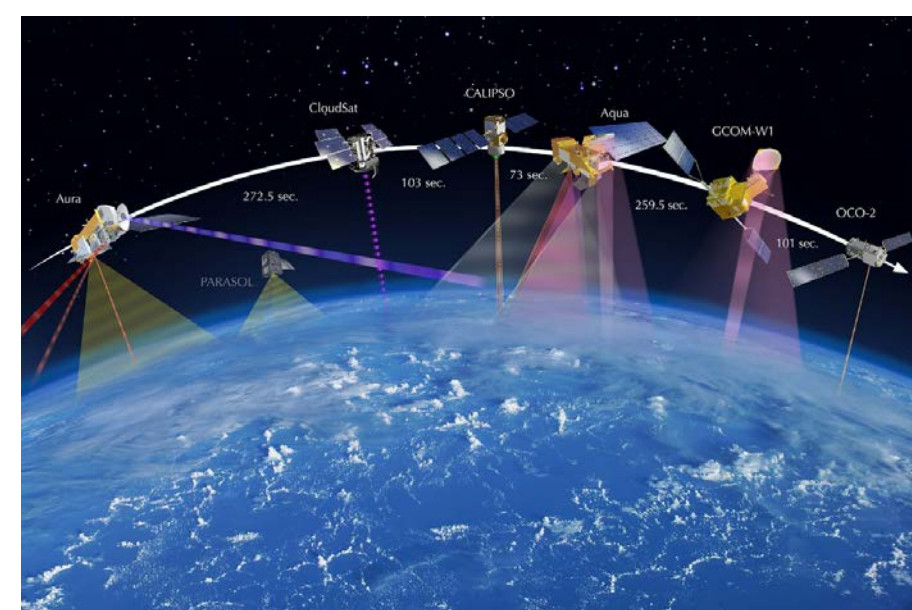


ARCFISH – Digital Twin of the Ocean for Arctic Fisheries

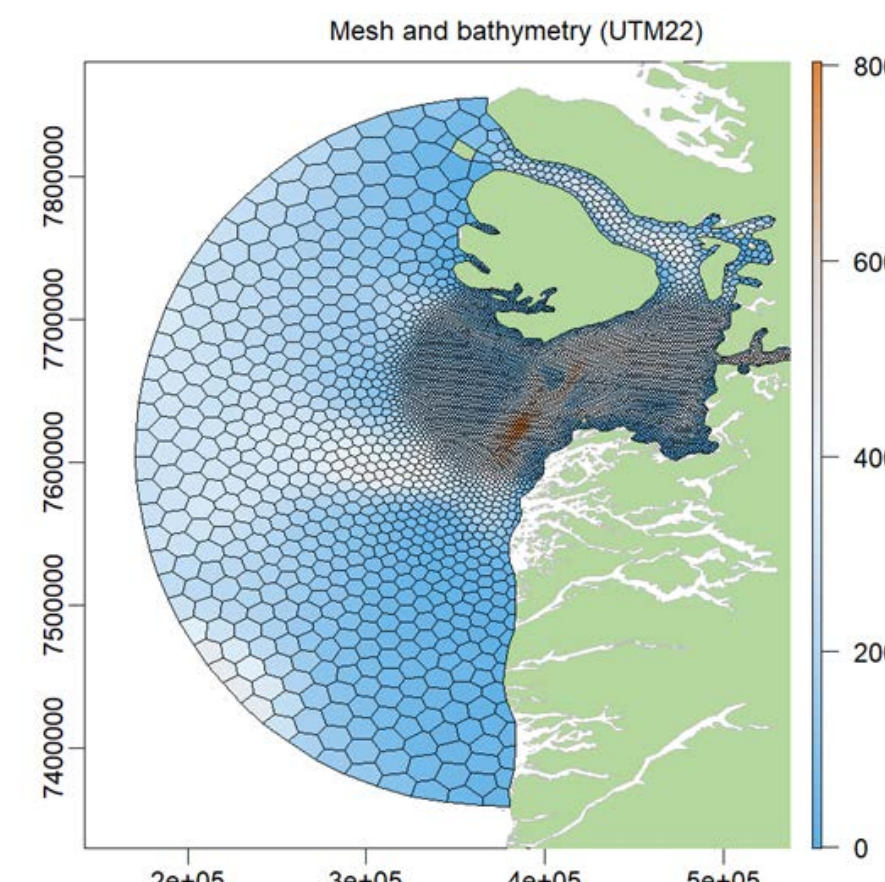
ARCFISH will develop a pilot Digital Twin of the Ocean (DTO) Platform delivering new data products and services in support of sustainable Arctic Fisheries. These data products and services will be co-designed with stakeholders in the fisheries sector and used to create products such as ecosystem indices that can be applied in fisheries planning and management. Available data sources and gaps will be analysed to fulfil user needs and ingest relevant data into the Blue Insight DTO Platform.

