
University of
South-Eastern Norway

18.000
STUDENTS

1.900
EMPLOYEES

BA **65** BACHELOR PROGRAMMES

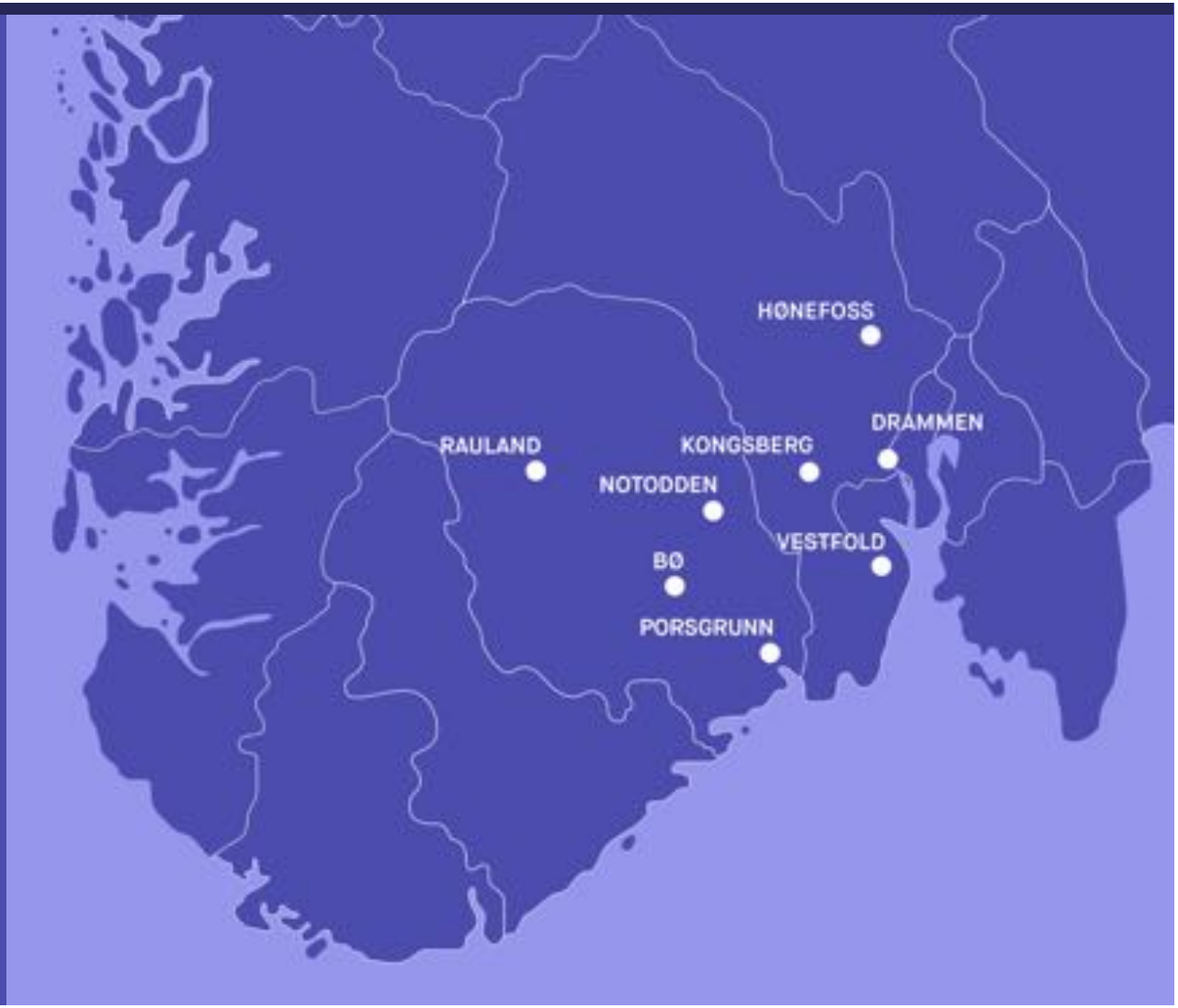
MA **36** MASTER PROGRAMMES

PhD **8** PHD PROGRAMMES

8
CAMPUSES

BØ – DRAMMEN – KONGSBERG
NOTODDEN – PORSGRUNN
RAULAND – RINGERIKE – VESTFOLD

Close upon 700 000 inhabitants



University of South-Eastern Norway

PhD Programmes

- Applied Micro-and Nano-systems
- Cultural studies
- Ecology
- Marketing Management
- Person-centred Health Care
- Process, Energy and Automation Engineering
- Research training in pedagogical resources and learning processes
- Nautical Operations

Project AUTOSTRIP-

«Autonomous Systems in Transport and Industrial Processes»

By Paal Aamaas
USN Partnership
Rector´s staff

University of
South-Eastern Norway

FORREGION Capacity Enhancement projects

www.autostrip.no

- AUTOSTRIP is one of 7 national projects financed by the NRC, the region and USN
- Started 2017 with a total budget of 8 MEUR over 6 years
- It is about:
  - how to develop a research area based on the future competence need, where the institution has an opportunity to take a leading research position relevant to the industry/business
  - mandatory learning outcome through courses, subjects or general education/degrees
