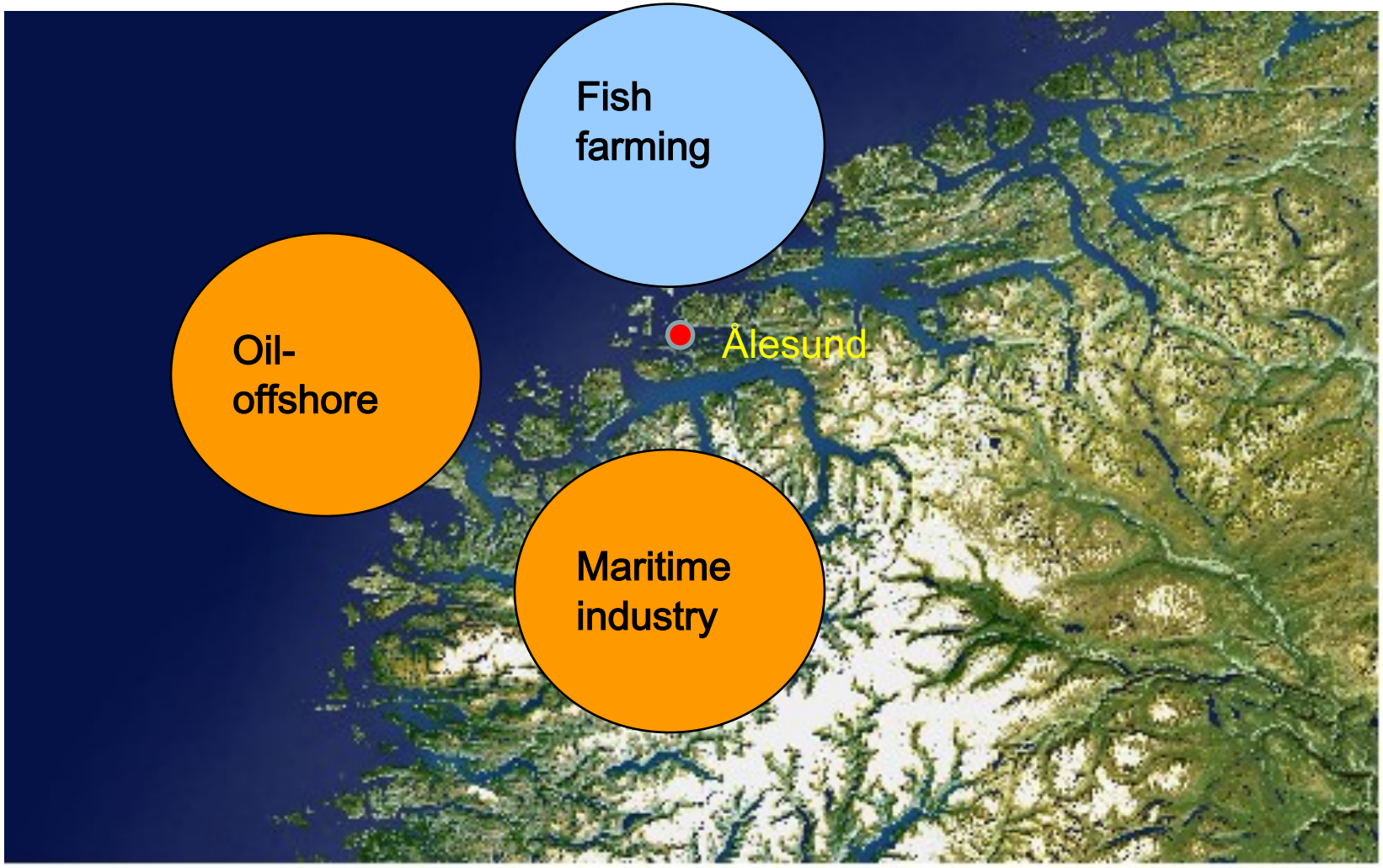
FedCSIS 2012:
Wroclaw, Poland 9-12 Sept., 2012

