UPDATE FROM NORWAY/INAS

5TH MASRWG CONFERENCE, 16TH JAN. 2020 - LONDON

Ørnulf Jan Rødseth, Senior Scientist, SINTEF Ocean
Secretary, International Network for Autonomous Ships

SINTEF: Scandinavia's largest independent research organization

Kr

NOK 3.1 billion
Revenues

NOK 450 MILL
International sales

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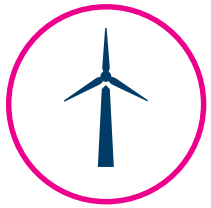
Applied research, technology and innovation

Expertise from ocean space to outer space:


Renewable energy


Ocean space


Industry


Buildings and infrastructure


Materials


Micro-, nano- and biotechnology


Climate and environment


Oil and gas


Health and welfare


Society

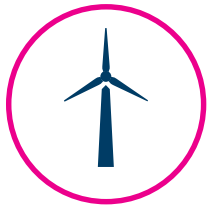

Digitalization


Transport

SINTEF

Cooperation also in autonomous ship technology

Expertise from ocean space to outer space: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SINTEF Ocean

From January 2017, a merger of:

- MARINTEK
- SINTEF Fisheries and Aquaculture
- SINTEF Environmental Chemistry

Not-for-profit, independent

Contract research

360 employees

Norwegian Forum for Autonomous Ships

- Established October 4th 2016
- Operated as a joint industry project at SINTEF Ocean.
- General Manager is Mr. Ørnulf Jan Rødseth.
- A board of governors overseeing operations. General assembly approves budgets and strategies.
- 47 Institutional Members
  - Including Industry, authorities, class, insurance research, universities, ports …
  - 2 other institutions as personal members

NFAS Norsk Forum for Autonome Skip

http://nfas.autonomous-ship.org

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International Network for Autonomous Ships

INAS
International Network for Autonomous Ships

- Agreed on at meeting in Oslo Oct. 30th 2017
- Hosted by NFAS and SINTEF Ocean
- 13 active countries
- 2 correspondent countries
- 3 regional organizations

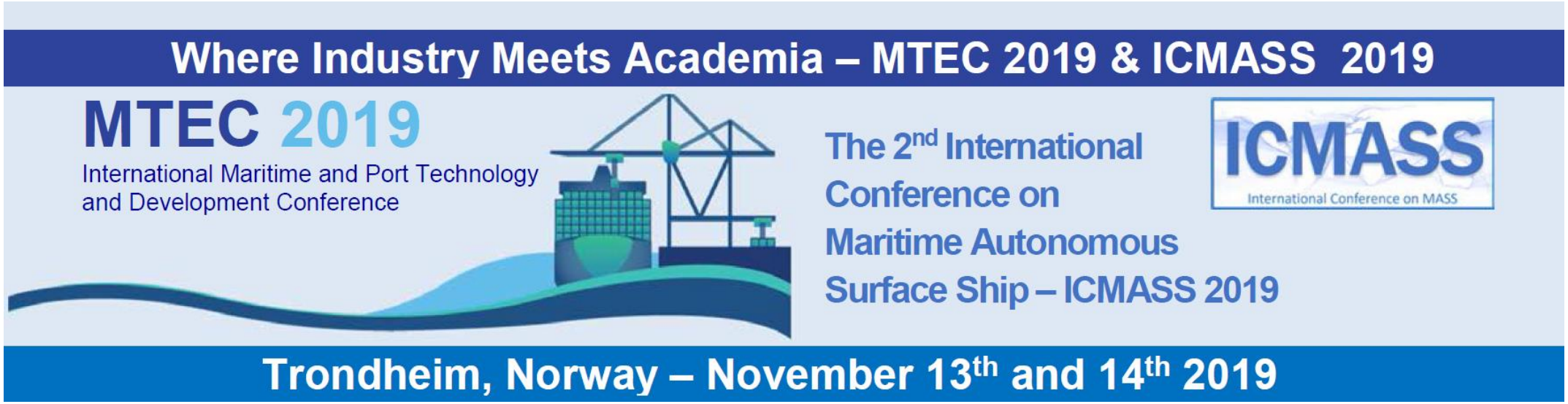
esa
European Space Agency

EMSA

SINTEF

www.autonomous-ship.org

International Conference on MASS



190 participants
75 presentations
47 published papers
http://nfas.autonomous-ship.org/conferences.html#H2

Next event:
Ulsan, Rebublic of Korea
November 11-12, 2020

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Autonomous ship summit

THE EMERGENCE OF SMART AND AUTONOMOUS SHIPS:

HOW CAN THIS MAKE OUR FUTURE MORE SUSTAINABLE?

Ships are transporting
90% of world trade: as the planet's lifeblood, it is vital for the provision of sustainable living conditions

New demands for cleaner and even more environmentally friendly ships re quire dramatic changes in the industry. Autonomy is part of the solution.

Ships and ports represent very promising applications of autonomy. It can create new, safe and clean jobs and boost commerce.

Next time in Brussels, 26. May 2020, arranged by DG MOVE and NFAS

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Why autonomous ships ?

Autonomous or automatic ?

Automatic

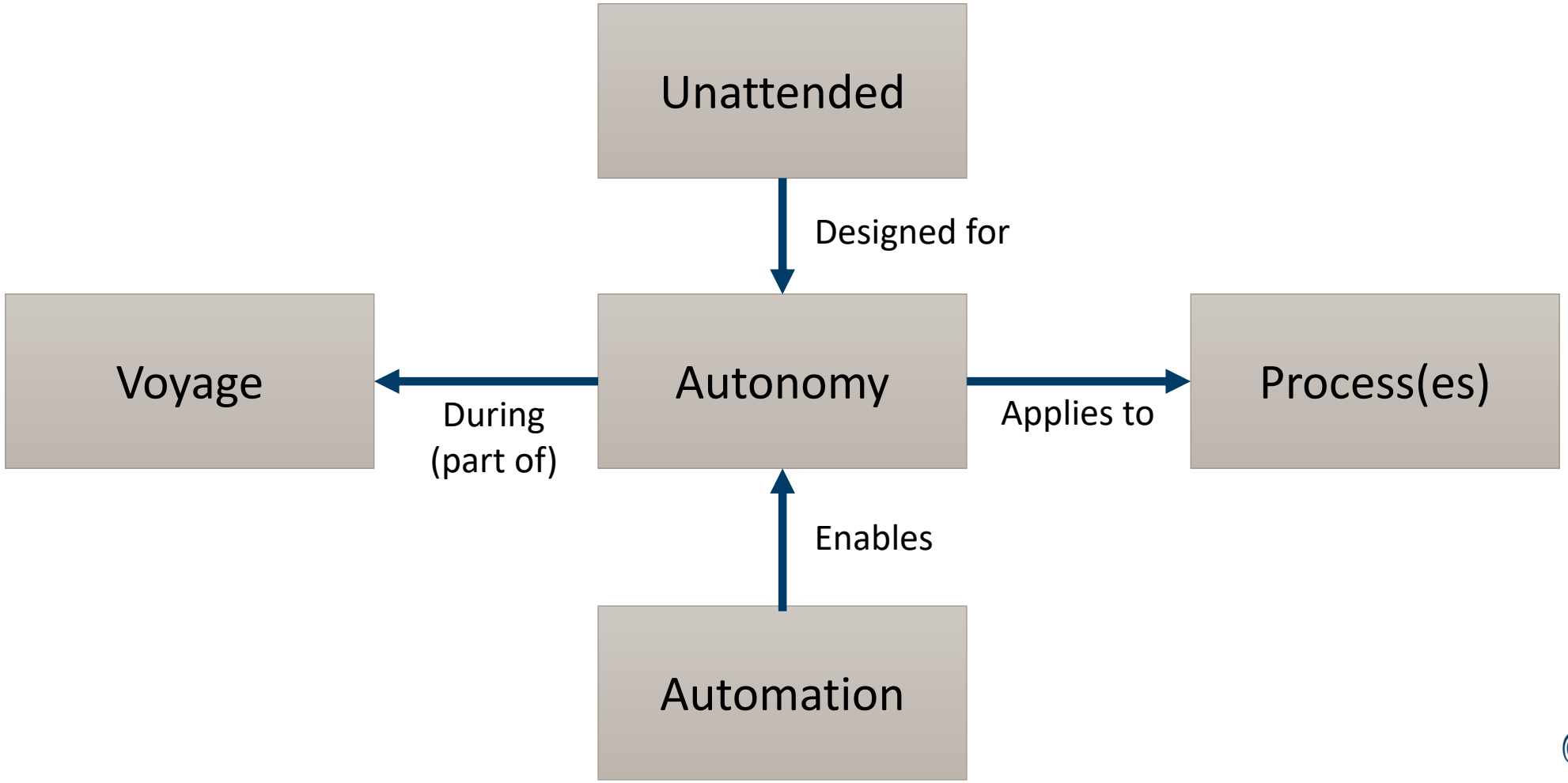
- Pertaining to a process or device that, under specified conditions, **can** function without human intervention (definition is based on ISO/TR 11065).

Autonomous – Autonomy

- In the context of ships, autonomy e.g. as in "Autonomous Ship", means that the ship use automation **to operate** without human intervention, related to one or more ship processes, for the full duration or in limited periods of the ship's operations or voyage.

