



eu-citizen.science

**The Platform for Sharing, Initiating and Learning
Citizen Science in Europe**

Deliverable 4.2

**Report on Policy Maker Engagement and Awareness-Raising
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Abstract	The EU-Citizen.Science project will create a platform to raise awareness of citizen science, and facilitate engagement with citizen-science projects. This document offers guidelines and recommendations for raising awareness of citizen science activities and projects among a variety of stakeholders. Through identification of existing projects and analysis of best practice, this report aims to establish a framework for increasing awareness in existing and new projects. A list of recommendations for awareness-raising among stakeholders is formulated based on existing literature. These recommendations are then allocated to the identified groups of stakeholders to suggest the most appropriate ways to raise awareness among different audiences.
Keywords	Awareness, Citizen Science, Recommendations

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1 Version Log

Version	Date	Released by	Nature of Change
V0.1	20/11/19	Mollie Latham	First Draft
V.02	17/12/19	Mollie Latham	Draft for external review
V.03	24/01/2020	Mollie Latham	Draft for the second round of external review
V.04	27/02/2020	Mollie Latham	Final version

2 Definitions and Acronyms

AI	Artificial intelligence
ARMI	Angler's Riverfly Monitoring Initiative
CA	Consortium Agreement
CC	Creative Commons
CSA	Coordination and Support Action
CSO	Civil Society Organisation
Data	Information, in particular facts or numbers, collected to be examined and considered as a basis for reasoning, discussion, or calculation. In a research context, examples of data include statistics, results of experiments, measurements, observations resulting from fieldwork, survey results, interview recordings and images. The focus is on research data that is available in digital form. (European Commission, 2016)
Dataset	A grouping of data
Digital Curation	Selection, preservation, maintenance and archiving of electronically stored data
DMP	Data Management Plan
DS	Data Set

EC	European Commission
ECSA	European Citizen Science Association
FAIR	Findable, Accessible, Interoperable and Reusable
GA	Grant Agreement
GDPR	General Data Protection Regulation
H2020	Horizon 2020
ICR	Immediate Civic response
IPR	Intellectual Property Rights
Metadata	A description of data
MoRRI	Monitoring the evolution and benefits of responsible research and innovation
NGO	Non-Governmental Organisation
Open Access	Access that is free to all and free of any restrictions
Open Data	Data that can be freely used, shared and built on by anyone for any purpose
OpenAIRE	Open Access Infrastructure for Research in Europe
PPSR	Public Participation in Scientific Research
Repository	A location in which data is stored or managed
RIA	Research and Innovation Action
RRI	Responsible Research and Innovation
SDGs	Sustainable Development Goals
SME	Small- and Medium-sized Enterprise

3 Executive summary

The EU-Citizen.Science project will create a platform to, among other things, raise awareness of citizen science, and facilitate engagement with citizen-science projects. This document offers guidelines and recommendations for raising awareness of citizen science activities and projects among a variety of stakeholders. Through identification of existing projects and analysis of best practice, this report aims to establish a framework for increasing awareness in existing and new projects. A list of recommendations for awareness-raising among stakeholders is formulated based on existing literature. These recommendations are then allocated to the identified groups of stakeholders to suggest the most appropriate ways to raise awareness among different audiences.

4 Introduction

Interdisciplinary collaboration and novel approaches are essential components to providing mutual ways of working within citizen science across Europe. The EU-Citizen.Science project aims to develop a diverse and innovative **platform** that will make citizen science accessible to all. The platform will be populated with carefully curated resources and tools that will be accessible to wider audiences. The provision of resources, tools, guidelines and training modules will facilitate people in initiating citizen science activities, enabling them to learn more and immerse themselves in citizen science. More specifically, the project aims to:

- coordinate citizen-science actions and leverage existing resources in the currently fragmented landscape of citizen science in Europe;
- engage stakeholders at all levels (local, national and European);
- create a mutual learning space and a set of comprehensive codesigned training modules for the different target audiences.

The platform will be made accessible to different stakeholders, ranging from interested citizens to scientific institutions, up to politicians and public media, and aims to facilitate citizen science on a broader scale. The project plans to broaden the awareness of citizen science among the general public, augmenting participation of citizen science in education and improve communication among scientific publications and project participants.

WP4 focuses on awareness and engagement of identified stakeholders. The work package and its subsequent tasks and deliverables facilitate the project objectives, namely in empowering diverse stakeholders to adopt citizen science practices and begin initiatives and strengthening links between citizen science and policymakers. WP4 will develop strategies and recommendations to facilitate engagement with and awareness of citizen science in Europe. Critically, the subsequent reports will provide best practice, including how to engage audiences with citizen science and create new initiatives, aided by the expertise of project partners across the consortium.

4.1 Purpose and Scope of this Report

This document, titled “Report on Policy Maker Engagement and Awareness-Raising Activities”, is a deliverable of Task 4.1 ‘Achieving societal awareness and engagement in science through existing citizen-science networks, projects and multiplier events’ and Task 4.2 “General policy recommendations for citizen science”, both of which contribute to the overall aims and objectives of Work Package 4 ‘Awareness and Engagement - Public and Policy Makers’. With the ambition to streamline citizen science in Europe and provide materials that are accessible to a wide range of audiences, Work Package 4 encompasses the engagement and awareness of a diverse catalogue of stakeholders. Guidance and assistance in achieving awareness and engagement with citizen science is a critical aspect of the centrality and interdisciplinary nature of the platform.

Deliverable 4.2 will offer a diverse approach to awareness-raising of citizen science projects and activities, fostering

awakening in those learning about, and hopefully participating with, citizen science, as well as offering a comprehensive understanding of strategies for awareness-raising. Deliverable 4.2 explores the literature surrounding awareness of citizen science, assessing the discussion surrounding strategy and optimization, in order to develop a comprehensive list of guidelines and recommendations for awareness-raising across the stakeholders. This list aims to explain the process of awareness-raising within the EU-Citizen.Science framework and will consider methods used by the project partners and third parties to raise awareness of the platform, ultimately offering examples of best practice.

