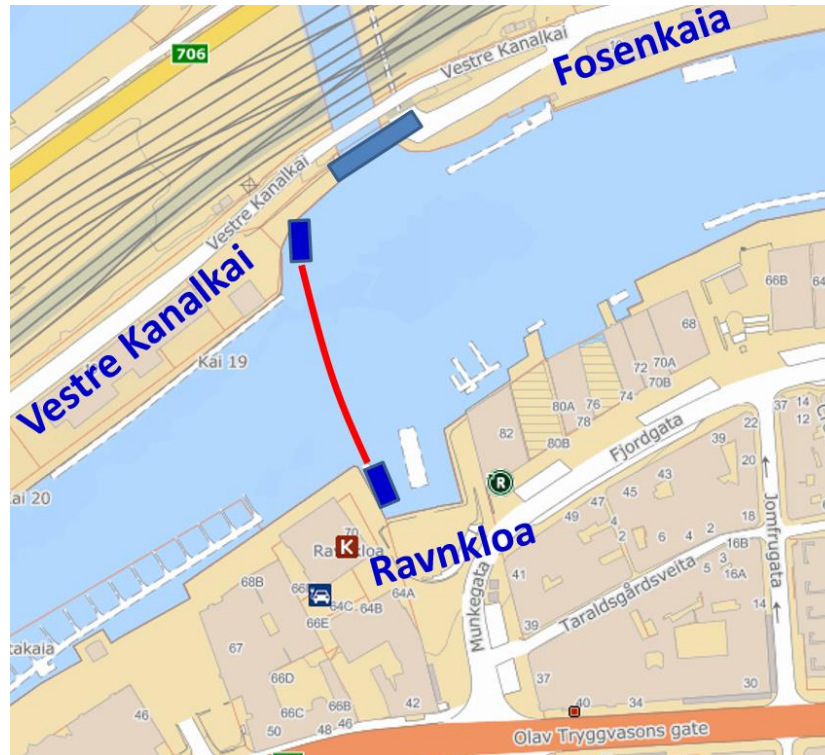
SEA
TONOMY

Utviklingsmetodikk

Noen typiske prosjekter på autonome skip



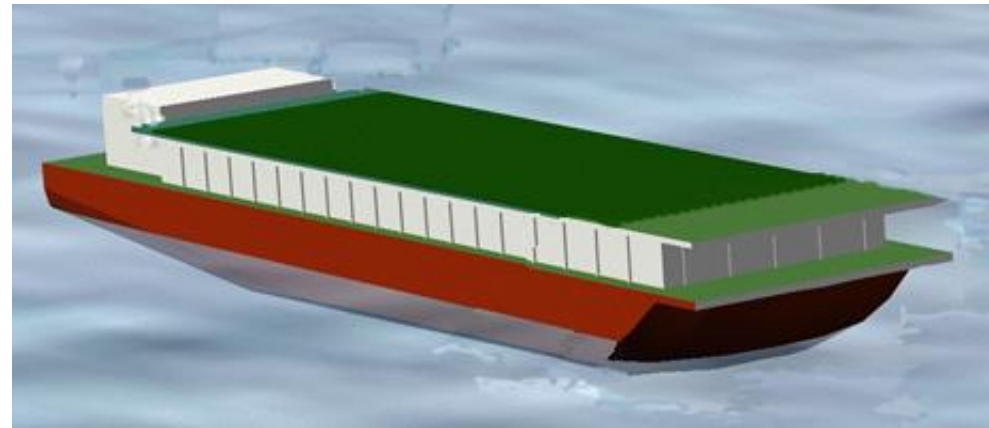
- On-demand passenger ferry
- Max 12 persons + bicycles
- Electrical propulsion, battery
- Inductive charging at quay



Linking center of Trondheim to
seaside and rail station

Autonomous Ship Transport at Trondheimsfjorden (ASTAT)

