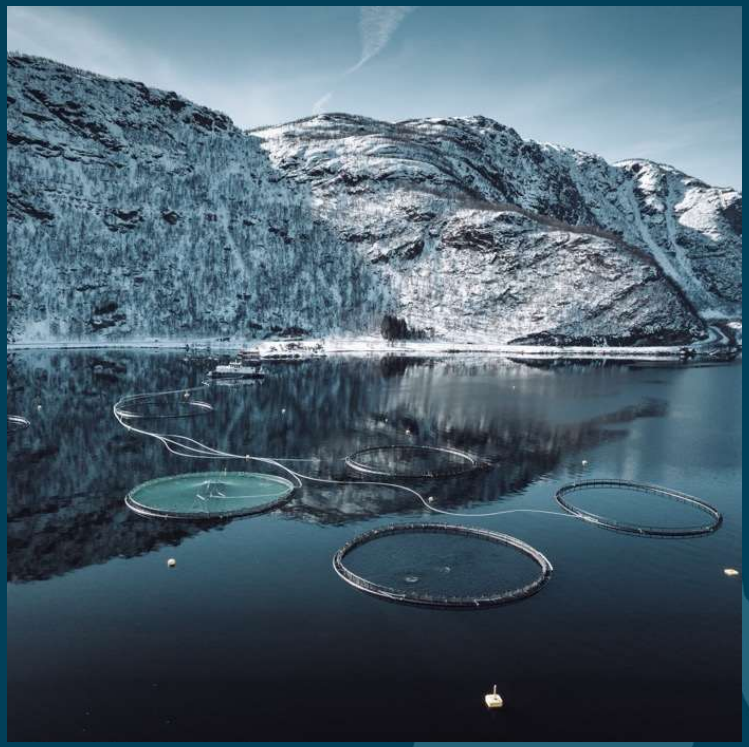
Collaborative AI in Aquaculture

Solving Industry Challenges with Federated Machine Learning



AquaCloud

NORCE

AI Aqkva 2025

By fish farmers, for fish farmers

AquaCloud was initiated by fish farmers and is governed by fish farmers who collaborate to promote knowledge development and insights based on shared and standardized data.

AquaCloud is a neutral entity working for the benefit of the entire industry!

What if?

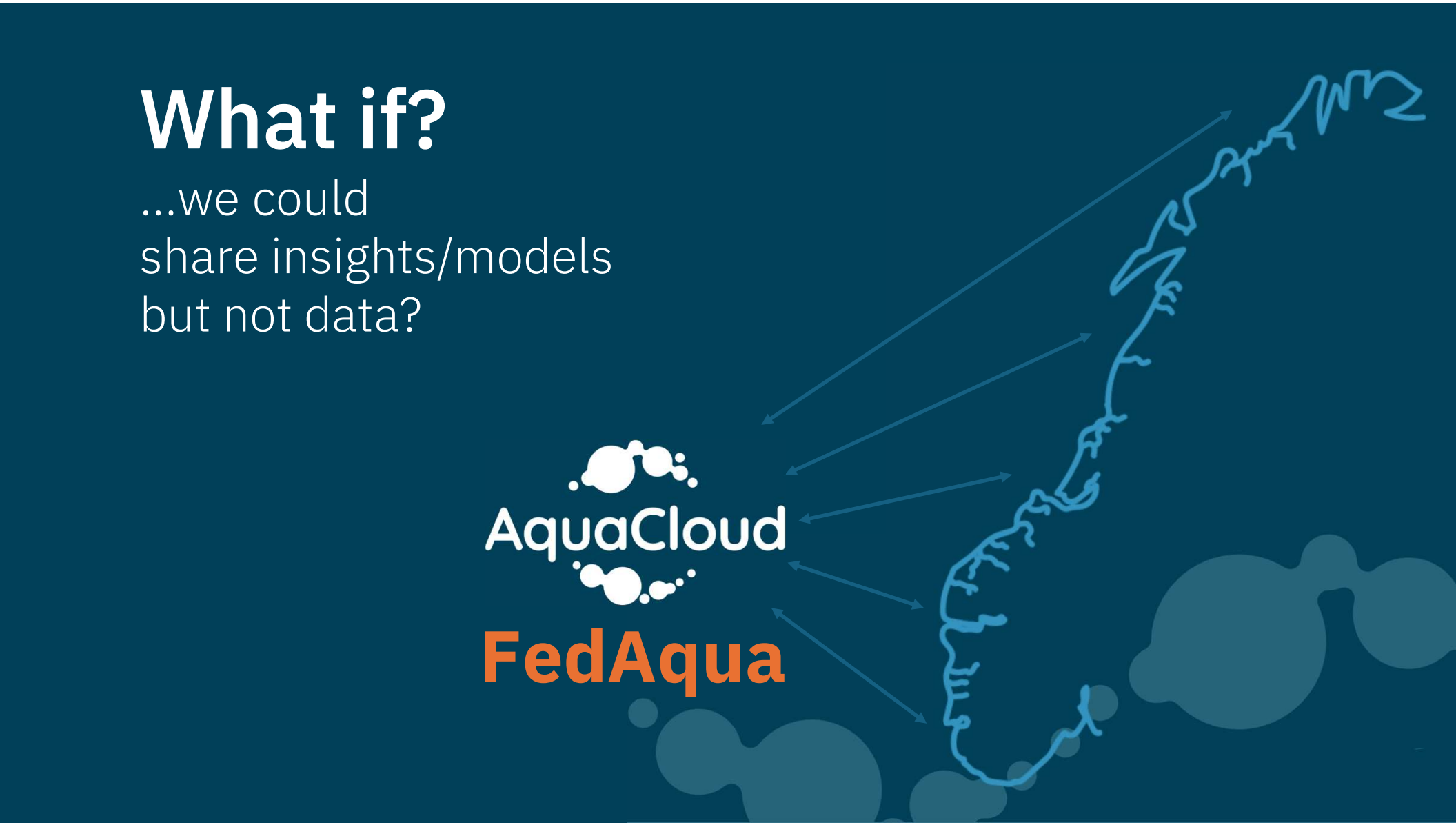
... AquaCloud data
was available
beyond sensitivity
to enhance any context?

