



NEWSERA - Citizen Science as the
new paradigm for Science
Communication

Deliverable 5.5

Re-thinking Science Communication: Take-away Ideas for Citizen Science Initiatives

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STATEMENT OF ORIGINALITY

This deliverable contains original unpublished work except where clearly indicated otherwise.

Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

EXECUTIVE SUMMARY

NEWSERA analyses and evaluates the complex and multidirectional science communication strategies including digital and non-digital, by addressing the quadruple helix stakeholders in Citizen Science (CS) projects across Europe as the new paradigm for science communication.

The aim of NEWSERA is to show the virtues of CS as an inclusive, broad and powerful science communication mechanism that can increase trust in science communication and, in turn, in science at large, while opening up science and innovation to society, raising awareness and educating in science, and reducing the chances of incurring in fake news by means of promoting critical thinking.

This policy report assesses the drivers and challenges of science communication of CS initiatives to the different stakeholders of the quadruple helix (the public sector and policy makers, citizens and society at large, academic scientists and industry and SMEs), and to data journalists¹.

CS projects are valuable for all the stakeholders involved and provide an innovative means of data collection for research, which otherwise may not have been possible. They have a huge potential when it comes to communication of science, evidence and data as they have the opportunity to engage at very different levels with all stakeholders. However, this communication mechanism presents a number of challenges, and the barriers to undertake are not always easy to overcome. NEWSERA is reflecting, together with a number of CS projects, how to improve their communication strategies to address quadruple helix stakeholders and how to partner with data journalists to maximize the impact of their research outputs and their communication efforts.

NEWSERA provides a science communication toolkit for CS projects across Europe, identifying barriers in reaching different stakeholders. Throughout the NEWSERA Labs (#CitSciComm Labs) series of workshops, we explore the state of the art of the communication of citizen science projects and facilitate discussions with stakeholders to understand where the gaps are when it comes to communication to issue recommendations on how to better communicate with quadruple helix stakeholders. Our recommendations will be tested in real citizen science projects (up to 38 CS projects involved as pilots in Italy, Spain and Portugal).

¹ This approach focuses on the research and innovation stakeholders that represent key local actors from government, associations, research and scientific institutions, companies and civil society/citizens, which engage in bottom-up collaborative processes in policy and research, and challenge the traditional top-down policymaking processes. Cavallini et al. (2016). "Using the quadruple helix approach to accelerate the transfer of research and innovation results into regional growth". Committee of the Regions, European Commission.

In this deliverable we provide preliminary take-away ideas and challenges to rethink science communication strategies for citizen science projects to better communicate and engage with the different stakeholders of the quadruple helix to achieve their goals, following the insights gathered during the first round of workshops of the NEWSERA #CitSciComm Labs.

The main ideas will also be collected and produced in an independent layout as a stand-alone document to be used for communication purposes during project execution.

This report is presented in the following order: First, an introduction “rethink in science communication”; second, NEWSERA #CitSciComm Labs are defined and discussed; third, a compilation of ideas from these #CitSciComm Labs are explained and divided accordingly (citizens and society at large, academic scientists, industries and SMEs, public sector and policy makers, and data journalists); and finally, a set of sections dedicated to acknowledgments, the list of acronyms, and references used to build this deliverable.

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1. Rethinking science communication

In 2014 the Oxford English Dictionary included the term citizen science with a definition broad enough to encompass all scientific disciplines: “Scientific work undertaken by members of the general public, often in collaboration with or under the direction of professional scientists and scientific institutions”². Citizen science is science, and therefore, it reflects the multiplicity of purposes and designs as the more traditional way of doing science. In Europe, Citizen Science is a broad term, covering the part of Open Science in which citizens participate in scientific research in multiple possible ways: having a passive role, as founders, as collaborators, as data collectors, and as co-designers³, in every case and approach. If carefully designed, citizen science experiences produce reliable data that are usable by the public, policymakers, journalists and the scientific community⁴.

