



Bringing new technology to the ocean

How digital innovation empowers
the aquaculture industry to
operationalize sustainability

Background

More than 70% of the earth’s surface is covered by water. With nearly 40% of the world’s population living in proximity, a mere 2% of the world’s food production stems from the ocean.

At the same time, as more than one billion people remain malnourished and the world’s population continues to increase, experts point to the ocean as a primary food source with great potential to support humanity’s needs.

Realizing this potential will require the creation of a resilient digital ecosystem—and to remain at the forefront of this development, organizations in the aquaculture industry must be able to scale by digitalizing operations that improve business outcomes and increase sustainability.

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Leaders look to AI to combat climate change

A survey conducted in 2022 by AI for the Planet Alliance and Boston Consulting Group reveals that 87% of leaders believe artificial intelligence (AI) will play a key role in fighting climate change, but only 43% have a vision for how this will happen.

Source: [Report from AI for the Planet Alliance, Boston Consulting Group, and BCG GAMMA](#)

Global demand for aquatic foods set to nearly double by 2050

The world is likely to eat twice as much seafood by 2050 compared to 2015. According to a study on blue foods, the authors predict a staggering 80% rise in global fish consumption by the middle of the century. Additionally, they anticipate a nearly twofold increase in the overall weight of the world's fish harvest, including shells, guts, bones extracted from the water.

The research also highlights:

- A total of 2,500 fish species, invertebrates, algae and aquatic plants are caught or cultivated specifically for food.
- Two-thirds of the blue food consumed by people is sourced from small-scale fisheries and aquaculture.
- 3 billion people get vital nutrients and 20% of animal protein intake from blue food.
- 800 million people rely on blue food systems for their livelihoods.

Source: [The Blue Food Assessment](#)

Global seafood market to reach \$155.3 billion by 2030

According to a report from Global Industry Analysts, Inc. from January 2023, the global seafood market—estimated at 116.8 billion US dollars in 2022—is expected to reach 155.3 billion US dollars by 2030.

Source: [Seafood global strategic business report](#)



The start of a synergy

Cognizant is collaborating with Tidal, a project inside X, Alphabet's Moonshot Factory, to make Tidal's ocean information platform widely available to the aquaculture market. Through longstanding relationships with global enterprises in the blue economy, Cognizant will be able to help companies integrate Tidal's technology into their systems. This integration will enable businesses to connect data and gather valuable insights to make decisions that improve efficiency throughout the entire value chain.



Stig Martin Fiskå - Global Head of Cognizant® Ocean

Through this comprehensive approach, our partnership allows for the development of robust systems that address blind spots and enable organizations to make timely and informed decisions to improve outcomes.

The primary focus is to create an enhanced decision-making model that improves sustainability and growth. This strategic collaboration aims to provide solutions that not only benefit the environment but also create lucrative business opportunities for organizations relying on a healthy ocean.

The solutions

Tidal was looking for an experienced partner with global reach that could deploy, support and integrate their newly tested and proven technology for the aquaculture industry.

With Cognizant's proven track record and industry knowledge, this partnership was seen as a significant stepping-stone toward helping maritime companies improve their operations while protecting the ocean—resulting in major global adoption.

We believe that digital transformation holds the key to tackling an unpredictable and rapidly evolving environment. By embracing this approach, organizations can become more resilient while helping solve humanity's most pressing challenges. We're committed to collaborating with Tidal to overcome challenges hindering increased food production—such as finding solutions to renewable energy utilization, addressing climate change concerns, and working towards the decarbonization of the ocean.



Craig Churchill - Chief Business Officer, Tidal

Cognizant's more than 355,000 experts dedicated to engineering modern businesses to improve everyday life.

Our deep industry expertise and local presence make us a reliable partner.

Over the past 25 years, we've built relationships with market-leading companies around the world.



30/30

Top global
pharma
companies



9/10

Top European
banks



6/10

Top internet
companies



23/25

Top healthcare
plans

Pushing technology to the next level

Tidal's technology has been tested and validated in Norway

Over the past four years, Tidal has been testing their underwater camera system and machine perception tools off the coast of Norway with the world's largest salmon producer.

