Possible impact of MASS on IMO's facilitation activities

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The fourth shipping revolution is on
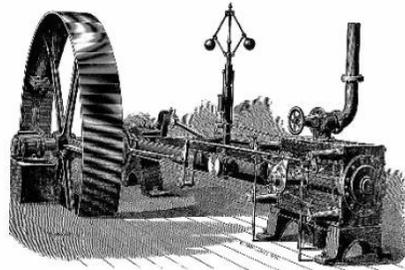
1800 1900 1970 2010
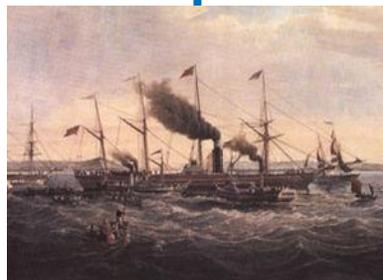
1. Mechanized Power
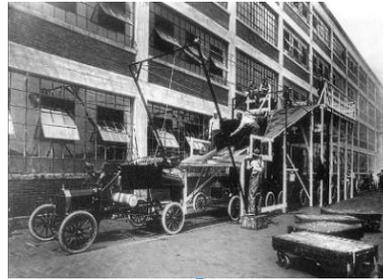
2. Mass Production

3. Computerized Control

4. Maritime 4.0

The essence is digitalization and automation

Maritime 4.0

- Robotics and Autonomy
- Maritime ITS
- Cyber Security
- Simulation and Optimization
- Open system integration
- Augmented reality
- Internet of Things at Sea
- Data Analytics
- Cyber-physical systems
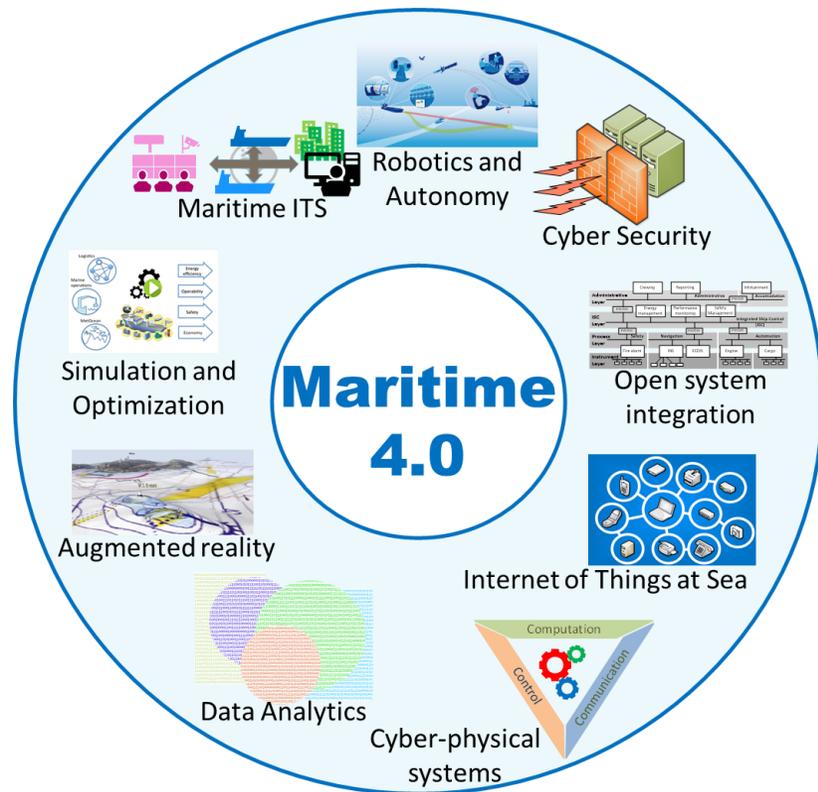
and MASS is part of it

