Co-designed Citizen Observatories Services for the EOS-Cloud

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Deliverable 6.6 Training materials and Capacity Building Report

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

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Executive Summary

Cos4Cloud is developing thirteen technological services focused on boosting citizen science observatories to help increase and improve the quantity and quality of observations. The project includes the participation of 9 established citizen observatories (CO) and Do it Yourself (DIY) initiatives, focused on biodiversity and the environment, integrating and testing these services. Part of this also, are capacity building, training, educational, networking, dissemination, codesign, communication and engagement collaborative strategic actions and initiatives which also demonstrate Cos4Cloud best practice.

Facilitating networking and citizen science knowledge management processes across organisations, people and initiatives is one of the key objectives of the Cos4Cloud project. Task 6.5 Training and Capacity building services, part of Work Package 6 (WP6) '*Networking, Training [Education] and Capacity Building*', supports this. Task 6.5 focuses on actions and initiatives for training citizen observatories participants, managers / leaders, developers and other potential target groups and stakeholders about the use of Cos4Cloud services. The development and validation of user / administrator / system guides and handbooks for different services, shared via the Cos4Cloud Toolbox and Evidence Hub is included as part of this.

This deliverable demonstrates the training materials and resources being developed to be made available online, as part of the Toolbox; outlines the capacity building framework guiding the development of these materials and reports on how they will be made accessible. This D6.6 Training materials and Capacity Building Report:

- Introduces capacity building and citizen science and proposes and approach of adapted to Cos4Cloud
- Summarises some of the research conducted which influences and defines the model and framework
- Includes an outline of other Cos4Cloud approaches and strategies supporting this
- Outlines the training and capacity building plan, supporting the Cos4Cloud services in particular, under implementation as part of the model devised for the Toolbox and Evidence Hub
- Includes summary examples of the training materials and resources developed supporting the Cos4Cloud services which will be live and accessible from the Cos4Cloud Toolbox and Evidence Hub before the end of the project; and
- Concludes with a summary of development and next steps for implementation and sustainability strategies supporting this which will help to build a legacy for Cos4Cloud in the citizen science landscape and the European Open Science Cloud (EOSC) beyond the lifetime of the project.

In addition to WP6 overall delivery, specifically Task 6.5: *Training and capacity building services* and D6.6 *Training material available online and capacity building report: user and*

administrator manual per service, work summarised in this report and the demonstration of training materials supports other *tasks, subtasks and deliverables.* This includes:

- *WP2: EOSC Compliant services architecture;*
- *WP 5: Cos4Cloud Services in Practice;*
- WP7 *Project Dissemination and Exploitation* and
- WP8 *Communication, outreach and stakeholder engagement*.

A five-step implementation process is outlined concluding with a development, implementation and sustainability plan for the training resource and capacity building support for core Cos4Cloud outputs as a lasting legacy of the project.

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1. Introduction

Codesigned Citizen Observatories Services for the European Open Science Cloud (Cos4Cloud) is (https://cos4cloud-eosc.eu/) is developing thirteen technological services focused on boosting citizen science observatories to help increase and improve the quantity and quality of observations. The project includes the participation of 9 established citizen observatories (COs) and Do it Yourself (DIY) initiatives, focused on biodiversity and the environment, integrating and testing these services. Supporting this are a range of focused capacity building, training, educational, networking, dissemination, codesign, communication and engagement collaborative strategic actions and initiatives which also demonstrate Cos4Cloud best practice.

Facilitating networking and citizen science knowledge management processes across organisations, people and initiatives is one of the key objectives of the Cos4Cloud project. Task 6.5 Training and Capacity building services, part of Work Package 6 (WP6) '*Networking, Training [Education] and Capacity Building*', supports this. 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.

Task 6.5 focuses on the development of training resources and supporting capacity building initiatives for citizen observatories participants, managers / leader , developers and other potential target groups and stakeholders to engage with and the use of Cos4Cloud services. The development and validation of user / administrator / system guides and handbooks for different services, shared via the Cos4Cloud Toolbox and Evidence Hub is included as part of this.

This deliverable demonstrates the training materials and resources being developed to be made available online as part of the Toolbox, reports in and outlines the capacity building framework guiding the development of these materials and how they will be made accessible. This D6.6 Training materials and Capacity Building Report:
- Introduces capacity building and citizen science and proposes and approach of adapted to Cos4Cloud
- Summarises some of the research conducted which influences and defines the model and framework
- Includes an outline of other Cos4Cloud approaches and strategies supporting this
- Outlines the training plan, supporting the Cos4Cloud services, in particular, under implementation as part of the model devised for the Toolbox and Evidence Hub
- Includes summary examples of the training materials and resources developed supporting the Cos4Cloud services which will be live and accessible from the Cos4Cloud Toolbox and Evidence Hub before the end of the project.

- Concludes with a summary of development and next steps for implementation and sustainability strategies supporting this which will help to build a legacy for Cos4Cloud in the citizen science landscape and the European Open Science Cloud (EOSC) beyond the lifetime of the project.

Work summarised in this report and the demonstration of training materials is part of WP6 overall delivery, specifically Task 6.5: *Training and capacity building services* and D6.6 *Training material available online and capacity building report: user and administrator manual per service*. It also aligns with *tasks, subtasks and deliverables across WP2: EOSC Compliant services architecture* and WP7 *Project Dissemination and Exploitation.*

This report directly contributes to the following tasks, and subtasks across WP 5: *Cos4Cloud Services in Practice;* WP6: *Networking, Training [Education] and Capacity Building* and WP8 *Communication, outreach and stakeholder engagement:*

T5.1:   Best practice for citizen observatories

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

T6.3.2: Addition and creation of training resources, case studies etc.

T6.3.3: Implementation of case studies

T6.3.4: Integration of an Evidence Hub

T8.2.6 Promote, design and layout the key project's outputs

This report also supports and or contributes to the following additional ***deliverables:***

D6.2:   Guidelines on best practice for COs as part of the outreach methodology. Report: Guidelines on best practice for building citizen observatories.

D6.3:   Citizen-science toolbox and evidence hub. Demonstrator: An on-line 'one-stop-shop' of guidelines and materials for existing and future citizen-observatory leaders.

D6.4:   Report to demonstrate the COS4CLOUD engagement model. Report: Demonstrate how the model for long-term, large-scale engagement in citizen science using the EOSC hub has been implemented, monitored and evaluated in the project.

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

Report: present the general design model and the implementation approach of the school-based CS activities.

2. Capacity building and citizen science: defining Cos4Cloud's capacity building approach

The growth and development of citizen science has been well documented. This includes various reports and papers outlining a range of examples on the role it plays facilitating participating in scientific research; being a bridge between scientists, researchers and volunteers, i.e. citizen scientists through a range of contributory, collaborative and cocreated projects[1]. The use of technology, online communication, social networking etc., and the impact this has had on citizen science projects including contributing to the growth of citizen observatories has also been noted.

Emanating from an interest and growth in knowledge sharing, citizen science has also seen a plethora of influential guidance documents, reports, toolkits etc focused on supporting those new to or already involved in citizen science projects and initiatives in a wide range of associated themes and topics. Formalised groups emerging nationally, regionally and internationally provide support and structure to advance practice, such as the European Citizen Science Association (ECSA)[2], the US-based Citizen Science Association (CSA)[3] and the Australian Citizen Science Association (ACSA)[4].

A good example of the practice of capacity development in citizen science is the ECSA Sharing Best Practice and Building Capacity Working Group. Over a few years members of this group collaborated, codesigned and shared knowledge leading to the development of the ECSA **Ten Principles of Citizen Science**. This has grown since it was first drafted to become one of the most utilised guides, applied to a wide range of settings (translated into over 26 languages), influencing the development of other best practice for citizen science.[5]

Throughout the years, a central theme that has emerged has been emphasis on the importance of developing and or building capacity as a mechanism to advance the potential for citizen science[6]. But what does this actually mean? Also, given the landscape of projects, tools and resources available, how can it be applied in the context of sharing Cos4Cloud knowledge, best practice, developing capacity and training?

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[1] Tweddle et al 2012

[2] https://ecsa.citizen-science.net/

[3] https://www.citizenscience.org/

[4] https://citizenscience.org.au/

[5] Robinson, L.D., Cawthray, J.L., West, S.E., Bonn, A. and Ansine, J., 2018. Ten principles of citizen science. n: *Citizen Science: Innovation in Open Science, Society and Policy*. (pp. 27-40). UCL Press, London. https://doi.org/10.14324/111.9781787352339

[6]Richter, A., Dörler, D., Hecker,S., Heigl, F., Pettibone, L., Serrano Sanz, F., Vohland, K., and Bonn, A., 2018 Capacity building in citizen science. In: *Citizen Science: Innovation in Open Science, Society and Policy*. UCL Press, London. https://doi.org/10.14324/111.9781787352339

2.1   What is capacity building? A citizen science approach

The terms capacity building, capacity development (or capacity strengthening) are sometimes used interchangeably, however an important distinction in definitions of these terms is a key consideration. The UNDP defines capacity building as "a process that supports some of the stages of building or creating capacities, while capacity development is "the process through which individuals, organisations and societies obtain, strengthen and maintain the capabilities to set and achieve their own development objectives over time.[7]

In addition to this, community capacity building has emerged, defined as a more long-term process involving all stakeholders. Key here is ensuring that building capacity focuses on developing and or strengthening the capacity of individuals, the organisation and importantly the 'community'. This is also important to defining a framework for the development of training resources. With an emphasis on meeting the training needs of citizen science participants, facilitators and designers, it is "the action of teaching skills and/or knowledge required to develop a competence related to a specific task/activity of a CS project".[8]

This is applicable to the context of Cos4Cloud. Introducing and implementing capacity development as part of the project process provides systematic structured support which helps to improve the overall impact of the project in a sustainable way. The established model for this process which has been adapted includes the following stages:

     i. engaging stakeholders
     ii. Assessing capacity assets and needs
     iii. Formulating a response
     iv. Implementing a response and
     v. evaluation.[9]

To put this into context, the main focus of Cos4Cloud is the development of technological services that can enhance the capabilities of COs to boost and improve observations. Training, capacity building and development demands a framework that is targeted to meet the requirements of stakeholders i.e. users, researcher, managers / developers of new and existing COs while emphasising the citizen observatory community. Online communities of practice are also an important consideration in the Cos4Cloud training and capacity building approach.

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[7] UNDP, 2009. Frequently Asked Questions: The UNDP Approach to Supporting Capacity Development , UNDP Capacity Development Group, content-ext.undp.org/aplaws_assets/2072460/2072460.pdf
[8] Lorke, J., Golumbic, Y.N., Ramjan, C., and Atias, O., (2019): Training needs and recommendations for Citizen Science participants, facilitators and designers. COST Action 15212 report.
[9] UNDP, 2009, ibid.

This D6.6 report contributes to WP6, *Networking, Training [Education] and Capacity Building.* One of the objectives of this WP is demonstrating new conceptual models for evidence-based knowledge exchange around capacity-building, training, learning and engagement etc. with and for citizen science. This is guided by Richter et al's demonstration of "capacity development for citizen science" which highlights different examples as case studies showcasing "principles of citizen science capacity building to inform capacity building elsewhere."[10] Based on this, capacity building is defined as "a framework for individuals and organisations, which focuses on process-oriented goals to strengthen and maintain the capabilities to set and achieve their own development objectives over time." A five-step model is proposed including: [11]:

1. Engage stakeholders & enhance visibility: i.e. platforms and community building
2. Assess CS capacity assets and needs: research, workshops, conferences, public consultation
3. Develop citizen science: create visions & missions and an action framework, policy documents and strategies
4. Produce resource and implement action framework: develop practical resources i.e. guides and videos
5. Evaluate CS capacity development: papers, workshops, guidelines recommendations

Adapting these approaches to capacity development, a five-step framework for capacity building was devised and applied in the implementation of aspects of Cos4Cloud project delivery which is demonstrated in this report.

2.2 Cos4Cloud capacity building: supporting and sustaining CO communities with technological services

COs can be defined as "initiatives that engage citizens and other stakeholders in community-based environmental monitoring. They address major issues such as global warming, biodiversity decline and natural disasters by providing valuable data ..."[12] They build on innovative and novel observation applications and web-based technology which can also be embedded in portable or mobile personal devices. [13] They are recognised as an important part of the growth of citizen science particularly in the role they play supporting communities of participants not only as providers of data, but as players of key roles i.e. co-creation (collating observations), data validation (confirming IDs) and data analysis.

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[10] Richter, et al, ibid, p271

[11] Adapted definition by Richter et al, 2018, ibid, p 279

[12] Gold, M., Wehn, U. ,(2020). Mission Sustainable: Fostering an enabling environment for sustainable Citizen Observatories. WeObserve policy brief 2. Zenodo. https://doi.org/10.5281/zenodo.4001672

[13] SC5-19-2017: Coordination of citizens' observatories initiatives call (https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/sc5-19-2017)

Findings from research and analysis of COs notes characteristics which makes them unique, i.e. the length of time required to engage and build a community of participants and the use of innovative data collection tools and technologies; but at the same time also presents challenges to their sustainability.[14] An understanding of the landscape of COs and other projects and initiatives of interests is also an important part of defining and capacity building requirements. D6.1[15] a review by Cos4Cloud contributed to the scope of this; highlighting that lists and inventories of CS activity and initiatives in the hundreds[16] and thousands[17] with different strategies and techniques adopted to reach stakeholders. Ongoing support, training and capacity building is an important part of responding to the needs of COs, in their organisational role, but also meeting the requirements of the participants', individuals who are part of the user community.

Cos4Cloud's approach, therefore, is focused on providing support to COs helping to meet these challenges by co-designing innovative services. An important part of fostering sustainability and providing building capacity, supporting stakeholders, including these citizen science communities, in the continued use of these services. The background outlined above introduces the approach for the strategic direction of Cos4Cloud's capacity building framework as well as the design, development and implementation of training resources.

2.3   Aligning a capacity building framework with other Cos4Cloud methodologies and approaches

This capacity building framework incorporates the development and design of training resources, and both have been devised in alignment with a range of methodologies and other approaches which influence the implementation of Cos4Cloud: These include:

Agile methodology: An agile methodology guides the phases of development, testing and validation of the services integrating understanding of user journeys, motivations, as well as the roles and purposes of COs and their communities, and associated

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[14] Gold, M., et al, ibid.