Tidal identified an opportunity to use fish farming technology to improve production planning for the aquaculture industry. The goal was to give farmers more insight to learn what happened underwater by partnering with experts in robotics and exploration. The team developed a system of cameras, sensors and tools to monitor vision and motion. Tidal tested the system in different locations—from protected fjords around the Arctic Circle to the open ocean in the North Sea—where environmental conditions like temperature, currents and the power of waves varied.

The technology has been installed, tested and optimized in over 500 different pens, and has generated 8 billion observations across 900 terabytes of operational video with 98% accuracy.

Today, the Tidal system can continuously monitor fish underwater while surviving in some of the world's harshest oceanic conditions with freezing temperatures, salt water, and strong currents.

Resilient in harsh conditions

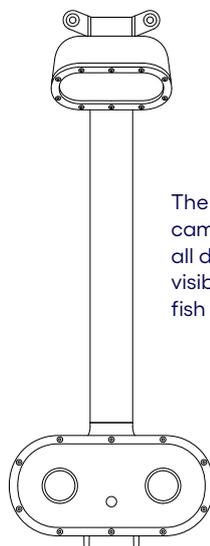
Designed to withstand freezing temperatures, corrosion and strong currents in remote locations

360 degree visibility

By rotating 360 degrees, the camera captures a complete underwater view

Machine learning

Machine learning makes it easy to quickly process and interpret images in remote locations.



The "Hammerhead" camera adjusts in all directions for full visibility inside the fish pen.

Intelligent production planning

The technology focuses on intelligent production planning. It leverages camera systems, big data, artificial intelligence and machine learning technologies in four broad use cases:

- Feeding automation
- Biomass estimations
- Sea lice estimations
- Fish welfare

And building long-lasting relationships with farmers allows for further implementation of the technology throughout the value chain.

Tidal's software works with any device, anywhere—removing the dependency on extensive edge computing and special devices.

Tidal's ocean information platform

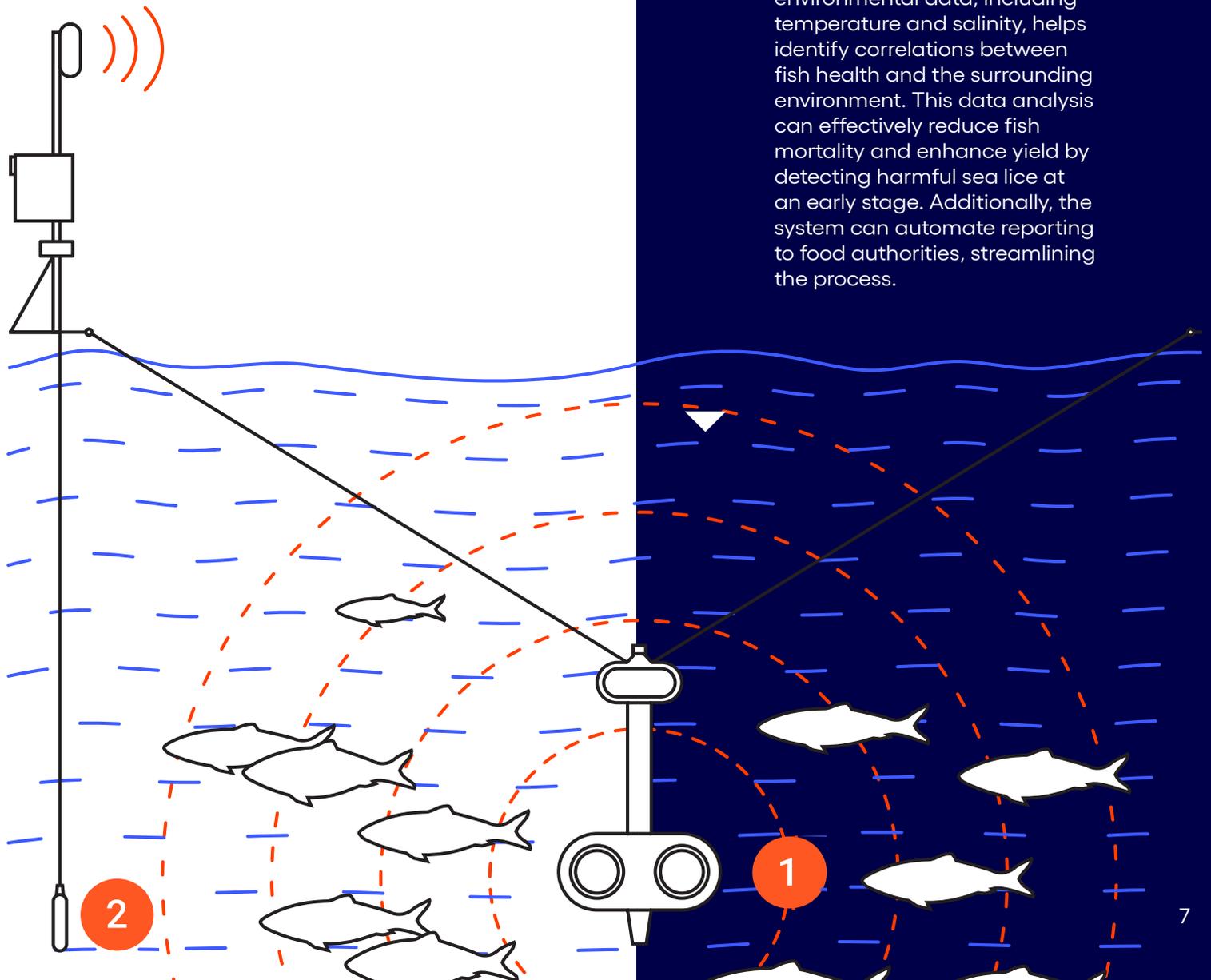
Tidal's underwater camera and machine perception tools can interpret complex oceanic environments.

