Folkeforskning – fra øyne til apper – bli med og tett noen av data-hullene

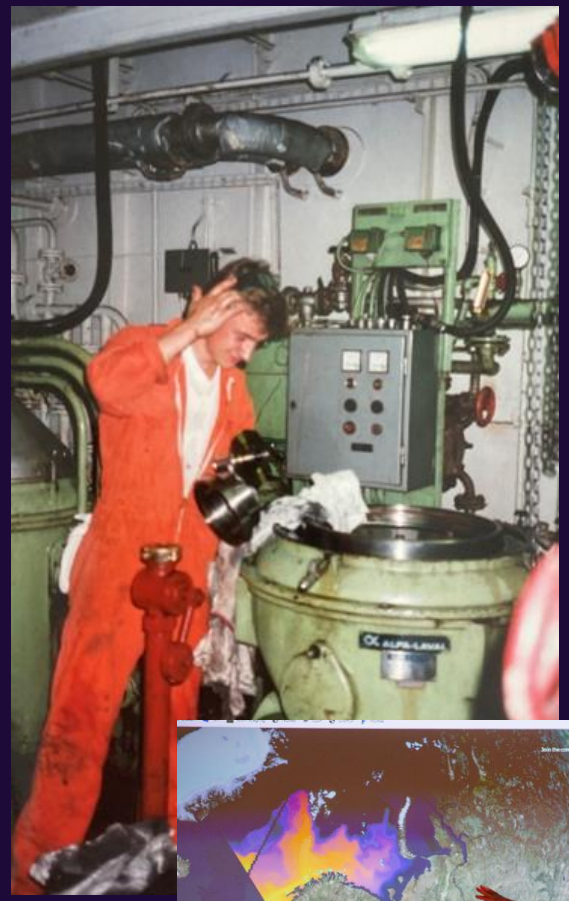
Jo Øvstaas

EVU-kurs miljøovervåking med bøye
NTNU Trondheim

6 Mai 2023

Centre for the Fourth Industrial Revolution

Litt om meg – En havglad kar fra Holmestrand



- BSMA 1989-1991
- NTH Marin 1991-1995
- DNV Maritime 1996-2001
- DNV Software 2001-2008
- DNV Shanghai 2009-2013
- DNV Digital Solutions 2013-2017
- DNV Veracity 2017-2018
- HUB Ocean 2019-

Hav og Maritim har vært en rød tråd ☺

Agenda

1. Kort om HUB Ocean og hva vi gjør
2. Litt om havdata og hvordan det samles
3. Hva er folkeforskning + inspirerende eksempler
4. Hvorfor trenger vi mer data?
5. Våre bidrag til folkeforskning i HUB Ocean

Kort om HUB Ocean og Ocean Data Platform (som kan brukes til folkeforskning)

HUB Ocean

A non-profit ocean foundation

Founded by

AKER

WORLD ECONOMIC FORUM

Centre for the Fourth Industrial Revolution

Supporting

United Nations Decade of Ocean Science

Leading

Ocean Data Action Coalition

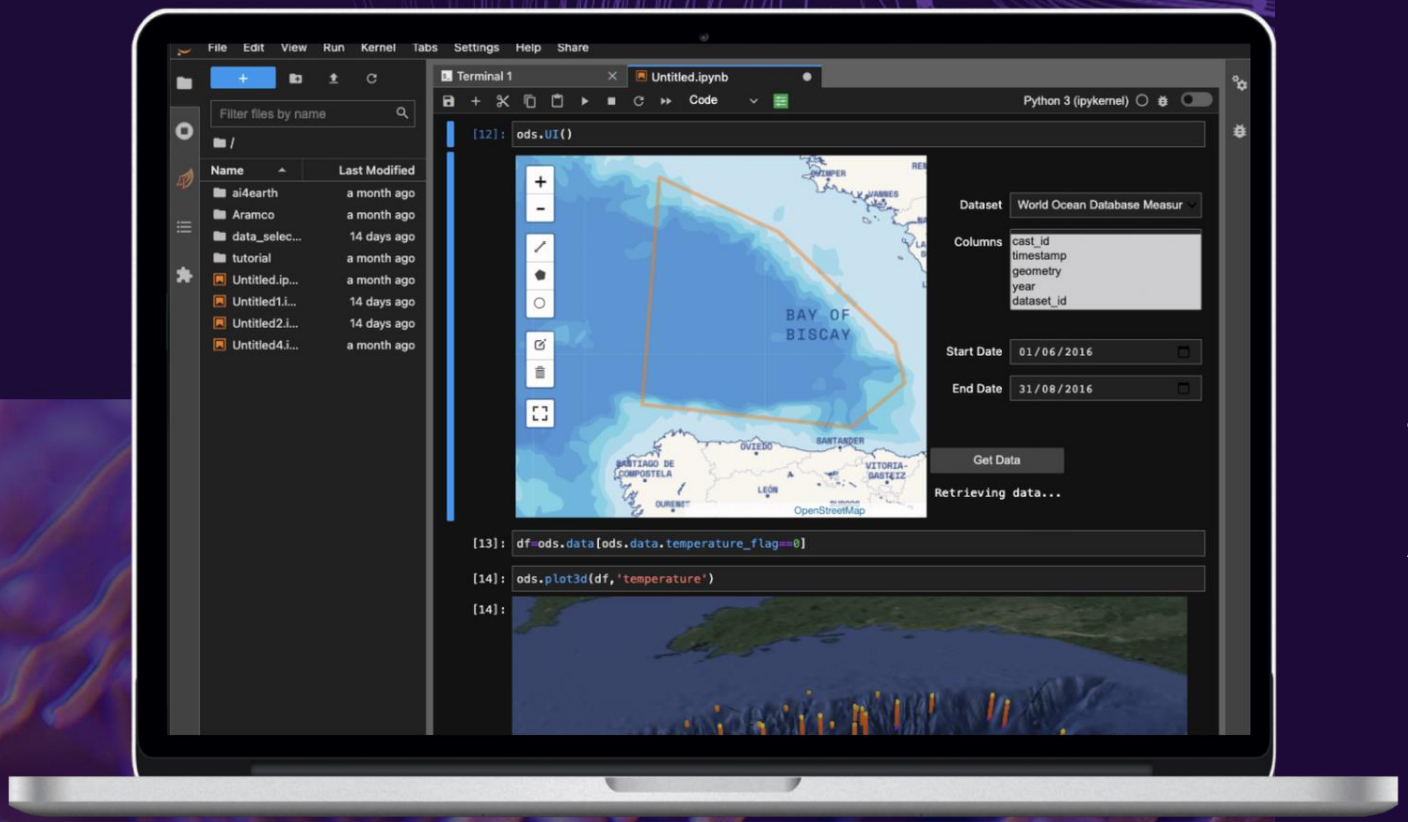
HIGH LEVEL PANEL for A SUSTAINABLE OCEAN ECONOMY

In partnership with

Microsoft

Operating

Ocean Data Platform



The

Ocean Data Platform

INGEST | SEARCH | ACCESS | ANALYSE

The geospatial platform at the heart of our mission

An advanced cloud technology to gather, fuse and provide access to a vast array of ocean data from multiple sources in one place

Powered by

Microsoft Azure COGNITE

Welcome to the Ocean Data Platform

Browse Catalog

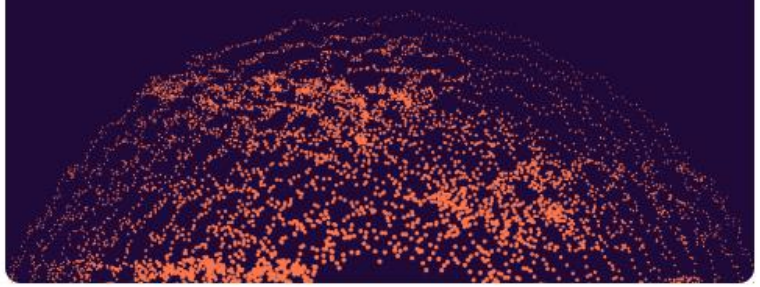
Browser our catalog of open source and user-contributed ocean data.

Browse Catalog

Access API Docs

Get information on connecting to our API through our technical documentation.

Go to Docs



Upload Data

Upload your datasets and create collections, then access via API or open them for analysis in a worksapce.

PGS data

Go to My Data

Enter Workspace

Connect to a Jupyter Hub environment where you can directly access your uploaded data and the rest of the ODP Catalog

Enter Workspace

Browse Projects

Projects combine ODP data according to a topic. See featured projects and find associated Workspace notebooks.

View Projects

Get Support

Join our Slack community to stay in touch with others passionate about ocean data and the ODP.

Join our community

Start Server

Choose your environment

- ○ **Minimal**
  Minimal resource environment: 1 VCPU, 3 GB RAM
- ○ **Small**
  Small resource environment: 2 VCPU, 7 GB RAM
- ◉ **Medium**
  Medium resource environment: 4 VCPU, 14 GB RAM
- ○ **Large**
  Large resource environment: 8 VCPU, 28 GB RAM

Start

File Edit View Run Kernel Tabs Settings Help

Filter files by name

/ ... / data / GlobalVesselEmissions /

Name	Last Modified
GlobalVesselEmissons.md	a year ago
GriddedVesselEmissionsAndTraffic.ipynb	a minute ago
VesselEmssions.ipynb	3 months ago

README.md | GriddedVesselEmissionsAnd1 | OBIS test.ipynb

Markdown

Python 3 (ipykernel)

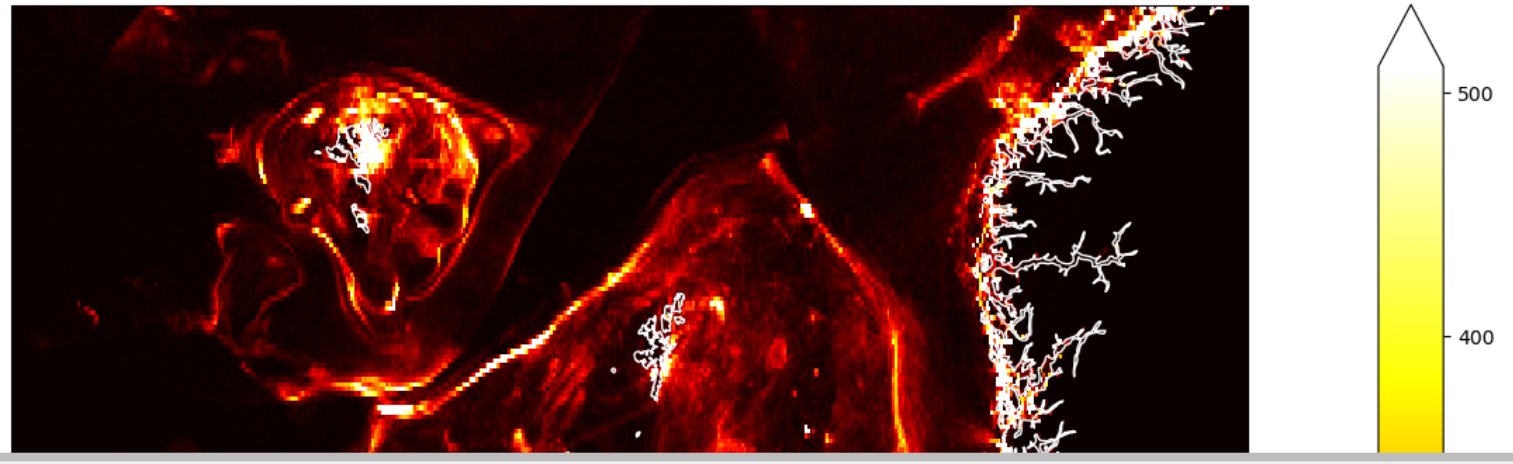
Hours of traffic from fishing vessels in the North Sea