Multi-Angents in Virtual Regional landscapes

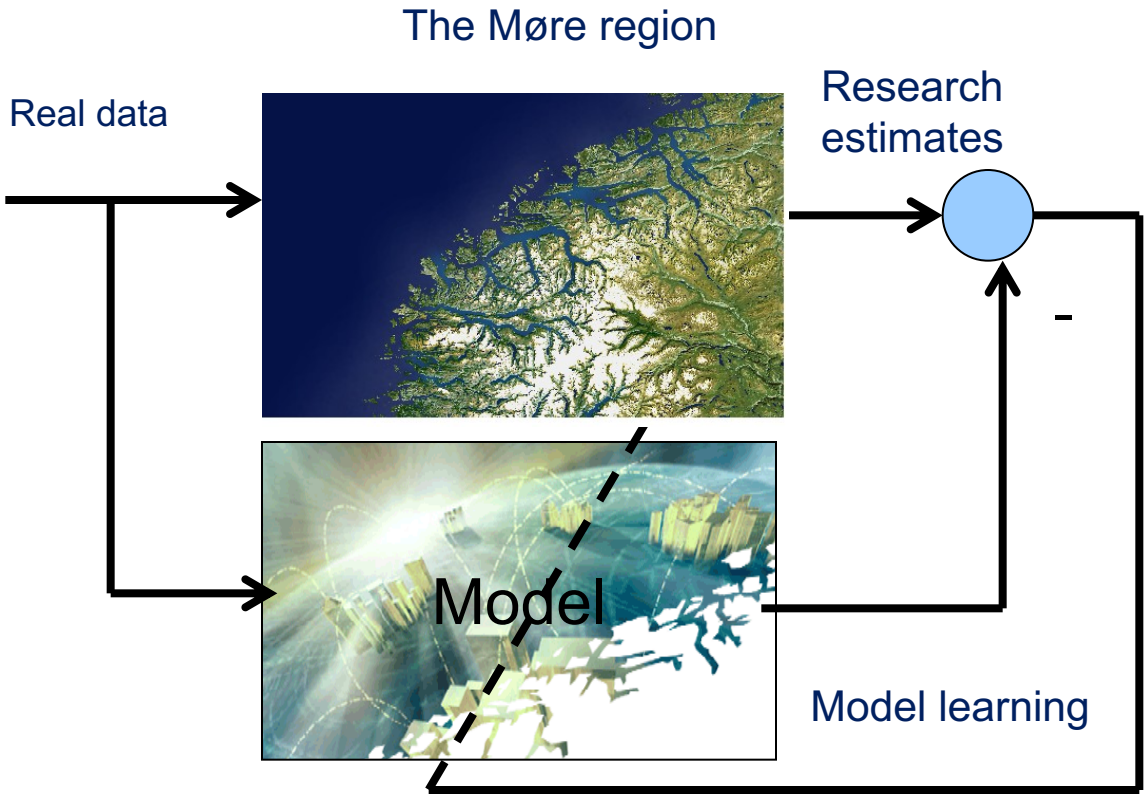
Prof. Harald Yndestad

HØGSKOLEN
I ÅLESUND
Aalesund University College

The More Region in Norway



The Virtual Møre



The goal

1. Simulation and visualization and 3D maps as a research tool

2. Adaptive modells for simulering og visualisering

The Ålesund city

HØGSKOLEN I ÅLESUND

Simple roads and houses

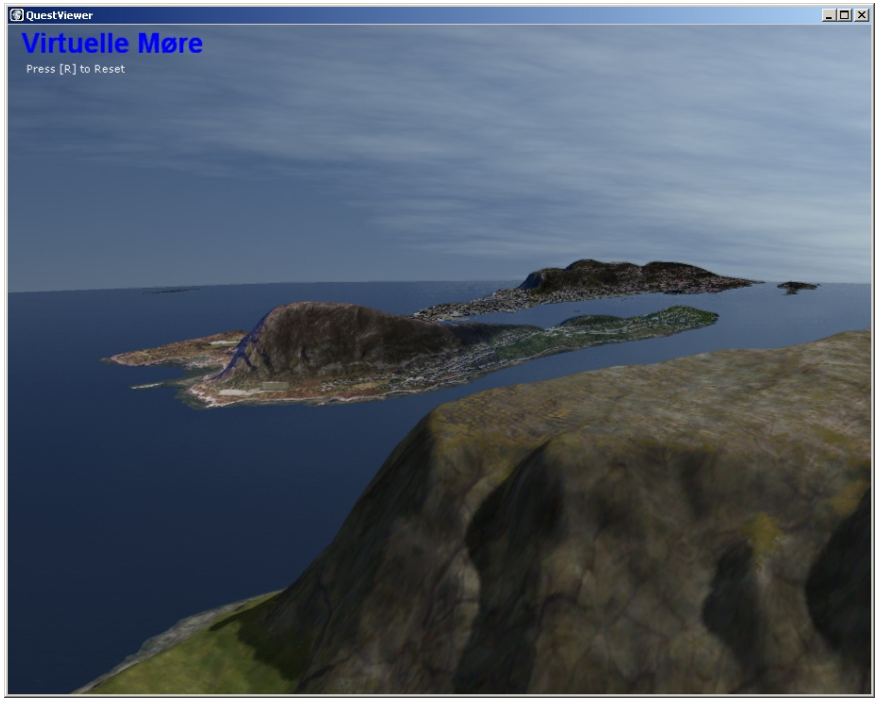
The Virtual Ålesund

Nice houses in the city

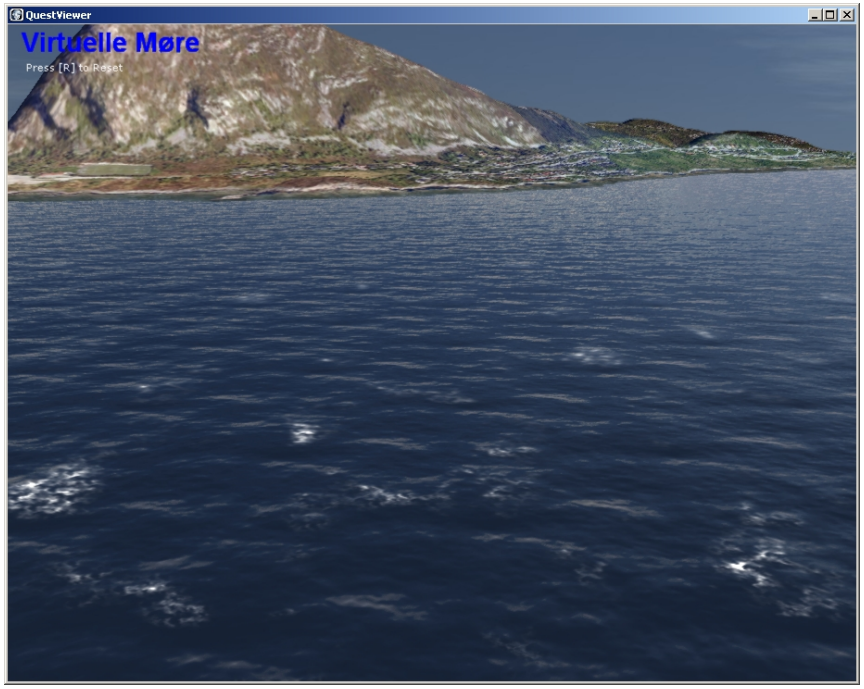
The Virtual Ålesund region

Nice sea and nice mountains

HØGSKOLEN I ÅLESUND



15 x 15 km model



Introduceing a game engine

The beginning of large terrains

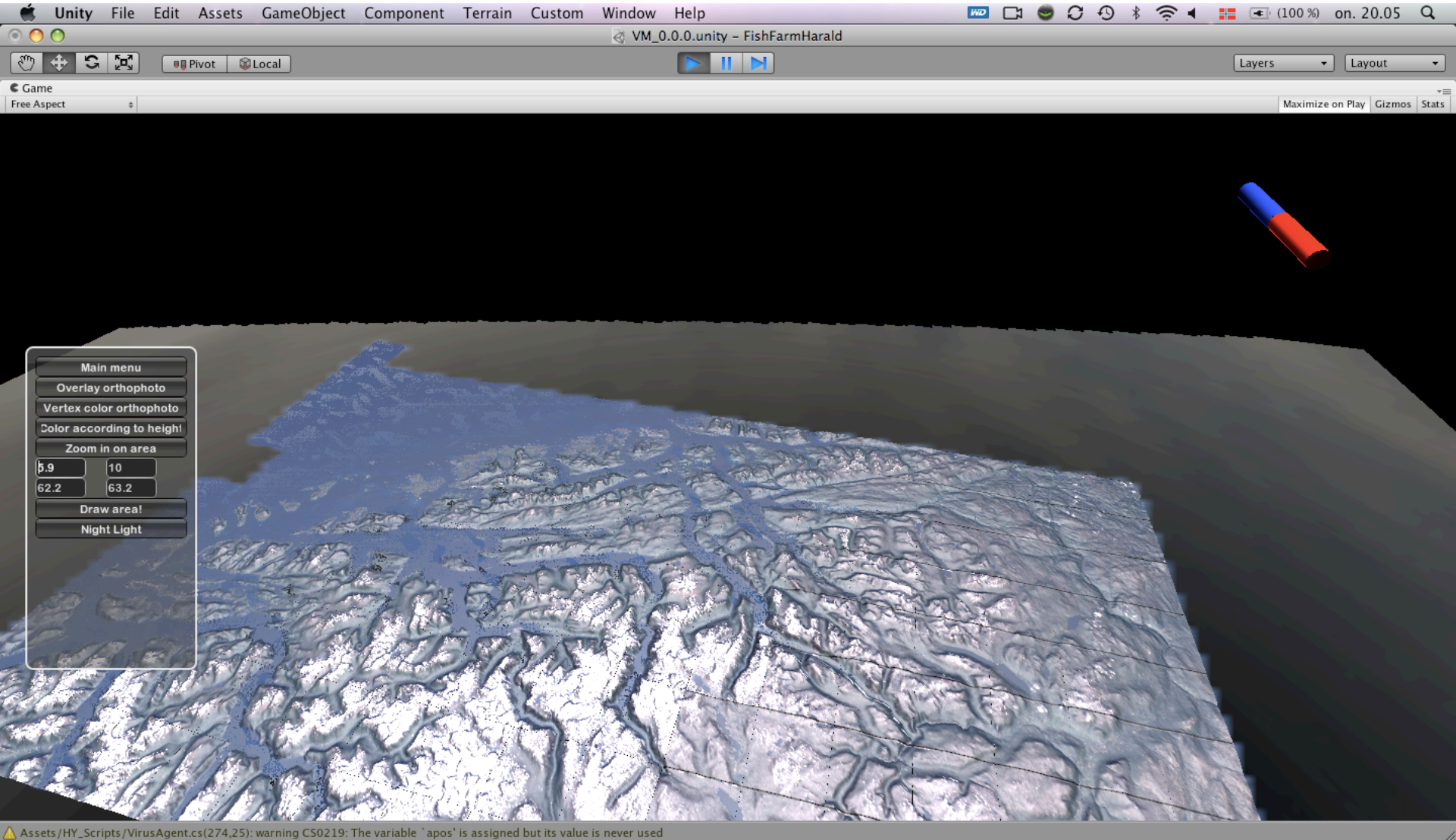
The beginning of visual agents on 3D terrains

The Virtual Møre region

The Landscape: GPS based 3D map

HØGSKOLEN I ÅLESUND

GPS-basert: +/- 10 cm



Simulation paradigm transform

HØGSKOLEN I ÅLESUND

From system dynamics, to individual dynamics

To a sum of individual models, based on free will

Virtual More as a generic concept:

1 Everything is Agent or landscapes
2 Adaptive Agents in landscapes
3 Social agents learning
4 Evolution agents learning
5 Time variant landscapes
6 Abstract landscapes as cost functions
7 Complex systems dynamics
8 Systems of systems

