




An Ecosystem of Citizen Observatories for Environmental Monitoring

WeObserve D2.3 WeObserve CoP Mid Term Progress Report

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Task	Task 2.2: Launch and coordinate the WeObserve Communities of Practice
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Partners



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Glossary of terms

Term	Description
Best Practice	Commercial or professional procedures that are accepted or prescribed as being correct or most effective.
Citizen Observatory (CO)	COs are community-based environmental monitoring and information systems, that invite individuals to share observations, typically via mobile phone or the web
Citizen Science Global Partnership	A network-of-networks that seeks to promote and advance citizen science for a sustainable world.
Communities of Practice	Community which works to consolidate practice-based knowledge of COs sharing information and resources as well as developing guidelines and toolkits for COs

COST Action	COST Action is a network dedicated to scientific collaboration, complementing national research funds
Data quality	A perception or an assessment of data's fitness to serve its purpose in a given context. The quality of data is determined by factors such as accuracy, completeness, reliability, relevance and how up to date it is.
Digital Earth Symposium	The annual event organized by The International Society for Digital Earth
Earth Challenge 2020	Earth Challenge 2020 is building the world's largest ever citizen science campaign. The initiative will collaborate with existing citizen science projects as well as build capacity for new ones as part of a larger effort to grow citizen science worldwide.
GEOSS	A central part of GEO's Mission is to build the Global Earth Observation System of Systems (GEOSS). GEOSS is a set of coordinated, independent Earth observation, information and processing systems that interact and provide access to diverse information for a broad range of users in both public and private sectors.
Impact	Within the WeObserve community, impact is considered:
Interoperability	Interoperability is a characteristic of a product or system, whose interfaces are completely understood, to work with other products or systems, at present or in the future, in either implementation or access, without any restrictions.
Interoperability Experiment	An experiment aiming at demonstration how current ICT (Information and Communication Technologies)-based tools can be applied together to better enable citizens to participate in Citizen Science projects
Landsense Federation	The LandSense Citizen Observatory aims to aggregate innovative EO technologies, mobile devices, community-based environmental monitoring, data collection, interpretation and information delivery systems to empower communities to monitor and report on their environment.
OGC	An international not for profit organization committed to making quality open standards for the global geospatial community
OGC standards	Technical documents that detail interfaces or encodings which have been produced by the Open Geospatial Consortium
Scientific article	A publication that is based on empirical evidence. It can support a hypothesis with original research, describe existing research or comment on current trends in a specific field.
Sustainable Development Goals	A collection of 17 global goals set by the United Nations General Assembly to end poverty, protect the planet, provide education and ensure well being
Terms of Reference	Terms of reference (TOR) define the purpose and structures of a project, committee, meeting, negotiation, or any similar collection of people who have agreed to work together to accomplish a shared goal.

Tier III indicator	Tier III indicators require work plans to be developed outlining the methodological development of the indicators for approval by the IAEG-SDGs
UN Environment Assembly	The United Nations Environment Assembly (UNEA) is the world's highest-level decision-making body on the environment. UNEA enjoys the universal membership of all 193 UN Member States and the full involvement of major groups and stakeholders.
UN Science Policy Business Forum	The UN Global Science-Policy-Business Forum on the Environment aims to identify and promote opportunities for green investment that are driven by advances in science and technology.
Vocabularies	The body of words used in a particular language, a range of artistic or stylistic forms, techniques, or movements.
WeObserve	An H2020 Coordination and Support Action to create a sustainable ecosystem of COs that can systematically address these identified challenges and help to move citizen science into the mainstream
WeObserve Community of Practice	The (virtual) place where diverse stakeholders who share a joint (practice-oriented) interest in citizen science can work together towards concrete solutions, tangible examples and tools by collating their experiences and lessons learned
We Observe Cookbook	Collection of information on how to build a Citizen Observatory

List of abbreviations and acronyms

Abbreviation	Meaning
CitSciIE	Citizen Science Interoperability Experiment
CO	Citizen Observatories
CoP1	Co-design and citizen engagement Community of Practice
CoP2	Impact and value of Citizen Observatories for governance
COPs	Communities of Practice
COST	European Cooperation in Science and Technology
COWM	Citizen Observatories for Water Management
CREAF	Centre de Recerca Ecològica i Aplicacions Forestals
CS	Citizen Science
CSA	Coordination and Support Action
CS-DS	Citizen Science Definition Service
CS DWG	Citizen Science Domain Working Group
CSGP	Citizen Science Global Partnership
ECSA	European Association of Citizen Science
EGU	European Geosciences Union
EO	Earth Observations
F2F	Face to Face
GEO	Group on Earth Observations
GEOSS	Global Earth Observations System of Systems
GPSDD	Global Partnership for Sustainable Development
IAEG-SDGs	Inter-agency and Expert Group on SDGs Indicators
IIASA	International Institute for Applied Systems Analysis
ICT	Information and Communication Technologies
IE	Interoperability Experiment
JRC	Joint Research Centre

LS	LandSense Citizen Observatory
MOOC	Massive Open Online Course
NSOs	National Statistical Offices
O&M	Observation and Measurements
OGC	Open Geospatial Consortium
PPSR	Public Participation in Scientific Research
SDGs	Sustainable Development Goals
SME	Small and Medium Enterprise
SOS	Sensor Observation Service
SSO	Single Signal On
SWE	Sensor Web Enablement
SWE4CS	Sensor Web Enablement for Citizen Science
TC	Technical Committee
UN	United Nations
UNEA4	United Nations Environment Assembly
UNESCO	United Nations Educational, Scientific and Cultural Organization
WMO	World Meteorological Organisation
WO	WeObserve project
WP	Work Package
WPS	Web Processing Service

Executive Summary

One of the key objectives of WeObserve is to assess the current CO knowledge base and strengthen it to tackle future environmental challenges using CO-driven science. WeObserve Task T2.2 has launched four Communities of Practice (CoPs) as a key mechanism for consolidating the knowledge inside as well as beyond the WeObserve consortium. The key role of the CoPs is to serve as the vehicle for sharing information and knowledge on selected key thematic topics related to COs, strengthening the knowledge base about COs in order to move citizen science into the mainstream of environmental management and decision making.

The first three WeObserve CoPs were set up and launched during workshops at the ECSA conference 2018, on 6 June in Geneva (immediately following the main ECSA conference). The fourth CoP was launched at a dedicated session at the conference 'Citizen Observatories for Water Management' on 29 November 2018.

This report presents the current status of the WeObserve CoPs, reporting on their launch events, respective thematic focus, work plans and progress to date. The report also takes stock of lessons learned from running these CoPs and how the WeObserve has responded to challenges related to CoP members' fluxes in participation.

All four WeObserve CoPs have formed stable groups of practitioners, with a clear focus on their respective themes, but the overarching aim of the WeObserve CoPs to consolidate knowledge dispersed across various stakeholders is not completely met and will require additional efforts to engage different stakeholder types.

A continuous discussion in the CoPs from their launch workshops in Geneva (June 2018) till the Forum in Venice (November 2018) has related to the definition of terms in general and the distinction of Citizen Science and Citizen Observatories in particular. At Forum #2, consensus was reached across CoPs on definitions of these key fundamental concepts. All four CoPs have contributed to creating this understanding of fundamental concepts and key terms. Moreover, the common glossary of terms the CoPs have produced is already a useful contribution to the wider community of CO and CS practitioners. As there is no ECSA glossary of terms, the WeObserve glossary presents a sound starting point and ECSA provides a perspective for maintaining this beyond the lifetime of the WeObserve project.

Several lessons have been learned regarding the set up and management of the CoPs, namely the careful preferential focus on small tasks, the joint production of scientific articles and usefulness of regular F2F meetings of the respective CoPs as means for ensuring the continued participation of the CoP participants. Resource constraints have affected the outreach activities of the different CoPs, hence limiting the wider dissemination of their results somewhat.

1 Introduction

WeObserve is a H2020 Coordination and Support Action (CSA) which tackles three key challenges that Citizens Observatories face: awareness, acceptability and sustainability. The project aims to improve the coordination between existing Citizen Observatories and related regional, European and International activities. The WeObserve mission is to create a sustainable ecosystem of Citizen Observatories that can systematically address these identified challenges and help to move citizen science into the mainstream.

One of the key objectives of WeObserve is to assess the current CO knowledge base and strengthen it to tackle future environmental challenges using CO-driven science. WeObserve Task T2.2 has launched four Communities of Practice (CoPs) as a key mechanism for consolidating the knowledge inside as well as beyond the WeObserve consortium. The key role of the CoPs is to serve as the vehicle for sharing information and knowledge on selected key thematic topics related to COs, strengthening the knowledge base about COs in order to move citizen science into the mainstream of environmental management and decision making. The WeObserve CoPs are therefore the (virtual) place where diverse stakeholders who share a joint (practice-oriented) interest in citizen science can work together towards concrete solutions, tangible examples and tools by collating their experiences and lessons learned.

The purpose of this report is to present the current status of the WeObserve CoPs, reporting on their launch events, respective thematic focus, work plans and progress to date. The report also takes stock of lessons learned from running these CoPs and how the WeObserve has responded to challenges related to CoP members' fluxes in participation.

This report is structured as follows. Section two presents a general overview of the launch and management of the 4 WeObserve CoPs. Section three to six present the objectives, work plans, progress and next steps for each of the four CoPs. Section 7 concludes this report with reflections on the lessons learned and implications for the future management of the CoPs.

2 Communities of Practices launch and management

2.1 What are Communities of Practice?

Communities of Practice are a key and practical approach in knowledge management. Communities of Practice can be defined as *‘groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis.’* (Wenger et al., 2002, p. 4). The key aspect of CoPs that is binding its members together is that they find value in the joint learning derived from their interactions. These interactions can consist of information sharing, problem solving, tool or standards creation or developing tacit understanding on the focal topic.

The structural elements of a CoP are domain, community and practice (Wenger et al., 2002):

- *The knowledge domain is the specific set of issues or topic. It is the raison d’être that brings the community members together and drives their joint learning.*
- *Community refers to the people who care about the domain*
- *Practice refers to the specific knowledge the community develops, shares and maintains; the shared practice of the community members that they are developing in order to be effective in their domain (e.g. frameworks, ideas, tools, styles, stories).*

These definitions highlight that a CoP is more than codified knowledge (e.g. a website, database or best practices), namely *‘a group of people who interact, learn together, build relationships, and in the process develop a sense of belonging and mutual commitment’* (Wenger et al., 2002, p.34).

Practice-based knowledge on diverse aspects of citizen observatories is dispersed among various stakeholders. Initiating WeObserve CoPs will serve as the vehicle for sharing information and knowledge on selected key thematic topics related to COs, strengthening the knowledge base about COs in order to move citizen science into the mainstream of environmental management and decision making. *The WeObserve Communities of Practice (CoPs) are therefore the (virtual) place where diverse stakeholders who share a joint (practice-oriented) interest in citizen science can work together towards concrete solutions by collating their experiences and lessons learned.*

2.2 Launch of the WeObserve Communities of Practice

The first three WeObserve CoPs were set up and launched during workshops at the ECSA conference 2018, on 6 June in Geneva (immediately following the main ECSA conference). The fourth CoP was launched at a dedicated session at the conference ‘Citizen Observatories for Water Management’ on 29 November 2018.

A Call for Participation in the CoPs was launched on the WeObserve online platform in April 2018 and promoted widely via social media leading up to Geneva launch event in June 2018. At the ECSA conference itself, a poster about the upcoming launch of the CoPs was presented on Day 1, presenting another opportunities to reach out to the Citizen Science community. Interested participants could sign up for participation in the respective launch workshops via a dedicated Google form (accessible via the WeObserve site and also directly from the ECSA conference site).