MASS: Maritime autonomous ship **system**
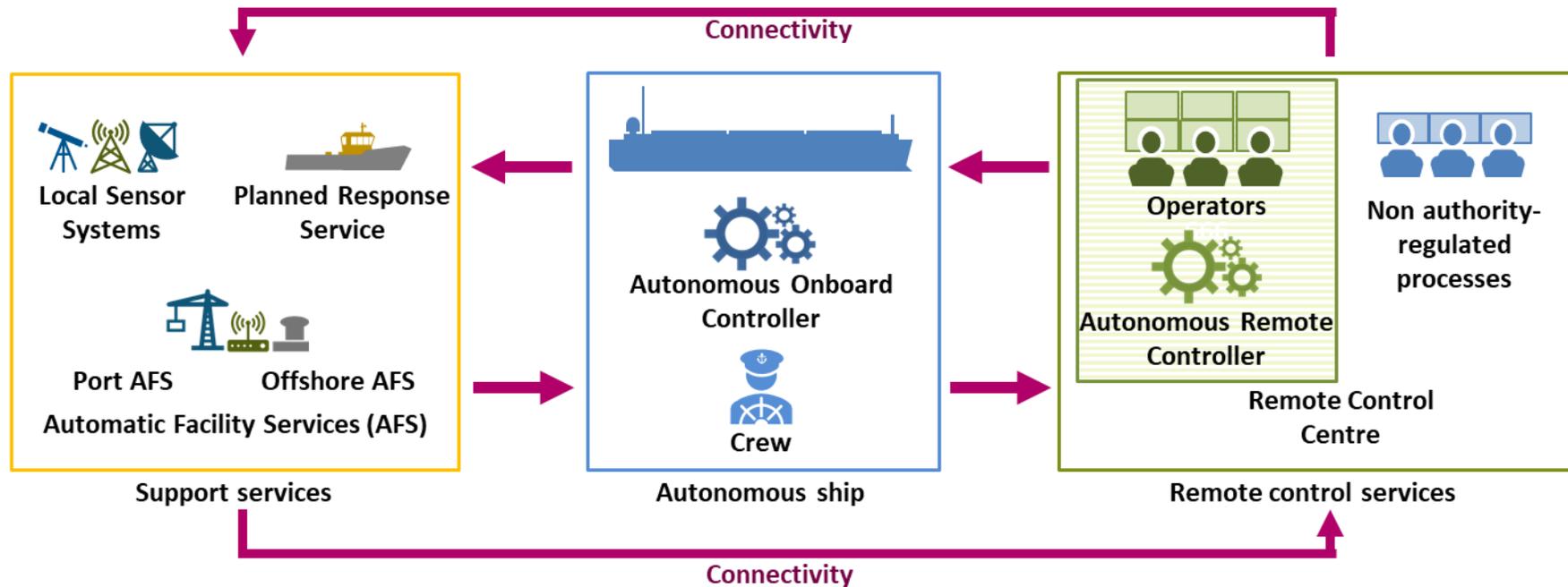
The Autonomous Ship System:

- The ship
- The automation
- The humans
- The support systems
- The connectivity