  - the institution must taking an agile role and willing to change/adapt
  - preferably multidisciplinary projects
  - an integrated process with the industry/businesses
- So how do you do that in an mostly static, top down organisation with typically low multidisciplinary collaboration with 2 faculties with 5 institutes spread over 4 campuses?

AUTOSTRIP approach from USN

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- Involved the industry from day one and further on through established cluster
- Established an agile unit with project developers from the industry to develop applications
- Ownership placed outside of line organisation at the rectorate
- Line organisation is stimulated through
  - Expectations and goals
  - Some basic funding to stimulate collaboration
  - Funding based on deliverables
  - Help to develop applications and to coordinate with industry/businesses
  - Gift professorships in cooperation with regional partners
  - Steering committee with all responsible involved committing in front of the partners
- Develop a national collaboration on autonomy research

AUTOSTRIP by it´s core

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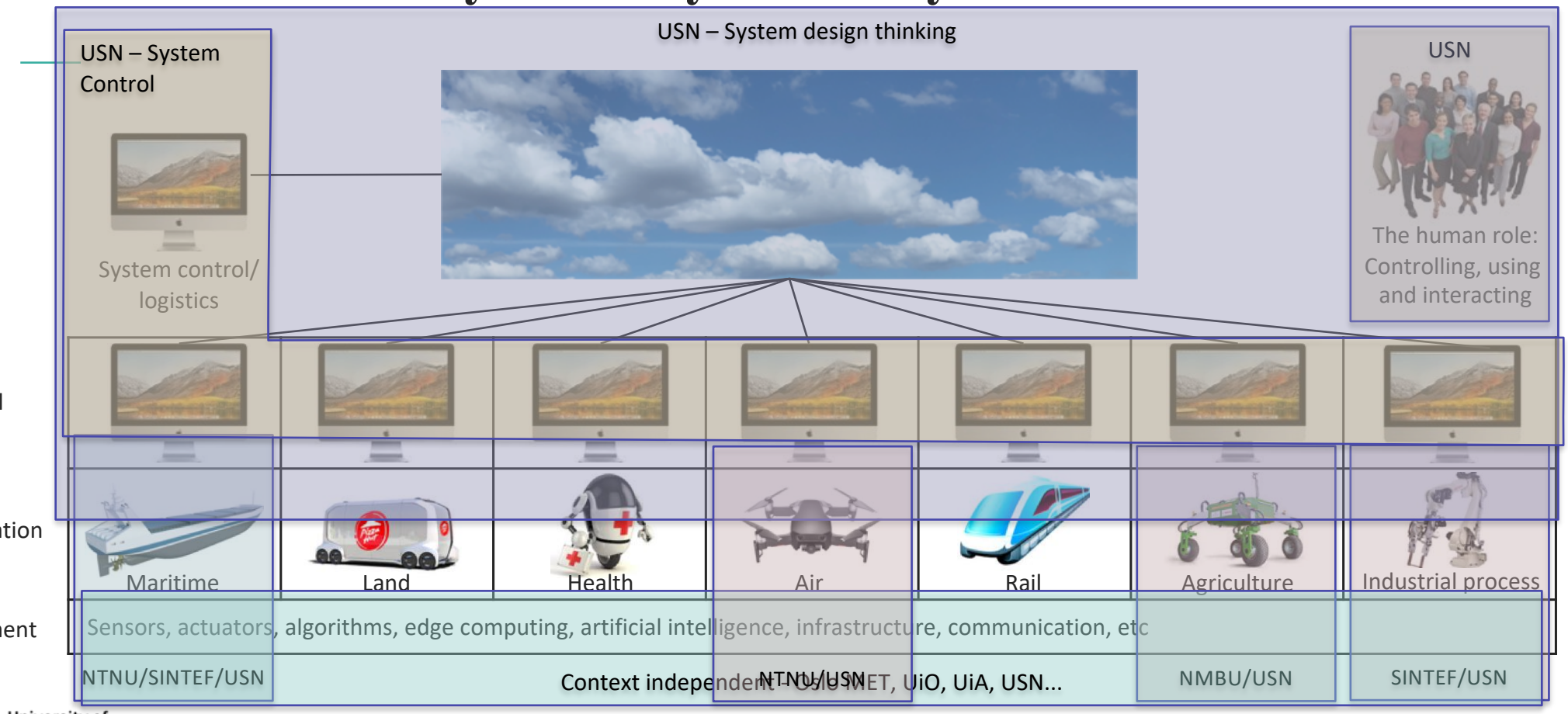
- For the industry and their future competence need
- Help them to SUCCEED in mastering AUTONOMOUS SYSTEMS