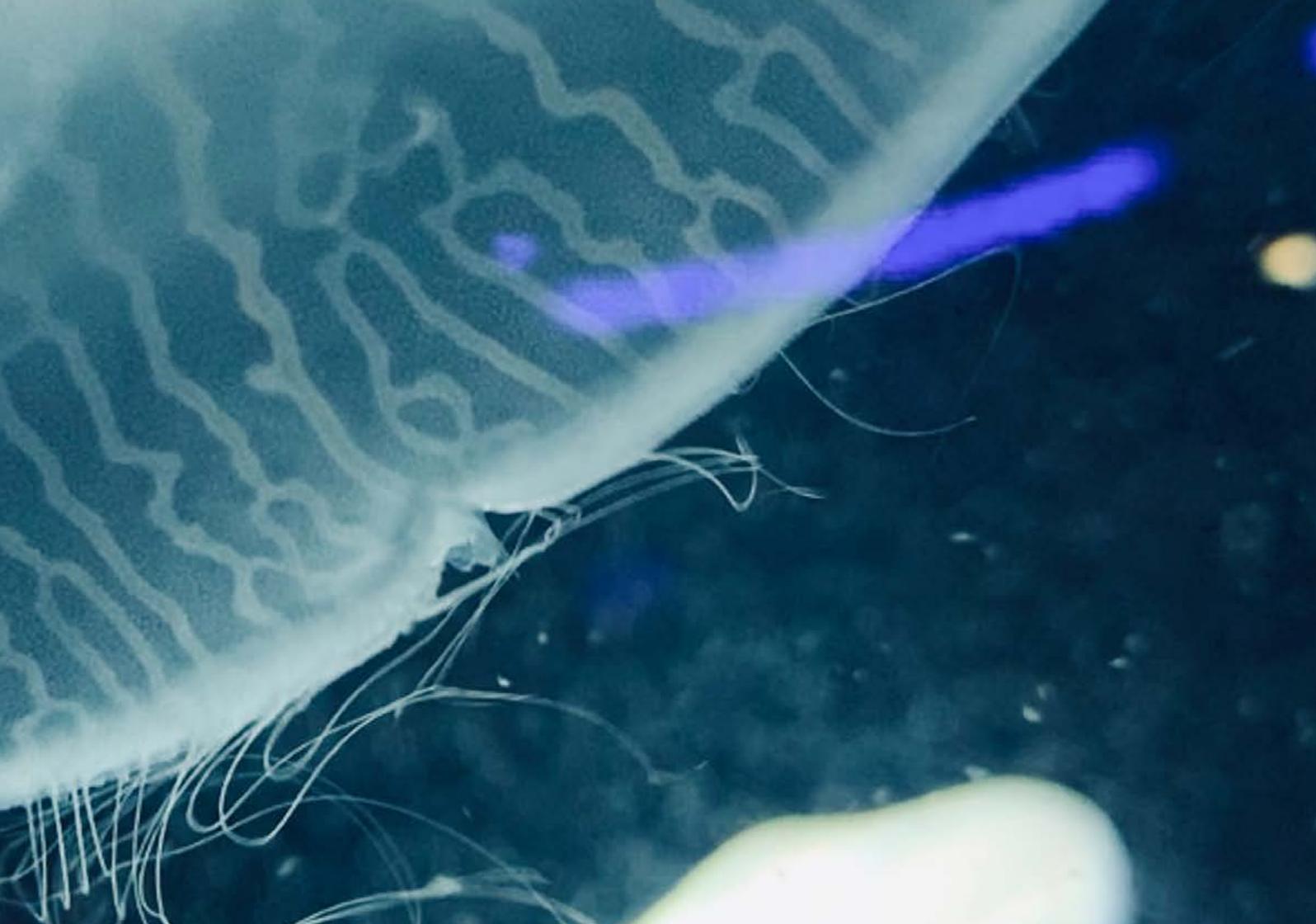
1. Camera and computer vision

The continuous gathering and interpretation of images enables farmers to gain insights into the growth of fish, identify diseases, and monitor feeding behaviors. For instance, farmers can access historical feeding summaries that include key parameters such as feed rate, total feed amount, pellets distribution heatmap, temperature and dissolved oxygen.

2. Environmental sensors

Collecting a combination of environmental data, including temperature and salinity, helps identify correlations between fish health and the surrounding environment. This data analysis can effectively reduce fish mortality and enhance yield by detecting harmful sea lice at an early stage. Additionally, the system can automate reporting to food authorities, streamlining the process.





According to a recent Gartner study, 80% of executives think automation can be applied to any business decision

The study also highlights:

- One-third of organizations are applying AI across several business units
- 40% of organizations surveyed have thousands of AI models deployed
- On average, 54% of AI projects make it from pilot to production
- Talent is not a significant barrier to AI adoption, with 72% of executives reporting that they have, or can source, the talent they need

Source: [Gartner.com Press Release](#)

Use cases

Realize business value through sustainability-driven solutions

1. Automated feeding

Up to 60% of fish farmers' operating costs are connected to feeding. Any improvements to feeding accuracy will benefit the farmers' bottom line while protecting the ocean ecosystem.

Excess feeding is not only expensive—it also amplifies pollution with sinking pellets gathering under the pen. Tidal's camera system combines advanced computer vision with artificial intelligence and machine learning technologies.

