Virtual Aquaculture Laboratory

On The Horizon webinar 29th September 2021

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INDUSTRY NEED

AQUA EXCEL 3.0
AQUAculture infrastructures for EXCELlence in European fish research 3.0

- **What if…**
  - You could raise 200.000 fish with a new diet in a matter of minutes.
  - Change the diet and raise them again?
  - Design a system for raising these fish with equipment from new suppliers before ordering any parts?

- **Virtual experiments**
  - Ethical perspective
  - Cost perspective

- **Integrating complex system**
  - Numerical models
  - Standardization
  - Co-simulate models
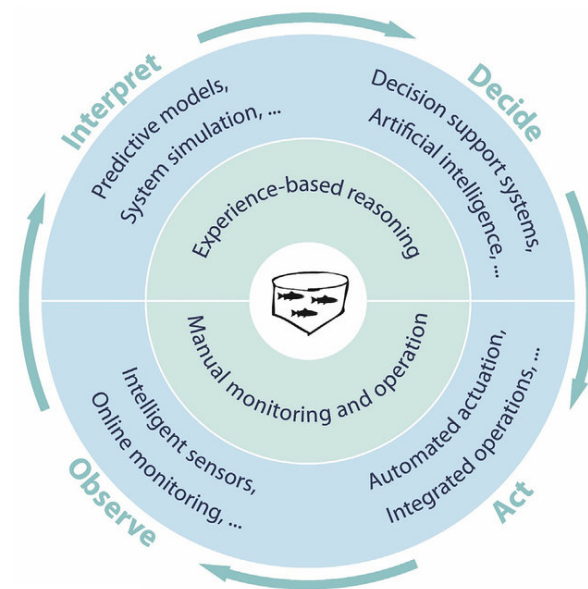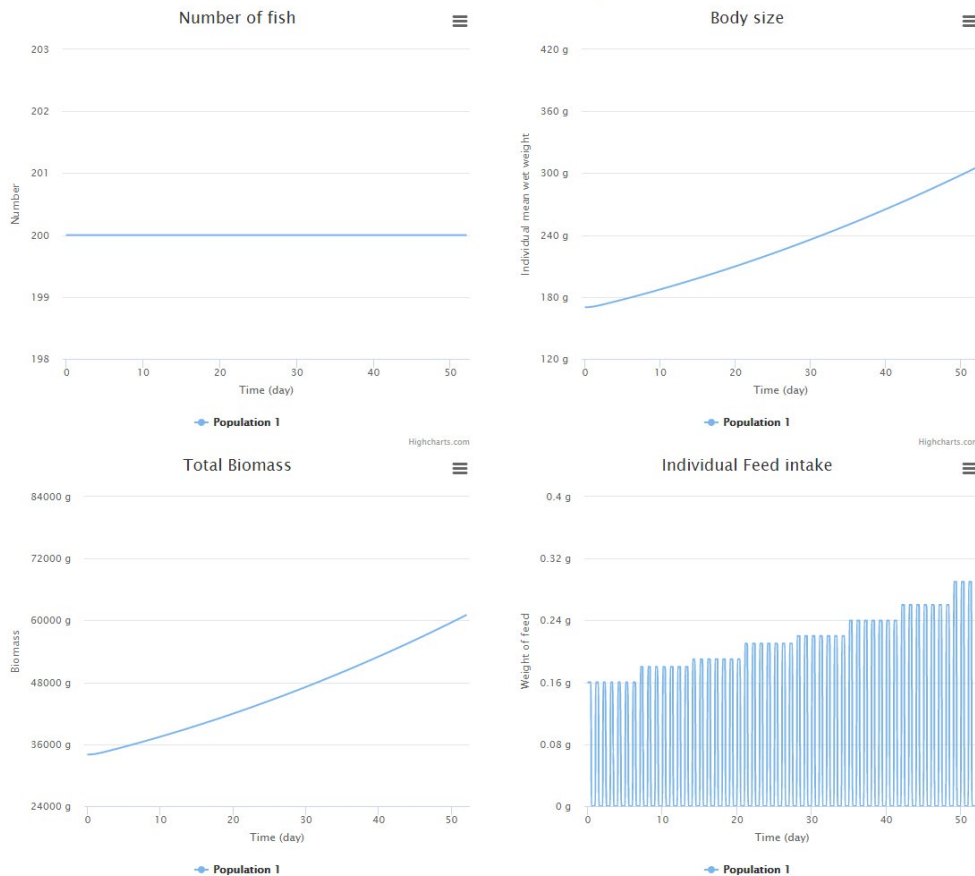