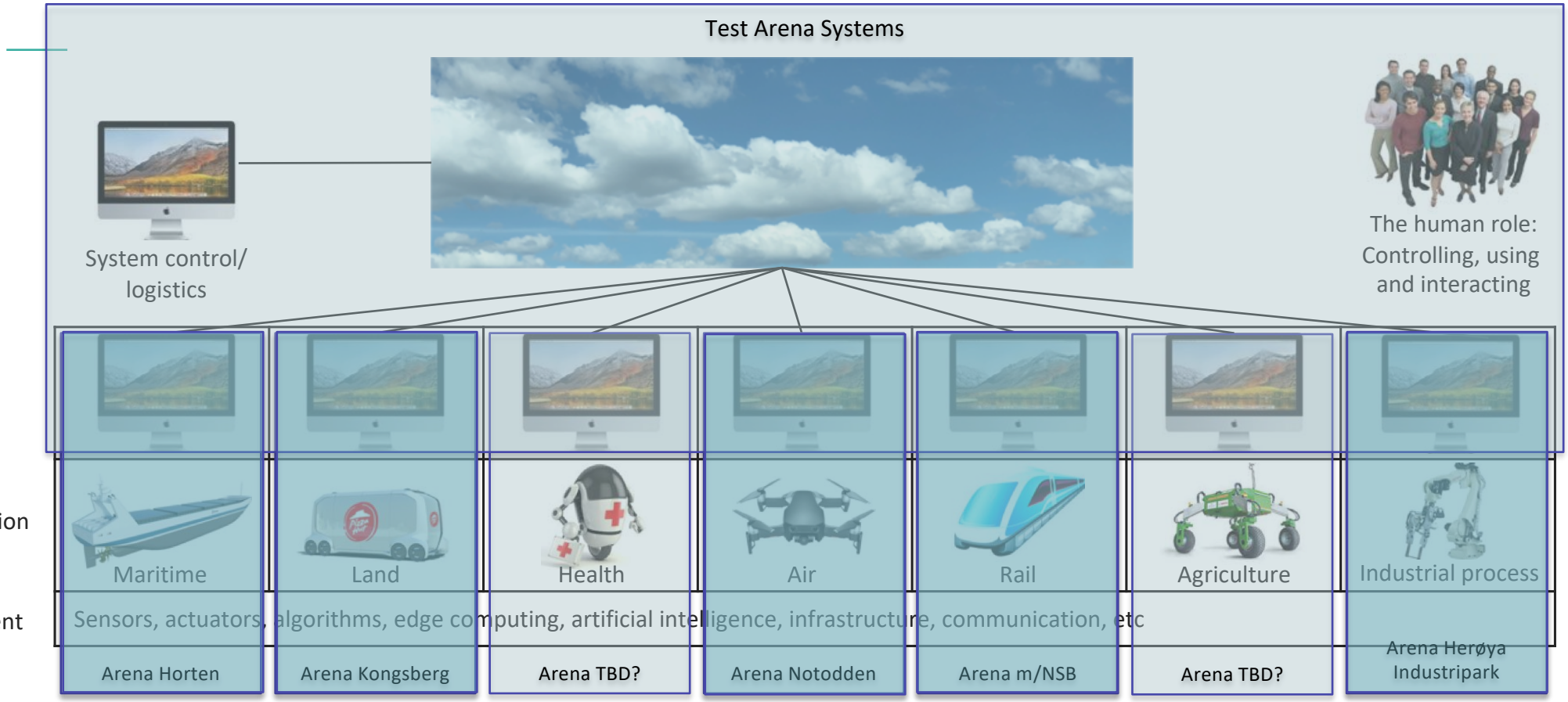
Our solution together with the industry partners:

- Develop competence, build capacity and convey though education and courses
- Develop tools and infrastructure for development, test and verification (test arenas)
- Develop research projects with the best of the industry
- Established SAMS Cluster – Sustainable Autonomous Mobility Systems with the industry
- All-in-all: Develop complete innovation system to help the industry and startups

The autonomous system – system of systems



Autonomous test arenas



Sub projects and cross competence focus

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	 Maritime	 Land	 Health	 Air	 Rail	 Agriculture	 Industrial
Logistics and multi modal operations							
Machine Learning and Smart Sensors							
Systems and Security							
Human Aspects in Autonomous Systems							
Business Development, Entrepreneurship and Innovation							

Goals of AUTOSTRIP

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- Understand and communicate with the industry
- Become more adaptable to external needs
- Develop the areas where we can play an important role
- Manifest the value of the research and the collaboration with the industry through
  - Relevant research projects with the best in the industry
  - Growth in the resource capacity to meet external demand
  - Portfolio of research projects of 30+ MNOK per year by 2023
- Develop new curriculums based on need
- Anchor USN as central actor in a national

Curriculum development

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- Changed B.Sc. program Cyber Security (start 2020) – refurbished course adapted to industrial demands
- Extended M.Sc. Computer Science with specialisation in Cyber Security (start 2020)
- Extended M.Sc. IT Management with specialisation in Entrepreneurship (start 2020)
- New M.Sc. Autonomous Systems, start 2021
- Interesting subjects will be made available to the industry as short courses

University of Southeast Norway

AUTOSTRIP projects

Related research applications 2018

www.autostrip.no

Prosjekt	Eier	Partnere	Status
IPN (NFR): «SAM - Self adapting model-based system for process autonomy – using data-based modelling and advanced sensors»	Bilfinger	Yara, Eramet, Hydro, Boliden Odda, Elkem, REC Solar, Equinor, Sintef Industry, Sintef Digital, og USN	Tildelt
Pilot-T (NFR): «Autonomous Mobility Enabler	Applied Autonomy	USN, Telenor, Herøya Industripark++	Tildelt, men Applied Autonomy trakk søknaden
Pilot-T (NFR): «Autonom Sundbåt i Kristiansund»	Maritime Robotics	Kristiansund Kommune, Henriksen Mek, USN++	Tildelt
Pilot-T (NFR): Miljøteknologiprosjekt «Unmanned Air Traffic System»	Indra	USN, Luftfartstilsynet, ASC, HungaroControl++	Tildelt (under annet IN program)
MAROFF (NFR): TSEBI - Transforming Shipping through Ecosystem Bus mod Innovation	Kongsberg Maritime	KDI, USN++	Godkjent

