



## **Co-designed Citizen Observatories Services for the EOS-Cloud**

*H2020 programme: Research and Innovation action*

## **Deliverable 6.3 Cos4Cloud Toolbox and Evidence Hub**

**31 March 2023, Version 1.0**



Project funded by the European Commission within the  
Horizon 2020 Programme (2014-2020)

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D6.3 Cos4Cloud Toolbox and Evidence Hub Report  
Cos4Cloud #836463

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Grant Agreement No. 863463

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Type		
R	Document, report excluding the periodic and final reports	
DEM	Demonstrator, pilot, prototype, plan designs	X
DEC	Websites, patents filing, press & media actions, videos, photos, etc.	
SOF	Software, technical diagramme, etc.	
OTHER	Flyers, etc.	

Dissemination level		
PU	Public, fully open	X
CO	Confidential, restricted under conditions set out in Model Grant Agreement	
CI	Classified	

**Revision history**

R#	Date	Description/Reason of change	Deliverable contributors
	20200102 - 20203112	Preliminary activities contributing to the Demonstrator: Research into Toolkits etc., i.e. presentation to the CoNnect Group in October 2020	Facilitated by Janice Ansine, Rachel Redford (OU)
	20210102 - 20213112	Preliminary activities towards developing the Demonstrator: Documentation on platform design and development; discussions on initial concepts i.e. co-creation / consultative process of conceptualising the design, i.e. presentation to the CoNnect Group August 2021, CoNnect Group Workshop Outline, Cos4Cloud Annual Meeting, November 2021:	Facilitated by Janice Ansine, Rachel Redford (OU)

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20220102 - 20223112	Activities contributing to the development of the demonstrator: Mockups and design of space; Definition of Toolbox categories and themes, templates for gathering resource content, and development of resources	Facilitated by Janice Ansine, Rachel Redford (OU)
20220102 - 20223112	Activities contributing to the demonstrator: Services training and capacity building resources under development: gathering of content, consultation with service leads, drafts created shared for review and further development	Facilitated by Janice Ansine, Rachel Redford, Harriett Cornish, Learning Design Team (OU)
20220102 - 20233101	Activities contributing to the demonstrator: Best practice guidelines, case studies and educational resources under development: gathering of content, consultation with partners / leads, drafts created shared for review and further development	Facilitated by Janice Ansine, Rachel Redford, Harriett Cornish, Learning Design Team (OU) / Contributions from partners
20220102 - 20233101	Activities contributing to the demonstrator: internal (Consortium, CoNnect Group) and External presentations and consultation i.e. ECSA Conference, CoP for Training Coordinators. Content revised and updated	Facilitated by Janice Ansine, Rachel Redford, Harriett Cornish, Learning Design Team (OU) / Contributions from partners
20230102 - 20232802	Activities contributing to the demonstrator: Content development and design - revised and updated based on new guidelines regarding use of Zenodo. Work on Evidence Hub development. Legacy, continuity, and future development planning after the project ends.	Facilitated by Janice Ansine, Rachel Redford, Harriett Cornish, Learning Design Team (OU) / Contributions from partners
20230103	Activities contributing to the demonstrator: Content development and design - revised and updated based on new guidelines regarding use of Zenodo. Work on Evidence Hub development. Legacy, continuity, and future development planning after the project ends.	Facilitated by Janice Ansine, Rachel Redford, Harriett Cornish, Learning Design Team (OU)

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	20233103	Activities contributing to the demonstrator: Content and design - revised and updated based on new guidelines regarding use of Zenodo. Work on Evidence Hub development. Legacy, continuity and future development planning after project ends.	Facilitated by Janice Ansine, Harriett Cornish, Learning Design Team (OU) / Contributions from partners
1.0		Activities contributing to final version of demonstrator: Content and design - revised and updated based on new guidelines regarding use of Zenodo. Work on Evidence Hub development. Legacy, continuity, and future development planning after the project ends. Cos4Cloud Toolbox and Evidence Hub launch and available online	Facilitated by Janice Ansine, Harriett Cornish, Learning Design Team (OU) / Final review and support from partners

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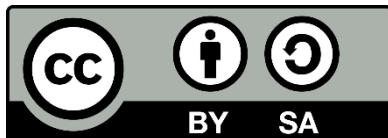
OU: Janice Ansine (lead), Rachel Redford, Harriett Cornish, Claudia Fabó Cartas (ECSA), Angela Justamante (CREAF).

### Citation

This demonstrator and report are a public deliverable. This can be cited as:

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## Executive Summary

D6.3 Citizen-science toolbox and evidence hub (renamed as the Cos4Cloud Toolbox and Evidence Hub) has been developed as a legacy collection of different materials and resources. It will be a 'one stop shop' of Cos4Cloud best practice demonstrating project results, this is being collated within the following category themes:

- Training & capacity building resources: Cos4Cloud co-designed technological services
- Best practice guidelines & resources for COs: Citizen observatories working collaboratively
- Educational resources: Examples of citizen science school-based approaches
- Case studies: demonstrating Cos4Cloud success stories and best practice examples
- Evidence Hub: feedback, discussion threads / themes, participation and engagement activities

The development of the Cos4Cloud Toolbox and Evidence Hub contributes to the delivery of Work Package 6 (WP6) *Networking, (education), training and capacity building*, led by the OU. This output contributed to creating and sharing best practice guidelines, training, capacity building and educational citizen science resources. The **Cos4Cloud Toolbox & Evidence Hub** was envisioned as a 'one-stop-shop' of Cos4Cloud best practice guidelines and materials for existing and future citizen observatory leaders incorporating case studies, training, capacity building and educational citizen science resources. The main goal of WP6 is to demonstrate new conceptual models for evidence-based knowledge exchange, capacity-building, best practice learning and engagement with and for citizen science, focusing on citizen observatories.

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## 1. Introduction

D6.3 Citizen-science toolbox and evidence hub (renamed as the Cos4Cloud Toolbox and Evidence Hub) has been developed as a legacy collection of different materials and resources. It will be a 'one stop shop' of Cos4Cloud best practice demonstrating project results, this is being collated within the following category themes:

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3. Educational resources: Examples of citizen science school-based approaches
4. Case studies: demonstrating Cos4Cloud success stories and best practice examples
5. Evidence Hub: feedback, discussion threads / themes, participation and engagement activities

The development of the Cos4Cloud Toolbox and Evidence Hub contributed to the delivery of Work Package 6 (WP6) *Networking, (education), training and capacity building*, led by the OU. This output contributed to creating and sharing best practice guidelines, training, capacity building and educational citizen science resources. The **Cos4Cloud Toolbox & Evidence Hub** was envisioned as a 'one-stop-shop' of Cos4Cloud best practice guidelines and materials for existing and future citizen observatory leaders incorporating case studies, training, capacity building and educational citizen science resources.

D6.3 is part of Work Package 6 (WP6) '*Networking, Training [Education] and Capacity Building*'. Supporting networking and citizen science knowledge management processes across organisations, people and initiatives is one of the key objectives of the Cos4Cloud project. The main goal of WP6 is to demonstrate new conceptual models for evidence-based knowledge exchange, capacity-building, best practice learning and engagement with and for citizen science, focusing on citizen observatories.

