

# TEST AREA FOR AUTONOMOUS SHIPS: THE NEED FOR AN OPEN MODEL

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- Why establish a test area? - A few cases.
- Way points – Where do we go from here?
- The need for an open model – Better together!
- Summary

# Test Area for Autonomous Ships in Trondheimsfjorden

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- Established 30/9-2016
- Partners
  - Kongsberg Seatex
  - SINTEF
  - NTNU
  - Maritime Robotics
  - Port of Trondheim
  - The Norwegian Maritime Authorities
  - The Norwegian Coastal Administration





# ***“Leading the transformation of shipping”***

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*"We will actively drive the transformation, rather than waiting for it to happen"*



The mission:

Foster  
knowledge  
building

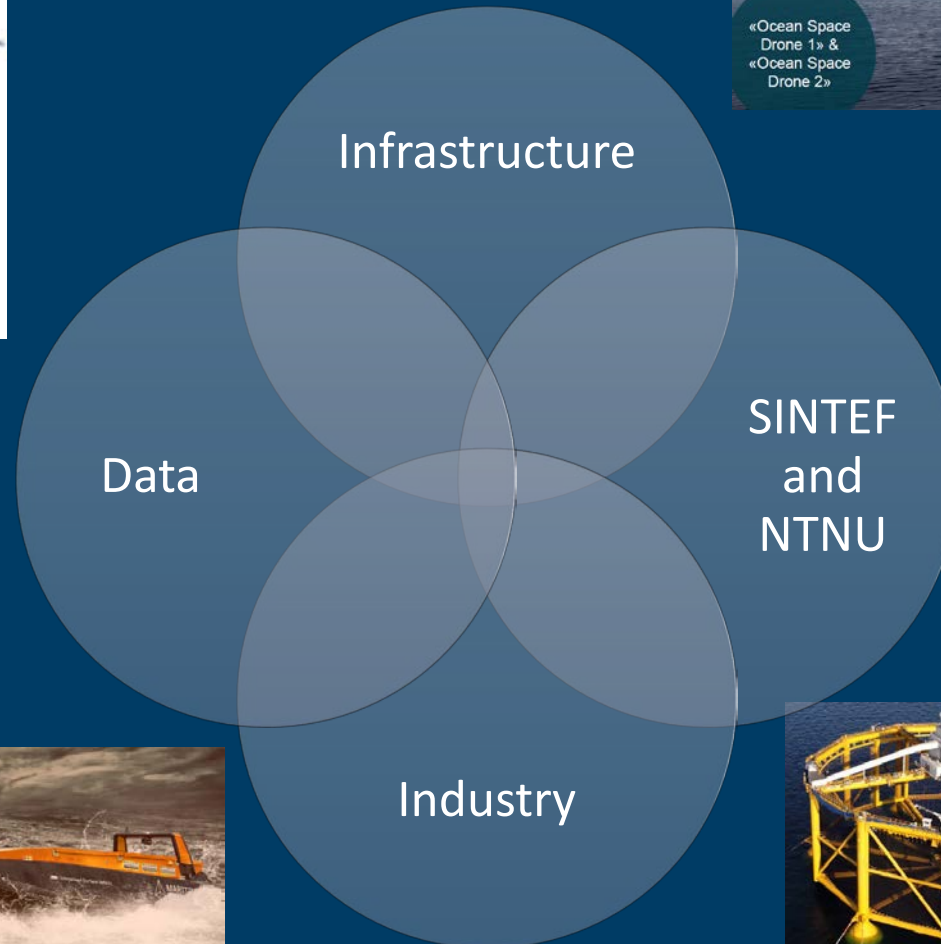
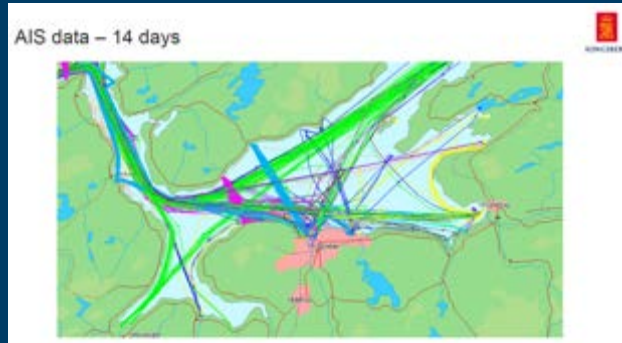
Stimulate  
technology  
development