ISO/WD 23860

Autonomous, automatic, unattended



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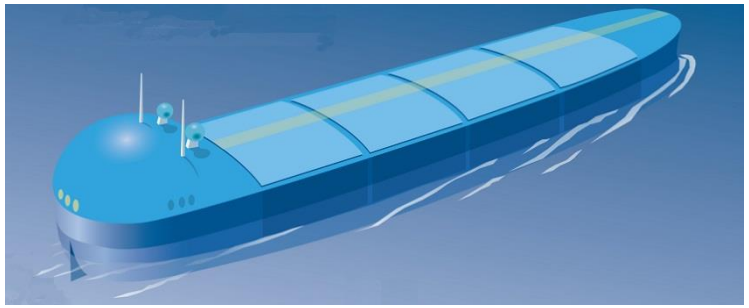
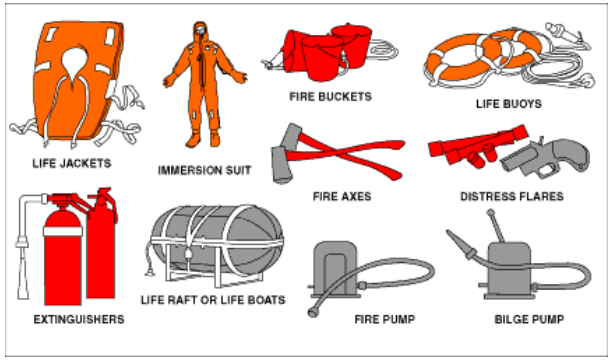
Fully unmanned gives most benefits!



No accommodation

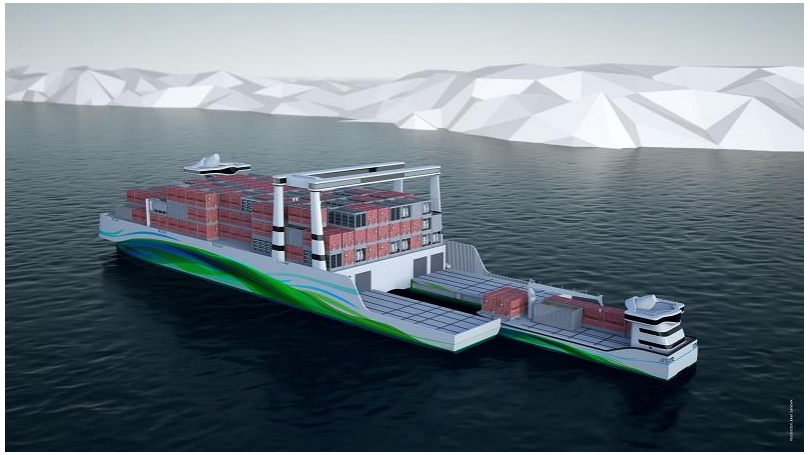
Less power

More cargo



No safety equipment

New constructions



NCE Maritime Clean Tech & NCL

Enables completely new transport system concepts

No crew

No crew related costs

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LP Odyssey (SeaLaunch)

Photo: Frank Leuband/Wikimedia

In operation:
1999-2014

S7 Space:
2016-

Unmanned and remote control during launch: Dynamic Positioning

Class: DNV-GL
Flag: Liberia

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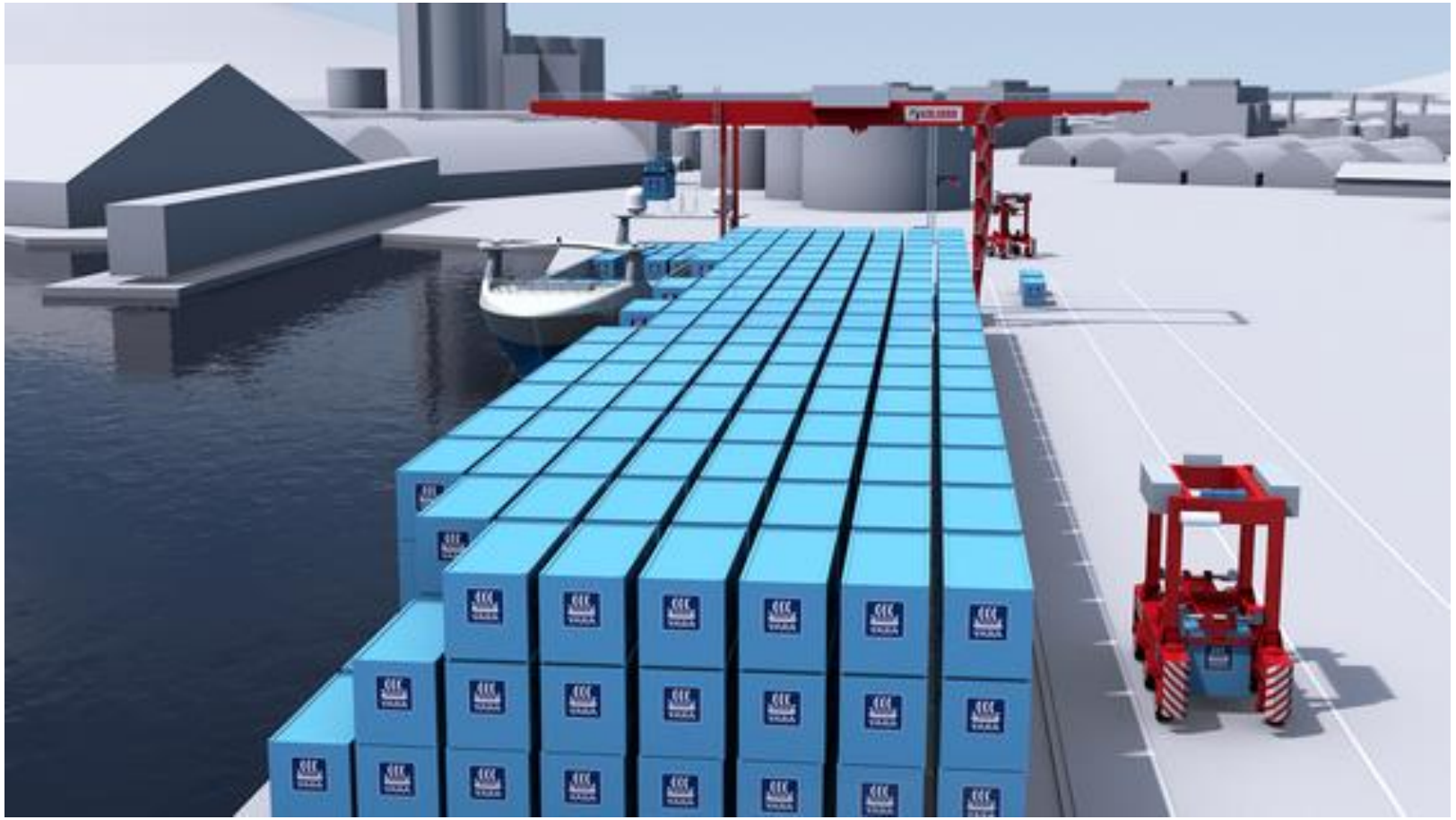
Automation and integration into supply chain



- Automation
- Last mile, door to door
- Industrial shipping
- Just in time
- Storage on ship

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Reduction of GHG – 50% by 2050

Slow steaming

New and more expensive fuels

Green energy generally have low energy density and high price.

High energy efficiency is critical for use of the technology.

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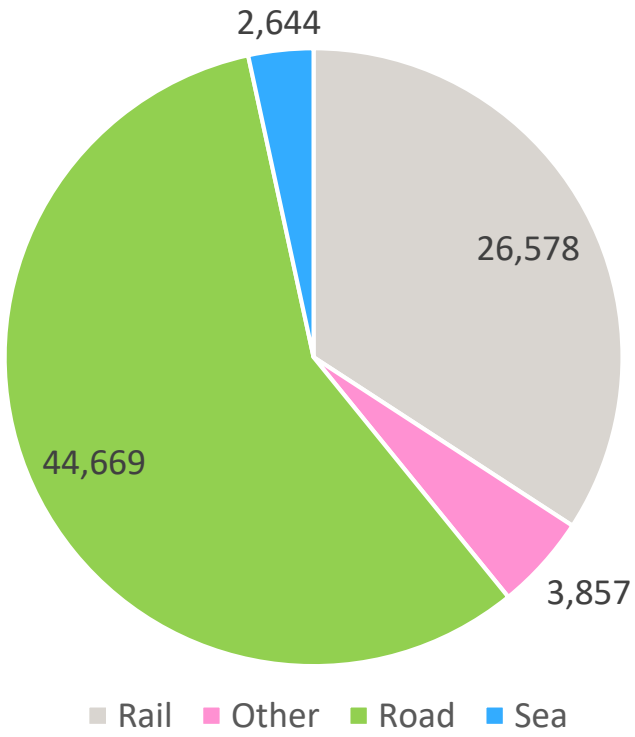
Reduce road use and congestion

- Reduce investments in expensive infrastructure
- Reduce congestion
- Reduce noise, dust and other pollution
- Increase energy efficiency



National Transport Plan in Norway: Planned investments in million NOK (2018-29)