This report is a narrative summary which supports and reports on D6.3 the Cos4Cloud Toolbox and Evidence Hub: an online 'one-stop-shop' of guidelines and materials for existing and future citizen observatory leaders' as an online demonstrator. Specifically, this also supports, consolidates and documents outputs developed under:

T6.2 Sharing best practice

T6.3: Production of a citizen-science toolbox and Evidence Hub

T6.3.1: Design, infrastructure planning and development within a co-designed / co-created process

T6.3.3 Implementation of case studies

T6.3.4 Integration of a Evidence Hub



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T6.5 Training and capacity building services

D6.2 Guidelines on best practice for COs as part of the outreach methodology

D6.4: Report to demonstrate the Cos4Cloud engagement model

D6.5 Design and evaluation of school-based CS activities.

D6.6 Training materials and capacity building report

M6.3 Best practice guidelines and resources.

D6.3 also contributes to the tasks, and subtasks across WP 5: *Cos4Cloud Services in Practice*; and WP8 *Communication, outreach and stakeholder engagement*; specifically, T5.1: Best practice for citizen observatories and T8.2.6 Promote, design and layout the key project's outputs. Training and capacity building resources, guidelines on best practice, case studies and educational resources, are shared as outputs to demonstrating the outputs and legacy of Cos4cloud targeted to citizen observatories and other stakeholders, collectively accessible via **D6.3 Citizen-science toolbox and evidence hub, which has been developed and renamed as the *Cos4Cloud Toolbox and Evidence Hub*.**

This deliverable outlines the content and development of D6.3 which includes the best practice resources which includes how a CO can be enhanced and developed within a Cos4Cloud framework and demonstrations of best practice for citizen observatories from the nine COs involved. It also includes summary descriptions of the training materials and resources supporting the Cos4Cloud services which are hosted and accessible in the Cos4Cloud Toolbox and Evidence Hub. It concludes with an outline of related activity and approaches for continued implementation of strategies supporting the Cos4Cloud Toolbox and Evidence Hub, to be delivered by the OU, to build a legacy for Cos4Cloud in the EOSC beyond the lifetime of the project.

## 2. Production of a citizen-science toolbox and Evidence Hub

**Production of the Cos4Cloud Toolbox and Evidence Hub** has focused the design and development of the space; content design and creation of resources, as well as plans for the continued review and updating with additional content beyond the lifetime of the project. This also supported by plans and activities for wider dissemination with stakeholders identified as part of further promotions, dissemination, and marketing potential as part of the project legacy.

### 2.1 Design, infrastructure planning and development

The objective of the Cos4Cloud Toolbox and Evidence Hub is to be the 'one stop shop' of Cos4Cloud capacity building and best practice demonstrating project results. This has been created through resources collated together and made available from a

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designated space in the OpenLearn Create (OLC) platform developed within specifications guided by the OLC system structure / functionality. This design framework went through different iterations, and this is summarised in the diagram above and details outlined below.

OLC functionality that groups connected resources together as *collections* was used to collate Toolbox content categorised using the themes:

1. **Training & capacity building resources:** Cos4Cloud services
2. **Best practice guidelines & resources:** Citizen observatories
3. **Educational resources:** examples of citizen science school-based approaches
4. **Case studies:** demonstrating Cos4Cloud success stories and best practice examples
5. **Evidence Hub:** feedback, participation and engagement activities

Design features of The Toolbox and Evidence Hub collection incorporated the development of theme areas. Graphics were designed to distinguish and define each grouped area defining the content of the resources. In addition to these special features were designed and developed for The Toolbox and Evidence Hub *collection* and each themed area. Special graphics were designed, aligning with the existing Cos4Cloud brand (*WP8: Communications Plan*), but distinctive to clearly differentiate the different types of resources i.e. a training resource vs a best practice guideline, etc.

These include:

### 2.1.1 Cos4Cloud Toolbox and Evidence Hub logo



### 2.1.2 Cos4Cloud branded banners using theme Cos4Cloud colour specification

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### 2.1.3 A bottom banner with partner, funder logos, etc

COORDINATION



This project is part of



This Project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 863463.



### 2.1.4 Theme area banners



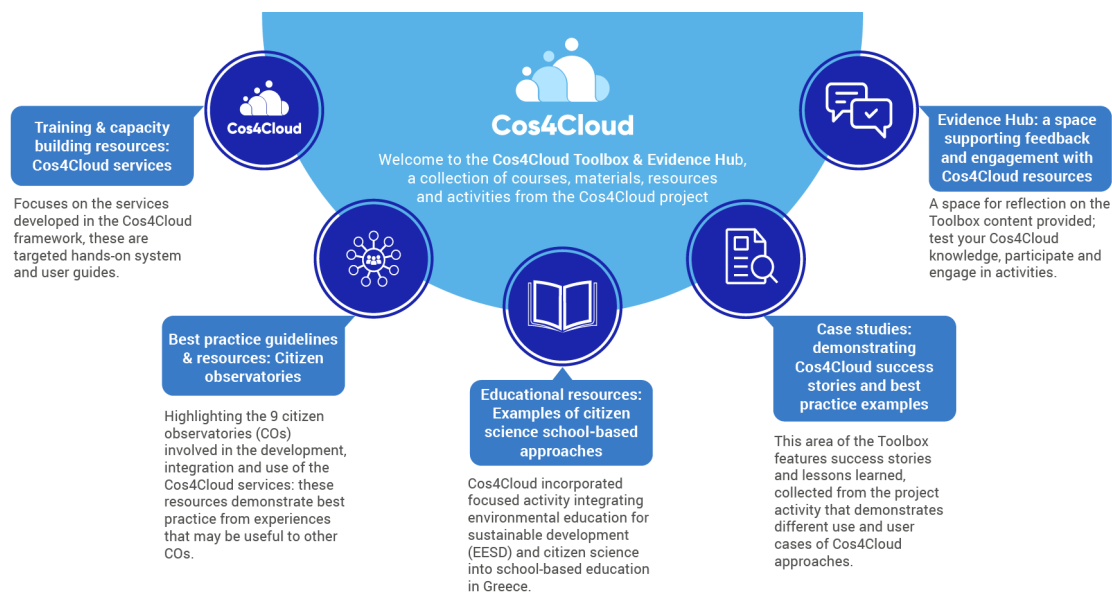




## 2.2 Toolbox specification aligning with the Cos4Cloud framework

The graphic below demonstrates the design framework of the Cos4Cloud Toolbox and Evidence Hub collaborative collection with the themed categories defined in alignment with the Cos4Cloud project framework. Summaries of details of the content defining these areas are further detailed below.




t



### 3. Cos4Cloud Toolbox and Evidence Hub content

#### Cos4Cloud Toolbox & Evidence Hub:

This is directed using the bespoke URL: <https://uni.open.ac.uk/Cos4Cloud-Toolbox-and-Evidence-Hub>. (Original home page link: <https://www.open.edu/openlearncreate/course/index.php?categoryid=592> ).

