Inspire Challenge 2019

Rapid genomic detection of aquaculture pathogens

Opportunities and Challenges

Global finfish aquaculture production of **54.1 million tons worth USD 138.5 billion annually**[1]

4.5 billion people rely on fish as a protein source[3]

Human population expected to reach **9.7 billion** by **2050**[4]

Aquaculture is one of the **fastest growing food** producing sectors[2]

19.3 million are employed in the aquaculture sector[1]

40% by **2030**[5]. Expected increase in demand for fish. Aquaculture will play a major role in meeting this

Losses to aquatic animal diseases exceed **USD 6 billion per annum**[6]

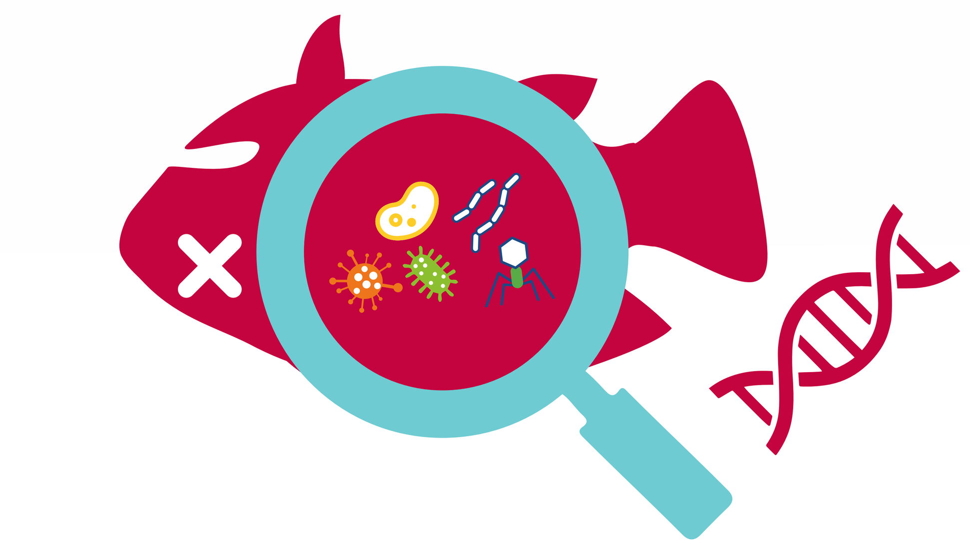
Infectious disease is a primary limitation to aquaculture production[7]

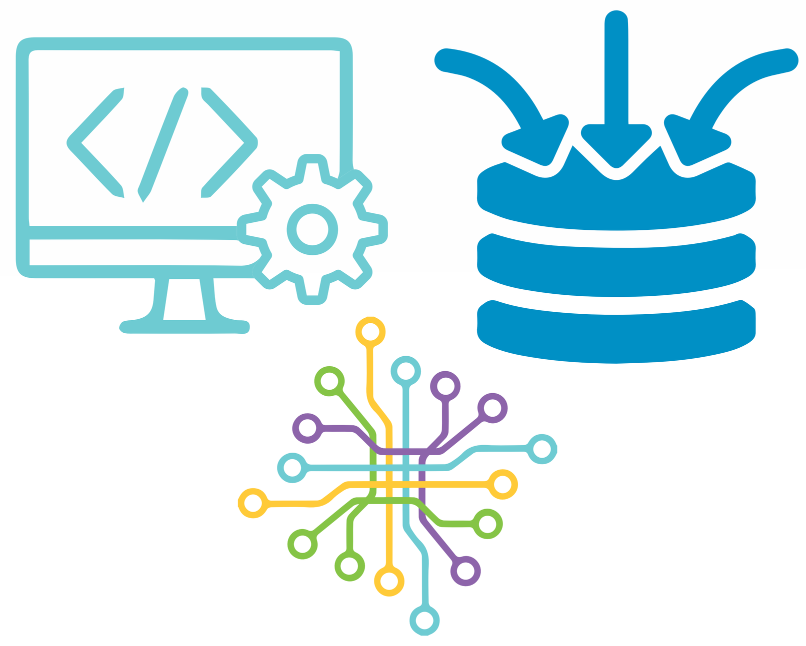
67 different antibiotic compounds are used in **11 major producing countries**[8]

Non-targeted use of antibiotics often **ineffective** and promote **increased resistance**[9]

Capacity to diagnose and **treat disease** is **limited** in low income food deficit countries