The current relationship between science and society is evolving, and new opportunities for dialogue and collaboration have burst. Public and private institutions aim to be close to citizens in order to increase legitimacy, accountability and good governance. In parallel, science-informed decisions are also gaining momentum in advanced democracies. Thus, CS is the perfect cocktail for catalysing new science communication mechanisms that can increase trust, awareness and education in science.

These changes affect the working practices of scientists, policymakers, science communicators, journalists, and other practitioners whose engagement with science communication is rapidly developing. Such changes also impact how citizens relate to science and science communication.

BOX 1. CITIZEN SCIENCE AS A DRIVER FOR SCIENCE

Citizen engagement in science is a reality. People are participating in scientific research, even though they do not work as researchers. The volume of data and knowledge they generate allows scientists to gather and analyse vast quantities of data in a short space of time.

Citizen science can be defined as the non-professional involvement of volunteers in the scientific process, commonly in data collection, but also in other phases, such as quality assurance, data analysis and interpretation, problem definition and the dissemination of results. The critical purpose of any citizen science project is to contribute to scientific research. Otherwise, we are talking about science communication or science education.

² [New words notes June 2014 | Oxford English Dictionary \(oed.com\)](#)

³ [Citizen science | Shaping Europe's digital future \(europa.eu\)](#)

⁴ Lepczyk, C. et al. 2020, p8.

But citizen science can also shape the process of scientific research in a more profound way: it can include and empower citizens in the selection and definition of issues to research, transforming scientific research in a collaborative effort between scientists and their community. It also promotes science literacy and critical thinking for an informed society, increases trust in science and contributes to defeating the so popular *fake news*. In a nutshell, it allows us to do science in alignment with society.

It was this need which prompted NEWSERA to analyse and evaluate the current effectiveness of science communication strategies of CS projects towards quadruple helix stakeholders and their collaboration with data journalists to build up stories from citizen-generated data.

Throughout the project, NEWSERA will increase the knowledge of science communication of CS projects and will try to define innovative communication strategies with each stakeholder group, using both digital and non-digital channels, in a co-creative and iterative process, while testing and demonstrating the concepts of Citizen Science Communication and Citizen Science Journalism.

During the path, we will suggest new incentive mechanisms and suggestions to involve career scientists in science communication beyond academia and promote interdisciplinarity. With these practical tips, the aim is to help future CS projects in defining their own communication plan and choosing the right tactics for effective communication in CS. This deliverable is therefore, thought of as a guide based on our CitiSciComm Labs.

2. NEWSERA in a nutshell

The overall aim of NEWSERA is to unveil the potential of citizen science projects as a communication mechanism for science and technology. These initiatives can be highly engaging, raise awareness and educate in science, they can promote critical thinking and increase trust in science and science communication.

Box 2. NEWSERA OBJECTIVES:

1. Evaluate the current effectiveness of science communication and the perception of stakeholders participating in CS projects.
2. Create five Citizen Science Communication Labs (#CitSciComm Labs) addressed to quadruple helix stakeholders and science and data journalists, in order to advance the state-of-the-art of science communication.
3. Interlink data journalism principles and CS and find new ways to explore common goals and collaborative efforts between citizen scientists and data journalists.
4. Develop improved ways to measure and assess science communication.
5. Identify good practices to ensure quality, reliability and increased trust in science communication and science.
6. Produce five innovation blueprints, addressed to quadruple helix stakeholders and science and data journalists, to guarantee project replicability.
7. Provide policy guidelines to increase trust in science communication.
8. Provide new contents and methodologies for formal and informal teaching in science communication within scientific disciplines.
9. Suggest new incentive mechanisms to involve academic scientists in science communication.
10. Use advanced data mining techniques to provide a framework to evaluate the effectiveness of the different science communication strategies; the impact and efficiency of such strategies will be validated through the definition of KPIs.
11. Communicate and disseminate the project actions to replicate NEWSERA findings and science communication strategies in CS projects and beyond.
12. Embed and put into practice a highly inclusive engagement model.
13. Embedded in the ethics dimension in relation to the participation of citizens in research, data protection aspects, and in relation to the perception of science and science communication of quadruple helix stakeholders.