The technology helps operators create an accurate feeding routine by tracking behavioral cues and micro expressions and measuring remaining pellets.

The systems can be used to fully automate feeding for multiple pens over multiple geographical areas—reducing the cost per kilogram harvested.

2. Accurate biomass estimations

The new technology also allows for advanced biomass estimations with an accuracy of 98% giving operators insights into how much protein they are growing at any point in time. This is vital to the fulfillment of pre-negotiated contracts, which are often very specific about the size and weight of each fish.

By having accurate insights, fish operators can grow even more protein

A site license sets a maximum mass limit for farmers' production. By utilizing Tidal's technology, they will have access to real-time data and precise predictions regarding their biomass production.

Accurate biomass estimations allow for price optimization

By leveraging real-time information about the quantity of fish in each weight category, along with knowledge about necessary contract fulfillment and the prevailing spot price, organizations can strategically optimize their sales orders. This enables them to maximize their returns through more efficient harvesting practices.

This enables operators to make informed decisions and strive to reach as close to the limit as possible to maximize the production potential of each site.



3. Addressing sea lice outbreaks

One of the farming industry's biggest problems is salmon lice. This is the most common type of parasite in farmed salmon and the numbers have increased considerably with the growth of the farming industry. Monitoring and preventing outbreaks has naturally been a major focus area for Tidal.