Our innovation



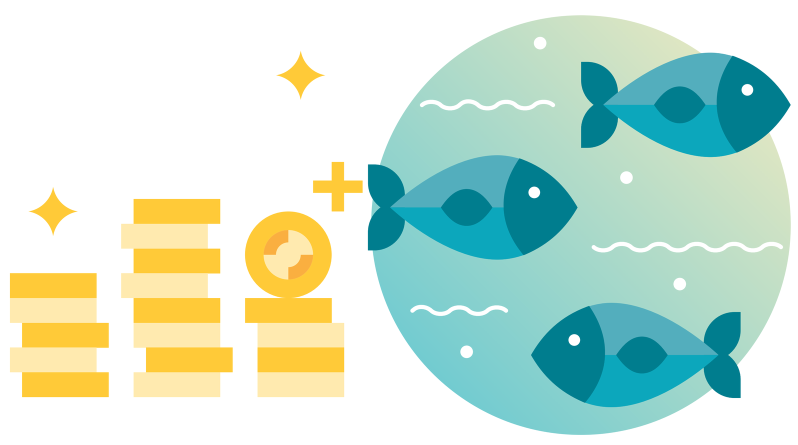


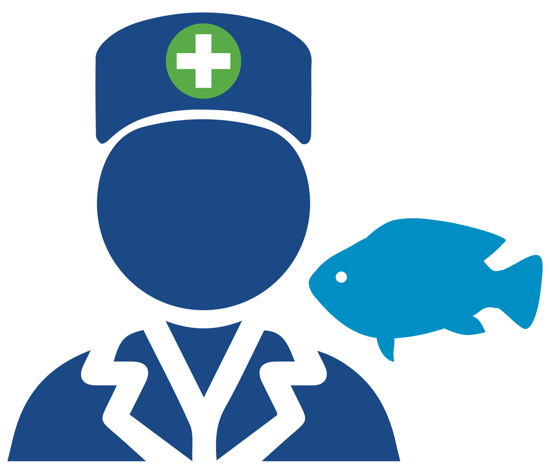
- **Real-time diagnostics** for disease **prevention** and **treatment**
- **Monitoring** and **surveillance** for **food safety** and **biosecurity**
- **Identification** of **outbreak** origins

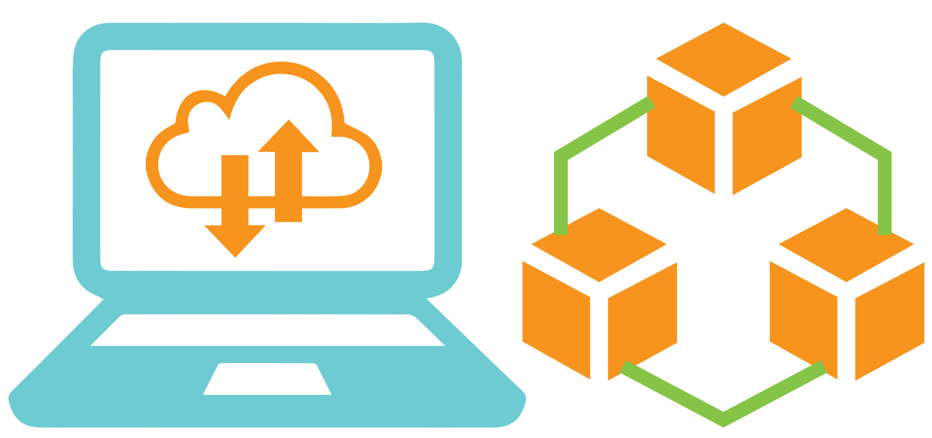
Genomic sequencing with **portable** Minion and MinIT devices from Oxford Nanopore Technologies

- Easy to use
- Same day diagnostics
- Little capital investment

Our **AI solutions** are designed to **decode noisy** sequence data to deliver **real-time diagnostics** with **unprecedented accuracy**







Cloud-based computing and **data storage** solutions quickly reduce large **complex datasets** down to **readable** and **actionable results**

Real-time diagnostics enable **fast targeted response** to disease, expedited **vaccine formulation**, prevention or localisation of **disease outbreaks**

Leads to **increased production** and **income** for **improved livelihoods**, **food** and **nutrition security**. Significant improvements in **animal welfare** and **greatly reduced use** of **antimicrobials**

SOURCES

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[4] United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019: Ten Key Findings

[5] FAO. 2019. The State of the World's Aquatic Genetic Resources for Food and Agriculture. FAO Commission on Genetic Resources for Food and Agriculture assessments. Rome

[6] World Bank. Reducing disease risks in aquaculture. World Bank Report #88257-GLB. 2014

[7] Stentiford GD, Sritunyalucksana K, Flegel TW, Williams BAP, Withyachumnarnkul B, Itsathitphaisarn O and Bass D. 2017. New paradigms to help solve the global aquaculture disease crisis. PLoS Pathogens 13(2): e1006160; doi.org/10.1371/journal.ppat.1006160

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CGIAR Research Program on Fish

Led by WorldFish

The University of Queensland Australia — Create change

Wilderlab

Mahidol University — Centex Shrimp — BIOTEC-NSTDA

Cefas — Centre for Environment, Fisheries & Aquaculture Science

University of Exeter