The NEWSERA approach of building a dialogue, through co-creation activities, with its target audiences, will allow rethinking science communication strategies. NEWSERA target audiences are represented by the quadruple helix stakeholders and data journalists.

2.1 Designing a communication toolkit for citizen science initiatives: The NEWSERA #CitiSciComm Labs

The co-design of innovative communication strategies using citizen science as a science communication tool is the core activity of the NEWSERA project. For this purpose, NEWSERA set up #CitSciComm Labs on communication and participation for citizen science projects to become a communication mechanism for science and technology.

The #CitSciComm Labs are focused on finding strategies to improve science communication of Citizen Science projects, to make them able to better reach and engage their stakeholders. All the #CitSciComm Labs invited relevant stakeholders to involve them in the co-creation process together with the communicators and the stakeholders representatives of the projects.

The Labs involve representatives from citizen science projects, science communicators, science and data journalists, and quadruple helix stakeholders: together they collaborate on new and improved strategies of communication addressed to quadruple helix stakeholders (citizens, academia scientists, policy makers, industries and SMEs). Each Lab consists of a series of co-creation workshops that are being organised locally in Spain, Portugal and Italy, allowing for remote participation and mutual learning.

The COVID-19 pandemic affected the NEWSERA project. The consortium adopted a new structure with a shift to virtual, local, delocalised Labs in the partners' countries (Spain, Portugal and Italy), happening in the local languages, instead of face-to-face centralized ones. In addition, a different format was adopted to include one stakeholder group representative for each #CitSciComm Lab, together with a relevant expert in science communication, at least one citizen science project representative and the NEWSERA partners. The new strategy has proven to be very effective and advantageous regarding what was originally foreseen: it has allowed us to increase the number of citizen science projects involved in NEWSERA (up to 4 projects per Lab and per country, with a total of around 38 projects: 16 from Spain, 12 from Portugal and 10 from Italy).

The new #CitSciComm scheme includes three rounds of workshops for each of the five Labs, planned to cover the entire duration of NEWSERA, as it has been extensively explained in D3.1. The citizen science practitioners are representatives of Citizen Science projects, which have been selected through a survey⁵ conducted

⁵ <https://newsera2020.eu/2020/06/08/survey/>

in the first months of the project, as explained in D2.1. The stakeholders differ according to the #CitSciComm Labs (see figure 1), and one Lab will be devoted to Data Journalists.

At the time of writing this report, the first series of workshops for each Lab addressed to quadruple helix stakeholders has been organized with high success. As a result, all citizen science projects participating in NEWSERA in Spain, Italy and Portugal have co-created an innovative science communication Plan, which will be applied and monitored until the second round of workshops, where the Plans will be refined after analysing the impact achieved.

The results of the #CitSciComm Labs will be the basis for five Communication Blueprints, guidelines for more effective science communication strategies in citizen science projects.