MASS requires automated communication

Ship services
Charts
Routing
Class

Fairways and port approach
Aids to Navigation
VTS
Mandatory Reporting System

Ship operations
Manager
Charterer

Clearance
Maritime Single Window
Cargo clearance

At sea
Other ships
AIS Satellite

Port operations
Port Community Systems
Terminals
Harbour master
Port services
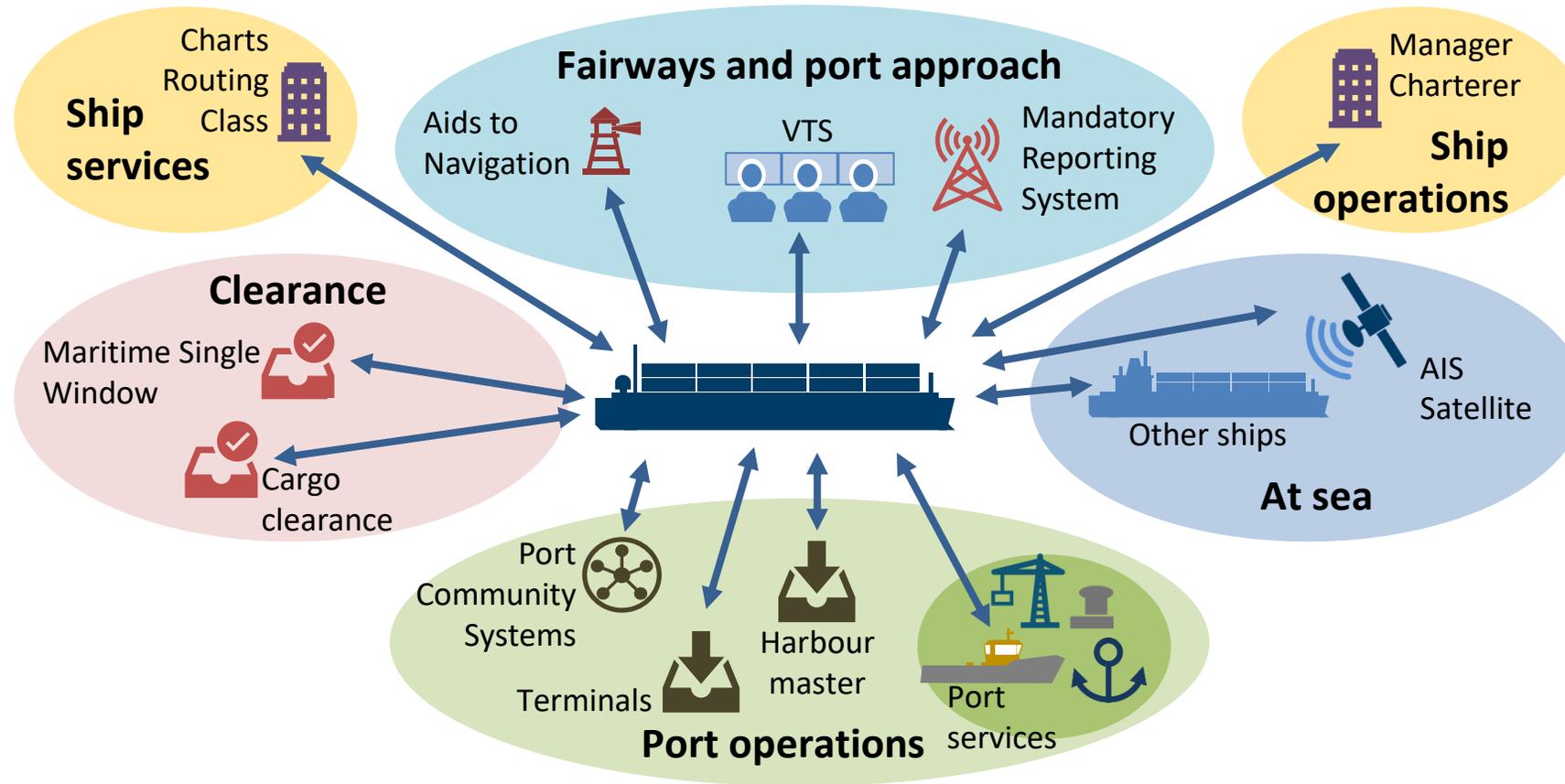
Some covered by (several) industry standards

Onboard networks	IEC 61162, ISO 16425, ISO 19847/48
Automatic data transfer	IEC 63173-2, ISO 28005-1, ISO 19848
Automated port	ISO 28005, IALA S-211
Cyber security	ISO 23806, IEC 63154
MSW, reporting	ISO 28005, UN/EDIFACT, IALA G1159
Just in Time arrival	IALA S-211, DCSA, ISO 28005-3

Just a few examples, many more!