Use case Greenland - Ecosystem modelling and data products

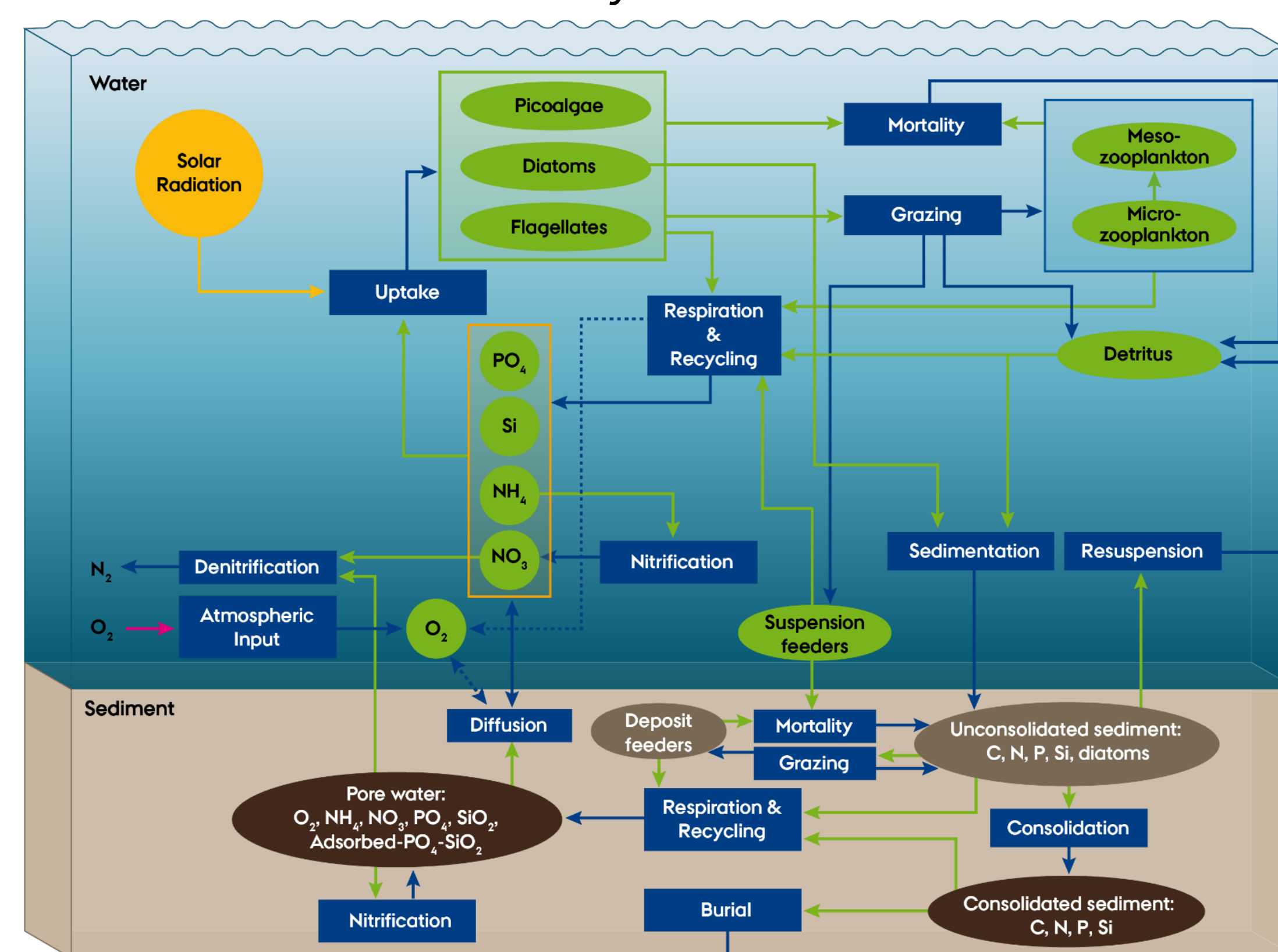
Copernicus products



Greenland monitoring data



FlexSem Ecosystem Model



Ecological indices for fisheries

Figure 1. FlexSem ecosystem model. Copernicus data is used to force and validate the model and Greenland Ecosystem Monitoring (GEM) program has local data from Disko Bay. The 3D model uses an unstructured grid and is coupled to a biogeochemical model. The model products can be used to develop ecological indices for fisheries.

The Greenland Ecosystem monitoring (GEM) program provides data of oceanography, nutrients, phytoplankton, and zooplankton (Møller & Nielsen. 2020). Fish stocks are monitored by the Greenland Institute of Natural Resources. A 3D dynamic FlexSem model of Disko Bay was developed in the EU INTAROS project using local measurements and Copernicus data for model forcing, calibration, and validation (Fig.1). The model will be improved with new descriptions of the zooplankton community including a life-stage population model of the dominant *Calanus* copepods and their seasonal and daily vertical migration. A new sub-model for shrimp will be implemented.

The updated spatio-temporal patterns of zooplankton biomass and productivity will be compared with environmental monitoring data and fish stocks to make new indices for fishery in collaboration with stakeholders. Model outputs will be imported into the DTO to better understand migration patterns. This will induce new indicators of fish resources that will increase knowledge of the spatial and seasonal distributions of fish and shrimp stocks for the fishery sector and managers to better support a sustainable fishery.