4.1.1 Scope of the deliverable

Work Package 4 focuses on increasing the awareness and engagement of identified stakeholders with citizen science, demonstrating a conceptual model for developing strategies to consolidating existing initiatives and increasing awareness among stakeholders, namely policymakers and provide guidance and consistency among citizen science initiatives. Task 4.1 details the approach to achieving societal awareness through existing networks and events, and encompasses the provision of guidance on how to improve awareness of citizen science, utilising existing activities to create a multiplier effect in awareness-raising. Task 4.2 considers general policy recommendations for citizen science, in which the work package will create a citizen science model for impacting science and research policy, and produce a set of policy recommendations on how to make use of and support citizen science. Notably, this task encompasses the interest to raise awareness of citizen science among policymakers and provide guidance on achieving this. This deliverable acts as a key output for task 4.2 and contributes to the outcome of task 4.1. This deliverable has allowed collaboration and co-operation with other project partners, encompassing the breadth of knowledge and expertise within the consortium, something that will be further utilised within the updates in months 24 and 34.

Deliverable 4.2 (this deliverable) presents recommendations on “awareness raising” in all types of stakeholders, with a specific focus on policymaker awareness to be incorporated within D4.3 and 4.5, which act as updates to this report. Deliverable 4.1, published separately, presents recommendations on “engagement” of all types of stakeholders, including policymakers.

4.2 Definitions

4.2.1 Awareness

When considering deliverables 4.1 and 4.2, it was necessary to clearly define the difference between awareness and engagement and establish the difference in definition to support the difference in approach. For the purpose of this project, engagement is defined as the active participation or involvement of an audience member with a citizen science project, activity or event, on one or more occasions.

For the purpose of this project, awareness is defined as a knowledge of a citizen science project, activity or event, and summarizes a more superficial interaction with a project, limited to a knowledge of its existence, opposed to involvement with it. This definition is in line with the Cambridge dictionary definition “knowledge that something exists, or understanding of a situation or subject at the present time based on information or experience” (Cambridge, 2019). Similarly, Collins Dictionary states that to be aware of something is to know about it, and that a person who is aware “notices what is happening around them or happening in the place where they live” (Collins Dictionary, 2019). When considering deliverables 4.1 and 4.2, it was critical to establish clear definitions of awareness and engagement, in order to establish differences in approach to both.

4.2.2 Audiences

For the purpose of this report, the audiences (or stakeholders) considered are:

- academia
- educators
- the public
- non-governmental organisations (NGOs) and civil society organisations (CSOs)

- industry and small- and medium-sized enterprises (SMEs)
- the press and media
- policymakers and funders.

These stakeholders have been identified via *Deliverable 2.1: Stakeholders, Network and Community Mapping Report*, a deliverable part of *Work Package 2: Platform, Community and Network Building* (Figure 1). For the purpose of this study, the public will encompass volunteers (or participants), as traditionally, in citizen science, volunteers are part of the public. It is important to remain consistent in audience terminology among the consortium, as having consistency in terms utilised impacts the development of knowledge, as referenced in Eitzel et al. (2017).



Figure 1- Stakeholder Map from *Deliverable 2.1: Stakeholders, Network and Community Mapping Report*, a deliverable part of *Work Package 2: Platform, Community and Network Building*

5 State of the Art

A critical aspect of engagement is termed the point of engagement, alluding to the point at which the participant learns about a project or activity, cementing awareness-raising as an integral aspect of participation with citizen science (O'Brien and Toms, 2008). For stakeholders to become involved with citizen science, they must first be aware of the existing opportunities. Lack of awareness acts as a barrier to active involvement with citizen science, with many unaware that opportunities aligning with their values and motivations exist (Burgess et al., 2017) (West and Pateman, 2016). Raising awareness of citizen science is critical for (1) increasing the interest in projects, (2) the recruitment of new volunteers, (3) establishing the importance of the work citizens are conducting, and (4) making this work well known among communities (Bonney et al., 2009). With an increasing value added to science, in addition to the desire of many audiences to actively involve themselves in the scientific activities and projects, it is important to highlight the opportunities made available by citizen science (Robinson et al., 2018).

It is essential to implement targeted efforts of awareness-raising, tailored to different audiences, to encourage greater interaction with citizen science (Haklay, 2015). Opportunities for awareness-raising are ample, particularly among underrepresented communities. It is important to employ a range of awareness-raising strategies to widen the audiences and diversify the participant base of citizen science (Robinson et al., 2018). Planning the awareness-raising of an event,

activity or project is critical for successful recruitment of volunteers and interest from key stakeholders (Tweddle et al., 2012). The approach to awareness-raising will vary with the audience, and interactions can differ depending on existing awareness, interest, motivation, audience size and category of stakeholder (Tweddle et al., 2012).

Efforts to scale citizen science and expand research areas are limited by a lack of awareness. Emerging scientific research demands a knowledge base that is multi-faceted, encompassing a range of stakeholders and facilitating a broad understanding across multiple audiences (European Commission Digital Earth Lab, 2019). Currently, the potential for a wider reach and broader access to knowledge bases is largely untapped, owing to lack of awareness. The expansion of citizen science across Europe commands a new approach to communication and participation, one that is interactive, open and wide-spread (DITOS, 2016). Methods of raising awareness are increasingly diverse, accessing various audiences and informing them of current and future projects and activities. Awareness-raising strategies can be tailored to suit different audiences, with the additional advantage that commonly employed techniques raise awareness among channels beyond those that are initially targeted.