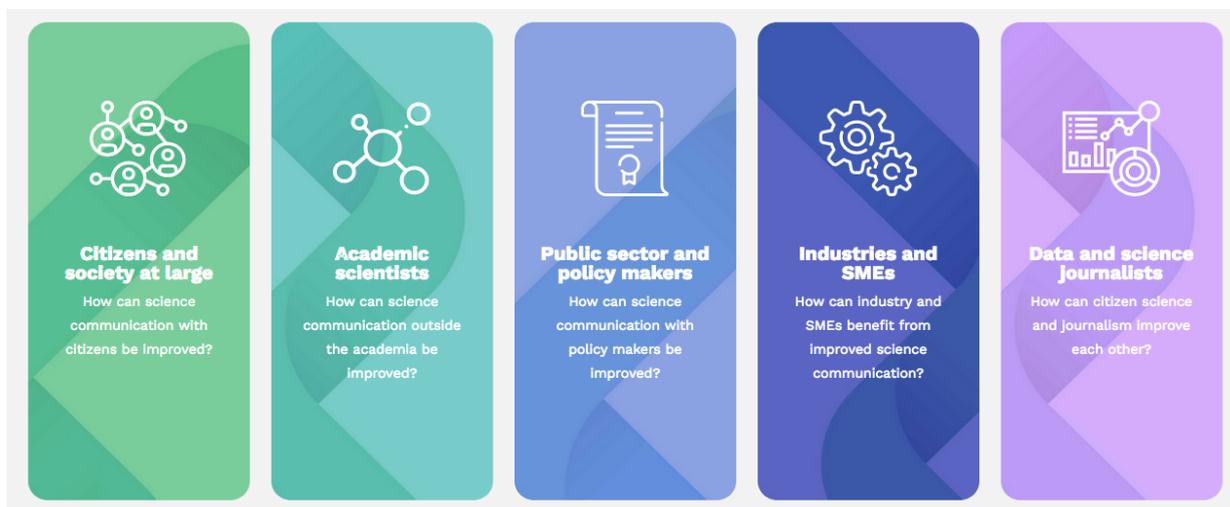


Figure 1: Scheme of the NEWSERA #CitSciComm Labs addressed to stakeholders of the quadruple helix and data and science journalists

3. Preliminary take-away ideas and challenges for better communication of citizen science projects with the stakeholders

Why do Citizen Science Projects need to communicate with quadruple helix stakeholders and data journalists?

Using CS as a new communication tool opens an interesting way of innovative communication in science, and helps democratize science.

In this context, understanding what processes may block, challenge, or drive any CS communication efforts is fundamental to pave the way for advancing citizen science communication strategies when reaching wider audiences. It is key to take into account the target stakeholder group that the CS projects want to address, since the key messages, channels, or communication actions could be totally different. The objective of the communication will also vary depending on the stakeholder group. For example, in the case of citizens, CS projects may want to increase or maintain engagement. CS projects may need to reach policy makers to achieve their policy impacts and goals or to inform public policies based on citizen-generated evidence. Other projects may need to address academics for a wider uptake of their project results, or to work in an interdisciplinary way, and they will need to generate trust among traditional scientists. Finally, reaching industries and SMEs can help build the exploitation model of the projects, contributing to their future sustainability.

Citizen science is a complex enterprise as it involves bringing together professionals with different backgrounds, disciplines, and interests to work together on common and collaborative joint initiatives.

For this purpose, the first round of workshops of #CitSciCom Labs started in December 2020 to build better and effective communication strategies, to identify barriers and stoppers and to co-create concrete communication actions to be immediately implemented and monitored⁶ towards the different stakeholders and data journalists.

The successful experience allowed us to set up a few preliminary take-away ideas and identify the most important challenges for better communication with the different stakeholders and data journalists. How different actors perceive, trust and engage with citizen science initiatives vary in a vast landscape.

⁶ A certain degree of flexibility was adopted to better tailor the Labs on the stakeholders' needs. Also differences between the citizen science context in Italy, Portugal and Spain have been taken into account.

3.1 Factsheet NEWSERA - citizens and society at large

The stakeholder⁷

Citizens who currently participate in citizen science projects (citizen scientists), who are interested in science, society at large, or citizens who may benefit from citizen science projects to address socio-environmental challenges of their concern, are a major NEWSERA target audience. The objective for the projects may be to increase the engagement of new groups of citizens or to maintain the engagement of the involved citizens.

The Projects involved in the #CitSciComm Lab⁸

Citizen science projects participating in the Citizen´s NEWSERA lab in each country		
Spain	Portugal	Italy
Plant*tes COMPASS Urbamar Mosquito Alert	FRISK Vacaloura.pt Grande Caça aos Ovos MosquitoWeb	GERT Roma UP Innat



3.1.1 Take-away ideas on how to communicate with citizens and society at large better

Foster Public Engagement

Public engagement makes the process of knowledge creation more open towards society. The purpose, hence, is matching science with specific societal motivations and needs. In doing so, we fight against science misconceptions and fake news.

