

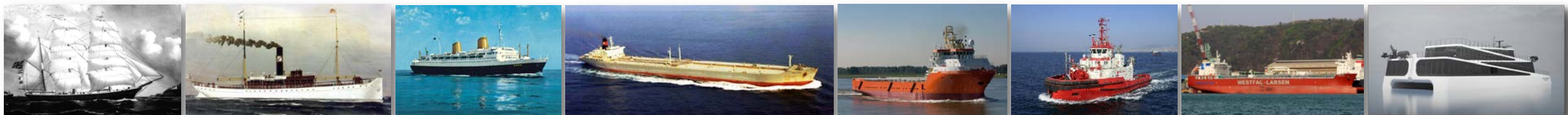
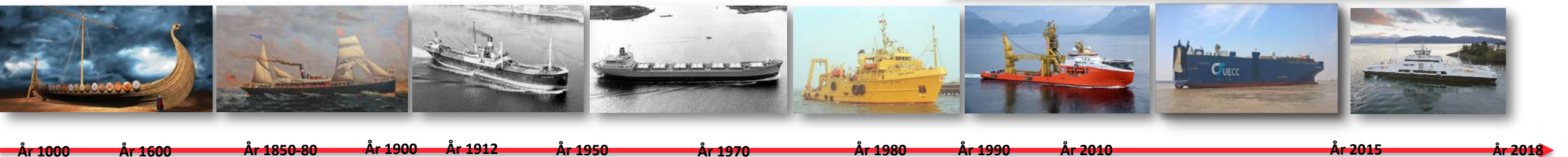
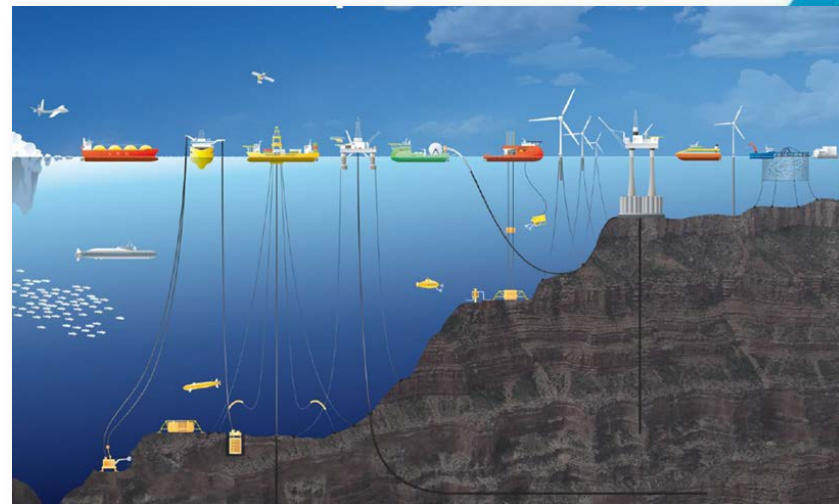
# “Facilitating disruptive innovation – The Norwegian approach”