5.1 Audience

It is important to raise awareness among a range of groups and to use a diverse catalogue of strategies (West and Pateman, 2016). The amount of awareness-raising necessary will depend upon the aims of the project, the size and category of the audience you are hoping to reach and the strategies employed. Targeting existing groups or audiences that you have already interacted with will require less effort than raising awareness among new stakeholders (Tweddle et al., 2012). Collaboration is an important resource for raising awareness of citizen science. Working with audiences to spread the word of an activity or project is a simple method of reaching a broad and diverse audience. Partnership with knowledge-based institutions such as universities, private and public research institutions, and corporate/organisation partnerships, can help to access new audiences and raise awareness. Similarly, this gives access to the networks that members of the organisation have access to, furthering awareness of the project. Established communication channels and interaction with a range of organisations are important to the success of citizen science, while also offering access to a variety of skills and understanding, that could subsequently benefit the project (Haklay, 2015).

Working with groups that have similar interests raises awareness among audiences that are already engaged in the topic of choice. It is noted that commonly, people partake in activities, projects or groups owing to an existing interest or desire to express values of importance (Curtis, 2015). Local stewardship groups, clubs or small organisations encompass people with an inherent interest in specific subject areas, who are often connected to external networks that also have an interest and further raise awareness of an activity or project among a broader audience.

Awareness-raising activities conducted at the correct time can feed into an ongoing or emerging policy debate, and will likely attract the attention of policymakers. Aligning with ongoing policy debate increases the likelihood of selecting an issue that is of political or societal prominence at that time or of local concern, and therefore of interest to communities and local people. This is likely to increase the impact that citizen science can have within policy (European Commission Digital Earth Lab, 2019). Awareness-raising activities can be tailored to achieve this, addressing the necessity for short reflections of the results, delivered in a robust and established way, leading to engagement of policymakers with the project or activity.

5.2 Outreach

Outreach is one of the most traditional and efficient methods of awareness-raising. Outreach offers a personalised and targeted way of contact, establishing points of contact and building relationships in the early stages. Speaking to people at events, conferences or gatherings is an effective method of raising awareness, and can include promotion from the research team, the volunteers or a dedicated research officer. Methods can be as simple as handing out leaflets and talking to people at a dedicated stand, or can expand to running a workshop or activity to spread the word of a project.

Similarly, when technology and traditional methods of advertising are less accessible, direct interaction may be the most plausible method of raising awareness (Lange et al., 2019). Often, events provide a captive audience and can be an easy way to contact people who already have an interest in citizen science or the topic area. Communication is a critical aspect of a project or activity, so maximizing face to face awareness-raising establishes relationships at an early stage, as well as providing a clear understanding of what involvement with the project looks like for specific audiences (West and Pateman, 2016). Some projects choose to employ designated team-members, or enrol specific volunteers, to act as community engagement officers, raising awareness of projects and providing information on participation. The UK Ladybird Survey employed a full-time officer for a period of the project, tasked with promoting the project to broad audiences; this proved successful in spreading the word of the activities and opportunities that were available to participate in (Roy et al., 2012). Considering a variety of methods for outreach is important; educational outreach and schools' visits can be effective in raising awareness. Project managers may wish to visit schools or educational settings, delivering workshops or sessions about citizen science, in order to raise awareness and run small scale trials (Cornell Lab of Ornithology, 2019). An example of this is the work Earthwatch conducts in schools, raising awareness of citizen science projects such as Naturehood. Designated facilitators offer a brief introduction to the projects and allow teachers and students to participate in some of the activities that they can get involved with if they sign up to the project. Students and teachers receive access to resources to take home, which can be shared with parents. Teachers can pass on the information of the projects to their networks, further raising awareness. Importantly, when interfacing directly with people, ensure the project has a clear, simple and accessible hook. Often, people feel overloaded by information, so using tools such as videos or photos will be effective in hooking people's attention and maintaining interest (Varner, 2014).

Traditional advertising such as posters, flyers, press, radio and television remain helpful in spreading awareness of a project or activity. Recruitment materials should be targeted to specific audiences, but general messages distributed via television, radio and print are effective ways to communicate with the general public (Hecker et al., 2018). Messages distributed through traditional media often reach large and varying audiences with diverse motivations, both directly and indirectly. Those seeing these messages will often distribute them among interested networks, expanding the reach of the message. However, considerations should be made to the uniformity of the message (Lange et al., 2019).

5.3 Project Design

Project Design is integral to awareness-raising. Careful consideration is needed to ensure projects and activities ensure effective, relevant and targeted awareness-raising. Planning for diverse demographics and having a clear target audience, whose interests and needs you understand, are critical to consider early on in the project design. Often, different stakeholders have different perspectives, goals and motivations, so providing a universal approach to awareness-raising will not be as effective as utilizing multiple methods and channels (Choi et al., 2005). Appealing to particular groups may add complexity to awareness-raising campaigns, but being responsive to audience interests will access broader audiences and engage more individuals (Pocock et al., 2014). Offering an integrated and shared approach when raising awareness of a project will cater to people with no experience, but also those with lots of experience, thus reaching a broader community. Lack of clarity about the offering and its purpose impedes interest from audiences, thus stressing the importance of establishing clear guidance on awareness-raising strategies and planning such strategies carefully, to ensure maximum gain (Vann-Sandera et al., 2016). When designing projects or activities, it is important to consider how results may be disseminated. Linking studies back to the research project is an effective way of raising awareness – plastic pollution studies are widespread, but not many people are aware of the citizen science project from which the results originated. It is important to link results back to the initial study and to discuss the successes of citizen science. An exploration of the Galaxy Zoo project noted that awareness of the project, and subsequent participation, rose drastically following discussion of the results on online media outlets (Raddick et al., 2010). Not only does this raise awareness, but this also offers acknowledgement of the impact and effort of volunteers (Thornhill et al., 2016).