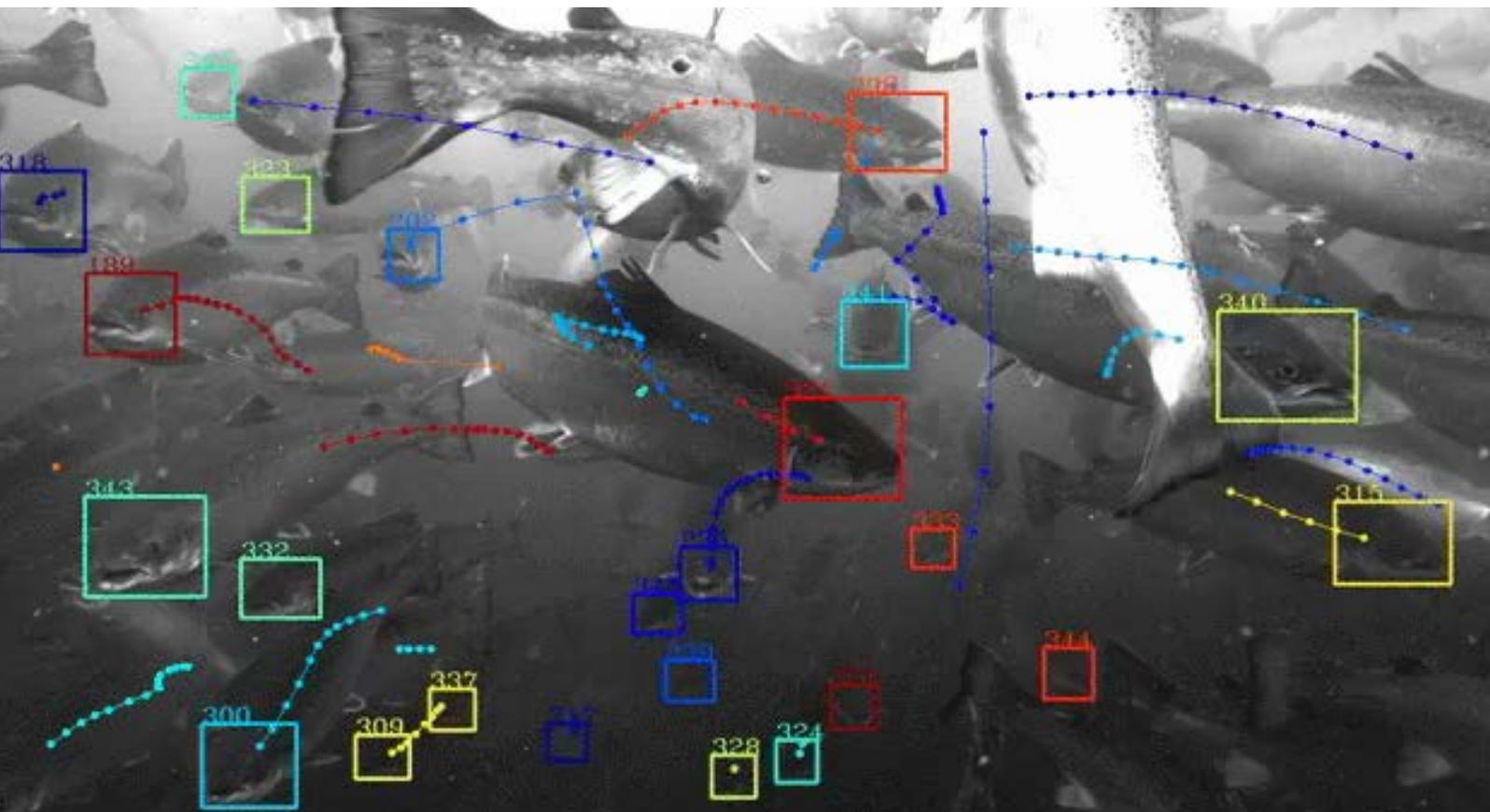
With each pen housing up to 200,000 fish, farmers have significant access to data. The real-time information captured by the cameras is fed into a computer system, providing an updated overview of the operations. This continuous data collection is powered by machine learning and artificial intelligence, transforming it into valuable insights.

