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# Trondheimsfjorden – World's First Test Range for Autonomous Vessels

The 2nd EU-Japan Satellite Positioning Public-Private Roundtable  
Tokyo, March 8<sup>th</sup>, 2017

Stig Erik Christiansen, Kongsberg Seatex AS

# AUTONOMY IS NOT NEW

- Autonomous underwater vehicles





# Autonomous Vessels has also been a reality for many years

**Dynamic Positioning (DP)** is a computer controlled system to automatically maintain a vessel's position and heading by using its own propellers and thrusters (i.e. without the use of anchors).



# Autonomous Systems - KONGSBERG



## Air

JSM, NSM, Penguin, UAVs



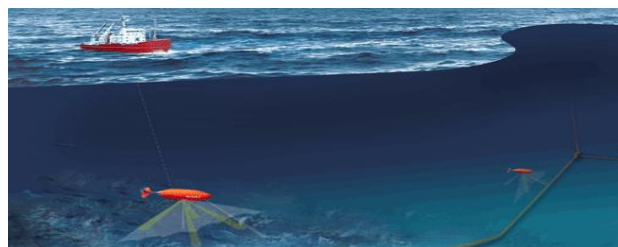
## Land

RWS, UGVs



## Sea-Surface

DP, Man. Ctrl, Autopilot

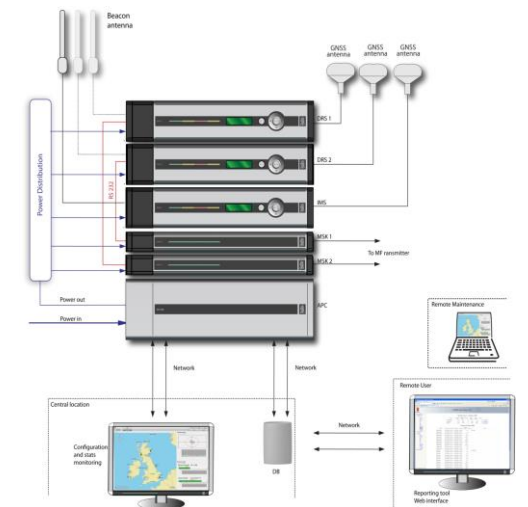


## Underwater

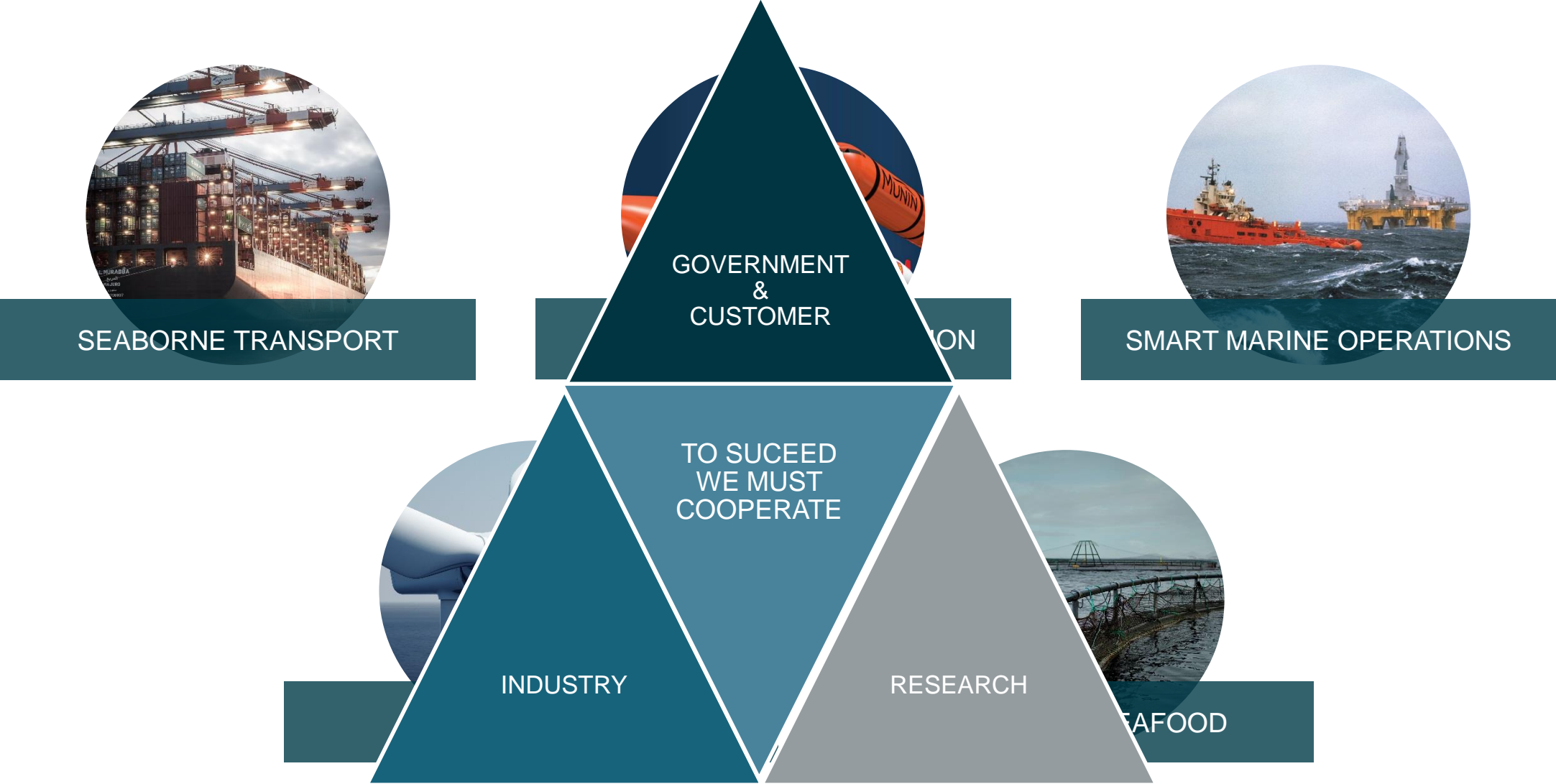
AUVs, ROVs



- GNSS
- Inertial Navigation
- Microwave Relative Positioning
- Laser Relative Positioning
- AIS (anti collision)
- Radar
- LiDAR
- Optical (Camera)
- Broadband Communication (MBR)
- VDES
- Control Room
- Satellite Surveillance
- Land infrastructure
- E-Navigation
- Etc.



# AN OCEAN OF OPPORTUNITIES







STÅLE  
LANGØRGEN  
Mobil: 968 07 152



47



Konsernsjef Walter Qvam i Kongsberg Gruppen mener at Norge både kan og bør ta en ledende rolle innen utviklingen av autonome skip. FOTO: KRISTIN SVORTE