[ ]:
```
# time=slice("2020-01-01", "2022-01-01"),
ds_fishing_north_sea = ds.sel(
    lon=slice(-13.337, 9.759),
    lat=slice(50.223, 63.384),
    time=slice("2020-01-01", "2022-01-01"),
).hours_fishing.compute()
```

[ ]:
```
# Plot function for gridded maps with coastline
import cartopy.crs as ccrs
import matplotlib.pyplot as plt


def plot_emissions(_ds, cmap="inferno"):
    p = _ds.plot.pcolormesh(
        transform=ccrs.PlateCarree(),
        cmap=plt.get_cmap(cmap),
        vmax=_ds.quantile(0.97),
        subplot_kws={"projection": ccrs.Mercator()},
    )
    ax = p.axes
    ax.figure.set_size_inches(24, 12)
    ax.coastlines(color="white")
```

[ ]:
```
plot_emissions(ds_fishing_north_sea.sum("time"), cmap="hot")
```



Simple 1 6 Python 3 (ipykernel) | Idle Mem: 658.00 / 14336.00 MB Mode: Command Ln 1, Col 1 GriddedVesselEmissionsAndTraffic.ipynb 1

Luse data

Årlig status på lus og temperatur

År for grafer og nedlasting av data

2012 — 2021 2023 — 2023

Uker for grafer og nedlasting av data

1 — 52

1 — 52

Utstrekning

Nasjonal

Ukentlig status på lus, behandlinger og gjennomsnittlig lus per fisk

År

2023

Behandlinger

badebehandling ×

forbehandling ×

mekanisk_fjerning ×

Ocean Data Connector

Har du en lusekoordinatorkonto? Logg inn her for å analysere data i en Jupyter notebook

Monitorering av lakselus

Få en oversikt over lakselus i oppdrettsnæringen i Norge. Se hvordan temperatur og behandlinger hjelper med å kontrollere mengden lus.

Gjennomsnittlig antall lus per fisk i Norge i uke 35 sammenlignet med uke 34

Voksne hunnlus

0.147

↑ 0.02

Bevegelige lus

0.468

↑ 0.06

Fastsittende lus

0.16

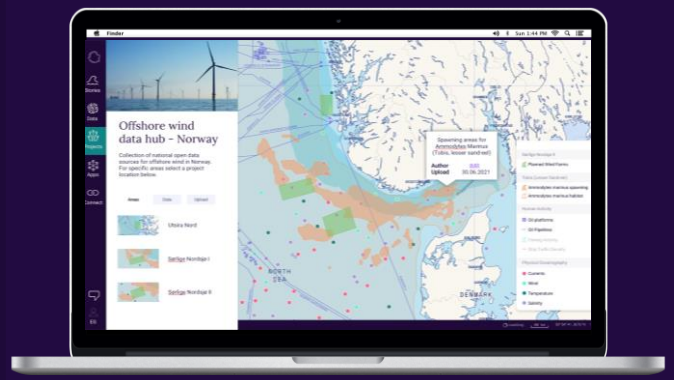
↑ 0.03

Lokasjoner i Norge

Alle lokasjoner i Norge med lusedata fra uke 35 2023. Grønne lokasjoner har mindre enn 0.2 voksne hunnlus per fisk, gule lokasjoner har mellom 0.2 og 0.5 voksne hunnlus per fisk og røde har mer en 0.5 voksne hunnlus per fisk.

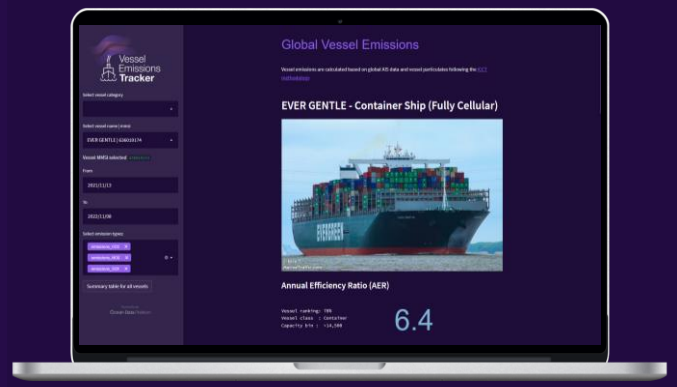
Sample Use Cases Relevant for Industry

OFFSHORE WIND



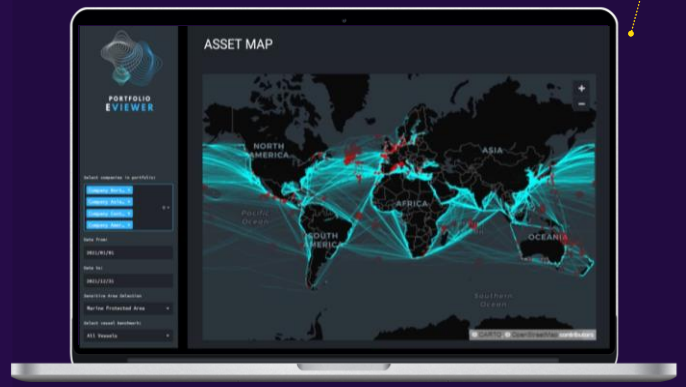
This project aims to create a streamlined portal for ocean data to expedite offshore wind development. We provide an intelligent approach to gather and organizing data and managing asset.

SHIPPING



This application provides a top-down method for estimating the emissions of the global shipping fleet. We provide greater transparency in, for example, chartering processes.

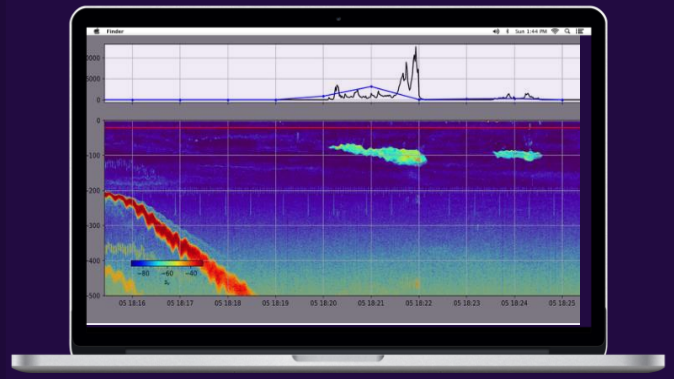
FINANCE



This project assess the effects and risks of shipping on the environment. The system provides a comprehensive analysis, including exposure-based CO2 emissions, vessel movement, and time spent within MPAs.

Sample Use Cases Relevant for Science & Policymakers

KRILL



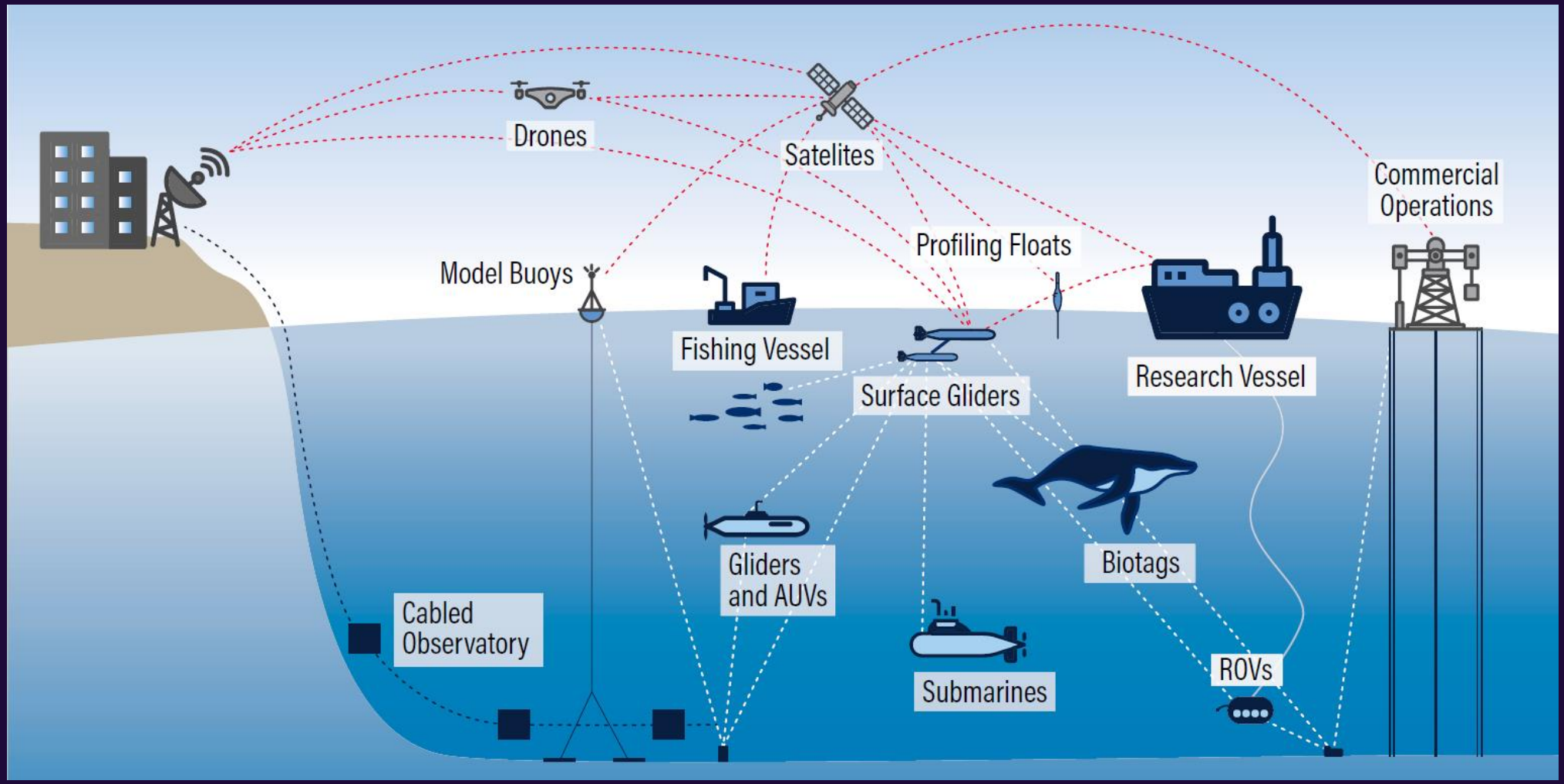
This dataset is a compilation of 10 years of Aker Biomarine fishing missions in the Southern Ocean. It can be used to improve management of the fishery and ensure sustainable catches.

POLLUTION

A pilot in the Ocean Lab infrastructure in Norway and Germany will leverage the system of system concept of ILIAD to combine data from sensors and models to enhance data resolution from real-time data.

Hvordan samler forskerene havdata?

How is ocean data collected?