Co-create the research project with citizens: make sure you understand what their concerns and needs are.

⁷ A more extensive description of the stakeholder can be found in D3.1 Description of the #CitSciComm Labs.

⁸ A description of the different projects and some examples of the co-created communication strategies defined for each one of them during the Labs can be found in D3.2 Co-designed Innovative Strategies for Citizen Science Communication.

Intercept potential voluntaries through initiatives on the territory following a two-fold strategy:

- Formal: Team up with already existing groups, associations, aggregative centers (e.g. youth centers, scouts)
- Informal: Create exchange meetings where every citizen can intervene bringing their thematic needs and concerns.

Involve Citizens in doing science

Engage citizens as sensors, as data interpreters, up to active collaborators in identifying the research problem, setting up research questions and to even analyse data. In other words, engage and involve citizens in each step of scientific research. Involve citizens with scientists. This alliance will develop into a mutual exchange and benefit for both.

Engage with citizens throughout the whole research project cycle, they can be an active participant in the advancement of science and technology.

Citizens can be involved directly in the dissemination of projects results in public events open to a broad audience: locally this may increase participation to follow-up events and further promote new volunteers enrolment.

Similarly the opportunity to experiment scientific activities can be an experience to be shared and to be further advertised through collection of video testimonies of citizens already involved / photo reportage.

Be flexible in difficult times

During COVID-19 times, make as much use as possible of social media to maintain the digital communication with citizens through social media or other channels. Use new digital tools to promote virtual co-creation.

Besides digital communication, citizen science projects should imagine further ways to exploit opportunities of mobility for citizens: virtual walks as new forms of bioblitz.

As many platforms for citizen science projects have shown, gamification approaches (namely to give rewards according to specific milestones reached) might be useful to ensure a high rate of participation and avoid turnovers.

Fight fake news

Citizens can be an active participant in science communication in so many ways. For instance, they can be an evidence-informed network to fight against fake scientific information.

3.1.2. The challenges

Lack of industry

Citizen science projects might not be able to engage citizens that are outside a clique of concerned groups or amateur already interested.

Make sure to engage with diverse citizens so they are as representative as possible of society.

Identify associations and institutions that may give you access to a good number of citizens underrepresented (e.g. Youth organizations, women associations, minority representative groups).

Lack of understanding of the real impact

It is not easy to have an idea about the impact of science communication across society. Thus, it is important to define ex post evaluation strategies to understand and then measure the effects of a project / intervention involving the citizens through specific participative methodologies. In pandemic times focus groups could also be done online.

Use the ex post evaluation to measure the effects of a project / intervention in the long term through qualitative methodologies involving the stakeholders (e.g. focus groups that can also be organized in time of COVID-19);

Lack of long term engagement

Citizens' retention strategies: Rethink how to maintain the engagement and motivation of citizens over a longer period of time. Continuous feedback and gamification always help.

An opportunity as reported by projects involved in the Labs is to coordinate with already existing educational paths or other volunteering organizations in order to have a turnover of enthusiast participants into citizen science activities.

Coordinate educational paths to promote scientific citizenship already in primary school.

Establish a schedule of updating moments with citizens at the end of the project: make them participate in the meetings to disseminate the results, allowing them to be protagonists in some contests.

3.2 Factsheet NEWSERA - academic scientists

The stakeholder

Academic scientists include researchers that work in universities, research centres, science and technology parks, learned societies, technology transfer offices, units of scientific cultures and other interface professionals. This diverse community includes both researchers who participate in citizen science projects and who do not know what citizen science is, or are skeptical about.

The Projects involved in the #CitSciComm Lab

Citizen science projects participating in the Academic scientists' NEWSERA Lab in each country		
Spain	Portugal	Italy
Biodiversidad virtual Genigma DENIS MammalNet	Biodiversity4All Memória para Todos Rios Potáveis	CSMON-Life Easin The school of Ants



3.2.1 Take-away ideas on how to communicate with academic scientists

Involve researchers and academics

Present citizen science projects in academic fora (conferences, journals) beyond the citizen science “bubble”. And explain the methodology and benefits of using it with quantitative and qualitative results, if necessary.