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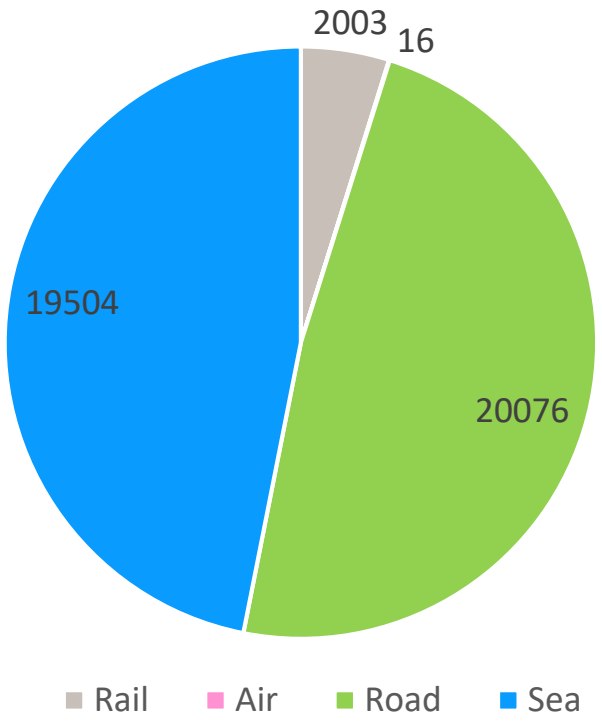
… at a fraction of the cost



Cargo transport in Norway in million ton-km (2017)

- Short sea fleet is old and needs replacement
- Need to stop growth in road transport
- Wish to further reduce road transport

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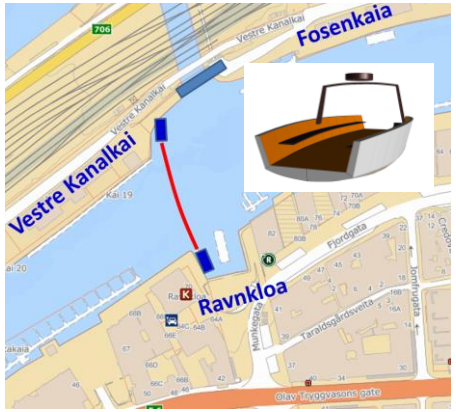
New and flexible sea transport for persons/cars

- Low volume, but important connections
- As alternative to expensive bridge or tunnel projects
- Smaller vessels, higher frequency/on demand



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New energy sources are challenging

Li_Ion Battery: © PBES

1 ton Li-Ion ~ 50 kg HFO

Hydrogen fuel cell
© CommScope/Flickr

6 litres H_2 (700 bar) ~ 1 litre HFO

High volumes and weight compared to HFO.

New risk factors.

High costs.

Smaller ships, slower, unmanned?

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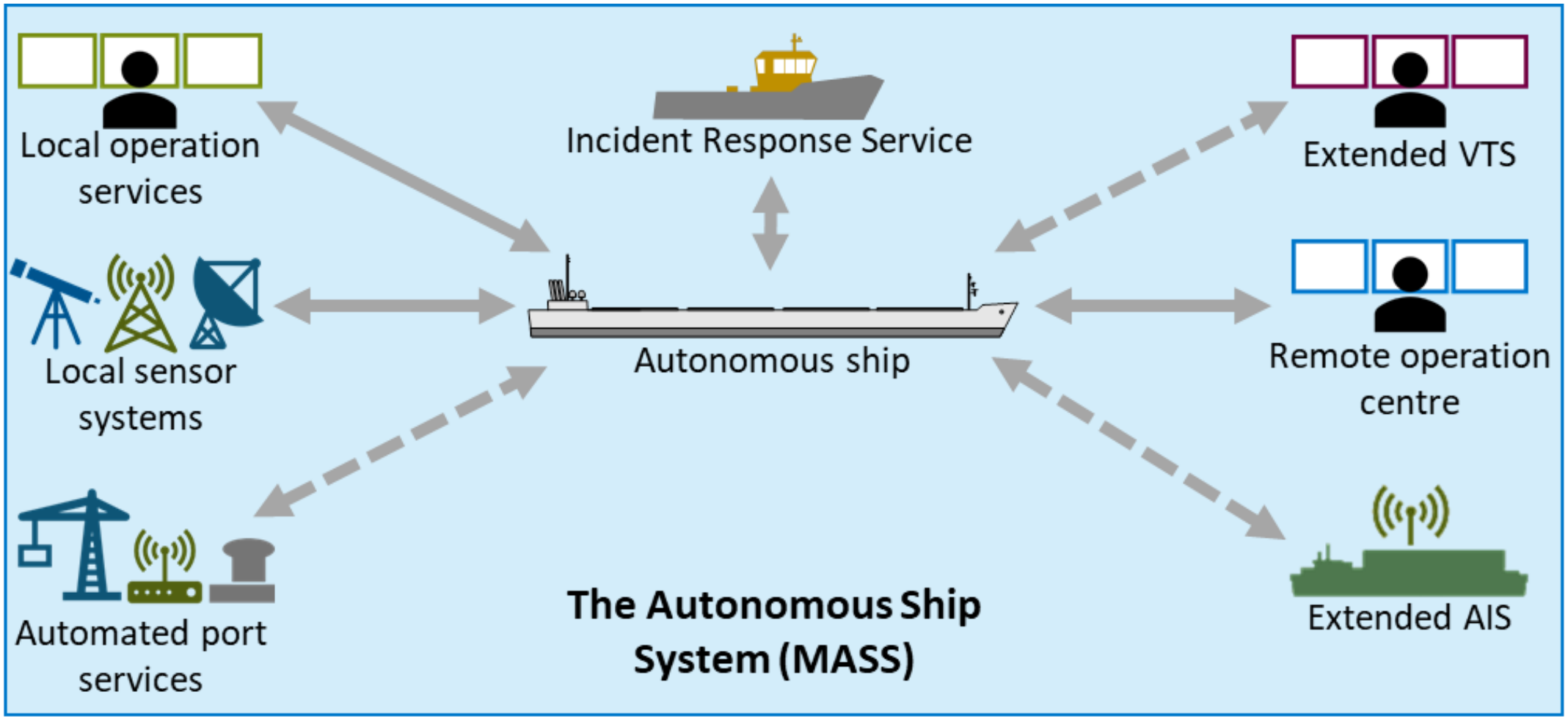
It is an autonomous ship **system**!



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Autoship – a new EU R&D project

AUTOSHIP
Autonomous Shipping Initiative for European Waters

Coordinator: Ciaotech Srl (PNO Group)
Total project cost: €27,679,830
EU Contribution: €20,109,109
Duration: 42 months (from 06/19)

AUTOSHIP will build and operate vessels and their shore control and operation infrastructure to TRL7:

- One inland case
- One short sea case

The project has received funding from the European Union's Horizon 2020 research and innovation program under Grant Agreement N°815012.

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A convergence is happening now!

Very high public focus on sustainability!

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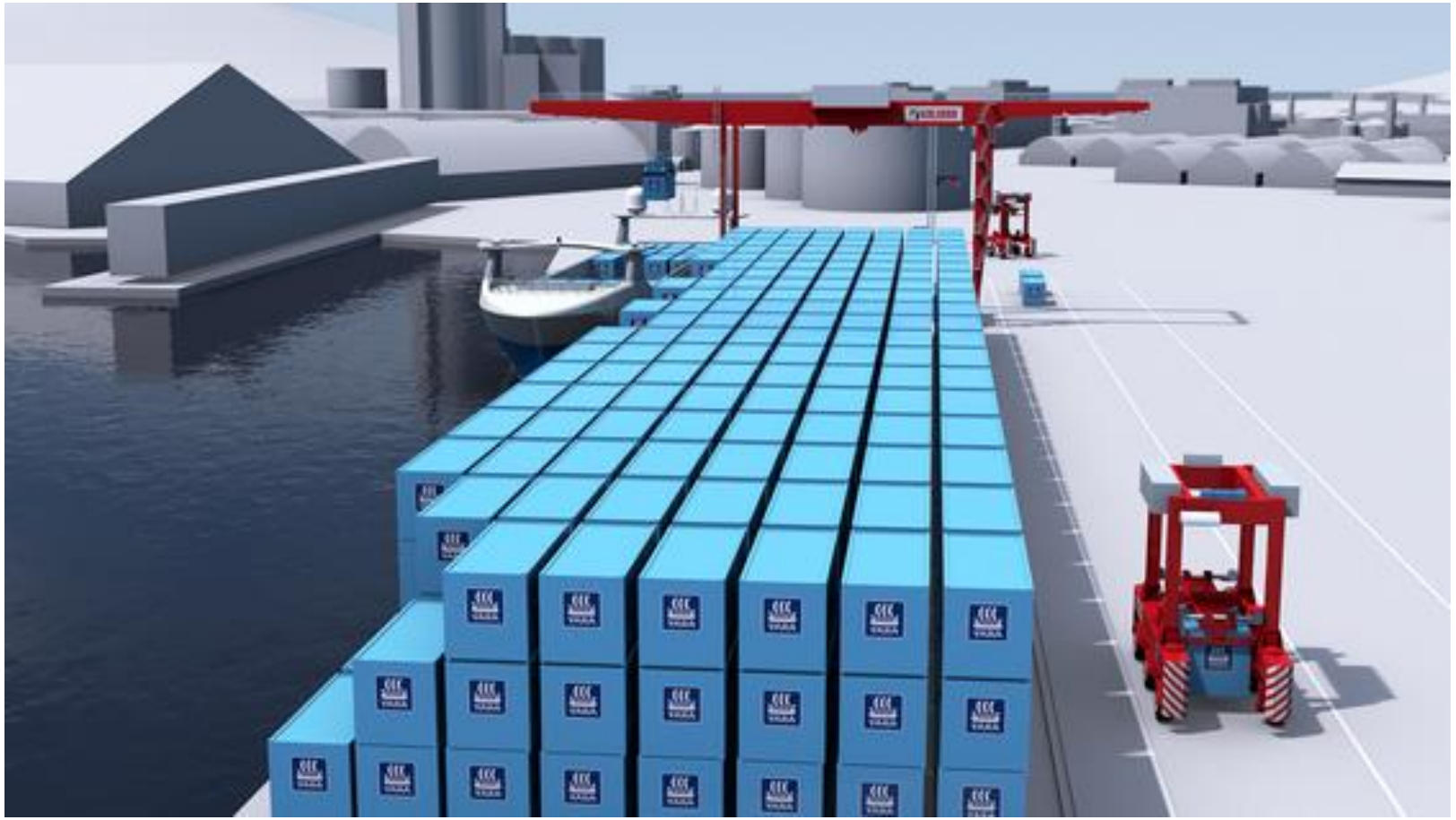
More automation of physical processes