Ocean “Internet of Things” – A small selection

HYPSO-1

SAILDRONE

Starlink rack

Mariner USV

SAIL BUOY

HUGIN AUV

ROV “Aurelia”

Sub “Aurelia”

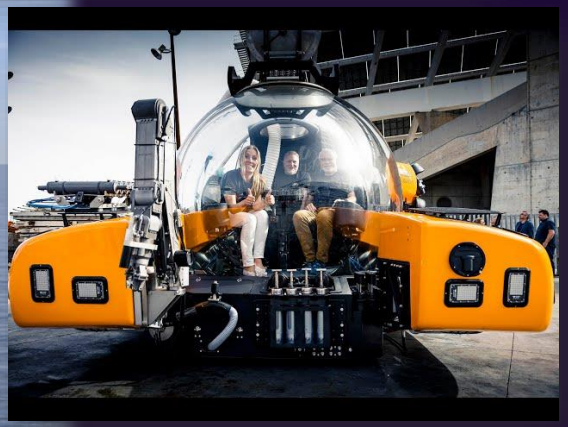
LoVe observatory

ARGO FLOAT

CTD - Conductivity, temperature, and depth

REV Ocean

The initiative was started as a result of Kjell Inge Røkke signing the Giving Pledge in 2017, vowing to donate more than 50% of his fortune to philanthropic causes

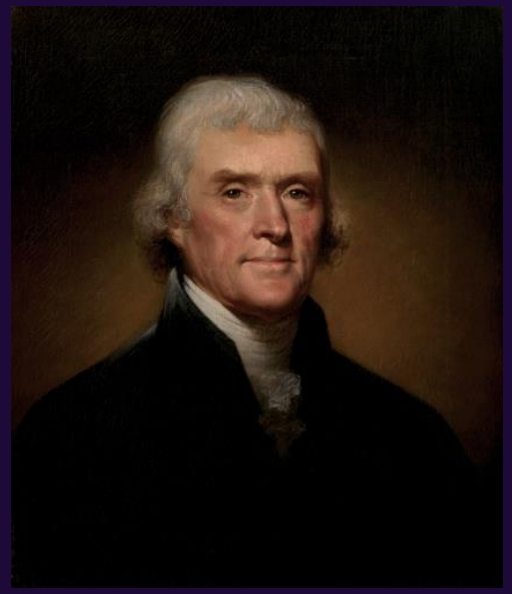


OCEAN CENSUS

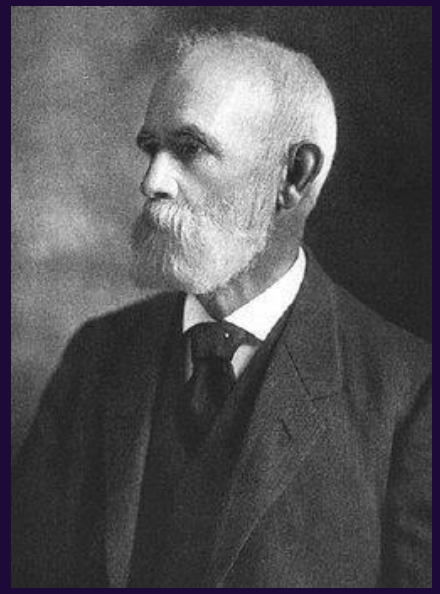
DISCOVERING LIFE

Hva er folkeforskning? Eksempler?

Historisk bakgrunn og utvikling



Thomas Jefferson (1743-1826)
Samlet inn data om vind og fuktighet, men instrumentene som var tilgjengelige for ham på den tiden var ikke så pålitelige



Wells Cook (1858-1916)
Organiserte frivillige over hele Mississippi Valley for å samle inn data om trekkfugler.
Senere digitalisert.

Ken-ichi Ueda
iNaturalist er et nettbasert sosialt nettverk av 3+ millioner mennesker som deler informasjon om biologisk mangfold for å hjelpe hverandre med å lære om naturen

OCEAN DECADE NETWORK

GenOcean

unesco
Intergovernmental Oceanographic Commission

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

ABOUT US LATEST TAKE ACTION COMMUNITY

THE OCEAN DECADE

The Science We Need for the Ocean We Want

10 Years. 10 Challenges. 1 Ocean.

Challenge 1

Change humanity's rela ocean

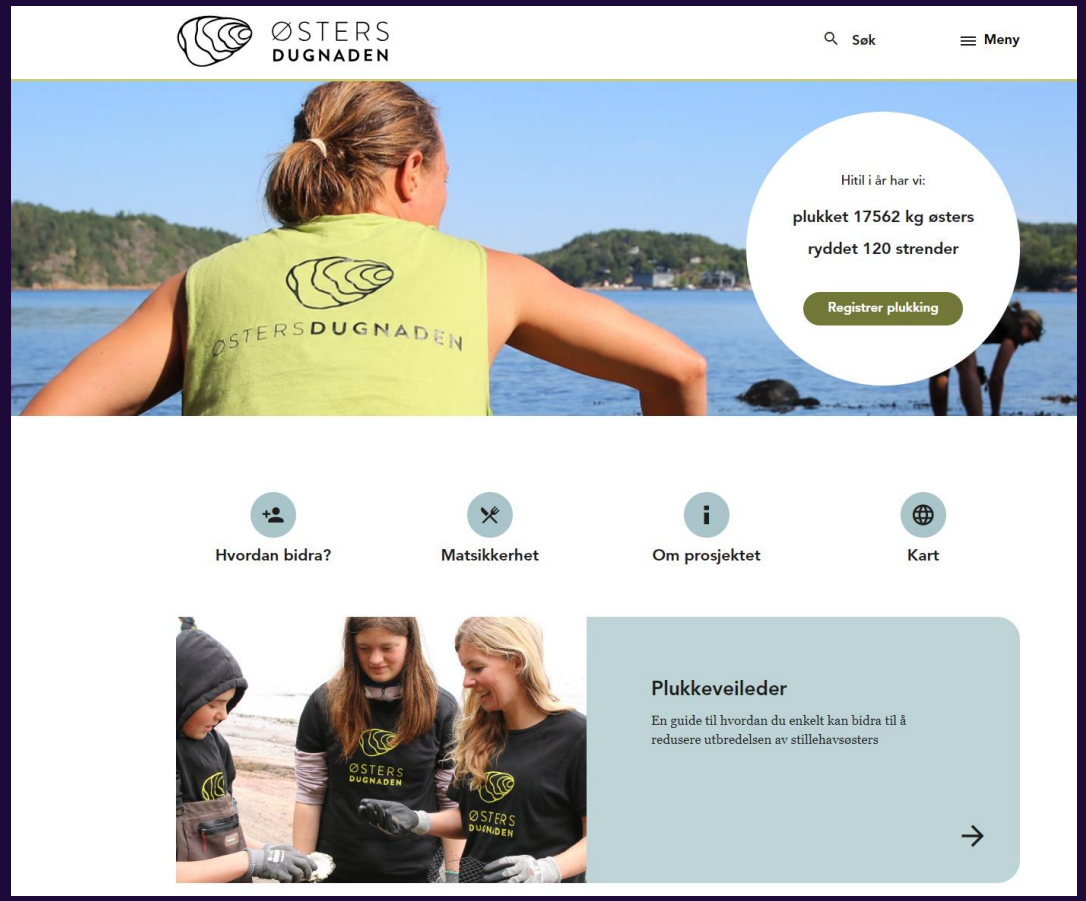
Ensure that the multiple of the ocean for human and sustainable develop understood, and identify barriers to behaviour ch step change in humanity the ocean.

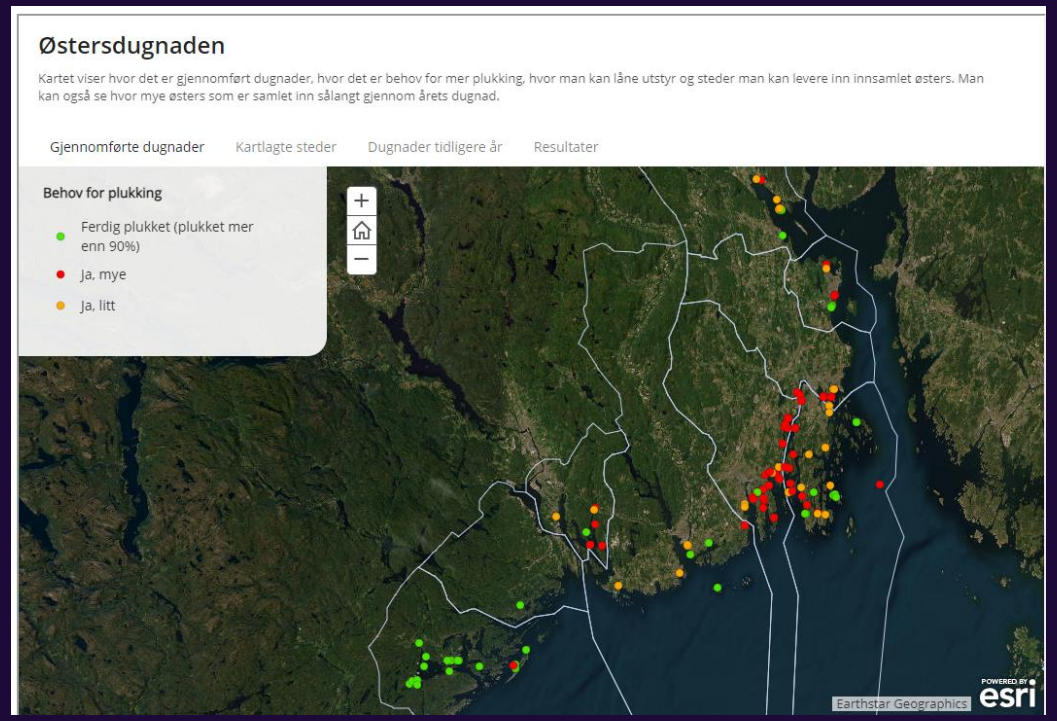
Fordeler og utfordringer med folkeforskning

- Alle kan bidra
- Økt datainnsamling
- Økt bevissthet om vitenskapelige spørsmål
- Det man forstår mer av tar med bedre vare på
- Inspirere morgendagens forskere/teknologer

- Kvalitetskontroll
- Krever litt tid + sette seg inn i nye ting
- Datahåndtering, dvs. lagring/prosessering
- Engasjementet kan være litt «av og på»
- Kan være veldig lokalt