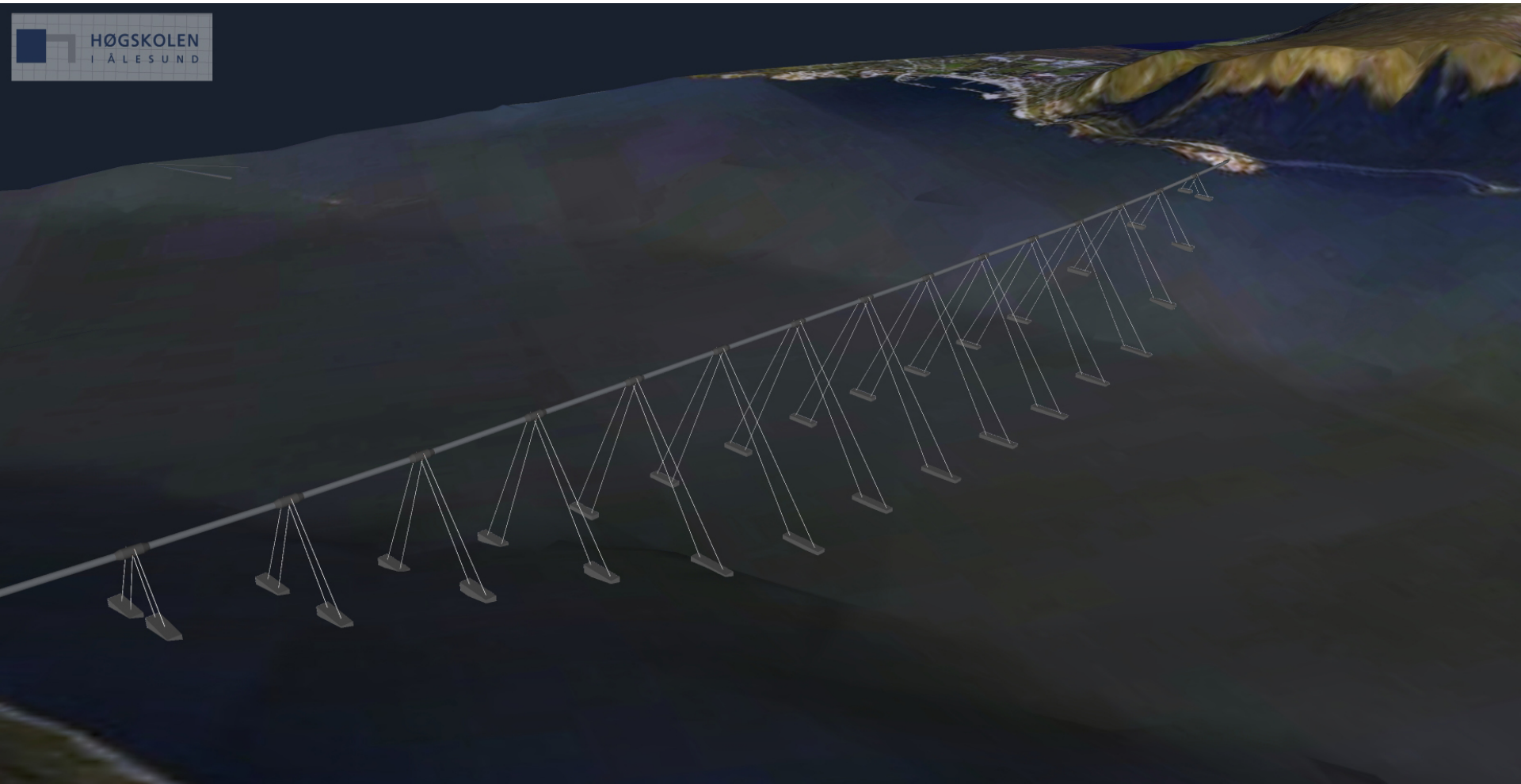
Needs a generic concept

Car agents in action

HØGSKOLEN I ÅLESUND

A car agent crossing an Norwegian fjord in a virtual tube tunnel

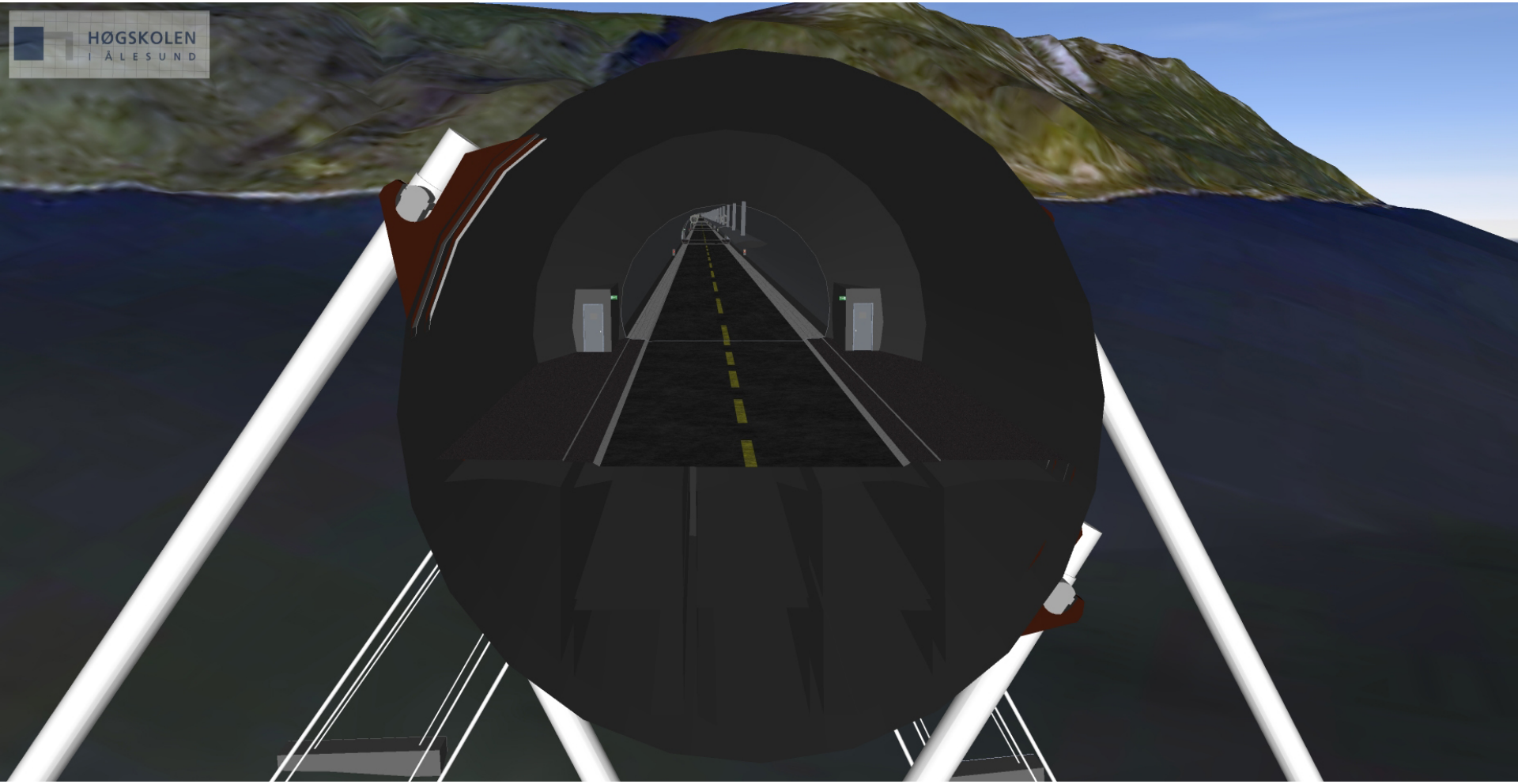
Camera on care agents, moving in a tube tunnel