Precision fish farming, Føre et. al 2017
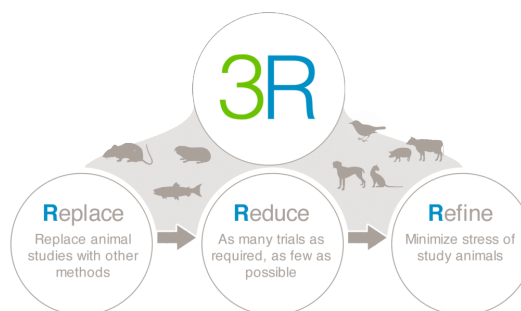
Bayer and Animal Studies

SINTEF Ocean
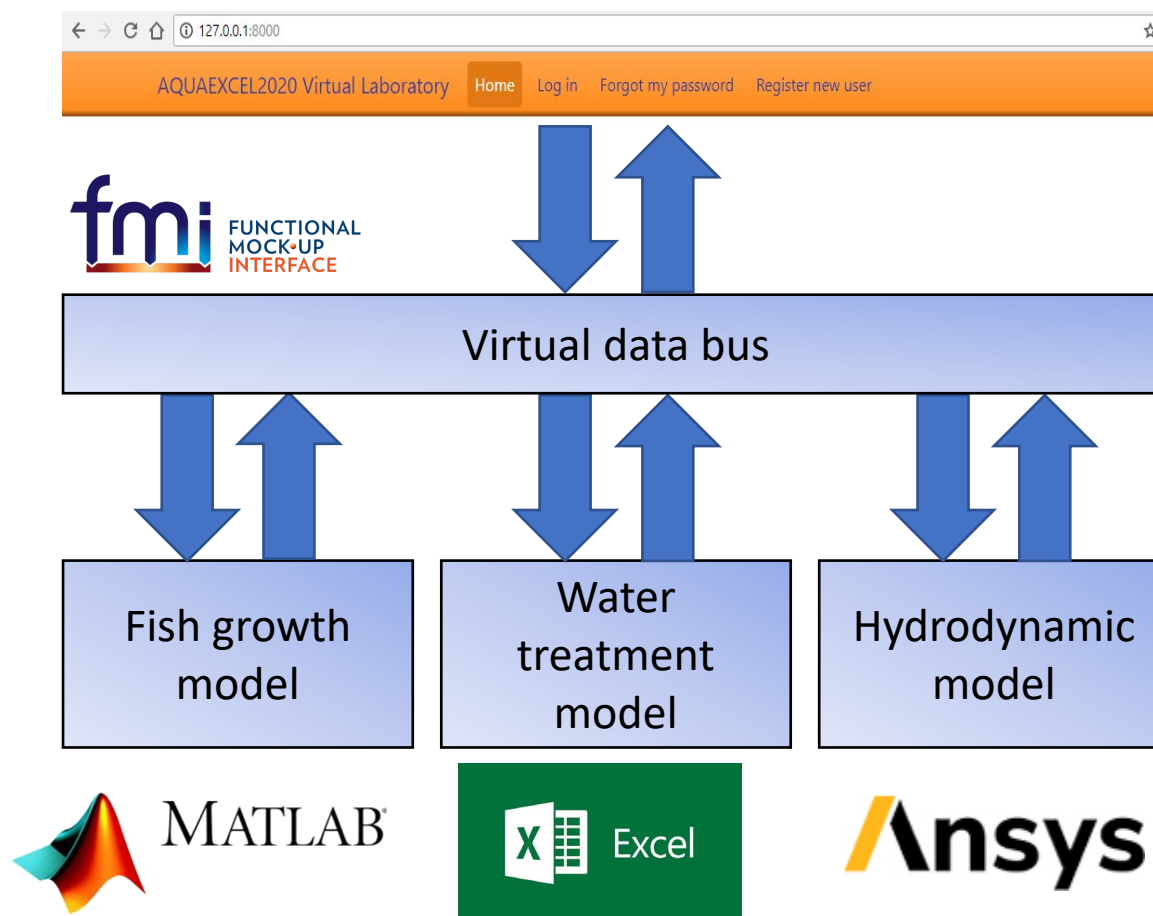
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SOLUTION