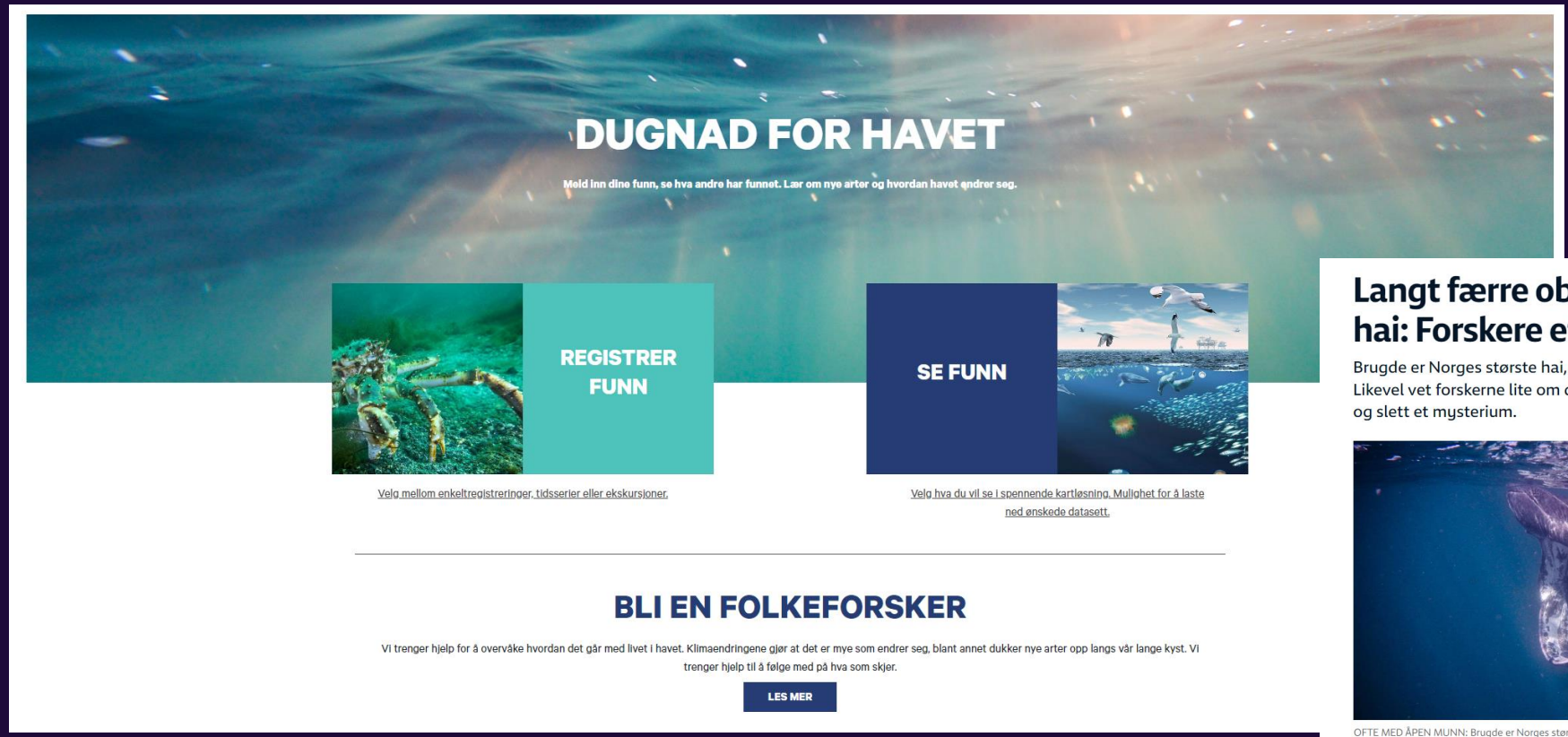
Eksempel: Østersdugnaden





- Etablert i 2018
- Fjerning av Stillehavsøsters; 17.5 tonn så langt i 2023
- Vestfold og Telemark

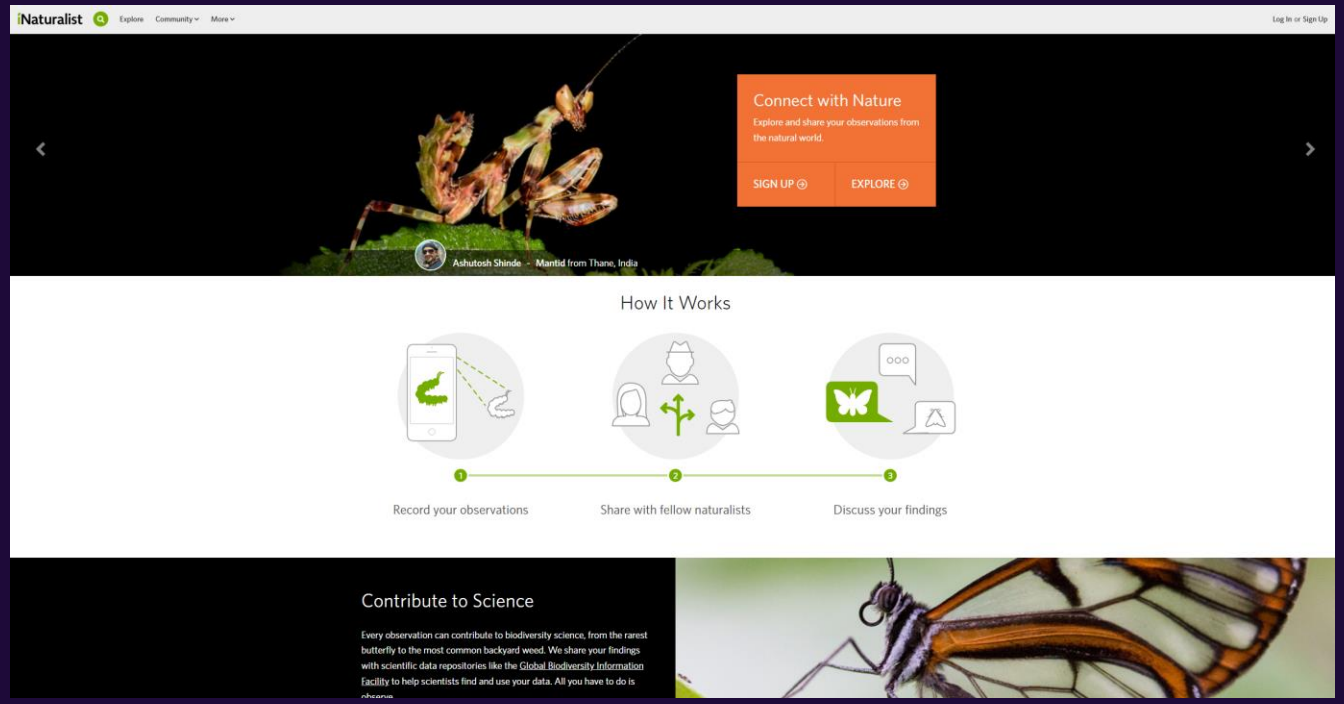
Eksempel: Dugnad for Havet

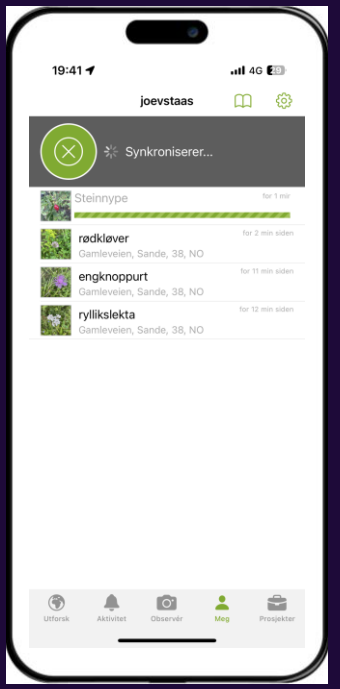


- Lansert i 2020
- Utviklet av Havforskningsinstituttet
- Vanlige arter, fremmedarter, søppel med mer

Eksempel: Windjammer og Christian Radich

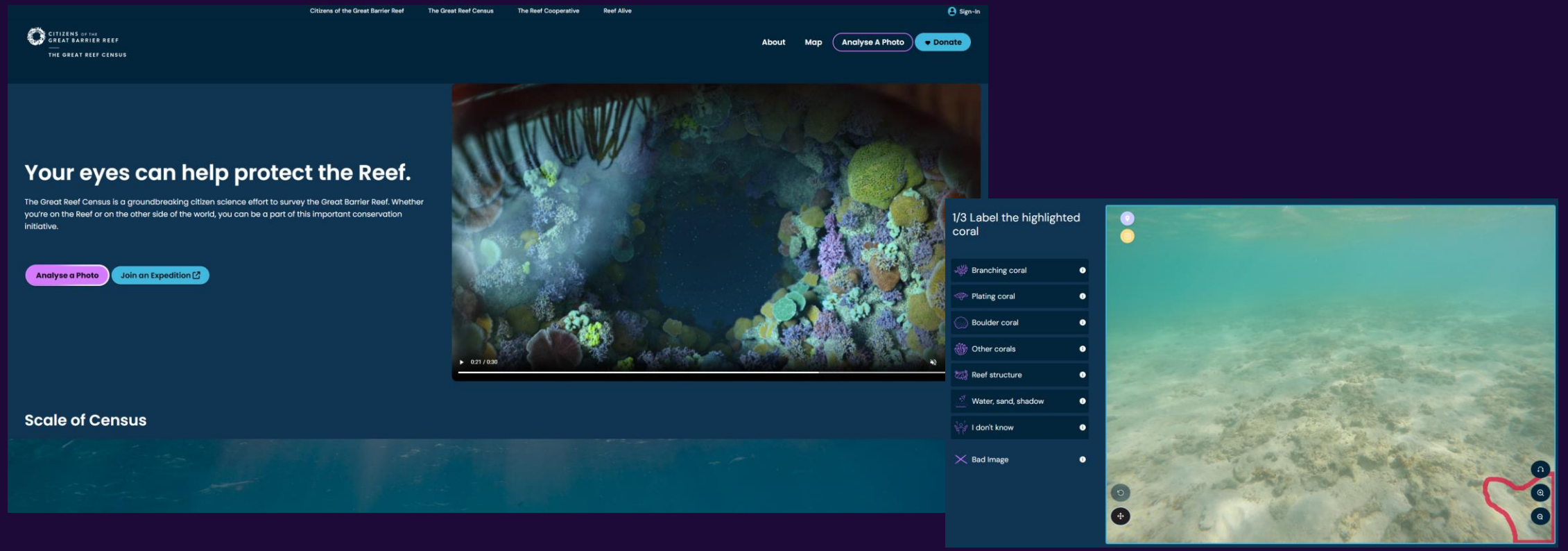
Eksempel: iNaturalist





- Lansert i 2008; 3+ millioner registrerte brukere
- Eksperter bidrar til økt datakvalitet
- Man kan registrere «alt som er liv»
- Mest fokus på fauna og dyr på land
- Bruker KI for å klassifisere arter

Eksempel: Citizens of the Great Barrier Reef



- Lansert i 2020
- Grunnlagt av Andy Ridley som også står bak «Earth Hour»
- Kartlegging av alle revene langs GBR

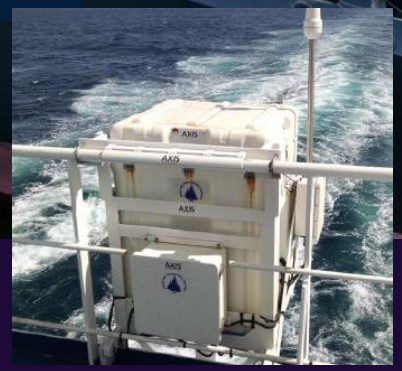
Eksempel: Research onboard Commercial Ships

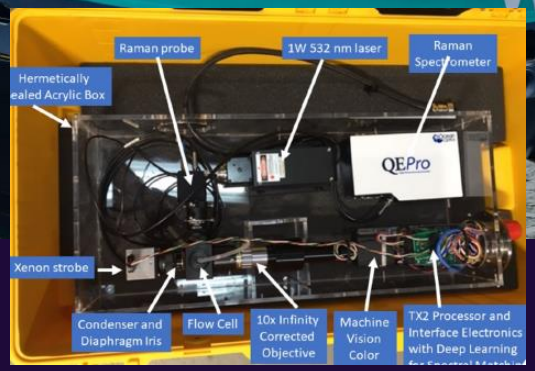
SCIENCE
RoCS
RESEARCH ON COMMERCIAL SHIPS

About People Industry Partners Publications News Contact

We are a **multi-institution** group of scientists, engineers, data managers, and administrators, whose goal is to **transform** ocean science by outfitting commercial ships with a suite of "maritime appropriate" **scientific sensors**.

