

sparos

I&D nutrition in
aquaculture

Tailoring your feeds

www.sparos.pt

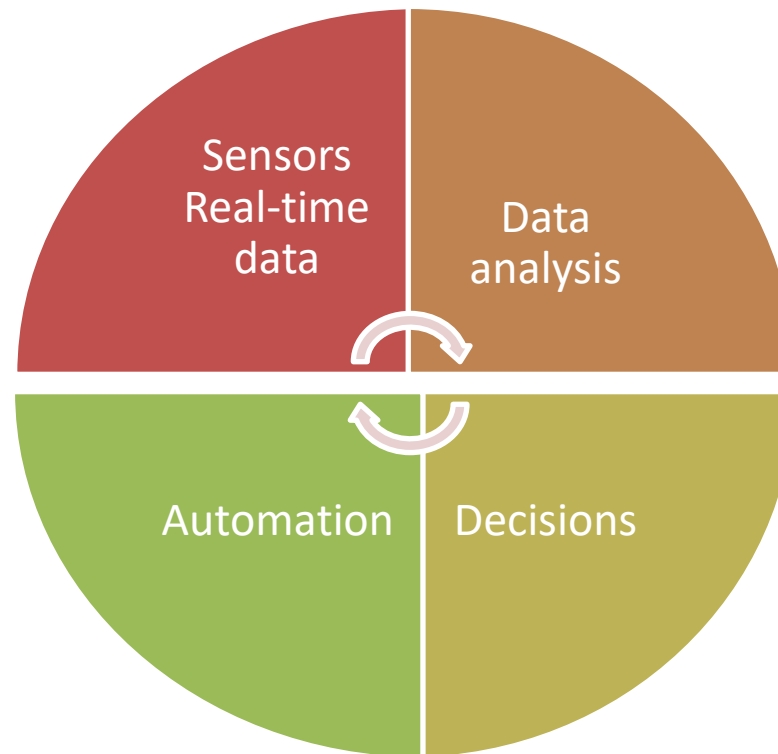


Smart-tools to integrate
knowledge and
optimize feeding in
aquaculture

WAS-APC Webinar
Digital Aquaculture

Luís Conceição
Co-founder and CEO

Precision aquaculture in Europe: Trends on digitalisation



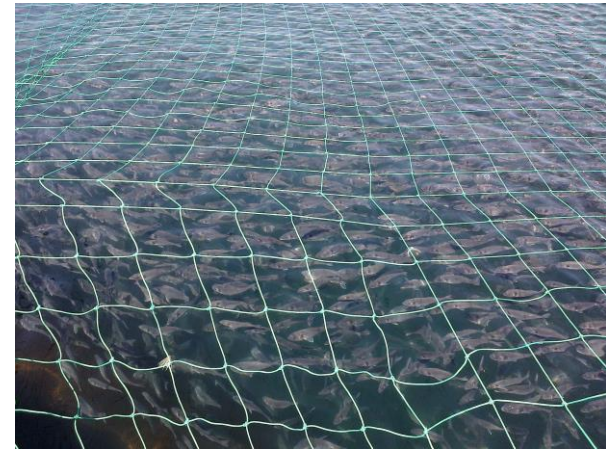
From empiric to knowledge based farming

Precision aquaculture in Europe: Trends on digitalisation

Today

- Surface camera
- Stereo video (UW)

Sensors
Real-time
data



- Fish behaviour (apetite & health)
- Fish numbers
- Fish biomass

Precision aquaculture in Europe: Trends on digitalisation

Today

- Recording Apps

Sensors
Real-time
data

- Temp
- O₂
- Feeding
- Abnormal behaviour
- Chlorophyll
- Turbidity
- Dissolved Organic matter