A new focal point:
The IMO Compendium/Reference Data Model

Nautical data

Administrative data

Operational data

IMO Reference Data Model
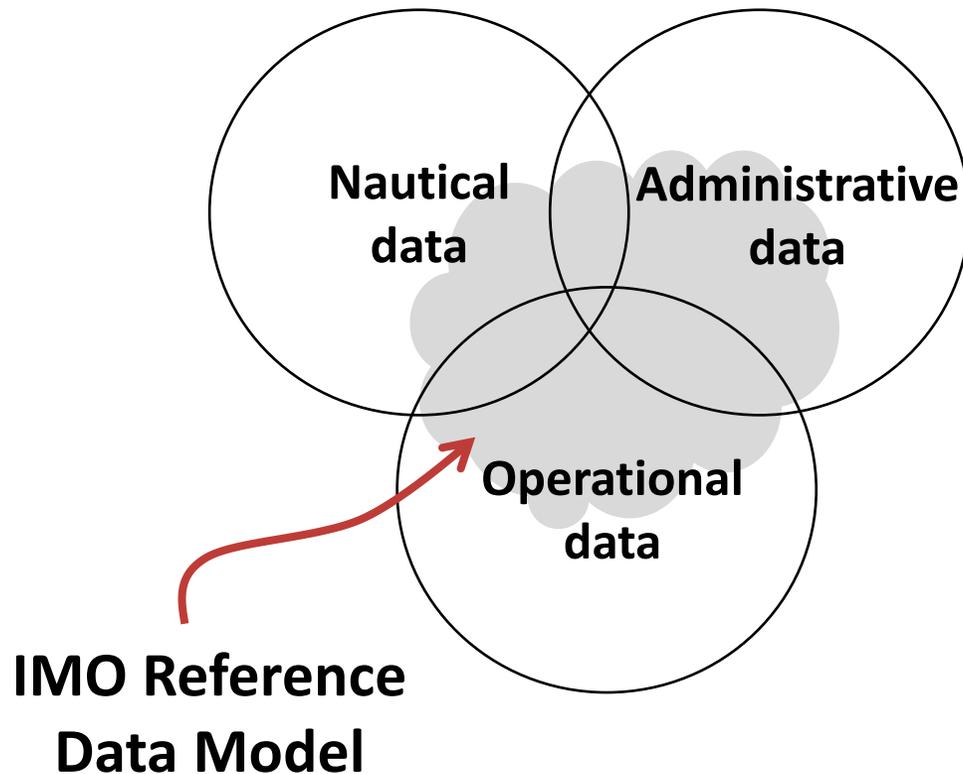
Key sources of data
- The FAL Forms
- Maritime Declaration of Health
- Stowaways
- Waste reporting
- Just in Time arrival
- Ship Certificate list
- Mandatory Ship Reporting System
- Ballast water reporting
- ...

Initial contributors

Harmonizes data elements between domains
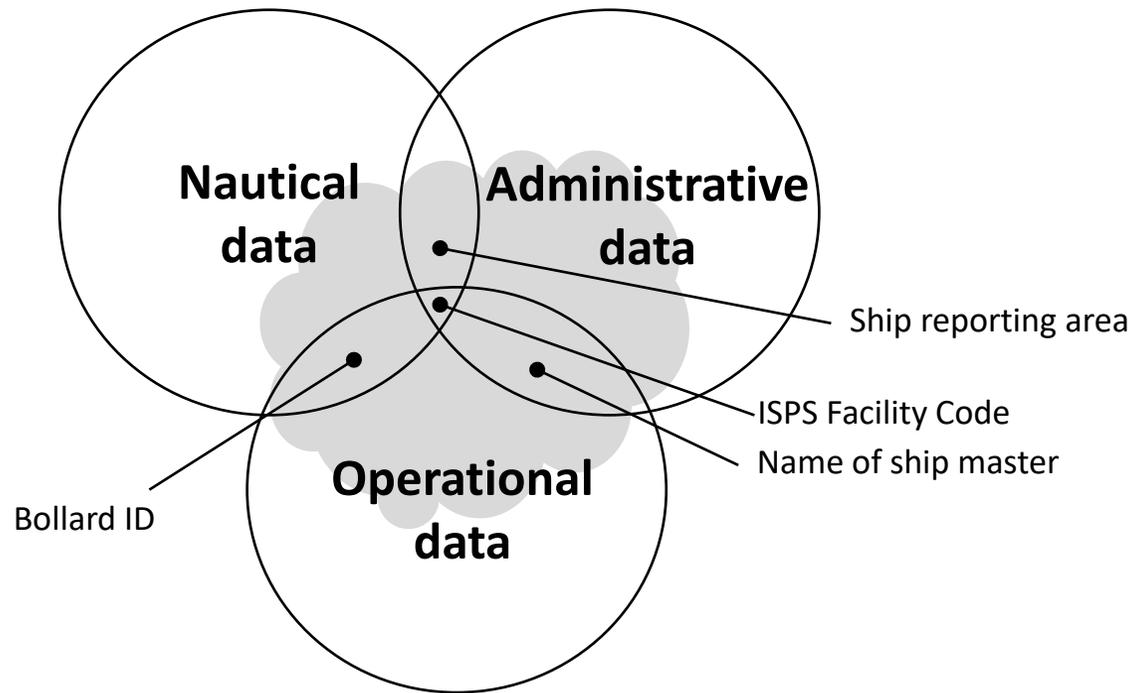
Digital trust and cyber security