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



Yara Birkeland

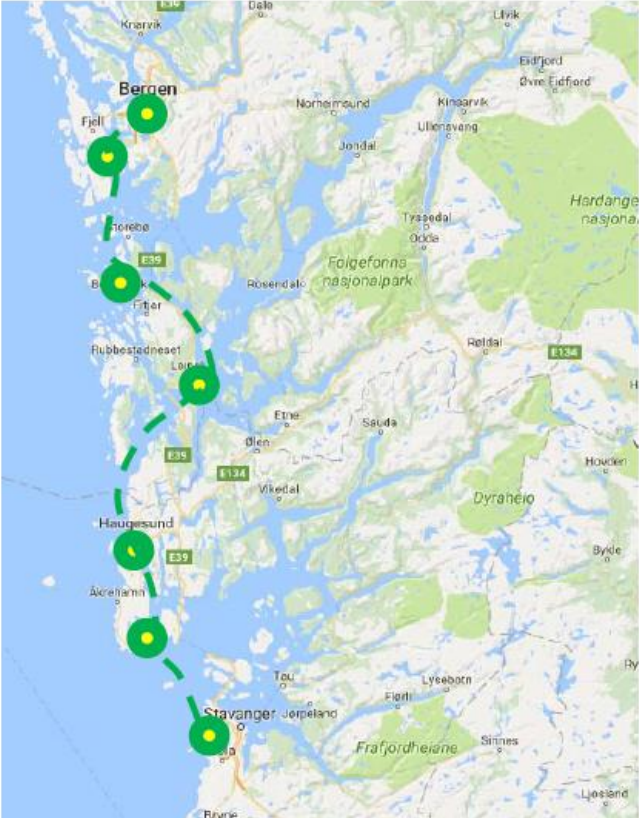


- Yara prosjekteier
- Kongsberg partner
- Eratatter 40 000 lastebilturer i året

GREEN COASTAL SHIPPING PROGRAMME

Pilot 8: AUTONOMOUS COASTAL CONTAINER FEEDER

Operational area



Vessel

Plug in hybrid.
Battery powered during normal operation.
Speed: 12 kts
Operational range: 100nm
Capacity: 100 TEU
1300 DWT
LOA: 60 m



KONGSBERG

Deep sea is feasible, but not first mover ?

- 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 ...



Norsk forum for autonome skip - NFAS

Norsk Forum for Autonome Skip

- Established October 4th 2016
- 38 Institutional Members
 - Including Industry, authorities, class, insurance research, universities, ports ...



<http://nfas.autonomous-ship.org>

Formålet med NFAS

Interessegruppen skal være et forum for organisasjoner og enkeltpersoner med interesse for utvikling og bruk av autonome skip. Interessegruppen mål er å:

- styrke samarbeidet mellom brukere, fagmiljø, myndigheter og andre organisasjoner og personer som har interesser innen autonome skip;
- bidra til å utvikle felles norske strategier for utvikling og bruk av autonome skip;
- være et felles nasjonalt talerør for utvikling og bruk av autonome skip;
- styrke det norske miljøets internasjonale kontakt og innflytelse innen området autonome skip.

Grader av autonomi

1. **Beslutningsstøtte:** Beslutningsstøtte og rådgiving til mannskap, men mannskap gir selv direkte kommandoer for styring.
2. **Selvstyrt:** Selvstyrende under kontinuerlig overvåkning om bord.
3. **Periodisk ubemannet,** for eksempel om natten i bra vær og med liten annen trafikk.
4. **Ubemannet:** Helt ubemannet, men med mulighet for direkte eller indirekte fjernstyring fra kontrollsenter på land.
5. **Fullt autonomt:** Helt ubemannet og uten overvåkning fra land.

Kompleksiteten av autonomi

	Bra vær	Dårlig vær	Svært dårlig vær
Åpent hav	1	2	3
Kystfart	2	3	4
Begrenset farvann	3	4	5
Havneområder	4	5	6

Noen aktiviteter i NFAS

- Utadventd: Web-sider, facebook, linkedin, flickr, pressemeldinger, kronikker ...
- Internt - arrangere seminarer og workshops: ca. 5 i første halvår 2017
- Strategi – tre strategigrupper i arbeid (marked, teknologi, regelverk), deltagelse i nasjonale og EU-organ for å etablere strategier.
- Internasjonalt – kontakt med en rekke nord-Europeiske tiltak + USA + Korea
- Nye prosjekter: Ferger, passasjertransport, MAROFF, EU ...
- +++

Vurderer også å bli et Arena/NCE-prosjekt. Ønsker samarbeide med andre maritime klynger.

Konklusjoner

- Autonome skip vil medføre en revolusjon innen shipping. Først i kort-distanse, men også i internasjonal.
- Norge er enestående posisjonert for å ta internasjonal ledelse.
- NFAS jobber for at dette skal skje!



Technology for a better society