<b>1. Page / Navigational label: Home</b>	
<b>Title: Cos4Cloud Toolbox &amp; Evidence Hub :</b> <a href="https://uni.open.ac.uk/Cos4Cloud-Toolbox-and-Evidence-Hub">https://uni.open.ac.uk/Cos4Cloud-Toolbox-and-Evidence-Hub</a>	
<b>Link:</b> <a href="https://www.open.edu/openlearncreate/course/index.php?categoryid=592">https://www.open.edu/openlearncreate/course/index.php?categoryid=592</a>	
 The logo for Cos4Cloud Toolbox & Evidence Hub. It features a dark blue background with a light blue vertical bar on the left. In the center, there is a white icon of four stylized human figures of varying heights, with the tallest one in the middle. Below the icon, the text "Cos4Cloud" is written in a large, white, sans-serif font, and "Toolbox & Evidence Hub" is written in a smaller, white, sans-serif font below it.	Links to banners and course images: Collection banners:  <a href="#">collection-banners</a> Course / resource images for each theme:  <a href="#">Theme areas - course images</a>

**Welcome to the Cos4Cloud Toolbox & Evidence Hub, a collection of courses, materials, resources and activities from the Cos4Cloud project.**

Codesigned Citizen Observatories Services for the European Open Science Cloud ([Cos4Cloud](#)) is a Horizon 2020 funded European Project Cos4Cloud focused on boosting citizen science codesigning technological services to help increase and improve the quantity and quality of observations. The project developed [thirteen technological services](#), supported by nine established biodiversity and environmental [citizen observatories](#), integrating and testing some of these services.

**The Cos4Cloud Toolbox and Evidence Hub** is a 'one-stop-shop' showcasing Cos4Cloud best practice, case studies, lessons learned, educational, training and capacity building resources and activities. A legacy of the Cos4Cloud project, it has been developed as a demonstration space sharing project results through a range of resources which can be useful for existing and future citizen observatory leaders and users as well as anyone with an interest in citizen science.

The **Cos4Cloud Toolbox and Evidence Hub** is hosted and managed by The Open University on behalf of the project partnership. It is available, as part of the project legacy, as an accessible collection to demonstrate results, best practices and lessons learned and support the sustainability and continued use of the knowledge and outputs produced by Cos4Cloud. It includes training and capacity-building resources, best practice guidelines, educational resources, case studies and the Evidence Hub as a space for reflection on the content provided.

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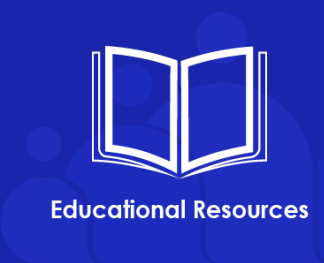




### The Cos4Cloud Toolbox and Evidence Hub



Explore the [Cos4Cloud Toolbox and Evidence Hub](#) collection of resources, materials, and activities using the following thematic categories:



 <p><b>Cos4Cloud</b> Training &amp; capacity building resources</p>	<p><b><u>Training &amp; capacity building resources: Cos4Cloud services</u></b></p> <p>Focuses on the services developed in the Cos4Cloud framework, these are targeted hands-on system and user guides, each training resource includes:</p> <ul style="list-style-type: none"> <li>• A description of the service</li> <li>• Who the service is for and the benefits</li> <li>• How it works, and</li> <li>• How to use the service – a step by step guide</li> </ul>
 <p><b>Best practice guidelines &amp; resources</b></p>	<p><b><u>Best practice guidelines &amp; resources: Citizen observatories</u></b></p> <p>Highlighting the 9 citizen observatories involved in the development, integration and use of the Cos4Cloud services these resources demonstrate best practice from these experiences that may be useful for other COs, this includes:</p> <ul style="list-style-type: none"> <li>• Guidelines on Best Practice for Citizen Observatories: framed by the ECSA 10 Principles of citizen science</li> <li>• Integrating FASTCAT-Cloud and PI@ntNet-API in the Cos4Cloud framework: iSpot and AI</li> <li>• Co-designing citizen observatories in the Cos4Coud framework</li> </ul>
 <p><b>Educational Resources</b></p>	<p><b><u>Educational resources: Examples of citizen science school-based approaches</u></b></p> <p>Cos4Cloud incorporated focused activity integrating environmental education (EE), education for sustainable development (ESD) and citizen science into school-based education in Greece. Resources highlighting examples from this work, include:</p> <ul style="list-style-type: none"> <li>• Summaries of educational scenarios and case studies involving Cos4Cloud services and COs involved in the project</li> <li>• Links to other educational tools and resources</li> </ul>

 <p>Case Studies</p>	<p><b><u>Case studies: demonstrating Cos4Cloud success stories and best practice examples</u></b></p> <p>This area of the Toolbox features success stories and lessons learned, collected from project activity that demonstrates different use and user cases of Cos4Cloud approaches. Resources include:</p> <ul style="list-style-type: none"><li>• Testing FASTCAT-Edge and FASTCAT-Cloud camera trap services in a real scenario</li><li>• Use cases of PI@ntNet-API in an app for farmers and to identify plant-pollinator interactions</li></ul>
 <p>Evidence Hub</p>	<p><b><u>Evidence Hub: a space supporting feedback and engagement with Cos4Cloud resources</u></b></p> <p>A space for reflection on the Toolbox content provided; test your Cos4Cloud knowledge, participate and engage in activities:</p> <ul style="list-style-type: none"><li>• Use the Cos4Cloud services: summary of training resources and what you can do</li><li>• Review the Cos4Cloud educational resources, case studies and best practice examples</li><li>• key take away Cos4Cloud tips</li></ul>

**Cos4Cloud** (<https://cos4cloud-eosc.eu/>) is a consortium of 15 partners (<https://cos4cloud-eosc.eu/the-project/partners/>). Development of the **Cos4Cloud Toolbox and Evidence Hub** is led by The Open University in collaboration with project partners. It is hosted by the OU's free learning platform OpenLearn Create ([www.open.edu/openlearncreate](http://www.open.edu/openlearncreate)). Contact: [cos4cloud-toolbox@open.ac.uk](mailto:cos4cloud-toolbox@open.ac.uk) .

### 3.1 Training and capacity building resources

The training and capacity building framework implemented included developing resources focused on the key outputs of the project i.e. the services which are targeted at COs, users associated initiatives, stakeholders etc. Part of this process includes gathering experiences and best practice from existing COs which is helpful to better understand the needs of Citizen Observatories.

In the last few months of the project the original design and development had to be changed due to a decision to have all Cos4Cloud resources downloaded directly from Zenodo (<https://zenodo.org/>) as the preferred project documentation repository. Therefore, initial plans documented in D6.6 which outlined that resources were being created as different OpenLearn Create *content types* (i.e. course, material, handbook, guide, article etc.) with selected *resource tools* and *activities* are being integrated as part of the design of the resources under development had to be changed and all resources designed instead as bespoke PDFs, added to Zenodo and these links embedded into the Toolbox. This change resulted in additional delays to the finalisation of resources as the design framework had to be changed.