BIOS
STONY BROOK UNIVERSITY
WOODS HOLE OCEANOGRAPHIC INSTITUTION
THE UNIVERSITY OF RHODE ISLAND GRADUATE SCHOOL OF OCEANOGRAPHY





Hvorfor trenger vi mer data?

Climate change is affecting our ocean.

Burning fossil fuels, deforestation and industrial agriculture release carbon dioxide (CO_2) and other heat-trapping gases into our atmosphere, causing our planet to warm.

making the ocean

WARMER | **LESS OXYGEN** | **MORE ACIDIC**

The ocean has buffered us from the worst impacts of climate change by absorbing more than 90% of this excess heat and about 25% of the CO_2, but at the cost of causing significant harm to marine ecosystems.

causing

SEA LEVEL RISE
Flooding coastal communities and drowning wetland habitats

BLEACHING
Warm water coral reefs will be lost if the planet warms by 2º

TOXIC ALGAE
Larger and more frequent blooms are making animals and people sick

HABITAT LOSS
Lower oxygen levels suffocate animals and shrink habitats

ACIDIFICATION
More acidic water prevents animals from building their shells

FOOD INSECURITY
Disruptions in fisheries affect the marine food web and human food security

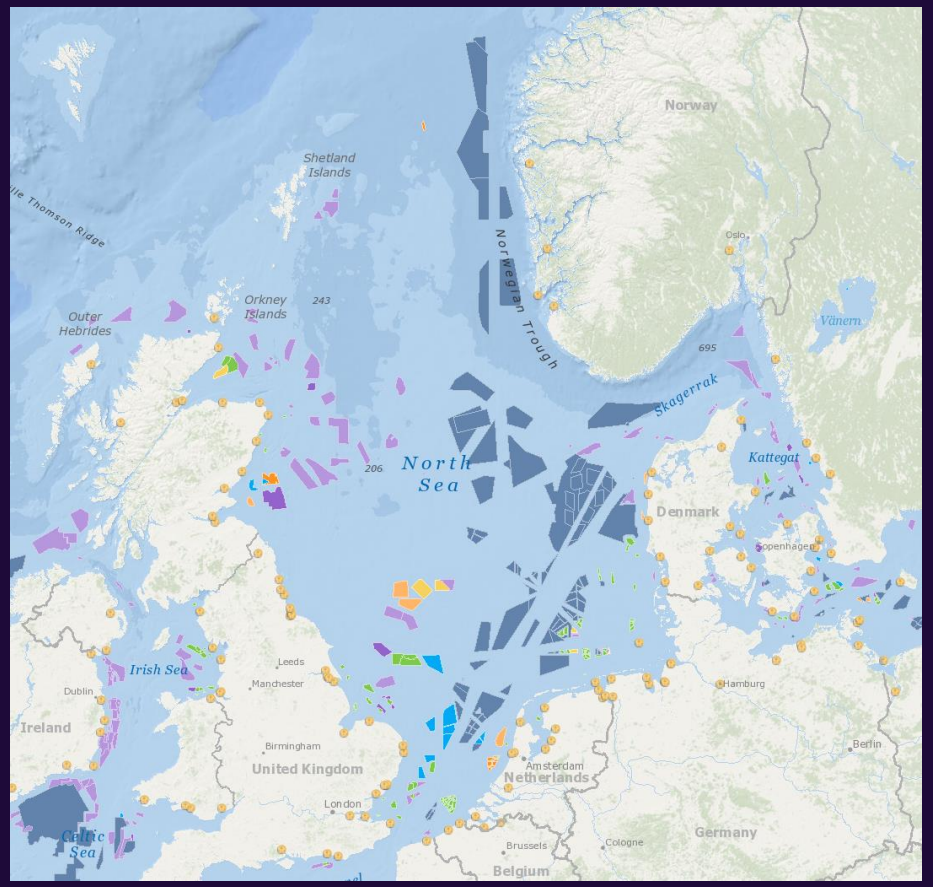
Heal the ocean vs Rewire industries

- SDG 14: Protect Life Below Water
- Map & manage 100% of a country's ocean territory
- Protect 30% of ocean territory by 2030

- 40x more renewable energy by 2050
- 6x more sustainable seafood by 2050
- Zero emission shipping by 2050

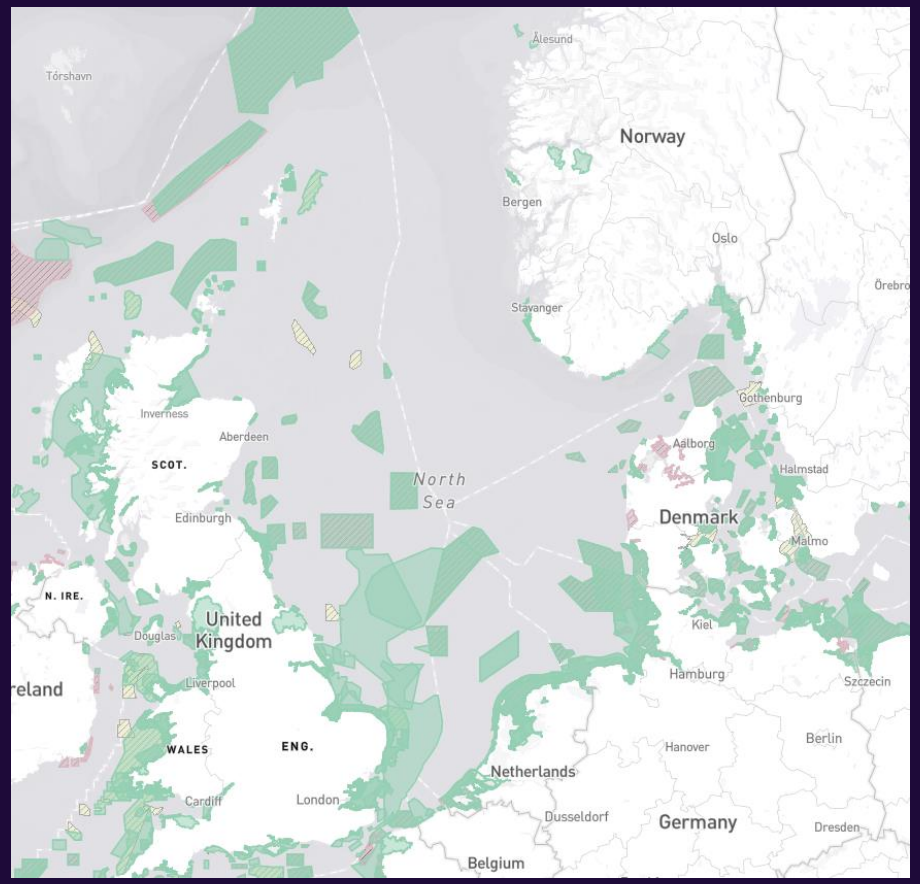
Vi trenger mer plass

Example: The North Sea basin – A myriad of Marine Protected Areas – Potential sector conflicts