5.4 Technology

Technology, such as social media, is a way to access a new audience quickly and efficiently. Online platforms are increasingly utilized to raise awareness of activities and projects rapidly and succinctly (Roy et al., 2012). Platforms such as Twitter are an effective way to get a clear and effective message to a wide audience in a short space of time. Similarly, platforms such as Facebook have analytical tools that help you to publicise posts and maximise reach. The project managers behind the Garden BioBlitz cite Twitter as an integral component of awareness-raising, fostering awareness among communities of people with an existing interest (Roy et al., 2012). Blogs and podcasts are also a diverse way of awareness-raising. Some projects, such as Galaxy Zoo, launch projects via blogs or podcast features, offering a detailed and accessible summary of the project, and promoting direct methods of involvement with a clear message (Raddick et al., 2010). Newsletters and blogs keep people informed with the updates to the project and can be forwarded among networks. Having a website is an easy way to raise awareness, as people who may be researching new opportunities could be directed to your website. Additionally, having a clear portal for key information allows this to be shared among networks, thus raising awareness. Studies identify websites as a critical route for involvement with and information about a project, with nearly all surveyed citizen science initiatives using a website to explain and promote the project (Roy et al., 2012).

6 Guidelines and Recommendations

Recommendations and their target audience are described below. It is important to note that the following list of recommendations is not exhaustive; understanding of awareness-raising strategies is continuously growing, and will, therefore, be expanded upon across the course of the project to encompass the broad range of experience from different projects, countries and audiences.

The recommendations are listed to align with project life cycle and then clustered them vaguely by the stages - concept, definition, development, handover and closure - as detailed by the Association for Project management (APM, 2019).

6.1 List of Guidelines and Recommendations

Recommendation 1: ensure awareness-raising is incorporated into project design

In order to achieve the project's aims, participants must be recruited. Unless they are aware that the opportunity exists to partake in citizen science, a project will be unable to achieve its research goals. Projects should be relevant, targeted and organised, identifying key methods of awareness-raising to spread the word and sustain interest. Work collaboratively to design strategies and consider techniques that will spread awareness among established and new networks (Tweddle et al., 2012). Plan for your demographic and have a clear target audience, whose interests and needs you understand. Awareness-raising should be integral to the project design, and should be planned accordingly to access a diverse audience (European Commission Digital Earth Lab, 2019). Raising awareness among educators may require different strategies, techniques and timings compared to policymakers. Complex protocols, designed to suit specific audiences, require planning, resources and time, and therefore should be considered early in the timeline of projects and activities (Pocock et al., 2014).

Example

A study surrounding recruitment messages for Zooniverse projects highlights the importance of planning awareness-raising strategies early on. Lee et al. (2017) considered the importance of awareness-raising strategies to successful recruitment of participants. Four messages were devised advertising the same project, but appealing to different interests and motivations, reflective of different audience types. This was conducted by utilising different messaging formats. The study found that understanding different interests, schedules and priorities was important in tailoring materials and hooks used to raise awareness. The study also highlights the importance of incorporating awareness-raising strategies into project design. Creating and implementing unique materials and procedures will take time, money and effort, and so should be considered early on so as to be prepared and allocate resources and time accordingly. It is critical to consider this in order to mobilise the objectives of projects and appeal to specific audiences.

Recommendation 2: have a clear, simple and accessible hook when publicising

Whether producing informative materials or attending events and conferences, it is important to have a clear, simple and accessible hook. Citizen science projects are lengthy and require a lot of design and consideration. However, potential participants often note that being overloaded with information can be overwhelming, limiting the understanding that they have about the project and its aims (Varner, 2014). Using tools such as videos or photos are effective in hooking people's attention and maintaining interest, which increases their awareness of the project. Techniques such as using puzzles to describe the problem that the project is tackling, or asking people to discuss research questions are innovative and engaging ways to raise awareness. It must be considered that different strategies and hooks will have varying levels of effectiveness among different audiences, and often awareness-raising techniques should be tailored to accommodate different stakeholders (Tweddle et al., 2012).

Example

If conducting a project about perspectives and attitudes towards plastic pollution, you could ask individuals to give an example of the plastic item they use most commonly and how they could minimize their use. This could be aided by having common plastic objects out on display. Alternatively, you could show a picture or video detailing plastic pollution and ask individuals what their response is to what they have seen and what they think the key issues, causes and solutions are. As well as raising awareness of the issue and the project or activity, this has the added benefit of acting as a trial for the project, determining if methods employed to gather perspectives are effective and potential issues that could arise. Using interactive tasks, videos or photos can avoid overloading potential participants with information and can help in sustaining interest long enough to raise awareness.

Recommendation 3: develop a project website

Utilising online tools for awareness-raising is invaluable for projects and activities. Websites act as hubs for information surrounding citizen science projects, and so their design and implementation should be carefully considered. Websites that have a clear user journey, accurate and informative content and easy navigation play a large role in sustained engagement, due to their role as a central hub for guidance and information (Newman et al., 2010). People who may be researching new opportunities or aiming to learn more could be directed to the website through a search engine or a link from another platform and links to websites can be easily shared among networks. Having a designated platform for the key information of a project or activity allows audiences to feel confident in learning more about citizen science and understand the key aims and objectives. It is important to consider the time and cost that building a website will require, as this could amount to significant amounts depending upon the requirements of the platform. Additionally, projects should consider that their website must be kept up to date with relevant and current information, which will incur further time and cost.

Example

Citclops is a project that developed systems to retrieve and use data on seawater colour, transparency and fluorescence, using low-cost sensors combined with people acting as data carriers, contextual information (e.g. georeferencing) and a community-based Internet platform, considering actual experiences (e.g. Secchi Dip-In, Coastwatch Europe and Oil Reporter). The project website, fully operational five years after the end of the project in 2015, acts as a critical point of information for existing users and interested parties. The website has an easy-to-use interface, with clear direction to collected data and areas to submit data. The site hosts a set of instructions for collecting observations. These instructions and the accessibility of the site raise awareness among a larger pool of participants. Information about the project is also hosted on other websites (such as <https://www.eyeonwater.org/>), broadening the scope of the audience. Citclops is also an excellent example of website sustainability.

Project - <http://www.citclops.eu/>

Recommendation 4: access groups of people with similar interests

Gathering support among groups with similar interests is an effective method of raising awareness. Commonly, people are motivated to involve themselves with activities, projects or causes that allow them to express values that are inherently important to them (Curtis, 2015). Accessing groups that have an existing awareness opens up an audience that is already engaged in the topic of choice, and is, therefore, more likely to participate and spread the word. Communicate with local interest groups, clubs or youth assemblages. Often, those who have an interest in the topic are connected to networks that also have an interest and could pass on the word of your project.