[15] Cos4Cloud Consortium (2020). Ansine, J., Arias, R., Bernal, D., Bredel, H., Ceccaroni, L., Coulson, S., Dodd, M., Daskolia, M., Gold, M., Joly. A., Justamante Rodríguez, Á., Leymarie, F.F., Masó, J., Matheus A., Parrilla López, M., Piera, J.. Rodríguez-Arias, M.A., Rüger, S., Soacha, K., Siddharthan, A., Woods, S., Woods, T. Identification and engagement with projects of interest - Report (D6.1). Co-designed Citizen Observatories Services for the EOS-Cloud (Cos4Cloud). Project funded by the European Commission within the Horizon 2020 Programme GA #863463. Available in: http://www.Cos4Cloud-eosc.eu/

[16] An inventory of Citizen Science activities' in 2018 collated over 500 initiatives across and beyond Europe. European Commission, Directorate-General for Environment; European Commission, Joint Research Centre; Bio Innovation Service(2018): An inventory of citizen science activities for environmental policies. European Commission, Joint Research Centre (JRC) [Dataset] PID: http://data.europa.eu/89h/jrc-citsci-10004. https://www.eea.europa.eu/about-us/who/epa-network

[17] SciStarter (www.scistarter.org), an online community aimed at improving CS experiences lists over 3,000 projects and events.

stakeholders.

Codesign: Cos4Cloud's codesign process has involved organising several co-design activities with end-users and other stakeholders collecting ideas, needs and expectations towards the Cos4Cloud technological services in the development and testing of the services.

Communication, outreach & stakeholder engagement: this includes aligning communication, outreach, stakeholder engagement with other approaches as part of the Communication Plan[18] (WP8) to reach different target groups, maximising the project's effort to create interest and understanding of the Cos4Cloud project. Also key is alignment of the capacity building approach and ensuring the design of training resources meets Cos4Cloud brand requirements .

Dissemination and exploitation : The exploitation roadmap, dissemination plan and marketing strategy (WP7) are key considerations in designing resources that can demonstrate Cos4Cloud outputs.   process of creating dissemination approaches to engage with stakeholders derived from projects of interest.

Engagement: Cos4Cloud's approach to engagement, combines the conceptual 'hook' model proposed by Eyal (2014)[19]. With a focus on converting external triggers into internal triggers, utilising the hook i.e. action as well as rewards creating habit-forming engagement with (b) the layered model of social experience proposed by Yamakami (2014)[20] based on citizen relationships with internet services and games i.e. for the habit to really form, the user has to invest in it.

Interoperability: One of the core objectives of Cos4Cloud is contributing to solving current CO challenges, focused on interoperability and innovative models of collaboration, by developing services that improve networking, data quality and security within the citizen observatories.

Networking, Training, [Education] & Capacity Building: Activities supporting capacity building and generating best practices are key aspects of Cos4Cloud to reach, involve and engage with stakeholders.   In particular WP6 focuses on demonstrating how Cos4Cloud will sustain long-term participation globally integrating: strategies and designs for citizen engagement,   knowledge transfer and capacity building (i.e. of the services) supporting key stakeholder groups to strengthen networks etc and fostering citizen science learning end education particularly in in school populations.

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[18] Cos4Cloud Consortium (2020). Ansine, J., Daskolia M., Grillia N., Gkotzos D., Justamante A., Liñán S., Nolland K., Piera J., Ramón, A., Rodríguez-Arias M.A., Soacha K., Woods S., Woods T., Kakaroucha E. Communications plan- Report (D8.2). Co-designed Citizen Observatories Services for the EOS-Cloud (Cos4Cloud).

[19] Eyal, N. (2014). Hooked: How to build habit-forming products. Penguin.

[20] Yamakami, T. (2014). A layered view model of social experience design: Beyond single-user user experience. In Advances in Computer Science and its Applications (pp. 35-41). Springer, Berlin, Heidelberg.

2.3 A five-step framework for capacity building in Cos4Cloud: supporting and sustaining CO communities with technological services training resources

A five-step capacity building framework has been devised and is under implementation, as part of WP6. As noted above, this was guided by Richter et al's suggested capacity building model for citizen science and demonstrated by case studies.[21] Informed by this, other capacity building models; along with insight from research around COs, and alignment with other key Cos4Cloud approaches; this framework provides the capacity building structure defining the design and development of training materials.   This framework is summarised in the table below.

Cos4Cloud's capacity building framework

Capacity Building - UNDP[22]	Citizen science Capacity Building – Richter, et al [23]	Citizen science (CS) capacity building approach – Cos4Cloud	Cos4Cloud capacity building - Summary description
Step 1: Engaging stakeholders	Step 1: Identifying and engaging different actors	Step 1: Engage stakeholders & enhance visibility	Identifying CS projects, initiatives & platforms stakeholders: enhancing the visibility of Cos4Cloud
Step 2: Assessing capacity assets and needs	Step 2: Assessing capacities and needs for citizen science in the setting under focus	Step 2: Assess CS capacity assets and needs	Assessing Cos4Cloud's citizen science observatories capacity, assets and needs
Step 3: Formulating a response	Step 3: Developing a vision, missions and action plans	Step 3: Developing citizen observatories: create visions & missions and an action framework	Training and capacity building – services for COs: part of the Cos4Cloud Toolbox and Evidence Hub framework

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[21] Adapted definition by Richter et al, 2018, ibid

[22] UNDP, 2009, ibid.

[23] Steps from Richter et al, 2018, ibid

Step 4: Implementing a response	Step 4: developing resources such as websites and guidance	Step 4: Produce resources as part of an action framework supporting Cos4Cloud services	Designing training and capacity building materials: implemented and demonstrated in the Cos4Cloud Toolbox and Evidence Hub
Step 5: Evaluation	Step 5: implementation and evaluation of citizen science programmes	Step 5: Evaluate Cos4Cloud CS capacity development	Cos4Cloud capacity building - implementation & evaluation: building sustainability through the Cos4Cloud Toolbox and Evidence Hub

3. The five-step capacity building framework in Cos4Cloud: supporting and sustaining COs by implementing training resources for technological services

The following five-step capacity building framework has been adapted and is successfully under implementation as the structure for this process:

Citizen science capacity building approach – Cos4Cloud	Cos4Cloud capacity building - Summary description
Step 1: Engage stakeholders & enhance visibility	Identifying CS projects, initiatives & platforms stakeholders: enhancing the visibility of Cos4Cloud
Step 2: Assess CS capacity assets and needs	Assessing Cos4Cloud's citizen science & citizen observatories capacity, assets and needs
Step 3: Developing citizen observatories: create visions & missions and an action framework	Training and capacity building – services for COs: part of the Cos4Cloud Toolbox and Evidence Hub framework
Step 4: Produce resources as part of an action framework supporting Cos4Cloud services	Designing training and capacity building materials: implemented and demonstrated in the Cos4Cloud Toolbox and Evidence Hub
Step 5: Evaluate Cos4Cloud CS capacity development	Cos4Cloud capacity building -implementation & evaluation: building sustainability through the Cos4Cloud Toolbox and Evidence Hub

The following sections of the report further highlight the tasks underway, demonstrated by associated activity. This includes the development and implementation of training resources as part of the Cos4Cloud Toolbox and Evidence Hub, in alignment with Cos4Cloud methodologies and approaches. The approach outlined in this report is directly associated with the implementation and delivery of T6.5 Training and capacity

building services and Implementation further aligns with Cos4Cloud services in practice (WP5) project communications Plan (WP8) dissemination and exploitation (WP7) .

Step 1: Engaging and identifying CS projects, initiatives & platforms stakeholders: enhancing the visibility of Cos4Cloud

Step 1 of the capacity building framework was initiated and has been supported by initial research, analysis and activity in WP6. T6.1. *Networking with other projects, initiatives and platforms* and D6.1 which focused on identifying stakeholders, laying out a framework for engagement with a range of stakeholders including key projects of interest, citizen observatories and stakeholders. It explored the landscape of citizen science in the context of projects and initiatives of interest, focusing on platforms, portals, projects and citizen observatories (COs). It provided the groundwork by researching and identifying possible projects of interest to Cos4Cloud.

D6.1: Identification of and Engagement with Projects of Interest - Report

To build a process for identifying projects of interest, a framework for data collection was developed and a range of attributes assigned guided by developing standards for citizen science projects and their data.[24] Each Cos4Cloud consortium member was invited to identify projects of specific interest. From the contributions, comments and feedback received a framework was further devised for the collation of information.

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[24] This was informed by current efforts to establish data and metadata standards for citizen science. See 22 above.

78 citizen science, citizen observatory (CO) projects, CO portals and other initiatives of interest were identified (past, current and future) as part of this process. as engagement, outreach, with across the duration of Cos4Cloud[25]. COs play a key role, providing ways for communities to monitor and report on environmental matters that interest them, access information, skills development as well as contribution to policy and wider decision-making.[26] This background has been key to conceptualising a model and design framework for Cos4Cloud training and capacity building approaches.

The process of identifying projects and initiatives formed part of targeted networking, engagement, outreach and dissemination approaches. This also contributes to identifying COs and other stakeholders with the potential of making use of the Cos4Cloud Toolbox and Evidence Hub including the Training and Capacity Building resources which are part of this as part of the implementation and sustainability planning. This D6.6 report, therefore, is supplemented by D6.1, while also aligning with D7.3 *Project Dissemination and Exploitation* and D8.2 *Communication, outreach and stakeholder engagement*.

Step 2:   Assess Cos4Cloud's citizen science capacity, assets and needs: landscape review of training and capacity building design / development - citizen science resources, toolkits etc

Step 2 involves capacity assessment and analysis in two parts to review the capacity building and development landscape: to assess the scope, design and the focus of Cos4Cloud training resources amongst other citizen science resources and spaces. Firstly, a review was conducted of external online learning platforms and online course platforms to better understand the online learning, training and capacity building landscape. Secondly, a review was also conducted to assess current citizen science best practice in training and learning resources, toolkits etc. This was conducted to help define the proposed framework as well as the design of the Cos4Cloud Toolbox and Evidence Hub (including the training resources) as fit for purpose.

The-learning industry has been growing, even more since Covid-19, and this is evidenced by the increasing interest in online learning for learning and teaching purposes as well as for capacity development– either to learn a new skill or teach online for organisations, schools, home learning. One of the key distinctions noted was the difference between 'online learning platforms' and 'online course platforms': an online learning platform emphasises and presents the learner's perspective whereas an online course platform

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[25] Cos4Cloud Consortium (2020). Ansine, J., et al, ibid.

[26] Rubio-Iglesias, J.M. (2013) Citizens' observatories for monitoring the environment: A commission perspective. In Proceedings of the Workshop on Citizen's Involvement in Environmental Governance, Arlon, Belgium, 7 October 2013; Directorate General Research and Innovation, European Commission: Brussels Belgium

takes the perspective of the online instructor/ teacher. Key here is applicability to designing training resources that meet stakeholder needs.

There are now numerous online learning and course platforms that offer the opportunity to learn or create, sell online courses or offer free resources targeting different audiences Research was conducted exploring popular online learning platforms (i.e. Coursera, Skillshare, Udemy, Codecademy, Edx, Pluralsight, LinkedIn Learning, Future Learn, Moodle as well as the Open University's Open Learn and OpenLearn Create). Online course platforms like LearnWorlds (how to teach online), Teachable, Thinkific, Kajabi, Podia were also reviewed. In conducting this review the following were considered:
- What is an online learning platform?
- What is an online course platform? (in relation to a Learning Management System - LMS).
- Online learning platforms vs online course platforms.
- Examples of online learning platforms / online course platforms, LMS etc.
- Choosing a suitable online learning platform

As part of this research a review of toolkits / toolboxes relevant to citizen science was also conducted to understand the landscape and find best practice etc to help guide the capacity development design framework. Key things considered:
- Identify core features and core tools – what exists and where?
- Are current toolkits good, could they be better?
- Think about all the different options that are out there at the moment – what works well? What needs improving?
- What happens to resources and resource spaces at the end of these projects/ i.e. Cos4Cloud and
- How can this become a sustainable legacy of a project i.e. Cos4Cloud.

A key consideration has been not to waste resources duplicating and recreating what already exists as part of the citizen science capacity development landscape particularly given the wide range of resources which have evolved in recent years. Instead consideration has been given to focus on capacity development around the key outputs of Cos4Cloud i.e. the technological services. Useful too was a review of the online (learning) platforms and technology used to create the range of toolkits/toolboxes etc available, as well as the process of design and development such as the EU-Citizen.Science platform[27].

OpenLearn Create has been selected as the online learning platform for the Cos4Cloud Toolbox and Evidence Hub which incorporates the training and capacity building

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[27] See: https://eu-citizen.science/about/ and https://zenodo.org/communities/eu-citizenscience/?page=1&size=20

resources. An important part of the decision-making process was the selection of a widely utilised interface (OpenLearn Create is Moodle based). The Open University will facilitate oversight of the legacy of Cos4Cloud's capacity development and training resources beyond the lifetime of the project using OpenLearn Create .Another consideration was selecting development infrastructure that can also help to facilitate and support a sustainable legacy for the training resources and other materials developed. More insights gained from research contributing to the design and development process has been included in the report supporting D6.3 The Cos4Cloud Toolbox and Evidence Hub which will be available before the end of the project.