Farm
Management
Software



Precision aquaculture in Europe: Trends on digitalisation

Today

- Surface camera
- Stereo video (UW)
- Recording Apps
- Temp, wind, O₂

Sensors
Real-time
data

Data
analysis

- Data mining

Farm
Management
Software



Precision aquaculture in Europe: Trends on digitalisation

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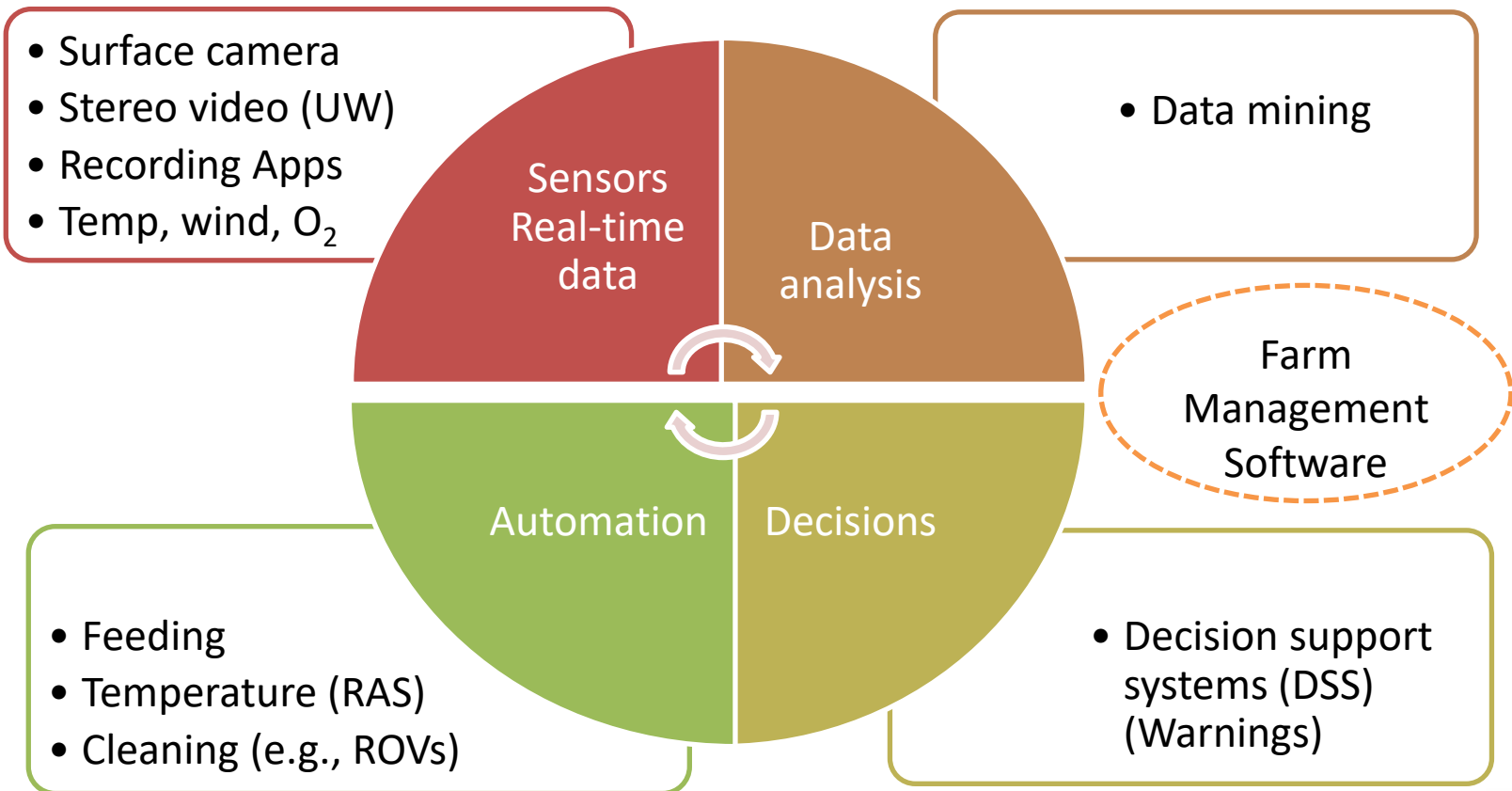
Farm
Management
Software

Decisions

- Decision support
systems (DSS)
(Warnings)