A structured approach was developed to run the WeObserve launch workshops (see example slide set in Annex 1) that guided each CoP through a process of co-designing the thematic focus of its CoP and agree on specific objectives and activities to achieve those. The results of the respective launch workshops are reported in details in each CoP’s Inception Report (Wehn and Velzeboer, 2018 b,c; Fraisl and Wehn, 2019; OGC Project Document 18-031, 2018).

2.3 Management of the WeObserve Communities of Practice

The CoPs are chaired by WeObserve partners, as follows:

- Co-design & Engage CoP (led by Uta Wehn from IHE Delft);
- Impact and value of citizen observatories for governance CoP (led Uta Wehn from IHE Delft);
- Interoperability and standards for citizen observatories CoP (led by Joan Maso from CREAM);
- Sustainable Development Goals CoP (led by Dilek Fraisl from IIASA).

The CoP chairs are supported by staff from their respective organisations who help with drafting minutes, preparing Forum (F2F) meetings, etc. All active CoP members contribute to minutes, outputs etc. To date, WeObserve has held 2 Forums to allow the CoP members to meet F2F and advance with their respective work plans.

The first Forum was held in conjunction with the conference ‘Citizen Observatories for Water Management’ in Venice, 27-29 November 2018. Half day working sessions were held for the first 3 CoPs (each attended by ca. 20 people) and the SDGs CoP was launched at this event (23 participants). A considerable amount of time was spent ‘ad hoc’ on the participants’ motivations for participating in the CoPs (see summary in Box 1). This revealed that the incentives to participate seem to outweigh the barriers but also some of the contradicting views: e.g. by some, the CoP discussions were perceived too academic, needing to move towards making the CoP more accessible for the general audience; others were more focused on tangible outputs such as publications. The emerging consensus was to move to smaller and more manageable tasks and that the benefits of actively participating in the CoP should become clearer. The production of a joint publication (to reach academics) and joint promotion of projects (to reach practitioners and the general public) were agreed as manageable activities and meaningful outputs.

Box 1: Summary of key incentives & barriers for participation in the CoPs (Forum #1 evaluation)

Incentives

Discussing- sharing- Reflecting on experiences

- help me to be more reflexive on our process
 - Learning about co-creation in terms of different and appropriate methods depending on the overall goal
 - Exchange of experience w/ other practitioners
 - Learn from experts/Understand academic people
 - clarify & distil ideas
 - Increased awareness of other tools/method that might be useful to my project
 - Protected time slots for reflection and challenging discussions

Project outcomes

- Exposure for my project
- Help amplify and provide visibility for projects/tools I work with
- Improve the sustainability of my project
- Show our work- we believe that our work is important

Networking

- Get to know more people in the field
- Becoming familiar about other projects and initiatives from people who are part of them (rather than "reading" about them)

Doing more tangible things like:

- literature reviews
- Joint publications
- writing applications
- workshop, symposia

Recognition

- Joint publications

Experiencing how a community of practice develops from scratch

Barriers

Objectives not so clear -> publication of best practices of CS engagement and co-design?

Need clearer idea of outcomes

WeObserve project & operational discussions – keep them out of CoP F2F meetings

Time funding

Time - Not clear/ tasks too demanding

Sustainability of the CoP after the project ends...->The future

For academics

The second Forum was held back-to-back with the 2019 General Assembly of the European Geosciences Union, a main cross-CoP (Co-design and Engage, Impact and SDGs) meeting spanning 12 to 15 April 2019. This created some opportunity for collaboration also with members of the Interoperability CoP which had held a separate F2F meeting concurrent with EGU 2019.

Keen to understand what allows or inhibits CoP members from participating in these CoP events, and aiming to balance a) the value of meeting face to face with b) the enthusiasm of some CoP members to join remotely, we carried out an evaluation of several key aspects of the event:

- what factors were involved in determining whether a CoP member did or did not participate in the F2F - both remotely and in-situ
- what elements of the F2F were most useful

The evaluation revealed some interesting insight into participant preferences (see Box and Annex 2), such as having meetings during the week, for no longer than 2 days and ideally in association with another meeting. It also revealed that the focus of the F2F (writing workshops and events) were considered to be closely in line with members' professional needs, and the writing workshops in particular were considered to be both valuable and productive. These insights are being taken on board for the planning of the next Forum (tentative planned for end of November/early December 2019 in Barcelona).

Box 2: Summary of key findings from Forum #2 evaluation

Of 110 total CoP members:

- 17 attended the F2F in Vienna and
- 1 attended remotely
- 19 CoP members responded to the evaluation as follows:

Of the 7 respondents who attended the F2F:

- stated that the agenda was in line with their professional needs and that either they were attending EGU and/or their work covered their travel
- 1 stated it was better to travel at weekends; and 1 that it was better to travel during the week

Of the 12 respondents who did not attend the F2F:

- 4 stated that it was better to travel during the week
- 3 stated that they might have attended if they had been attending the EGU or other meeting nearby
- 4 stated that they were on leave or at another event

In terms of life time and long term management of the WeObserve CoPs, these have been set up to exist only as long as they deliver value for their members in terms of achieving jointly set objectives, as per WeObserve CoP [Terms of Reference](#) (Wehn & Velzeboer, 2018a). Each individual CoP will need to adhere to its own defined timeline. After the end of the WeObserve project, the CoP management could be transferred to GEOSS in the form of GEO activities or to ECSA in the form of a sub-working group.

3 Co-design & Engage Community of Practice

3.1 Thematic focus of the Co-design & Engage CoP

Knowledge on co-designing citizen observatories and engaging active citizen scientists is dispersed among various stakeholders. Many organisations have valid and important practice-based knowledge, but it is not brought together in such a way that a more general methodology can be developed. Participants of the Co-design & Engage CoP Launch workshop (Geneva, June 2018) discussed a wide range of themes relevant to how this CoP could benefit from bringing together members from across these diverse stakeholders.

Taking into account feasibility, the distinction between Co-design & Engage CoP and Impact CoP, and the aim of ensuring tangible outcomes, two key themes were prioritised in the first instance:

- 1) *Strategic engagement practices - efforts to engage different demographic and geographic target groups based on understanding incentives and barriers*
- 2) *Co-design a CO toolbox including co-design conditions, versions and tools*

The envisaged overarching outcome of the Co-design and Engagement CoP is to become recognised by the Co-design & Engage CoP members and other relevant constituencies as an effective CO knowledge resource on co-design and citizen engagement (by 2019).

This in turn will be achieved through three core Co-design & Engage CoP objectives:

1. To identify and define strategic engagement practices and methods for CO co-design
2. To capture lessons learned from implementing strategic engagement practices and CO co-design tools in differing conditions
3. To share these methods and lessons learned in Co-design & Engage CoP, via the WeObserve Cookbook on Citizen Observatories and via other means

3.2 Work plan

Table 1: Work plan for the Co-design & Engagement CoP (2018-2020)

Action or event	Date	Status
Startup		
Call for participation (online)	April 2019	Done
Launch workshop at ECSA conference in Geneva	6 June 2019	Done
Execution		
Set up glossary and template to categorise strategic engagement practices	October 2018	Done

Set up glossary and template to categorise CO co-design conditions, versions and tools	October 2018	Done
Regularly repeat inventorisation to capture emerging terminology from additional initiatives	September 2020	Ongoing
Set up template to capture actual CO co-design conditions, versions and tools in projects and initiatives	October 2018	Done
Scope paper on <i>co-design practices</i>	April 2019	Done
Apply co-design template to projects from Co-design CoP members and other projects (e.g. via WeObserve landscape report)	June 2019	Not started yet
Jointly analyse and synthesize lessons learned across projects; submit scientific publication on co-design practices	July 2019	Not started yet
Set up template to capture steps and aspects (incl. success and failure) in engagement practices	October 2019	Not started yet
Scope paper on <i>engagement practices</i>	November 2019	Not started yet
Apply engagement practices template to projects from Co-design CoP members and other projects (e.g. via WeObserve landscape report)	January 2020	Not started yet
Jointly analyse and synthesize lessons learned across projects; submit scientific publication on engagement practices	February 2020	Not started yet
Develop a decision-tree for methods related to citizen science and engagement	March 2020	Not started yet
Regularly repeat inventorisation to capture emerging engagement and co-design approaches from additional initiatives	September 2020	Ongoing
Co-design with end users how captured information and lessons learned are to be presented (in WO Cookbook)	Various F2F events	1 done
Identify suitable case studies & prepare case study informatino	January 2020	Not started yet

Finalise information for the WO Cookbook	March 2020	Not started yet
Identify outreach opportunities (for demonstration, videos, WO Cookbook, etc.) to feed methods, lessons learned and case studies into ongoing CO projects and initiatives	continuously	ongoing
Undertake outreach activities	continuously	ongoing
Wrap-up and Reporting		
Final report submission	November 2020	Not started yet

3.3 Activities and outputs

Glossary of relevant terms

In order to facilitate communication and discussion on key topics within the Co-design and Engage CoP, the members developed a glossary with brief descriptions of, and links to, some 40 key terms relevant to co-design and engagement within the context of Citizen Science in general and COs in particular. Following permission to publish being sought from CoP members (May 2019), the glossary will be published for reference - and future development - on the WeObserve platform/website and will allow for comments and additions from the wider CS and CO community. In the long run, the maintenance of the glossary can be taken over by ECSA.

Template for inventorising engagement practices and CO co-design conditions, versions and tools

In order to structure the CoPs work on identifying and defining strategic engagement practices and methods for CO co-design and to allow the capturing of lessons learned from implementing strategic engagement practices and CO co-design tools in differing conditions, a template was co-created by the CoP members to structure these efforts. This template allows various co-design practices to be categorised according to conditions (e.g. geographic, cultural setting, infrastructure, thematic scope), versions (type of stakeholders involved, extent of co-design, resources required), tools and SWOT (strengths, weaknesses, opportunities, threat). Similarly, for engagement practices, the template provides categories relating to e.g. specific engagement steps, types of stakeholders involved, level of participation, outputs and SWOT.

Collaboration with WP3 toolkit survey

The work on the template described above provided opportunities for collaboration with the activities related to a toolkit survey prepared by WeObserve WP3 which aimed to provide an overview of what exists in terms of tools, toolkits and current provision of instruments to support the activities of citizen observation. A literature review helped to form initial lists of steps for setting up and implementing a CO project, which were then presented and discussed during three consecutive Co-design & Engage CoP telcos. These discussions helped to develop and refine a collection of steps that encapsulate activities found in diverse CO projects. Moreover, the CoP gave detailed feedback and advice on the design of the toolkit survey instrument that was launched online in November 2018.

Draft of scientific publication on co-design practices

The preparation of a scientific article had emerged as a priority activity and key incentive from Forum #1. Given the thematic breadth of this CoP, it was decided to prioritise the production of an article on co-design practices and that later, a subsequent article will focus on engagement practices. An outline of the co-design practices article was prepared by the CoP Chair prior to F2F writing workshop at Forum #2 in Vienna. The working sessions at Forum #2 were used to gather and discuss comments on the outline and to structure and gather data for the article. For that purpose, a matrix structure was created (based on the earlier template presented above) and filled in order to inventorise the co-design practices from the various CO projects presented by the CoP members. A combination of individual work and group discussions resulted in substantive progress and served to peer review the provided content. A timeline was agreed for further steps in article production (section writing, approach for analysing the inventorised practices, and finalisation of the article), with the overall aim of submitting the article in July 2019.