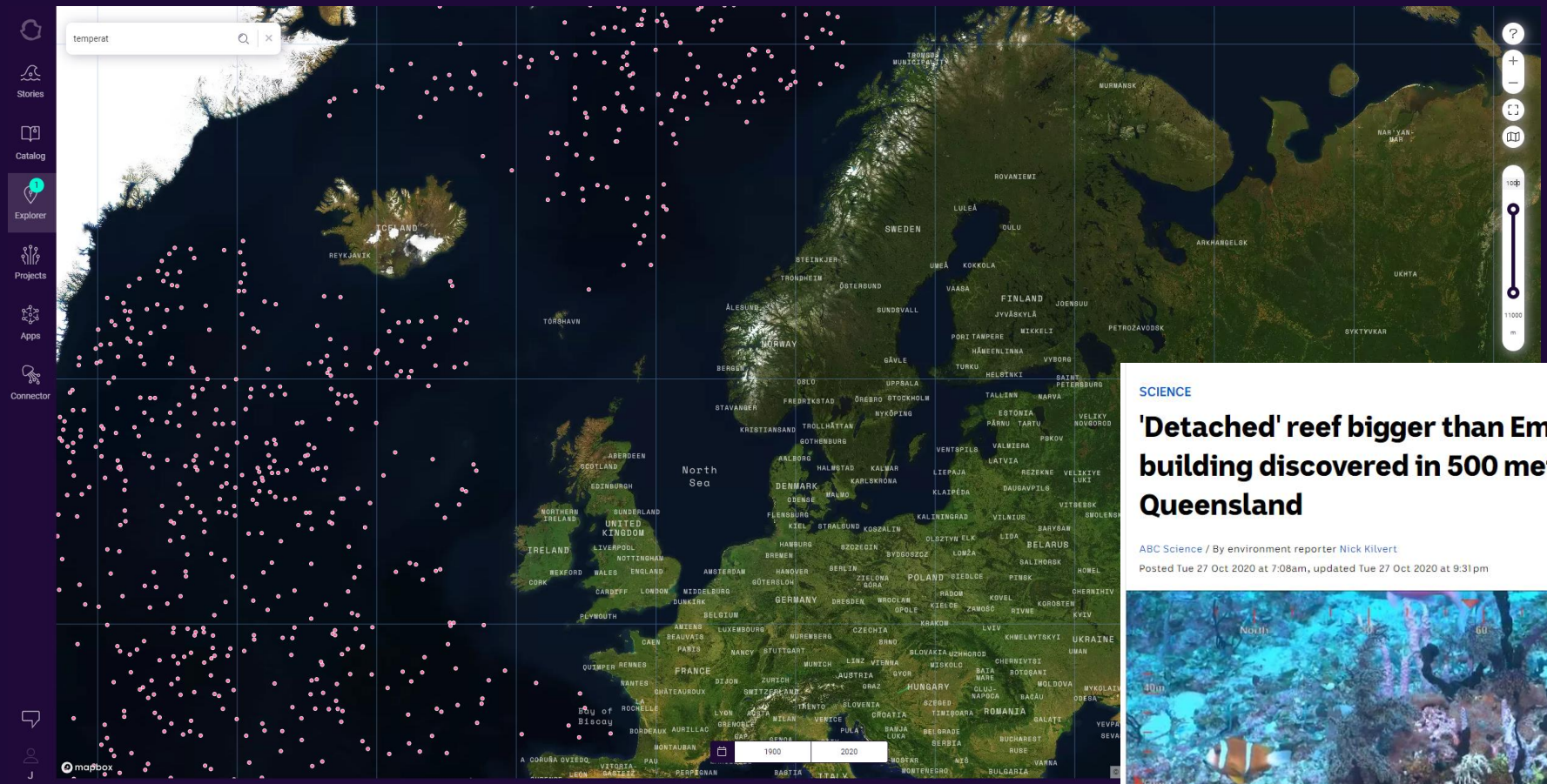
Commissioned or planned wind farms

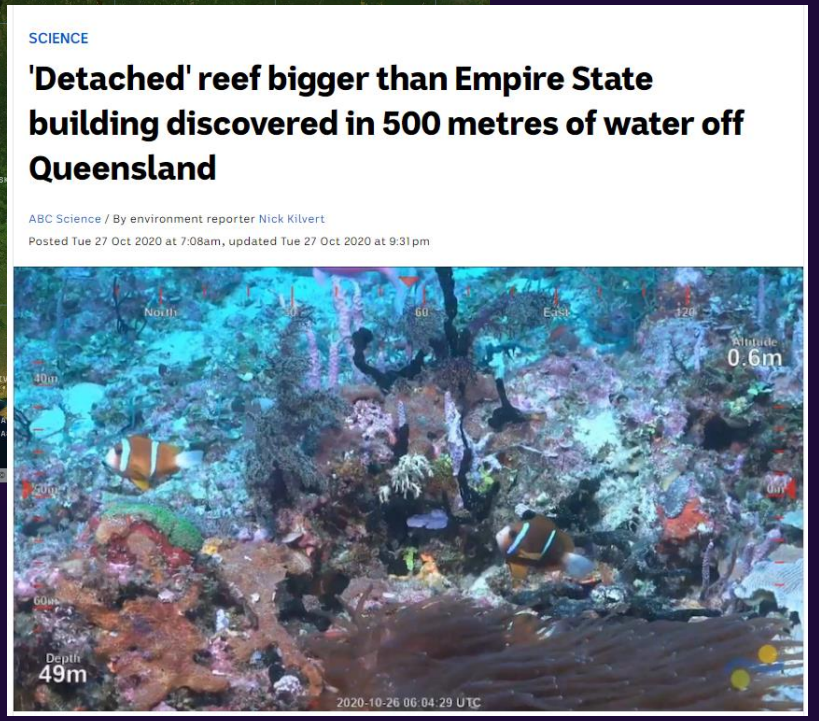
Source: 4coffshore.com + MPA Atlas



Current Marine Protected Areas
(from current ~3% to 30% by 2030)

Vi vet ikke nok





SCIENCE

'Detached' reef bigger than Empire State building discovered in 500 metres of water off Queensland

ABC Science / By environment reporter Nick Kilvert

Posted Tue 27 Oct 2020 at 7:08am, updated Tue 27 Oct 2020 at 9:31pm

World Ocean Database

Types of ocean data

1 Physical Oceanography

Conditions and physical processes within the ocean

Temperature, Salinity, Density, Pressure

2 Chemical Oceanography

Chemistry of marine environments and the influence of different variables.

Nitrate, Silicate, Carbon, Oxygen, pH

3 Geological Oceanography

Study of the history and structure of the ocean floor

Bathymetry, Sediments, Hydrothermal vents

4 Biological Oceanography

How organisms affect and are affected by the physics, chemistry and geology of the oceans (bottom-up)

Phytoplankton, Primary Productivity

5 Marine Biology

The study of marine life (top-down)

Biodiversity, Occurrence data on organisms

6 Human Activity and Boundaries

Human assets in the ocean as well as human defined boundaries

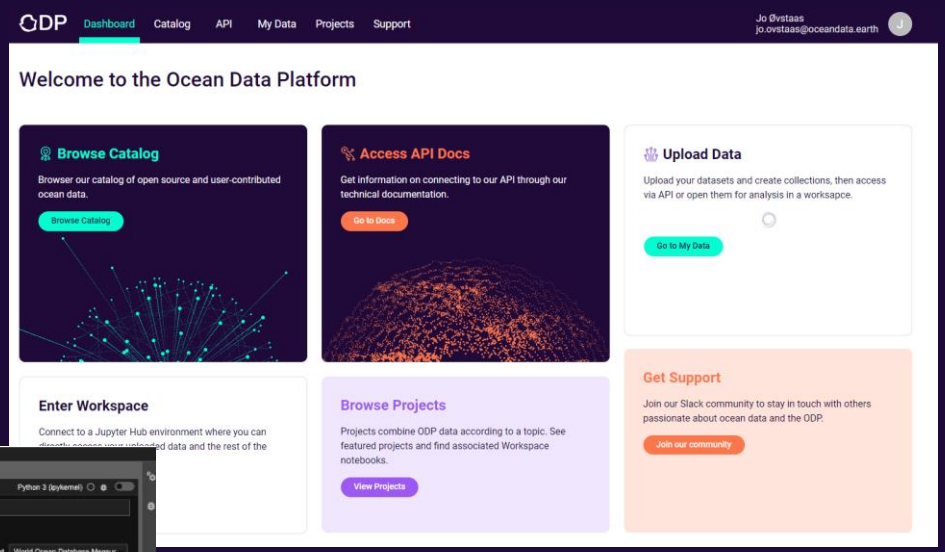
Marine regions, EEZ, wind farms, platforms, aquaculture facilities etc.

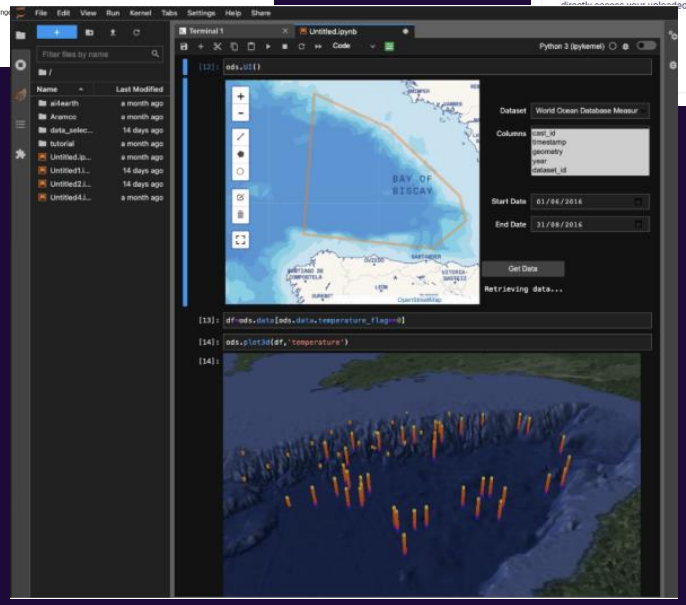
Essential Ocean Variables (EOVs)
Essential Biodiversity Variables (EOBs)

Hvordan jobber vi med folkeforskning i HUB Ocean?

Integrasjon mellom ODP og Dugnad for Havet

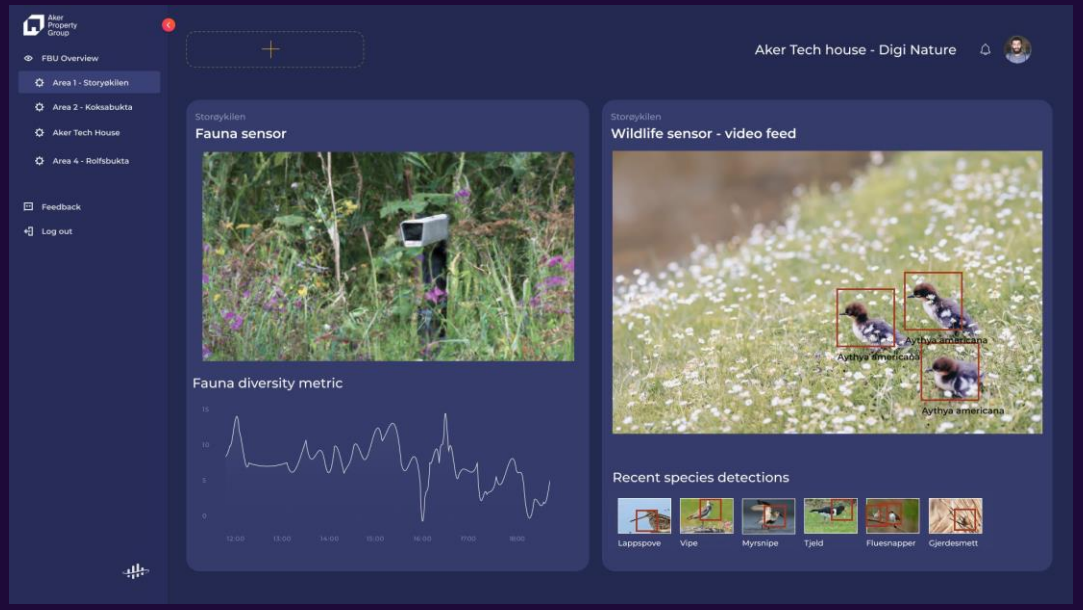
+

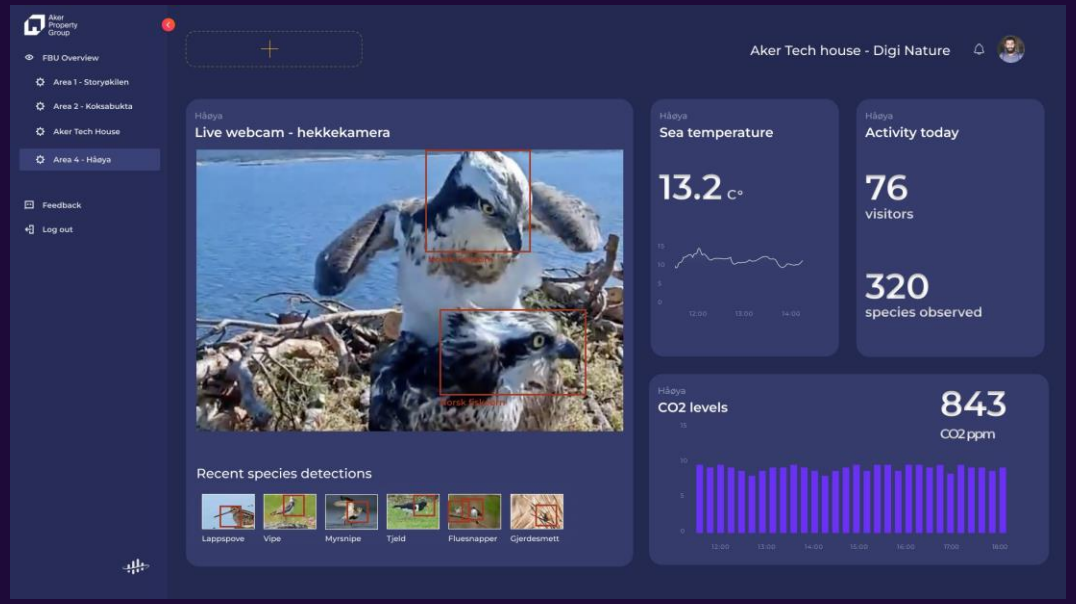




Data Science miljø og
Python-programmering

Aker Tech-House og Digi Nature på Fornebu





Mercuria

MERCURIA

Seafarer App
550+ sjøfolk på mange skip

Hvordan kan vi motivere forskere og folkeforskere?