Targeted user, system and user guides, and guides were designed supporting the Cos4Cloud will help support and promote further interest from existing and future citizen observatories participants, managers, stakeholders etc on the use of Cos4Cloud services. Knowledge transfer from the co-design, testing and other engagement activities which have been key to the development of the services, have also informed this providing content for the resources collated from these processes.

A **Training and Capacity Building resources template** was developed and used to collate, structure and format content for the resources. In collaboration with each service lead, content has been collated from a number of sources incorporating as many sources as possible involving each service. The training guides were designed with an overarching framework as 'system and user guides' to meet the needs of the different target audience types (i.e. CO administrator / developer or CO user) using one resource (rather repetition with multiple resources) and how the service is devised for integration and use within a CO (i.e. as a developer too or directly used by CO participants).

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A system and user guide has been designed and developed for each of the 13 Cos4Cloud services. The following Zenodo links to these resources have been embedded in the Training and capacity building resources area of the ToolBox;

AI-GeoSpecies system and user guide: <https://zenodo.org/record/7790021>

AI-Taxonomist system and user guide: <https://zenodo.org/record/7790028>

Authenix system and user guide: <https://zenodo.org/record/7790035>

Cos4Bio system and user guide: <https://zenodo.org/record/7790001>

Cos4Env system and user guide: <https://zenodo.org/record/7790054>

DUNS system and user guide: <https://zenodo.org/record/7790064>

FASTCAT-Cloud system and user guide: <https://zenodo.org/record/7789928>

FASTCAT-Edge system and user guide: <https://zenodo.org/record/7790078>

GBIF-DL system and user guide: <https://zenodo.org/record/7790044>

MECODA system and user guide: <https://zenodo.org/record/7790103>

MOBIS system and user guide: <https://zenodo.org/record/7790084>







Pl@ntNet system and user guide: <https://zenodo.org/record/7789861>

STApplus system and user guide: <https://zenodo.org/record/7790093>

<b>Page / Navigational label: Training resources</b>
<b>Title: Cos4Cloud Training &amp; capacity building resources</b>
<b>Link:</b> <a href="https://www.open.edu/openlearncreate/course/index.php?categoryid=593">https://www.open.edu/openlearncreate/course/index.php?categoryid=593</a>
 A banner with a blue background. On the left is a vertical light blue bar. The main area is dark blue with a white icon of three stylized figures of varying heights. Below the icon, the text "Cos4Cloud Training & capacity building resources" is written in white. There are also some faint, larger blue circles in the background.
<b>Cos4Cloud Training &amp; capacity building resources</b>

This area of the **Cos4Cloud Toolbox & Evidence Hub** shares targeted system and user guides designed and collated to help support the use of services developed in the Cos4Cloud framework to help to increase and improve the quantity and quality of citizen science observations. Read more about the [thirteen technological services](#) developed by Cos4Cloud.

These training resources are particularly targeted to the audience of each service and aim to support and build the capacity of existing and future citizen observatories users, participants, managers and developers. Each system and user guide explores the opportunities each service provides. Read the description and click on the link for each service to access each resource which outlines:

-  WHAT IS THE SERVICE?
-  WHO IS THE SERVICE FOR?
-  WHAT ARE THE BENEFITS OF THE SERVICE?
-  HOW DOES IT WORK?
-  HOW TO USE THE SERVICE – A STEP BY STEP GUIDE
-  INFORMATION AND FURTHER SUPPORT

Training & capacity building resources available for the Cos4Cloud services include:







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Resource Image	Name of Cos4Cloud service	Resource Banner	Links and titles Cos4Cloud training & capacity building resources	Description: about each guide:
	AI-GeoSpecies © Inria, PI@ntNet and Cos4Cloud		<a href="#">AI-GeoSpecies system and user guide</a>	This is a system and user guide to <b>AI-GeoSpecies</b> : a service that uses artificial intelligence to predict which species users can observe in a particular area.
	AI-Taxonomist © Inria, PI@ntNet and Cos4Cloud		<a href="#">AI-Taxonomist system and user guide</a>	This is a system and user guide to <b>AI-Taxonomist</b> : a service which enables citizen observatories, citizen science or other research projects to integrate customisable automatic identification tools and help users identify species from images.
	AUTHENIX © Secure Dimensions and Cos4Cloud		<a href="#">AUTHENIX system and user guide</a>	This is a system and user guide to <b>AUTHENIX</b> : an online authentication service that provides access to multiple protected citizen science platforms and services via a Single-Sign-On and facilitates General Data Protection Regulation (GDPR) compliance for apps and services.









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Resource Image	Name of the service and Coordinator	Resource Banner	Links and title of the Training & capacity building resource	Summary: about each free guide:
	<p>Cos4Bio © Bineo Consulting and Cos4Cloud</p>		<p><a href="#">Cos4Bio system and user guide</a></p>	<p>This is a system and user guide to <b>Cos4Bio</b>: a service that integrates biodiversity observations from multiple citizen observatories into one place. This provides easier access to large number of observations saving time while supporting the expert community in the species identification process.</p>
	<p>Cos4Env © Bineo Consulting and Cos4Cloud</p>		<p><a href="#">Cos4Env system and user guide</a></p>	<p>This is a system and user guide to <b>Cos4Env</b>: a service that integrates environmental observations from multiple citizen observatories saving time by providing easier access to a wide environmental data in one place.</p>
	<p>DUNS © Bineo Consulting and Cos4Cloud</p>		<p><a href="#">DUNS system and user guide</a></p>	<p>This is a system and administrator user guide to <b>DUNS</b>: a centralised service which helps citizen observatories (COs) with observations on the Cos4Bio portal be aware of how their data is</p>









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				being used enabling them to reward user contributions.
	FASTCAT Cloud © DynAlkon and Cos4Cloud		<a href="#"><u>FASTCAT-Cloud system and user guide</u></a>	This is a system and user guide to <b>FASTCAT-Cloud</b> : an AI-based service that helps with species identification by automatically filtering out unwanted pictures from camera traps.
	FASTCAT-Edge © DynAlkon and Cos4Cloud		<a href="#"><u>FASTCAT-Edge system and user guide</u></a>	This is a system and user guide to <b>FASTCAT-Edge</b> : a service that helps users build their own smart camera trap to record videos and pictures of wildlife activity which can be linked to a cloud-based service and help support identification of species names.
	GBIF-DL © Inria, Pl@ntNet and Cos4Cloud		<a href="#"><u>GBIF-DL system and user guide</u></a>	This is a system and user guide to <b>GBIF-DL</b> : a service which provides support to train an Artificial Intelligence (AI) model to identify a particular group of species: facilitating the creation of training sets of groups of living organisms for machine learning applications.