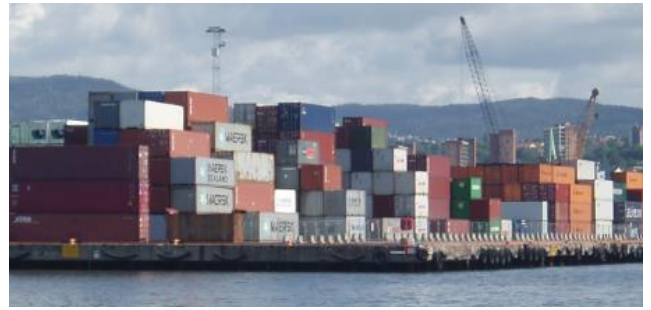
- Cargo handling
- Cargo storage
- Berthing
- Mooring
- Charging

More automation of administrative processes

Digitalization of ships

Connected and Automated Transport

Digital Class and Administration



IACS
INTERNATIONAL ASSOCIATION OF CLASSIFICATION SOCIETIES

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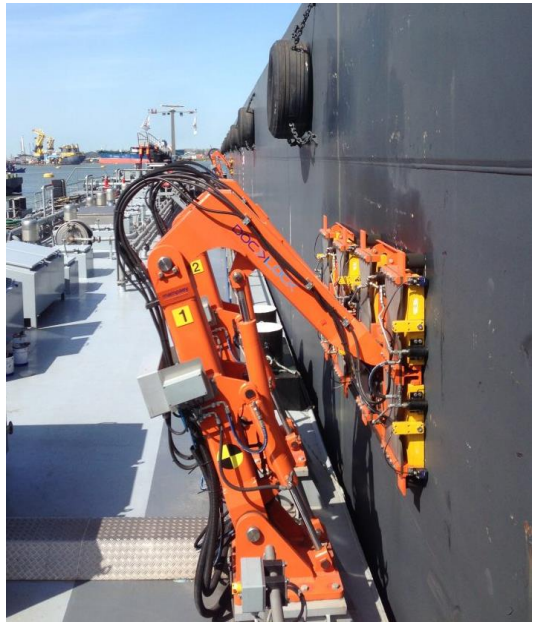
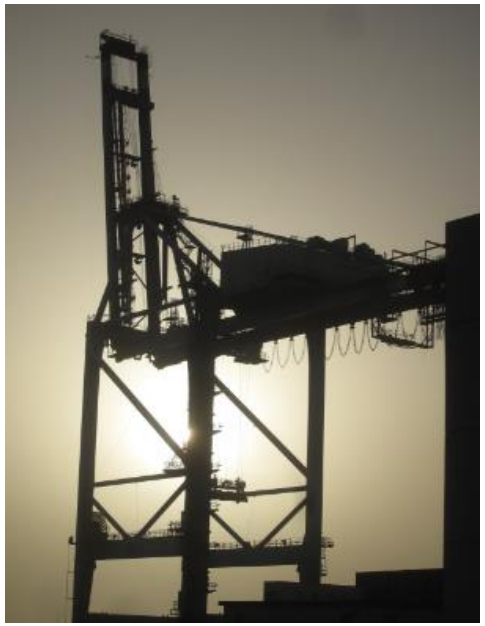
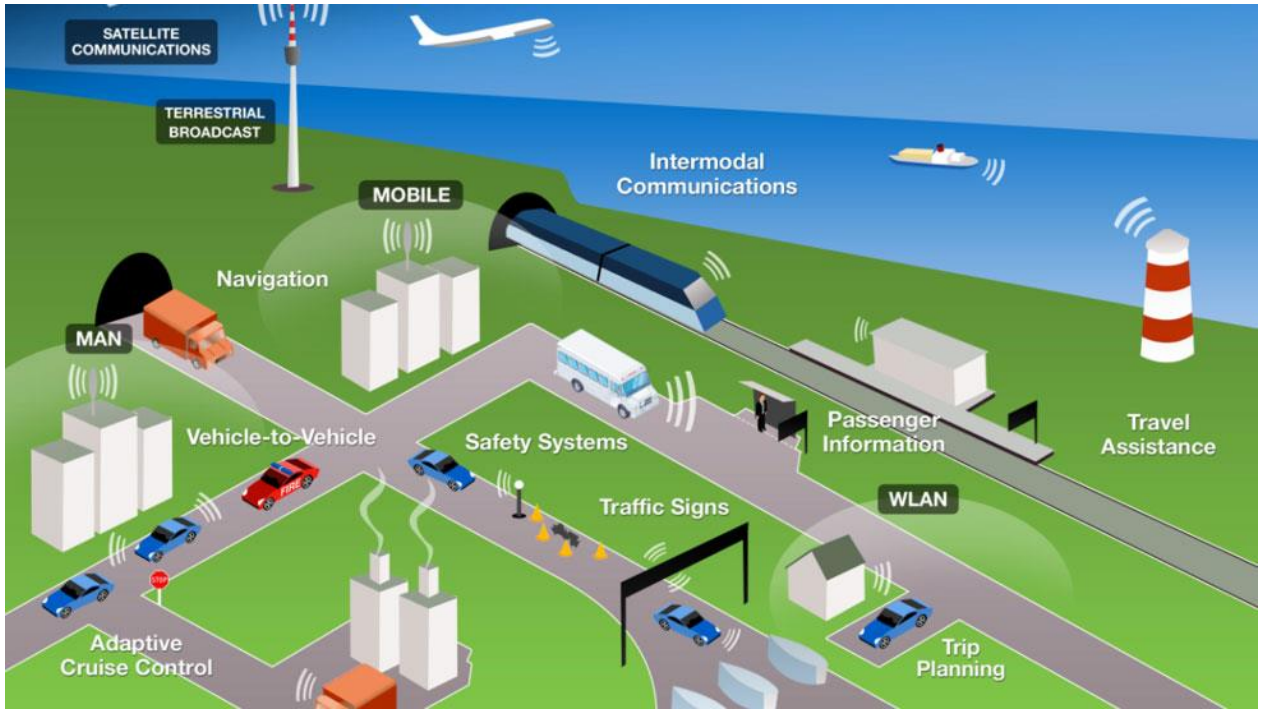
Creating the future automated transport system





Ship and port operations



Connected and Automated Transport (CAT)

This makes it interesting for other parties to enter the business, e.g. cargo owners and logistics operators.

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New parties coming into shipping?

YARA

ASKO
– vi forsyner Norge med mat

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Scalable transport systems with smaller ships

- Can call on smaller and possibly lower cost ports
- More direct routes, less transhipment
- Differentiated speeds
- Higher frequency