Online searches and results indicate that this covers key areas across citizen science. Online searches and results indicated key areas for synergies to maximise outreach i.e. the [EU-Citizen.Science platform](#), see examples of some of the different toolkits / collections of resources of relevance that were reviewed included:

- CitiesHealth – a customisable and interactive collection of adaptable instruments: www.citizensciencetoolkit.eu
- WeObserve open access tools developed focused on Citizen Observatories (GROW, SCENT, Ground Truth 2.0 and LANDSENSE): https://www.weobserve.eu/knowledge-base/toolkit/
- CoAct Project.EU - Co-designing Citizen Social Science for Collective Action: https://coactproject.eu/resources/toolkits/what-will-the-open-science-toolkit-be/ https://coactproject.eu/resources/
- RRI Tools.EU - Citizen Science Toolkit for choosing citizen science teaching science through citizen science: https://rri-tools.eu/
- CAL Academy.ORG – Citizen Science Toolkit: https://www.calacademy.org/educators/citizen-science-toolkit
- Open AIRE.EU Project – Citizen science activity: https://www.openaire.eu/citizen-science-activities-in-openaire
- European Open Science Cloud EOSC (EOSC-hub and EOSC Portal): https://www.eosc-hub.eu/ and https://eosc-portal.eu/
- Citizen Science.GOV - Case Studies and Resources: https://www.citizenscience.gov/#
- Nesta org.uk - 20 Tools innovating government - https://www.nesta.org.uk/report/20-tools-innovating-government/ https://www.nesta.org.uk/education/?type=toolkits.ToolkitPage
- Citizen Sensing Odour Collect - https://odourcollect.eu & https://dnoses.eu https://citizensense.net/kits/
- CSEOL - Citizen Science Development Toolkit: https://cseol.eu/csdk/
- EU-Citizen.Science - https://eu-citizen.science/

Step 3:   Developing citizen observatories: Training and capacity building – services for COs (part of the Toolbox and Evidence Hub framework

The training and capacity building framework for Cos4Cloud includes 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 "enabling environment needed for Citizen Observatories to achieve their full potential in recognition of their unique characteristics."[28]

Setting the context an initial Cos4Cloud Citizen Observatory Survey was initiated with the nine citizen observatories within the Cos4Cloud consortium, focused on biodiversity and environmental monitoring i.e. Artportalen, CanAirIO, Freshwater Watch, iSPEX, iSpotnature, Natusfera, Odour Collect, Pl@ntnet Kduino. The focus was collating information to inform key strategic planning for codesign, networking, engagement, outreach, communication and dissemination, while supporting best practice and capacity building for other COs. Analysis was conducted of survey submissions from the Cos4Cloud COs: to gather an understanding of the capabilities, similarities, differences, assets and needs.

For example, information collated demonstrated experiences from established COs, some with between 10 to 20 years of practice (i.e. iSpot, Pl@ntNet, Artportalen). Expertise was demonstrated within the thematic areas of focus noted in the COs descriptions i.e. biodiversity or environmental monitoring across them all. Similarities and differences noted by the COs, gave insight into the capacity development experience, needs and requirements for the development of training materials targeting other COs and their users. This was particularly useful in the context of i). different user groups contributing to data and using the CO; ii). Examples of different tools and resources developed and used in educational, engagement & outreach activities, etc., iii). how COs engage and reach users and iv). interest from user groups i.e. in tools, resources etc.

Information collected contributing to the design and development of capacity building resources includes:
- Introductory / general information: i.e. CO name, years in operation, objective, discipline, etc.
- Data collection, geographical focus, technical information
- Engagement: i.e. types and no. of users, testimonials, success stories documentation, activities etc
- Training and educational tools and resources
- Performance: i.e. metrics for data collection

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[28] Gold, M., et al, ibid.

● Use and impact, as well as lessons learned

Cos4Cloud CO Survey 1 results: Engagement – types of users / participants
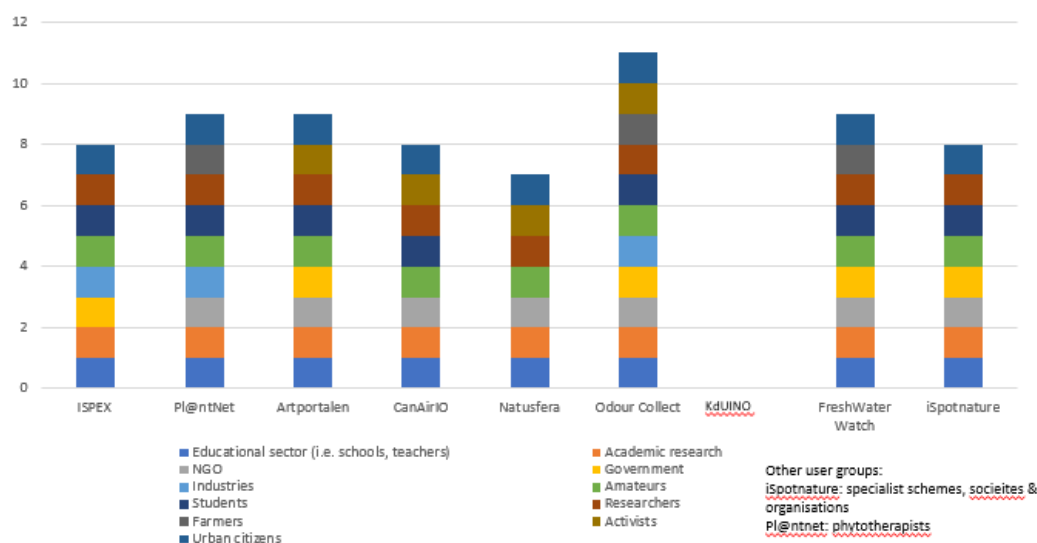
A follow up survey is underway to further collate lessons learnt and inform guidelines of best practice from the COs involved. This will also further facilitate impact through capacity building sustainability planning, as well as engagement outreach and dissemination of the training resources. Findings will also contribute to examples of Cos4Cloud CO best practice i.e. demonstrating CO's involved in the development of services i.e. Pl@ntNet and iSPEX; as well as others involved in the integration and testing with their user communities i.e. iSpot, Natusfera, Artportalen; and those involved in both development and testing (i.e. Pl@ntNet. Findings from both surveys are being collated as part of *D6.2 Guidelines on best practice for COs as part of the outreach methodology*.

This assessment of Cos4Cloud's citizen science & citizen observatories capacity, assets and needs also contributes to the design and production of resources outlined in Step 4, below.

Step 4: Produce resources: designing training & capacity building resources - implemented and demonstrated in the Cos4Cloud Toolbox and Evidence Hub

Step 4 involves producing the training and capacity building resources which are being implemented and demonstrated as part of the **Cos4Cloud Toolbox and Evidence Hub**. An online repository of Cos4Cloud training and capacity building resources, best practice and educational materials for citizen observatories, the Cos4Cloud Toolbox (D6.3) is being developed as a 'one-stop-shop' of guidelines and materials for existing and future citizen observatory leaders, and other interested stakeholders, representing project outputs.

Design specification: capacity development resources

The diagram below demonstrates the design framework for the training and capacity building resources. As one of the categories of the Cos4Cloud Toolbox, the design integrates specifications from OpenLearn Create, where these resources will be hosted and supported as a legacy collection after the project ends. This design incorporates different content types, resource tools and activities, see content outline diagram below:
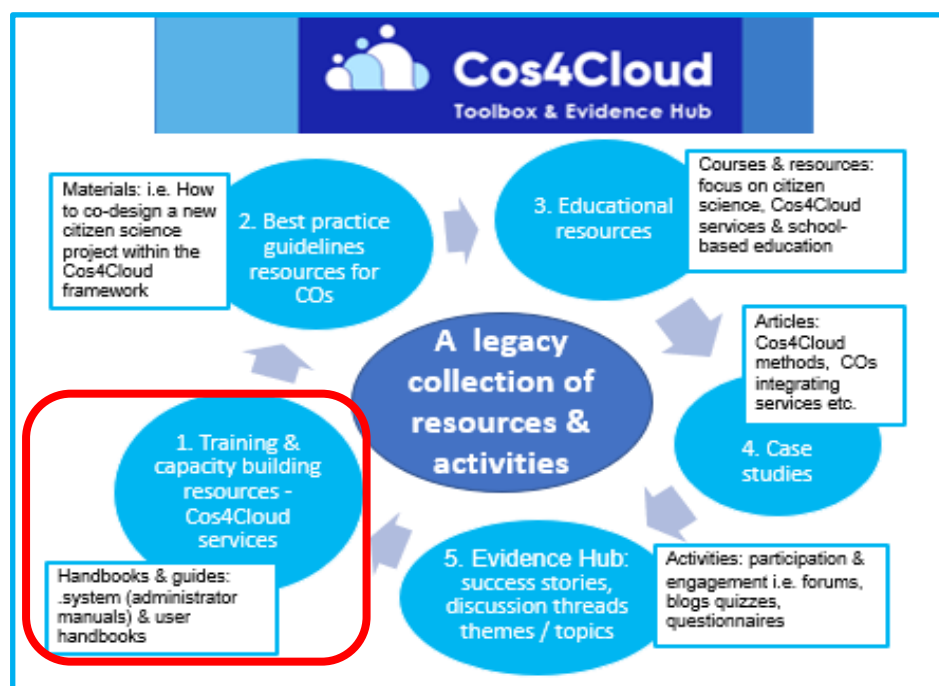
These resources are part of one of the five themed categories merged into a collaborative *collection* within the Toolbox. Training and capacity building resources, are being developed as one of the themed categories:

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, discussion threads / themes, participation and engagement activities

Special graphics have also been 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: The most suitable options, appropriate for the type of content / resource, have been selected and to encourage interest, engagement and / or participation, as demonstrated below:

Training resources and capacity building: design features and template

Bespoke design features developed include:

4. **Resource title & icon banner:** Themed colour banner representing the Training and capacity building space and each resource, including title and category icon: example below (for more see Appendix 1)

5. **Resource name display image:** Designed branded thumbnail display image for each resource in the areas i.e. each service resources: e.g. the Pl@ntNet-API (for more see Appendix 1):

Training resources and capacity building: content description

Targeted user, system, administrator guides, and user handbooks have been 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. See Appendix 2: Training Resources Template - Services.

Core content headings:

Subtitle: What is this service what does it do?
Description: What is it? Outline the focus of this training resource
Who is this service for? i.e. who is the target user audience and why
What are the benefits of this service?
How does it work?
Step by step guide i.e. How to use this service
Information and further support: additional resources / content links, etc.

Drafts of the resources are developed, reviewed and finalised with the approval of each service lead.

Training and capacity building resources are being created within two content styles: *handbooks or guides* (i.e. content types) resources are designed to display information broken down by different headings , label, embedded videos, files, links etc (resource tools)

The training handbooks and guides are developed based on the target audience types (i.e. CO administrator / developer or CO user) 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). Resources are either multi-page handbook resources i.e. including an embedded book-like format, (i.e. Appendix 3: *Pl@ntNet-API administrator and user handbook:* OLCreate: PUB_5868_1.0_Pl@ntNet-API_administrator_and_user_handbook (open.edu). The other option are resources developed as Guides which include an embedded PDF designed and formatted to include design icons representative of each topic/ theme per service. i.e. Appendix 3: *MECODA user guide*: OLCreate: PUB_6049_1.0 MECODA User Guide (open.edu). *Resource links will be live in January 2023.

Content for each resource is further structured and styled integrating different *resource tools* (i.e. page, file, book format, heading, label, sub-page, URL links, images, media files, video etc) (See Appendix 3: Training and Capacity Building Resources: Handbooks and Guides .

Training and capacity building resources: Content development

A key part of the Toolbox is facilitating capacity building by sharing training handbooks and guides, educational resources, best practice guidelines, case studies etc. Key Performance Indicators (KPI) targets developed for this deliverable indicted that by the end of the project handbooks and guide, (a minimum total of 8) will be developed each featuring a different service, based on the service requirements)[29] and integrated into the Toolbox. Once approved by each service lead , content is finalised and integrated in the Toolbox space with resource spaces and online links created and made available. See example content in Appendix 3 below. Each training resource provides potential user cases for the different services demonstrating support for CO's through these technological services for citizen observatories .

Content under development in consultation with Service leads includes*:
Phase 1: November 2022
- Pl@ntNet-API administrator and user handbook: OLCreate: PUB_5868_1.0 Pl@ntNet-API administrator and user handbook (open.edu)
- FASTCAT-Cloud administrator and user handbook: OLCreate: PUB_6045_1.0 FASTCAT-Cloud administrator and user handbook (open.edu)
- Cos4Bio administrator and user handbook: OLCreate: PUB_6044_1.0 Cos4Bio administrator and user handbook (open.edu)
- MOBIS administrator and user handbook: OLCreate: PUB_6047_1.0 MOBIS system and user handbook (open.edu)

Phase 2:December 2022
- MECODA user guide: OLCreate: PUB_6049_1.0 MECODA User Guide (open.edu)
- Authenix user guide: OLCreate: PUB_6046_1.0 Authenix User Guide (open.edu)
- AI-Taxonomist user guide: OLCreate: PUB_6052_1.0 AI-Taxonomist User Guide (open.edu)
- AI-GeoSpecies system guide: OLCreate: PUB_6055_1.0 AI-GeoSpecies system guide (open.edu)

Phase 3: January 2023
- Biodiversity-DL system guide: OLCreate: PUB_6056_1.0 Biodiversity-DL system guide (open.edu)

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[29] Woods, S., Ceccaroni, L., Liñán, S., Soacha, K., Piera, J., Woods, T., Justamante, A., Ansine, J., Joly, A. (2020) Cos4Cloud's strategic plan for the exploitation and dissemination of the results (PEDR) - Report (D7.3).

- FASTCAT-Edge user guide: [OLCreate: PUB_6050_1.0 FASTCAT-Edge User Guide (open.edu)](#)
- DUNS system guide: [OLCreate: PUB_6054_1.0 DUNS System Guide (open.edu)](#)
- Cos4Env user handbook: [OLCreate: PUB_6053_1.0 Cos4Env User Handbook (open.edu)](#)
- STAplus user guide: [OLCreate: PUB_6061_1.0 STAplus User Guide (open.edu)](#)

*All online resource links have been created. These will be live for beta review of the Toolbox and Evidence Hub in January 2023. See example below of the training resource development process using the Pl@ntNet API. Others highlighted in Appendix 3.

Content development example: Pl@ntNet-API administrator and user handbook

- **Summary title and description**

- **Training resource content:**
    6. Guide Description
    7. Guide Content
    8. What is the Pl@ntNet-API?
    9. Who is this service for?
    10. What are the benefits of this service?
    11. How does it work?