3.4 Membership and Participation

Table 2: Participation in Co-design & Engagement CoP activities June 2018 to May 2019

Action or event	Date	Attendants
F2F meetings (Forums)		
Launch workshop at ECSA conference	6 June 2018	20
Cops Forum 1#, Venice (COWM conference)	November 11th 2018	22
CoPs Forum #2 Vienna (EGU conference)	April 12th to 15th 2019	16
Teleconferences		
First telecon	July 13th 2018	15
Second telecon	September 3rd 2018	16
3rd telecon	October 11th 2018	11
4th telecon	November 8th 2018	7
5th telecon	January 10th 2018	8
6th telecon	February 14th 2018	6
TF telecon: Events	February 18th 2018	3
TF telecon: Publications	February 18th 2018	11
TF telecon: Policy	February 18th 2018	1
7th telecon	March 14th 2018	7
8th telecon	May 9th 2018	8

Of 110 total CoP members, 68 are signed up for the Co-design & Engage CoP, of which 45 have participated in one or more Co-design & Engage CoP activities. It is not possible to immediately determine from the register of members, which countries or sectors members represent.

Participation in Co-design & Engage CoP telcos reduced quite quickly and has more or less leveled off; participation in F2F meetings is significantly higher. Of the Task Forces, enthusiasm for activities focused on producing scientific papers is clear. Of 22 Co-design & Engage CoP participants at the F2F meeting in Venice, 8 have participated in at least one subsequent activity.

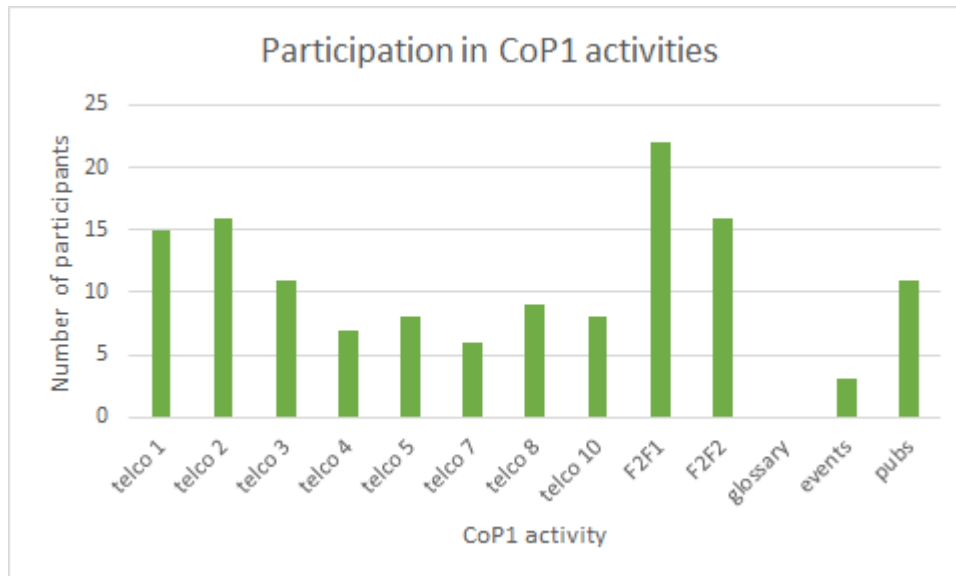


Figure 1: Participation in Co-design and Engagement CoP activities

A small number of participants (five) have participated in between 6 and 10 activities, most of whom are part of the WeObserve project team. Around a third of Co-design & Engage CoP members have participated in between 2 and 5 events, while another third have not participated in any.

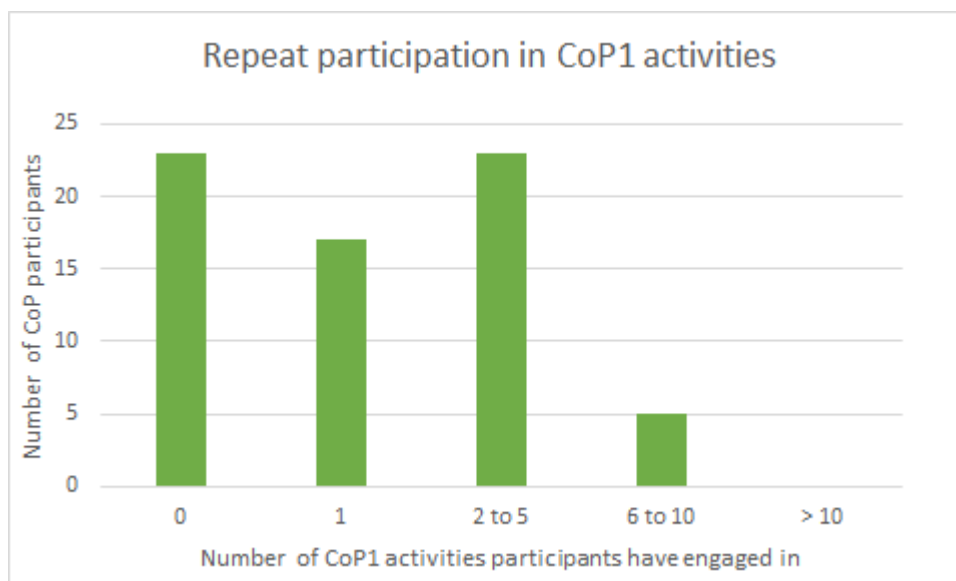


Figure 2: Repeat participation in Co-design and Engagement CoP activities

3.5 Next steps

The next steps are focused on publishing scientific articles on a) co-design of COs (with an anticipated submission date of July 2019) and b) strategic engagement of citizen scientists in COs, with a draft outline to be prepared in advance of the next F2F meeting, Forum #3. This F2F meeting will be held in Q4 2019, and

will provide a forum for developing the engagement paper, agreeing the next steps for the CO Cookbook, and providing further opportunities for networking and knowledge exchange across the four WeObserve CoPs.

4 Impact Community of Practice

4.1 Thematic focus

Knowledge on the impact and value of citizen observatories for governance is dispersed among various stakeholders, making it difficult to learn about common successes and challenges across projects. Many organisations have valid and important practice-based knowledge, but it is not brought together in such a way that a more general methodology can be developed. Participants of the Impact CoP Launch workshop (Geneva, June 2018) discussed a wide range of themes relevant to this CoP. Taking into account feasibility, the distinction between CoP 1 (Co-design and Engage) and Impact CoP (Impact), and the aim of ensuring tangible outcomes, two key themes were prioritised in the first instance (see cells in green in Table):

- 1) Governance dynamics: understanding existing decision-making structures and the role of COs (and their data) in changing these to address societal challenges*
- 2) Impact stories: capturing and demonstrating the impact and value of COs for governance*

The Impact CoP aims to bring the knowledge of different stakeholders together on the impact and value of citizen observatories for governance. Ultimately, the resulting insights will be brought together in a WeObserve ‘Cookbook’ on citizen observatories. The envisaged overarching outcome of the CoP activities would be to become recognised by the Impact CoP members and other relevant constituencies as an effective CO knowledge resource on the impact and value of COs for governance (by 2019).

This in turn will be achieved through three core Impact CoP objectives:

1. To provide an inventory of ‘tried and tested’ methods for capturing the impacts of COs on governance
2. To capture CO impact stories/examples of best practice from citizens, public sector and policy perspectives
3. To provide guidance on CO impact assessment for the Impact CoP members and beyond

4.2 Work plan

Table 3: Work plan for the Impact CoP (2018-2020)

Action or event	Date	Status
Startup		
Call for participation (online)	April 2019	Done
Launch workshop at ECSA conference in Geneva	6 June 2019	Done
Execution		
Set up template to capture impact stories (incl. success and failure) from different perspectives (citizens, scientists, public sector and policy perspectives)	October 2018	Done
Apply template to projects from CoP2 members and other projects (e.g. via WeObserve landscape report)	November 2018	piloted
Jointly analyse and finalise provided impact stories; capture lessons learned across impact stories	January 2019	Not started yet
Regularly repeat inventorisation to capture emerging of impact stories from additional initiatives	September 2020	N.a. yet
Co-design with end users how captured information, impact stories and lessons learned are to be presented (in WO Cookbook, on WO knowledge platform, etc.)	December 2018	Started
Finalise information for the WO Cookbook	January 2019	Not started yet
Identify guidance opportunities and modalities to feed insights on CO impact assessment methods, lessons learned and impact stories into ongoing CO projects and initiatives	February 2019	Not started yet
Implement CO impact assessment guidance (incl. targeted government officials to increase the uptake of COs)	September 2019	Not started yet
Co-design with end users how captured information, impact stories and lessons learned are to be presented (in WO Cookbook, on WO knowledge platform, etc.)	Various F2F events (September 2018, November 2018, others tbd)	1 done
Finalise information for the WO Cookbook	January 2018	Not started yet
Identify guidance opportunities and modalities to feed insights on CO impact assessment methods, lessons	February 2018	Not started yet

learned and impact stories into ongoing CO projects and initiatives		
Implement CO impact assessment guidance (incl. targeted government officials to increase the uptake of COs)	December 2019	Not started yet
Wrap-up and Reporting		
Final report submission	September 2020	Not started yet

4.3 Activities and outputs

The activities undertaken by the Impact CoP initially followed the agreed work plan (see section 4.2) and led to the production of the glossary of terms relevant for this CoP and templates for structuring the work of inventorising existing co-design and engagement practices. During Forum #1 in Venice, it emerged that most participants wished to focus on the production of a joint scientific publication. This has since then become the vehicle for focusing the Impact CoP activities, building on the detailed steps and inputs as specified in the work plan but with adjusted timing.

Glossary of relevant terms

Similar to the Co-design and Engage CoP, the Impact CoP members developed a glossary with brief descriptions of, and links to, some key terms relevant to capturing the value and impact on governance of Citizen Science in general and COs in particular. Following permission to publish being sought from CoP members (May 2019), a glossary combining definitions from all 4 CoPs will be published for reference - and future development - on the WeObserve platform/website. In the long run, the glossary maintenance can be taken over by ECSA.

Template for inventorising methods for capturing impacts & value of COs on governance AND experiences with applying the methods

In order to structure the CoPs work on inventorising methods for capturing the impacts and value of COs on governance as well as experiences with applying the methods, an initial template was drafted by the CoP Chair and then further co-created by the CoP members. This template captures basic method-related details (e.g. title, reference), users and conditions for using the method as well as questions about the ways in which the method captures the impact and value of CS and COs on governance and its strengths and weaknesses. This template is being turned into a survey tool for launch on the WeObserve website in order to reach a wider community of practitioners who may have developed or used methods and practices and wish to share their experiences with applying such approaches.

Template for the CO impact stories/examples

A second template was developed for the dual purpose of a) capturing specific impact stories to gather empirical evidence on emerging impacts and b) to provide a service to the wider CS and CO community which is increasingly under pressure demonstrate its impacts but often lacks the methods and knowledge of how to go about capturing impacts. This template, entitled “Capturing governance impact stories of your

Citizen Science initiative”, was developed based on initial drafts by the CoP Chair and collaboration with the US sister initiative. The CoP members then elaborated and discussed this template at Form #1 in Venice and further fine-tuned it. It captures the background of a CS/CO initiative, the problem/issue the CO is addressing, changes triggered by the CO, challenges encountered by the CO as well as wider impacts. This template will be made available shortly as a self-reporting instrument on the WeObserve website. Moreover, respondents will also be able to choose to complete their impact story via an interview with one of the Impact CoP members, which will be based on this template.

Short paper and presentation Impact Stories

The opportunity created by the Ground Truth 2.0 project which will convene an interactive, CO-focused session at the forthcoming Digital Earth symposium in September 2019 was seized by the Impact CoP with the submission of a ‘station’ proposal for this session and a short paper. This presents the current work of the Impact CoP on the impact stories approach with examples.

