

# To patch, to rebuild, or to build a new? The genesis of the ICES portal

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## Introduction

The International Council for the Exploration of the Sea (ICES) operated EcoSystemData portal<sup>1</sup> for 12 years, allowing users to search, view, and download data available at ICES. The EcoSystemData portal became a focal point for the cross-disciplinary research based on ICES resources, but with time, it also revealed several flaws and limitations. Therefore, a new project was started to create a new ICES Data Portal<sup>2</sup> to replace the EcoSystemData portal. The new data portal uses recent technologies, such as microservices architecture, and is made in AngularJS for a good and responsive user experience. ICES Data Portal standardises the services that each dataset makes available to the community and minimises the impact on the resources that each portal/dataset has available. In addition to the features previously provided by the EcoSystemData portal, the new portal aims for a more intuitive interface by visualizing data, has an extended data portfolio, and provides both the base data and the ICES community data products for users.

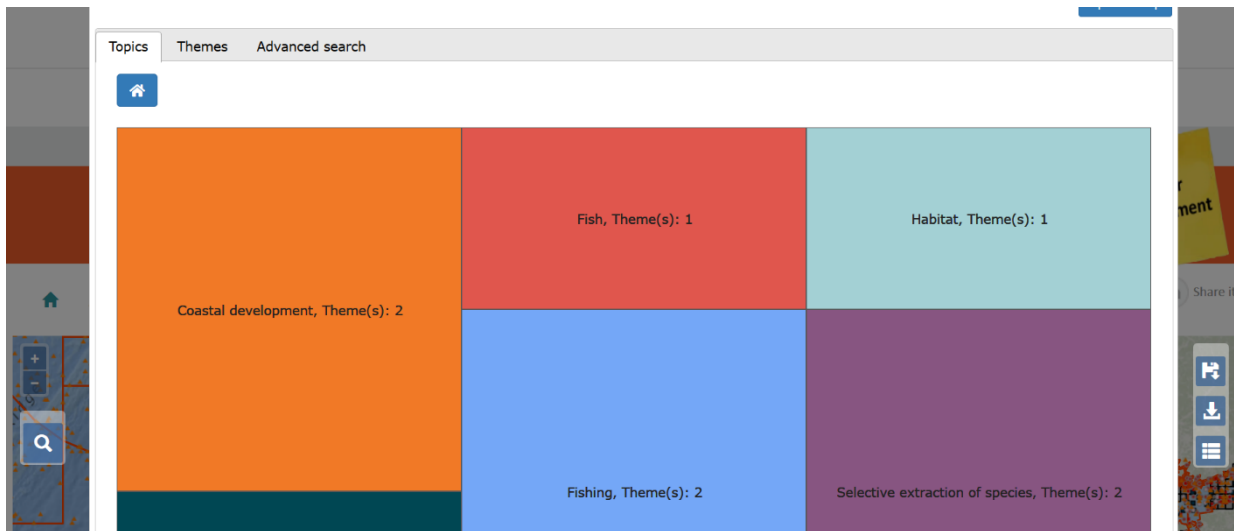


Figure 1: Search data by theme. In the figure we can see a screenshot of the top topics where the user can drill down into

## Visualization of data in ICES Data Portal

The main component of the new data portal is the visualization of data, either in a tree map or in a geographic map. We provide the tools to allow a good search, query and visualization of the dataset. Data are organized in topics, which comprise one or more theme(s) (Figure 1). Themes, in turn, include one or more dataset(s) and/or data product(s). When the user selects a theme, the corresponding data

<sup>1</sup> C. PINTO, & H. Jensen & N. Holdsworth. ICES EcoSystemData – Visualising data for the ecosystem approach. In Nishida, T., and Caton, A.E. (Editors) 2010. GIS/Spatial Analyses in Fishery and Aquatic Sciences (Vol. 4). Fishery-Aquatic GIS Research Group, Saitama, Japan, 401-416.

<sup>2</sup> <https://data.ices.dk>

will be added to the map. The tool also allows an advanced search, where the user can filter the data by defining their preferred data criteria. Data criteria consists of two parts: [1] mandatory fields that are: location and date range and [2] fields defined by the data provider, some examples are species, country, survey, station name.

After selecting one or more themes, the user can visualize the data in the map (**Figure 2**). The user can return to the search (**Figure 1**) by clicking the search button.

A user has the possibility to save a custom map (as an image) or to download the selected data. When a download is requested, each data provider microservice sends the data to the data portal from the thematic databases, and only when all the data are available, does the service create a zip file and sends the download link by email to the user. RabbitMQ (an open-source message-broker software) was implemented to manage the messaging between all microservices and ensure the user receives the requested data. This allows the fail-free processing of complex queries for big data layers without overloading any of the data providing databases or the ICES Data Portal itself.

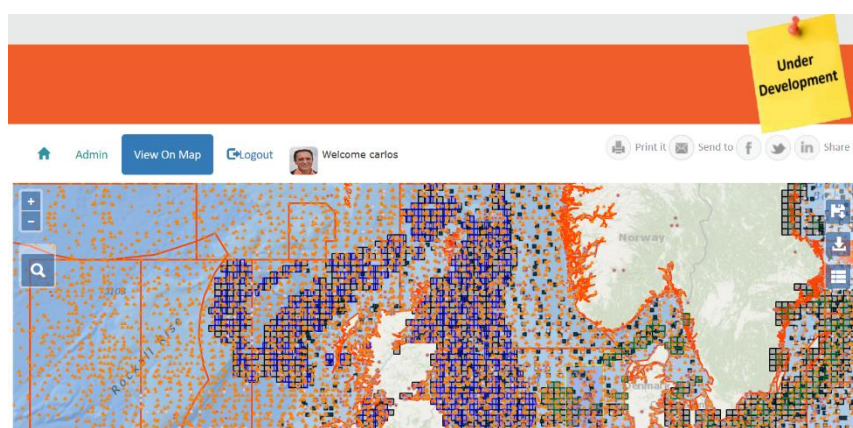


Figure 2: Mapped data, where several layers (polygon, point, and base data and data products) are displayed together.

### Microservices architecture

ICES Data Portal is built with AngularJS and with microservices architecture. Microservices are an architecture, where all the components of the system are put into individual components that can be built, deployed, and scaled individually. This brings more scalability, fault to tolerance and allows the option of moving to the cloud in the future. The microservices also allow services to be fine-grained and the protocols are lightweight. For each of the data streams (base data or data products) that feed the new data portal, the data provider has to provide the address of the microservices. In the microservice, the data managers have a possibility to customize options, such as (1) map style, (2) data criteria, (3) summary of data, and (4) download service.

### Summary

The ICES Data Portal facilitates and fortifies the exchange of data and the organizational data communication of ICES and its community. In this version we open the option of the ICES community to share their products.

The development of the new ICES Data Portal (<https://data.ices.dk>) was done in an agile way and with the option of moving the data portal to the cloud.

Future developments would include user authorisation for data types with separate data licenses restricting data access, not covered by the ICES data policy (<https://www.ices.dk/marine-data/Documents/ICES-Data-policy.pdf>), which allows full access and re-use rights.