Car agents in a tube tunnel

A car as and agent, carries a camera

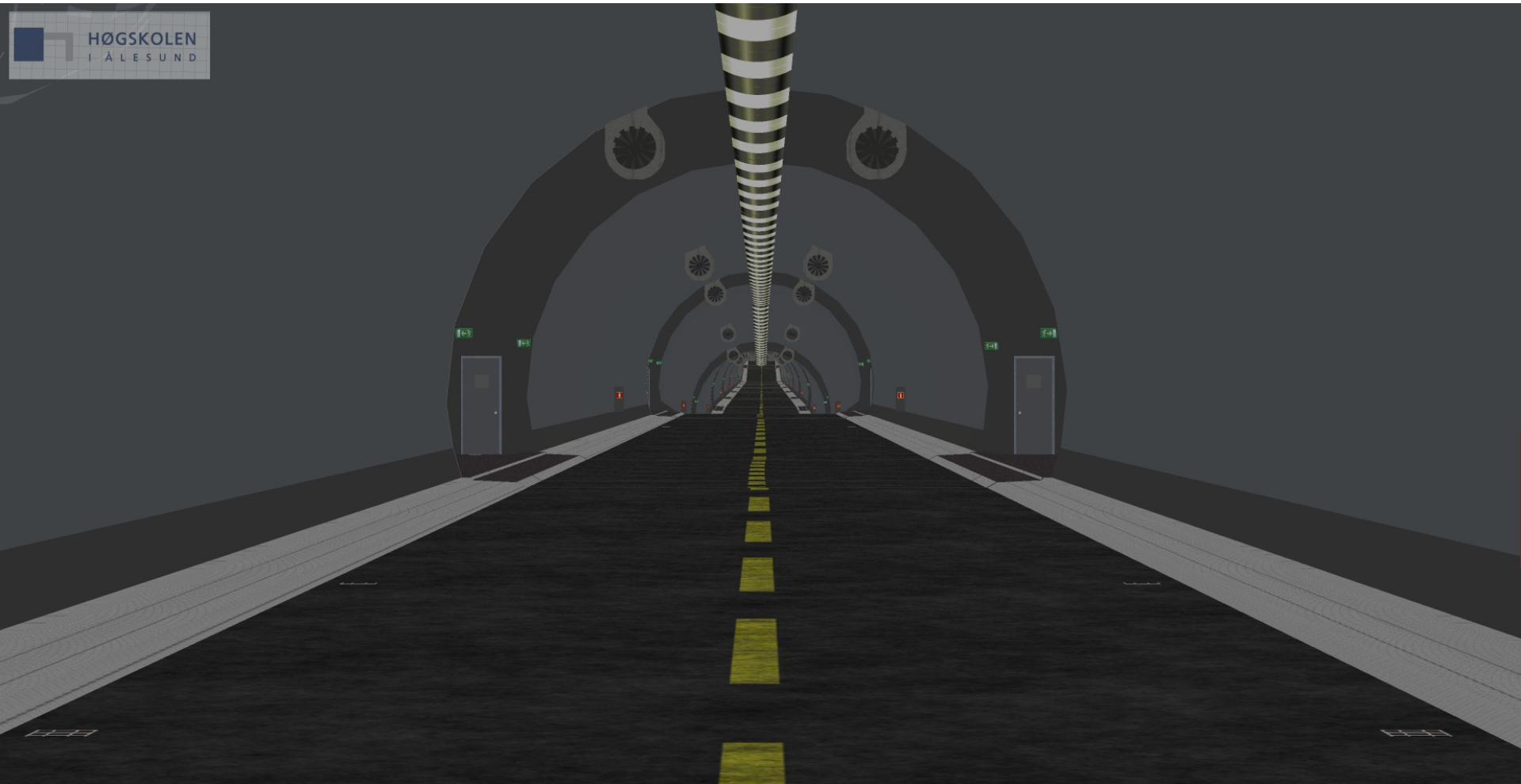
HØGSKOLEN I ÅLESUND



Car agents in a tube tunnel

A car as and agent, carries a camera

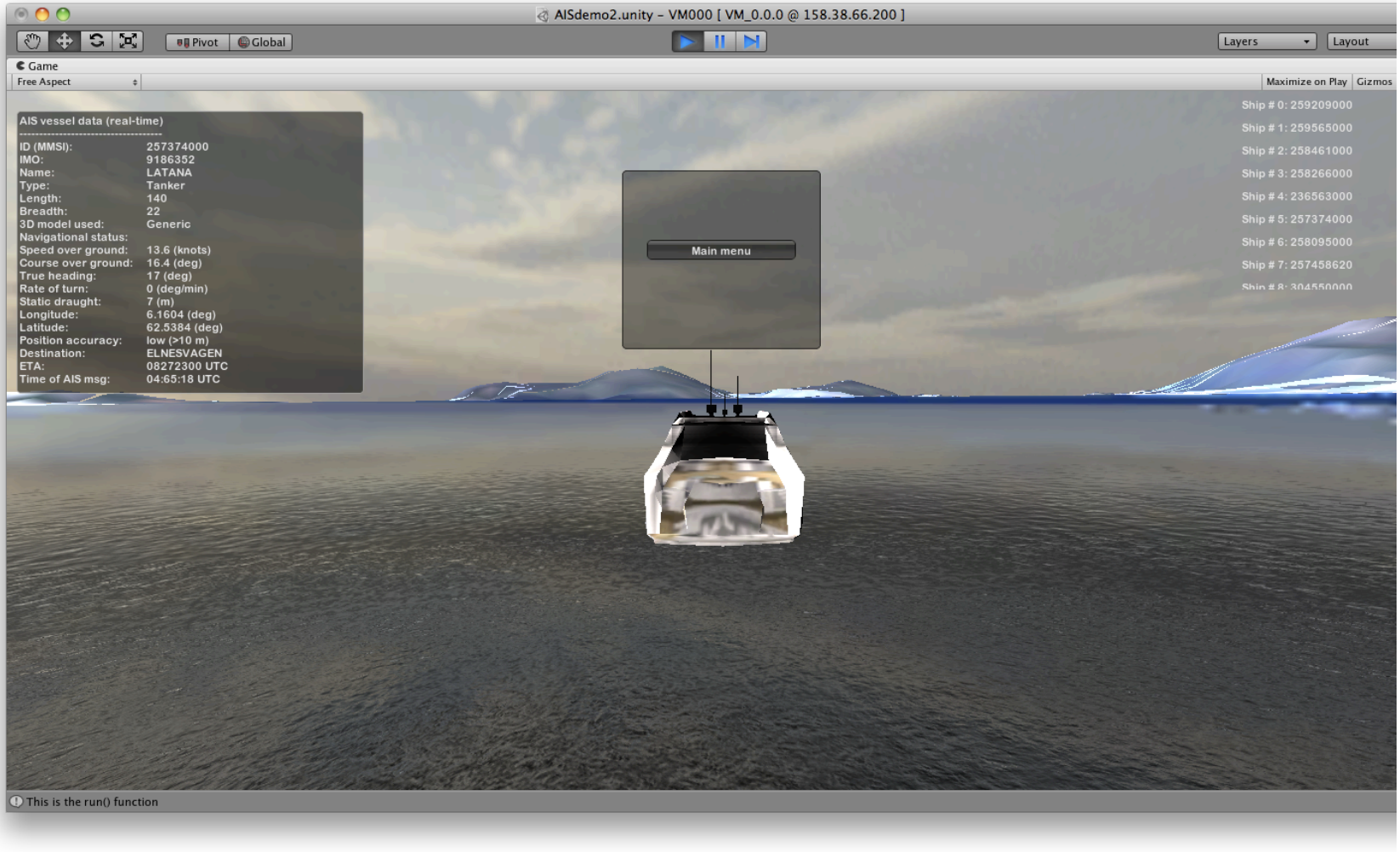
HØGSKOLEN I ÅLESUND



Ship agents in action

HØGSKOLEN I ÅLESUND

Optimum: speed, road map, energy, cost, safety, service, in real time