Outline of full scientific publication on impact storytelling approach

As for the Co-design and Engagement CoP, the preparation of a scientific article had emerged as a priority activity and key incentive from Forum #1. The CoP members decided to prioritise the production of an article on capturing CS and CO impacts by means of impact stories; a subsequent article will focus on other methods and practices for capturing CS and CO impacts. An outline of the impact stories articles was prepared by the CoP Chair prior to the F2F writing workshop at Forum #2 in Vienna. The working session at Forum #2 was used to gather and discuss comments on the outline, identify suitable projects for inclusion in the empirical part of the paper and to select a suitable journal. The main production of this article was agreed to take place during the upcoming Forum #3 in Q3 of 2019.

Draft paper on the AAWA Citizen Observatory in Italy

WeObserve partner AAWA represents one of the success stories in the CO field, with its citizen observatory pilot during the WeSenseIt project (2012-2016) having impacted regional policy for flood risk management. A Task Force of the Impact CoP was created to support AAWA in capturing its impact story by means of cost benefit analysis for a scientific article. A combined F2F and online meeting was used to make rapid progress with the production of a full draft article that is currently being finalised for submission to a scientific journal.

4.4 Membership and participation

Of 110 total CoP members, 56 are signed up for Impact CoP, of which 38 have participated in one or more Impact CoP activities. It is not possible to immediately determine from the register of members, which countries or sectors members represent.

Participation in Impact CoP telcos reduced quite quickly and has more or less leveled off; participation in F2F meetings is significantly higher. Of 22 Impact CoP participants at the F2F meeting in Venice, 8 have participated in at least one subsequent activity.

Table 4: Participation in Impact CoP activities June 2018 to May 2019

Action or event	Date	Attendants
F2F meetings		
Launch workshop at ECSA Conference	June 2018	
Cops Forum 1#, Venice (COWM conference)	November 28th 2018	22
CoPs Forum #2 Vienna (EGU conference)	April 12th to 15th 2018	16
Teleconferences		
First telecon	July 11th 2018	12
Second telecon	September 10th 2018	11
3rd telecon	October 16th 2018	5
TF telecon: Impact Stories	November 6th 2018	5
4th telecon	November 8th 2018	7
5th telecon	January 24th 2019	7
6th telecon	February 21st 2019	7
7th telecon	March 21st 2019	8
8th telecon	May 22nd 2019	8

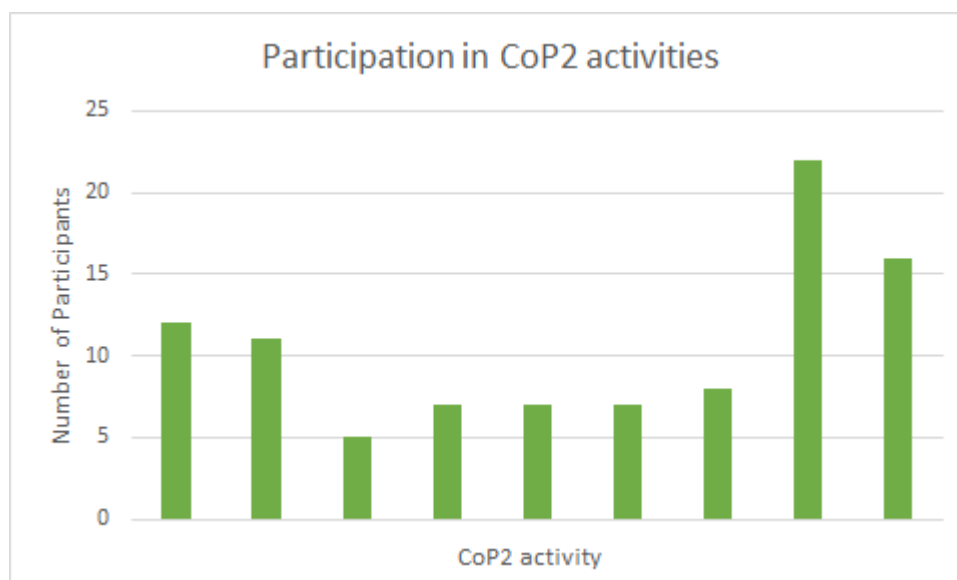


Figure 3: Participation in Impact CoP activities

A small number of participants (five) have participated in between 6 and 10 activities, most of whom are part of the WeObserve project team. Around a quarter of Impact CoP members have participated in between 2 and 5 events, while another third have not participated in any.

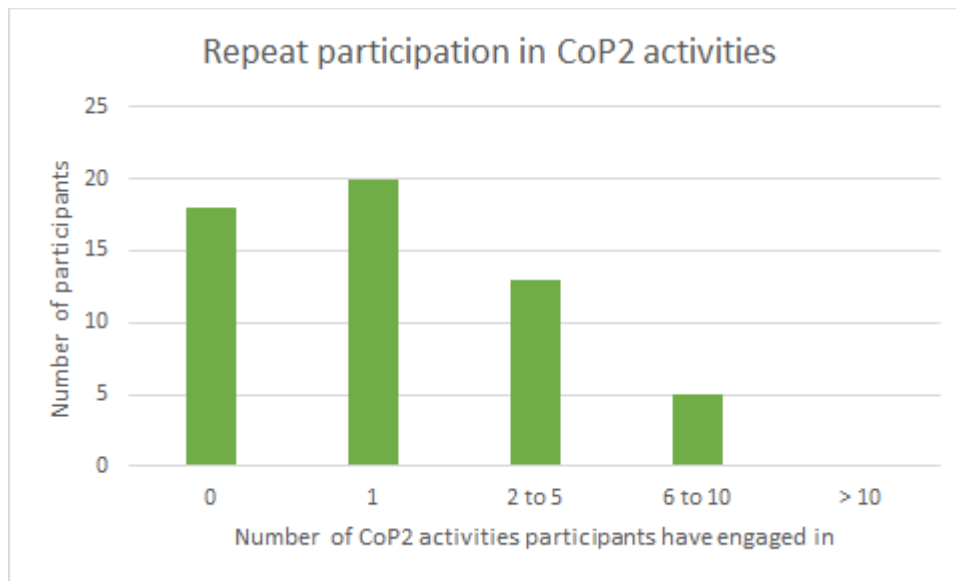


Figure 4: Repeat participation in Co-design and Engagement CoP activities

4.5 Next steps

The next steps are focused around using the impact stories template to collect evidence of success, failure and identify best practice with respect to COs. This is scheduled in the run-up to the next F2F#3 in Q4 2019, with a draft outline to be prepared in advance of that meeting. This third F2F meeting will be held in Q4 2019, and will provide a forum for developing the engagement paper, agreeing the next steps for the CO Cookbook, and providing further opportunities for networking and knowledge exchange across the four WeObserve CoPs.

5 Interoperability Community of Practice

5.1 Thematic Focus

The Interoperability Community of Practice was initiated to demonstrate how current ICT-based tools can be applied together in a standard way to better enable citizens to participate in Citizen Science projects, as well as improve the reusability of the data gathered, in turn overcoming the isolation of individual initiatives.

The Interoperability Community of Practice started within Task 2.2 of the WeObserve project. The community agreed that the main activity should be the organization of an interoperability experiment taking advantage of the OGC support to gain visibility. Interoperability experiments do not last more than a year, so the first one was organized and named OGC Citizen Science Interoperability Experiment (OGC CitSciIE). It is expected that after the finalization of the first one, another will follow thus covering the first two years of the CoP.

The primary focus of the OGC CitSciIE experiment is to demonstrate the interoperability of Citizen Science (CS) projects and the way OGC standards can be applied to Citizen Science, including possible relationships to other relevant standards from the community. In particular, a subset of these topics are being addressed based on the participant organizations:

- The use of OGC standards (e.g. Sensor Web Enablement for Citizen Science SWE4CS) to support data integration among CS projects, and with other sources, esp. authoritative data;
- The integration of CS projects/campaigns in a Single Sign-On system (SSO) federation;
- The relationships between OGC standards and data and metadata standards currently used by Citizen Science projects.

The desired outcome of this experiment is to:

1. Successfully demonstrate how OGC standards (e.g. SWE) are applicable to Citizen Science, document available supporting tools, identify the challenges of using OGC SWE standards (or Internet of Things equivalent solutions) within current Citizen Science projects, and propose a way forward.
2. Determine the security considerations and the available tools to support a SSO federation that helps users in participating in several projects by using a single user account.
3. Assess the possible relationships of OGC standards (e.g. SensorML) with other existing standards in the field (e.g. Public Participation in Scientific Research (PPSR) - Core, the ontology developed by the COST Action on Citizen Science, and the Citizen Science Definition Service (CS-DS) developed in the NextGEOSS project).
4. Satisfy the necessary requirements to integrate Citizen Science into Global Earth Observations System of Systems (GEOSS) by using OGC standards.

This IE is promoted by the OGC Citizen Science Domain Working Group, the WeObserve and NextGEOSS H2020 projects, and The Earth Challenge 2020 project as supported by National Geographic Society. This IE contributes not only to the interoperability and possibly standardization program of the OGC, but also to the Global Earth Observation System of Systems (GEOSS). This work is also relevant to the foundational

objectives of the Citizen Science Global Partnership (CSGP). Regional and national Citizen Science Associations will equally benefit from the results of this OGC IE.

5.2 Work plan

The work plan for the development of the Interop CoP activities has been the following (see Table below).

Table 5: Work plan for the Interop CoP

Action or event	Date	Status
Startup		
Draft activity plan presented to CS DWG	Mar 19th, 2018	Done
OAB revision and approval	June 4th, 2018	Approved
Call for participation	June 5th, 2018	In process
Pre-kickoff event ECSA conference in Geneva	June 6th, 2018	Done
Execution		
Official Kickoff after the Stuttgart TC	September 14th, 2018	Done
Development, testing and bug fixing	September 2018 to June 2019	In progress
Presentation at GEO plenary in Kyoto	Oct 29th – Nov 2nd 2018	Done
CoPs Forum #1, Venice (COWM conference)	Nov 27th– Nov 30th 2018	Done
Meeting at the EGU general assembly & CoPs Forum #2	April 11th 2019	Done
Planned end date	June, 2019	Not started yet
Wrap-up and Reporting		
Technology Demonstration in an OGC TC in Leuven	June 2019	Not started yet
Final report submission	September 2019	Not started yet

The results of the experiment will be documented in an OGC Engineering Report (ER), to be presented in next OGC Technical Committee Meeting in Leuven (Belgium) on June 24-28, and may result in changes and improvements to OGC standards. This IE may also result in an OGC standardization best practice document or a new extension or profile of current OGC standards. These will be promoted by the Citizen Science Domain Working Group in OGC and the CS activities in the work plan of GEOSS.

5.3 Activities and outputs

In order to start the activities as soon as possible, the CoP prepared the description of the first interoperability experiment and proposed it to the OGC. In the first CoP face to face meeting, the interoperability experiment was already defined but not fully endorsed by the OGC. In the end, the first meeting was defined as the pre-kick off of the first Interoperability Experiment on Citizen Science, allowing for an early start of the activity while the approval process in the OGC continued in parallel.

The official kick off meeting for the OGC CitSciIE experiment was held on Friday 14th September 2018 at the OGC TC meeting in Stuttgart. Activities have continued until March 2019.