Drive  
innovation

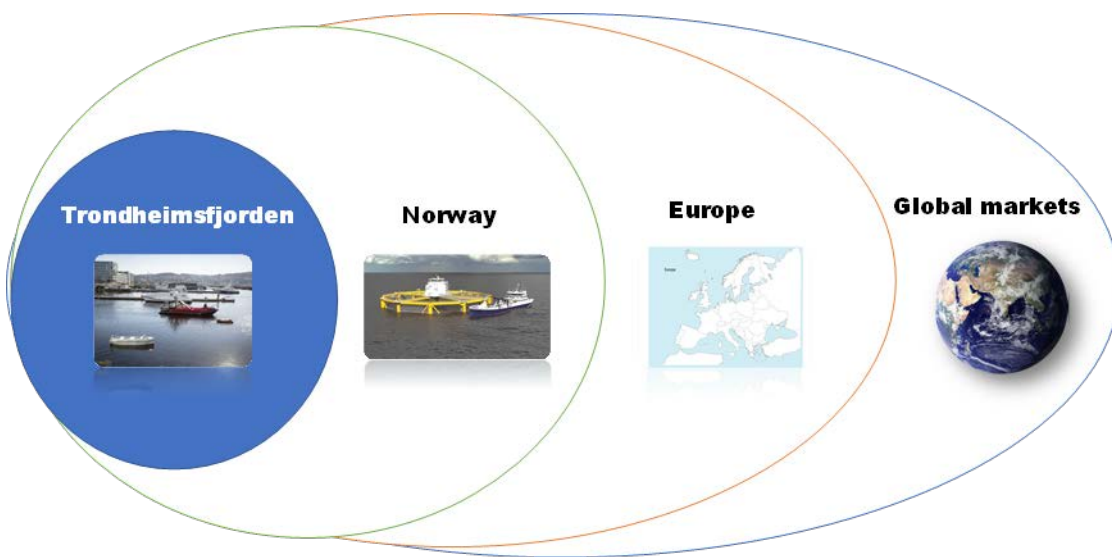
Develop  
rules and  
regulations

Test and  
verify  
concepts and  
solutions

# Test Area Trondheimsfjorden



# Why test area for autonomous ships in Norway?



- A strong maritime cluster
- A shipping nation
- NTNU and SINTEF – strategic research on autonomous ships and transport systems