Svein David Medhaug



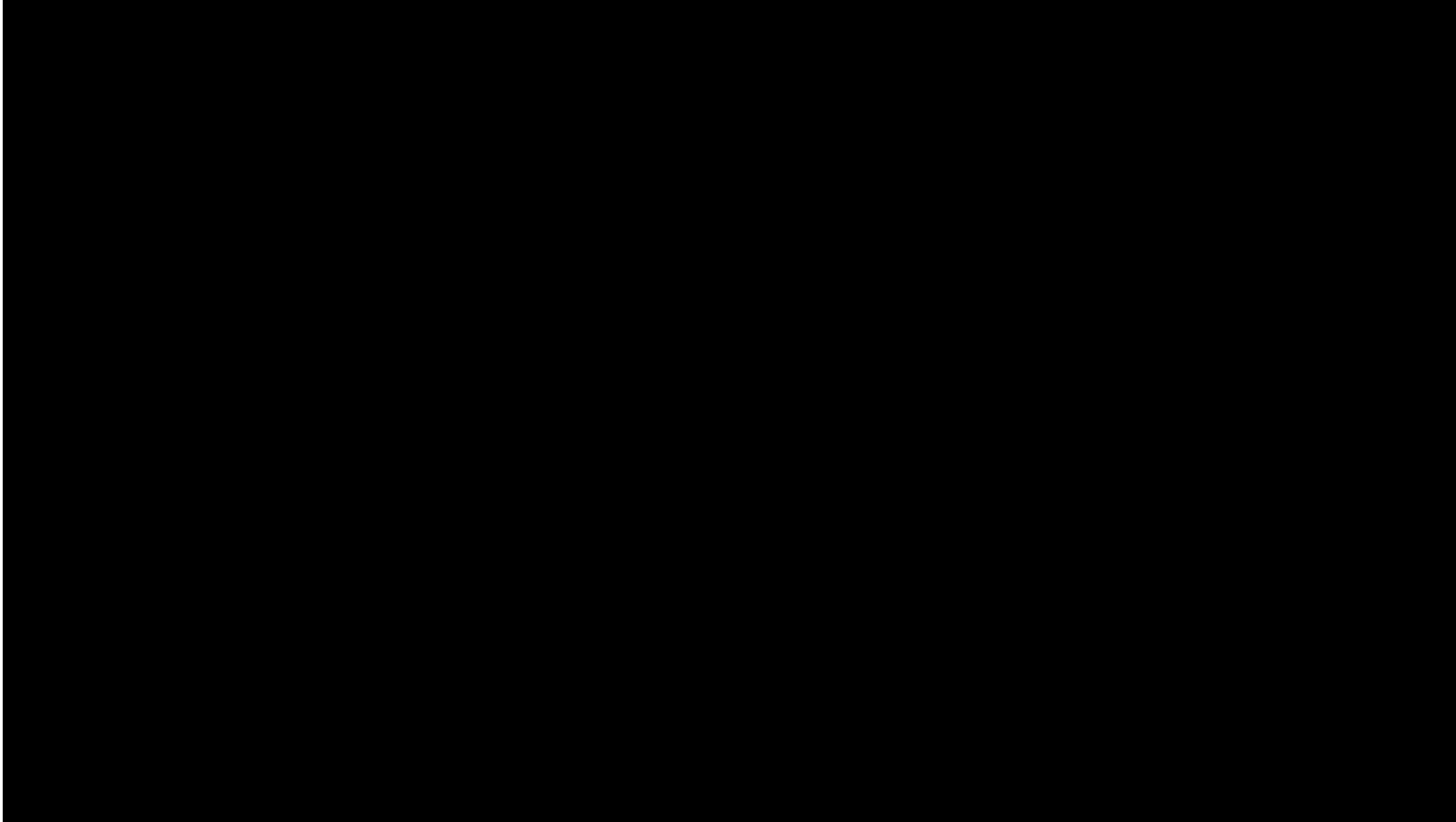
# Norway

## The world's most advanced Sea nation & a Maritime Superpower





# Innovation and new technology





# Innovation and new technology

## Maritim Strategi



## Hav Strategi





# Innovation and new technology

- Environment
- Expertise
- R&D
- Innovation
- Blue growth
- International conditions
- UN's Sustainable Development Goals





# The Norwegian model - "The maritime cluster"

- A knowledge based Norway
- The complete and unique cluster;
  - Developers
  - integrators
  - equipment suppliers
  - distributor
  - Operator / Ship-owner
  - R & D
  - Authority
  - among others
- National cooperation in a international marked