- **How to use the Pl@ntNet-API – a step by step guide**

Step1: Create an account
Step2: Login and get an API key:
Step 3: HTTP Methods - adding plant pictures:
Step 4: Full data summary:
    Full data documentation:
Step 5: Run identification requests:
Step 6: Generate identification results:

- **Information and further support**

Example: Design and development – User Handbook

Example: Design and development – User guide

Step 5:   Cos4Cloud capacity building - implementation & evaluation: building sustainability through the Cos4Cloud Toolbox and Evidence Hub

Cos4Cloud's capacity building framework: development, implementation & sustainability

Citizen science (CS) capacity building approach – Cos4Cloud	Cos4Cloud capacity building - Summary description	Actions and next steps for training and capacity building – Cos4Cloud services
Step 1: Engage stakeholders & enhance visibility	Identifying CS projects, initiatives & platforms stakeholders: enhancing the visibility of Cos4Cloud	- October - December 2022: Review / update projects of interest inventory - February 2023: Networking, training & capacity building activity: Online seminar promoting the resources and Toolbox – hosted collaboration Cos4Cloud and ECSA Sharing best practices & capacity building Working Group - February 2023: Integration into the EU.Citizen Science platform - February 2023: Integration into the EOSC-Hub Training area
Step 2: Assess CS capacity assets and needs	Assessing Cos4Cloud's citizen science observatories capacity, assets and needs	- October 2022 – January 2023: review and analysis Cos4Cloud CO Surveys 1 & 2 (contributing to capacity building, best practices, case studies, lessons learned etc resources for the Toolbox & Evidence Hub - January – February 2023: Discussions on next steps with CO and service leads, CoNNect and SciTech Groups / Consortium

Citizen science (CS) capacity building approach – Cos4Cloud	Cos4Cloud capacity building - Summary description	Actions and next steps for training and capacity building – Cos4Cloud services
Step 3: Developing citizen observatories: create visions & missions and an action framework	Training and capacity building - services for COs: part of the Cos4Cloud Toolbox and Evidence Hub framework	- January – February 2023: Communications, dissemination promotions & outreach: Training and capacity building resources & Cos4Cloud Toolbox launch reaching target groups through relevant channels, event mailing, lists etc.
Step 4: Produce resources as part of an action framework supporting Cos4Cloud services	Designing training and capacity building resources: implemented and demonstrated in the Cos4Cloud Toolbox and Evidence Hub	- August 2022 - February 2023: Training and capacity building resources development aligned with other Toolbox resources targeting COs and other stakeholders - January 2023: Development of promotional content about the Training resources i.e., videos etc - February 2023: Launch of the Toolbox & Evidence Hub - Promotional plan incorporating Cos4Cloud Communications channels i.e. social media, project website (including blogs), press releases, newsletter, etc. (WP8) and related dissemination actions (WP7)

Citizen science (CS) capacity building approach – Cos4Cloud	Cos4Cloud capacity building - Summary description	Actions and next steps for training and capacity building – Cos4Cloud services
Step 5: Evaluate Cos4Cloud CS capacity development	Cos4Cloud capacity building - implementation & evaluation: building sustainability through the Cos4Cloud Toolbox and Evidence Hub	- February 2023 – Ongoing: Integration and promotion of tools to facilitate evaluation and sustained engagement of capacity building resources i.e. training resource quizzes, competitions etc included as part of the Evidence Hub - February 2023 – Ongoing: dissemination and promotional activities i.e. EOSC presentation Training Coordinators Community of Practice, CSA Conference etc. - February 2023 – Ongoing: Communication activity using promotional tools (i.e. videos, social media etc) supporting training for CO participants, managers and stakeholders about the use of Cos4Cloud services and other potential target groups according to the sustainability plan (WP5). - February 2023 – Ongoing: Sustainability Plan incorporating legacy promotions i.e. via OU (OpenLearn etc), ECSA Working Groups & EU.Citizen.Science platform.

Facilitating a sustainable legacy has been a key part of this in creating and sharing training, capacity building and educational guidelines, handbooks, materials and resources. The Toolbox and Evidence Hub is being developed to demonstrate Cos4Cloud engagement outreach, capacity development, best practice, lessons learned, and success stories targeted for existing and future citizen observatories and other stakeholders. In doing so it incorporates the following project outputs: Training and capacity building resources for Cos4Cloud services (D6.6) and Case studies (& success stories), best practice guidelines for COs (D6.2).

Associated with the training resources guidelines on CO best practice and case study materials are also under development. This includes demonstrating interoperability

between services i.e. the use of Authenix in Cos4Bio, etc.; as well as examples of citizen observatories (CO) involved in Cos4Cloud user cases of service integrated i.e. iSpotnature and the Pl@ntNet-API. These demonstrator examples of best practice and associated case studies are associated categories of the Toolbox and Evidence Hub. More about this in ***D6.3 Citizen science toolbox and evidence hub*** and ***D6.2 Guidelines on best practice for COs as part of the outreach methodology***.

5. Conclusion: Training and capacity building sustainability

This report contributes to the overarching goal of WP6 defining a Cos4Cloud capacity building approach and shares the development of training and capacity building resources supporting the Cos4Cloud services as key outputs of the project. . The D6.6 Training materials and Capacity Building Report:

- Introduces capacity building and citizen science and proposes and approach of adapted to Cos4Cloud
- Summarises some of the research conducted which influences and defines the model and framework
- Includes an outline of other Cos4Cloud approaches and strategies supporting this
- Outlines the training plan, supporting the Cos4Cloud services in particular, under implementation as part of the model devised for the Toolbox and Evidence Hub
- Includes summary examples of the training materials and resources developed supporting the Cos4Cloud services which will be live and accessible from the Cos4Cloud Toolbox and Evidence Hub before the end of the project.
- Concludes with a summary of development and next steps for implementation and sustainability strategies supporting this which will help to build a legacy for Cos4Cloud in the citizen science landscape and the European Open Science Cloud (EOSC) beyond the lifetime of the project.

As noted, these resources and materials are being developed and promoted via the Communications Plan (WP8) and disseminated as one of the project's exploitable outputs (WP7). This will contribute a legacy collection of different materials and resources, available as an online space, that will be promoted from the project website and other channels etc. It will support the Cos4Cloud goal of positioning citizen science in the European Open Science Cloud (EOSC) as a linked resource available from the EOSC Portal Catalogue and Marketplace (https://marketplace.eosc-portal.eu/. It will also be shared and promoted through relevant repositories e.g. ECSA's EU-Citizen.Science.

Implementation of the training and capacity building resources as part of the Cos4Cloud Toolbox and Evidence Hub is underway with the development and integration of content

and the design framework. The link: [OLCreate: Cos4Cloud Toolbox and Evidence Hub (open.edu)](open.edu) will be live in January 2023, with resources made available on a phased basis. Supported by promotional and communications and engagement and networking activities the Toolbox will be launched in January 2023 as a Cos4Cloud legacy capacity building tool.

Participants will be encouraged to use resources and engage using the participatory activities shaped into the Evidence hub. This will be part of the process of providing feedback which will be the start of the evaluation process. The Toolbox and evidence hub will be promoted as a recognisable collection of Cos4Cloud project outputs with a sustainability plan in place.

6. Appendices: training and capacity building report

Appendix 1: Design features

1. Training and capacity development – resource collection banner

2. Capacity building resources banners – Cos4Cloud Services

3. **Resource name display images:**

Appendix 2: Training and Capacity Building resources template

Cos4Cloud Toolbox & Evidence Hub: Training & Capacity Building Resources Template - Services

This is the Cos4Cloud Training and Capacity Building Resources Template for Cos4Cloud Services. Please fill in the form, adding as much detail as you can, to propose a new resource. This will be shared as part of the content in the **Cos4Cloud Toolbox & Evidence Hub** which is developed in and hosted by the Open University's (OU) free learning platform OpenLearn Create. The Cos4Cloud Toolbox & Evidence Hub uses Open Learn Create which is based on OLC functionality (which is Moodle based). Resources are being developed within a framework guided by this structure. This template has been developed in a format suitable for publication in this platform.

Browse the Training and Capacity Building Resources description here. Look at this example of content: Pl@ntNet-API system user guide.

A new form should be completed for each proposed training and capacity building resource. Please send completed form and any other associated content to: janice.ansine@open.ac.uk

Training resource name / title
Add a short name / title for your training resource. Ideally this should describe what it is about but should not be too long.

Training resource summary and purpose
Describe this resource, explaining / summarising what it contains indicating the purpose.

Cos4Cloud Partner name
Name the project partner suggesting this resource.

Author name / names
This can be assigned to named team members (if so include title and role in the Cos4Cloud project), a project partner organisation, service or citizen observatory. If more than one, provide information for all and indicate who should be added as lead author.

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It uses a format suitable for integration into Cos4Cloud Toolbox & Evidence Hub developed by the OU as part of the H2020 funded Cos4Cloud project.
Page **1** of **6**

Training resource main content
This section is for the main text of a training resource. Text as well as sub-headings, bullets and any style preferences can be noted. Add relevant links, where required. This can include video (hosted elsewhere i.e. YouTube). Images, PDFs etc. can also be added (see more below) please clearly indicate any ideas / preferences of placement by signposting in the text.

Please note there is no set limit on the word count, but content should be written in a style to interest potential readers (*text will be reviewed and may be edited or revised to correct errors, condense for style when being formatted for publication).

Content can be added guided by the suggested subheading below. However, please add any additional heading most appropriate / suitable for this resource.

Subtitle: (one line only) What is this service what does it do?

Description: What is it? Outline the focus of this training resource

Who is this service for? i.e. who is the target user audience and why

What are the benefits if this service?

How does it work?

Step by step guide i.e. How to use this service

Information and further support: additional resources / content

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Page **2** of **6**

Training resource assets (images, diagrams, graphics etc)
Referring to the main content section(above) include a list and any ideas for any images, diagrams, graphics etc and where they should be added within the content.

If you already have options available, attach these in the email when sending this form. The maximum file size for each image that can be uploaded to the platform is 110MB. Accepted file types: (GIF) .gif, (JPEG) .jpg or (PNG) .png.

If you would like to suggest a graphic to be included please describe this below and the OU team will explore possibilities.

Please note, for the inclusion of any assets, information is required which identifies any third party, source, licence, copyright clearance information, acknowledgements and keywords. For accessibility purposes, a description of any images and diagrams is also required.

Educational level: Please choose a level you think is the most appropriate for this resource:
- Level 0 Beginner – equivalent of up to high school level
- Level 1 Introductory – equivalent to advanced high school or early University undergraduate study
- Level 2 Intermediate – equivalent to university undergraduate level study
- Level 3 Advanced – equivalent to post graduate university study

	Level 0
	Level 1
	Level 2
	Level 3

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Duration / Time: If you can, suggest the amount of time required to complete this training content. This should be in whole hours (i.e. 30 minutes of training needs to be recorded as 1 hour).	

Training resource format / style: These training resources can be developed as a Guide or Handbook: Resources that require formatting as a type of manual which is downloadable. The term Guide or Handbook can be applied based on what heading is deemed most suitable for the content.

Different features can be inserted into the content i.e. a book-like add-in format with headed sections; web pages and integrated files i.e. downloadable Word document, PDF, Excel spreadsheet or PowerPoint slides, etc

Please choose any preferred options. If not appropriate formats for content will be selected. Add any comments you may have in the box below

Guide		Handbook	
	Page		Page
	Book		Book
	File		File
Comments			

Training resource language

The default language that will be used is English. However in some cases content can be translated and provided in additional languages. If another language is required, please specify language / languages and why this is needed.

Training resource – services study subject / theme

Please select the main subject / theme area and others that apply. Number selections, with 1 being the main subject / theme.

	Philosophy		Art/Architecture
	Design		Business and money/finance
	History		Technology/computing
	English Language		Social care
	Maths and statistics		Psychology
	Law		Literature
	Health, nursing and medicine		Environment
	Society/sociology		Engineering
	Music		Education
	Other languages		Science
	Communications and media		Politics
	Sports		

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:

Primary skill (optional, select one only)			
Are there any skills you think users could develop from reading this resource?			
General life skills		Skills for work	
☐	Information technology skills	☐	Entrepreneurship skills
☐	Writing and literacy skills	☐	Leadership skills
☐	Communications skills	☐	Management skills
☐	Maths skills	☐	Information technology skills
☐		☐	Communications skills
☐		☐	Maths skills
☐		☐	Apprenticeship related
		☐	Vocational qualifications
General life skills		Skills for work	
☐	Information technology skills	☐	Teacher training
☐	Writing and literacy skills	☐	Health worker training
☐	Communications skills	☐	Voluntary sector training
☐	Maths skills	☐	Vocational qualifications

Other skills (this is optional, select any / all that you think apply)			
Are there any other skills you think users can develop from using this resource?			
General life skills		Skills for work	
☐	Information technology skills	☐	Entrepreneurship skills
☐	Writing and literacy skills	☐	Leadership skills
☐	Communications skills	☐	Management skills
☐	Maths skills	☐	Information technology skills
☐		☐	Communications skills
☐		☐	Maths skills
☐		☐	Apprenticeship related
		☐	Vocational qualifications
General life skills		Skills for work	
☐	Information technology skills	☐	Teacher training
☐	Writing and literacy skills	☐	Health worker training
☐	Communications skills	☐	Voluntary sector training
☐	Maths skills	☐	Vocational qualifications

Declaration
This resource will be published as part of the Cos4Cloud Toolbox & Evidence Hub hosted in the OU's OpenLearn Create platform. As a named author, I agree for this content to comply with The Open University website accessibility statement.
Yes ☐ No ☐

result:

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Appendix 3: Training and Capacity Building resources - examples

*All online resource links have been created. These will be live for beta review of the Toolbox and Evidence Hub in January 2023.

- Cos4Cloud Toolbox and Evidence Hub: OLCreate: Cos4Cloud Toolbox and Evidence Hub (open.edu) – including Training and capacity building resources: OLCreate: Cos4Cloud Training & capacity building resources (open.edu)
- Authenix user guide: OLCreate: PUB_6046_1.0 Authenix User Guide (open.edu)
- AI-Taxonomist user guide: OLCreate: PUB_6052_1.0 AI-Taxonomist User Guide (open.edu)
- AI-GeoSpecies system guide: OLCreate: PUB_6055_1.0 AI-GeoSpecies system guide (open.edu)
- Biodiversity-DL system guide: OLCreate: PUB_6056_1.0 Biodiversity-DL system guide (open.edu)
- Cos4Bio administrator and user handbook: OLCreate: PUB_6044_1.0 Cos4Bio administrator and user handbook (open.edu)
- FASTCAT-Cloud administrator and user handbook: OLCreate: PUB_6045_1.0 FASTCAT-Cloud administrator and user handbook (open.edu)
- MECODA user guide: OLCreate: PUB_6049_1.0 MECODA User Guide (open.edu)
- MOBIS administrator and user handbook: OLCreate: PUB_6047_1.0 MOBIS system and user handbook (open.edu)
- Pl@ntNet-API administrator and user handbook: OLCreate: PUB_5868_1.0 Pl@ntNet-API administrator and user handbook (open.edu)

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Free guide

Authenix User Guide

AUTHENIX

Training & capacity building resources

Cos4Cloud Services

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This is a user guide to **Authenix:** 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.