AquaCloud Today

- Unique centralized database as fundament for future AI
- Sensitive production data daily from ≈60% of salmon/trout biomass in Norway
- Reported and publicly available environment data
- Shared in the partnership, based on heavy governance agreement, regulating access and granularity based on rules around sensitivity and origin.

What if?

...we could
share insights/models
but not data?



AquaCloud Tomorrow - leveraging AI

- Models from all data used to enable better predictions, where data context normally is too small, or sensitivity prohibits sharing across partners in AquaCloud.
- Tools for testing the relevance or added value of AquaCloud data to a given context
- High resolution and volume environment data to enhance production insight
  - Standardized timeseries environment data from updated standard and stream API, and sharing solution, open for all.
- AquaCloud insight for all
- Promotes the value of data sharing, and simplifies onboarding to AquaCloud

Why federated learning?

- More data, better models
- Improved decision making, increased value creation

How to improve AI systems?

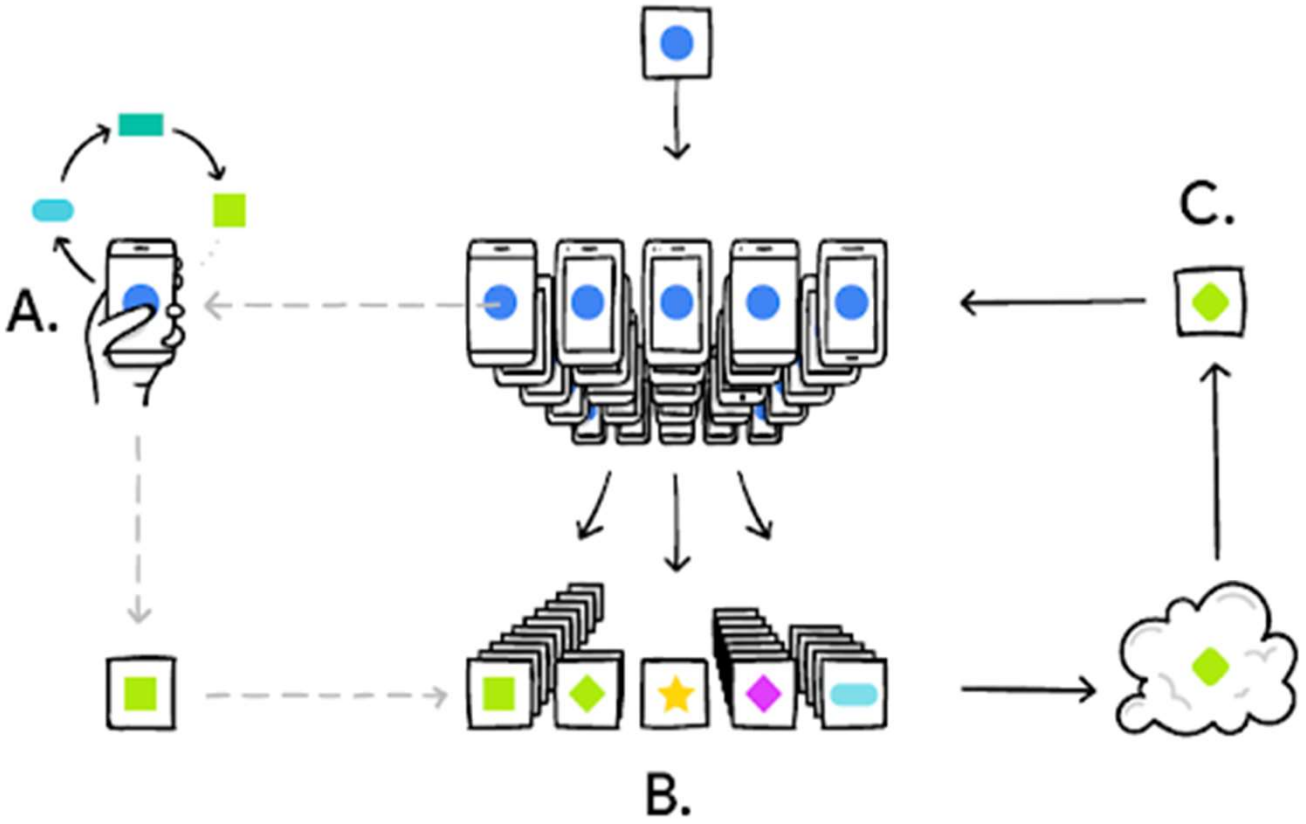
AquaCloud NORCE

- Better machine learning algorithms
- More compute
- Large amounts of high-quality training data

How to get access to more data?

- Most relevant data owned by someone else
- Proprietary industry data
- Cannot share with competitors

Federated learning in everyday use



Google Research

- Train models on data from mobile devices
- Do not expose user data
- Federated learning

Federated learning in an industry setting

AquaCloud NORCE