Example

The Riverfly Partnership works to conserve water quality in rivers by sampling Riverfly and their habitats (Riverfly Partnership, 2019). In 2007, the partnership launched the Angler's Riverfly Monitoring Initiative (ARMI). The partnership recognized the unique position of anglers in monitoring the health of water bodies that are frequented by people for recreational fishing. The initiative and its tutors mobilize interested by training them in the simple sampling technique and equipping them with the understanding to contribute to their research (The Conservation Volunteers, 2014). Utilizing the position of this group and their current interest effectively, raised awareness of the partnership's work. It provided a unique opportunity for individuals to spread the word among niche social circles.

Project - <http://www.riverflies.org/rp-riverfly-monitoring-initiative>

Recommendation 5: utilise traditional advertising techniques

Publicity is a critical component of raising awareness. Traditional advertising such as posters, flyers, radio and television remain helpful in getting the word out about a project or activity. This range of strategies is not exclusive to specific audiences, and the strategies can be used individually or in combination to raise awareness efficiently and among a large audience (The Conservation Volunteers, 2014). It is difficult to target these types of messages to specific audiences, and so project managers should be aware that only general messages can be distributed. Additionally, this method of awareness-raising can incur high costs and demand a substantial amount of time preparing and distributing messages. Typically, messages circulated through these channels have a spread beyond the initial scope, as many individuals will be reached indirectly through social networks Lange et al., 2019).

Example

The CAPTOR project aimed to monitor air quality data in areas of Spain, Italy and Austria. The project utilised low-cost devices to measure levels of tropospheric ozone, in an attempt to raise awareness of the issue and engage local communities with the monitoring and upkeep of data collection. The interactive component of this project was the "hook" for the mass media. A report released in the local press, followed by a discussion of the project on local news, brought a huge amount of awareness to the project and the air quality problem in the concerned region (Captor-project.eu, 2016).

Project - <https://www.captor-project.eu/en/>

Press release - https://www.captor-project.eu/wp-content/uploads/2016/03/pressrelease_ecologistas_10062016.pdf

Recommendation 6: utilise technology to access a broad audience quickly and efficiently

Increasingly, technology and social media are being utilised to raise awareness of citizen science. New technology is an easy method of accessing a new audience quickly and efficiently (Tweddle et al., 2012). Platforms such as Twitter or Facebook are an effective way to get a clear and effective message to a wide audience in a short space of time. Some platforms have analytical tools that help you to publicise posts and maximise reach. Online media and technology were a critical component of mobilising the launch of the Galaxy Zoo project, with project managers utilising various online channels to convey messages to a broad reach of stakeholders (Riddick et al., 2010). Messages sent using technology and social media should be general and point to sources that offer more information. Awareness-raising conveyed in this way often has reach beyond the intended audience and is often distributed following interpretation by others, and so cannot be tailored as well (Lange et al., 2019)

Example

The social media platform Twitter has millions of users, representing a broad range of audiences. The platform allows succinct messages to be distributed to a wide audience in a short time-frame, and is, therefore, a low-cost option for raising awareness. Having a Twitter profile is a good way to stay connected with established networks, while also allowing messages and information to be widely shared and discovered by new audiences

(Tweddle et al., 2012). The Garden BioBlitz recognizes twitter as a critical component in forming a dedicated community of participants and raising awareness not only of the project, but also of the contributions made by other participants, both of which raise awareness and encourage participation (Roy et al., 2012).

Project - <https://www.brc.ac.uk/irecord/garden-bioblitz-info>

Recommendation 7: provide a newsletter or blog

Newsletters and blogs keep people informed with updates to the project and can be forwarded among networks. Similarly, they can be used to advertise new activities or opportunities for involvement. Both strategies have the capacity to communicate within and beyond existing communities, establishing a central location for information and communication in the project or activity (Richter et al., 2018). Similarly, blogs allow project managers and volunteers to communicate effectively with audiences (Curtis, 2015). Newsletters can detail updates from an organization, news from citizen science projects and events and opportunities. While newsletters are often targeted at existing members, the opportunity for awareness-raising remains prevalent. Many of the featured projects or events may be new to recipients. Additionally, recipients may choose to forward the newsletter among their networks, accessing a new audience.

Example

A key component of the launch of the Galaxy Zoo project was an announcement on one of the principle investigators blogs. The publicity raised awareness of the project among a broad audience and resulted in a mass uptake of participants. Following the launch of the project, the project managers launched a blog detailing the research conducted as a result of participants contributions; this blog receives approximately 25,000 unique visitors every month (Raddick et al., 2010).

Blog Website - <https://blog.galaxyzoo.org/>

Recommendation 8: collaborate with knowledge-based institutions, research institutes, companies and/or organisations

Raising awareness is mobilised by forging relationships and dialogues across disciplines, fostering a multi-faceted and diverse network (Hecker et al., 2018). Collaboration with knowledge-based institutions (institutions whose service is the provision of knowledge, such as universities) is empirical to the success of projects and activities; targeted efforts should be made to raise awareness among such institutions surrounding citizen science and establish a partnership and network to work with (Haklay, 2015). Institutions such as universities, private and public research institutions, and corporate/organisational partnerships can help access specific audiences and networks among which to raise awareness.

Example

Capturing Our Coast (CoCoast) was a 3-year long Citizen science project. Across the course of the project, CoCoast trained nearly 3,000 citizen scientists to survey rocky shores, gathering data on marine species to create a wider understanding of UK coastal biodiversity. The partners involved were Newcastle University, University of Hull, University of Portsmouth, The Marine Biological Association, Marine Conservation Society, Bangor University, Scottish Association for Marine Science and Earthwatch. Collaboration with knowledge-based institutions accessed a wide network of academics, scientists and students, all of which had individual networks in which to collaborate and raise awareness. The geographical scope for awareness-raising was broad, as the partners were located across the United Kingdom.

