



Virtual Aquaculture Laboratory On The Horizon webinar 29th September 2021

Finn Olav Bjørnson, SINTEF Ocean



s project has received funding from the European Union's Horizon 2020 research and innovation programme under grant eement No. 871108 (AQUAEXCEL3.0). This output reflects only the author's view and the European Commission cannot be d responsible for any use that may be made of the information contained therein.



INDUSTRY NEED

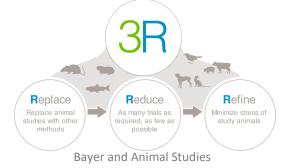


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Precision fish farming, Føre et. al 2017



- 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





SINTEF Ocean



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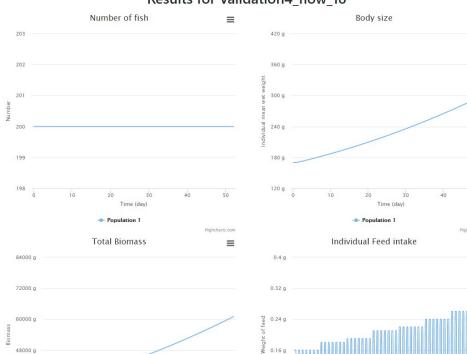
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SOLUTION



AQUAEXCEL²⁰²⁰ Virtual Laboratory Home Models Simulate Results

Results for Validation4_flow_18





FUNCTIONAL MOCK•UP INTERFACE



36000 a

24000 a

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- Population 1

30

Time (day)

40

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- Population 1

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Time (day)



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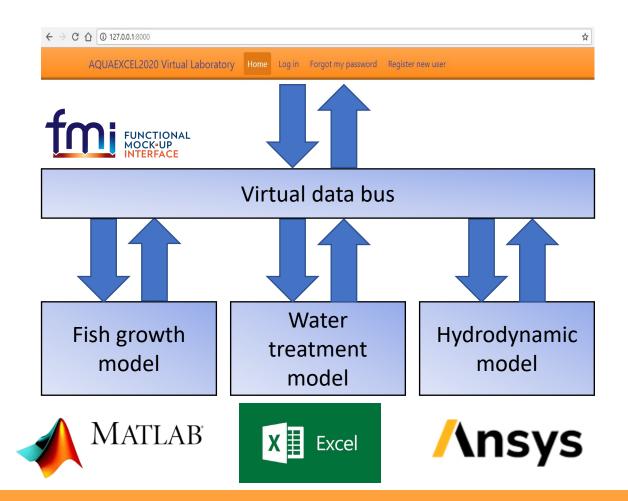
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UNDERLYING MAGIC







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TARGET MARKET



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- 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





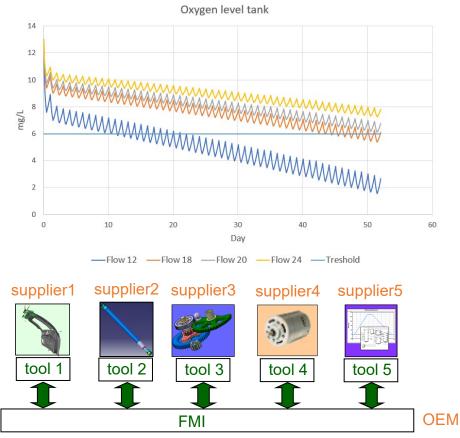
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RESULTS and IMPACT

- 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 CO₂ 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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