Digitalization in the transport systems

Autonomous and automatic transport

Connected and automated transport
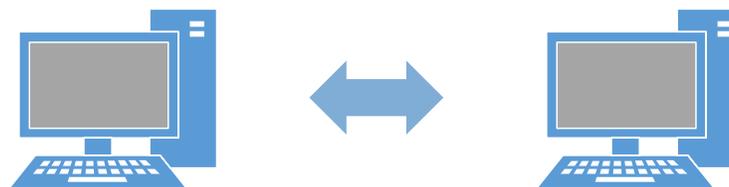
Automatic machine to machine communication
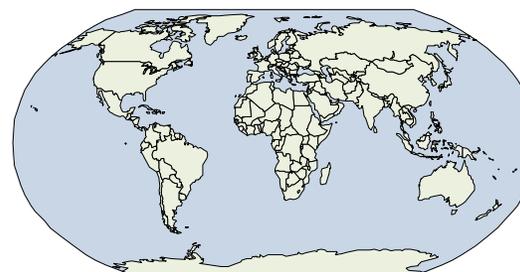
To or from ships, world wide

Secure and trusted data transmissions

**Strong international competition,
but also a strong need to cooperate!**

Autonomous Ship System: Many interfaces
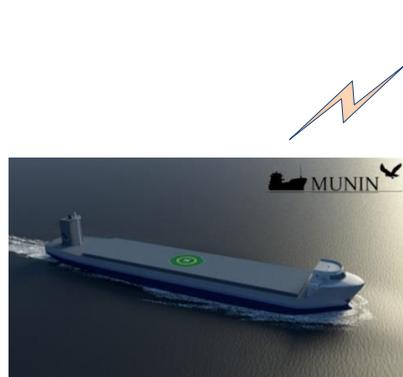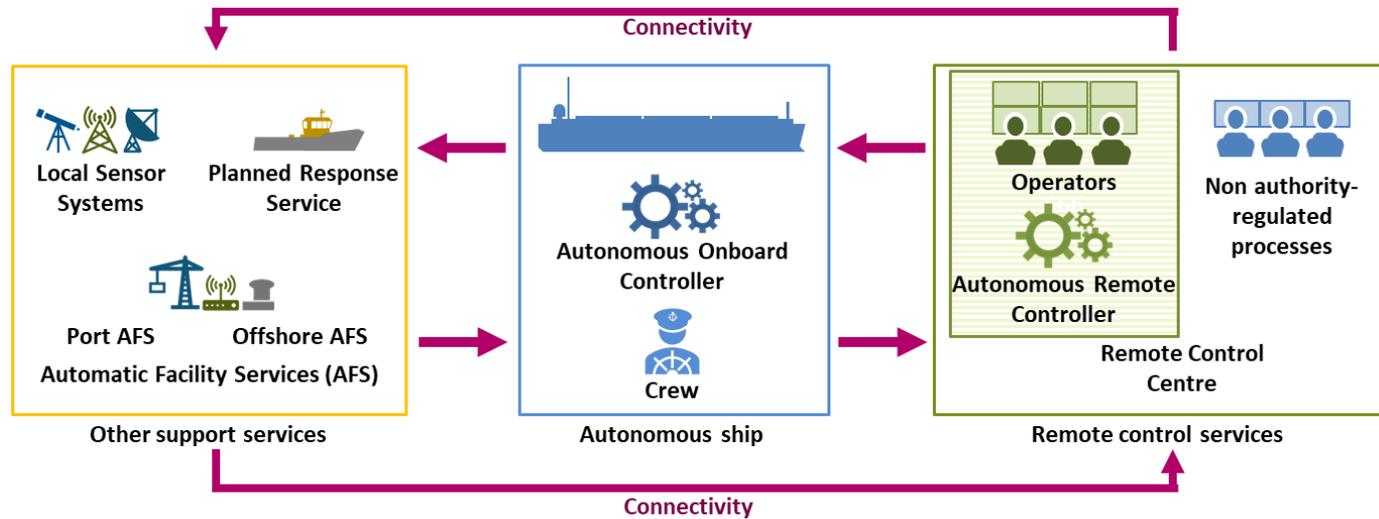
Communication ship to remote control
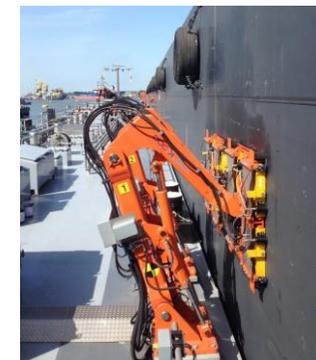
Interfaces to shore automation systems