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	<p>MECODA © Instituto de Ciencias del Mar ICM-CSIC and Cos4Cloud</p>		<p><a href="#"><u>MECODA system and user guide</u></a></p>	<p>This is a user guide to <b>MECODA</b>: an online service that provides a repository of tools that facilitate analysis <b>and visualisation of citizen science data</b>.</p>
	<p>MOBIS © DDQ Pocket Science and Cos4Cloud</p>		<p><a href="#"><u>MOBIS system and user guide</u></a></p>	<p>This is a system and user guide to <b>MOBIS</b>: a service that provides integrative citizen science mobile applications through which users can report environmental and biodiversity observations using one Android or iOS App.</p>
	<p>Pl@ntNet-API © Inria, Pl@ntNet and Cos4Cloud</p>		<p><a href="#"><u>Pl@ntNet-API system and user guide</u></a></p>	<p>This is a system and user guide for <b>Pl@ntNet-API</b>: an AI-based plant identification service that uses Pl@ntNet's visual identification engine that can be used to improve the user experience in citizen observatories.</p>
	<p>STApplus © CREAM, Secure Dimensions, and Cos4Cloud</p>		<p><a href="#"><u>STApplus system and user guide</u></a></p>	<p>This is a system and user guide for <b>STApplus</b>: a service which helps to standardise citizen science data, making it accessible, interoperable,</p>

				and reusable particularly amongst different citizen observatories.
<p>These <b>system and user guides</b> are Cos4Cloud training and capacity building resources developed and shared by The Open University (OU), in collaboration with project partners, for <b>the Cos4Cloud Toolbox &amp; Evidence Hub</b>. <b>Contact:</b> <a href="mailto:cos4cloud-toolbox@open.ac.uk">cos4cloud-toolbox@open.ac.uk</a>.</p>				

### 3.2 Best practice guidelines

**D6.2: Guidelines on best practice** contributed to the development and sharing of resources through the Cos4Cloud Toolbox and Evidence Hub. The focus of the D6.2 report was to demonstrate best practice in citizen observatories through the experiences of COs directly involved in the project. This was supported by insight from a number of sources: networking and engagement with projects of interest; sharing between the COs in Cos4Cloud (i.e. discussions, workshops internal and external reports etc); from the COs contributions / involvement in the co-design of the technological services; and from two questionnaire surveys facilitated with the CO leads gathering feedback to directly capture information, best practice and lessons learned. This has been collated contributing to knowledge transfer and consolidated into the development of guidelines of best practice in **the Cos4Cloud Toolbox and Evidence Hub**.





<b>Page / Navigational label: Best practice guidelines</b>
<b>Best practice guidelines &amp; resources: Citizen observatories</b>
<b>Link:</b> <a href="https://www.open.edu/openlearncreate/course/index.php?categoryid=594">https://www.open.edu/openlearncreate/course/index.php?categoryid=594</a>





**Best practice guidelines resources from citizen observatories experiences in the development, integration, testing and use of the Cos4Cloud services**

This area of the **Cos4Cloud Toolbox & Evidence Hub** demonstrates best practice experiences from the nine citizen observatories (CO's) involved in the development, integration, and use of the Cos4Cloud services and associated project activity. These resources are based on activities COs have been involved in the project, and sharing lessons learned from associated engagement, networking, educational and other activities or strategies implemented. Developed as guidelines they have been created from evidence-based knowledge that may be useful for and support other citizen observatories. These guidelines sharing examples of Cos4Cloud best practice sit alongside the services system and user guides, case studies and other resources. Read more about the nine established biodiversity and environmental [citizen observatories](#) involved in Cos4Cloud.

Best practice guidelines & resources in this area of the Cos4Cloud Toolbox include:

Resource Image	Resource Banner	Links and best practice resource title	Description: about each best practice guideline:
		<p><a href="#">Guidelines on best practice for citizen observatories: framed by the ECSA 10 Principles of citizen science</a></p>	<p>This guideline is an output from the Cos4Cloud project which demonstrates best practice for Citizen Observatories (COs), based on the experiences of the COs involved in the project. It highlights COs best practice, developed from implementation, reviewed in the context of the <a href="#">ECSA Ten Principles of citizen Science</a> which has been applied as a framework. These examples are produced as guidelines for other COs, initiatives and interested stakeholders which if followed, can produce good outcomes</p>
		<p><a href="#">Integrating FASTCAT-Cloud and PI@ntNet-API in the Cos4Cloud framework: iSpot and AI</a></p>	<p>Cos4Cloud includes the participation of <a href="#">nine established citizen observatories</a> (COs) and Do it Yourself (DIY) initiatives. These COs have contributed to the development of technological services; integrating, testing and providing feedback; as well as demonstrators sharing the services with their user communities. This guideline demonstrates best practice from the experiences focused on the PI@ntNet API and FASTCAT-Cloud and the CO iSpot (<a href="http://www.iSpotnature.org">www.iSpotnature.org</a>).</p>

 <p>Cos4Cloud Best practice guidelines &amp; resources Citizen Observatories</p>	 <p>Cos4Cloud Best practice guidelines &amp; resources Citizen Observatories</p>	<p><a href="#">How to co-design a citizen science project within the Cos4Cloud framework</a></p>	<p>The Cos4Cloud framework demonstrates best practice providing solutions, interventions, actions, or procedures that can assist the development of new or support existing citizen observatories and citizen science projects. This has developed from the successful implementation of technological services, involving COs, and practical experiences of integration and testing. Aligned with multi-dimensional approaches, all-together this builds capacity, supports and facilitates outreach, engagement and participation to reach key publics and stakeholders. This best practice guideline summarises insight from some of these experiences which can be adapted by others, highlighting <b><i>how to co-design a citizen observatory or citizen science project within the Cos4Cloud framework.</i></b></p>
<p>These <b>best practice guidelines resources</b> highlight experiences from the citizen observatories involved in the development, integration, testing and use of the Cos4Cloud services. These resources demonstrate best practice that may be useful for other COs and citizen science initiatives; and are developed and shared by The Open University (OU), in collaboration with project partners, for <b>the Cos4Cloud Toolbox &amp; Evidence Hub</b>. Contact: <a href="mailto:cos4cloud-toolbox@open.ac.uk">cos4cloud-toolbox@open.ac.uk</a></p>			

### 3.3 Educational resources

Educational content was part of Cos4Cloud’s work led by Cos4Cloud project partner National and Kapodistrian University of Athens (NKUA) Environmental Education Lab. The Cos4Cloud project has developed thirteen technological services to help increase and

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improve the quantity and quality of observations. Cos4Cloud includes nine Citizen Observatories (COs). Supporting this, NKUA designed and demonstrated educational content which can be adapted to support learning at primary, secondary or university level in Environmental Education (EE) and Educational Sustainable Development (ESD). This content showcases examples of citizen science school-based approaches that include examples demonstrating citizen observatories involved in Cos4Cloud and the use of project services. This summary was compiled from NKUA documentation and incorporates contributions made by Greek Environmental Education teachers and school educational stakeholders as part of the co-design of educational scenarios in the context of the Cos4Cloud project. The main supporting resources and outputs were originally developed and delivered by NKUA in Greek and some of this content has been collated adapted and presented in English as part of the Cos4Cloud Toolbox & Evidence Hub.