NCE
Finance
Innovation

E24! E24+ TIPS OSS SØK

Privatøkonomi | kategorier

Schibsted E24 er en del av Schibsted. Schibsted er ansvarlig for dine data på denne siden. Les mer her

Tre forsikringskjemper satser på kunstig intelligens for å avsløre juksere

I fjor ble det oppdaget forsikringssvindel for en halv milliard kroner. Nå går tre selskaper sammen for å oppdage enda mer.

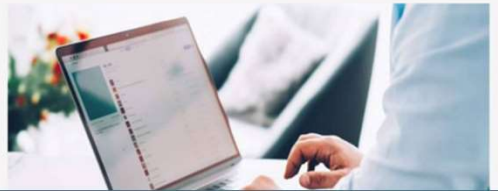
FINANSWATCH

Tryg om forsikringssamarbeid: – Vi samarbeider med armlengdes avstand

Tryg, Frende og Fremtind samarbeider om datadravet svindelkartlegging. – Da kan vi i større grad avdekke der det er ugler i mosen. Det innebærer at vi kan avsløre en større andel svindel som kommer kundene og selskapet til gode, samtidig som det reduserer et samfunnsproblem, sier Karl Ove Aarbu, analysesjef i Tryg, til FinansWatch.

Frende: – Vi får et større univers trene maskinlæring på

Forsikringsselskapet kjører nå et pilotprosjekt der de samarbeider med Fre og Tryg for å redusere svindelforsøk. Roald Heie, leder for business intelligence-senteret i Frende, sier til FinansWatch at de oppfordrer andre forsikringsselskapet til å bli med i samarbeidet.



FINANSWATCH

Bank | Forsikring | Pensjon | Kapitalforvaltning | Regulering | Fintech

Fremtind oppdager svindelsaker for rundt 45 millioner hvert år

Årlig avdekker forsikringsbransjen svik og svindel for 500 millioner kroner, mens Fremtind forventer å politianmelde ti ganger så mange svindeltilfeller som de har gjort til nå. – Svindel er et stort samfunnsproblem som ikke ett forsikringsselskap kan løse alene, sier Roy-André Sørheim Lyngbø.