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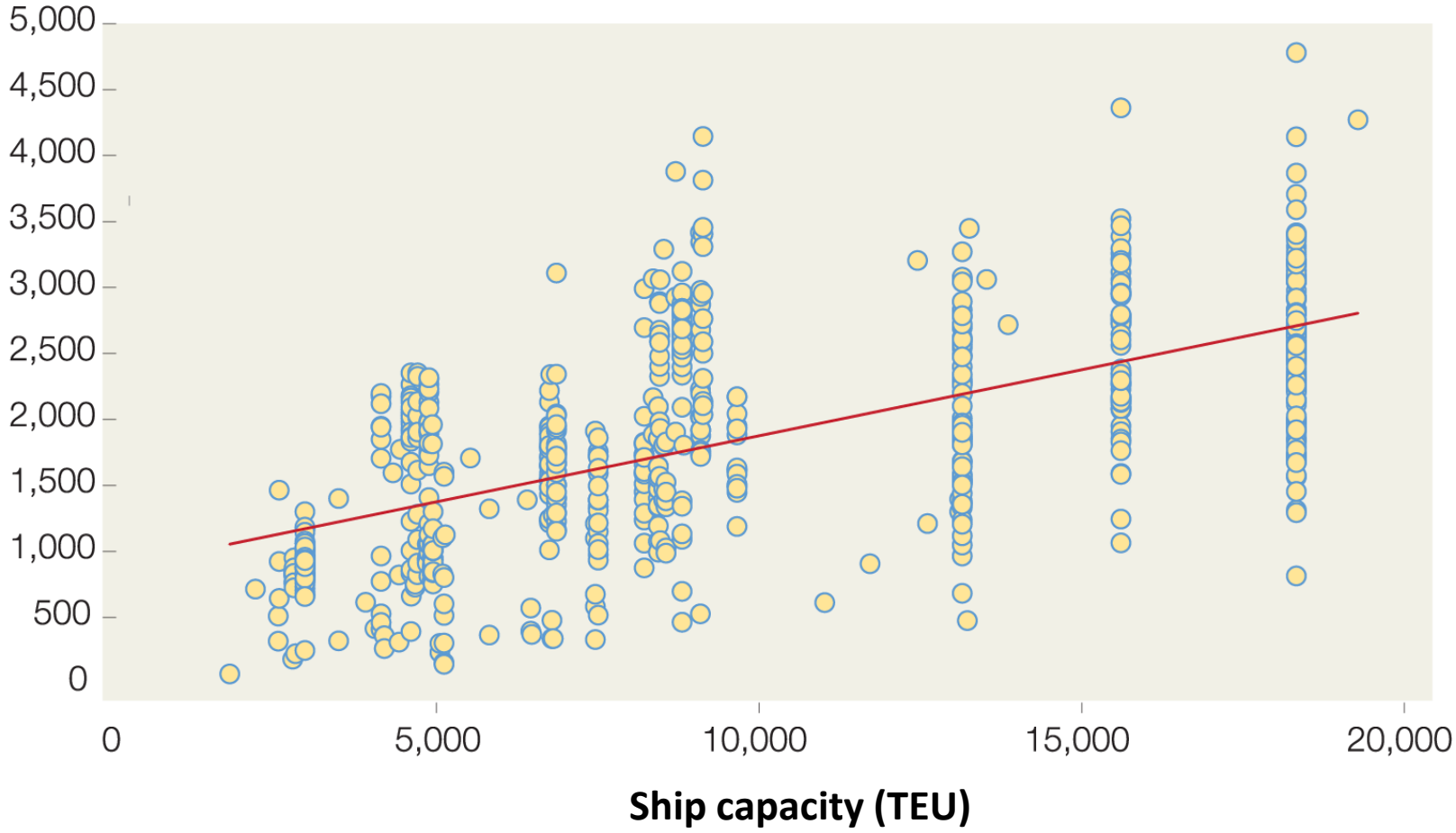
Efficiency of port call

Calls at large EU terminal 2014/15, n=697

How to rethink pricing at container terminals

By Timo Glave and Steve Saxon

McKinsey&Company



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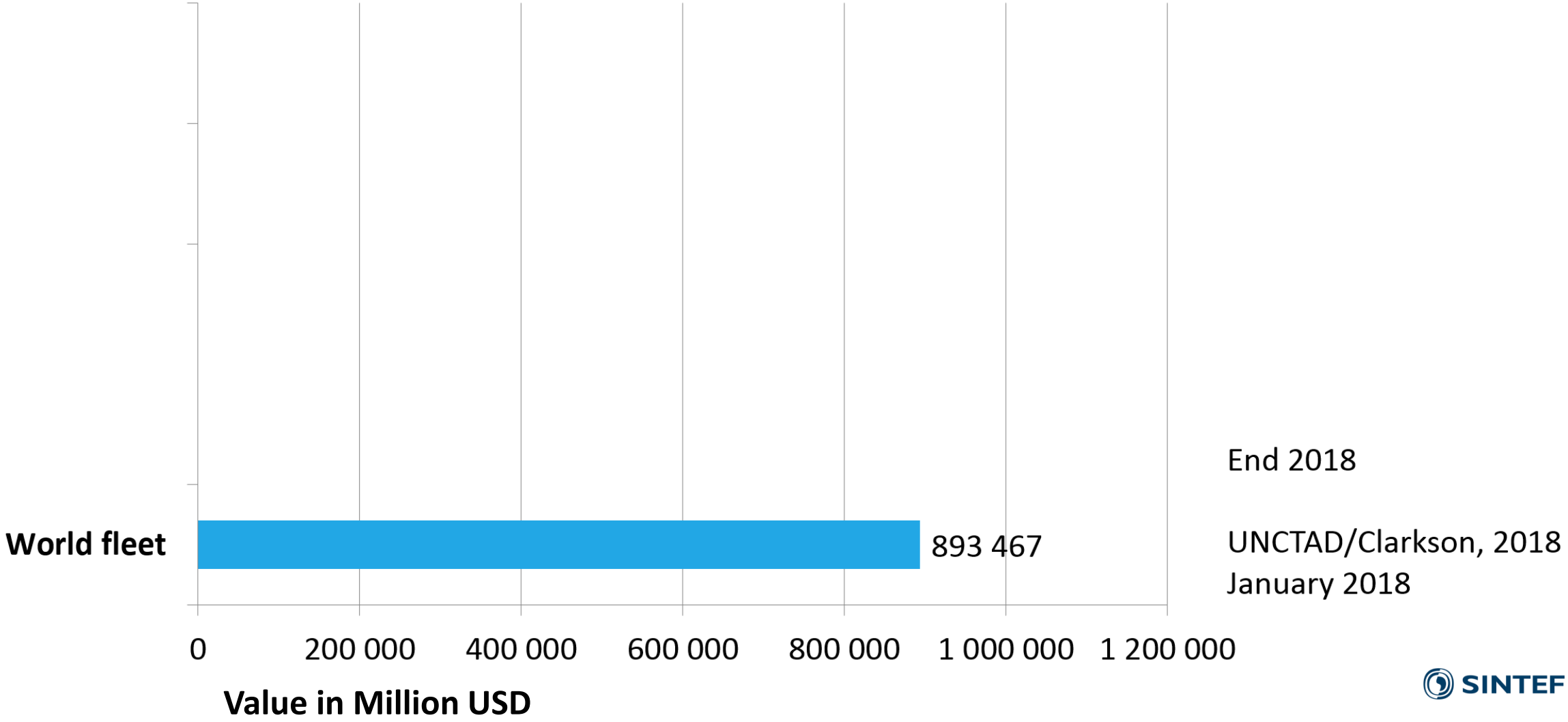
Need for standards and international cooperation

Value of world fleet



End 2018

UNCTAD/Clarkson, 2018
January 2018

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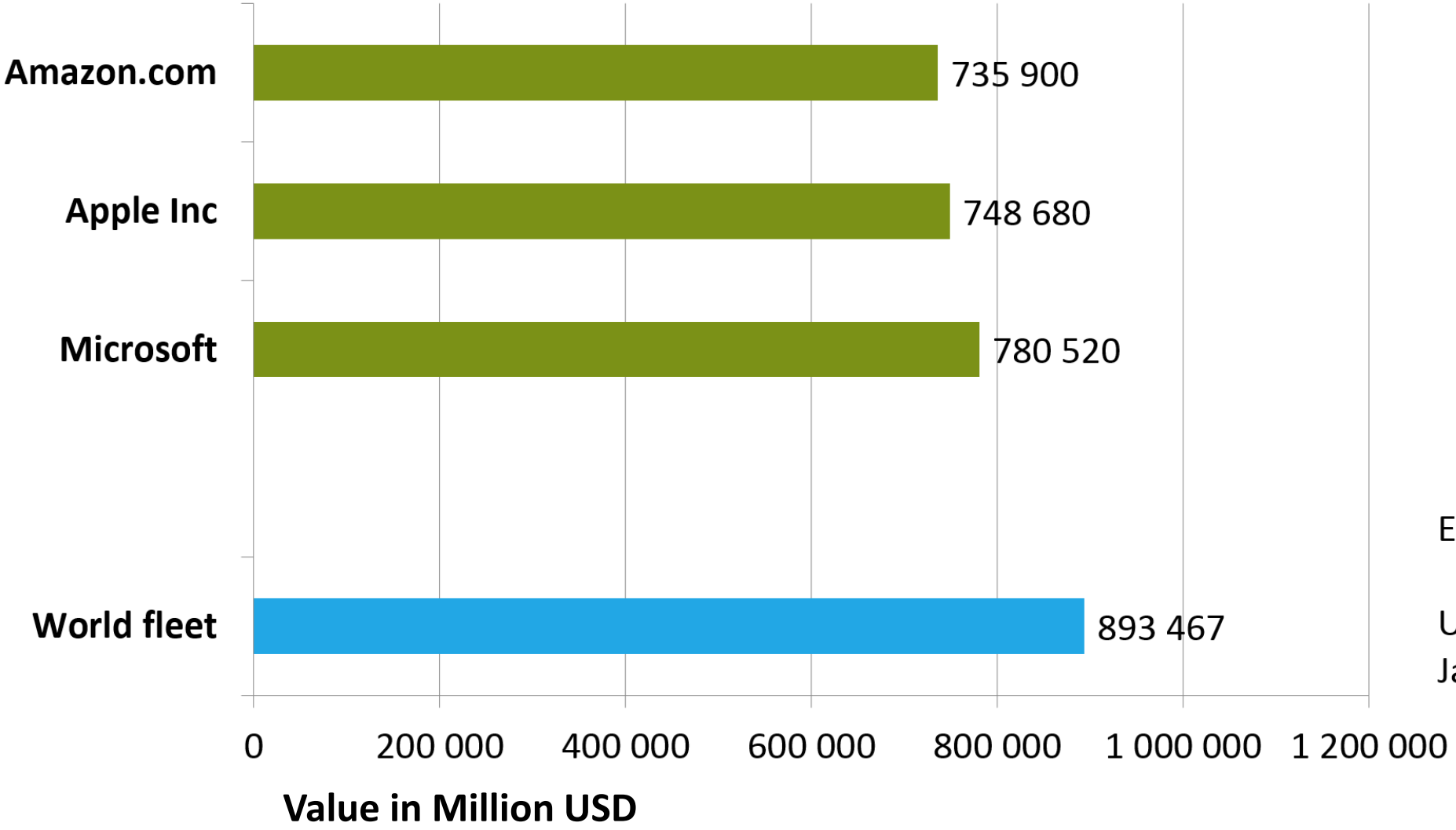
Value of world fleet