**Page / Navigational label: Educational resources**

**Examples of citizen science school-based approaches**

**Link:** <https://www.open.edu/openlearncreate/course/index.php?categoryid=595>





**Cos4Cloud activity integrating environmental education (EE), education for sustainable development (ESD) and citizen science into school-based education**

This area of the **Cos4Cloud Toolbox & Evidence Hub** shares Cos4Cloud educational best practice focused on citizen science school-based approaches. The strategy for engaging school communities in Cos4Cloud was implemented by project partner National and Kapodistrian University of Athens (NKUA) in Greece, with adaptations in other areas, and includes activities focused on introducing citizen science through the Cos4Cloud services and citizen observatories (COs) with an emphasis on

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school-focused practical examples. The Toolbox resources showcased here include a range of demonstrator educational scenarios and approaches implemented to evaluate citizen science methods in school-based education. These have been developed targeting users from a wider audience with an interest in environmental education. Educational resources in this area of the Cos4Cloud Toolbox include:

Resource Image	Resource Banner	Links and educational resource title	Description: about each educational resource:
		<p><a href="#">Cos4Cloud Citizen Science &amp; Environmental Education for Sustainability - NKUA Six Educational Scenarios summary</a></p>	<p>This <b>Six Educational Scenarios</b> summary was developed as a resource to support interest, in the development of Educational Scenarios that are part of Cos4Cloud citizen science-based environmental education activities and interventions. Educational Scenarios are part of Cos4Cloud’s work on education. led by NKUA with <a href="#">designed and demonstrated educational content</a> that can be adapted to support learning at primary, secondary or university level in Environmental Education (EE) and Educational Sustainable Development (ESD). This content showcases examples of citizen science school-based approaches including examples from the citizen</p>

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			<p>observatories involved in Cos4Cloud and the use of the project services.</p>
		<p><a href="#">Cos4Cloud Citizen Science &amp; Environmental Education for _____ Sustainability Educational Scenario Guide</a></p>	<p>This <b>Cos4Cloud Educational Scenario Guide</b> was developed to support the creation of Educational Scenarios that are part of citizen science-based environmental education activities and interventions led by NKUA. This Guide was adapted from a template initially used as a resource for Greek Environmental Education teachers and school educational stakeholders as part of the co-design of educational scenarios in the context of the Cos4Cloud project. The supporting resources and outputs were originally developed and delivered by NKUA in Greek and this Guide has been adapted as part of the <b>Cos4Cloud Toolbox &amp; Evidence Hub</b>.</p>
		<p>(Under development)</p>	<p>Links to other educational tools and resources</p>

These **educational resources** demonstrate materials and results from the citizen science and environmental education content and activities for schools developed and delivered by NKUA in the Cos4Cloud project. They have been adapted, collated, developed and shared by the Open University in collaboration with project partners for the **Cos4Cloud Toolbox & Evidence Hub**. Contact: [cos4cloud-toolbox@open.ac.uk](mailto:cos4cloud-toolbox@open.ac.uk).

### 3.4 Case studies

Case studies are part of the Cos4Cloud project outputs providing evidence-based knowledge of project approaches and their impact. The aim was to highlight examples that cover diverse approaches and disciplines/sectors shared as part of the legacy / lessons learnt from the project. These incorporate a range of experiences generated through the lifetime of the project i.e. blogs and articles, user-friendly presentations of selected best practices success stories etc. They form part of this section of the Cos4Cloud Toolbox and Evidence Hub which are shared as part of the legacy and lessons learned from the project.

The development and implementation of these case studies also demonstrates exemplars of best practice for citizen observatories, and lessons learnt contributing to Cos4Cloud exploitable results which will be shared online via the toolbox and evidence hub (WP6). They have also been promoted and shared via other project channels i.e. as blogs etc. on the project website, communication, outreach and stakeholder engagement activities as part of the project; and through other online relevant repositories i.e. and EOSC hub channels. A template was developed to guide the structure and development of the case studies. Case study themes and information was gathered and selected from ideas proposed by promoting a participatory approach. Case studies produced include:

- Evaluating the learning potential of citizen observatories: a case study of iSpotnature.org an online learning community for nature lovers: <https://zenodo.org/record/7790120>
- Use cases of Pl@ntNet-API in an app for farmers and to identify plant-pollinator interactions: <https://zenodo.org/record/7790118>
- Testing FASTCAT-Edge and FASTCAT-Cloud camera trap services in a real scenario: the FELIS project: <https://zenodo.org/record/7790112>

**Page / Navigational label: Case studies**

**Title: Cos4Cloud Case studies**

**Link:** <https://www.open.edu/openlearncreate/course/index.php?categoryid=596>







**Case studies demonstrating Cos4Cloud success stories and best practice examples**

This area of the **Cos4Cloud Toolbox & Evidence Hub** showcases case studies demonstrating evidence-based knowledge from a range of examples of Cos4Cloud approaches to citizen science and their impact.. Examples are diverse and are shared as part of the legacy and lessons learned from the project. These case studies include a range of stories and experiences collated from activity generated throughout the lifetime of the project which are presented as user-friendly resources of selected best practices, success stories etc of activity involving [Cos4Cloud citizen observatories \(COs\)](#), as well as the use and integration of [Cos4Cloud services](#).



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Case studies in this area of the Cos4Cloud Toolbox include:

Resource Image	Cos4Cloud CO and / or Service demonstrated	Resource Banner	Links and Case Study Title	Description: about each case study
	<p>@iSpotnature Open University and Cos4Cloud</p>		<p><a href="#">Evaluating the learning potential of citizen observatories: a case study of iSpot - an online learning community for nature lovers</a></p>	<p>This Case study explores the citizen science learning potential of citizen observatories demonstrating examples of <b>iSpotnature</b> activity highlighting the learning potential from online activities focused on collecting and sharing biodiversity data. iSpot is a citizen science platform (citizen observatory) for biodiversity developed and operated by The Open University (OU). It is aimed at helping anyone share wildlife observations, identify, explore and learn about nature.</p>
	<p>Pl@ntNet-API © Inria, Pl@ntNet and Cos4Cloud</p>		<p><a href="#">Use cases of Pl@ntNet-API in an app for farmers and to identify plant-pollinator interactions</a></p>	<p>This case study demonstrates the potential of the Cos4Cloud service <b>Pl@ntNet-API</b> in two different use cases to query the Pl@ntNet identification engine allowing the integration of an automatic plant identification feature into an app and workflow, respectively, without having to manage the plant</p>


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				identification feature itself. PI@ntNet-API is an Application Programming Interface (API) allowing users to query the PI@ntNet identification engine.
	<p>FASTCAT-Cloud and FASTCAT-Edge          © DynAlkon and Cos4Cloud</p>		<p><a href="#">Testing FASTCAT-Edge and FASTCAT-Cloud camera trap services in a real scenario: the FELIS project</a></p>	<p>This case study demonstrates the potential of the Cos4Cloud services <a href="#">FASTCAT-Edge</a> and <a href="#">FASTCAT-Cloud</a> to improve the camera trap community users' experience. It is focused on a testing session that Cos4Cloud organised with the <a href="#">FELIS' group</a>, a camera trap community in Catalonia, Spain that uses camera traps to monitor Catalan mammals, focusing on the wildcat (<i>Felis silvestris</i>).</p>
<p>These <b>case studies</b> demonstrate Cos4Cloud success stories and best practice examples created as part of the legacy and lessons learned from the project; developed and shared by The Open University (OU), in collaboration with project partners, for <b>the Cos4Cloud Toolbox &amp; Evidence Hub</b>. Contact: <a href="mailto:cos4cloud-toolbox@open.ac.uk">cos4cloud-toolbox@open.ac.uk</a></p>				







### 3.5 The Evidence Hub

The development of the **Cos4Cloud Toolbox** has involved the creation and sharing of training, capacity building and educational, materials and resources and sharing best practices demonstrating Cos4Cloud frameworks and outputs. engagement outreach, capacity development, best practice, lessons learned and success stories targeted existing and future citizen observatories and other stakeholders. This is a legacy collection of different materials and resources, available as an online space, which also supports engagement, that is also promoted from the project website and other channels etc. The **Evidence Hub** is being built in as part of the legacy of the Cos4Cloud project. An accessible space added to the Toolbox it I will continue to be maintained, further developed and managed by The Open University on behalf of the project partnership, continuing to build and showcase the results contributing to the legacy of the project.