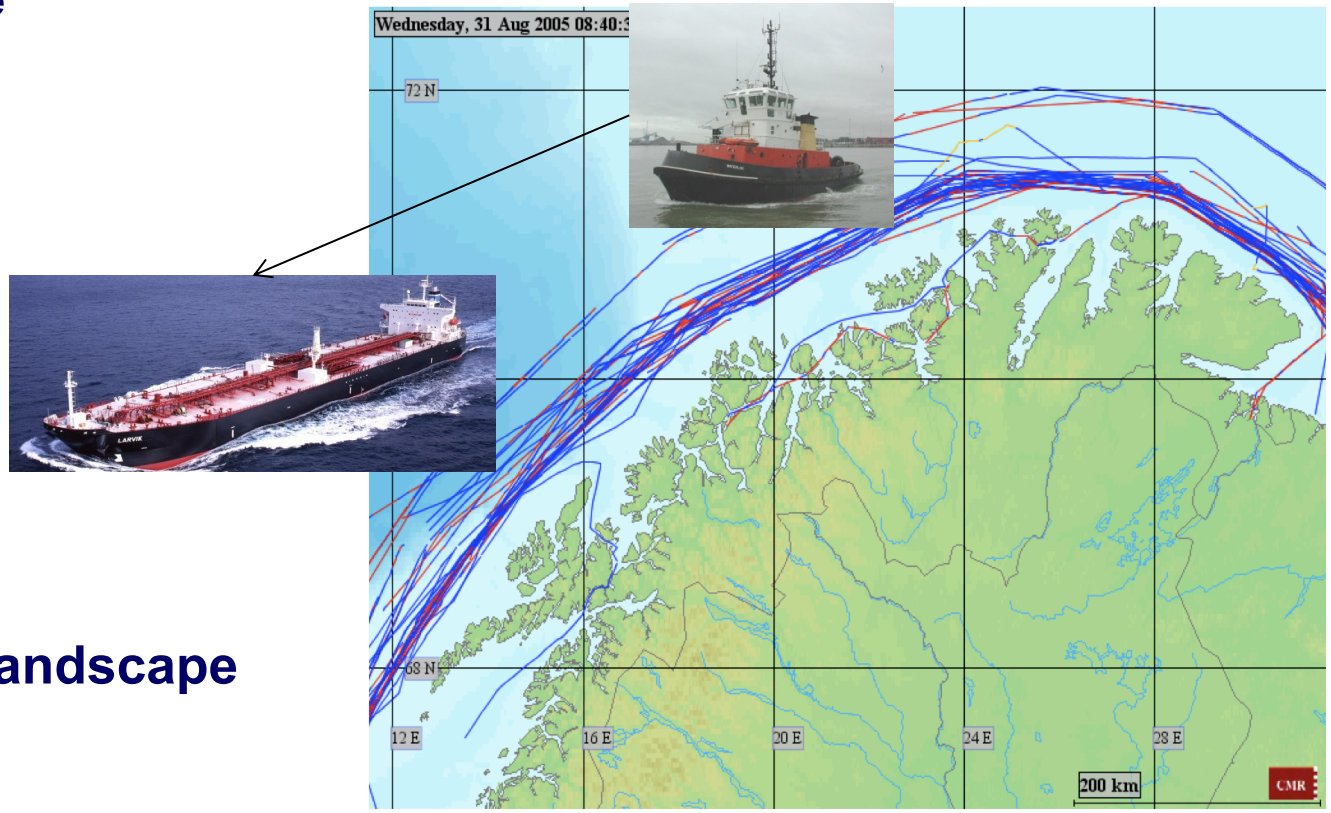


Ship agents in action

Ship agents computes the optimum Tanker-Tug position

HØGSKOLEN I ÅLESUND

Oil tanker is a risk at the Norwegian coastline



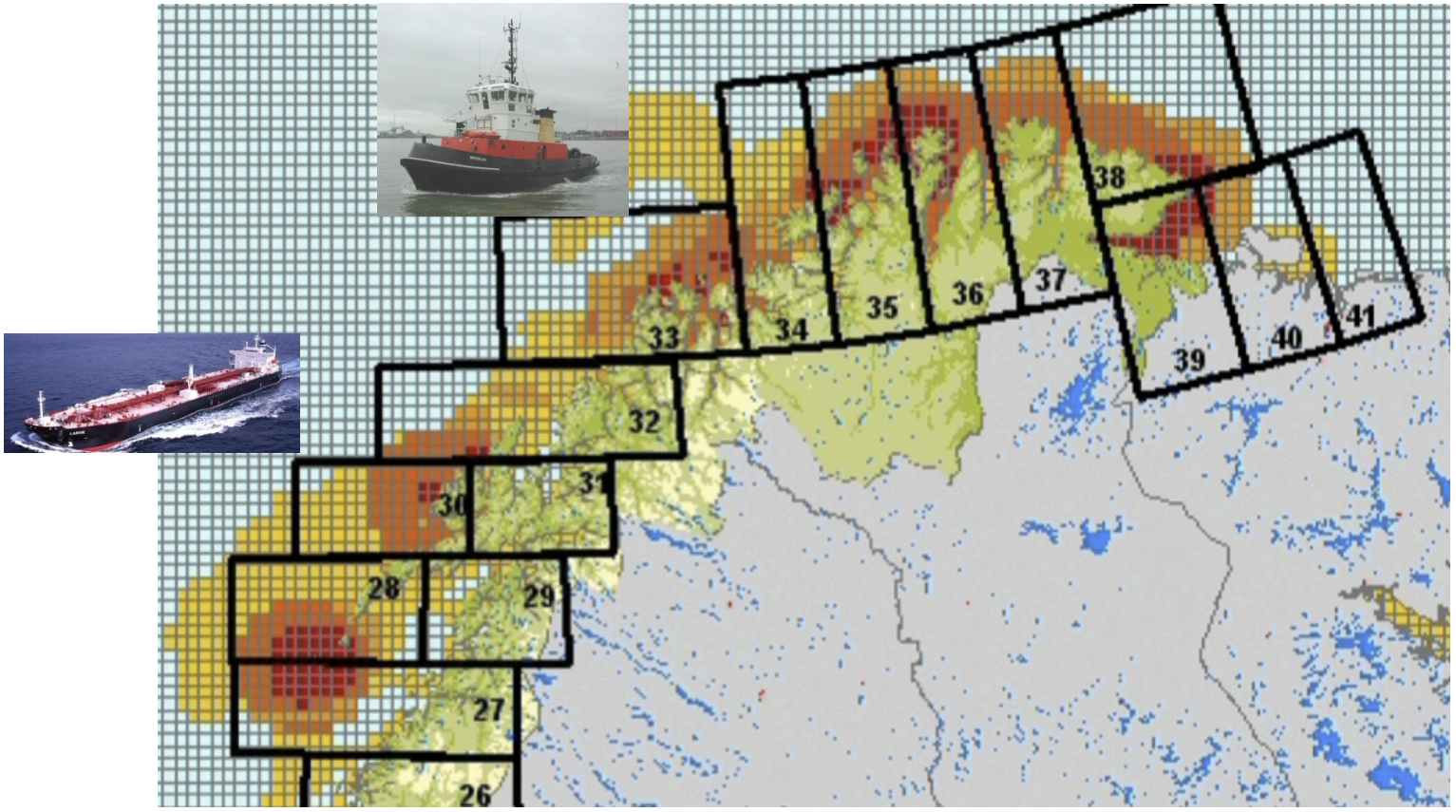
Case Stationary landscape

A general solution

Ship agents in action

Ship agents computes the optimum Tanker-Tug position

Case: Time variant landscape