Roy-André Sørheim Lyngbø, leder for utredning i Fremtind. | Foto: Fremtind

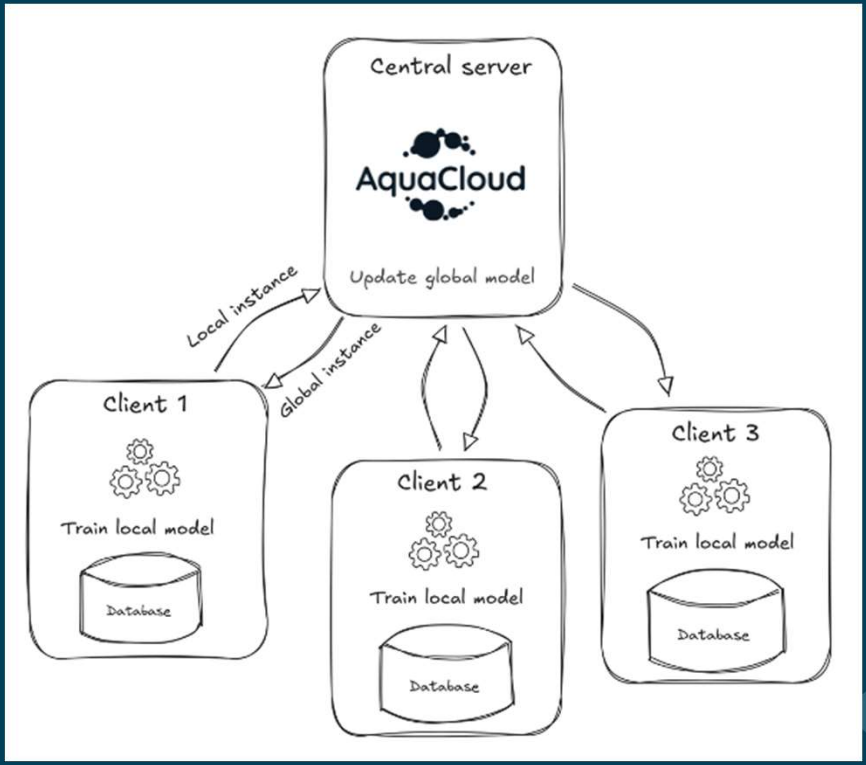
Les også

Kron estimerer med nye pensjonsavtaler tilsvarende 100 millioner

Rettssak om pandemiforsikring:

Centre of Expertise

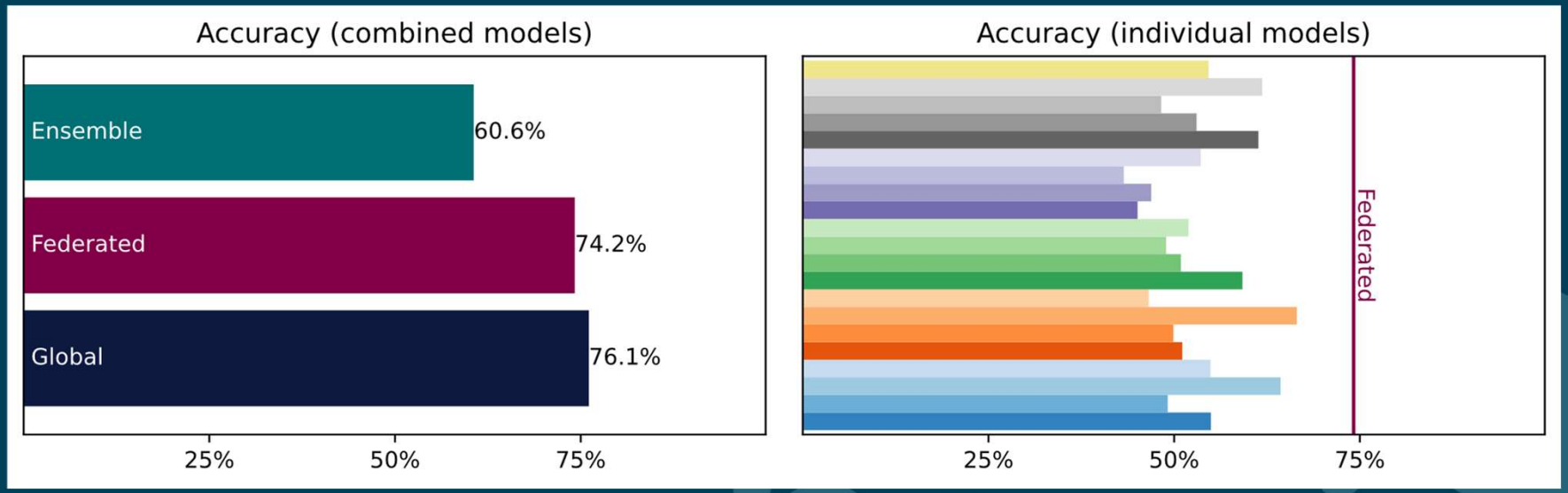
ML vs federated ML



- Conventional ML trains on centralized data.
- Federated ML uses decentralized data.
- Trains locally at each client, orchestrated by a server, to iteratively update a global model
- No exchange of training data

Federated ML performance

- Federated model almost matches full dataset model in accuracy
- Federated model show up to 50% improvement in accuracy, over individual model.