# Vil teste førerløse skip i Trondheimsfjorden

Kongsberg Gruppen mener det bør opprettes et testområde for førerløse skip i Trondheimsfjorden og utenfor kysten av Trøndelag.

I Trondheim har forskerne i mange år studert hvordan skip kan operere uten verken kaptein eller mannskap, og konsernsjef Walter Qvam i Kongsberg Gruppen spår en rivende utvikling av slike såkalte autonome fartøyer i årene fremover.

Han mener at Norge med sine maritime tradisjoner både kan og bør ta en ledende rolle.

Podcast: Bli med Rasmus&Saga på innsiden av RBK

Leses nå:

Trondhjemmer erkjente å ha bestilt overgrep mot smågutter



MENY

LOGG INN

TU's bidragsytere: Ekspertene skriver



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## Det store ENERGISLAGET

KRISTIANSAND 30. og 31. mai 2016

Agder Energi-konferansen



Rolls-Royce (Foto: Rolls-Royce)

## Norge blir først i verden: Peker ut fjord til testing av skip uten mannskap

Etablerer fast testområde.



AV: TORE STENSVOLD | INDUSTRI | PUBLISERT: 11. MARS 2016 - 13:25

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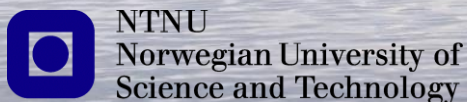
Kystverket lanserer planene i innspill til ny Nasjonal Transportplan (NTP) 2018-2029. Forslaget blir svært godt mottatt i det maritime miljøet.