Related research applications 2019

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Prosjekt	Eier	Partnere	Status
IPN (NFR): Ole 4 – Autonom passasjerferge - IPOFFENTLIG	Tønsberg Kommune	Maritime Robotics, USN, ++	Innsendt. Beslutning Q1 2020
IPN (NFR): Autonom søppelsamler – IPNÆRINGSLIV	SpillTech	Maritime Robotics, USN++	Avslag
IPN (NFR): Smart Condition Monitoring – IPNÆRINGSLIV	Kongsberg Maritime Subsea	USN++	Tildelt
Pilot-T (NFR): Trygghetsmetodikk for satellittbasert landingssystem for fly	Indra	USN	Tildelt
SFI: DigiPro - Centre for digitalisation of process industries"	SINTEF	USN, UiA	Søknad sendt

Projects: National project– «Water shuttle»

AUTO STRIP
www.autostrip.no

- Co-operation project with SAMS, Nordic Edge, Maritime Cleantech, NTNU and USN
- USN is lead on project
- Market on small ferries is historically owned by small local suppliers
- Large suppliers avoid this market (new market, new product)
- Developing a national developing project together with suppliers and communities (17 so far in Norway)
- Goal is complete Norwegian delivery of system, infrastructure and services
- Market Northern Europe approx 2000 ferry crossings (current operating small passenger/bisycle ferries, crossing < 500m)
- Autonomous fery market about 4 times this size
- Market size 100+ Mrd

Water Shuttle example
Water Shuttle: Ole 4

- Ferry to replace current ferry
- 100m crossing in high traffic area
- USN running a risk analysis project
- 8,8% incidents when other vessels present

Way forward

- Established national cooperation project
- 20 Norwegian cities interested
- 1.500 ferries identified in northern Europe

Risk analysis water shuttle

- 279 registered incidents from 4802 crossings (5.8%)
- 1650 crossings without any other vessels present
- Totally 6.225 passengers (average = 1.3 passengers per crossing)

Probability of collision (subjective categories)