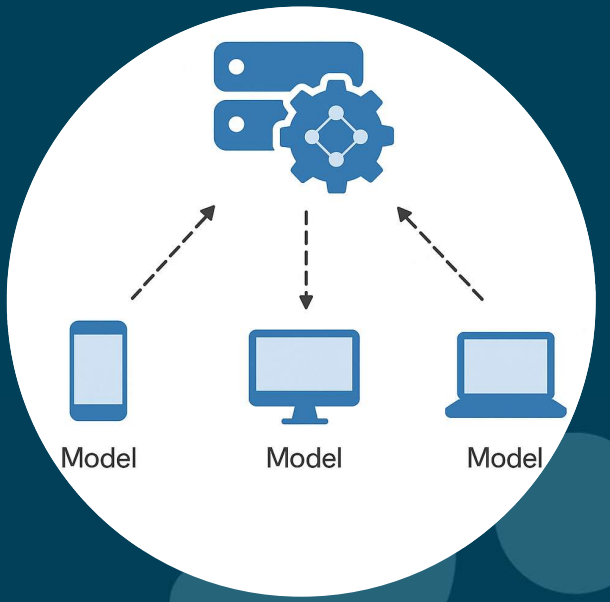


Accuracy = Percentage correctly predicted by model

Challenges and research tasks

How can we:

- Build a federated platform offering a self-service solution to data scientists and analysts?
- Give the users tools for doing explorative data analysis and modelling on relevant (regional) data without exposing sensitive information?



FedAqua status and plans

- Primo 2025: Pre-project to evaluate methodology
- Ultimo 2025: Phase 2 to investigate geographical scale to preserve confidentially and what types of aggregated data and descriptive analytics can be safely used.
- 2026 --> Build services and infrastructure

Continue developing AquaCloud database as unique source for leveraging AI for Norwegian aquaculture.

AquaCloud

Rune Smistad

- Senior Project Manager

rune@aquacloud.ai
+47 900 93 739

NORCE

Anders Sleire

- Manager NORCE Analytics

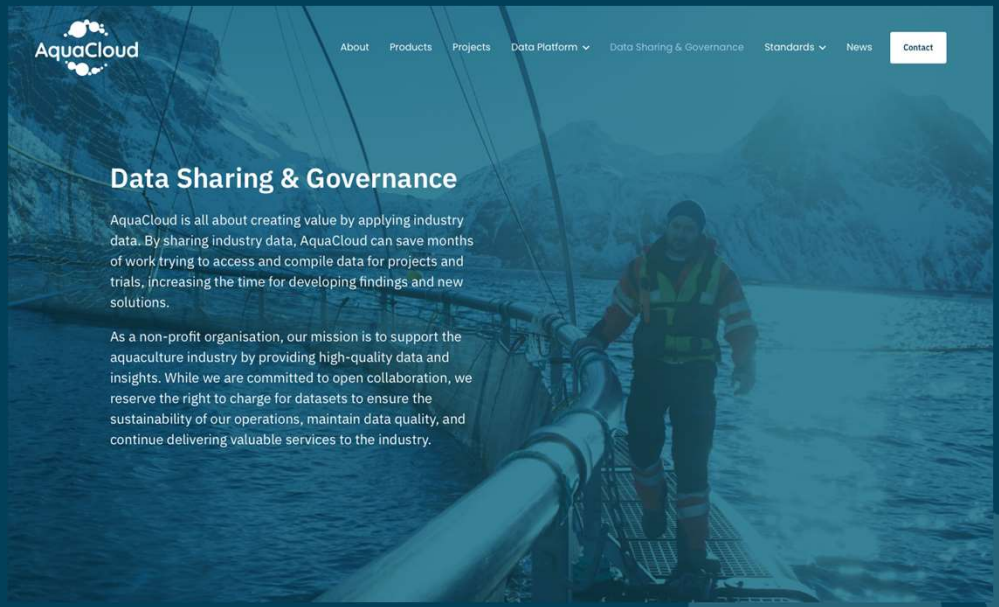
ansl@norceresearch.no
+47 916 20 691

AquaCloud

Exploring federated learning with AquaCloud

The experiment

- We use standardized data from several owners: Inventory, environment, lice, and treatment
- 80% of the data is used to train models
- 20% of the data is used to evaluate models

Models

- ***Global:* Trained on centralized data**
- ***Federated:* Trained on distributed data**
- *Individual*: Trained on one owner's data
- ***Ensemble:* Average of individual models**