Project - <https://www.capturingourcoast.co.uk/>

Recommendation 9: discuss your project at events, conferences or gathering

Raising awareness directly through conferring with audiences is a critical method of raising awareness and distributing information in a clear and personal way. Speaking to people at events, conferences or gatherings is a traditional but effective method and can be conducted by the research team, volunteers or a dedicated outreach officer. Maximising face to face interaction offers a personal component to awareness-raising, which can help to establish working relationships and address expectations early on (Tweddle et al., 2012). Awareness-raising in this setting allows communication of a large volume of information and the opportunity to respond to questions, without relying on third parties to correctly disseminate the information to stakeholders (Lange et al., 2019). The UK Ladybird Survey employed a dedicated officer who was responsible for promoting the survey in a plethora of ways, including hosting talks and workshops at events and attending shows and conferences (Roy et al., 2012).

Example

Events and gatherings are a good way to access a range of audiences. Often, educators or pupils will arrange events at which external parties can have a stand or deliver a presentation. The Association for Science Education hosts a conference each year that attracts people from all over Europe, with a broad range of disciplines, primarily educators, to discover new opportunities, many citizen science-based projects or organizations run sessions delivering the impact of their research. Similarly, a range of stakeholders could be attracted to events, such as the European Researchers Night. This takes place annually, with events hosted in approximately 300 cities across Europe. The event hosts workshops and activities, showcasing science and research to a broad audience.

Recommendation 10: educational outreach and school visits

Projects may wish to employ educational outreach, visiting schools or learning groups, delivering workshops or sessions about citizen science, in order to raise awareness and run small scale trials. Educational settings, both formal and informal, are a largely untapped resource for generating interest in citizen science projects. Experiencing citizen science activities stimulates interest in the field, establishing an increased awareness of citizen science generally and a motivation to participate (Vitone et al., 2016). Citizen science projects Naturehood and Freshwater Watch are regularly used in schools; in 2019, these projects reached 477 educators and 2923 young people combined. Pupils receive resources to take home to their parents with the website on them, while teachers can pass on the information to their networks. This vastly increased awareness among key audiences, both directly and indirectly.

Example

A group of researchers introduced a citizen science project, investigating the Horseshoe Crab, to a group of pupils aged 11-13. The key aim of this was to determine the effects of citizen science on various social factors, including awareness, willing to participate and science performance. The result of the study indicated that including citizen science activities within these settings has a positive effect on interest in the project and citizen science generally (Hiller and Kitsantas, 2014). While this study incorporated continuous exposure to the same project, even one workshop or session could drastically increase the awareness of large audiences to citizen science.

Project links - <https://freshwaterwatch.thewaterhub.org/> and <https://naturehood.uk/>

Recommendation 11: align projects with ongoing or future policy debate

It is suggested that decisions guiding involvement with a project or activity are determined by the purpose and nature of the topic or issue (Hollo et al., 2015). Therefore, considering alignment with ongoing or future policy debates could be an effective method of raising awareness of projects or activities. Awareness-raising that is well-timed and carefully prepared to fit with ongoing or emerging policy debate can raise the profile of a project or activity and attract the attention of politicians. Similarly, aligning with ongoing policy debate means you are likely to select an issue that is of political/societal prominence at that time or of local concern, raising awareness among potential participants. Information gathered from projects or about new and existing projects and activities that is distributed at the right time

can feed into policy debate and will attract the attention of policymakers and other audiences who have an interest in the issue or debate. Citizen science offers effective ways of connecting policy and communities. So, interest in projects or activities from relevant audiences has the capacity to raise awareness among secondary audiences (e.g. raised awareness among communities on projects surrounding local issues could mobilise individuals to discuss this with local policymakers) (Hecker et al., 2018). It is important to consider that not all topics can feed into policy, and that this recommendation is opportunistic and will not be applicable to all citizen science projects and activities.

Example

Populations of Koala bears vary across Australia; while some districts fear for the survival of the species, other areas, such as Kangaroo Island, see them as a pest, wreaking havoc on the landscape (Masters et al., 2004). This has caused widespread discussion about how best to manage populations of the species. In the early '90s, culling populations led to a huge public outcry. Lack of comprehensive information on population distribution presents an inimitable challenge for policymakers, confusing efforts to formulate a suitable management plan and framework that applies nationally (Flower et al., 2016).

This highlights an area of potential for citizen science to influence policy. Long-term data monitoring has provided a significant contribution to management schemes, offering substantial and clear information on population and distribution (Flower et al., 2016). The Great Koala Count is a citizen science project, aimed at formulating a comprehensive idea of koala populations across Australia. The project is repeated annually, offering a long-term perspective of changes to population, particularly following natural disaster (Research Data Australia, 2019). This project, and its respective data, has been widely utilised in the management planning for the species, contributing to the development of a South Australian Government koala management and conservation policy (Hollow et al., 2015).

Project - <https://researchdata.andis.org.au/national-parks-association-koala-count/671425>

Recommendation 12: link studies, publications and reports back to the citizen science project

Linking studies back to the research project is effective in raising awareness – sometimes, research that is reported on is not linked back to the project or activity from which data was gathered. It is important to link blogs, reports and publications utilising results from citizen science back to the initial study and to raise awareness of the successes of citizen science.

Example

Plastic pollution studies often make national news, yet many are unaware that the results were gathered from a citizen science project. The 'Break Free from Plastic' project encompasses the work of multiple environmental organizations, working towards the goal of tackling plastic pollution. The project co-ordinates clean-ups and is most famous for its brand audit. Sampling more than 180,000 pieces of plastic across 42 countries, the project aimed to highlight the corporations that were the top 'offenders' for plastic pollution. The results were widely publicized and awareness of the project increased exponentially as a result of mention in the media (Break Free from Plastic, 2019).