Tips og råd fra NIVA rundt folkeforskning

- Ocean Darkening
- Find mussels
- Alien oyster
- Find turf
- Find forest
- Find saltmarshes
- Alian seaweed

Suggestions for citizen science projects – by Trine Bekkby, NIVA

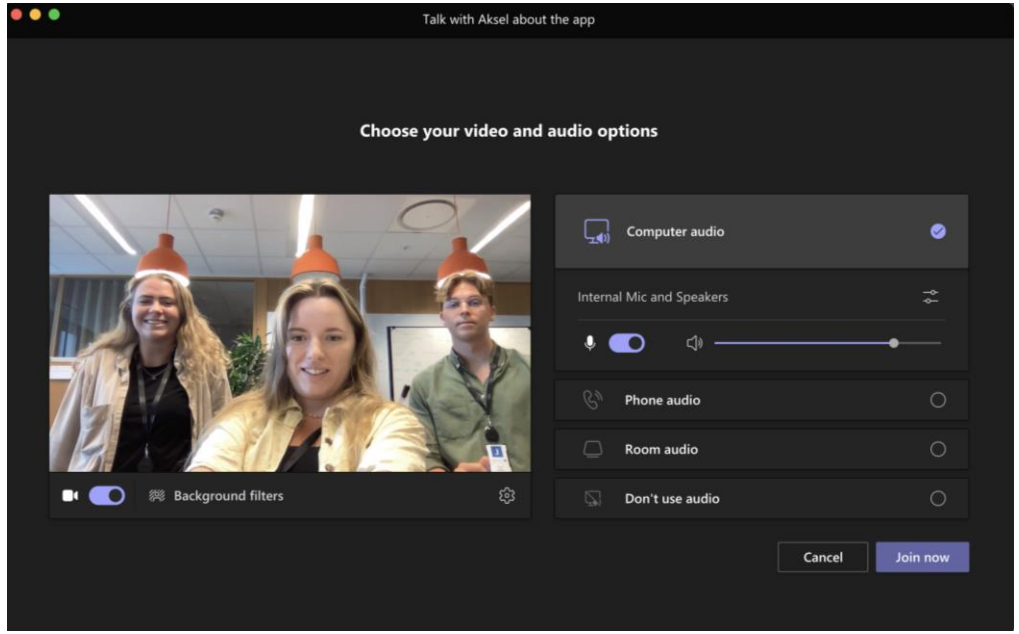
Below, there are several suggestions for citizen science projects. It is also possible to have an "Adopt a beach" project, in which people can record blue mussels, Pacific oysters, turf algae, kelp, saltmarshes, seagrass, seaweeds (also alien) and, if possible, record secchi depth. That is a bit more advanced and needs a bit more training. But I guess we can have people assigned to different levels, from really easy (just a point with "presence") to more advanced recording of more species and more features.

Topic short name	Description	Approach	Definition of success
Ocean Darkening	All plants and algae need light, also those growing in the ocean. We now have more storms, floods and heavy rainfall events, resulting in more dirt, particles and nutrient flushing from land into the lakes, rivers, fjords and coastal areas. Also, the temperature is increasing, giving small algae in the water masses better conditions to grow. All of this make the ocean darker, and the marine vegetation (like the kelp) needs to creep upwards to get enough light. This means that we lose large parts of our blue forests, which are the "houses" that are needed by crabs, fish and other animals living in the fjord. But the storms, flooding and heavy rainfall events vary with season and year, so it is hard to know if the ocean is getting darker and darker og if this is just part of a fluctuation. To know this, we need time-series, i.e. data that are continuously (or at least very often) recorded. Time-series are the backbone of research and knowledge on long-term changes, and they are really hard to get funded.	Help us find out if the ocean is getting darker. Build your own secchi disc (we have a manual; it is really easy) and record the water transparency 1. Large spatial extent: lower the secchi disk wherever you are with your boat, kayak or while walking at your local (or any) pier or marina. Any time, at any season. 2. Adopt a spot/station to monitor more intensively, as much as you can We can provide a map of old stations (from the 1990s) and encourage people living nearby to "adopt" a station and continue the time-series. New data entered into an App can immediately be shown on a map and compared with old data . Maybe they could get some kind of "Time Series Contributor" badge or diploma?	• Lots of spatial/geotagged data from here and there • Time series data from some stations
Find Mussels	Blue mussels are important food for crabs, fish, seabirds and people living along the coast. But the blue mussels are disappearing, both in Norway and other countries. This loss has been discussed for years, and the scientists still don't know why the mussel beds are declining, in some areas completely disappearing. And are they really declining and disappearing everywhere, or just in some areas or just as part of natural fluctuations?	Can you help us find blue mussels? Take a photo and record the position; let us know how big the shells are and how big area they cover. Or just record "yes" if present. 1. Large spatial extent: record findings of blue mussels (and size and coverage if possible) wherever you are with your boat,	• Lots of spatial/geotagged data from here and there • Time series data from some stations Only presence of blue mussels or, if possible, both size of the mussel and the patch

1

Summer Internship at C4IR Ocean

- 9 weeks of working together
- 20 user testing sessions
- 10 researchers involved in the process
- 2 field trips to Cognite and Fornebu beach
- ∞ cups of coffee
- 15 Alien Oysters found*



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Creating citizen science component for OCEAN DATA PLATFORM

WHAT HAVE WE ACCOMPLISHED?

1. Extended user-testing
2. Clickable prototype after cycles of iterations
3. Coded prototype of the concept
4. Proof-of-concept AI-model for image recognition
5. Business model and value proposition

Bella, 18, Oslo
Citizen Scientist

"I don't understand the impact of my contribution"

"I wish I could understand how it's all connected"

"Do I have enough knowledge? "

"I want to contribute but my schedule is so busy"

Bella, 18, Oslo
Citizen Scientist

- User addressed in personal way
- Celebration of success
- Give – get loops
- Playful
- Building confidence
- Tailored to everyday life