We believe that digitalization will be the driving force to ensure the future growth of sustainable seafood.

Through a holistic approach to digitalization and innovation in the seafood industry, we'll establish resilient systems to address challenges. These systems will enable organizations to make timely and informed decisions, paving the way to sustainability.

4. Improving general fish health

Capturing visual diseases, including lesions and abnormalities, through camera technology is crucial to preventing disease outbreaks. The interpretation of data allows farmers to implement measures that limit spread and minimize damage.



Picture: Tidal's underwater system interpreting feeding behavior by tracking objects in the water

One out of six farmed fish die before reaching the dinner table

That's according to a new report from The Norwegian Veterinary Institute. The mortality rate in Norwegian waters was 16.1% for salmon in 2022—an increase from 2020 and 2021. The report also shows that costs related to diseases have increased and surpassed feeding expenses.

Source: [Research Council of Norway](#)



The time to market is now

The fish pen as a “black hole” is history

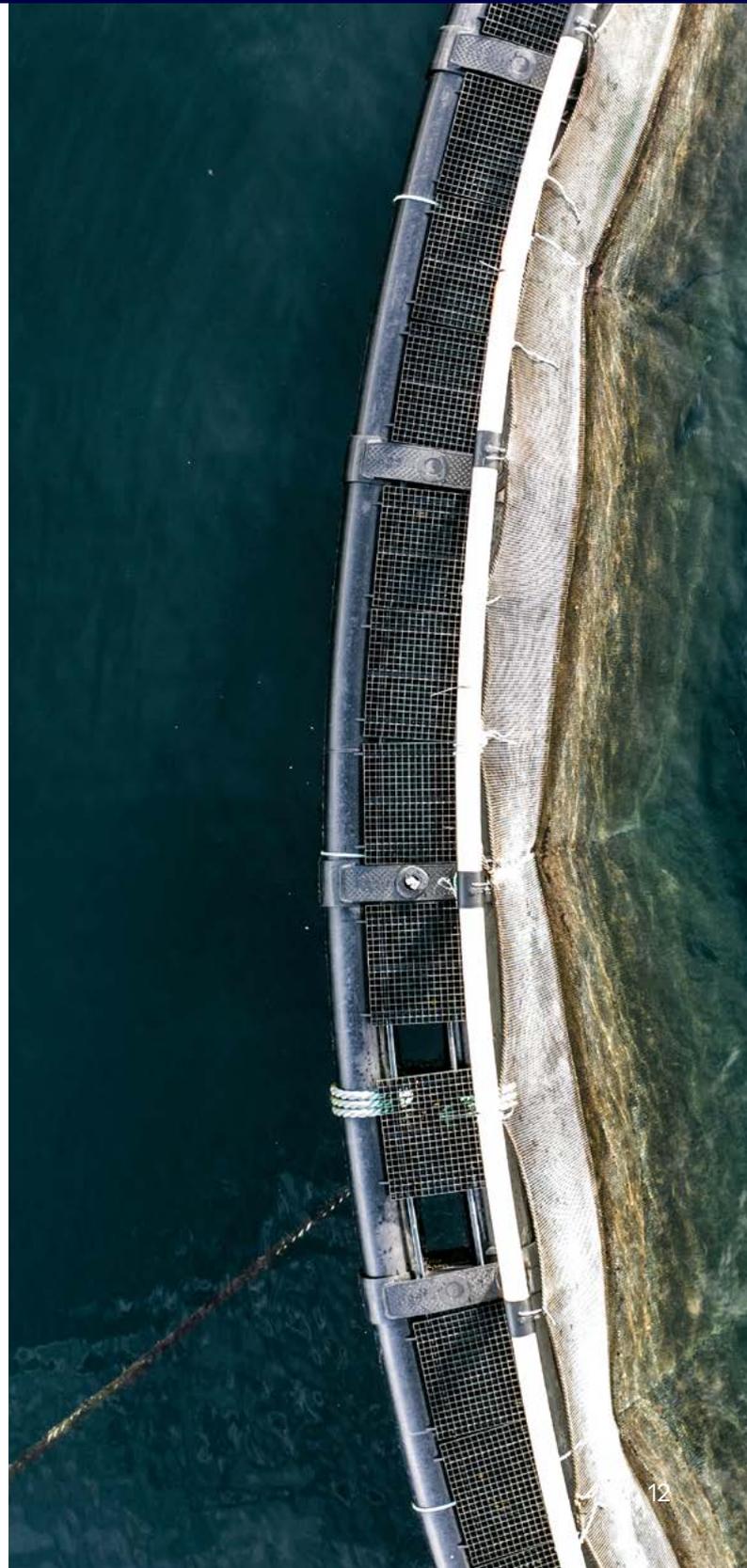
Within 48 hours, farmers can become more data-driven, sustainable and profitable fish producers