Precision aquaculture in Europe: Trends on digitalisation

Today



From empiric to knowledge based farming

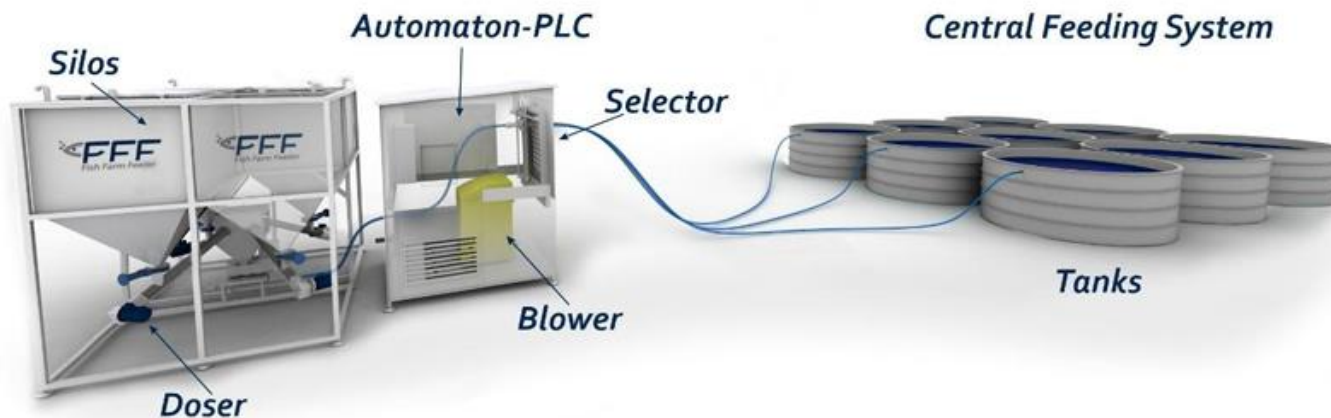
Tailoring
your feeds

Today

Precision aquaculture in Europe: Trends on digitalisation

Automation

- Feeding

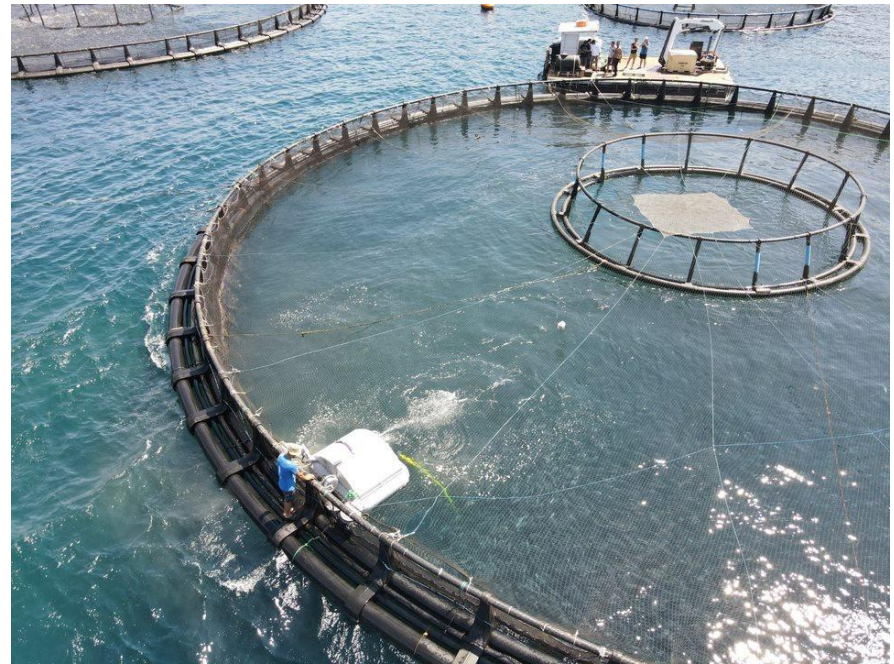


Precision aquaculture in Europe: Trends on digitalisation

Today

Automation

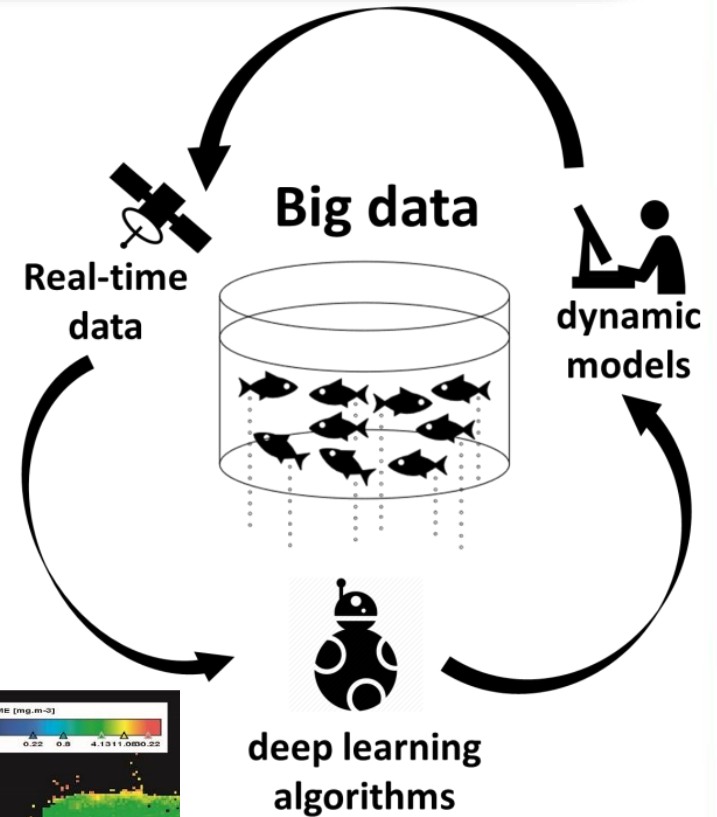
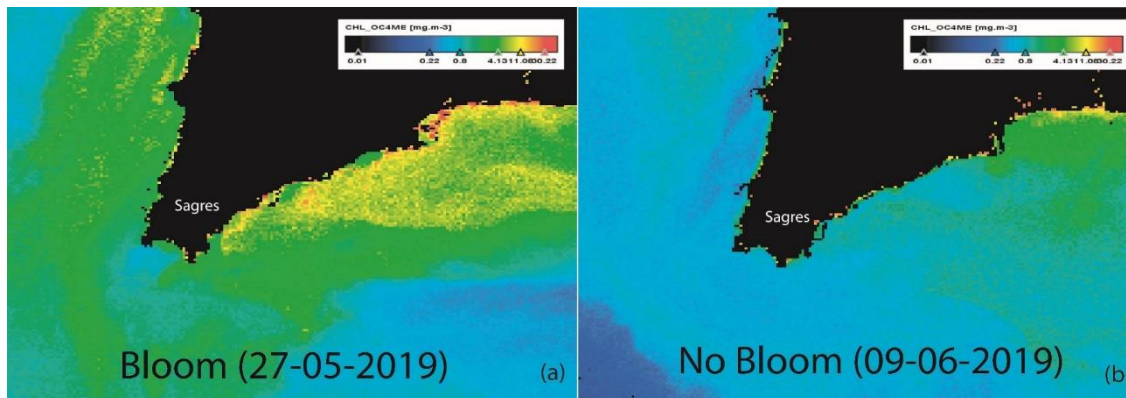
- Cleaning (e.g., ROVs)



Precision aquaculture in Europe: Several research projects



Application to prediction of Harmful algal blooms in Southern Portugal



Tailoring
your feeds

Precision aquaculture in Europe: Several research projects

Environmental data
in-situ

Meteorological data:
The Weather Company

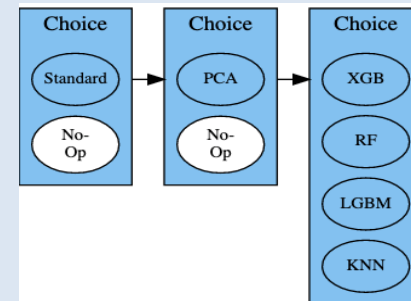


Models: Ocean data
Copernicus Iberian
regional forecasting
model (at resolution of
~1.8km)



Data: 2014 to Feb. 2021

“Machine Learning”
semi-automated

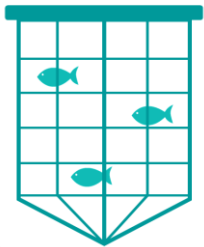


Production area closing
forecasts due to toxins in
SW Portugal: Successful in
88% of cases



Problem – Feeding optimisation

AT THE FARM



- Feed costs : 50% to 70% of production costs
- **Feeding strategies often based on trial and error**
- Sub-optimal farm performance and fish health
=> Higher environment impacts