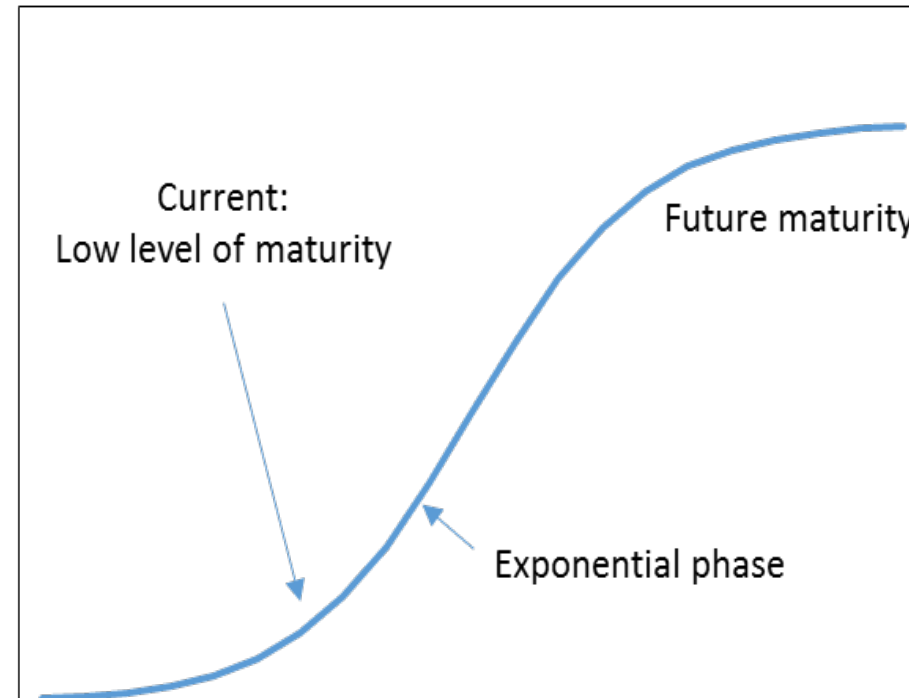


VALUE ADDED [MUSD]	2010		2030		GVA
Ocean-based industries	[MUSD]	Share	[MUSD]	Share	CAGR
Offshore wind	2 868	0,2 %	230 473	8,6 %	24,5 %
Industrial fish processing	78 807	5,2 %	265 601	9,9 %	6,3 %
Industrial capture fisheries	21 082	1,4 %	47 049	1,7 %	4,1 %
Industrial marine aquaculture	3 627	0,2 %	10 965	0,4 %	5,7 %
Port activities	193 000	12,9 %	472 850	17,5 %	4,6 %
Maritime and coastal tourism	390 107	26,0 %	777 138	28,8 %	3,5 %
Maritime equipment	168 035	11,2 %	299 674	11,1 %	2,9 %
Shipbuilding and repair	57 693	3,8 %	102 890	3,8 %	2,9 %
Water transport (shipping)	82 594	5,5 %	118 023	4,4 %	1,8 %
Offshore oil and gas	504 035	33,6 %	636 090	23,6 %	1,2 %
Total	1 501 847	100 %	2 960 753	100 %	
Average of the total ocean-based industries					3.45 %
Global economy between 2010 and 2030					3.64 %

# Global Autonomous Ship Market

## Maritime market (2018):

Merchant fleet ships	81 500
Fishing vessels	2 700 000
Recreational vessels	29 200 000
Inland Waterways	529 000