We're ready

This innovative technology is available now and can be quickly implemented along with a platform-based strategy that allows farmers to take advantage of existing algorithms and available technologies without major changes.

The solutions

The demand for solutions to these challenges has been present for a long time despite many organizations' attempts to solve them. Historically, the pen has been regarded as a black hole in terms of information. However, farmers can now access a genuine solution based on extensive research and development.





Accurate modelling

During the last years of development, Tidal trained its models on over 900 TB of video capture. 19.9 million fish were observed, enabling teams to build accurate models to improve core solutions.

Fish growth. Monitoring fish biomass makes it possible to make informed sustainable decisions on how to feed, what to sell and when to harvest based on reliable insights. Tidal's biomass detection provides a 98% accurate estimation of average daily weight with no manual effort needed.

Fish insights. Our solution helps farmers automate feeding based on key behavioral features, some of which happen in milliseconds. Farmers significantly save costs by reducing food waste—improving fish growth metrics, ensuring proper food amounts and reducing the impact of feed on the seabed.

Fish health. Detecting sea lice on the fish at an early stage and in real-time enhances fish welfare, quality, and yield. Tidal's solution effectively identifies various forms of sea lice, including mobile lice, adult females and adult females with egg strings. The system also allows for trend

analysis. Notably, Tidal is among the few companies authorized by The Norwegian Food Safety Authority, Mattilsynet, to report on lice levels.

Environmental sensors. Monitoring water quality—such as dissolved oxygen and temperature—helps farmers identify correlations between fish health and the surrounding environment.

A new era for fish farming

Using a collaborative approach, Cognizant will oversee all aspects of the digitalization, encompassing networks and support across the entire value chain within fish farming. Tidal will deploy the solution to assist customers with setup and integrations.

Looking beyond the pen

The aquaculture industry is entering a new era driven by a continuous search for innovative solutions to reduce cost per kilo while ensuring optimal conditions for the fish. Addressing complex challenges such as sustainable growth in aquaculture demands an approach that takes into account the diverse stakeholders involved—animals, humans and nature.

So, our partnership looks holistically at the industry, with a systems thinking mindset. In addition to the actual pens, we also consider the ecosystem impact of governments, feed production factories, hatcheries, processing centers, and retailers .

By understanding the roles and interactions between various stakeholders, we can identify opportunities that span and connect across the entire value chain. From feed production to salmon retailing and from water ecosystems to communities, we can leverage technology for a positive impact on nature, businesses and people.



We approach the ecosystem from multiple angles:

- Redesign of processes and routines
- AI-based automation
- Smart analytics for better insights and improved decision-making
- Assistance with new tool implementation and system integration
- Solutions to fit employees' needs

We create standardized processes and scalable solutions that offer agility and adaptability, fewer manual tasks and decreased human errors leading to efficient and streamlined operations that give organizations an intuitive edge.

About Cognizant

Cognizant (Nasdaq-100: CTSI) engineers modern businesses. We help our clients modernize technology, reimagine processes and transform experiences so they can stay ahead in our fast-changing world. Together, we're improving everyday life. See how at www.cognizant.com or @Cognizant

About Tidal

Tidal is a project within Alphabet division X. Tidal is developing new tools to protect the ocean while preserving its ability to support life and help feed humanity, sustainably.

See how at <https://x.company/projects/Tidal/>.



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