**Collaboration = Success**



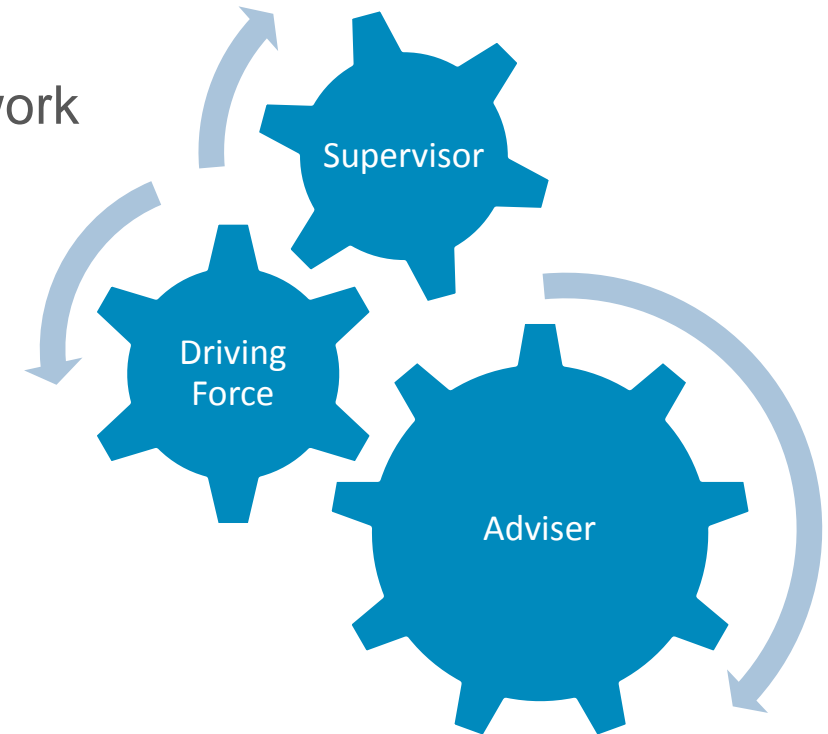
# The Norwegian model - "The maritime cluster"





## Contribute to making National innovation to international standard

- Stimulate innovative thinking
- Coordinate and facilitate
- Actively participate in international forums
- Invite the industry to participate in the Authority's international work
- Take initiative
- Participate in development projects