Samples quizzes and summary tips are being integrated and mechanisms to gather feedback including a bespoke email: [Cos4Cloud-toolbox@open.ac.uk](mailto:Cos4Cloud-toolbox@open.ac.uk) (See example quiz below)

Name of Cos4Cloud service	About the service system and user guide:	Test your knowledge about each service:
	<p><b>AI-GeoSpecies system and user guide</b></p> <p>This is a system and user guide to <b>AI-GeoSpecies</b>: a service that uses artificial intelligence to predict which species users can observe in a particular area.</p> <p>Check out the training resources and find out more about:</p>	<p><b>AI-GeoSpecies</b></p> <ol style="list-style-type: none"> <li>AI-GeoSpecies is a ready-to-use application True or False?</li> <li>AI-GeoSpecies is a service that can be integrated into an app and predicts which species users will find in a particular area True or False</li> <li>AI-GeoSpecies is a mapping tool for viewing photos of species in diverse spots [Answer: False]</li> <li>As a user, can this service notify me of the presence of exotic or endangered species? Yes or No</li> <li>Can I integrate this service into existing apps?</li> </ol>



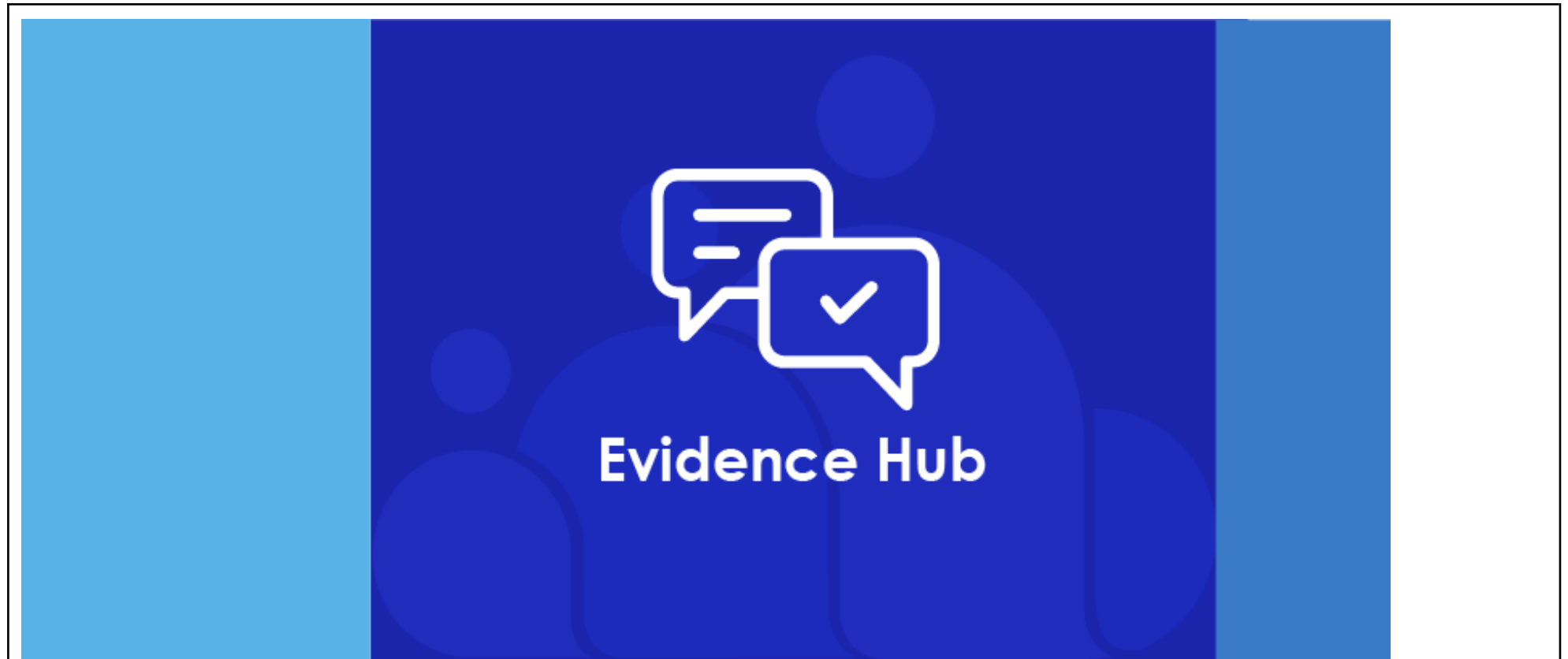
	<p> <b>What is this service?</b></p> <p> <b>Who is this service for?</b></p> <p> <b>What are the benefits of this service?</b></p> <p> <b>How does it work?</b></p> <p> <b>How to use this service - a step by step guide</b></p> <p> <b>Information and further support</b></p>	<p>Yes or No</p> <p>f. AI-Geospecies operates on a .....scale European or Global</p> <p>g. Who are the main users of this service? Citizen scientists or Developers with experience in web technologies</p> <p>h. How do you think AI-GeoSpecies improves citizen observatories performance? [Add a word or a phrase, create and contribute a word cloud]</p> <p>Free word responses generated as a word cloud</p> <p>Example answers:</p> <p>information prediction              improve quality of report data quality              prediction              innovative integrative engagement data integration open              quick app development              conservation              probability</p>
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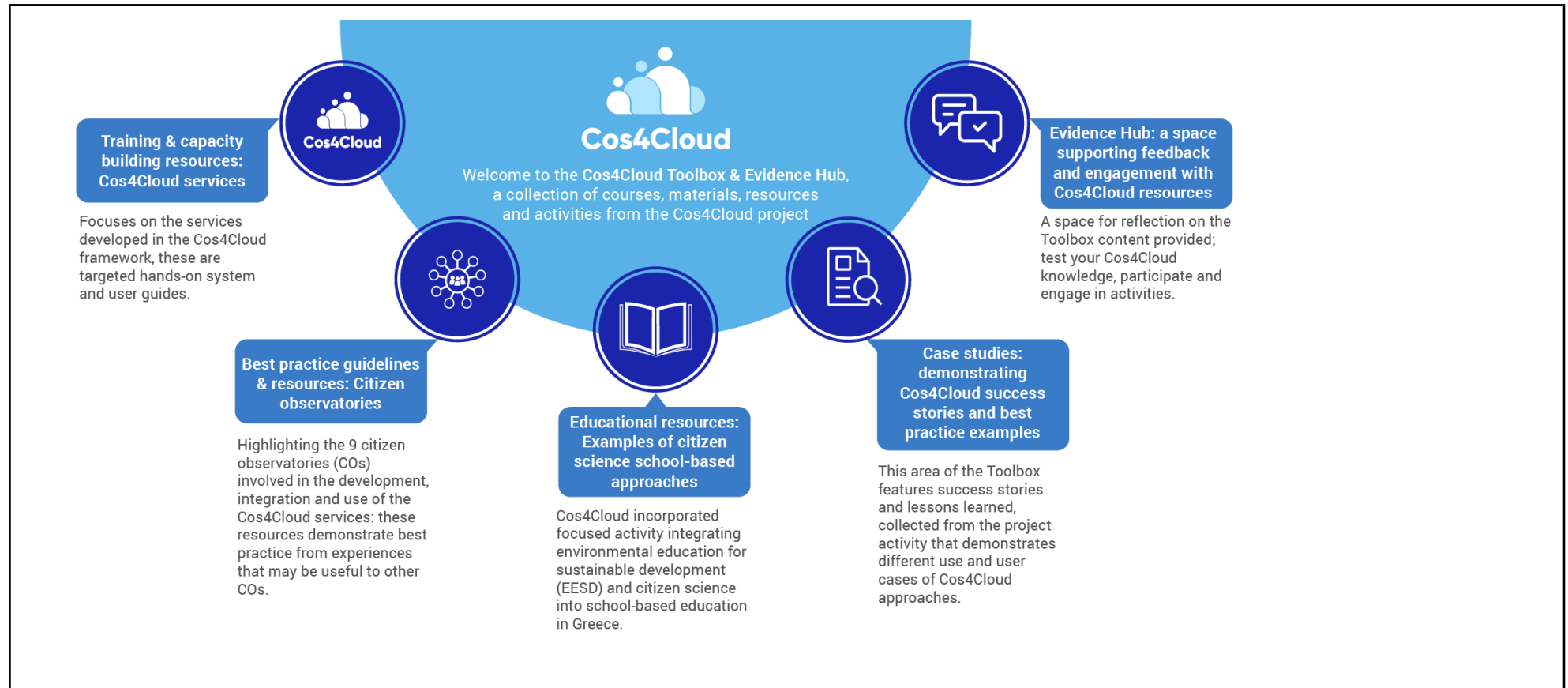
**Evidence hub page link: <https://www.open.edu/openlearncreate/course/index.php?categoryid=597>**