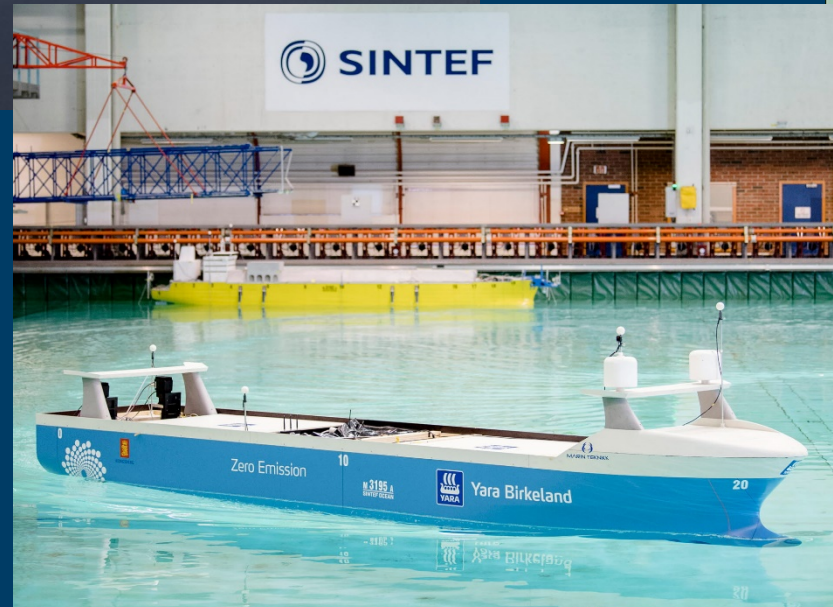
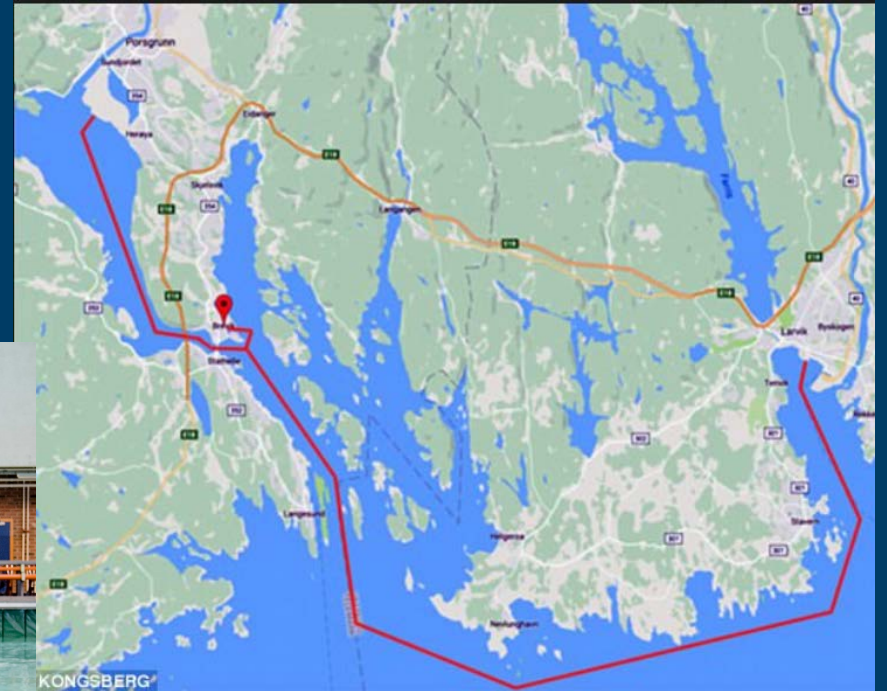
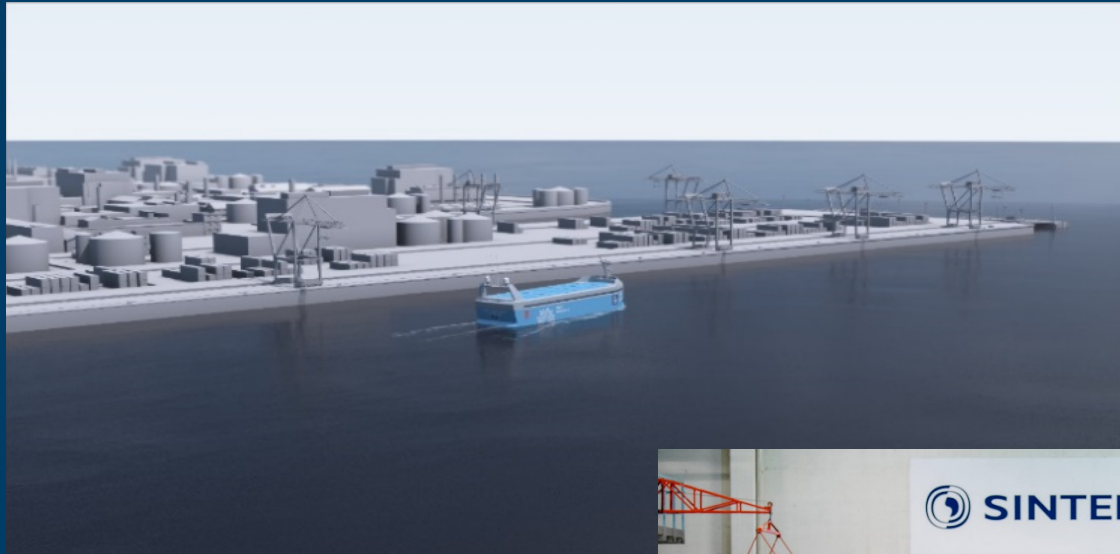


The current total number of maritime vessels (about 32,5 million) will increase significantly when new autonomous concepts will enable more extensive use of sea-borne transport and increased maritime activities.