Development of MASS is expensive today!
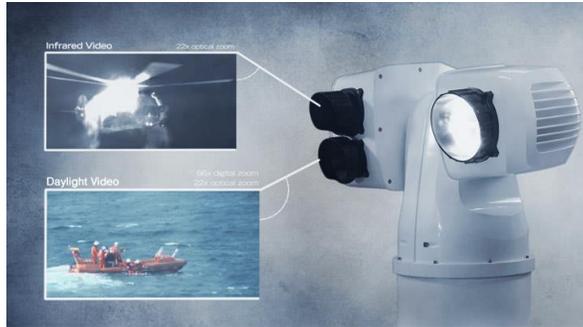
No standard system integration

No standard interface to RCC

No standard port infrastructure

No standard rules or legislation

No standard for training of crew
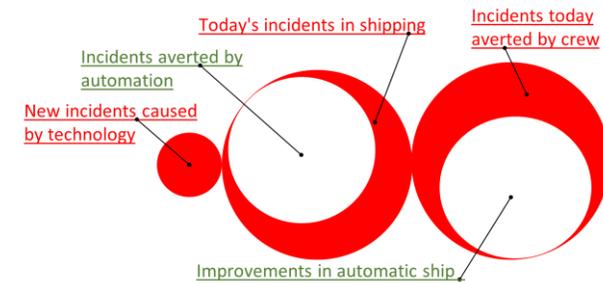
No standard risk model