Use case Iceland - Fishery-dependent information

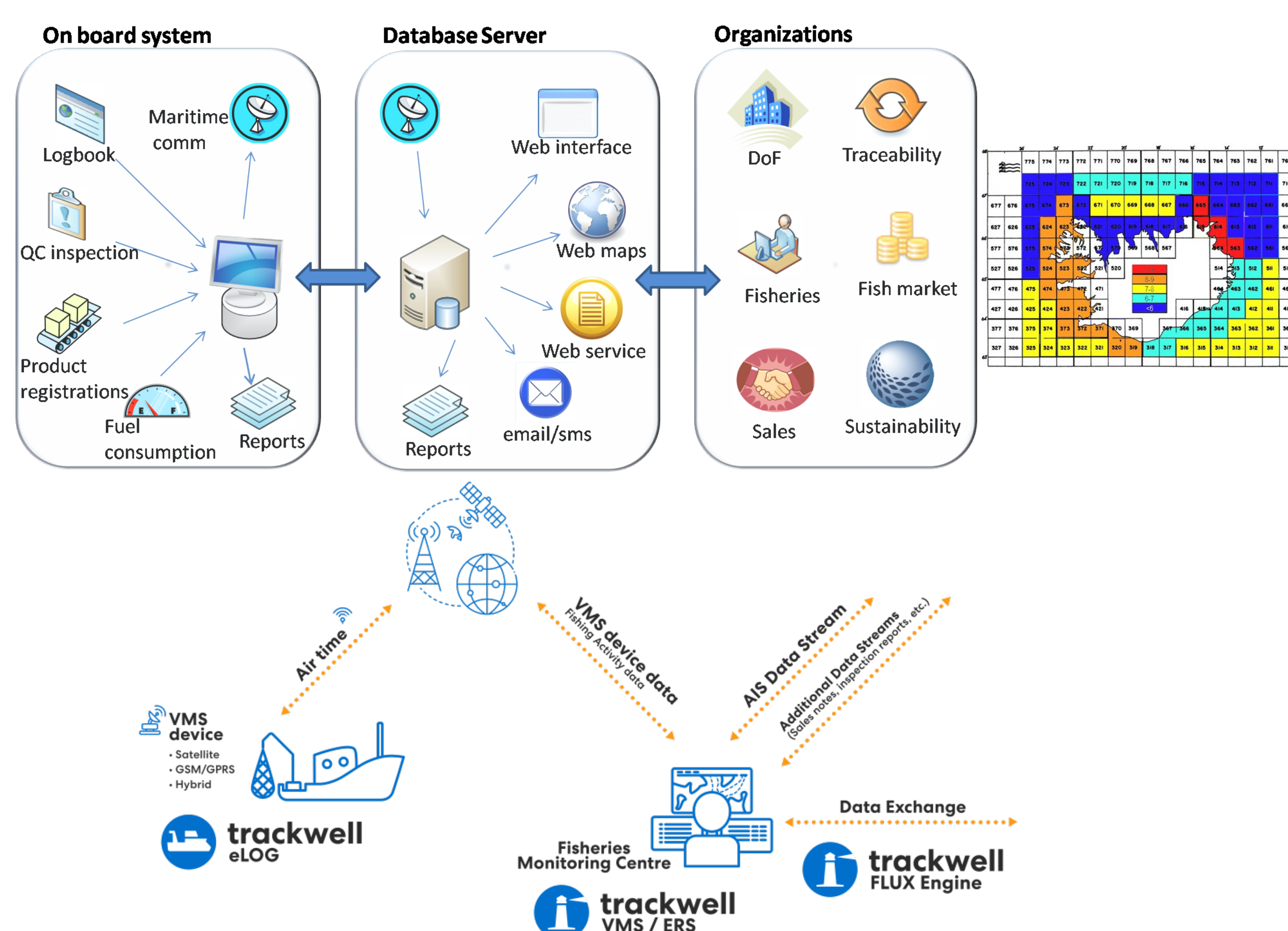


Figure 2. The Icelandic use case will demonstrate how dispersed data can be coupled to provide stakeholders with important information to support decision making and facilitate sustainable and profitable utilization of marine resources.

North Atlantic industrial fisheries and seafood supply chains are high-tech industries that collect a vast amount of data from each link of the value chain. Most of this data is however not being utilised or shared. ARCFISH will demonstrate how data collected onboard fishing vessels and in seafood processing can be made a part of the DTO and provide important information for policy- and decision makers, as well as for the seafood sector, marine research, scientific community and academia.

Project partners Brim, Trackwell and Matis; along with public institutions such as the Directorate of Fisheries, the Marine Research Institute, the Revenue and customs office and more are already collaborating on how the use of available data can be extended and shared (Fig.2). They are also working on coupling the data with other available data, such as from the meteorology office, Copernicus, ICES, etc. The use case will be co-created with the different stakeholders, ensuring the usability, practicality, applicability, and usefulness of the final results.

References:

Møller, E.F. and Nielsen, T.G. (2020), Borealization of Arctic zooplankton—smaller and less fat zooplankton species in Disko Bay, Western Greenland. *Limnol Oceanogr*, 65: 1175-1188. <https://doi.org/10.1002/lno.11380>

Project Partners:

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