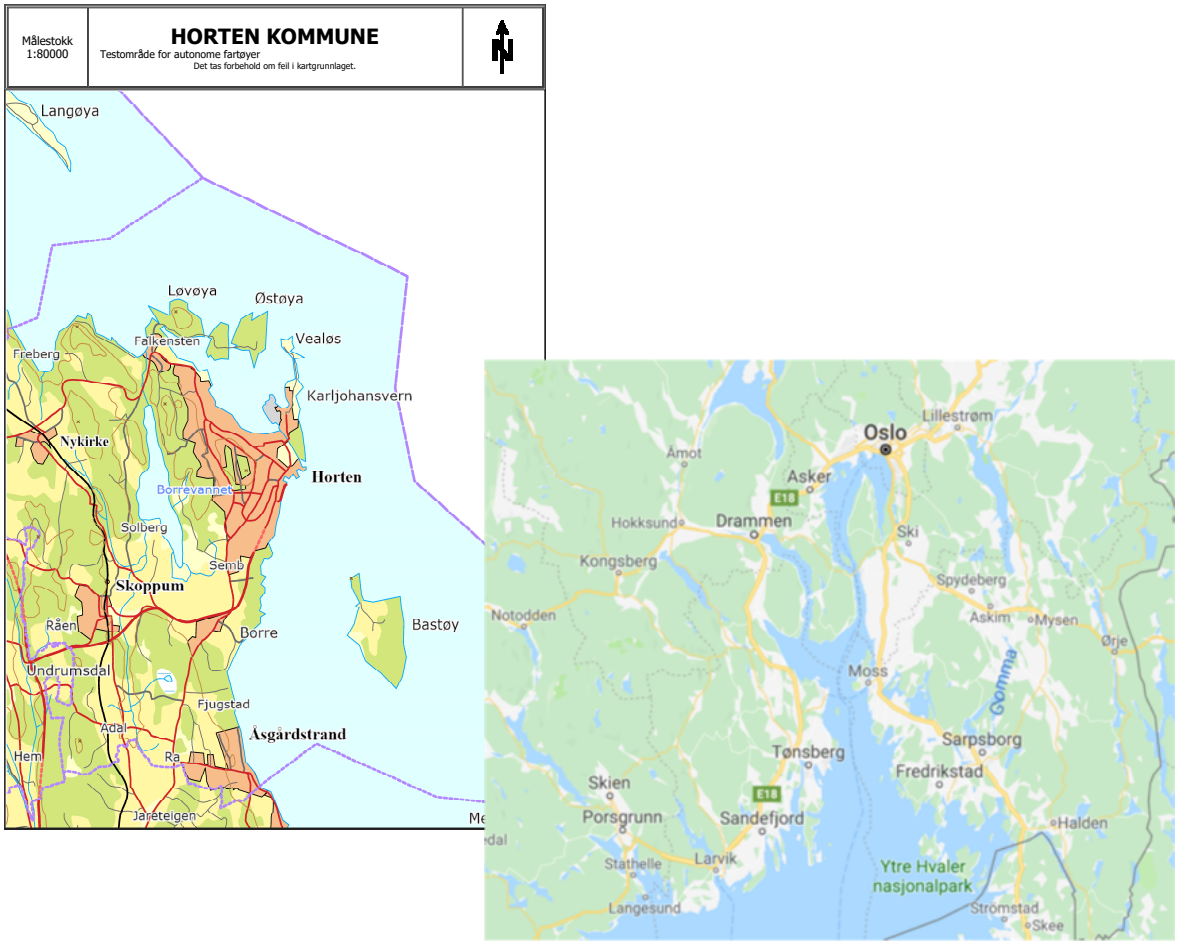
Consequence	Passengers	No other vessels	Normal	Deviation	Dangerous	Critical	Total
	10 to 12	7	9	0	0	0	16
	7 to 9	14	42	3	0	0	59
	3 to 6	200	442	35	6	2	685
	1 to 2	741	1294	97	15	7	2154
	0	688	1086	93	18	3	1888
	Total	1650	2873				
		4523		228	39	12	4802

High	18	0.4 %
Moderate	33	0.7 %
Low	228	4.7 %
Negligible	4523	94.2 %

MASS Test Arena Horten

MASS Test Arena Horten

- One of 3 MASS test arenas in Norway together with Trondheim and Ålesund
- High traffic area, especially by leisure boats
- USN i heading a national cooperation to develop a closer cooperation between the three test areas



Learnings from the process

- Academic institutions (generalised)
  - are not adapted to quick hiring of resources
  - are very funding and task oriented
  - stimuli through funding and resources is crucial
  - easier to get backing for projects initiated internally than externally
  - has a low willingness to change – change will come – but slowly – be patient
- Top management backing is essential
- Patience and a positive attitude helps
- You can never coordinate and discuss too much…
- It is actually about non profit business development and professionalising of an academic institution

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Ongoing activities in Test Arena Horten

The HUGIN Story

25 Years of collaoration, development and success

DEVELOPMENT

HUGIN was developed in partnership with FFI, Statoil and the Royal Norwegian Navy. The first dive was in May 1993.

DEPLOYMENT

HUGINs have been deployed all around the globe, covering more than 1 million line kilometres of survey.

COLLABORATION

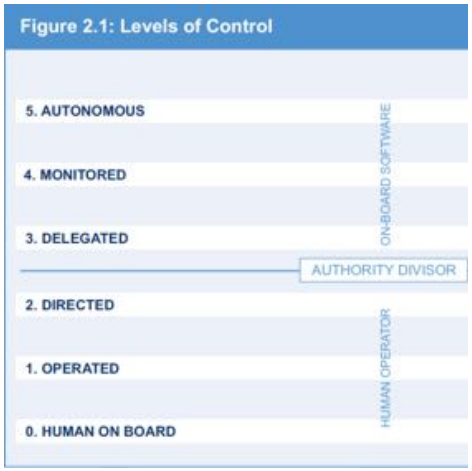
We work with our customers to increase productivity, including sending personnel to assist with operations.