AT AQUAFEED COMPANIES, UNIVERSITIES and R&D LABS



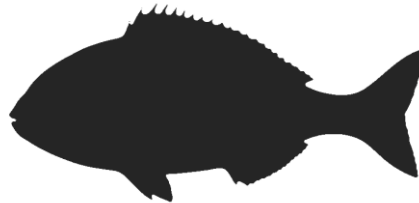
- R&D efforts not always efficient (many variables, interactions and long-term effects)
- Aquafeed performance dependent on farms conditions

Solution – A prediction tool

... where users can optimize feeding strategies
and get real time estimates:
from months to hours



Increase profits
by savings
on feed



Plan harvest dates
by getting
accurate predictions



Knowledge
benchmark
Production
data

Tool 1 - feedEst

Bioenergetic mathematical model



FEEDEST public web-app



<https://www.webtools.sparos.pt/feedest/>

- **Predict optimal feeding rates** for 3 typical feeds for gilthead seabream and European seabass
- **Predict growth**
- **Predict waste**
- **To be used with minimum input required**

Tool 1 - feedEst

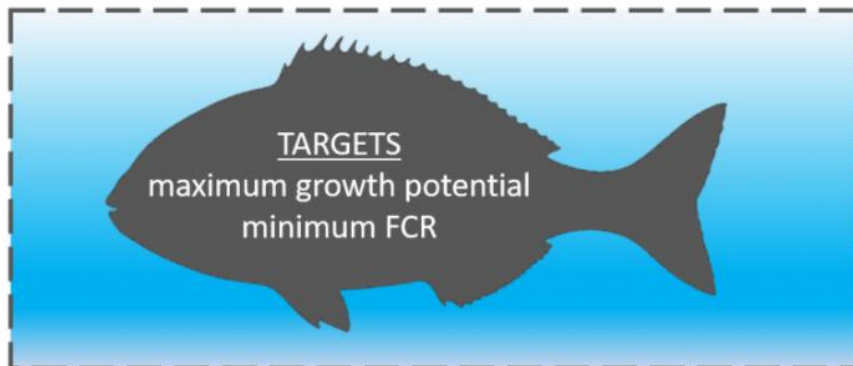
Bioenergetic mathematical model



INPUTS

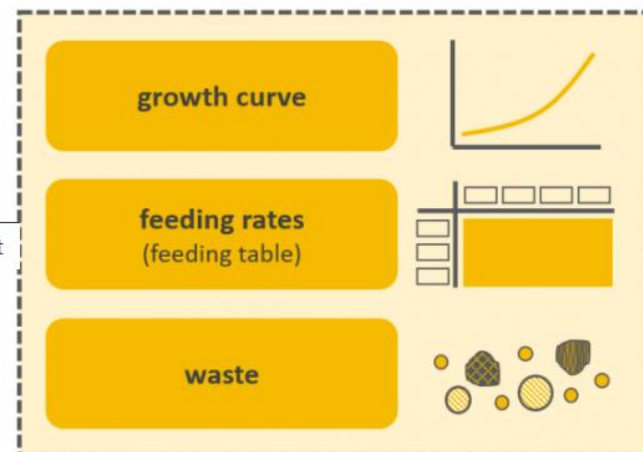


fish growth model



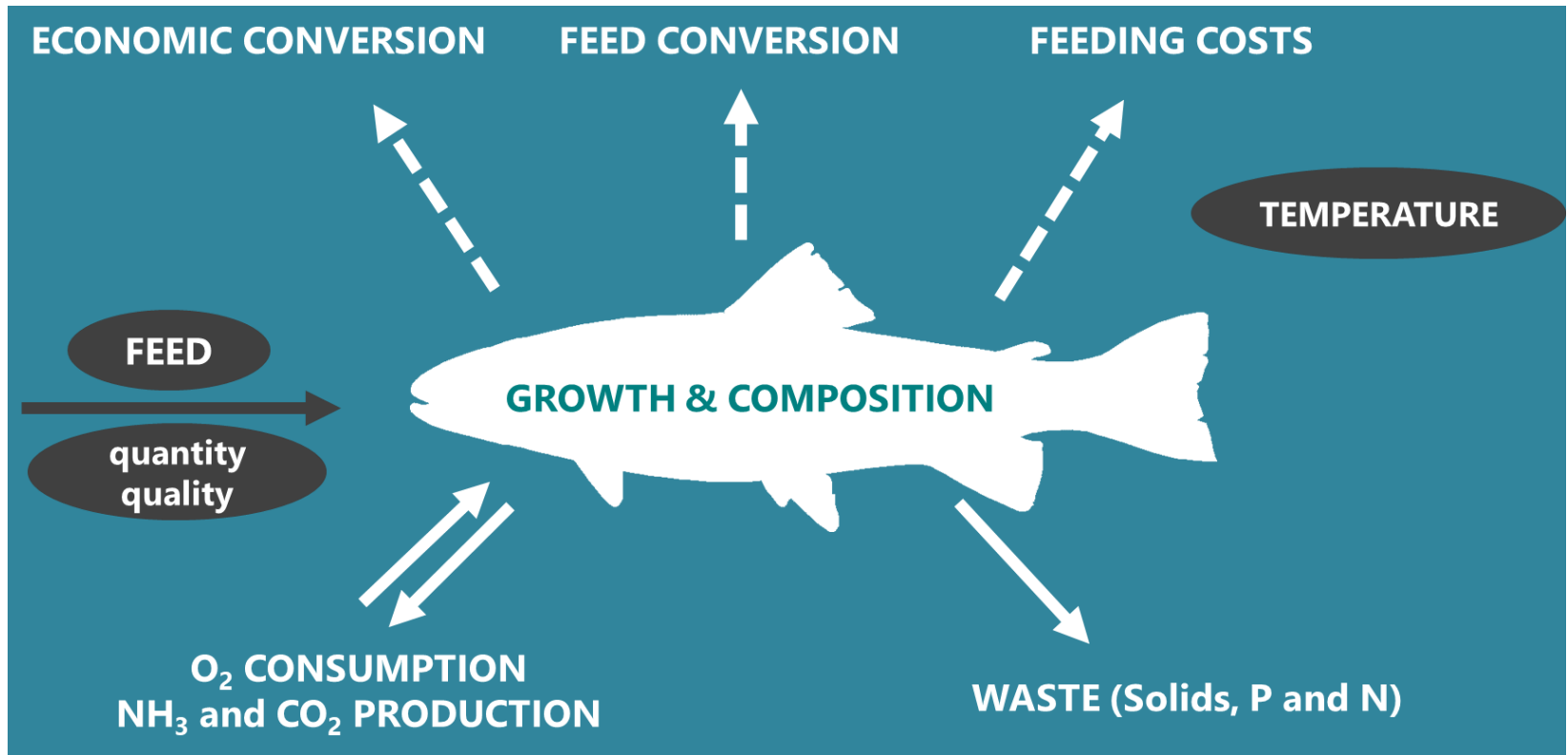
feedEst

OUTPUTS



Tool 2 - FEEDNETICS

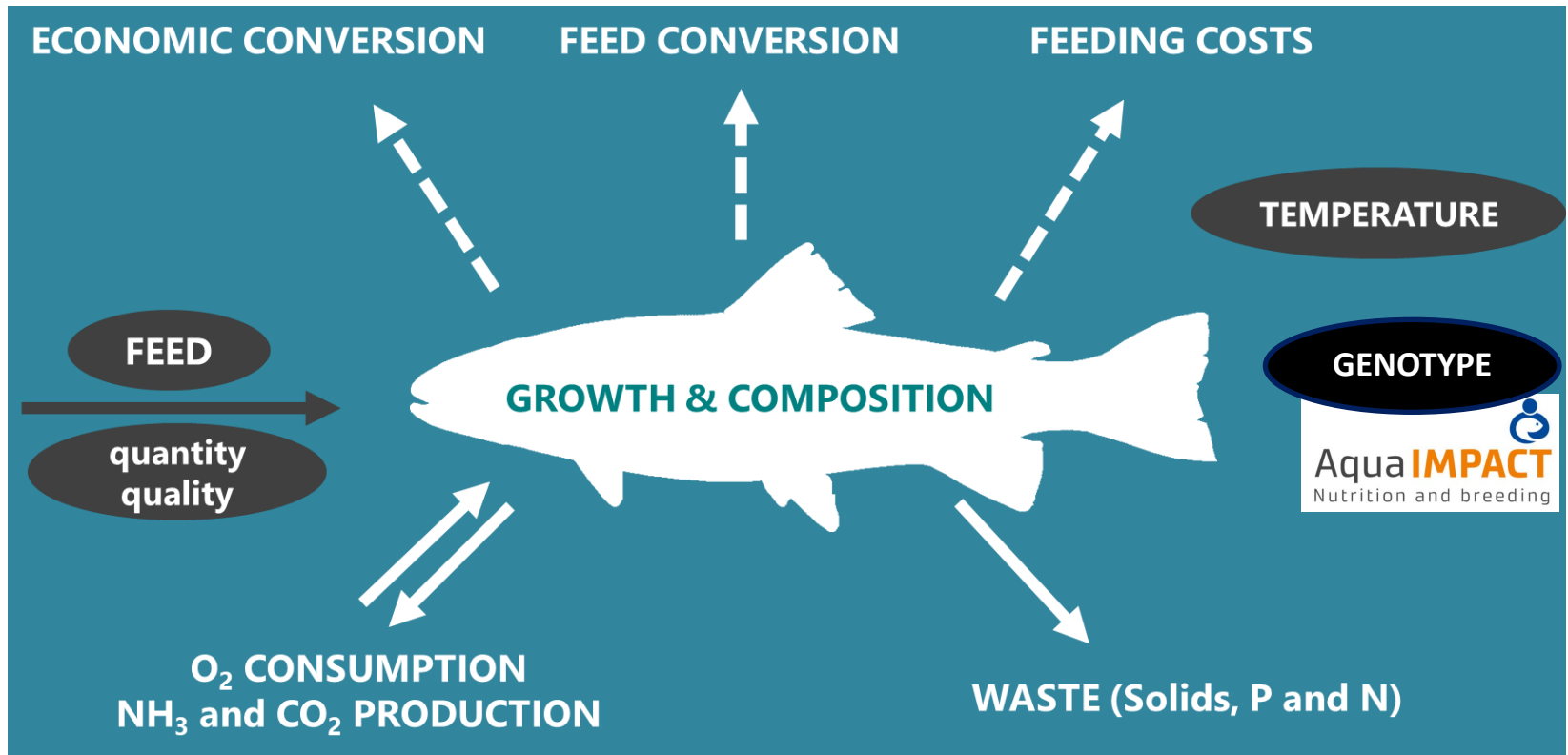
Nutrient-based mathematical model