Make communities and platforms available and open as opportunities for researchers to improve their research. Allow scientists to formulate their own questions.

Explain the science of the citizen science projects to your colleagues also in informal environments.

Identify champions within the scientific community

Have citizen science ambassadors within research institutions to promote citizen science, and establish a formal internal communication method.

Engage scientists in citizen science projects that help to amplify the results' communication, at every level.

Be sure to communicate the science within the project

Make sure to communicate the scientific features of citizen science projects to academic scientists. This way the scientific community will understand that citizen science is real science, and hence, can create a positive spill-over effect in the community.

Make clear the scientific aims of every citizen science project by presenting quantitative and qualitative benefits of implementing this methodology.

Be sure academic scientists recognize the scientific component of citizen science projects, by also training them in using this methodology.

Nurture coordination among researchers involved in similar citizen science initiatives

Acknowledge the diversity of the citizen science ecosystem and make use of existing experiences and resources. There is a vast literature already published, which can benefit and enhance future citizens' science projects.

Co-create citizen science projects along with researchers involving all scientific disciplines and research fields (including social sciences and humanities).

Find relevance to research and make the bridge between the local level and the researcher's interest. In doing so, you make sure any research answers societal interests directly.

Promote open science

Sharing information might benefit scientists and their research. Following the European Commission recommendations, open science is a policy priority and the standard method of working under its research and innovation funding programmes. It improves the quality, efficiency, and responsiveness of any research. When partners from across academia, industry, public authorities and citizens are invited to participate in the research and innovation process, creativity and trust in science increases.

Collaborate, whenever possible, with universities and public research centers in science dissemination of citizen science projects, due to their image of impartiality, independence and public service.

3.2.2. The challenges

Lack of initiatives and motivation for academic scientists

Understand what motivates scientists to work outside their routine research but also the barriers they face in doing so (e.g., pressure to publish, workload, lack of time, among other things).

Help in increasing the recognition of citizen science as a research field for scientists (it is still mainly seen as a science communication or education action, but not as real science).

Lack of trust in citizen generated data

Promote trust among academic scientists; citizen science can be as rigorous and trustworthy as “professional” science.

Improve data validation and data quality of your citizen science project (scientists need to have the evidence of data validation mechanisms).

Promote structured policy engagement of citizen science projects in scientific institutions.

Lack of funding

Promote new ways of communicating to get more funding (consider social media as a potential way to boost financing and attention to the research activities).

Integrate citizen science as part of scientific proposals when looking for funding.

Lack of professionalization

Rethink organization culture and develop new talent at the interface of science and society.

Provide training to academic scientists in citizen science matters.

Search for professional communication expertise and resources to better engage academic scientists.

3.3 Factsheet NEWSERA- Industries and SMEs

The stakeholder

Private sector stakeholders include industry, private companies, which can be multi-national organisations, as well as SMEs and start-ups. This target audience may cover entrepreneurs, research and development, research and innovation, communications departments of SMEs or big companies, as well as Corporate Social Responsibility departments.

The Projects involved in the #CitSciComm Lab

Citizen science projects participating in the Industries and SMEs' NEWSERA Lab in each country		
Spain	Portugal	Italy
RiuNet Adopt a plant Vivencia Dehesa Biook biohacking	Censos de Borboletas Lixo Marinho	Reef Check Italia Onlus Sea cleaner



3.3.1 Take-away ideas on how to better communicate with industries and SMEs

Involve industry and SMEs

Citizen science projects are sometimes reluctant to partner with the private sector. Including the private sector in the entire process of design of the project can benefit the project in many aspects: new perspectives and research questions, funding opportunities, further outreach and many others.

Try to engage with the vision and mission of industries with a potential interest in your project.

Industries are also exploring better ways to engage with citizens: use that common objective to work together on joint initiatives.