**Link: <https://www.open.edu/openlearncreate/course/index.php?categoryid=597>**



**The Evidence Hub is a space to support and encourage feedback and engagement with Cos4Cloud resources**

Under development to support use of the Cos4Cloud Toolbox resources, The **Evidence Hub** integrates features that facilitate crowdsourced knowledge exchange. This space will facilitate feedback and discussion as well as host activities for participation and engagement with users of the training and capacity building resources, best practice guidelines, educational resources and case studies included.





### Cos4Cloud Evidence Hub






Explore, review and engage with the [Cos4Cloud Toolbox](#) collection of resources:

- Start by reflecting on the thematic categories provided
- Read about the Cos4Cloud services: use the training resources and find out what you can do

- Review the Cos4Cloud educational resources, case studies and best practice examples
- Gathers together key take away Cos4Cloud tips

 <p><b>Cos4Cloud</b> Training &amp; capacity building resources</p>	<p><b>Evidence Hub: Build your knowledge on what you have learned about the Cos4Cloud services</b></p> <p><b>Focus on the services developed in the Cos4Cloud framework: <a href="#">Training &amp; capacity building resources: Cos4Cloud services</a></b></p>
 <p><b>Best practice guidelines &amp; resources</b></p>	<p><b>Engage and build your knowledge on what you have learned about Cos4Cloud CO best practices</b></p> <p><b>The Cos4Cloud Toolbox highlights best practice from the experiences of the 9 citizen observatories involved in the development, integration and use of the Cos4Cloud services that may be useful to other COs: <a href="#">Best practice guidelines &amp; resources: Citizen observatories</a></b></p>

	<p><b>Review highlights and examples while learning from the Cos4Cloud educational approaches</b></p> <p><b>Cos4Cloud incorporated focused activity integrating environmental education (EE), education for sustainable development (ESD) and citizen science into school-based education in Greece; highlights and examples from this work: <a href="#">Educational resources: Examples of citizen science school-based approaches</a></b></p>
	<p><b>Document highlights and examples while learning from Cos4Cloud case studies</b></p> <p><b>The Cos4Cloud Toolbox features success stories and lessons learned collected from project activity that demonstrates different use and user cases of Cos4Cloud approaches: <a href="#">Case studies: demonstrating Cos4Cloud success stories and best practice examples</a>.</b></p>
	<p><b>The Evidence Hub: <a href="#">a space supporting feedback and engagement with Cos4Cloud resources</a></b></p> <p>Explore review and engage with the <a href="#">Cos4Cloud Toolbox</a> collection of resources; reflect on the thematic categories provided; test your Cos4Cloud knowledge, participate and engage in activities based on the different areas and resources.</p> <p>Soon you will be able to test your Cos4Cloud knowledge, participate and engage in activities based on the different areas and resources. Now you can contact us with your comments and feedback: <a href="mailto:cos4cloud-toolbox@open.ac.uk">cos4cloud-toolbox@open.ac.uk</a>.</p>

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	The Evidence Hub is being developed and shared by The Open University (OU), in collaboration with project partners, for <b>the Cos4Cloud Toolbox &amp; Evidence Hub</b> .
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## 4. Promoting the Toolbox and Evidence Hub: contributing to Cos4Cloud's legacy

Available in May 2023 with a promotional campaign linked with core citizen science, environmental and biodiversity activity and ongoing across featured events, activities and associated themes to promote its use facilitated through ongoing OU communications and marketing. It will be promoted and available under the url: <https://uni.open.ac.uk/Cos4Cloud-Toolbox-and-Evidence-Hub>.

Developed and hosted by the OU, further plans are underway to expand its growth and use of the Cos4Cloud Toolbox and Evidence Hub as part of the [OU sustainability mission](#) which will be co-promoted and launched aligned with Biodiversity Day on May 22<sup>nd</sup> and World Environment Day June 5th as well as incorporated into other activity over the coming months.

It is anticipated that over time **the Cos4Cloud Toolbox and Evidence Hub** will continue to support achieving Cos4Cloud goal of positioning of citizen science in the European Open Science Cloud (EOSC) as a linked resource available from [the EOSC Portal Catalogue and Marketplace](#) . It will also be shared and promoted through relevant repositories e.g. ECSA's [EU.Citizen.Science](#) and as part of the promotion to launch [SciStarter UK](#) in the summer of 2023.

User data will be monitored and shared and new content incorporated as the legacy of the project continues.