A position dependent solution

The agent has to recompute an optimum solution

Multi-Agents as fish farmers

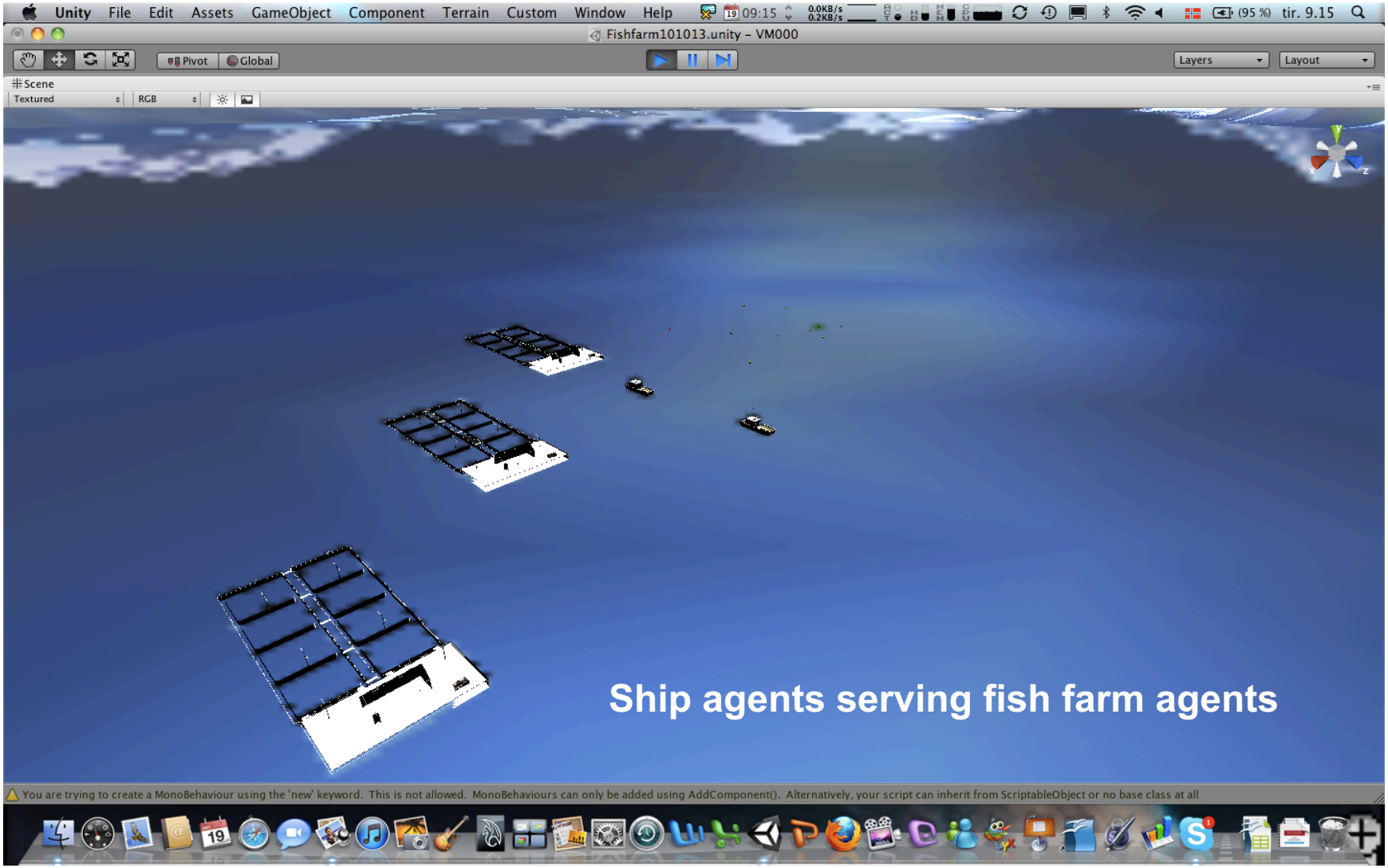
HØGSKOLEN I ÅLESUND

System of systems: A swarm of fish farms in Norwegian fjords

Multi-Agents as fish farmers

HØGSKOLEN I ÅLESUND

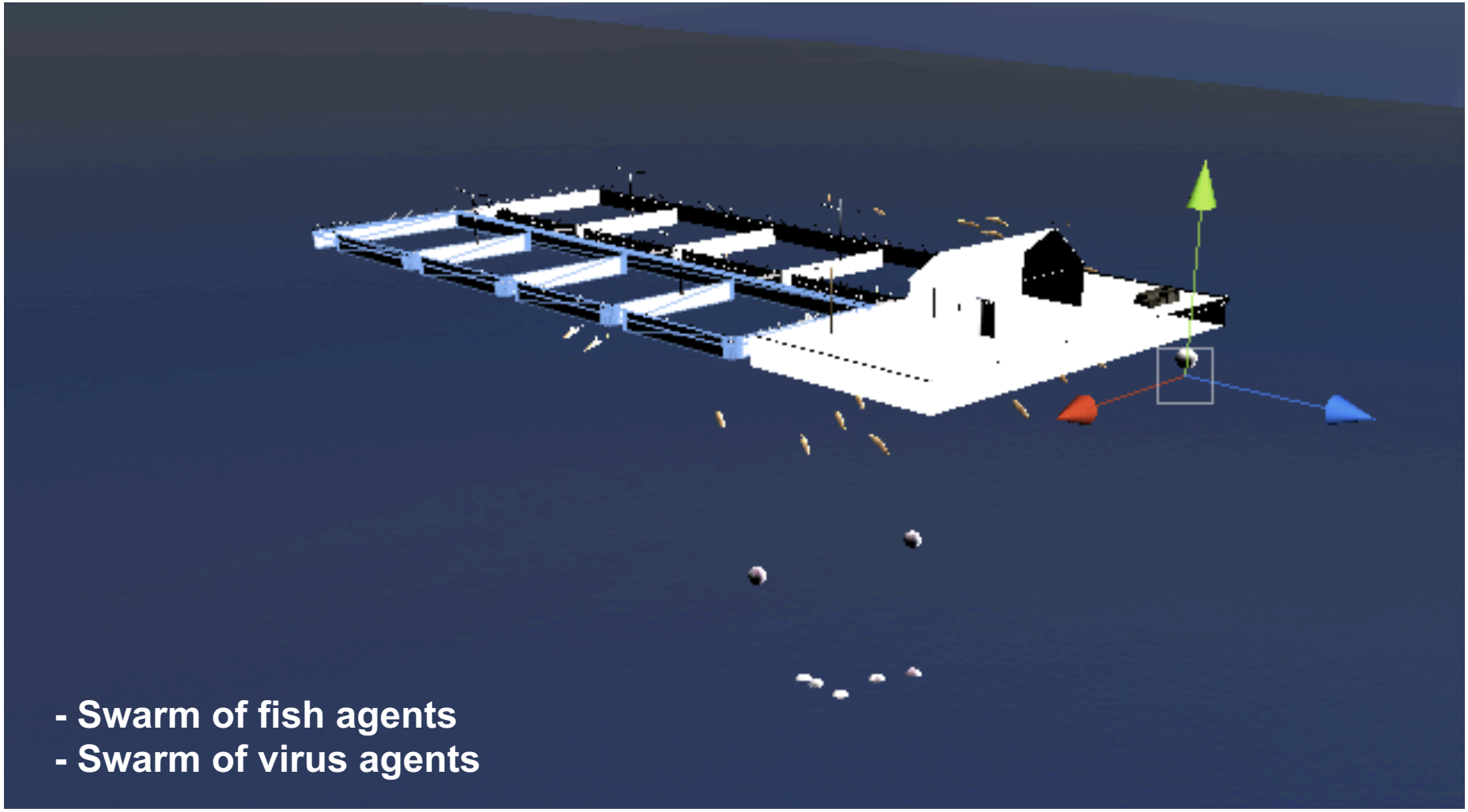
Horizontal integration: Fish farm agents and ship agents