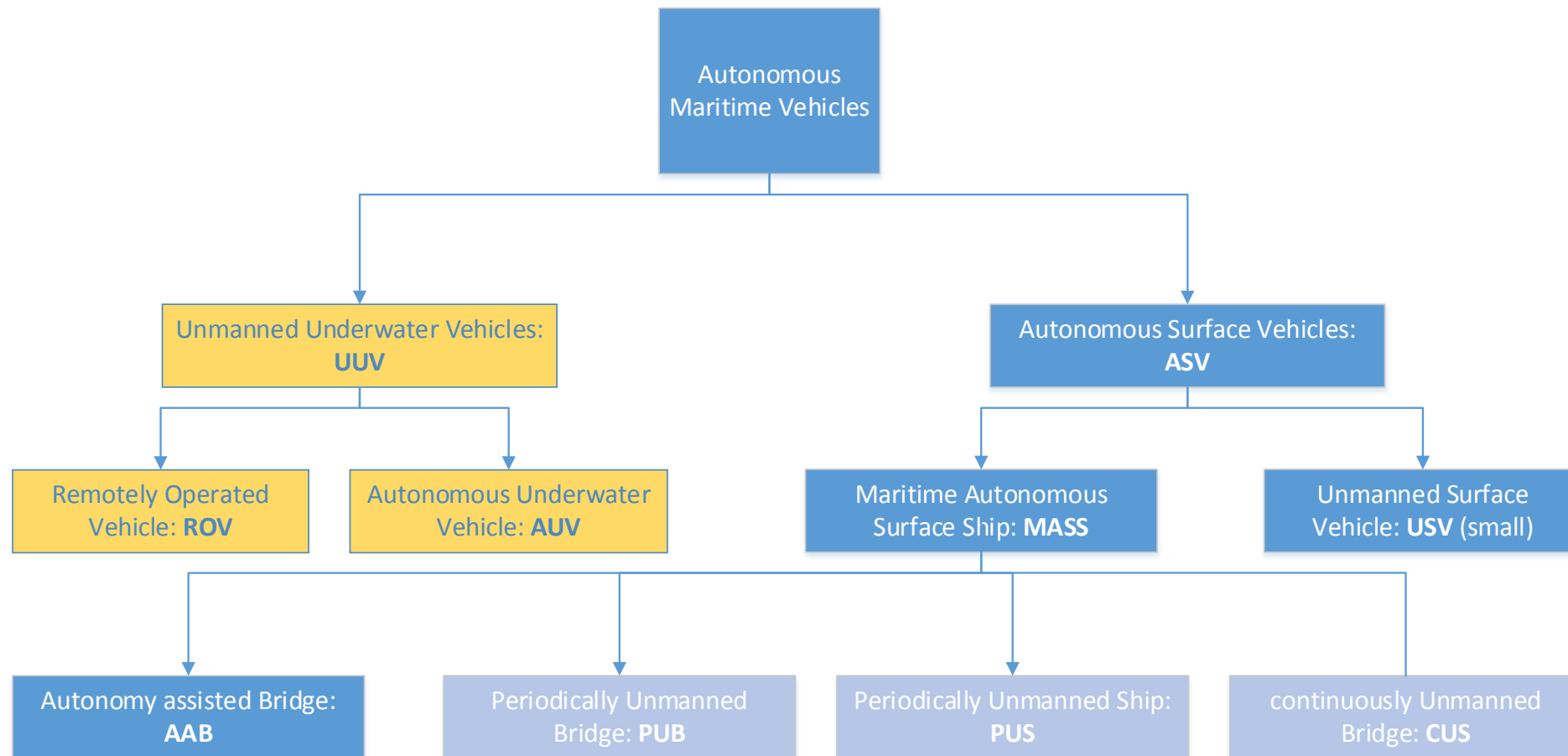








# Autonomy – Autonomous Maritime Vehicles





# Operational autonomy levels

Four operational autonomy levels;

1. Decision support
2. Automatic
3. Constrained autonomous
4. Fully autonomous

	<b>Manned bridge</b>	<b>Unmanned bridge - crew on board</b>	<b>Unmanned bridge - no crew on board</b>
<b>Decision support</b>	Direct control No autonomy	Remote control	Remote control
<b>Automatic</b>	Automatic bridge	Automatic ship	Automatic ship
<b>Constrained autonomous</b>	-	Constrained autonomous	Constrained autonomous
<b>Fully autonomous</b>	-	-	<b>Fully autonomous</b>



# Challenges – with Autonomy

- Legislations
  - COLREG
  - 1978 STCW Convention and Code
- Radio Spectrum
  - Frequencies/ ITU (WRC)
  - Bandwidth
  - Coverage
- Responsibility, Liability and Insurance.
  - Master, owner..
- Geographical restrictions.
- Technical





## Benefits

- Cost
- Safety
- Security
- Environmental
- Efficiency
- Digitalization
- Reliability
- Human errors
- Continuous trade– Non-stop process
- optimal Logistic
- Shore based control stations



# Why - The Goal!

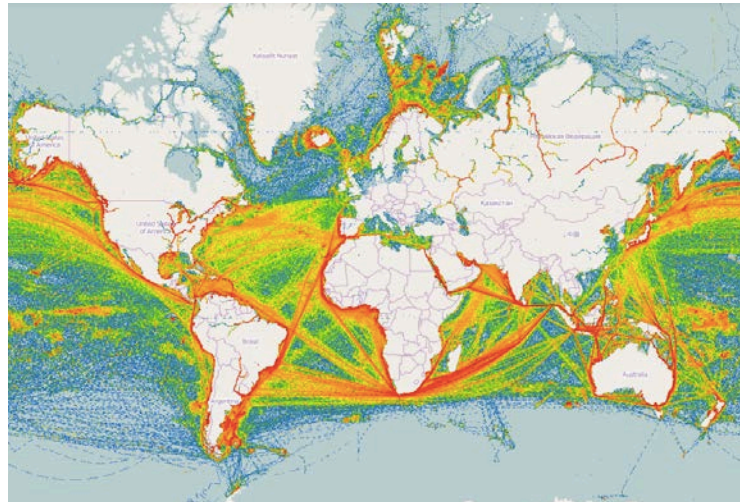
- Safety, Security and efficiency
  - Blue economy in a green ocean
  - Environmental
  - Norwegian achievements in a international perspective
  - UN's Sustainable Development Goals
  - International legislation
- 
- “Look to Norway”