During the Kick off meeting of the Experiment the following subgroups emerged:

- V: Vocabularies for organizing Citizen Science projects. There was a discussion on essential variables but also on other kind of practices that can be associated to vocabularies, i.e. on how to publish vocabularies (PublishingDefs) or on defining a list of vocabularies that could be useful to experiment with (observations, project descriptions, general glossaries of terms in Co-design & Engage CoP and Impact CoP).
 - Working item V.1: A list of the current projects that Wilson Center knows that can align with the Earth Challenge topics (air and water quality, pollution, human health and eventually biodiversity) and extraction of a common set of variables the usually cover.
 - Working item V.2: Analysis of data models that contributors in the project can bring in: Air quality (HackAir), Biodiversity (Atlas of Living Australia & Natusfera), Mosquito (CREAF), Land Use (IIASA), Phenology (CREAF), Invasive Alien Species (JRC).
 - Working item V.3: Consider the COST action metadata model for inclusions as another vocabulary, this may include a set of definitions of phenomena that are being addressed by CS initiatives (based on the inventory of citizen science activities for environment policies).
- D: Data sharing using OGC standards such as O&M and SOS. A pool of services were identified for participating in an interoperability experiment, including SOS services and clients and citizen science project databases and APIs.
 - Working item D.1: A set of instruction on how a CS project can easily setup a SOS service. It could include 52North implementation and might include MiraMon SOS (with some work in the implementation). It should address the case of a small project contributing to the Earth Challenge 2020.
 - Working item D.2: Create a SOS endpoint for HackAir data with minimum resources
 - Working item D.3: Define the requirements for a data provider that could assist Wilson Center in setting up the challenge database. It should consider upload of data into the system. It seemed to go for a harvest system instead of a federated system. It could describe a possible architecture to allow the dialog between the central database and the small contributing projects. It should impose data sharing requirements (services o APIs) on the central database.
- S: Connection between Landsense federation and JRC user system.
 - Working item S.1: Interoperability test on the integration of LS-SSO and JRC-SSO
- Q: Data quality.

- Working item Q.1: Write a document on perspectives of the different quality aspects: Quality assessment (ISO 19157-QualityML), Quality improvement, Quality plan, Data Management principles (ISO 8001), Quality documentation, Quality communication
- Working item Q.2: Perfect the quality measurement system based on WPS and SOS harvest by demonstrating the concept in practice. Also include in the SOS harvesting the possibility to have a query for assessing the quality of "views"/"selections"/"fragments" of a dataset.
 - Connection with: D.2
- Working item Q.3: Refine the QualityML vocabulary with new entries considering the work done in Australia
 - Connection with: D.3
- Working item Q.4: Add new entry point the QualityML for other common vocabulary formats like TTL etc.
 - Connection with: V

For each of the subgroups a chair and the main participants and contributors were identified. Responsibles were also assigned to each of the working items.

These are the main activities and outcomes of the interoperability experiment detailed by activity

- V: Vocabularies for organizing Citizen Science projects.

The objective of this activity was to support the Earth Challenge 2020 research questions. The questions were defined during the first month of the experiment and now it is time to analyse them in terms of data needs and thematic vocabularies they are going to use. That is the reason this activity has not resulted in tangible outputs and will be reintroduced in the second interoperability experiment.

- D: Data sharing using OGC standards such as O&M and SOS.

This activity has been the most active one. During the testbed the following servers have been deployed: MiraMon SOS server, Grow SOS, DLR istSOS SOS and 52north SOS. Three clients have also been produced: MiraMon SOS browser, Grow SOS data viewer and 52north Helgoland. In the last meeting at the EGU, the group was able to demonstrate interoperability by connecting the SOS clients to the SOS services and showing the data on clients, sometimes mixing data from different services and datasets in a single view. This is the most significant result of the experiment and will be extensively documented in the Engineering Report resulting from the IE.

- S: Connection between Landsense federation and JRC user system.

Andreas Matheus SME (Secure Dimensions) was very active in providing demonstrations and information on how the LandSense federation works and how other projects can be included in the federation and use the single Sign on facility. Unfortunately, no other member of the CoP had the resources to apply the SSO on their services or clients and take advantage of the Andreas offering. The activity resulted in a video demonstrations that are publicly available here: https://portal.opengeospatial.org/files/?artifact_id=81550.

- Q: Data quality.

Two quality vocabularies have been detected: an Australian work done by Peter Brenton team (<https://github.com/tdwg/bdq>) and the QualityML vocabulary developed by CREAM in the GeoViQua project. The intention was to do a comparison of both approaches but we were not able to do that in the

timeframe of the first interoperability experiment. It is foreseen that the second IE will continue what was started here.

In addition to these activities, another activity about quality annotating scientific documentation in a standard way was proposed by Lucy Bastin. A video was recorded that summarizes the idea: https://portal.opengeospatial.org/files/?artifact_id=82544

5.4 Membership and participation

The Interop CoP currently has 73 members, from which 26 are subscribed to the Community since before its pre-kick-off in Geneva on June 6th, 2018. 13 members subscribed after this pre-kick-off and 12 after the Official Kickoff at the Stuttgart TC in September 2018. After the Presentation at the GEO plenary in Kyoto at the end of October, 8 new members registered for the CoP and 14 did the same after the Meeting at the Citizen Observatories for Natural Hazards and Water management Conference in November 2018 (see Figure 6 for the evolution of the registrations).

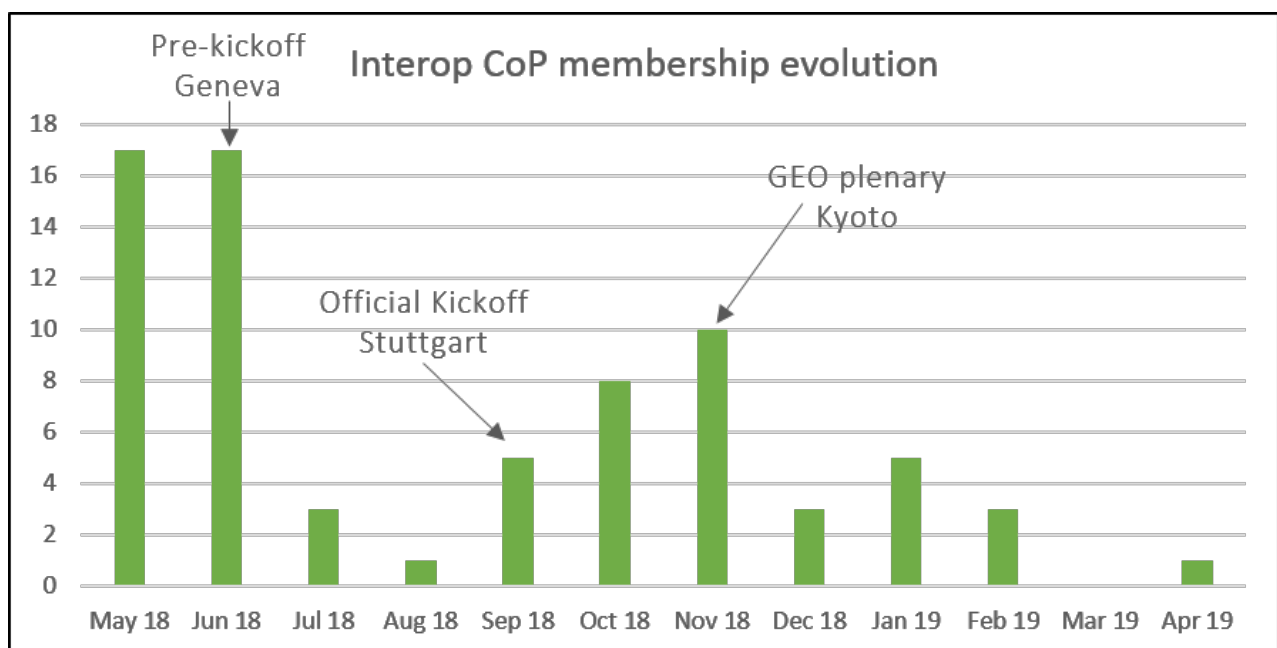


Figure 5. Evolution of the registrations for the Interop CoP showing key events

From the 73 actual members, 12 are from the WeObserve consortium, the rest (61) are external members.

Regarding the participation, these are the number of attendants both at the telcos and the F2F meetings held:

Table 6: Participation in Interop CoP activities June 2018 to May 2019

Action or event	Date	Attendants
F2F meetings		
Pre kick-off meeting	June 2018	23
Official kick-off meeting	September 14th 2018	14
COWM conference meeting	November 27th 2018	20
EGU conference meeting /CoPs Forum Vienna	April 11th 2019	15
Teleconferences		
First telecon	June 27th 2018	15
Second telecon	August 28th 2018	
3rd telecon	October 10th 2018	18
4th telecon	November 7th 2018	8
Focussed telecon	December 3rd 2018	
5th telecon	December 20th 2018	13
6th telecon	January 18th 2019	
7th telecon	February 21th 2019	13
8th telecon	March 29th 2019	11
9th telecon	May 16th 2019	5

The average assistance per event has been of 14 participants. Regarding the participation of members, from the 73 actual members of the CoP, 49 people have attended at least one CoP event (F2F or telco), 15 have attended 4 or more events and 10 have attended 6 or more events.

5.5 Next steps

Current OGC Interoperability Experiment will end on June 2019, but a second IE is foreseen for next year within the activity of the WeObserve Interoperability Community of Practice.

New possible topics for next IE to be discussed among the members include the following:

- There is a need for clarifying how to coordinate infrastructures for citizen science in Europe, and adopt standard procedures for data sharing and single sign on. Solving this issue will help in connecting CitSci to GEO. Steffen Fritz (IIASA) has proposed a side event in the next EuroGEOSS workshop to discuss this with the relevant players. This is emerging as a new activity in the CoP that is related but not directly connected to the IEs.

- Thomas Krennert (Zentralanstalt für Meteorologie und Geodynamik, Austria) has recently joined the CoP. He is concerned about the amount of different CitSci activities that are being organized by meteorological organizations. The WMO (World Meteorological Organization) is looking for ways of taking advantage of this new data stream but they have problems of standardization of what is measured and how the data is being shared. WMO has detected the potential of these data streams and would like to harmonize the situations to make data more useful for weather predictions in the future.
- OGC is promoting a new generation of web services based on OpenAPI. It is unclear how this could impact the use of OGC standards by CitSci projects but it is seen as an opportunity to make OGC standards more usable and compatible with IT mainstream. A hackathon to develop OGC API specifications is organized on June 20-21 in London. We are studying how the Interop-CoP could collaborate in this process and contribute the experience of the community.

The definition of the follow up IE will start in June when the first one will finalize and the ER is produced.

6 SDGs Community of Practice

6.1 Thematic focus

The thematic focus of the SDGs CoP is the UN Sustainable Development Goals (SDGs) and Citizen Observatories (COs). It is widely accepted that COs and citizen science in general, has a great potential to contribute to SDG monitoring and implementation. COs can complement traditional sources of data and fill data gaps; enable active citizen involvement in the SDG processes and ensure government accountability as a transparent and participatory approach. As such, it has a strong potential to leverage the SDGs as an active operator and monitor of change. During the SDGs CoP launch event that took place in Venice at the [Citizen Observatories for Water Management \(COWM\) Conference](#) on 27-30 November 2018, the foundational members of the SDGs CoP, in other words, launch event participants co-created the objectives and relevant activities of the CoP, which were then discussed with and confirmed by the wider CoP members that couldn't make it to the launch event. The objectives of the SDGs CoP, as per the inception report, are as follows:

1. Understand the opportunities for COs/CS in SDG monitoring and implementation, integrate these into the WeObserve knowledge base/community and learn from existing partnerships (i.e. projects and custodian agencies, national statistical offices)
2. Advance our knowledge of how COs/CS can help change behaviors towards achieving SDGs

6.2 Work plan

Taking these two objectives as a general frame of reference, SDGs CoP determined the following activities, which are currently underway, according to the CoP activities timeline.