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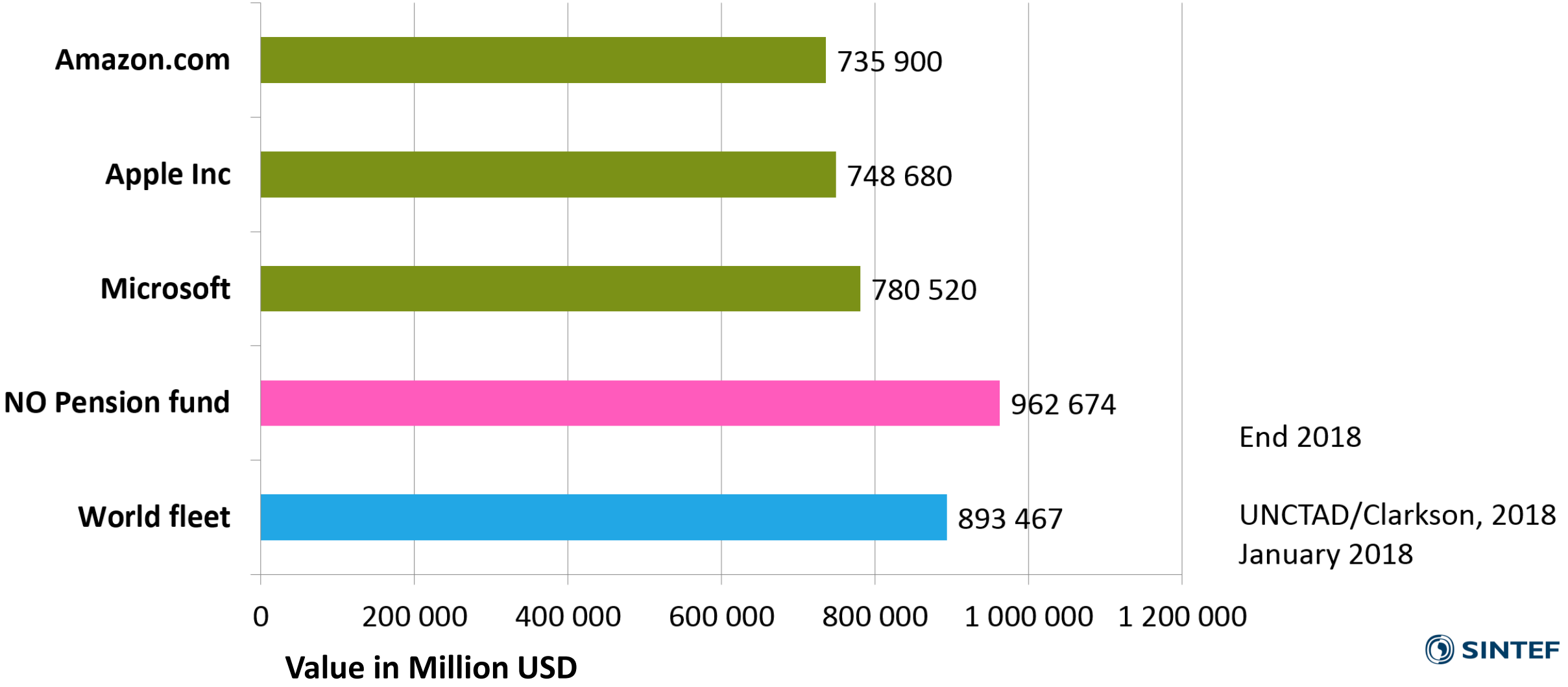

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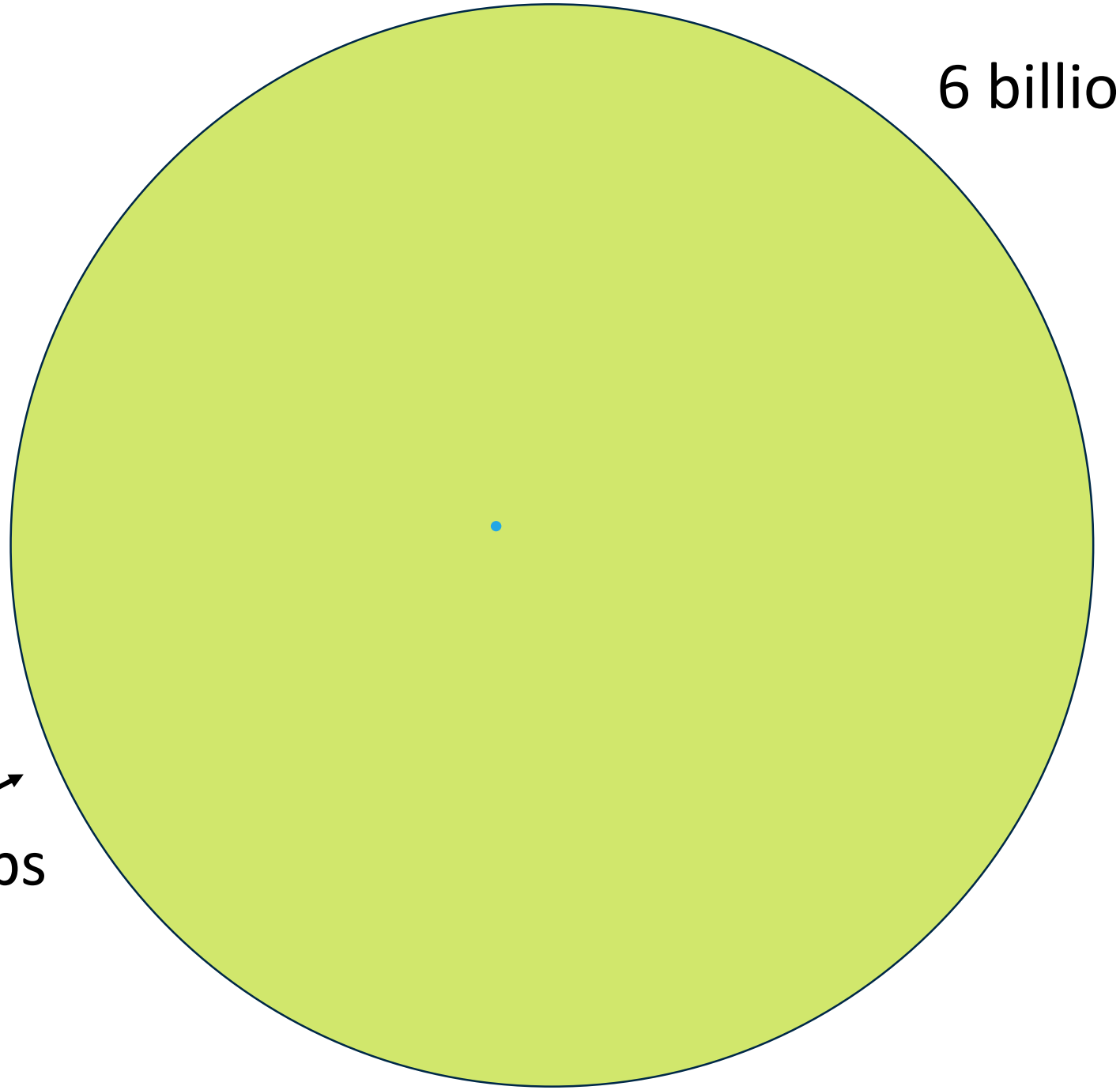
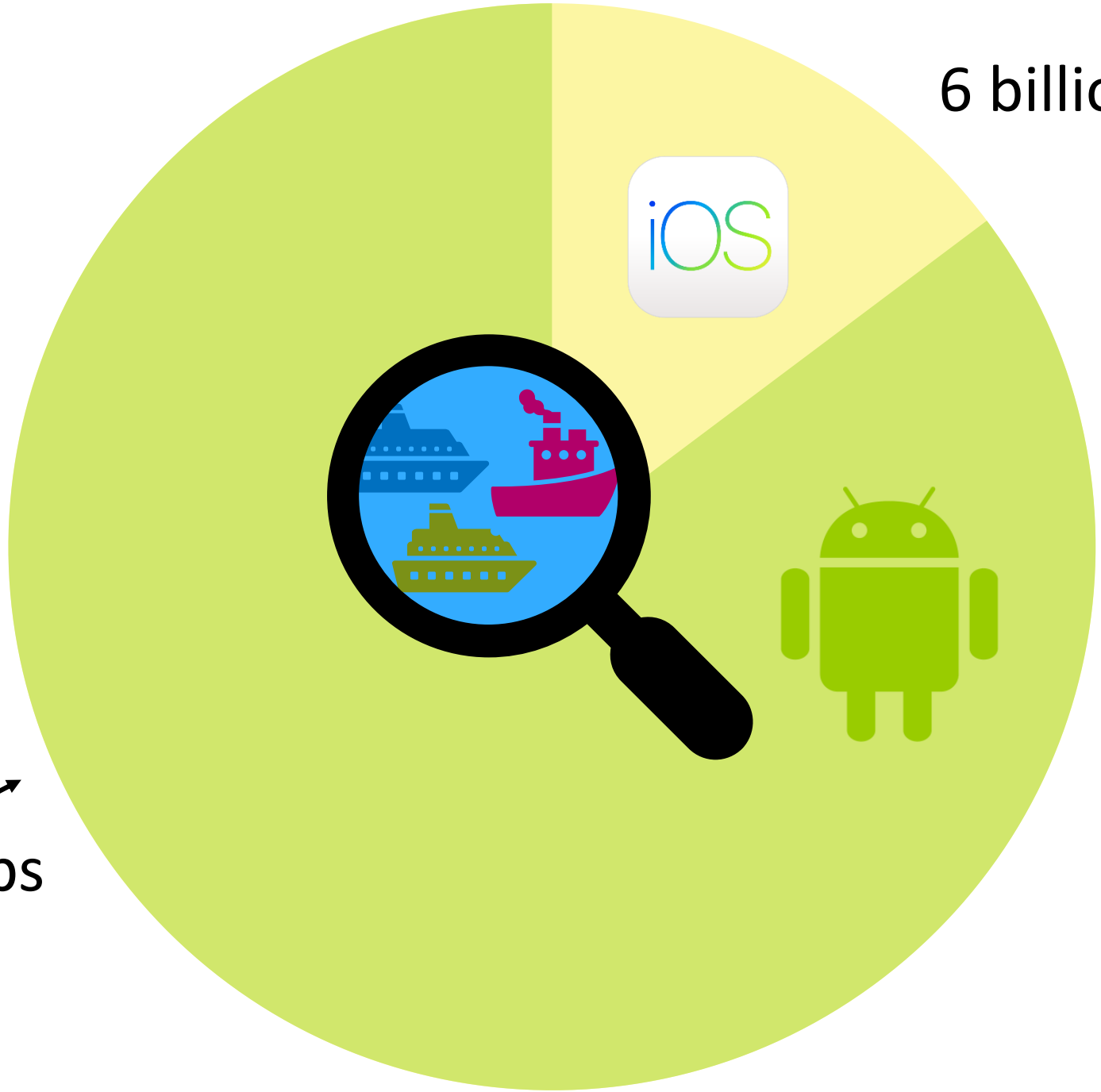