Project - <https://www.breakfreefromplastic.org/>

News - <https://www.euronews.com/living/2019/11/16/who-are-the-world-s-top-ten-marine-plastic-polluters>

6.2 Stakeholder Mapping

Table 1 depicts which of the recommendations would be suitable for raising awareness among different stakeholders. Stakeholders are identified in figure 1, encompassing academia, educators, the public, NGOs and CSOs, industry and SMEs, the press and media and policymakers and funders. The table uses crosses to indicate whether the listed

recommendation (numerical value only) is able to be utilized among the listed audience.

Stakeholder	Recommendation											
	1	2	3	4	5	6	7	8	9	10	11	12
Academia	X	X	X	X	X	X	X	X	X			X
Educators	X	X	X	X	X	X	X	X	X	X		X
The Public	X	X	X	X	X	X	X		X	X	X	X
NGOs & CSOs	X	X	X	X		X	X	X	X			X
Industry & SMEs	X	X	X	X		X	X	X	X			X
The Press & Media	X	X	X		X				X	X	X	X
Policymakers & Funders	X	X	X						X		X	X

Table 1 - Relevant recommendations among the identified groups of stakeholders

6.2.2 Policymakers

The following list details the recommendations relevant to policymakers, exploring in more depth the relevance to this stakeholder.

Recommendation 1: ensure awareness-raising is incorporated into project design

Successful mobilisation of the project aims is heavily dependent upon an awareness of the project's existence. It is, therefore, critical that awareness-raising is implemented within the project design, as it remains an integral component of a project's success. It is important to consider stakeholders and the desired interaction they will have with projects as raising awareness among different stakeholders will require different strategies of employment, varying in timing, technique and activity. This is inclusive of policymakers; specific strategies, tailored to suit the interests and schedules of policymakers should be established as part of the project design (Tweddle et al., 2012). Strategies can often be complex and multi-faceted, and so require planning, resources and time, meaning they should be considered early in the timeline of projects (Pocock et al., 2014). For example, you may wish to pre-plan awareness-raising activities, such as having meetings with policymakers or local decision-makers who are concerned by the topic, detailing that you are starting a project involving citizen science, what the objectives are and details of opportunities to be involved, remain informed and decide on if and how they want to contribute.

Recommendation 2: have a clear, simple and accessible hook when publicising

Varner (2014) suggests that many stakeholders feel overwhelmed when overloaded with information, which consequently limits their understanding of a project or activity. Citizen science projects are lengthy, detailed and complex, so it is important to highlight the key aims and outcomes when awareness-raising. Different strategies for communicating the key information points will vary in effectiveness among different stakeholders, and so techniques employed should be specifically tailored to policymakers when networking with this audience (Tweddle et al., 2012). It is suggested that decisions guiding involvement with a project or activity are determined by the purpose and nature

of the topic or issue (Hollo et al., 2015). Highlighting the ways that your topic or research focus could benefit policy development is a clear hook for policymakers. Similarly, highlighting how citizen science can raise awareness among communities surrounding local issues could mobilise interest from policymakers (Hecker et al., 2018).

Recommendation 3: develop a project website

Websites act as central hubs for information and guidance about a project. Having a designated location for the key information about a project allows audiences to feel confident in learning more and understanding the key aims and objectives. In some settings, it can be difficult to comprehensively communicate the full scope of a project, particularly if time is restricted. Signposting a website can offer policymakers a place to learn more and remain updated with developments surrounding a project.

Recommendation 9: discuss your project at events, conferences or gathering

As detailed in section “4.3 Event and dissemination”, events, conferences and gatherings are an effective method of interacting with policymakers and discussing citizen science projects. Awareness-raising in this capacity offers the communication of clear and targeted messages to policymakers, as well as the opportunity to respond to questions and queries in a personalised manner. Maximising face to face interaction offers a personal component to awareness-raising, which can help to establish working relationships (Tweddle et al., 2012).

Recommendation 11: align projects with ongoing or future policy debate

Involvement with a project is likely influenced by the purpose or nature of the research focus (Hollow et al., 2015). Subsequently, alignment with issues of policy concern could be an effective method of awareness-raising among policymakers. Awareness-raising strategies that are constructed and timed to align with ongoing or emerging policy concerns could attract the attention of politicians. Alignment with issues of importance to policymakers also increases the relevance of the project to society and offers opportunities to contribute to policy with the results of the project. It is important to consider that not all topics can feed into policy, and that this recommendation is opportunistic and will not be applicable to all citizen science projects and activities.

Recommendation 12: link studies, publications and reports back to the citizen science project

In order to establish why stakeholders should engage with citizen science, it is important to highlight the numerous successes, particularly those that appeal to them. Establishing why policymakers should be interested in citizen science is important. When results from a citizen science project are reported upon, either in the media or in publications, highlighting the origin of the data draws attention to the project or activity. It is important to link blogs, reports and publications utilising results from citizen science back to the initial study, raising awareness of the successes of citizen science. When policymakers see reports or publications utilising the results, and naming the project, they may be interested in the implications of the results and be drawn to project platforms.

6.3 Events and Dissemination

On an annual basis in months M24 and M34, the report will be updated to include information (title, date, location, content) on significant events (conferences, seminars, workshops) which will be organized by EU-Citizen.Science partners (Table 2).

Over the course of the project, WP4 will consult with project partners and third parties to gather information on awareness-raising activities and strategies used at events. Policy-makers will be engaged in activities at events co-organized by the project partners and through the global portal. This will be expected to result in increased awareness and understanding from citizens, policymakers, commercial companies and not for profit – philanthropic organizations. Existing citizen-science networks and projects’ events will be used as awareness-raising multipliers. In this section, we will provide case study style examples of the use of the awareness-raising techniques and report on the aforementioned multiplier events, to offer an insight into their success when implemented.