Table 7: Work plan for the SDGs CoP (2018-2020)

Action or event	Date	Status
Startup		
Call for participation (online)	October 2018	Done
Launch workshop at COWM conference in Venice	29 November 2018	Done
Execution		
Undertake a mapping exercise of CO/CS projects and their potential contribution to Tiers 1 to 3 indicators based on the Tier Classification for SDG Indicators by IAEG-SDGs	August 2019	Ongoing
Bring the identified CO/CS projects and relevant custodian agencies together through the SDGs CoP forums and/or workshops	August 2020	Ongoing
Moving to the national level, compile a list of minimum data requirements/standards that would need to be met if data from CO/CS were to be	June 2020	Not yet started

considered usable for SDG reporting (by contacting National Statistical Offices)		
Set up a glossary to create a common base of understanding on behavior change and transformations	September 2019	Not yet started
Review and analyze behavioral change theories and models that could help guide the research on the theme	October 2019	Not yet started
Collate existing practices on how COs/CS have contributed/are contributing to behavior change (learning outcomes of CS) from the literature and study their potential link to the SDGs	July 2020	Note yet started
Discuss how COs/CS project design could be improved to achieve impact on behavior to address the SDGs	August 2020	Note yet started
Wrap-up and Reporting		
Final report submission	September 2020	Not yet started

As SDGs CoP was launched about 6 months later than the other three WeObserve CoPs, the start of the activities, their timeline and planning has accordingly started later.

6.3 Activities and outputs

Activities undertaken by SDGs CoP follows the agreed work plan. Therefore, SDGs CoP is currently focusing on finalizing the Activity 1.1, the results of which will feed into the other activities of the CoP. In addition, due to the time constraints, SDGs CoP participants agreed to carry out the above activities in the listed order. This is particularly the case for Activity 1.1., 1.3. and 2.3, as the outputs of these activities are expected to be scientific articles published in peer-reviewed journals as per the SDGs CoP participants' requests and interests. Publishing scientific papers as result SDGs CoP activities is the output that the SDGs CoP participants want to achieve.

First scientific paper of the SDGs CoP (Activity 1.1 - mapping exercise) that we are closely collaborating with the UN Environment, the custodian agency for 26 environmental indicators, is expected to be submitted to a peer-reviewed journal by the end of summer 2019.

Even though, it has only been 6 months since the launch event, SDGs CoP has achieved very important results. For instance, the participation of the SDGs CoP chair in the expert consultation meeting for developing a methodology for the Tier III indicator 14.1.1 "Index of coastal eutrophication and floating plastic debris density". Citizen science has been agreed to be used as part of the methodology for collecting data on this indicator. UN Environment is currently piloting the agreed methodology in Kenya and Mauritius.

SDGs CoP is also very present at the global level. SDGs CoP chair is also co-chairing the Citizen Science Global Partnership (CSGP) SDGs and Citizen Science Maximization Group, and a member of a global level data expert group, as well as a few others (e.g. Group on Earth Observation Citizen Science and

Crowdsourcing Community Activity (that is closely linked to WP4 of WeObserve), Global Partnership for Sustainable Development Data (GPSDD) Citizen-generated Data Task team, COST Action Policy WG, etc.)

SDGs CoP was also quiet present at the UN Environment Assembly (UNEA4) and Science Policy Business Forum that took place in Nairobi on 9-15 March 2019, and the CoP chair gave a presentation on the citizen science contribution to SDG reporting for the indicator 14.1.1 mentioned above. These are just to name a few of the activities carried out as part of the SDGs CoP and many more will follow.

6.4 Membership and participation

Table 8: Participation in SDGs CoP activities November 2018 to June 2019

Action or event	Date	Attendants
F2F meetings		
Pre kick-off meetings	Sept/Oct/Nov 2019	7
Official kick-off meeting (COWM conference, Venice)	29 November 2019	23
CoPs Forum #2, Vienna (EGU conference)	12-14 April 2019	12
Teleconferences		
1st telecon	28 January 2019	15
2nd telecon	25 February 2019	14
3rd telecon	25 March 2019	9
4th telecon	25 April 2019	8
5th telecon	27 May 2019	12
Focussed telecon (Subgroup 1.1. Mapping Paper)	12 February 2019	5
Focussed telecon (Subgroup 1.1. Mapping Paper)	4 March 2019	5
Focussed telecon (Subgroup Objective 2 Behavior Change Paper)	26 March 2019	5

Focussed telecon (Subgroup 1.1. Mapping Paper)	29 March 2019	6
Focussed telecon (Subgroup 1.1. Mapping Paper)	24 April 2019	3
Focussed telecon (Subgroup 1.1. Mapping Paper)	6 May 2019	6
Focussed telecon (Subgroup 1.1. Mapping Paper)	13 May 2019	5
Focussed telecon (Subgroup 1.1. Mapping Paper)	29 May 2019	6

SDGs CoP currently has 53 participants. Participants choose themselves whether they want to be an active member or an observer of the CoP. Active participants are expected to take part in the CoP telcos, F2F meetings, etc. as much as possible, and actively contribute to the CoP activities identified. Observers are included in the email communication and have access to the CoP online workspace. Active participants of the SDGs CoP includes UN custodian or partner agency representatives (UN Environment, WMO, UNESCO, etc.), statisticians, policy makers at the EU level and broader, citizen science practitioners, academics, researchers, citizen-generated data specialists, etc. worldwide.

Participation in SDGs CoP activities reduced since the launch of the CoP, which is the tendency in similar groups. Active participants have been interested in producing scientific papers since the beginning of CoP activities, as mentioned above.

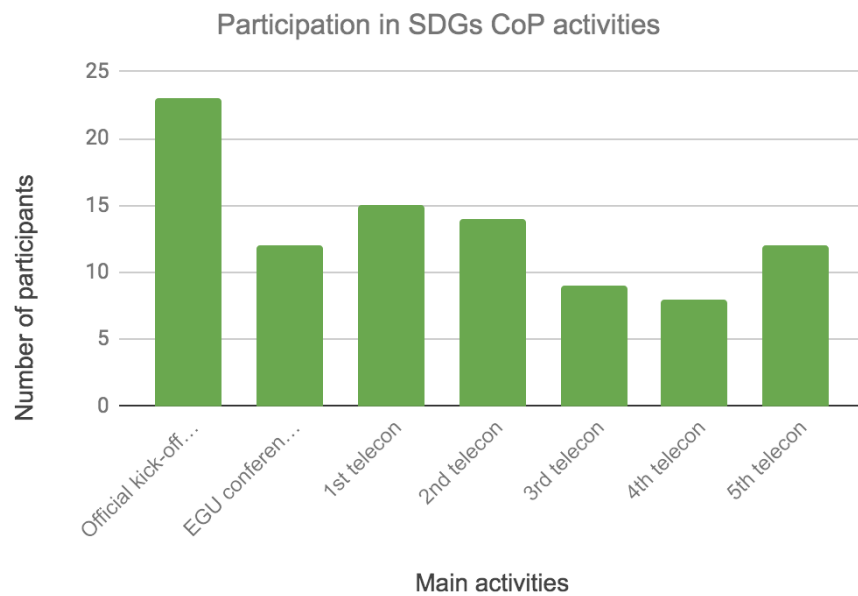


Figure 6: Participation in main SDGs CoP activities

6.5 Next steps

What the SDGs CoP plans to focus more on the upcoming period is to bring in national statistical offices (NSOs) representatives from Europe and worldwide, as the collaborations between the UN custodian agencies, NSOs and citizen science practitioners/researchers are the key to success for achieving the SDGs CoP general objectives. At least, one of the coming F2F CoPs meetings, as well as the scientific article as the output of Activity 1.3 are expected to be the milestones for this particular goal.

7 Conclusions & way forward

7.1 Creation of identity and joint understanding

All four WeObserve CoPs have formed stable groups of practitioners, with a clear focus on their respective themes, as reported in the previous sections. Moreover, they have also evolved and created clear identities for their respective groups, most notably by the name change from CoP1, CoP2, CoP3 and CoP4 to Co-design & Engage CoP, Impact CoP, Interop CoP and SDGs CoP. This allows their respective members to refer to each group more meaningfully and facilitates their communication about the CoP's activities to diverse audiences.

Among the many outputs they have generated so far (as detailed above), the common glossary of terms is already a useful contribution to the wider community of CO and CS practitioners. As there is no ECSA glossary of terms, the WeObserve glossary presents a sound starting point and ECSA provides a perspective for maintaining this beyond the lifetime of the WeObserve project.

A continuous discussion in the CoPs from their launch workshops in Geneva (June 2018) till the Forum in Venice (November 2018) has related to the definition of terms in general and the distinction of Citizen Science and Citizen Observatories in particular.

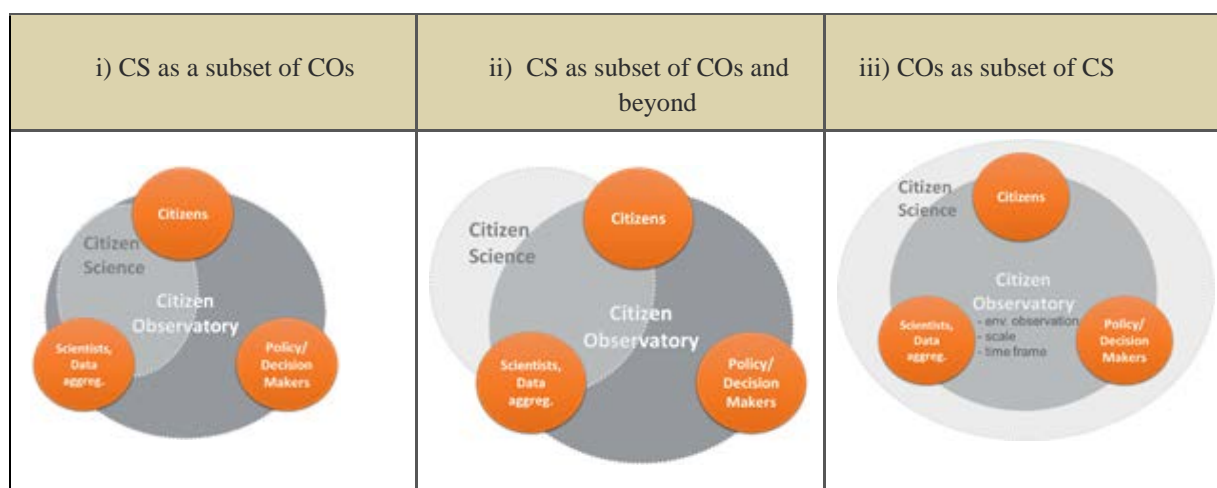


Figure 7: Different delineations of Citizen Science and Citizen Observatories

Source: Wehn and Velzeboer (2018 b,c)

At Forum #2, consensus was reached across CoPs on the following definitions:

- *Citizen Science is a new knowledge creation methodology compared to traditional knowledge creation.*
- *Citizen Observatories are not just about knowledge creation but also about knowledge application. COs are typically designed with linkages and (policy) impact in mind.*

COs are therefore seen to present a specific form of Citizen Science, characterised by their focus on observing the environment (rather than other phenomena), the scale of their activities (typically local) and their timeline (typically long term). In this respect, all four CoPs have contributed to creating this understanding of fundamental concepts and key terms.

7.2 Emerging insights for WeObserve activities

Insights for the WeObserve MOOC

Close collaboration between the Co-Design & Engage CoP and the WeObserve MOOC team informed the design of the MOOC which has taken up recommendation for generalised a step by step structure from the CoP. This was a result of the extensive collaboration process where Co-design & Engage CoP members discussed the steps or phases commonly found in citizen science projects. These steps were applied to structure the WeObserve MOOC course outline.

Insights for the WeObserve Cookbook

The work and discussions in the Co-design & Engage CoP as well as the Impact CoP have already generated useful insights for the WeObserve Cookbook. Both CoPs clearly underscore the need to use balanced and nuanced approaches to co-designing COs as well as capturing their impacts, that fit particular circumstances, resources, purposes, etc. Interop CoP has also generated insights on the best practices to follow regarding data models and protocols to be used in order to achieve a better interoperability and standardization of citizen science data. These insights feed into the design of the Cookbook which will therefore adopt a 'decision tree' approach to guide its users to the most useful information and guidance tailored to their circumstances.