Service Coordinator

Secure Dimensions
Holistic Geosecurity

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This guide is a training resource for one of the technological services codesigned by the Cos4Cloud project (**https://cos4cloud-eosc.eu/**). It is part of the **Cos4Cloud Toolbox & Evidence Hub** developed by the Open University in collaboration with project partners. Contact: **cos4cloud-toolbox@open.ac.uk** .

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

📄 View or download the Authenix User Guide here.

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About this free User Guide

This is a user guide to AUTHENIX: 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.

Guide Description

This is a system guide to AUTHENIX: an online authentication service that facilitates data protection compliance for registered applications and websites. It provides users (i.e. citizen scientists and researchers) with the ability to access multiple citizen science platforms and services using a Single-Sign-On.

AUTHENIX has been developed by Secure Dimensions as part of Cos4Cloud a European Horizon 2020 funded project. The Cos4Cloud project is developing thirteen services boosting citizen science technological services to help increase and improve the quantity and quality of observations.

AUTHENIX facilitates General Data Protection Regulation (GDPR) compliance for applications and websites registered, facilitating users with the option to use a Single-Sign-On a useful feature for citizen science platforms and services.

Service Coordinator

Secure Dimensions
Holistic Geosecurity

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The following content has been provided to help guide users of this service.

? WHAT IS AUTHENIX?

AUTHENIX is a user authentication service provider that targets citizen science platforms and services, as well as the data created, enhancing accessibility and possibilities for review and research. Once an entity is registered a login process that provides unique user IDs is supported.

WHO IS THIS SERVICE FOR AND WHAT ARE THE BENEFITS?

AUTHENIX provides a login service which brings together organisations, including universities, and particularly those who operate citizen science projects and services, facilitating registration of applications and websites providing GDPR compliance support. In doing so it gives users (i.e. citizen scientists and researchers) the ability to log in using third-party accounts (i.e. Facebook, Google etc.).

Through these integrated OAuth protocols and OpenID authentication, multiple citizen science platforms and services, for example, can be accessed using a Single-Sign-On system reducing the repetition of re-logins. AUTHENIX also connects to an Identity Federation called eduGAIN that facilitates Universities user login.

AUTHENIX has the potential to support citizen science and improve capabilities for research by reducing the impact of data silos, helping to make citizen science data more accessible, while providing opportunities to improve FAIR aspects based on GDPR compliant processing of personal data.

HOW DOES IT WORK?

As a user authentication service provider AUTHENIX acts as a broker of user authentication and personal information between Identity Providers and the Operators of registered applications. Identity Providers (IdP) facilitate the authentication and provides the personal information of the user. Through the registration process operators select the information they would like to request from users. This can include none, one or more of the following:

- IdP: identifies which third-party platforms used to log in (i.e. Facebook, Google, University, etc.)

- ID: creates a unique identifier for users

- Profile: collects personal information from users (name, surname, etc.)

- Email: collects the user's email address

Each IdP gains user consent to release personal information which enables user registration via the AUTHENIX service. If no options are selected, the user acts de-facto anonymously. Some options i.e Profile or Email require the operator to provide a privacy statement informing users about the personal data to be collected, why and how it will be used.

Once AUTHENIX is integrated an OpenID Connect token is provided for each app, website or service which includes the type of personal information requested which is based on the categories selected by the operator in registration. Each access token has a validity period which sets limits on the timeframe within which it can be used to fetch the pre-selected categories of personal data. Through this process there is no need to store personal information, which supportS compliance to GDPR requirements.

HOW TO USE AUTHENIX – A STEP BY STEP GUIDE

Go through the steps below to understand how AUTHENIX can be integrated as part of the log in process of a registered application, service, website etc. A demonstration example has also been included highlighting the user log in experience when signing into an application that has integrated AUTHENIX as part of the user authentication process.

01 REGISTER AN APPLICATION, SERVICE OR WEBSITE:

Go to https://www.authenix.eu/, and fill in the required information in the application form. Registration must be done by the legal entity with responsibilities for the application which can be an organisation or an individual.

```
* indicates required input.

Operator Name    ?
[                                              ]*

Operator Homepage URL    ?
[                                              ]

Operator Postal Address    ?
[                                              ]*

Operator Contact Name    ?
[                                              ]*

Operator Contact Email    ?
[                                              ]*

Operator Country    ?
[ Please select ...                        ∨ ]*
```

02 PROVIDE DETAILS ABOUT THE TYPE OF APPLICATION, SERVICE OR WEBSITE:

AUTHENIX's authorisation server supports different application types. Select the appropriate option of the authorisation code grant which is the application exchanges for an access token. Options include:

- *Client-side Web-Application*: runs inside the Web-Browser (must use the OAuth2 Implicit Grant)

- *Server-side Web-Application* runs on a Web Server (must use the OAuth2 Authorisation Code Grant)

- *Mobile application* must use the Authorisation Code Grant and a redirect URI with application specific scheme, not http: or https

- *A Desktop application* must use the Authorisation Code Grant with a redirect URI specific for the application.

- *A Service application* must use the Client Credentials Grant and therefore has no redirect URI.

03 PROVIDE FURTHER INFORMATION ABOUT THE APPLICATION:

General information i.e. software version, application name, URL etc. is required as part of the process of releasing access tokens and can also include uploading the Terms of Use or Privacy Statement of the application:

General information

Software Version   ?

[   ]*

Application Name   ?

[   ]*

Application Logo Upload   ?

[select file]

Application Logo URL   ?

[   ]

Application Terms of Use URL   ?

[   ]*

04 PERSONAL DATA POLICY SETTINGS:

As part of the registration process for each application etc., categories have to selected indicating the type of information users will be required to provide (i.e. choose none, one or multiple options, or all):

- IdP Policy: indicates the use of a third-party platform to log in (Facebook, Google, University, etc.) and does not include the submission of personal information.

- ID Policy: creates a unique identifier for users but this does not require GDPR compliance, as no personal information is requested. A generated ID, it is not stored therefore cannot be used to identity the user.
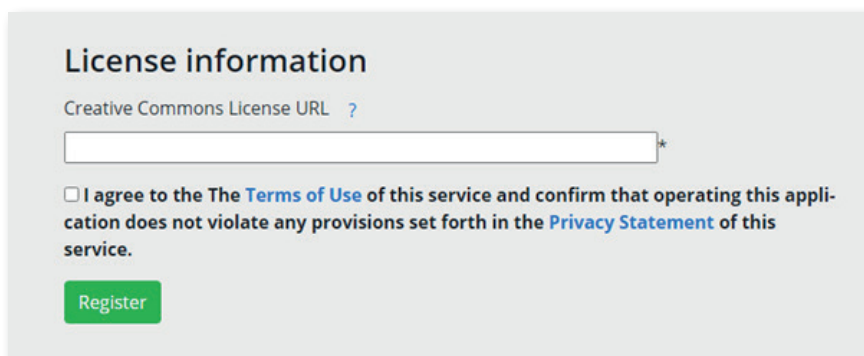
- Profile Policy: requires the collection of personal information from users (name, surname, etc.)

- Email Policy: requires collecting of the user's email address

Please note: The default setting (i.e. no policy option selected) means that the user of the application would successfully login but after doing so acts anonymously. If the Profile or Email policies are selected, a privacy statement must be provided, informing users of the personal information to be collected, why and what their data will be used for.

05 CREATIVE COMMONS AND TERMS OF USE AGREEMENT:

A url link to a creative commons license as well as agreement to the Terms of Use of AUTHENIX are required to complete the registration process:

License information

Creative Commons License URL ?

☐ I agree to the The Terms of Use of this service and confirm that operating this application does not violate any provisions set forth in the Privacy Statement of this service.

Register

06 CLICK REGISTER:

Once all the required fields are completed select the Register button. Once registered Operators and registered applications are logged here: https://www.authenix.eu/Operators.

07 USE THE AUTHENIX AUTHENTICATION SERVICE:

Inform your user community about the use of AUTHENIX as an authentication service provider for your application etc. See example of the user experience signing in via AUTHENIX demonstrated by Cos4Cloud service: Cos4Bio: https://cos4bio.eu/:

Cos4Bio: users go to the website click the sign in button:
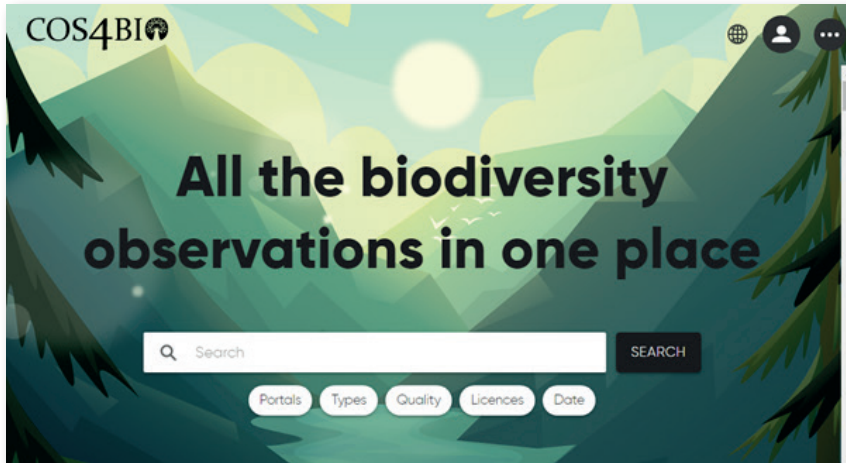
A short description of the AUTHENIX has been added and pops up with as part of the application log in:
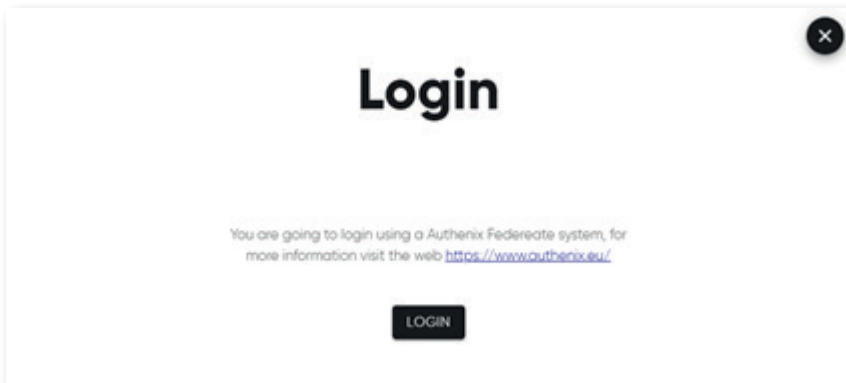
Logging in via AUTHENIX: users are redirected to the authentication service options:
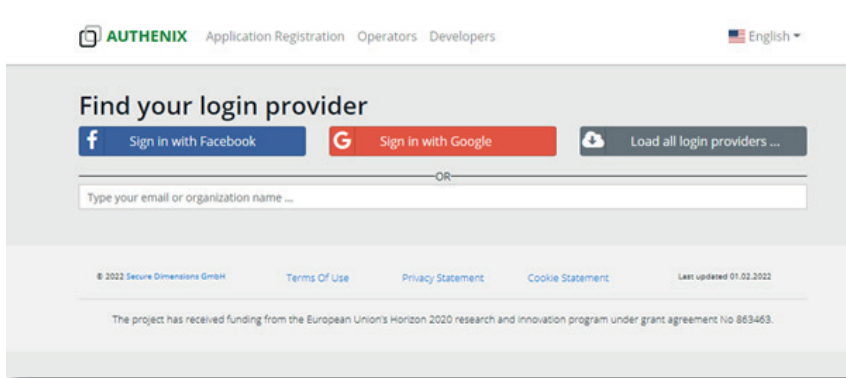
ℹ INFORMATION AND FURTHER SUPPORT

EOSC Marketplace registration: https://marketplace.eosc-portal.eu/services/authenix

Cos4Cloud: https://cos4cloud-eosc.eu/authenix-gdpr/

Authenix website: https://www.authenix.eu

Registration page: https://www.authenix.eu/registerapps

Operators and registered applications: https://www.authenix.eu/Operators

Authenix API (OpenID Connect / OAuth2): https://www.authenix.eu/API

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Below is the guide content. You can click on any section here and it will take you through to this section of the guide.

This is a user guide to **AI-Taxonomist:** a Cos4Cloud service which enables citizen observatories, citizen science or other research projects to integrate customisable automatic identification tools and help users identify species from images.

Service Coordinator

Pl@ntNet Inria

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

📄 View or download the AI-Taxonomist User Guide here.

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Below is the guide content. You can click on any section here and it will take you through to this section of the guide.

This is a system guide to **AI-GeoSpecies:** a Cos4Cloud service which supports the integration of artificial intelligence into citizen science applications or websites which facilitates the prediction of species users can find in a particular area.

Service Coordinator

Pl@ntNet   *Inria*

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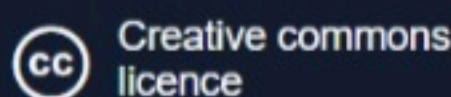
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Below is the guide content. You can click on any section here and it will take you through to this section of the guide.

This is a system guide to **Biodiversity-DL:** a Cos4Cloud service that allows citizen observatories to integrate machine learning by training Artificial Intelligence (AI) models supporting easier identification of particular species groups.

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📄 View or download the Biodiversity-DL User Guide here.