# How to reach the goal...

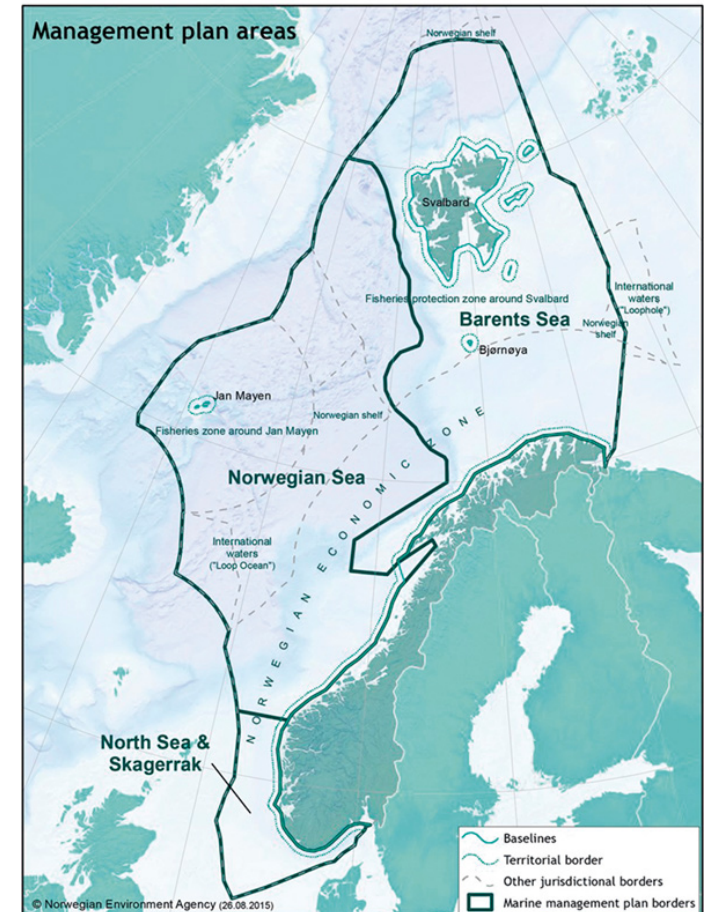
- **National engagement**
- **International adjustments**





# How to reach the goal.

- Finalizing a national approach, showing the world how to do it.
  - National engagement
    - National legislations
    - Restrictions and exemptions
  - Circulars and Instructions
    - Class rules
  - Guidance
  - Implemented national regulations







# How to reach the goal..

- Working in parallel with national achievements towards an international legislation regime
- International adjustments
  - International legislation
  - Bilateral agreements between coastal administrations
- IMO
  - Finalizing scoping exercise
  - Defining maritime autonomy



International Labour  
Organisation





# How to reach the goal...

- Joint action
- Harmonizing class rules and legislation
- Combined effort for the benefit of innovation and new sustainable technology
- Take advantage of the edge and the lead of the Norwegian model and maritime industry
- The Key factor is cooperation

**Collaboration = Success**

# Conclusion

The Goal is Not Autonomy!, but;

- Safety, security, efficiency and environment.
- The industry need to;
  - find a common ground, define and decide the way ahead.
  - Dedicated areas of testing
  - Norway will promote sustainable technology and concepts.
- Cooperation is of grate essential, and;
  - Harmonization of instruction from flag and class rules

**CONCLUSION**



Thank you for your attention!

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