Multi-Agents as fish farmers

HØGSKOLEN I ÅLESUND

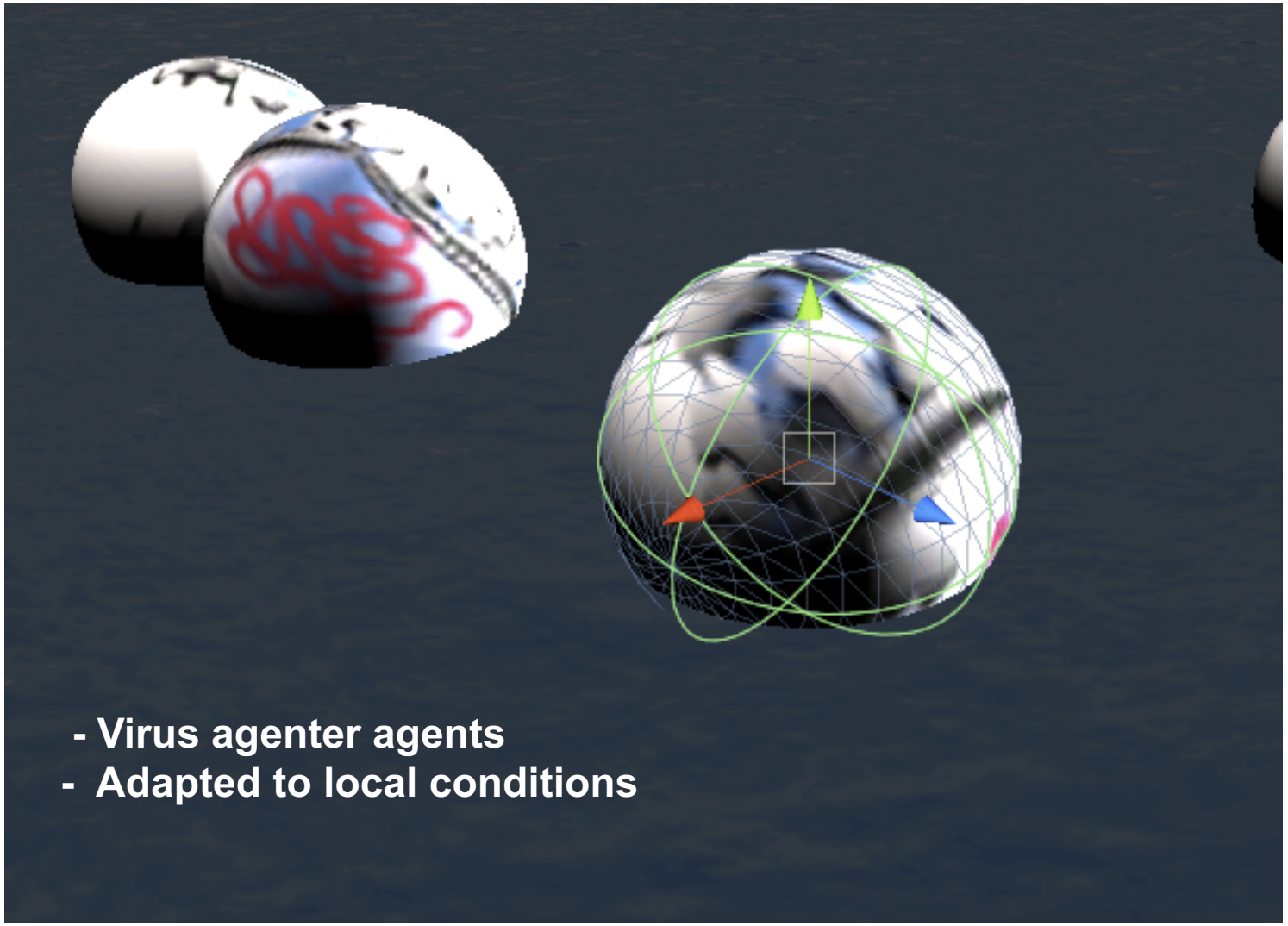
System of systems: Fsh farm agents, fish agents and virus agents



Multi-Agents as fish farmers

HØGSKOLEN I ÅLESUND

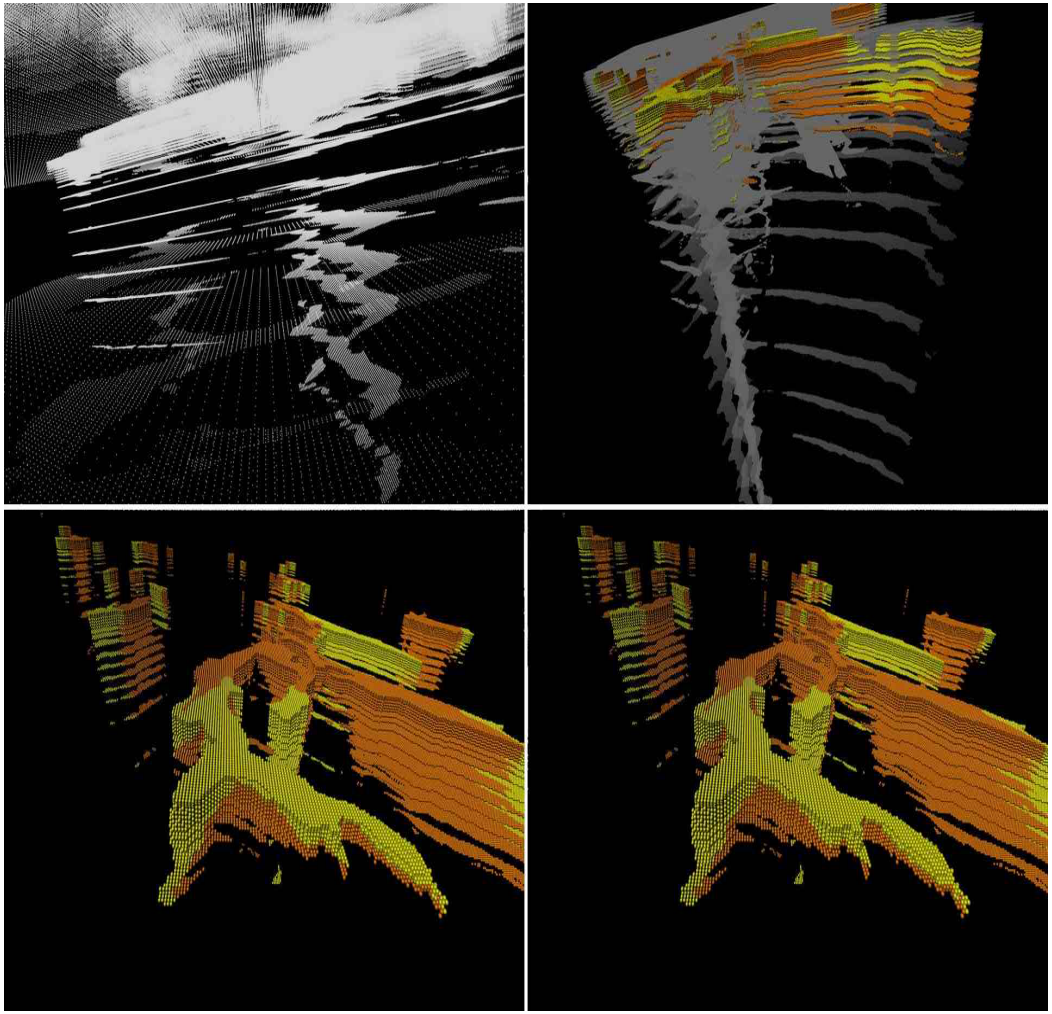
Systems to landscape: Virus agents are related to an ocean system



Ocean currents is landscapes

HØGSKOLEN I ÅLESUND

Systems of landscapes: Active virus agents behave different at different temperatures and salinity in the sea