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FASTCAT-Cloud
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This is an administrator and user handbook for **FASTCAT-Cloud:** a Cos4Cloud service that uploads and analyses nature videos and pictures filtering to relevant images and recordings of wildlife activity to identify species names using Artificial Intelligence (AI).
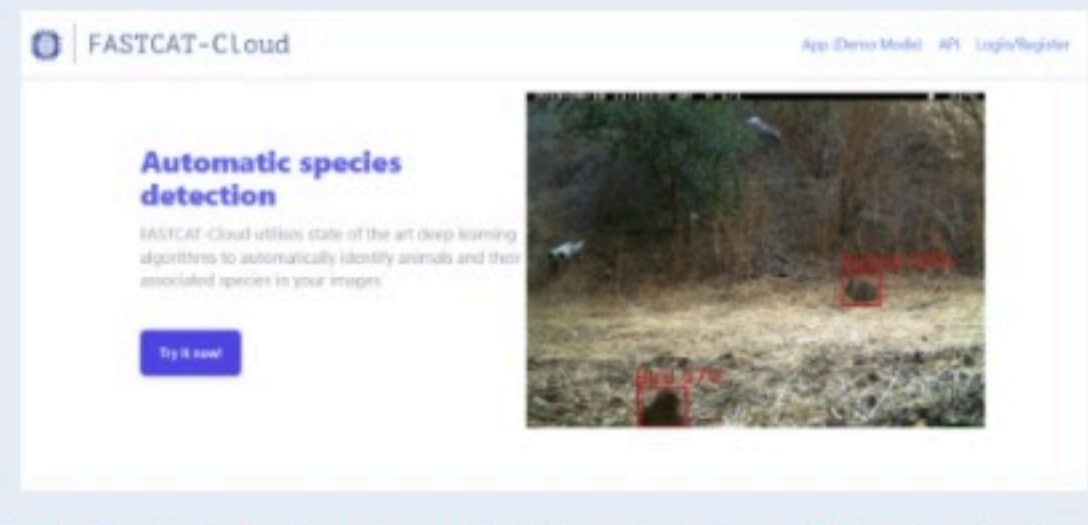
FASTCAT-Cloud has been developed by **Cos4Cloud** project partner **DynAIKon**. Cos4Cloud is a European Horizon 2020 funded project focused on developing citizen science **technological services** to help improve the quantity and quality of observations.

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Below is the guide content. You can click on any section here and it will take you through to this section of the guide.

This is a user guide to **MECODA:** an online service that provides a repository of tools that facilitates analysis and visualisation of all sorts of citizen science data.

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

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About this free User Guide

This is a user guide to MECODA: an online service that provides a repository of tools that facilitate analysis and visualisation of citizen science data.

User Guide Description

This is a user guide to MECODA: a Cos4Cloud service that is a repository of online tools to facilitate analysing and viewing of all sorts of citizen science data.

MECODA has been developed by project coordinator Instituto de Ciencias del Mar (ICM)-CSIC as part of Cos4Cloud a European Horizon 2020 funded project. The Cos4Cloud project is developing thirteen services boosting citizen science technological services to help increase and improve the quantity and quality of observations.

MECODA (ModulE for Citizen Observatory Data Analysis) is a repository to facilitate analysing and viewing different types of citizen science data, including from citizen observatories. This service aims to break the barrier between experienced users or programmers and the general public.

Service Coordinator

Institut de Ciències del Mar

The following content has been provided to help guide users of this service.

WHAT IS MECODA?

MECODA (ModulE for Citizen Observatory Data Analysis) is a Cos4Cloud service developed as a repository of accessible tools that can facilitate the analysis and viewing of different types of citizen science data from citizen observatories and other sources. Once data is uploaded to MECODA users can view and or access this data for analysis using the online tools available.

WHO IS THIS SERVICE FOR?

MECODA is aimed at scientists, students, citizens, and anyone doing research and training activities associated with citizen science and citizen observatories. It has also been developed to support developers and managers of citizen science data as well as those who contribute citizen science observations including those more experienced as well as those with a general interest. It can be used by citizen observatories that collate different types of citizen science data i.e. biodiversity, environmental etc or other data from other sources. MECODA can be used by installing Orange Data Mining, the programming interface integrated, and use the accessible ready-to-use tools available to analyse data and generate visual, user-friendly results. Developers and those with experience can use the code directly. Bridging gaps which sometimes exist between these different groups and the data generated from observations, MECODA allows users to first upload and store data and then conduct their own exploratory visual data analysis without the help of specialised analysts. Integrated tools facilitate visual dataflows which can be used to help share and reuse results.

For example: a researcher studying the butterfly population in a big city can upload their data and use tools available in the MECODA repository to create a 'distribution graph' and visualize the number of observations of butterfly species over time. Are they increasing? Are them decreasing? Or a biodiversity group can use MECODA to analyse participation (i.e. biological recordings) from a citizen science BioBlitz, this could include the number of observations, identifications, participants, etc.

WHAT ARE THE BENEFITS OF THIS SERVICE?

MECODA aims to make data analysis tools more accessible in doing so it supports the creation of data analysis workflows as well as assembly, processing, visualization, and modelling for those seeking to conduct research, better understand and /or make use of citizen science data.
Benefits of MECODA include:

- User-friendly access to various citizen science observatories

- Customisable data-quality control

- Customisable data-analysis methods

- Data-viewing tools

- Tools that facilitate data exports data in different tabular formats

- The possibility to export images locally and the workflows can be saved and reproduced

Based on Orange Data Mining, an open-source visual programming toolbox for data analysis and visualization, MECODA uses a targeted approach which can help to manage citizen science related data. The system has been designed with specific widgets developed, integrated and made available that directly access data from citizen observatories.

So far this facilitates the analysis and visualisation of data from the following citizen observatories : Minka, OdourCollect, CanAirIO, Ictio, Natusfera and Smart Citizen. MECODA can be easily adapted and used by other observatories and different citizen science data types.

HOW DOES IT WORK?

MECODA's repository currently includes different widgets that access environmental and biodiversity data from:

- Minka: collects observations of biodiversity and links these to environmental measurements contributing to research on the SDGs

- Odour Collect: an open App used to report odour observations.

- canAIRio: a citizen science project that uses mobile and static sensors to measure air quality with cell phones and low-cost technology.

- Ictio: Ictio is a database and a mobile App created to register observations of caught fish in the Amazon basin.

- Natusfera: a citizen observatory platform where users from Spain can post observations of biodiversity.

- Smart Citizen: empowers communities to better understand their environment through tools for citizen action in environmental monitoring and methodologies for community engagement and co-creation.

Real-time data from these citizen observatories is linked to the service through requests made to the API. When a user queries the data using the MECODA tools it is retrieved in a structured way presented as data tables for further enquiry. This data can then be analysed using the in-built tools. Results can then be saved locally for further use and exploration.

MECODA has integrated tools which can be used to perform the following tasks:

Data analysis methods & graphs

- Use the available tools to do tendency graphs, histograms, participation analysis, species distribution analysis on a map; statistical or image analysis etc.

Data-quality analysis

- Define your own data quality criteria to decide which citizen science data is trustworthy or not (e.g. number of validations, scientific identification, etc.).

Download graphs and data

- Download your work in different formats: .csv, .xlsx, .tab, etc.

Create and share your own tools

- MECODA is an open collaborative repository. Create new tools or data sources and share them with the community.

HOW TO USE MECODA – A STEP BY STEP GUIDE

Demonstration examples are used throughout the steps below. A data analysis example is also used to demonstrate how to conduct research using the existing databases in MECODA. Go through the steps to understand how the system works and how to initiate research using data from the citizen observatories embedded in the system.

MECODA can be used to analyse data from the citizen observatories already integrated in the system accessible from widgets already created and available. These widgets can also be used as a model for other citizen observatories. To do this go to Information and further support *- below for the additional MECODA system information.*

01 DOWNLOAD MECODA-ORANGE:

MECODA integrates the use of Orange Data Mining as the underlying operational system. Integrated widgets enable user analysis of data from citizen observatories added to the system.

To use MECODA and the tools it offers you first need to download the latest version of Orange Data Mining for your operating system:
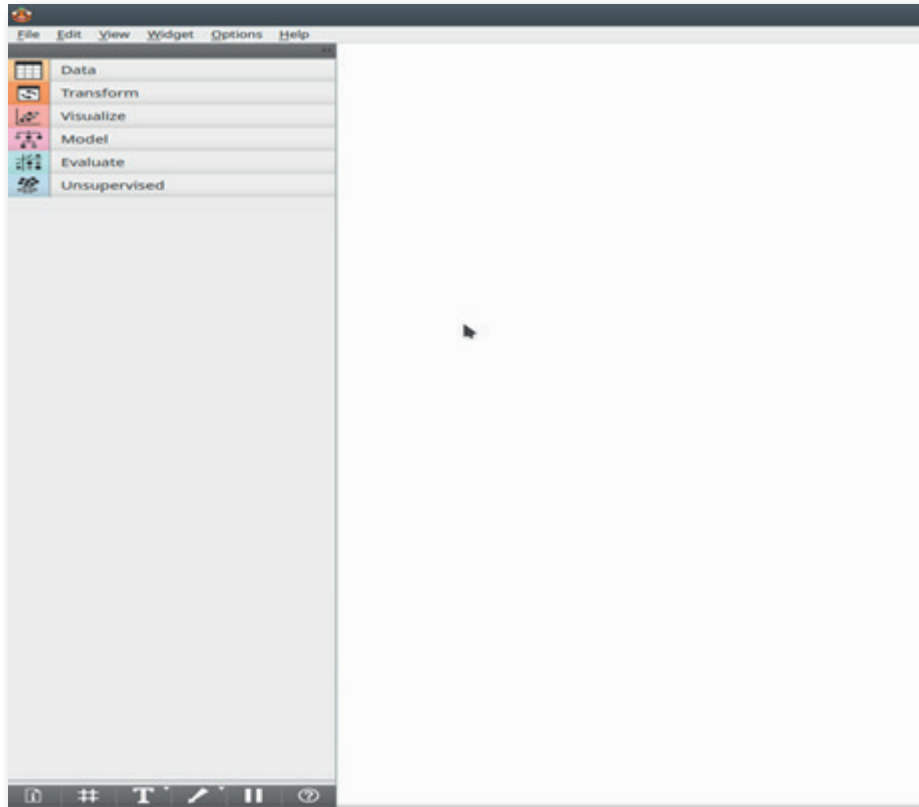
1.1 Go to: https://orangedatamining.com/download

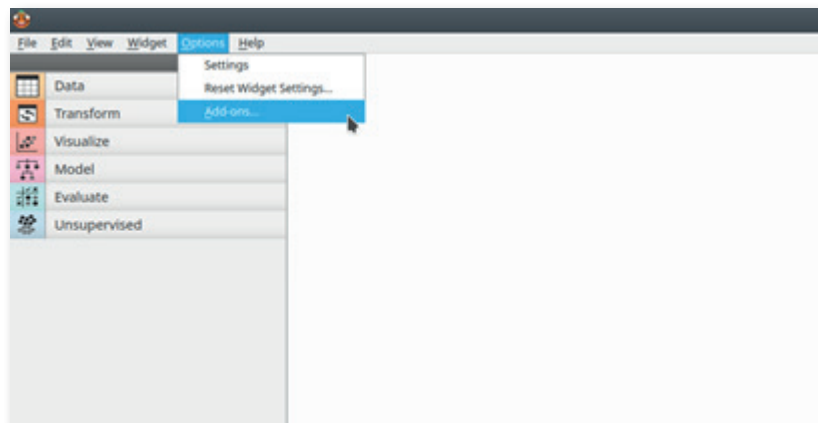**1.2** Click: Download Orange 3.33.0
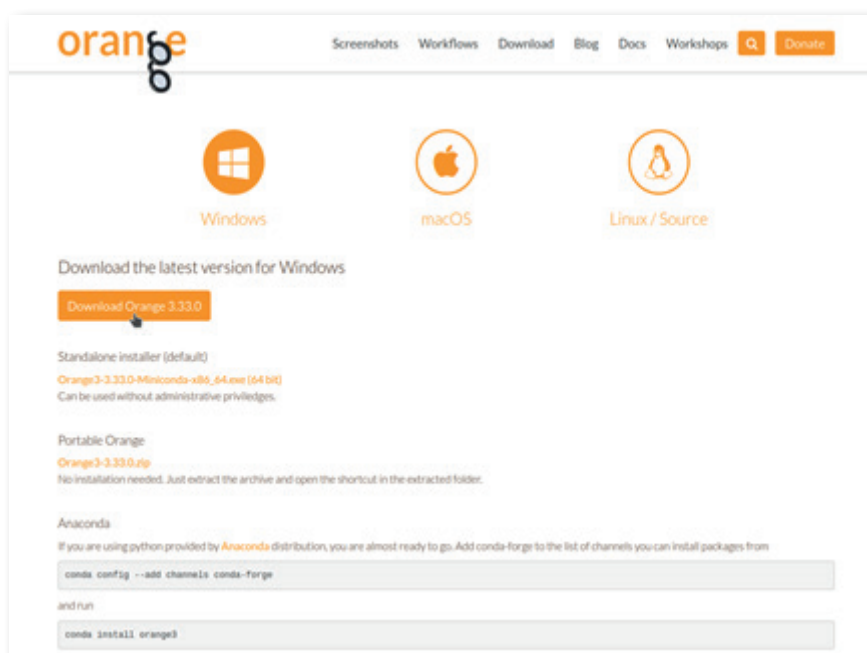
02 OPEN MECODA - ORANGE:

From your computer menu, find and open MECODA-Orange, see demo example of how system will appear below:
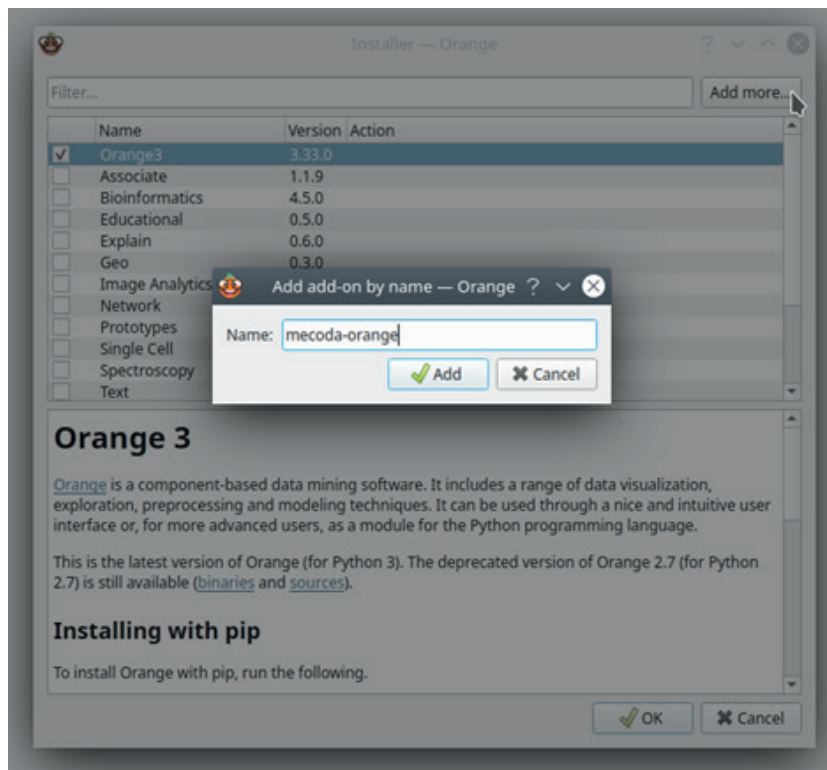

03 PREPARATION FOR INSTALLING MECODA - ORANGE:

3.1 From the MECODA-Orange menu bar go to "Options" and select "Add-ons":
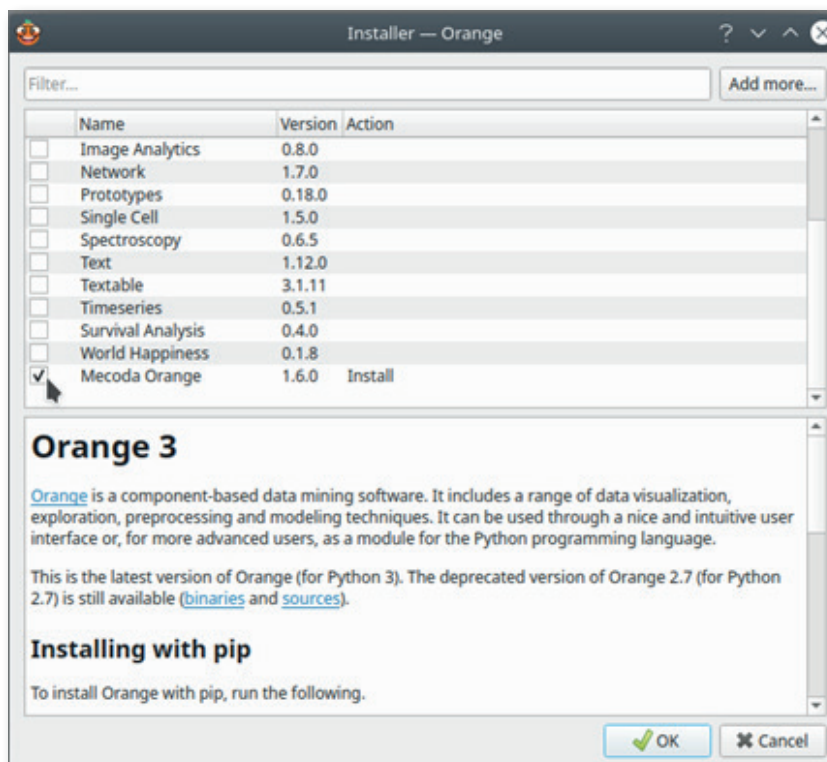
3.2 From the pop-up window which appears click on the "Add more…" button, top right. A search window will appear called "Add add-on by name". Write "mecoda-orange" in the search box and click on the "Add" button:

3.3 In preparation for installation, look for Mecoda-Orange, which will appear in the list of packages available for installation. Check the box beside the name:
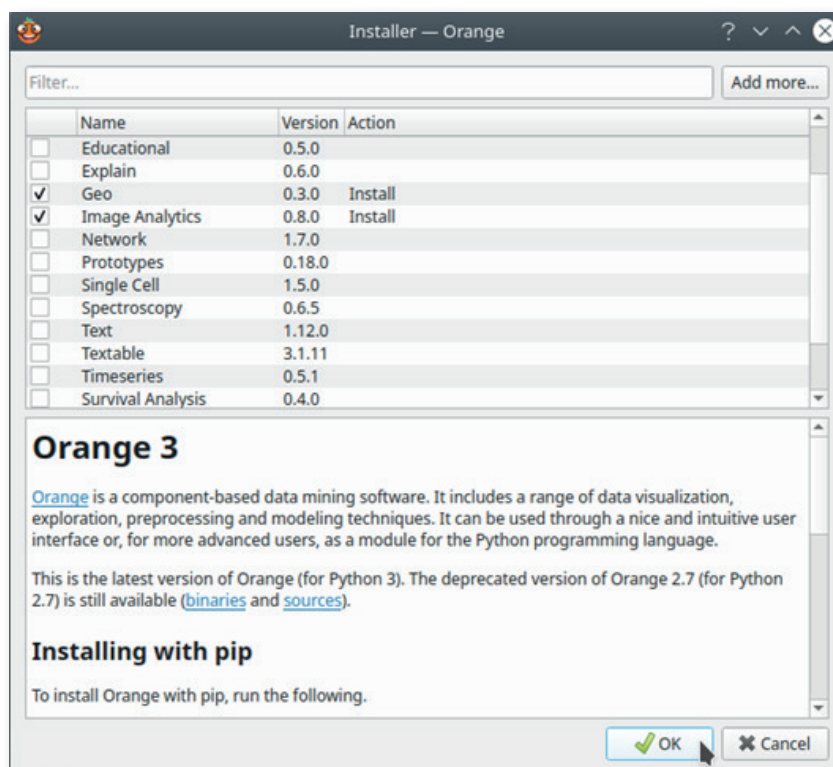
3.4 Additional packages are required to enable functionality to perform image and geographical analysis. Look for Geo and Image Analytics and check the boxes for these packages also:
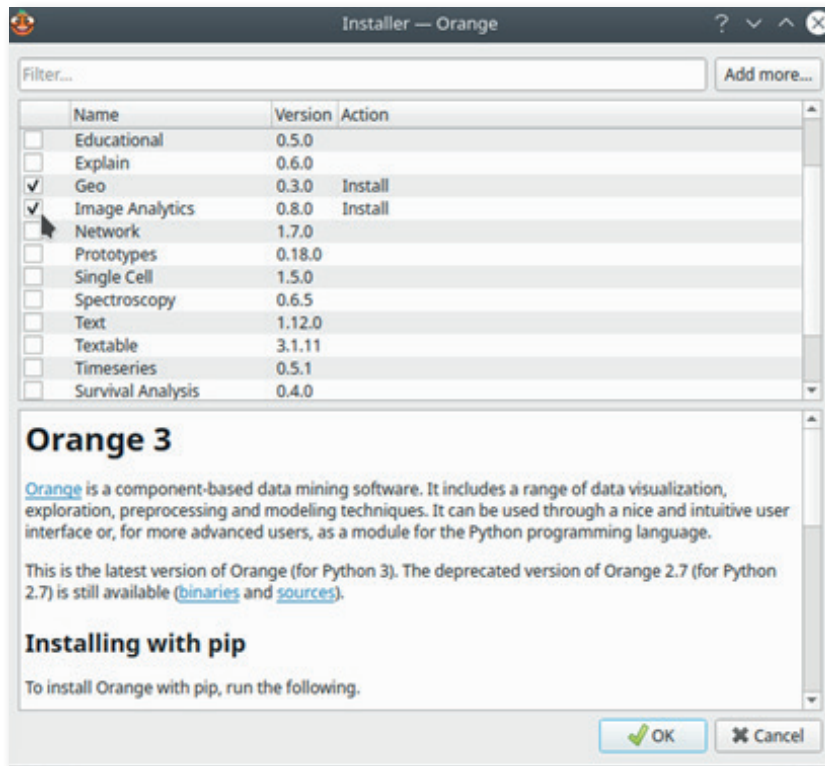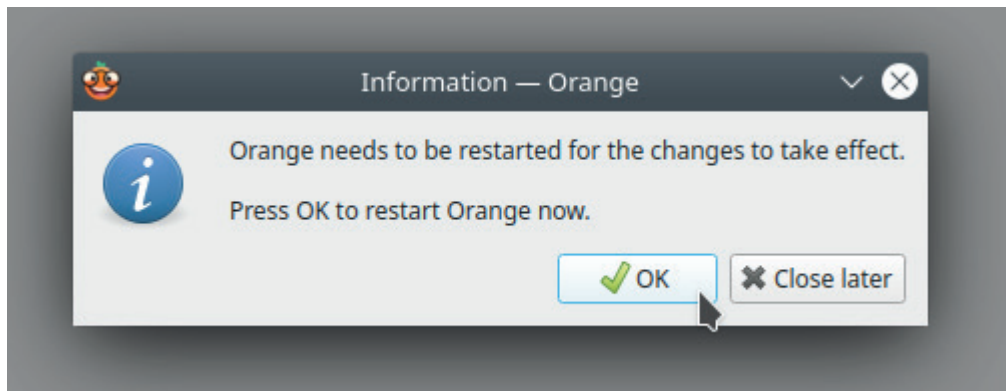

04 INSTALLING MECODA - ORANGE:

4.1 After selecting these three packages, click OK to install them:

4.2 MECODA-Orange should now be installed; however a restart is required for it to take effect. When the pop-up box appears click "OK":

4.3 Once your computer has restarted, the installed packages will appear and MECODA-Orange is ready for use. When opened the installed packages will appear in the left-hand side column:
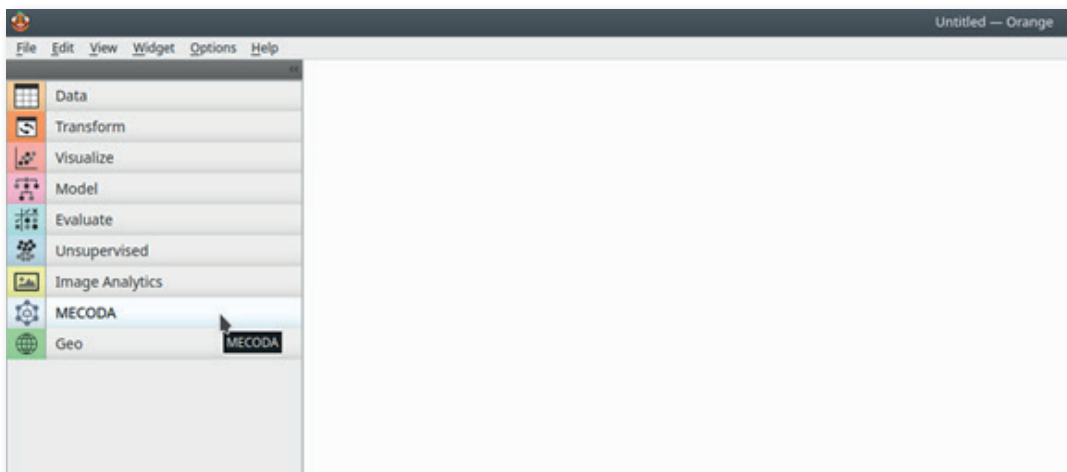

PLEASE NOTE: If MECODA does not appear in the Orange interface, as demonstrated above, the software will need to be removed and reinstalled. Close the system and remove the cache/Orange folder from your computer. Follow the installation STEPS above. If it still does not appear remove and install it again.

05 HOW TO USE MECODA: USING AND ANALYSING CITIZEN OBSERVATORY DATA (ODOUR COLLECT EXAMPLE)

This step will take you through MECODA with a demo example using data from the environmental citizen observatory Odour Collect (see more here: https://odourcollect.eu/).

5.1 Get to Odour Collect data: Open Orange, click on the MECODA package, and then click on the Odour Collect Obs widget:
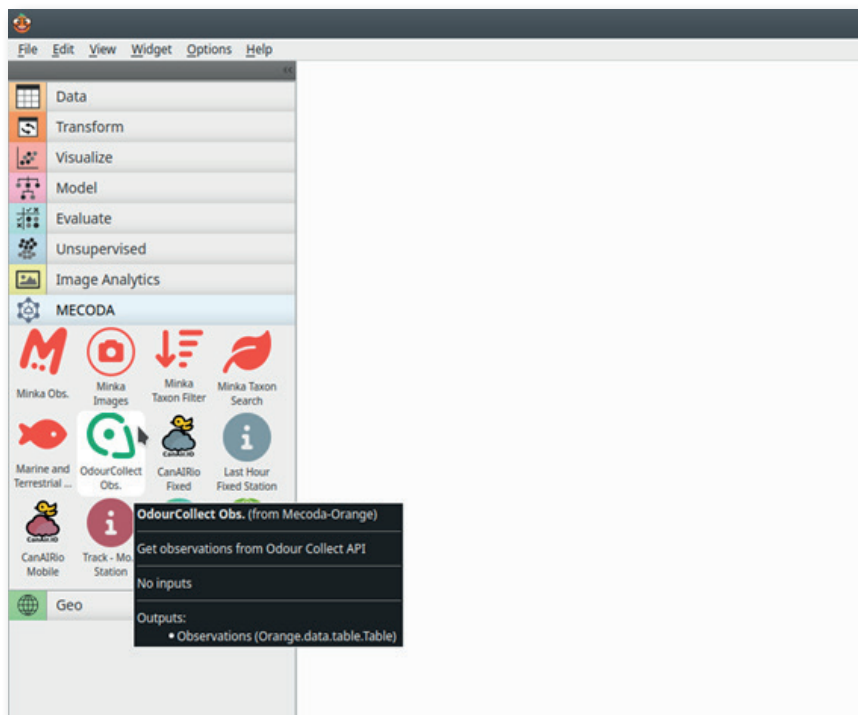
5.1.1 The OdourCollect Obs widget will appear on the white canvas space on the right-hand side. It allows the user to get observations directly from the Odour Collect API.
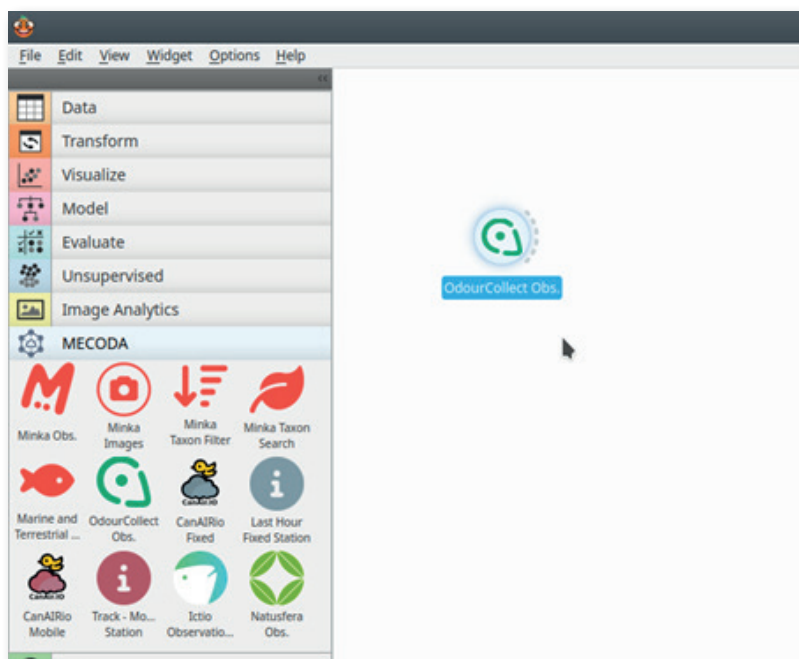
5.2 Download Odour Collect data:

5.2.1 Double click on the Odour Collect widget this opens a pop-up window showing information about the data available and the selection / search fields to facilitate a data download.