EVOLUTION

Our AUVs are continually changing with new payload sensors, processing and in-mission autonomy.

Unmanned Surface Vehicle

Deploying Kongsberg Autonomy on Unmanned Surface Vehicles



K-MATE

K-MATE is the controlling software that enables the safe and efficient autonomous operation of USVs

DEVELOPMENT

Working in conjunction with FFI (The Norwegian Defence Research Establishment) we have devloped advanced autonomy for USV

NEAR-SHORE

The Norsafe team have designed a USV for shallow water and near-shore use, controlled by K-MATE and equipped with KM sensor packages

TRANS-OCEAN

SEA-KIT has been developed by Hushcraft Ltd, GEBCO and the Nippon Foundation. It is controlled by K-MATE and equipped with KM sensor packages

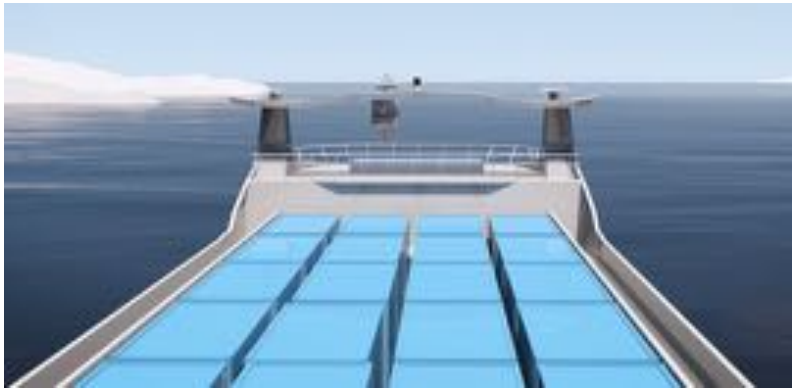
KONGSBERG

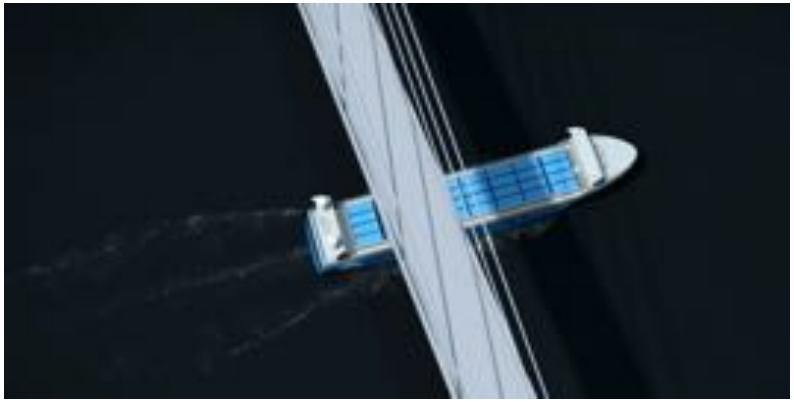