Inputs for WeObserve outreach events

Regular inventorisation of upcoming events and opportunities in the monthly telcos of the CoPs has created awareness and uptake of outreach events by various CoP members for disseminating their respective project results as well as presenting join results of a particular CoP, e.g. the acceptance of the Impact Stories presentation of the Impact CoP at the forthcoming Digital Earth Symposium (September 2019).

Inputs for WeObserve Open Data Exploitation Challenge

Interop CoP will facilitate the availability of datasets to be included in the Open Data Exploitation Challenge which is being promoted within WeObserve, thanks to the participation in the CoP of different partners working with different data sources and their willingness to share and collaborate.

Insights for WeObserve adoption into Earth Observation initiatives

Incorporation of WeObserve ecosystem related initiatives into the GEO Work Programme and support of standards, data management and interoperability via the OGC citizen science domain working group are activities clearly facilitated through the Interop CoP activities and, in particular, through the development of the OGC CitSci Interoperability Experiment. Interop CoP is also promoting the first CO for EO workshop organized in WP5 and which will take place beginning of July in Salzburg.

7.3 Challenges faced & lessons learned

Engagement of participants

In line with the focus of the Co-design & Engage CoP on how to engage citizens and other stakeholders in CO activities, so have all four WeObserve CoPs struggled with a certain ebb and flow of participation in their respective activities. The F2F meetings (launch, Forum #1 and Forum #2) were generally very well attended, while the monthly telco suffered from lower levels of participation at times. The CoP Chairs and WeObserve

team responded by timing the Forums as frequently as possible and paying particular attention to the participants' interest in terms of thematic focus of these meetings (i.e. co-designing the agendas). The consensus reached during Forum #2 (Venice) on using the joint production of scientific publications as the main vehicle and incentive for participation meant that initial CoP work plans had to be adjusted slightly accordingly. This preference is correlated with the large percentage of research and academic participants in the Co-design & Engage, Impact and SDGs CoPs. In this respect, the overarching aim of the WeObserve CoPs to consolidate knowledge dispersed across various stakeholders is not completely met and will require additional efforts to engage different stakeholder types.

Moreover, the evident preference for F2F interactions in the WeObserve CoPs is in line with the literature on CoPs and knowledge management (Wenger, 2002). Moreover, the feedback obtained following Forum #2 about the nature and length of F2F meetings is being taken on board for the organisation of Forum #4. Future surveys among the CoP members will be used to capture evolving preferences, so that the WeObserve team can respond accordingly.

Resource constraints

The budgets allocated to each CoPs (for travel, Forums, etc.) are rather limited, which means that attendance of some key events by the CoP Chairs for representation of their CoPs is often not possible.

One of the key objectives of WeObserve is to develop communities of practices around key topics to assess the current CO knowledge base and strengthen it to tackle future environmental challenges using CO-driven science. In the first year of the project, a total of 4 CoPs were launched, three as initially envisaged (Co-designing citizen observatories and engaging citizens; Impact and value of citizen observatories for governance, and Interoperability and standards for citizen observatories) plus a fourth one on the highly current subject of the United Nations Sustainable Development Goals and Citizen Observatories.

Having gone through the launch process four times and sustaining four CoPs, the consortium has learned several lessons. For one, we now understand much better all that is involved in launching and sustaining these CoPs. Moreover, the themes currently addressed by the CoPs provide a sound thematic spread of issues that need to be addressed in order to enhance the knowledge base on COs, namely social, technical and political aspects. Finally, adding another CoP would not only drain resources from the project team but also potentially lead to thematic duplication and overlaps across the CoPs (as is partly already the case between the current CoPs).

In order to use the available resources efficiently and effectively, we therefore propose to limit the total number of CoPs to these four CoPs, rather than five as envisaged in the proposal. This approach has the advantage of using project resources for the CoPs most effectively, keeping the four CoPs running at the current intensity while covering key thematic aspects of the CO knowledge base.

8 References

1. Fraisl, D. and Wehn, U. (2019) CoP on UN Sustainable Development Goals and Citizen Observatories - SDGs CoP Inception Report [Final], January 2019
2. OGC Project Document 18-031 (2018d) Activity Plan for an OGC Interoperability Experiment
3. Wehn, U. and Velzeboer, V. (2018a) [D2.2 Detailed Terms of Reference and Guidelines for WeObserve Communities of Practice](#), WeObserve deliverable D2.2.
4. Wehn, U. and Velzeboer, V. (2018b) [Co-design & Engage CoP Inception Report \[Final\]](#) 3 September 2018.
5. Wehn, U. and Velzeboer, V. (2018c) [Impact CoP Impact and value of citizen observatories for governance Inception Report](#), 7 September 2018.
6. Wenger, E., McDermott, R. and W. Snyder (2002) Cultivating Communities of Practice. A guide to managing knowledge, Harvard Business School Press: Boston, M.A.

Annex 1: CoPs launch event slides

Example from Co-design & Engage CoP


5/24/2019



CoP 1: Co-design and citizen engagement
Launch Workshop, 6 June 2018, Geneva

Uta Wehn | IHE Delft

Introducing WeObserve



KNOWLEDGE BASE

- AWARENESS**
- ACCEPTABILITY**
- SUSTAINABILITY**

COP 1: ENGAGING STRATEGIES & CO-DESIGN COs

COP 2: IMPACT & VALUE OF COs FOR GOVERNANCE

COP 3: INTEROPERABILITY & STANDARDS FOR COs

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Welcome Remarks

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WeObserve Landscape Report

Mapping the EU landscape of existing Citizen Observatory initiatives, relevant communities and their interactions



1. Geographic scope
2. Type of participants
3. Network establishment mechanism
4. Revenue stream
5. Communication Paradigm
6. Effort required
7. Platform support
8. Data accessibility, availability & quality

Source: Chelvestoff, Mohammad & Wehn, Uta & van der Zaag, Peter. (2017). Towards Benchmarking Citizen Observatories: Features and Functioning of online sensor weather networks. *Journal of Environmental Management*. 195. 1051-1061. 10.1016/j.jenvman.2017.02.020

Introducing WeObserve

- WeObserve
 - An Ecosystem of Citizen Observatories for Environmental Monitoring
 - Tackling 3 key challenges: awareness, acceptability and sustainability of COs
 - Improve coordination & help to move citizen science into the mainstream
 - H2020 funded (2017-2020), Coord. Steffen Fritz, IASA

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WeObserve Landscape Report

Table 1: The Citizen Observatories selected for the first phase of the Landscape Report

FPF - funded COs	Thematic focus	Timing
CORWEB	Biosphere monitoring	2012 - 2016
DIRIS-CENTIS	Odour monitoring	2012 - 2014
CITY-SENSE	Air pollution monitoring	2012 - 2016
WetSensit	Flood and drought monitoring	2012 - 2016
CitScape	Coastal and marine water quality monitoring	2012 - 2015
H2020 - funded COs		
Ground Truth 2.0	Flora and fauna, water availability and water quality for land and natural resources management	2016 - 2019
GROW	Soil, land-use, crop planting, and water resources	2016 - 2019
hackAir	Air quality	2016 - 2018
LandSense	Land use and land cover	2016 - 2019
Scent	Water supply & quality, flood risks	2016 - 2019
D-Noses	Odour sensing	2018 - 2021
Monocle	Coastal waters, lakes and estuaries	2018 - 2021

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Introducing WeObserve Communities of Practice

CoP = Communities of Practice
Groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly



Source: Yusuf et al. (2011)

CoP = Domain + Community + Practice

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CoP ToR

WeObserve Communities of Practice can undertake one or more of the following:

- **Thematic knowledge co-creation:** create new knowledge related to the CoP's focal theme, with the aim of generating lessons learned for other CO initiatives.
- **Generating new solutions or agreeing on how to use existing ones** e.g. interoperability experiments and generating technical recommendations.
- **Knowledge sharing activities (meetings, events, conferences etc):** wide dissemination, communication and diffusion of information, enabled also by the WeObserve platform.


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Topics of the WeObserve CoPs


- **CoP 1** **Co-designing citizen observatories and engaging citizens** | addressing incentives and barriers for participation, engagement strategies and citizen-science ethics (led by IHE Delft)
- **CoP 2** **Impact and value of citizen observatories for governance** | defining socio-economic and environmental impacts of community-based environmental monitoring for public authorities and decision makers including risk evaluation (led by IHE Delft)
- **CoP 3** **Interoperability and standards for citizen observatories** | adopting data quality, curation and preservation of citizen-science data, and addressing privacy and licensing for CO sustainability (led by CREAM)

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Welcome from the WeObserve CoP Team




Uta Wehn – IHE Delft
Coordinating the CoPs
Chair of CoP1 & CoP2



Joan Masó – CREAM
Chair of CoP3



Joeri Naus – IHE Delft
CoPs support



Ester Prat – CREAM
Admin Management

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Introducing WeObserve Communities of Practice

General objectives of the CoPs

- To assess, strengthen and extend the CO knowledge base
- To support implementation of best practices and standards
- To demonstrate the added value of COs
- To promote uptake of information and foster business innovation

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A Debt of Gratitude to the Participants. THANKS!!

Can you please write down:

1. Your Name
2. Your Organization
3. Participant or Observer of CoP1
4. Which 3 sub-topics of co-design & citizen engagement you are most interested in:

I. ...

II. ...

III. ...

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Linked activities

ECSA Working Groups on: Sharing Best Practice and Building Capacity; Policy Strategy; Governance and Partnerships; Learning and Education in Citizen Science; Citizen Science and Open Science

Citizen Science COST Action • CA151212: to promote creativity, scientific literacy, and innovation throughout Europe (<https://www.cscf.eu/CA151212/>). Develop synergies with education; improve society-science-policy interface; Enhance the role of CS for civil society.

OPENER Community of Practice on Public Engagement in Environmental Research (UK) (<https://researcher-repository.ac.uk/opener/>)

Citizen Science Global Partnership (CSGP) first call for participation (<https://www.cscf.eu/CA151212/first-call-for-participation/>)

"Earth Observations and Citizen Science" Community Activity of the GEO Work Program (<http://earthobservations.org/activity.php?id=152>)

"Socio-economic benefits of Earth Observations" Community Activity of the GEO Work Program (<http://earthobservations.org/activity.php?id=153>)

EuroGEOSS initiative ([http://eur.europa.eu/en/infrastructure-and-policy/infrastructure/infrastructure-facts-and-figures/infrastructure-facts-and-figures](http://eur.europa.eu/en/infrastructure-and-policy/infrastructure/infrastructure-facts-and-figures/infrastructure-and-policy/infrastructure-facts-and-figures))

is supported by the H2020 project WeObserve (<https://www.weobserve.eu/>), the H2020 Citizens' Observatory projects Gove (<https://goveobservatory.org/>), Groudbuurt 2.0 (<http://g20.eu/>), LandSense (<https://landsense.eu/>) and Scout (<https://scout-project.eu/>).

WeObserve CoP1 Launch Workshop - Science



What do we want to do?

This workshop is launching CoP1
"Co-design & citizen engagement - Addressing incentives and barriers for participation, engagement strategies and citizen-science ethics"

- We need to co-define the CoP1 objectives
- We need to agree on the first activities
- How we are going to work together
- How can we present what we will do
 - In terms of demonstrations, videos, in the WeObserve Cookbook, etc.
- Who is going to do what

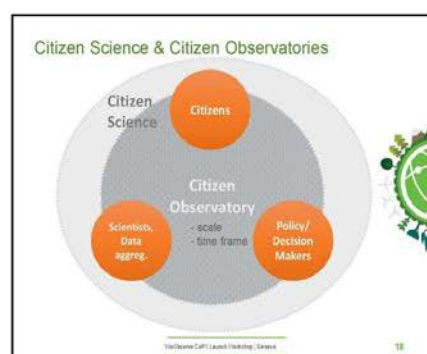
WeObserve CoP1 Launch Workshop - Science



CoP 1: "Co-design & citizen engagement"

Citizen science Citizen observatories

WeObserve CoP1 Launch Workshop - Science



CoP 1: "Co-design & citizen engagement"

What you bring to this CoP:

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WeObserve CoP1 Launch Workshop - Overview

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CoP 1: "Co-design & citizen engagement"

1. What is the need for this CoP?
 - What do you need to know about co-design & citizen engagement?
 - What kind of expertise do you want to share with others?
 - What type of insights need to be consolidated?
2. **Target audience:** Who will benefit from the work done?