The widget has different search fields: date, annoy level, intensity level, category and type. Observations can also include distance, i.e. from a Point of Interest, if this is set.

5.2.2 The "Initial Date" and "End Date" search fields provide details on the range of the dataset of Odour Collect observations available i.e. 2019 to today. To adjust this, enter the dates for the timeline required, see below:
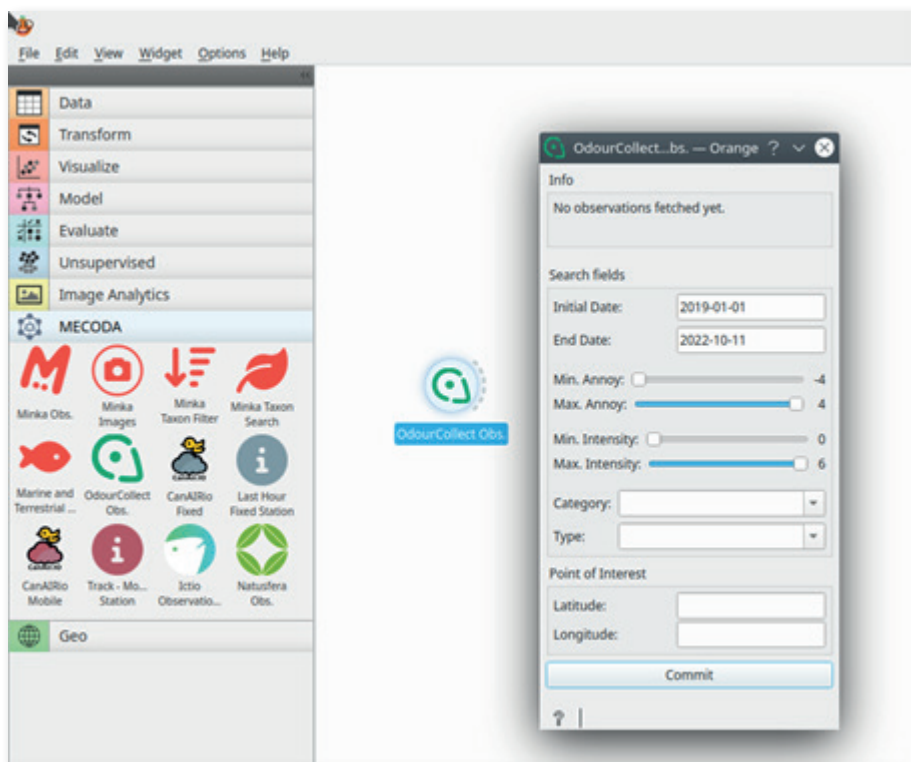
5.2.3 Click "Commit" to initiate a data request, from the Odour Collect API. In the example below this request has downloaded a data set of 11,700 observations:
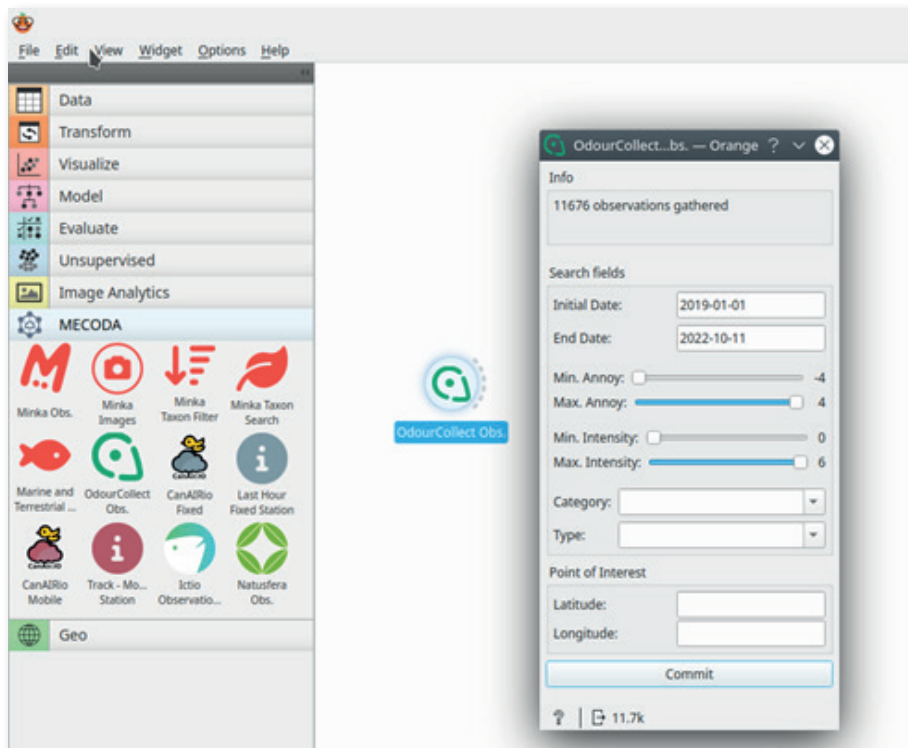
5.3 Analyse Odour Collect Data: The Table widget allows viewing and manipulation of the selected dataset.

5.3.1 To access this put your mouse over the right-hand side of the Odour Collect widget, a pointed curve appears. Drag this curve and a line will appear, release to show a pop-up menu of options:
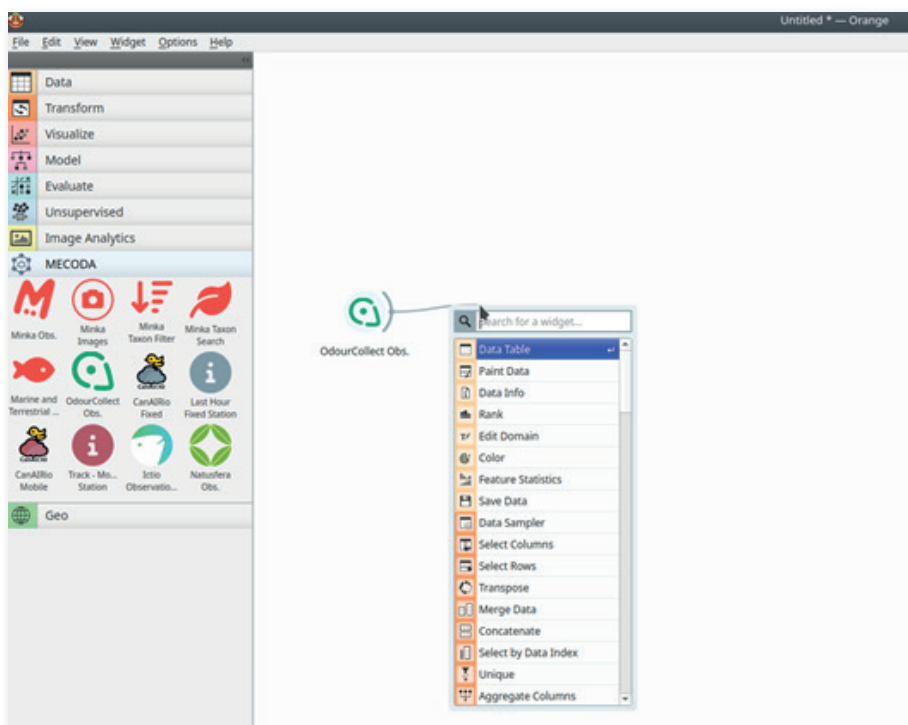
5.3.2 This shows the different options available to connect with the dataset. For the purposes of this demo. "Data Table" is selected. The result is a Table with data fields for further analysis that can include:

field	description
user	OdourCollect's user ID of the citizen that registered the observation.
date	Observation date in yyyy-mm-dd format.
time	Observation time in HH:mm (24h) format, UTC timezone.
week_day	Observation day of week. This field is extra data calculated by PyOdourCollect to help the analyst in finding patterns. Please bear in mind that this calculation is based on UTC, not local time, so it could be misleading in some edge cases.
category	First tier of odour classification. In OdourCollect webapp, this is called "type". It provides complementary classification nuances that can be safely ignored for basic analysis. See the full table below for better understanding.
type	Second tier of odour classification. In OdourCollect webapp, this is called "subtype". It provides the richest odour classification criteria. See the full table below for better understanding.
hedonic_tone_n	Hedonic tone of odour observation (numeric representation). Hedonic tone is the subjective measurement of how annoyant an odour is, from -4 (`Extremely unpleasant`) to +4 (`Extremely pleasant`). Zero is used to report nor annoyance nor pleasure. This scale is based on the VDI 3940:2006 standard for odour impact assessement.
hedonic_tone_t	Text description version of the former metric.
intensity_n	Intensity of odour observation (numeric representation). Intensity is the measurement of how intense and noticeable an odour is, from 1 (`Very weak`) to 6 (`Extremely strong`). Zero (`Not perceptible`) is also used, but only to report absence of odour in observations. This scale is based on the `VDI 3940:2006` standard for odour impact assessement.
intensity_t	Text description version of the former metric.
duration	Metric informing for how much time an odour has been perceived by reporter. Categorical text data with following self-explanatory options: (`No odour`),`Punctual`,`Continuous in the last hour` and `Continuous throughout the day`

field	description
latitude	GPS coordinates of observation. Latitude.
longitude	GPS coordinates of observation. Longitude.
distance	Distance in Kms (with an accuracy of 0.01 Kms.) between the point of observation and a configurable Point of Interest (POI). This extra data is calculated by PyOdourCollect when the data analyst provides a set of coordinates for a given suspicious activity that motivates his/her analysis. In case that no POI coordinates are provided, this field is missing.
time_hour	Observation time in HH (24h) format, UTC timezone.
time_mins	Observation time in mm (0-60') format, UTC timezone.
time_secs	Observation time in ss (0-60") format, UTC timezone.

If you are interested in analysing data from OdourCollect and other citizen observatories see links to further details in the Information and further support below.

ℹ INFORMATION AND FURTHER SUPPORT

More help analysing citizen observatory data: For further assistance analysing data from the integrated citizen observatories i.e. OdourCollect go to the detailed user example here: https://github.com/eosc-cos4cloud/mecoda-orange/blob/master/docs/installation_and_user_guide.md

Help adding data from other citizen observatories: MECODA can be used to analyse data from other citizen observatories:

- *Create a Widget:* for each citizen observatory modelled from the existing ones in the system. See the code to develop similar widgets in the Github repository, and make a pull request to integrate inside MECODA package: https://github.com/eosc-cos4cloud/mecoda-orange

- *How to add data:* data can be uploaded directly to the Orange platform and connected to other widgets created in Orange to perform analysis and visualization. To use this path, you can go directly to the Orange learning materials directly (no need to use MECODA): https://orangedatamining.com/docs/

MECODA-Orange github repository: https://github.com/eosc-cos4cloud/mecoda-orange (includes demonstrations on how to access MECODA-Orange data from all integrated citizen observatories and other documentation.)

Installation and user guide: https://github.com/eosc-cos4cloud/mecoda-orange/blob/master/docs/installation_and_user_guide.md

Help and other information (Pypi package): https://pypi.org/project/Mecoda-Orange/

Orange Data Mining Platform: https://orangedatamining.com/

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Free handbook

Pl@ntNet-API administrator and user handbook

| **Description** | Content |

This is an administrator and user handbook for **the Pl@ntNet-API:** an AI-based plant identification service that uses Pl@ntNet's visual identification engine and improves the users' experience.

The Pl@ntNet-API has been developed by **Cos4Cloud** project partner **Inria**. Cos4Cloud is a European Horizon 2020 funded project focused on developing citizen science **technological services** to help improve the quantity and quality of observations.

The Pl@ntNet-API is a plant identification service, based on the Pl@ntNet citizen observatory extensive database, which uses Artificial Intelligence (AI) to help people identify and better understand plants.

Inria leads **Pl@ntNet** and this API is one of the web services developed as part of Cos4Cloud for existing and new citizen science initiatives wanting to integrate AI-based Species Photo ID and AI-based Biodiversity Prediction as a tool and resource for plant biodiversity in their applications.

Service Coordinator

This handbook is a training resource for one of the technological services codesigned by the Cos4Cloud project (https://cos4cloud-eosc.eu/). It is part of the Cos4Cloud Toolbox & Evidence Hub developed by the Open University in collaboration with project partners. Contact: cos4cloud-toolbox@open.ac.uk .

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Pl@ntNet-API
Training & capacity building resources
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| Description | Content |

Handbook content

Below is the handbook content. You can click on any section here and it will take you through to this section of the handbook.

What is the Pl@ntNet-API?	›
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What are the benefits of this service?	›
How does it work?	›
How to use the Pl@ntNet-API – a step by step guide	›
Addtional information and further support	›

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