Kongsberg Maritime
Yara Birkeland

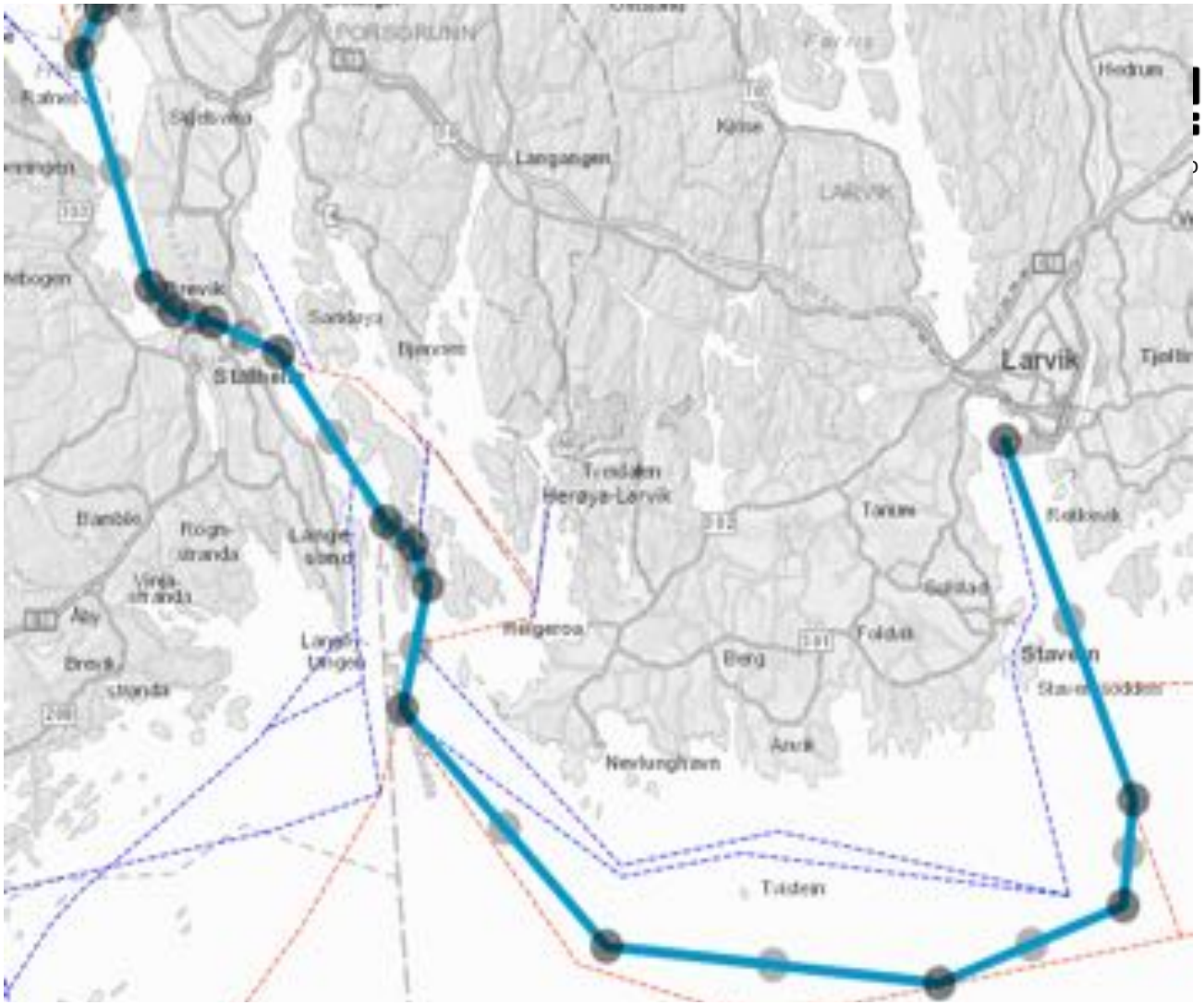
AUTOSTRIP
www.autostrip.no

- Customer: Yara Birkeland AS
- Area: Porsgrunn – Brevik - Larvik
- Saves 50.000 travels with trucks per year
- In operation Q1 2020
- Autonomous operation 2022-
- Fully autonomous logistics chain on land
- Has available capacity

Yara Birkeland







Kongsberg Maritime
ASKO project

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- Customer: ASKO – Norway´s largest grocery logistics company
- Area: Moss – Holmestrand
- Saves 2,4 mill km per year with trucks
- In operation 2022
- Autonomous operation 2024-

Kongsberg Maritime
Bastø Fosen

- Crossing Horten - Moss
- Retrofit of existing ferry
- Auto dock/cross functionality

FFI

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