6 billion smartphones
60 000 ships

6 billion smartphones



60 000 ships

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Data modelling work in IMO and by others

IMO FAL ship reporting harmonization group

Harmonized Data Modelling Group – S-100

Individual data modelling developments in IEC and ISO

Digital Transport Logistics Forum, EMSA, EU

IMO Data Reference Model
FAL IMO Expert Group on data Harmonization (EGDH)

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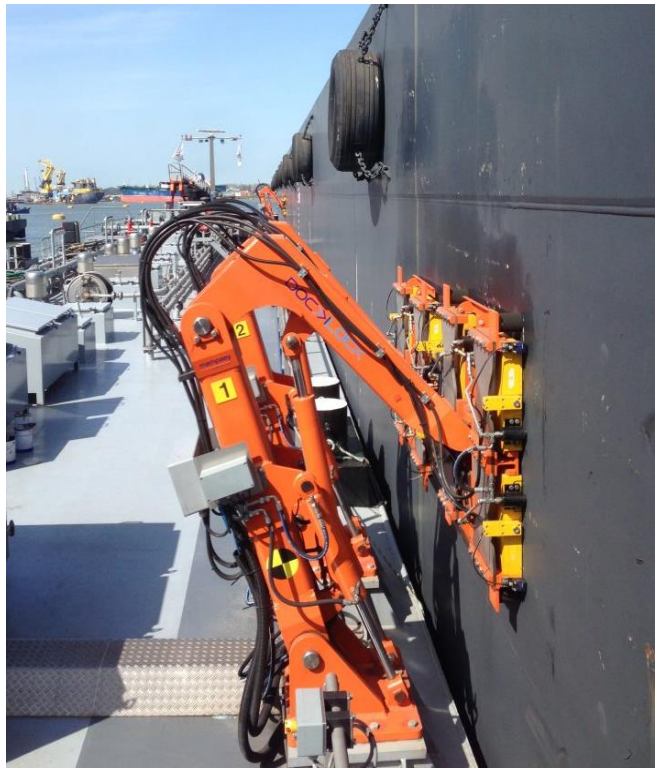
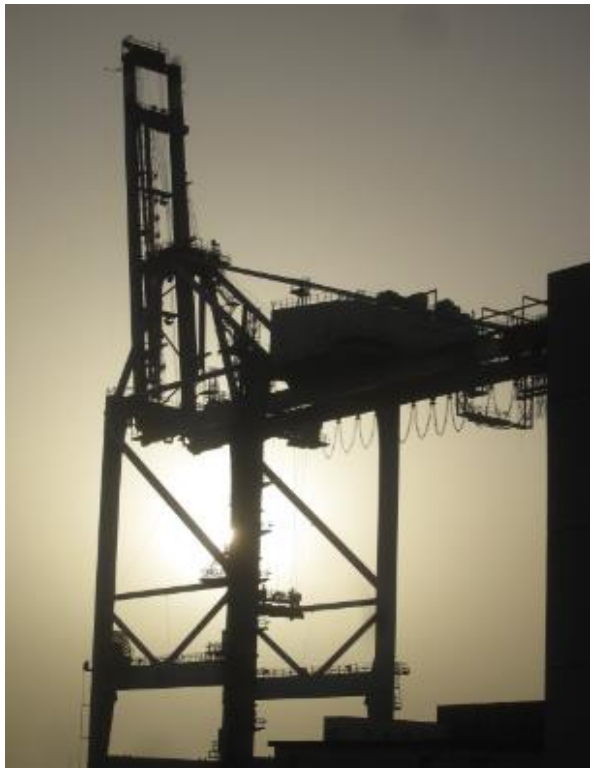
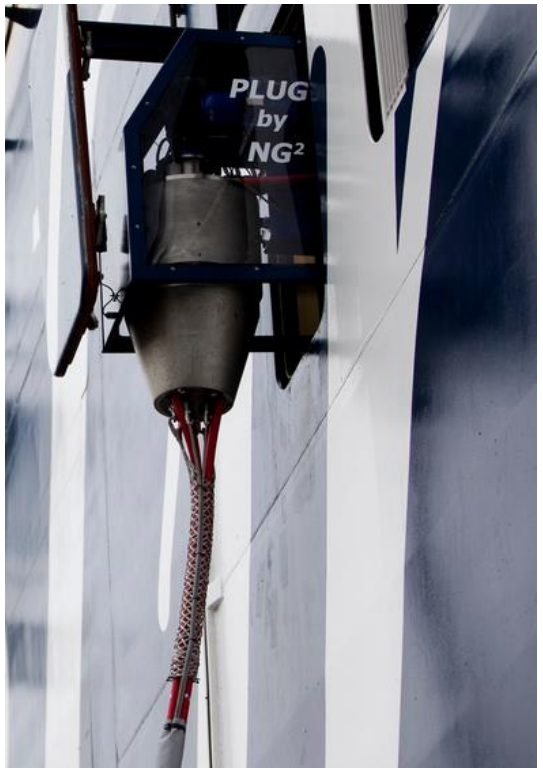
Physical interfaces in port



Mooring

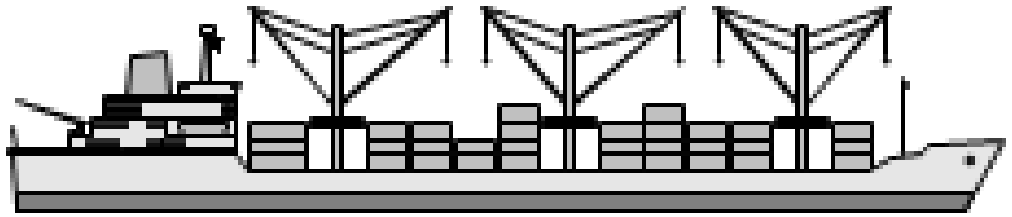


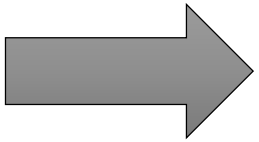
Cargo

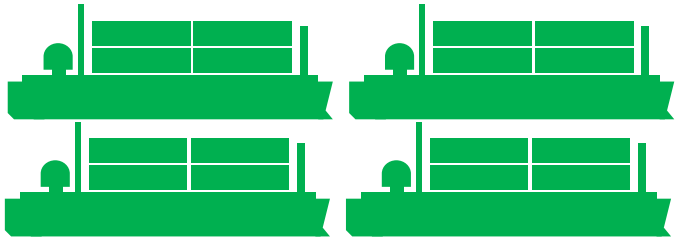


Power

Standardized vessel concepts ?







The small vessel type for sheltered water is similar to inland vessels.