JOBB

Jobbportalen for ingeniører og teknologer



# Trondheimsfjorden – Test site for Autonomous Vessels

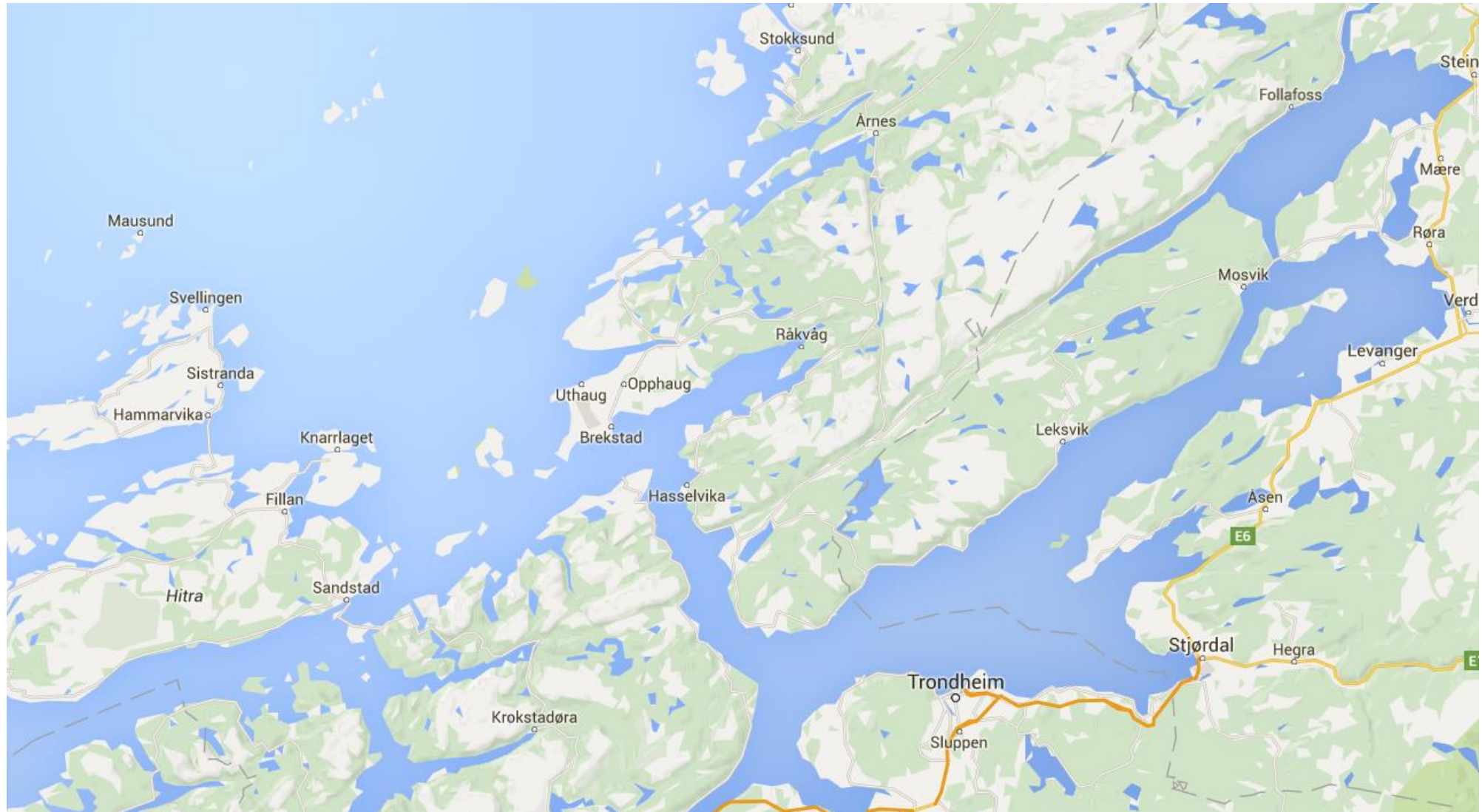




# Test site - Trondheimsfjorden



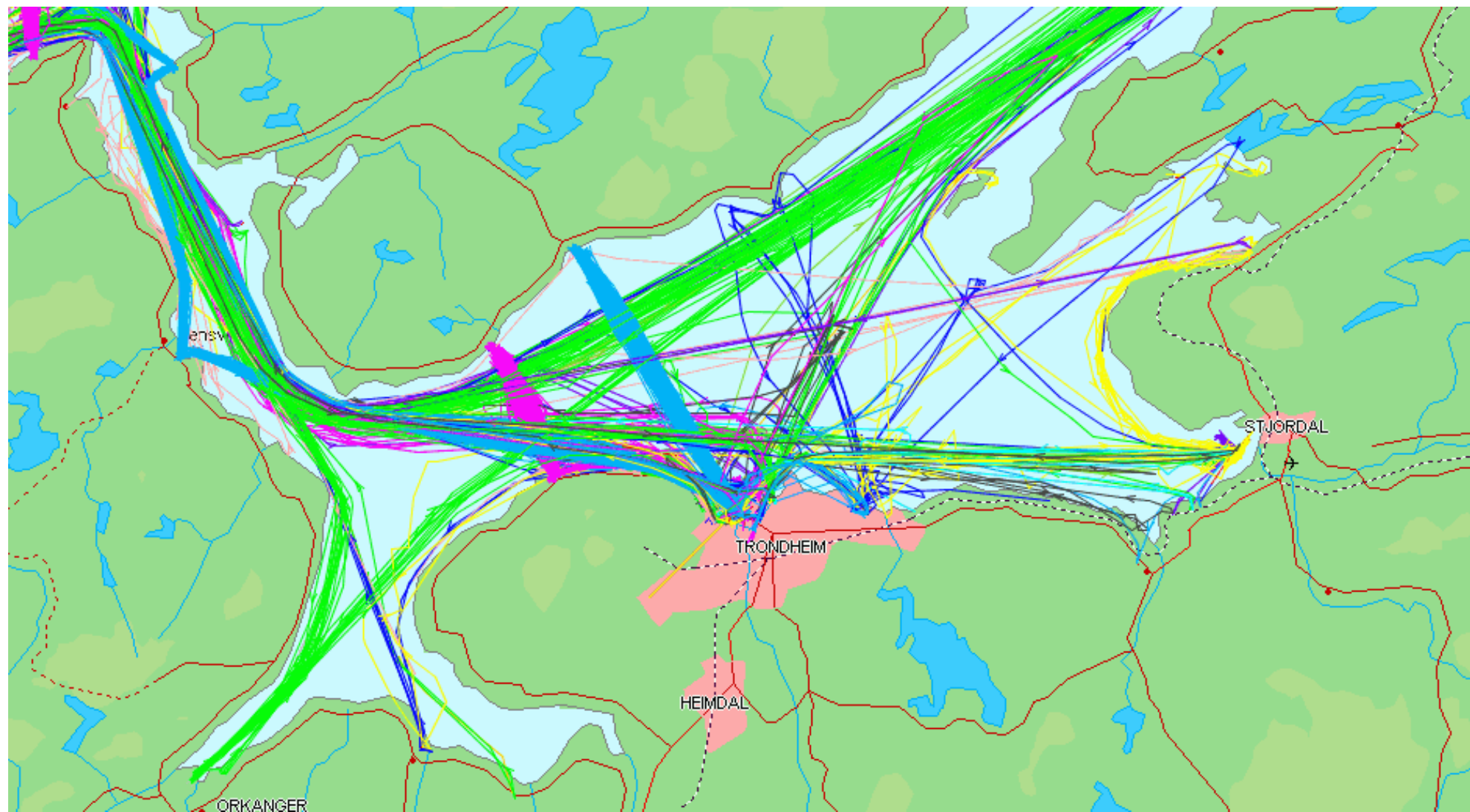
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# Ship traffic – May 31<sup>st</sup> - June 14<sup>th</sup> 2016



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NTNU  
Norwegian University of  
Science and Technology



MARITIME  
ROBOTICS

Trondheim  Havn



Agreement signed - Sept 30th 2016



# SEVERAL INITIATIVES



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ReVolt



ODIN



HRÖNN

*And certainly there will be even more initiatives in the years to come.*



# USV Odin

## Named by the Minister of Defense August 18th 2016



«Odin» is a research project between  
Forsvarets forskningsinstitutt and KONGSBERG





# Automated Ships Ltd and KONGSBERG to build first unmanned and fully-automated vessel for offshore operations





# NORWEGIAN GOVERNMENT PLAYS ALONG



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*“Building and testing autonomous vessels and transport systems in national waters now will make it easier to bring about changes in international regulations later. But the most important factor for the authorities is safety”,* says Olav Akselsen, Director General of Shipping and Navigation. “If you can steer a ship from an onshore position, this means that hackers could also take control of the ship. We have to make data security a priority”, Olav Akselsen told Teknisk Ukeblad at the inauguration of the Norwegian Forum for Autonomous Ships.



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# WORLD CLASS

THROUGH PEOPLE, TECHNOLOGY AND DEDICATION