User-friendly & flexible software

Tool 2 - FEEDNETICS

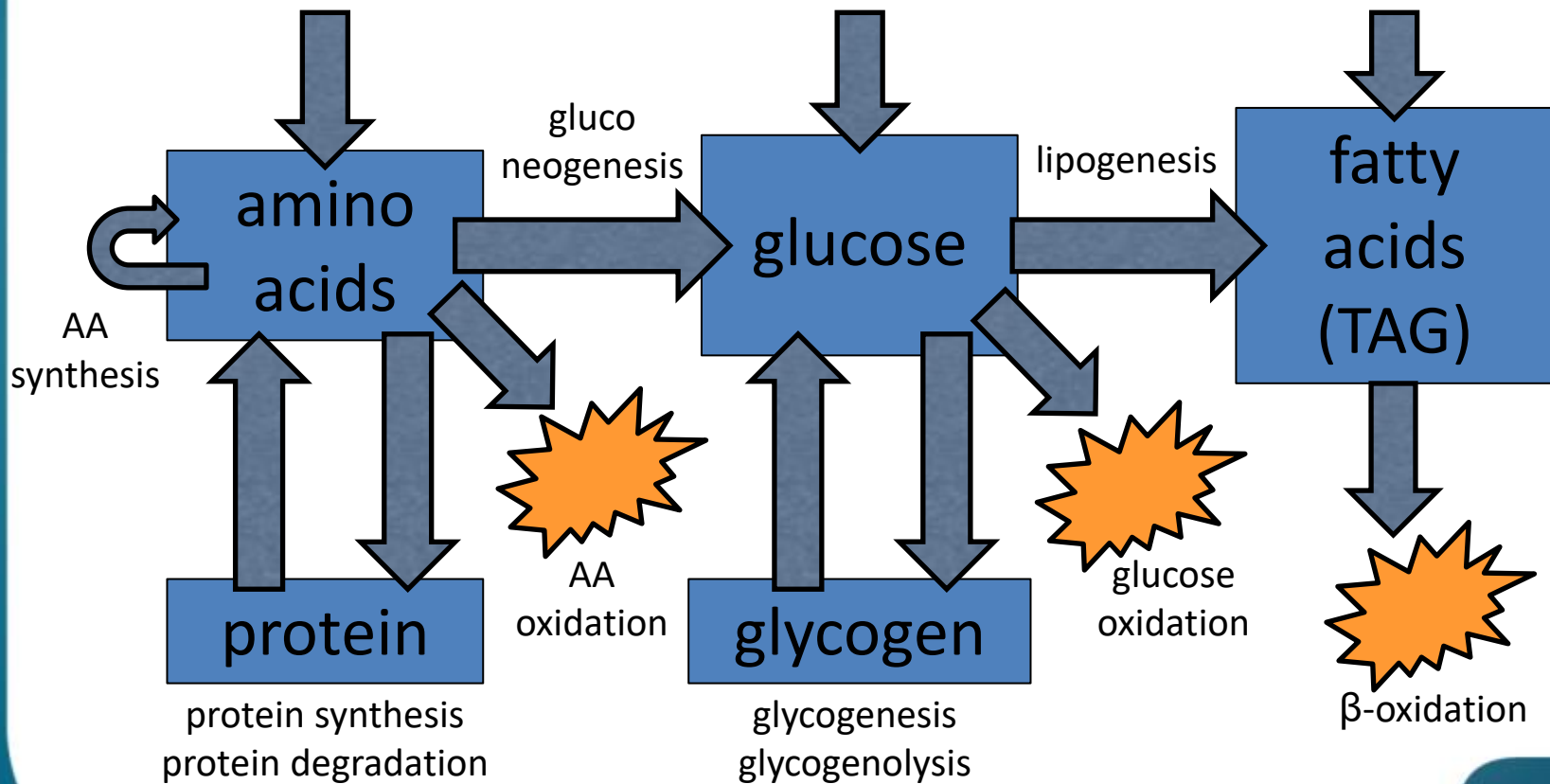
Nutrient-based mathematical model



User-friendly & flexible software

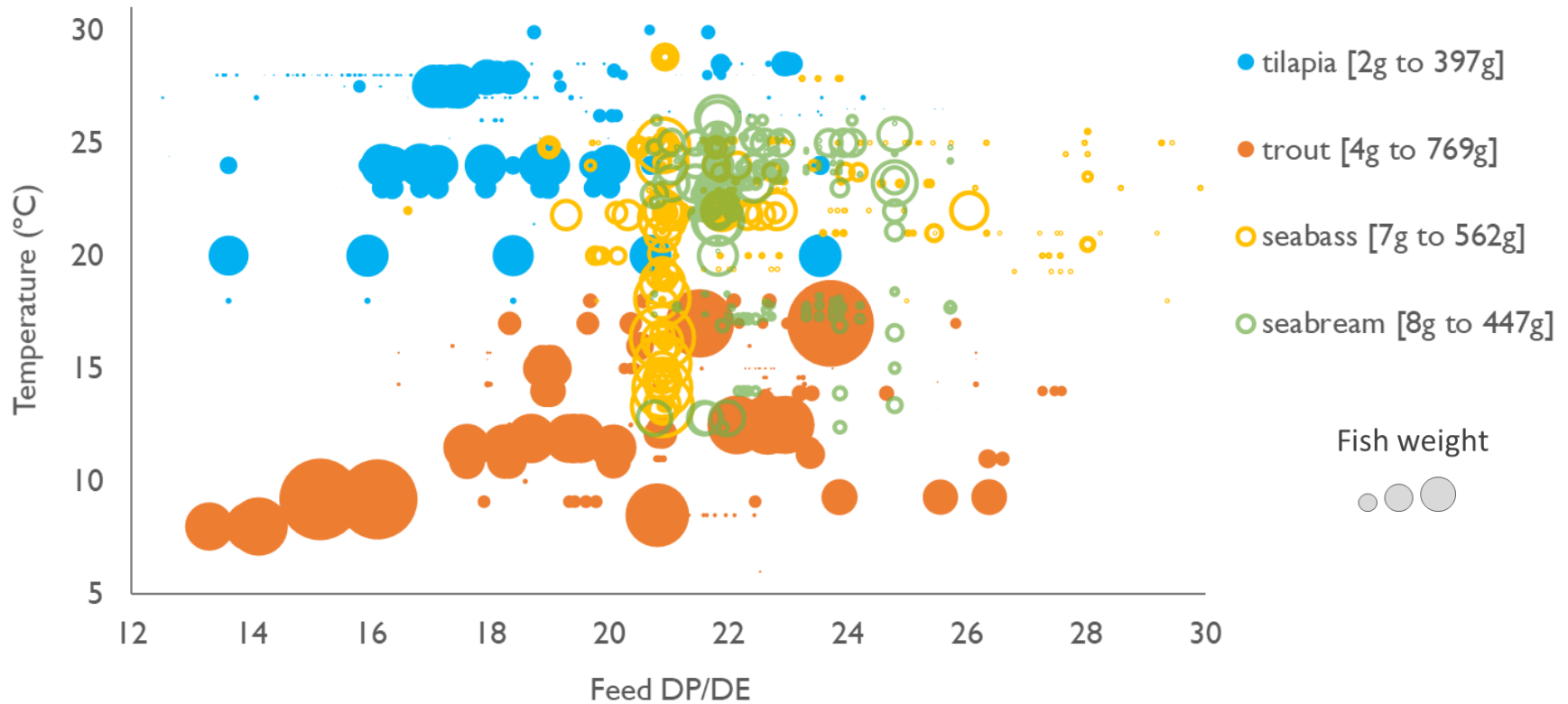
Tool 2 - FEEDNETICS

Feeding & metabolic processes drive feed use & growth



Tool 2 - FEEDNETICS

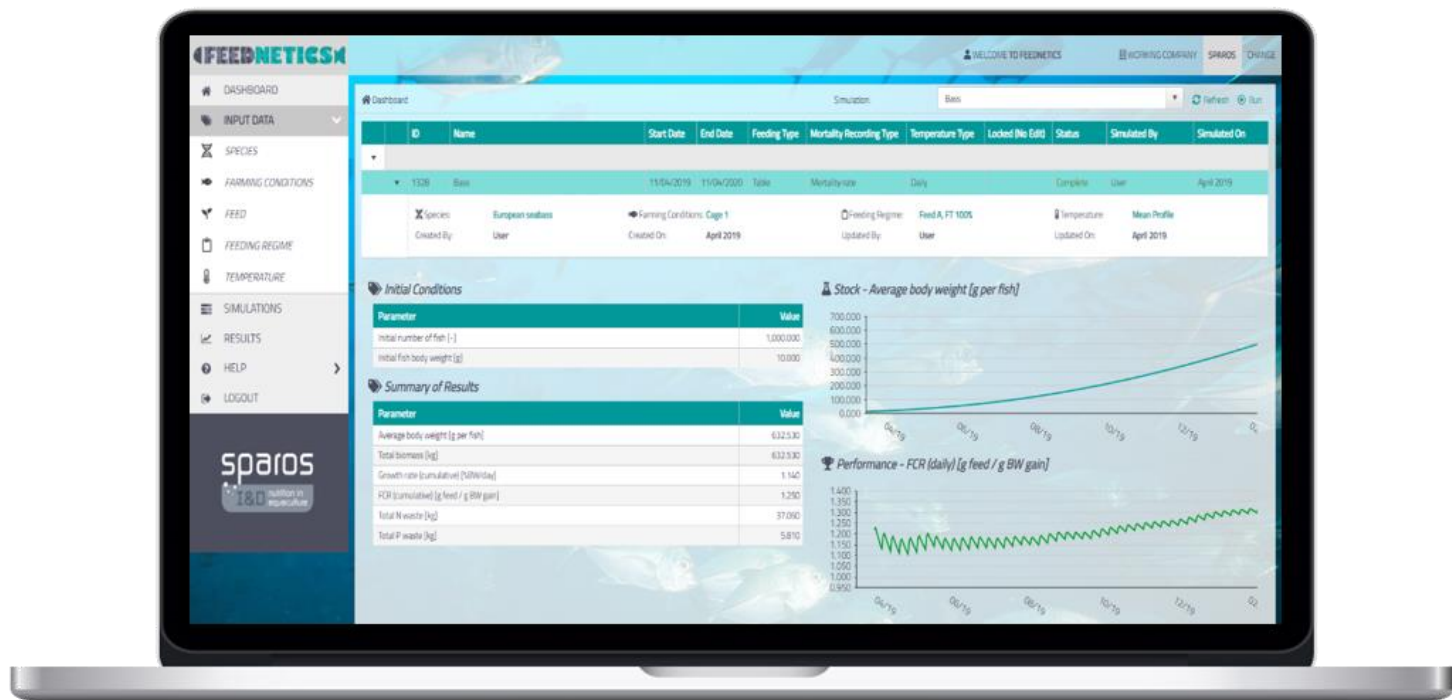
Data for Calibration (published and own data)



