Supporting knowledge creation and sharing by building a standardised interconnected repository of biodiversity data.

An EOSC in Practice Story where a biodiversity data community is built according to FAIR principles.

The project involved

Cos4Cloud

Cos4Cloud (**Co-designing Citizen Observatories Services for the EOS-Cloud**) is a European Horizon 2020 project funded under Grant Agreement no 863463. The project aims at boosting citizen science technologies. One of the biggest challenges of citizen science is the **quality of data**, as well as maintaining the citizen observatories used to collect this data. Cos4Cloud is addressing these challenges by developing twelve technological services to improve citizen science platforms.

The Users

This EOSC in practice story targets a very wide user base as it is addressed to any researchers, teachers, students, companies, institutions and, more generally, anyone interested in knowing, studying or analysing biodiversity information.

The Challenge

Citizen Observatories are currently faced with **fragmentation problems**. The collected data is heterogeneous and comes in varied formats. This is an obstacle for the users who have to dedicate massive resources to elaborate, standardise and aggregate data, thus making the data collection and management phases very long and inefficient. These problems relate to the difficulty of practically implementing FAIR (Findable, Accessible, Interoperable, and Reusable) rules, which instead is a crucial feature for the integration of the services in the EOSC marketplace. To solve such challenge and support users when downloading and using the data, **a better dialogue between the different citizen observatories is needed**.

The solution

Cos4Bio is a **co-designed, interoperable and open-source** service that integrates biodiversity observations from multiple citizen observatories in one place, allowing experts to save time in the species

"Adopting co-design and co-design thinking approaches to develop Cos4Bio was a real challenge. However, involving developers, experts and users in the early phases of the work was fundamental to really help us build a better product"

Santiago Martinez de la Riva, CEO, @Bineo Consulting **& Cos4Bio Developer** @Cos4Cloud
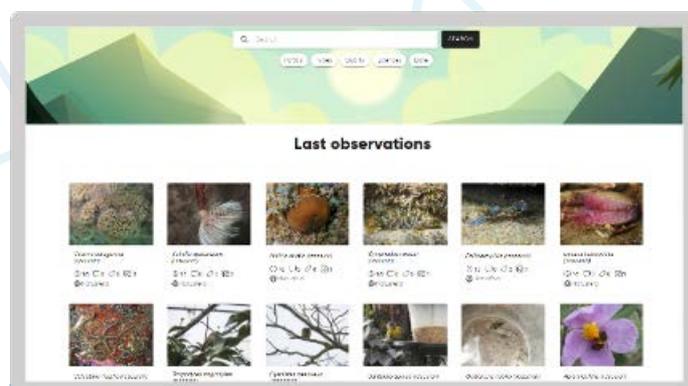
View of the Cos4Bio service website

identification process and get access to an enormous number of biodiversity observations. Co-design principles were followed in the creation phase to ensure a collaborative and interdisciplinary approach that could maximise the service quality and usability. Cos4Bio allows citizen science experts to view and identify all observations from a single place, interacting with the community and contributing their knowledge about each species. When an observation has been identified in Cos4Bio, this information is updated in the citizen observatory where it was published, awaiting final validation according to the algorithm defined in each observatory. Cos4Bio has a search system that allows to consult the observations of a specific species or a specific location across different citizen observatories. It is also possible to apply criteria to filter information such as origin, type, quality of observation, license or date. All the information can be downloaded in "csv" format following Darwin Core (DwC), a widely known and accepted standard within the biodiversity community. Finally, Cos4Bio relies on Authenix to provide secure and federated authentication services to the users and GBIF Backbone Taxonomy to manage data classification.

The service provider

The Cos4Bio service complies with FAIR principles and is provided by Bineo Consulting, a small Spanish software company specialised in the offering of Web Development, Mobile, Infrastructure, Big Data and Data Science services. Bineo Consulting is an EOSC provider. Bineo Consulting leads the work on Interactive Services in Cos4Cloud.