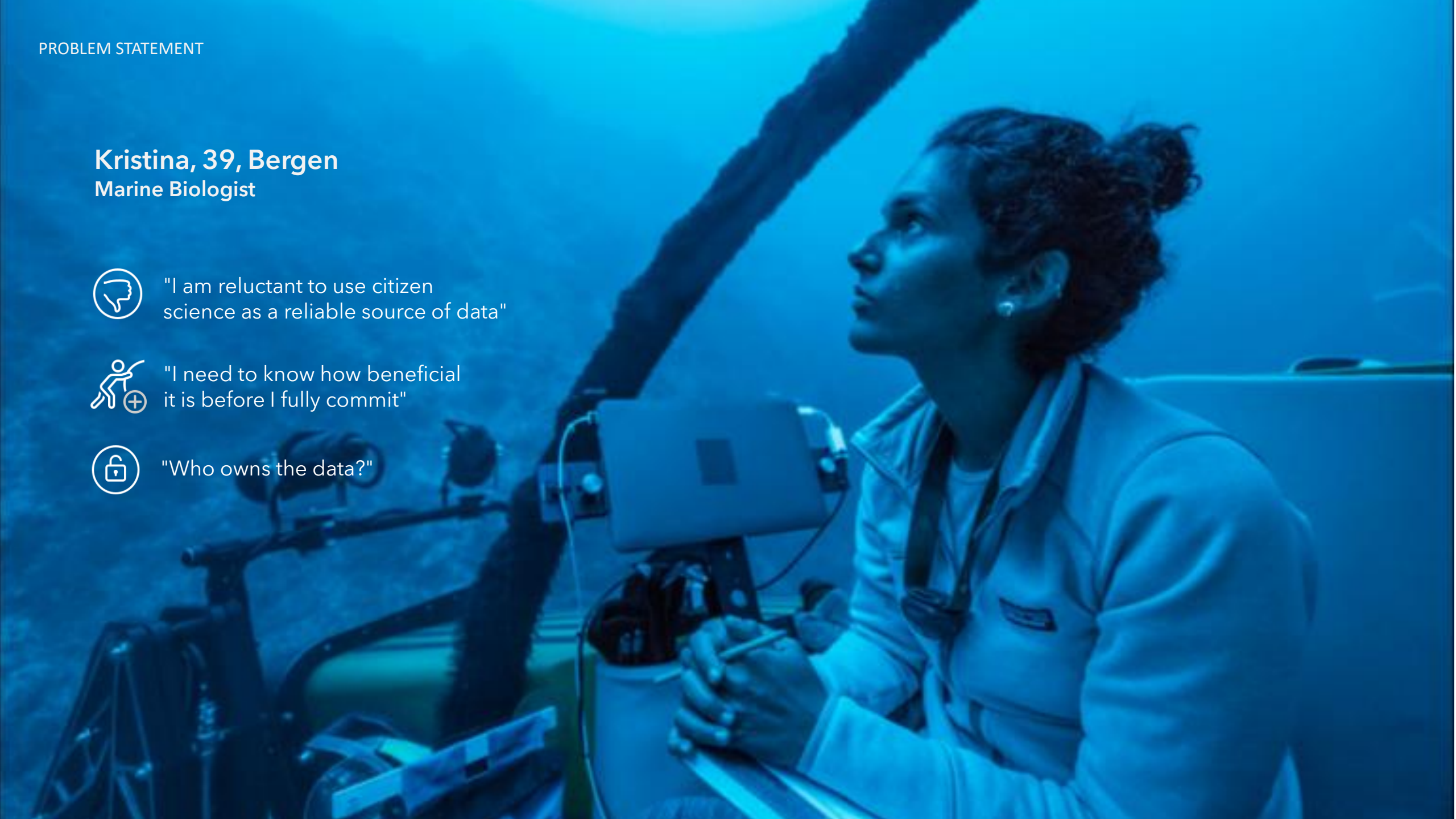
PROBLEM STATEMENT

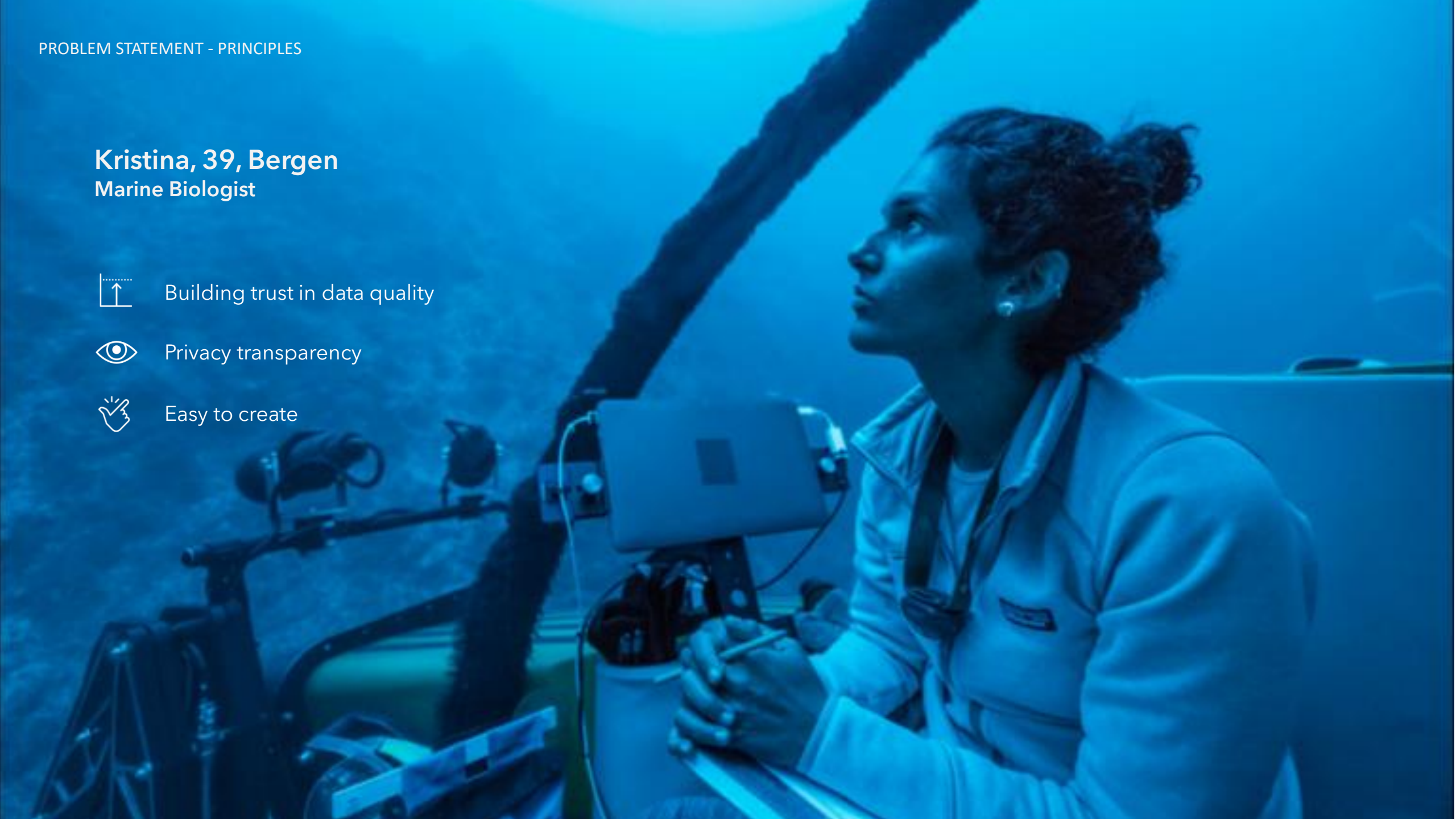
Kristina, 39, Bergen
Marine Biologist

"I am reluctant to use citizen science as a reliable source of data"

"I need to know how beneficial it is before I fully commit"

"Who owns the data?"





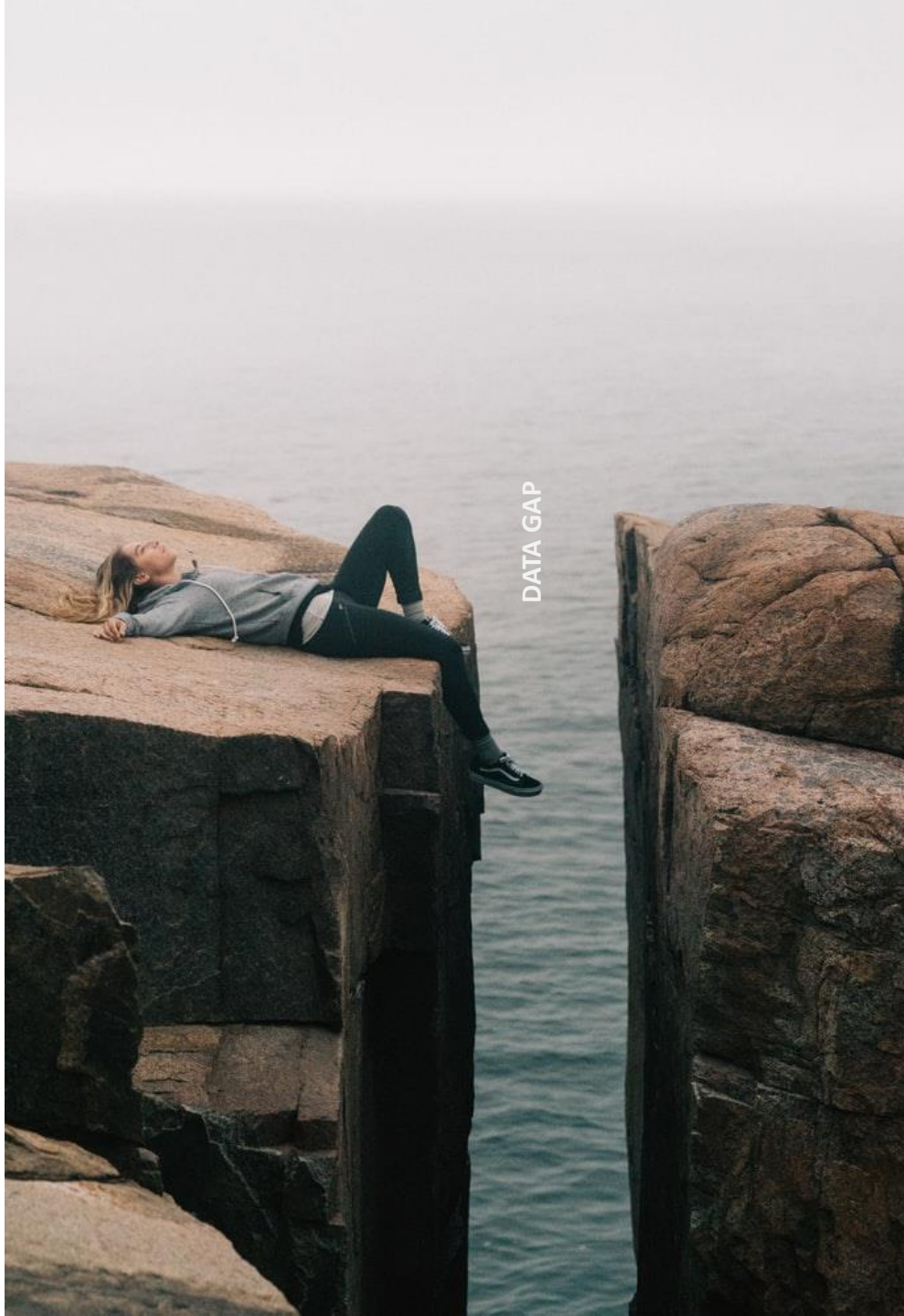
Kristina, 39, Bergen
Marine Biologist

- Building trust in data quality
- Privacy transparency
- Easy to create

Facilitate the communication between citizen scientists and researchers to fill the data gaps in marine biodiversity?

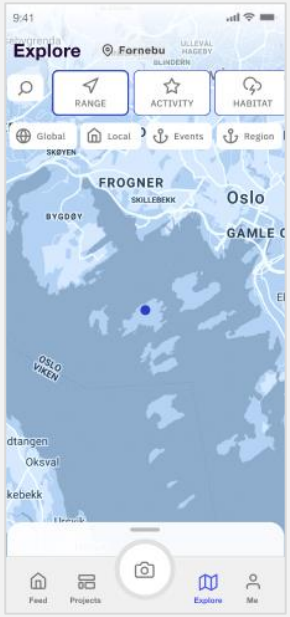
How can we make sure the collected data is trustworthy?

How to motivate users to collect data continuously?

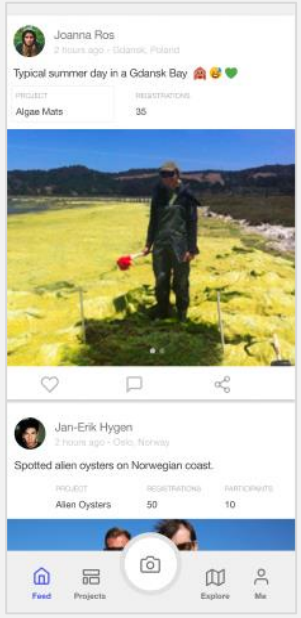


Social – discovery - based gamification elements

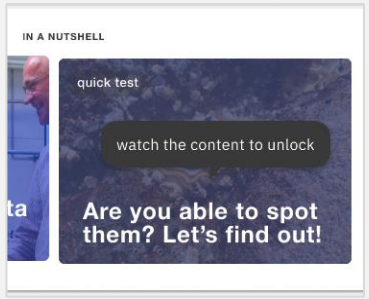
Explore



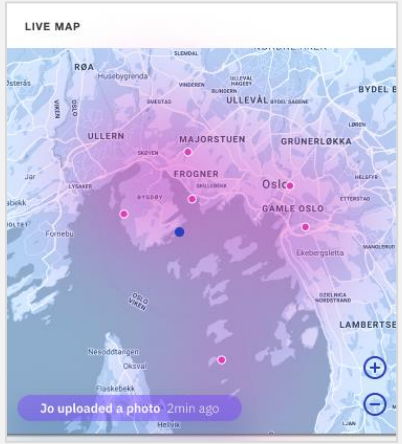
Social network – social status



Unlockable – rare content

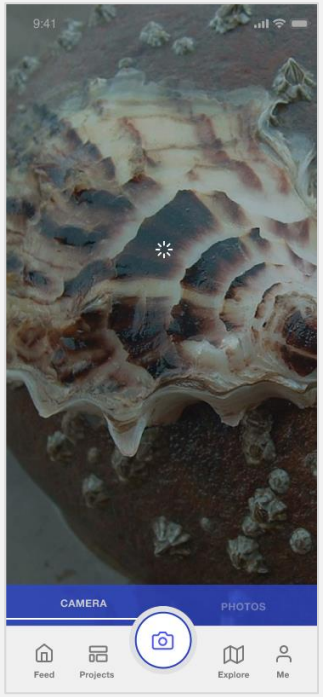


Competition

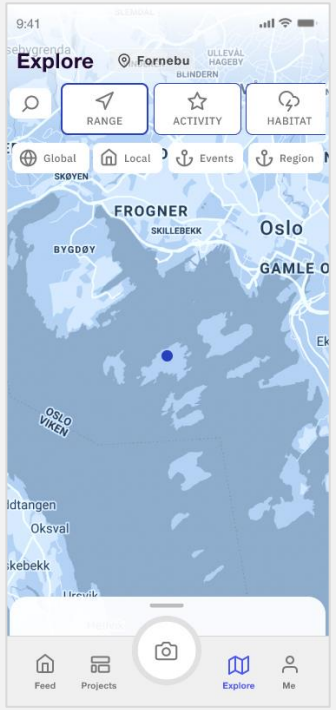


How can the scientist trust the data?

Photo submission

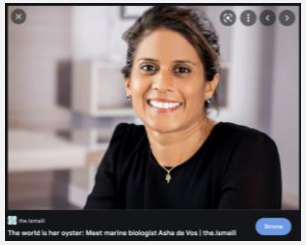


Good match

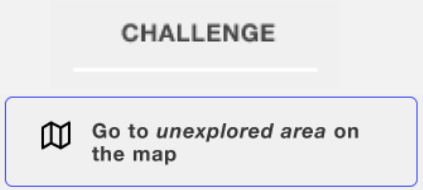


Community review

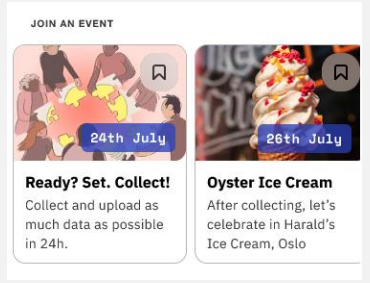
Expert review



Replication by multiple participants



Training and testing



Thanks for listening!

Unlock the full potential of our oceans. Share your ocean data today and be part of a global movement working to build a better, more sustainable world. Break down the silos, collaborate with other organizations, and shape the future of our planet with the power of data.

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