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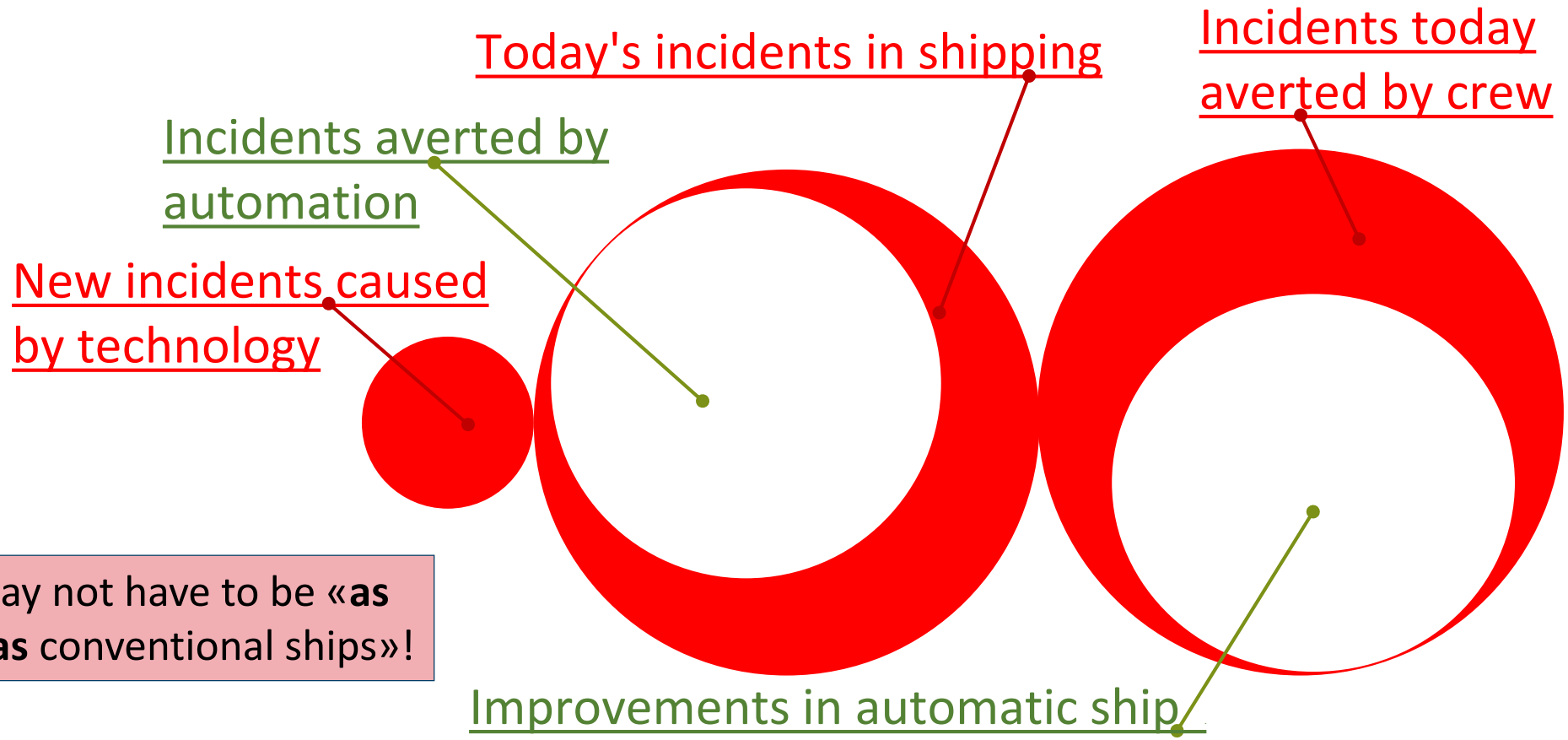
Determine effective safety targets



It may not have to be «**as safe as** conventional ships»!

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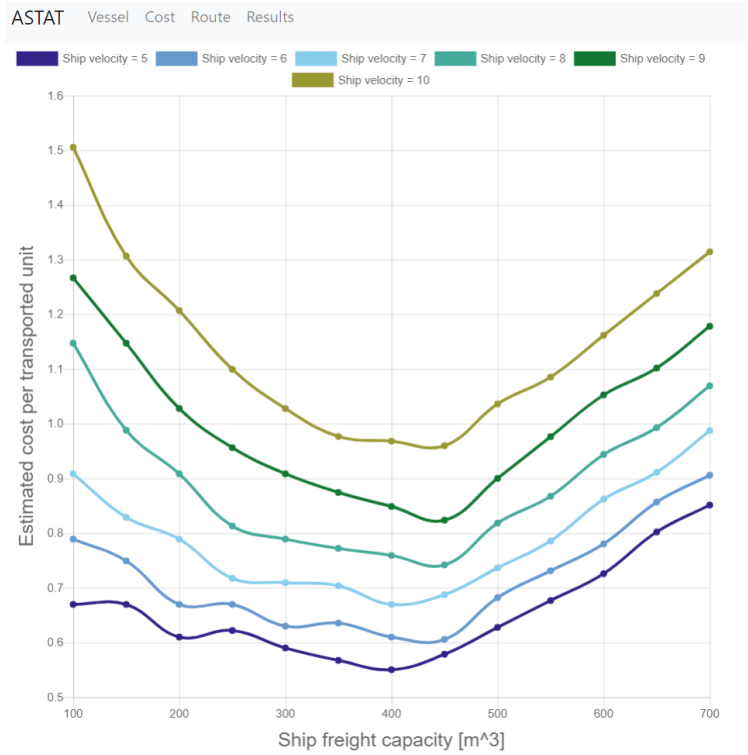
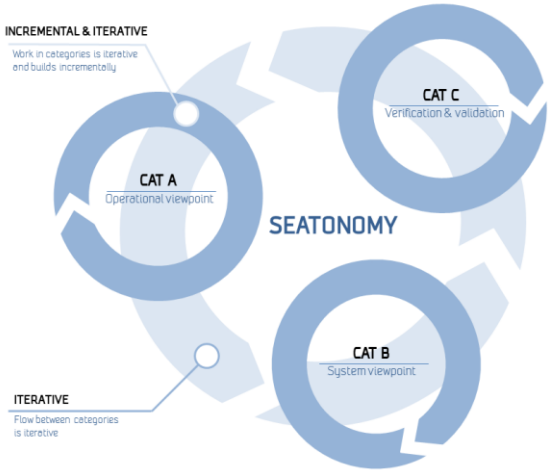
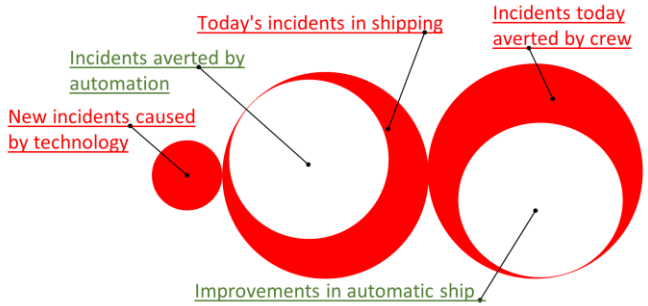
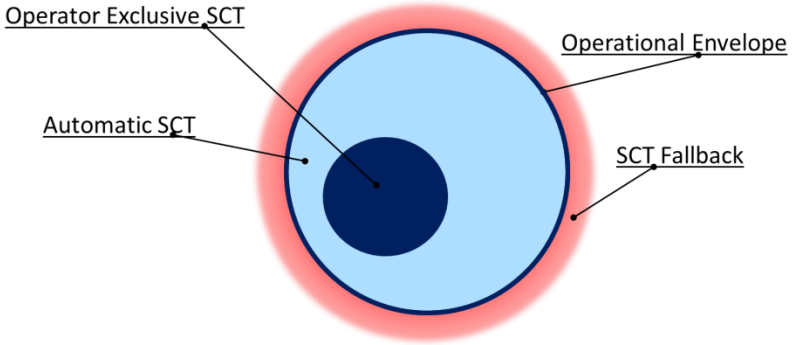
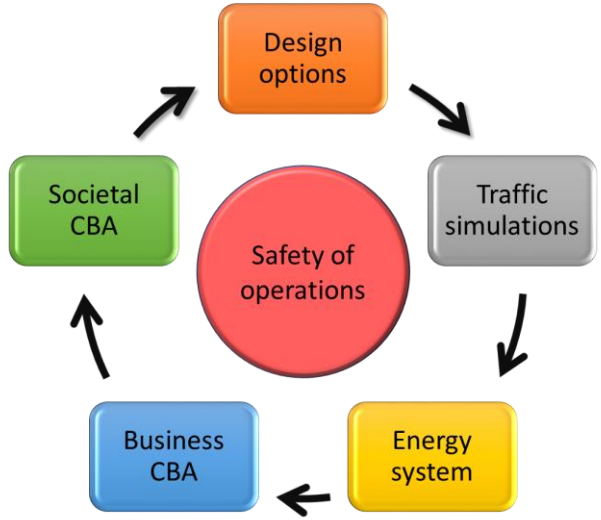
Better tools for a complete CBA











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Conclusions

- Autonomous and automated ships are coming
- Much driven by increased focus on sustainability
- Standards will be necessary to help develop cost-effective solutions
- **This requires close cooperation between stakeholders**

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Teknologi for et bedre samfunn