Title	Date	Location	Content
Museum Night Leiden	18.05.2019	Leiden, South Netherlands	At the Leiden Observatory, partners presented several CS projects and had a booth about CS in general and the CS Lab. <i>Recommendation 4, 8, 12</i>
Beyond borders in Citizen Science	27.06.2019	Vienna, Austria	EU-Citizen.Science workshop on “Beyond borders in Citizen Science” <i>Recommendation 12</i>
Round Table Discussion in cooperation with COST Action: Open discussion: Perspectives of Citizen Science in Lithuania	13.09.2019	Vilnius, Lithuania	Talk “Intro to CS for policy makers”, followed by presentations from EUCS project partners, with a moderated discussion to conclude <i>Recommendations 1 and 12</i>
Towards an alliance of citizen-science in Europe	18.09.2019	Porto, Portugal	Speaker at a workshop at the Open Science Fair Conference <i>Recommendation 4 and 12</i>
Monthly citizen science activities	October 2019	Barca D'Alva, Portugal	Organization of monthly citizen science activities to monitor the water quality of the Douro river (as part of the Drinkable Rivers project) in collaboration with schools, citizens and policymakers <i>Recommendations 4,8,12,13</i>

Table 1 - Significant events organised by EU-Citizen.Science partners, in which policymaker engagement and awareness-raising occurred

7 Conclusion

The EU-Citizen.Science project and its partners aim to provide a comprehensive and sustainable platform, providing relevant resources, training and guidelines that have been carefully curated to support a range of audiences. This deliverable contributes to this, detailing recommendations for achieving a wider awareness of citizen science among the variety of stakeholders highlighted within the project. Through identification and analysis of best practice and study of the available literature, this deliverable establishes a framework for improving the awareness of citizen science projects and activities. This deliverable contributes to Task 4.1 and 4.2, which aim to achieve societal awareness in citizen science through identified projects and initiatives and make general recommendations for policy. This deliverable will undergo further development and review in order to be adapted into an accessible and helpful resource that will be hosted on the platform, which will include a list of activities and events hosted by project partners and third parties. Parallel steps include the delivery of D4.1, which focuses on sustained engagement among stakeholders for citizen science, as well as contributing to WP5 through the development of a “Train the Trainer” methodology. Next steps include the delivery of D4.4, which focuses specifically on policymaker engagement and the implementation of recommendations regarding citizen science.

8 Next Steps

Deliverable 4.2 is an output of tasks 4.1 “Achieving societal awareness and engagement in science through existing citizen-science networks, projects and multiplier events” (Months 1 – 34) and task 4.2 “General policy recommendations for citizen science” (Months 1 – 30). This report and its resulting recommendations provide concrete assistance in raising societal and policymaker awareness of citizen science. This deliverable will contribute to the content provided on the EU-Citizen.Science website; the recommendations produced in D4.2 will assist stakeholders with raising awareness of citizen science activities and events across Europe, and will form the basis of an informative and user-friendly resource to be hosted on the platform. The foundation of these recommendations is formed from an extensive literature review, but WP4 will consult project partners and third parties throughout the updates and the process of translating the deliverable into a resource.

Deliverables 4.1 and 4.2 begin the development of a citizen science model for impacting science and research policy, contributing to a set of recommendations on how to make use of and support citizen science. These deliverables provide recommendations surrounding the engagement of policymakers in citizen science, the motivation of collaboration, the discussion between policymakers and citizen scientists, and capacity building, production of supporting materials and identification and production of key messages and recommendations. This model will need to be developed to include communication of information needs, the partnership between policymakers and citizen scientists, joint planning and fundraising and establishment of research ethics. WP4 will work closely with project partners to establish the facilitation of these points, as well as consulting supporting literature to develop the model to encompass these factors. This work will occur as part of Tasks 2 and 3 and will be conducted between months 13 and 34. Developments surrounding this model will also be reported upon within the updates to Deliverable 4.2, which will occur in months 24 and 34, and Deliverable 4.4. Once the recommendations resulting from the model are developed, WP4 will adapt the list to produce a resource that will be hosted on the platform.

Critically, in addition to the updates to events, Earthwatch will concentrate on awareness-raising among policymakers, in an attempt to broaden the understanding of policymaker engagement. This will include running an online workshop or survey in which we gather the thoughts and questions of project partners. This will involve discussing the current understanding of policymaker awareness, the benefits and challenges and the areas for action. Following this, WP4 will deliver a workshop during the project meeting in Madrid to disseminate these results and expand upon them, to form content for the first update (D4.3). To improve the interaction between the public, scientific experts and policy decision-makers, a series of policy recommendations on the integration of responsible research and innovation into the citizen science context will be devised. These recommendations will be reported upon in the updates to Deliverable 4.2, which will occur in months 24 and 34. This deliverable will contribute to the work conducted by MINECO to produce the

report for deliverable 4.4. WP4 will work closely with MINECO to establish how these recommendations will contribute to the case study, and similarly utilize their expertise and the results of the study to develop this deliverable within its updates.

Discussion with project partners highlighted the necessity to offer specific guidance for individual stakeholders, incorporating participation at the various phases of initiatives, examples of best practice, the benefits to these stakeholders and statistics that promote the relevance and successes of citizen science. As a result of this feedback, WP4 aims to develop a toolkit, including a series of documents aimed at individual stakeholder groups, that will provide guidance to partners, third parties and external parties in raising awareness of citizen science initiatives among specific audiences.

The outputs of tasks 4.1 and 4.2 will be measured using the EU-Citizen.Science evaluation framework, a result of task 7.1 produced by work package 7. As an output of these tasks, deliverable 4.2 will be measured using this framework. Within the tasks remaining timeline (months 15 to 34), a thorough evaluation will be conducted, to ensure that the objectives of the project are achieved. Deliverable 4.2 aims to assist the EU-Citizen.Science project in broadening understanding of citizen science across Europe, providing recommendations and examples of implementing them to establish best practice. As a result of WP4, there is an expectation of increased awareness of citizen science amongst all stakeholders, but particularly policymakers. Critically, we must ensure this is achieved within the task timeline and following the development of resources reflecting the content of this deliverable by utilizing the evaluation framework.

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