UNDERLYING MAGIC

TARGET MARKET

- Production planners

- Equipment industry

- Designers

- Aquaculture farmers

- Researchers and students in aquaculture

- Simulate production cycles

- Simulate new equipment setups

- Testing new equipment virtually

- Optimizing production, simulate operations

- Designing experiments virtually

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RESULTS and IMPACT

- Virtual laboratory
  - Optimize production cycles
    - Reduction in cost, increase biomass
  - Increased predictive power and decision support
    - Increase welfare, reduce loss
  - Optimize experiments
    - Reduction in trial cost and time as well as 3Rs
- Framework
  - Standardization of simulation and digitalization in aquaculture
    - Decision support
  - Standardize component simulations
    - Digital twins
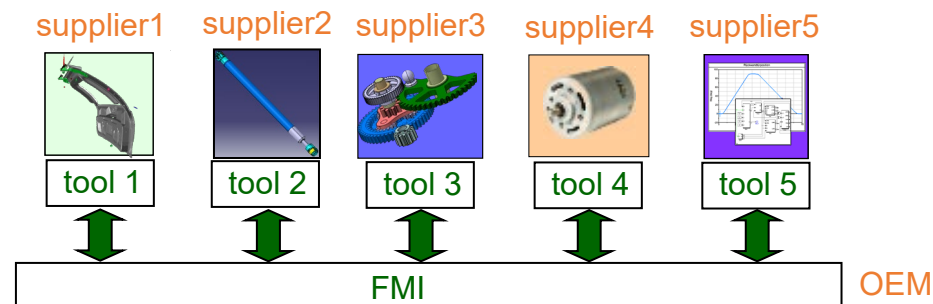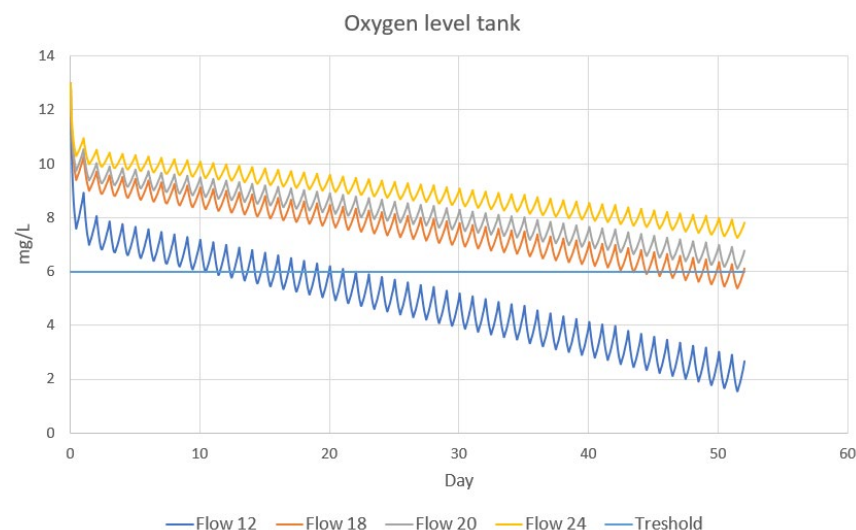
Images adapted from Blochwitz & Otter 2011
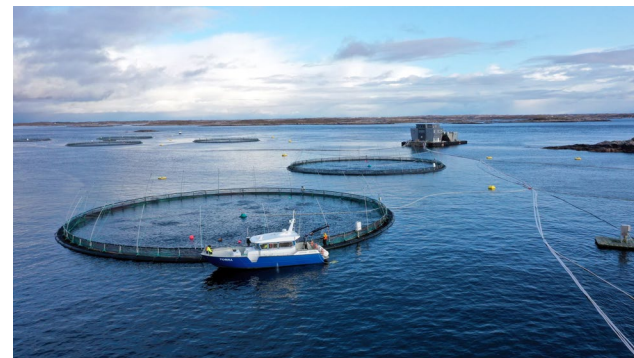
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CURRENT STATUS

- TRL 7 – system prototype demonstration in operational environment
- Ongoing work in AQUAEXCEL 3.0:
  - Further validation of models
  - Extending growth model
  - Extending CO_2 model in water treatment
  - Adding behavioral modelling
  - Standardising parameters to exchange between models
- FMI Framework, free and open source, ready to use!

https://ae2020virtuallab.sintef.no/

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Thank you!

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