# Autonomous transport – no longer a vision

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# Some cases....

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**NFAS** Norsk Forum for  
Autonome Skip  
**INAS** International Network for Autonomous Ships

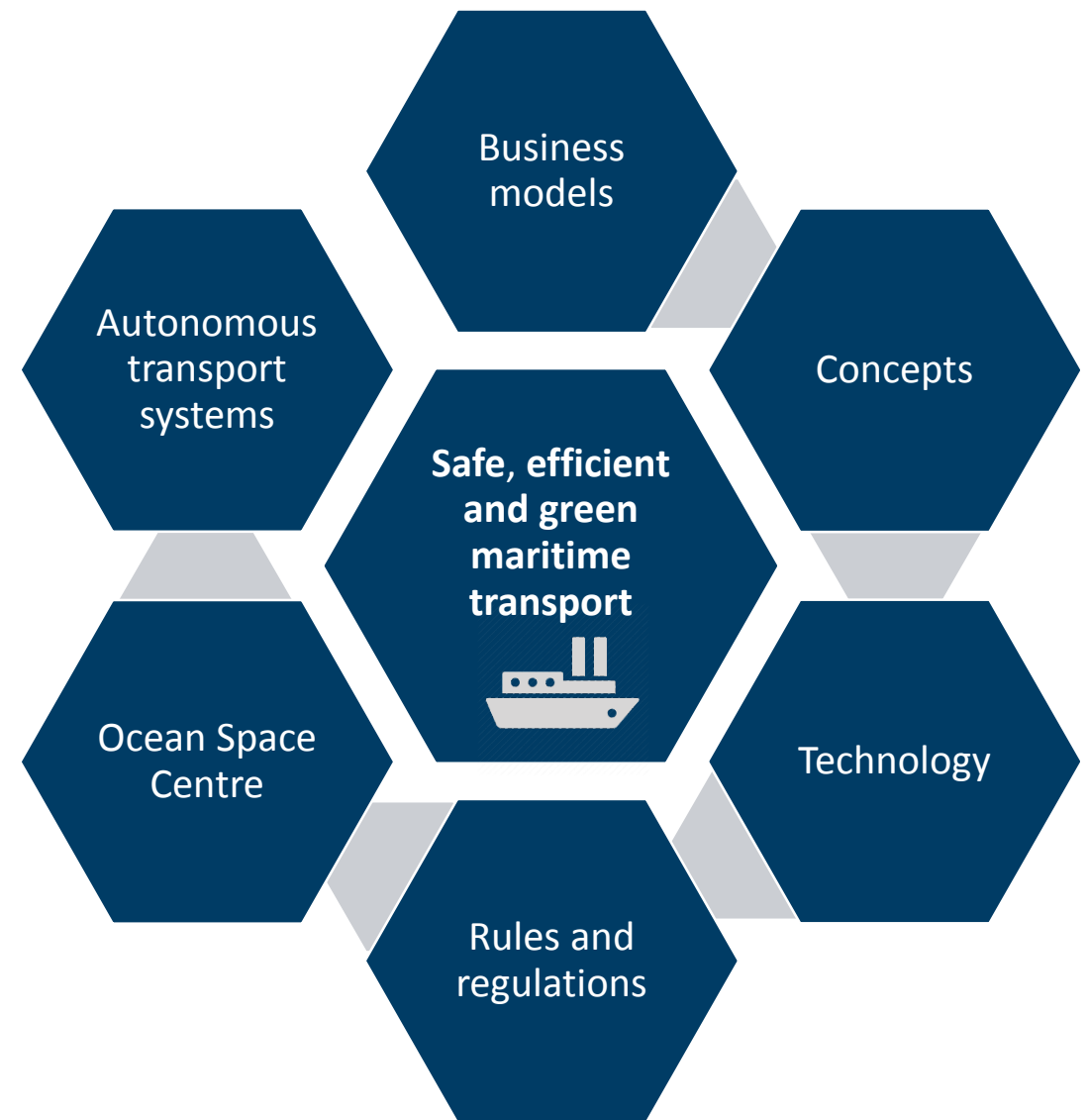
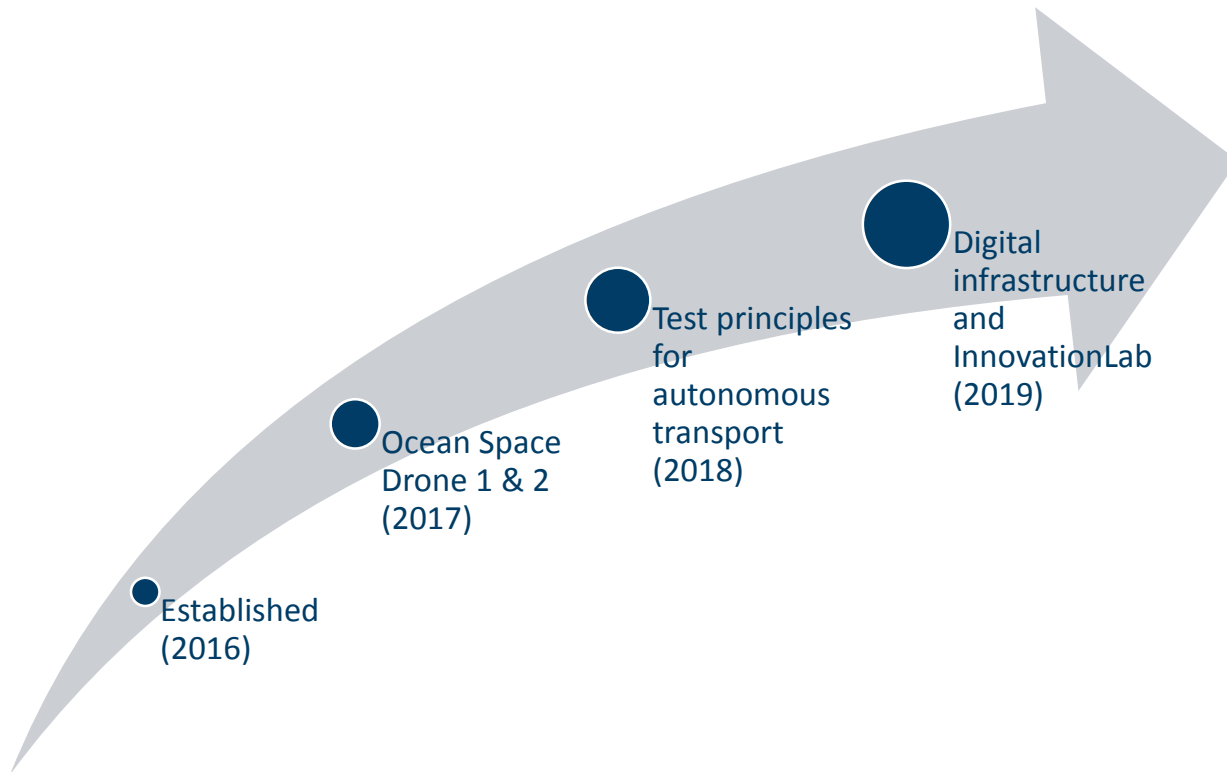