Standards reduce costs and increase innovation

Earn money

Digital transformation

Save money

Digitalization

Spend money

Digitization

6 billion smartphones

iOS

96 000 ships

Mostly different!
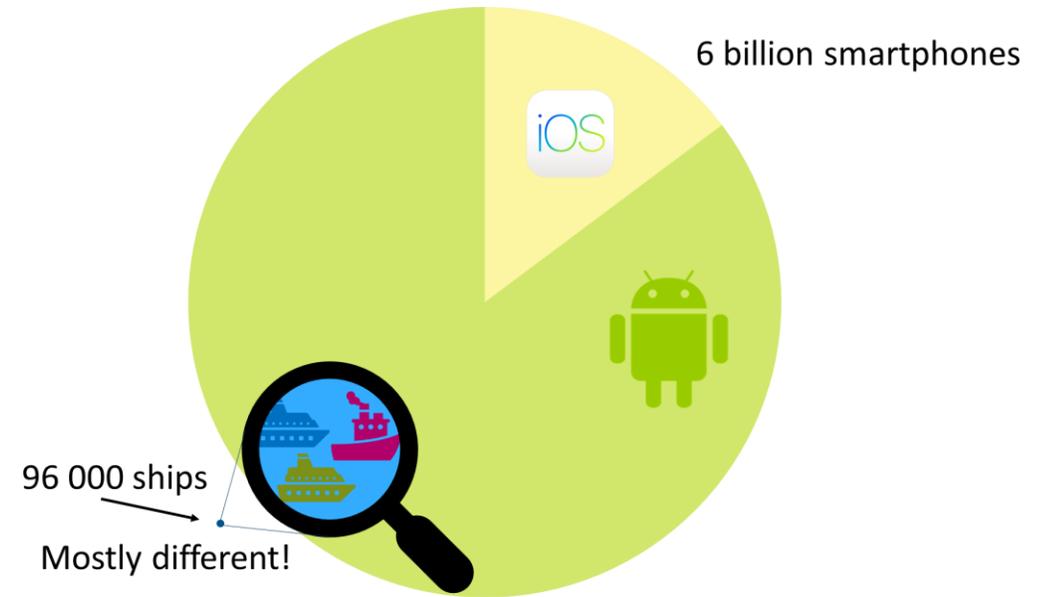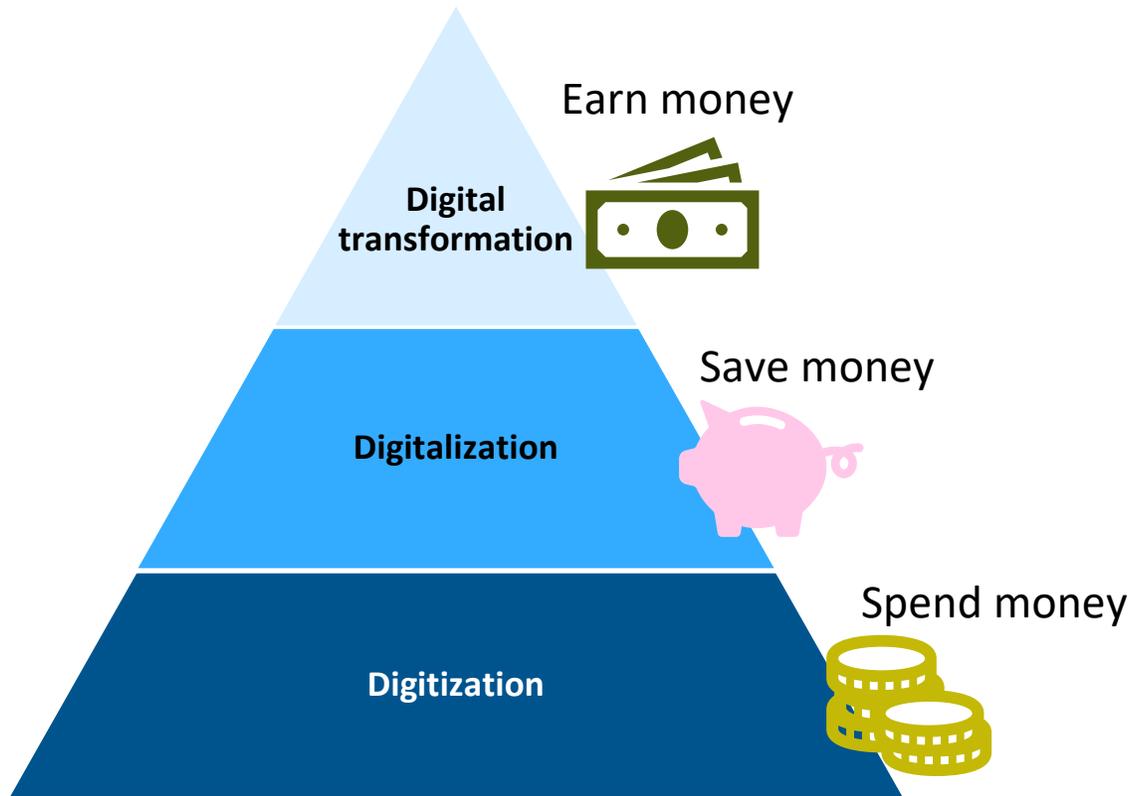
Conclusions

- Automation and digitalization will affect all ships
- This is a system, including the ship itself, port, RCC and many other parties
- Shipping is a small sector and require more cooperation in standards development
- The FAL Compendium and reference data model provide a new focal point

Thank you for your attention!