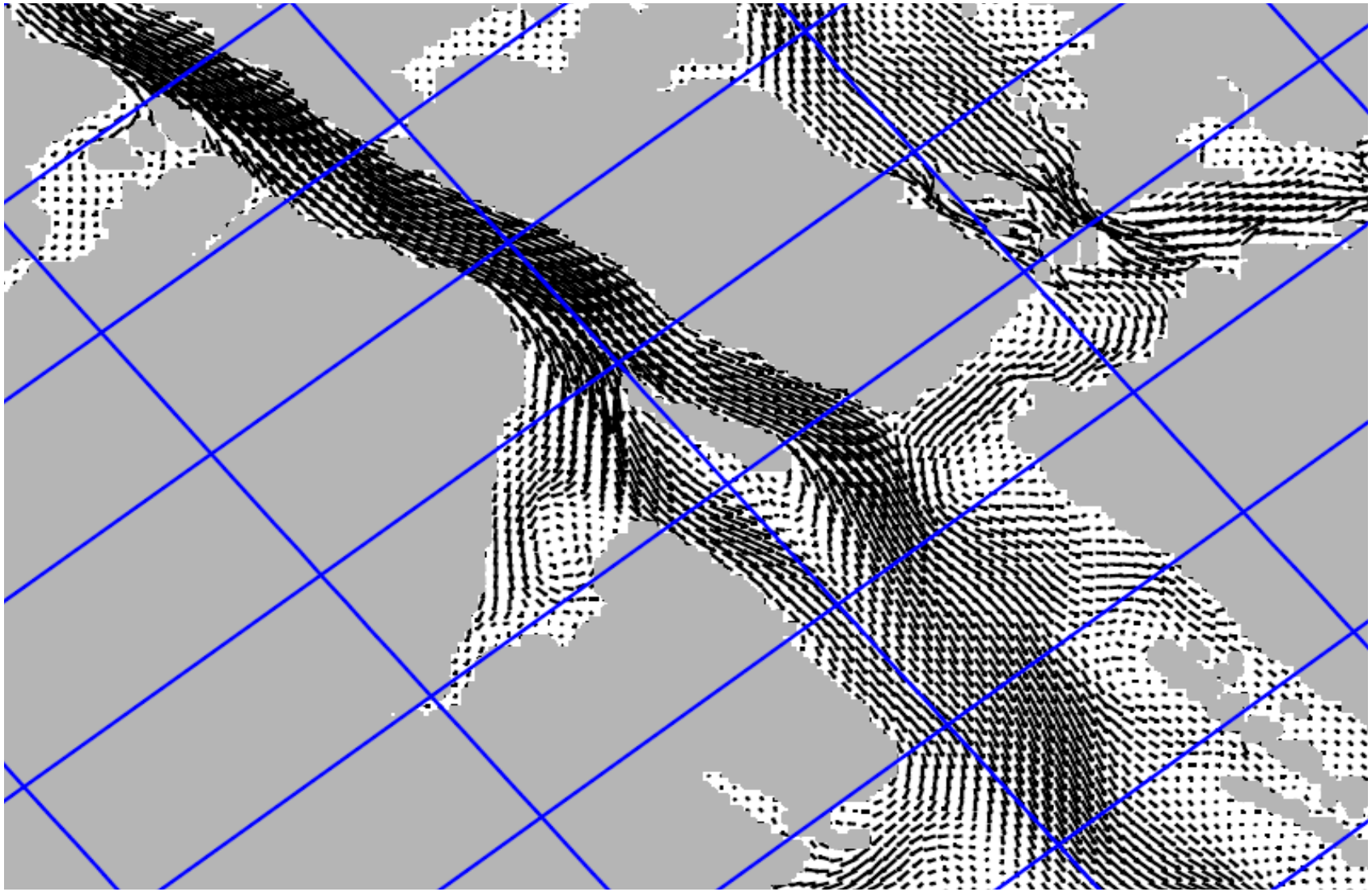


Temperatures are landscapes
Actice virus agents in landscape

Ocean currents is landscapes

HØGSKOLEN I ÅLESUND

System of systems: Virus swarm paints produces landscapes



What bringing life to agents?

HØGSKOLEN I ÅLESUND

As a summery

Landscapes

Generic Agents and landscapes concept

1 Everything is Agent or landscapes
2 Adaptive Agents in landscapes
3 Social agents learning
4 Evolution agents learning
5 Time variant landscapes
6 Abstract landscapes as cost functions
7 Complex systems dynamics
8 Systems of systems

Cost function landscapes
Oceanographic landscape
Climate landscape model
Tide model
Terrain landscape
Astronomy model

Future challanges

HØGSKOLEN I ÅLESUND

Next Virtual More :

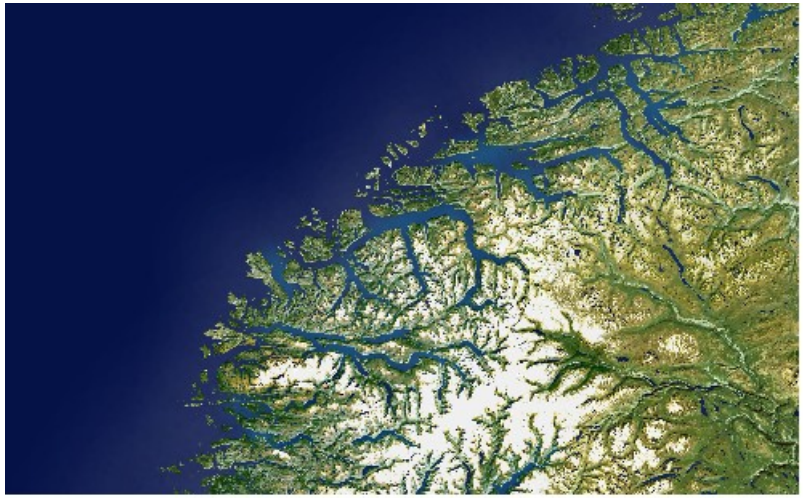
1 Big agent swarms > 1 million
2 Parallel computing
3 Generic agent modeling
4 Time variant landscapes
5 Abstract landscapes as cost functions
6 Complex systems dynamics

Thank you

More information?
You will find me, at the end of the rainbow

http://ansatte.hials.no/hy/

3D terrain model challenges



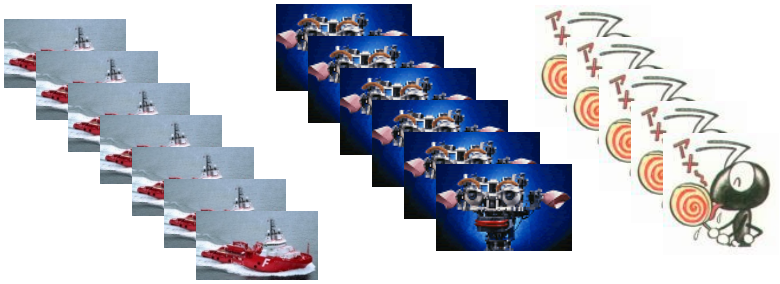
1. Integration of large 3D terrain and sea maps
2. Position resolution and accuracy
3. Communication between 3D maps and agents
4. Computer capacity

The Map as a research arena

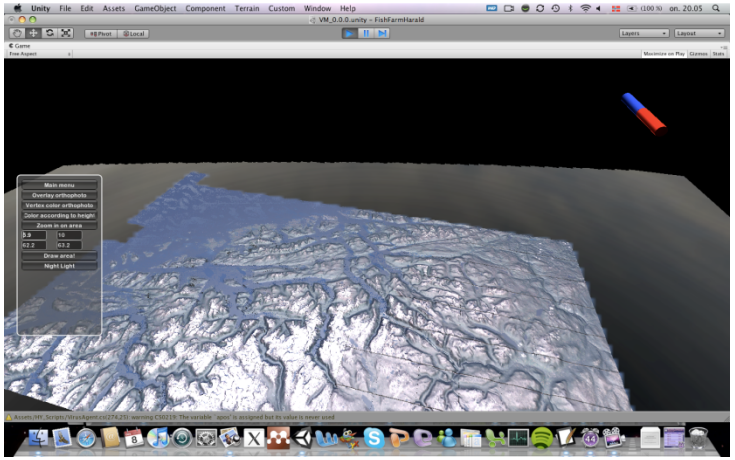
HØGSKOLEN I ÅLESUND

Needs a paradigm shift in simulation methods





From deterministic Newton dynamics



To individual modeling, based on free will