Tailoring
your feeds

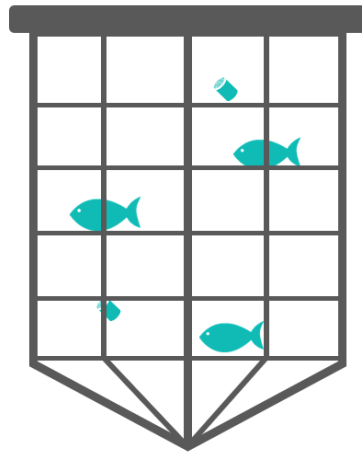
IT prediction tool

FEEDNETICS

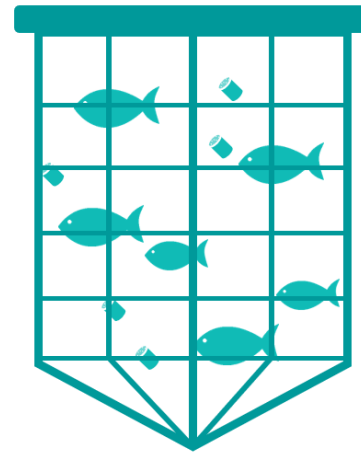


a prediction tool for fish farmers and
aquafeed formulators

A tool for fish farmers and aquafeed developers



~~Scenario A~~

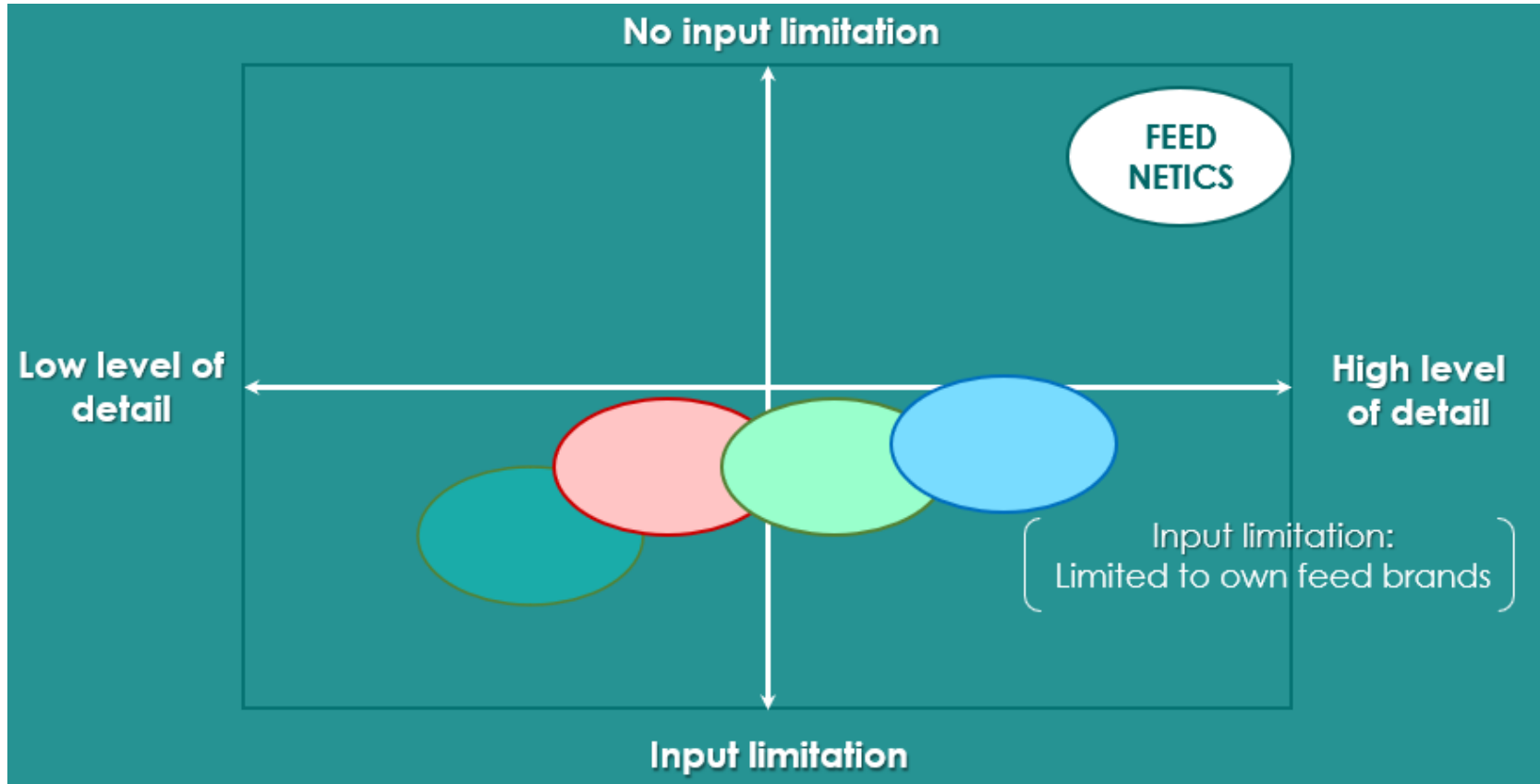


Scenario B ✓

Feed cost savings

Optimize farm
performance

Level of detail in models and limitation in inputs at key



Precision aquaculture in Europe: Trends on digitalisation

Future

- Surface camera
- Stereo video (UW)
- Sonar
- Recording Apps
- **Hydrophones**
- **Fish telemetry**
- **Biomarkers**

Sensors
Real-time
data

Data
analysis

- Data mining
- **Big data**
- **Deep learning**
- **Dynamic models**

Farm
Management
Software

- Feeding
- Temperature (RAS)
- Cleaning (e.g., ROVs)
- **Oxygen**
- **Parasite control**

Automation

Decisions

- Decision support systems (DSS)
- **Artificial Intelligence**

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Thank you for your attention !



UNIÃO EUROPEIA
Fundo Europeu
de Desenvolvimento Regional



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sparos
I&D nutrition in
aquaculture