Individually: Put your own ideas on post-its (1 per post it)

Per table: Discuss and cluster

Share with plenary

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CoP 1: "Co-design & citizen engagement"

Objectives

"Intentionally becoming an effective CO knowledge resource to the CoP members and to other constituencies that may benefit from the CO expertise."

1. To identify and document relevant methods on ...
2. To generate lessons learned on implementing the methods ...
3. To feed the methods and lessons learned on ... into the WeObserve Cookbook on Citizen Observatories

SMART objectives:
specific, measurable, achievable, relevant & timely

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Reporting back per table

CoP 1: "Co-design & citizen engagement"

1. What is the need for this CoP?
 - What do you need to know about co-design & citizen engagement?
 - What kind of expertise do you want to share with others?
 - What type of insights need to be consolidated?
2. **Target audience:** Who will benefit from the work done?

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CoP 1: "Co-design & citizen engagement"

From Objectives to ...

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CoP 1: "Co-design & citizen engagement"

Activities to achieve these Objectives

Table 1 – topic
Table 2 – topic
Table 3 – topic

1. To identify and document relevant methods on ...
2. To capture lessons learned on implementing the methods ...
3. To feed the methods and lessons learned on ... into the WeObserve Cookbook on Citizen Observatories



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Management




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Discussion per table

1. **How** to communicate and disseminate the results
 - I. Demonstration, video, WeObserve cookbook...
2. **What** do you value from this CoP:
 - I. Recognition for your contributions
 - II. Social event for community building
 - III. Producing a video
 - IV. Something else

Select 2 priorities



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Principles of Conduct

- Extend respect and courtesy to colleagues at all times
- Develop and test ideas and insights impartially
- Think internationally, devising insights and solutions that meet the needs of diverse cultural contexts and operational environments
- Individuals who attend the WeObserve CoP-facilitated meetings are prepared to contribute to the ongoing work of the CoP
- Adhere to the agreed rules that protect the IPR of the members and the privacy of their discussions
- Adhere to the consensus process for deciding CoP-internally what content will be made public and when



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Reporting back on the discussions per table

1. Communicating and disseminating the results
 - I. Demonstration, video, WeObserve cookbook...
2. What you value from this group:
 - I. Recognition for your contributions
 - II. Social event for community building
 - III. Producing a video
 - IV. Something else


Do we need help to achieve this?



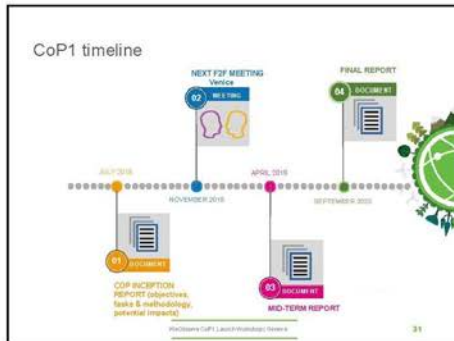
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How we are going to work together

- Email list
- GoogleSite
- Regular telcos each month
 - Report on progress
 - Plan ahead
- Next F2F Venice, November 2018
- Other?



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Who's doing what

Activity	Timing	Who

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IPR - Creative Commons licensing

Six types of licenses:

- Attribution - CC BY**: lets others distribute, remix, tweak, and build upon your work, even commercially, as long as they credit you for the original creation. Most accommodating of licenses offered. Recommended for maximum dissemination and use of licensed materials.
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- Attribution-NonCommercial-NoDerivs - CC BY-NC-ND**: most restrictive of main licenses, only allowing others to download your works and share them with others as long as they credit you, but they can't change them in any way or use them commercially.



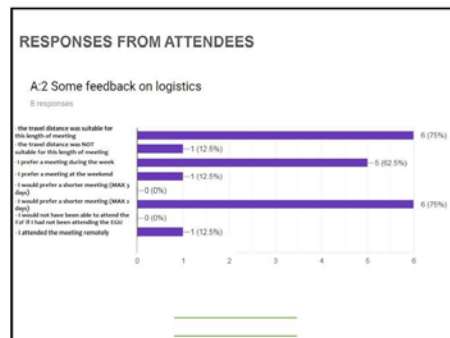
Annex 2: CoPs F2F#2 Vienna evaluation slides

5/24/2019



Feedback on CoP F2F Forum, Vienna

Friday 12 to Monday 15 April, 2019
Brigittenau Youth Palace, Vienna



Attendance

Of 110 total CoP members:

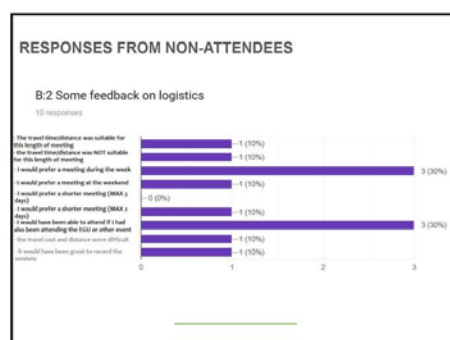
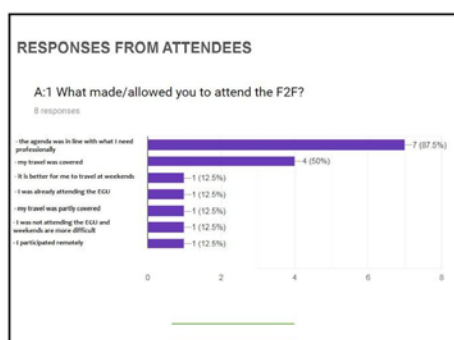
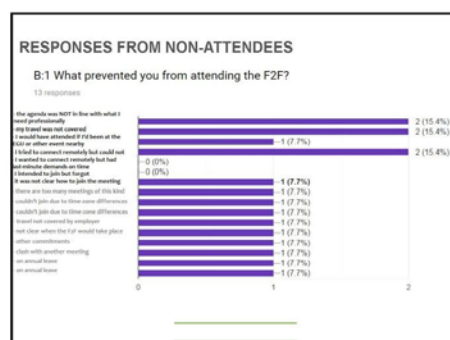
- 17 attended the F2F in Vienna and
- 1 attended remotely
- 19 CoP members responded to the evaluation as follows:

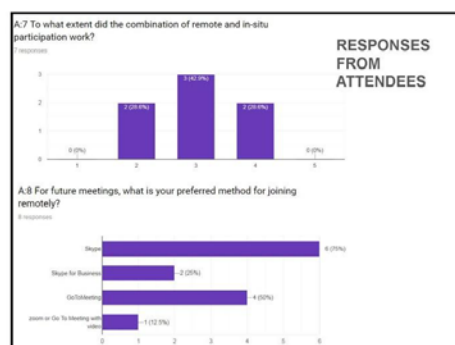
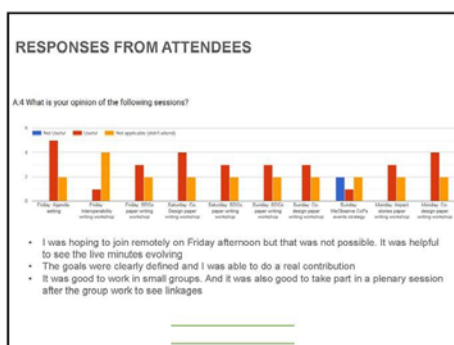
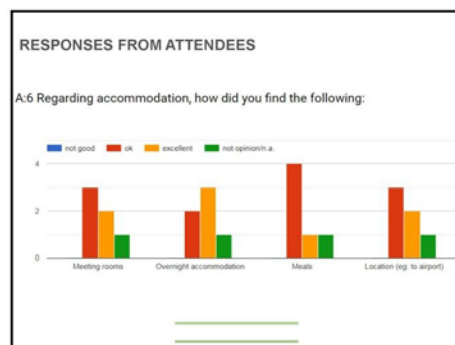
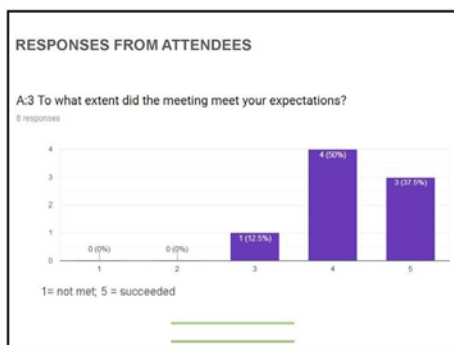
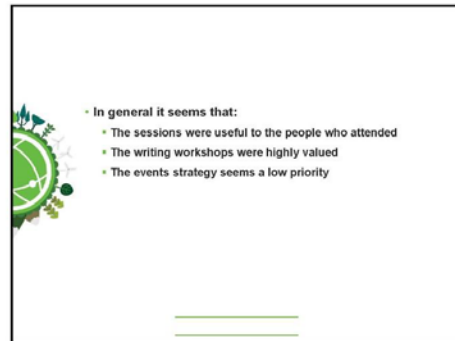
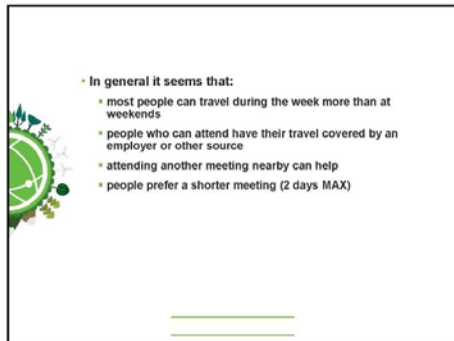
Of the 7 respondents who attended the F2F:

- 6 stated that the agenda was in line with their professional needs and that either they were attending EGU and/or their work covered their travel
- 1 stated it was better to travel at weekends; and 1 that it was better to travel during the week

Of the 12 respondents who did not attend the F2F:

- 4 stated that it was better to travel during the week
- 3 stated that they might have attended if they had been attending the EGU or other meeting nearby
- 4 stated that they were on leave or at another event





5/24/2019



ADDITIONAL COMMENTS

- The writing sessions were very productive overall, but my main issue was getting access to shared documents whilst at the meeting. For future meetings it would have been helpful to have this access beforehand.
- Good initiative to keep doing and having as many tangible outputs as possible
- Have set times for remote participants to get online updates (possibly best using GoToMeeting, Jitsi or similar, as there are issues with conflicts between Skype and Skype for Business users), if there is no continuous streaming possible
- Maybe try setting up a 'buddy system' - team up a F2F participant with a remote participant, both interested in the same topics, and the F2F participant is then responsible for having Skype/other online system/email connection to the remote participant. This would not take time away from the organisers, and would provide a great opportunity for collaboration between buddies.
- It was disappointing not to be able to connect via skype, whatsapp or other communication platform with sound/ image. I struggled to manage things to attend for the weekend and until the last minute I hoped we would somehow connect live, even for shorter periods. I had time and budget constraints to travel in person - and I do believe face to face meetings are much better than skype/ video calls. The Minutes google doc was a good way to maintain contact, as was Dr. Cath Cotton's email feedback before and during F2F.
- Thank you!



THANK YOU!

Any Questions?

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An Ecosystem of Citizen Observatories for Environmental Monitoring