Why do I need EOSC?

Cos4Bio service brings the following benefits to its users thanks to its presence on the EOSC Portal Catalogue and Marketplace :

» one unique repository for citizen collected data on biodiversity accessible throughout Europe
» integration of heterogeneous data following accepted standard formats
» integration of multiple nature apps & repositories
» provision of additional services via integration with other resources available on EOSC, such as Authenix and Pl@ntNet
» GDPR compliance
» fast identification of the species and access to data
» impact monitoring available for each entry about downloads, notifications and comments
» visibility to all contributing citizens and researchers that can share their profile and details about the data they have provided

At the same time, being the service accessible via EOSC, the following benefits are left to the provider:

» Increased number of observations
» Improved identification of species
» Larger data than a single observatory to maximise algorithm training potential
» Higher quality of information
» Increased community

You can Access Cos4Bio on the EOSC Portal Catalogue and Marketplace here

The impact on society

Cos4Bio's effect on society is to facilitate the interest, participation and connections of **multiple users and experts in biodiversity and environmental science**. The ultimate mission is to create a wide and engaged community facilitating knowledge creation and sharing.

Across disciplines

Biodiversity is not only flora and fauna. It has important interactions with various environmental data. In this sense, the information provided via Cos4Bio can be used as part of wider environmental studies.

Future developments

Bineo Consulting is developing in the Cos4Cloud framework two other services to follow-up **Cos4Bio**. Cos4Env and DUNS (Data Use Notification Service) are also being released and onboarded to EOSC. Cos4Env, in particular, will have a similar structure and purpose to Cos4Bio, despite being broader in scope. All types of environmental data (e.g.CO2 emissions, temperature, humidity) coming from citizen observatories will be included in this service and not only biodiversity. Finally, DUNS will act as a centralised service to (1) register usage of the citizen science observations downloaded from the Cos4Bio and Cos4Env portals and (2) make this information available to the citizen observatory the observation comes from. The aim is to help make citizen observatories aware of how their data is used and reward their users' contributions.

Sustainability for an EOSC in practice

Nature apps and services, such as Natusfera and Pl@ntNet are already integrated in Cos4Bio. Others, including ArtPortalen and iSpot, will be integrated soon to help enlarge the community. According to Santiago, creating a strong community is the first step to make this service scalable and sustainable in the future. In order to facilitate the building of a massive scale, Cos4Bio is working on multiple levels:

» Facilitating and speeding up the onboarding and integration of new Citizen Observatories via easy interoperability mechanisms, such as APIs
» Establishing connections with other services developed in CoS4Cloud and available on the EOSC Portal Catalogue and Marketplace, so to create an ecosystem of biodiversity services
» Working on communication, dissemination and engagement of users and experts via recognition mechanisms and incentives to the use of the service. These include visibility for the experts, dashboards, reporting and other tracking systems to monitor the performance of each contributor

Future funding model scenarios

Cos4Bio wants to invest as much as possible on growing the community and quality of the content and data provided, connecting Cos4Bio to a wider ecosystem of services, also currently under development, such as the ones mentioned in this EOSC in practice story. Such actions should be undertaken during the life of Cos4Cloud project, so that one of the possible funding scenarios is the natural support of this unique data source via a follow-up project or similar EU-financed grants.

An alternative or concurrent funding scenario includes a yearly fee-based mechanisms for the Citizen Observatories that want to integrate their observations in Cos4Bio, while the service shall remain free for the experts and researchers using the data available on Cos4Bio. The fee paid by the Citizen Observatories would be inversely proportional to the number of observations provided.

The sustainability plan and business model of this and the other services produced under the remit of Cos4Cloud will be finalised in July 2022.

Useful material related to this story

» Cos4Bio website
» Cos4Bio Q&A

Want to learn more about the other services being developed by **Cos4Cloud**? Read here

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