# Research projects in Trondheimsfjorden

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- ASTAT – business models for autonomous transport in Trondheim area
- H2H – H2020 project, hull to hull navigation
- Proxima – detecting small targets at sea
- Shifting cargo to sea with Autonomous Transport Systems
- CySims – cyber security
- SATS – SINTEF strategic project on autonomous transport
- SAREPTA – risk models for autonomous transport
- AutoSea – anti collision
- Milli Ampere – a full scale ferry for inter city connection
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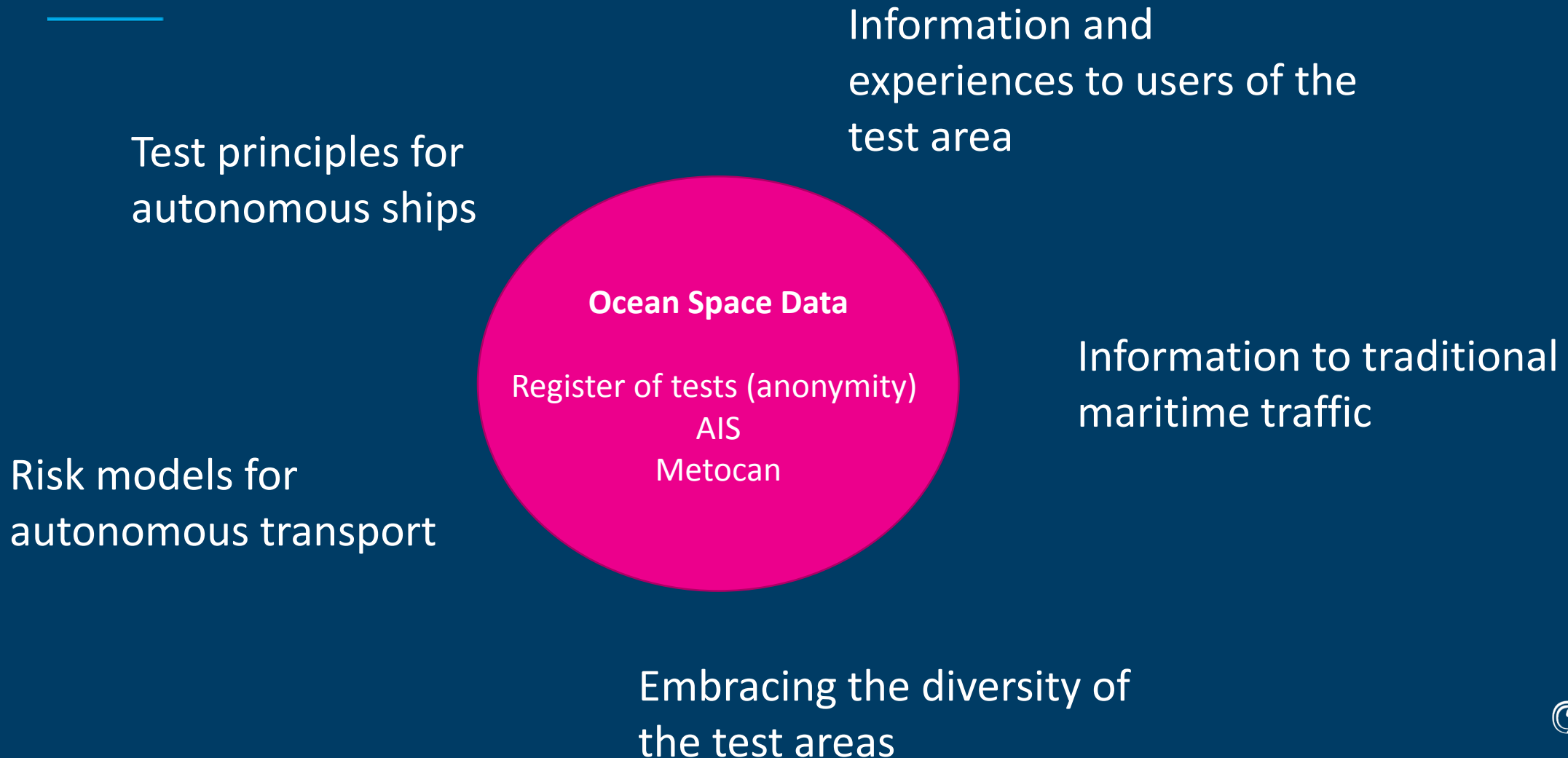
# What's next?





# Better together!

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# Summary

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- There was clearly a need for test areas
- The test area in Trondheim has paved the ground for more research and development on autonomous transport in Norway
- The test areas around the world should work together on test principles and risk models



Teknologi for et bedre samfunn