Network with sister citizen science projects

Build up a social capital network to gain credibility and to ensure social impact. Shape a service for the industry to create a win-win situation.

One size does not fits all

Identify the right industry. Industry is not a homogeneous category, not only because they may be different for their sectors but even because they might differ in size, scale of their business, ownership and so on. The same strategy could not be adapted for all.

Embrace new business models

Fight stereotypes. Convince the industry that Responsible Research and Innovation (RRI) and Corporate Social Responsibility dimensions are important aspects of modern industry. Help industry to adopt "greener" and "more social" models.

Contribute to rethink organization culture and develop new talent at the interphase of science and society conducting successful pilots and interconnecting all departments.

Your data is valuable. Be proactive

Call attention to the added value of the data generated by your citizen science project.

Show that data and the community/citizen science can help them in multiple ways: (1) to improve their products/services/processes, (2) to improve their social and environmental capital, and (3) to change the background narratives.

Solve real socio-environmental problems (or at least try to improve them).

3.3.2 The challenges

Lack of trust

The private sector may be sometimes reluctant to share data with citizen science projects. In order to avoid this, we suggest that citizen science is part of the research and innovation ecosystem, and therefore, the private sector can also benefit from this practice in the short and long term.

Team up with other stakeholders (policy makers, for instance).

Lack of mutual knowledge and understanding

Acknowledge citizen science as a key asset for the company's image and reputation.

The private sector is not so common a target group. We suggest finding a common agenda (e.g. show them the connection between agriculture, livestock and biodiversity).

Include citizen science in private sector strategies.

Lack of common language

Here, we need to find a common language between projects and private sector stakeholders.

For that purpose, we suggest to facilitate communication channels and exchange interfaces among researchers, citizens and private sector stakeholders.

Lack of founding

Support research by providing funds from international research projects.

Explore new research funding opportunities.

3.4 Factsheet NEWSERA - public sector and policy makers

The stakeholder

A broad definition of what a policy maker would be: a member of a government department, legislature, or other organization who is responsible for making rules, laws in the local, regional, national, and European level. This may include officers and public sector officials who create ideas, plans, and policies carried out by a specific government.

From the last century, our world faces unprecedented environmental, health and socio-economic challenges that require the common action of citizens, policy makers, business and researchers, and citizen science communication represents a crucial step in overcoming these challenges. Besides, our current political context increasingly is in need of civic involvement, either through traditional mechanisms or deeper integration in multiple stages of the policy agenda.

The importance of the communication of citizen science is not yet visible at all policy stages, neither territories nor within the current public engagement mechanisms -public consultations, initiatives, and activities. In order to tackle these challenges, the NEWSERA project seeked to boost science communication with policy makers.



The Projects involved in the #CitSciComm Lab

Citizen science projects participating in the Policy Makers NEWSERA Lab in each country		
Spain	Portugal	Italy
Geovacui Cities at night D-NOSES PQSTORYα	Gelavista Novos Decisores Ciências Invasoras.pt	GENA Airt Heritage Aliens in the Sea

3.4.1 Take-away ideas on how to better communicate with policy makers and public sector

Build alliances with policy makers

Engage the citizen science community to work together with the public administration at any level: from the local, regional, national, European or even international levels. Partner with policymakers in joint endeavours, and avoid unnecessary conflicts.

Public institutions wanting to engage in citizen science communication also have to consider the amount of resources required to manage the project, but also the expectations from those actively engaged. Empowering communities and individuals requires a constant feedback and flow of information from each actor involved. This can be seen as a great challenge that can be overcome by planning meticulously the communication channels for feedback and provision of appropriate contextual information. There is room to build alliances with policymakers in this regard, they are also trying to find new ways to connect with citizens and improve administration popularity, and this is something that we all can take advantage of (mutual interest).

Do not think as a scientist, policymakers are usually more interested in solutions to daily problems, not in scientific results or research questions. This is why it is of utmost importance to generate synergies with complementary projects to show the potentials of CS for the administration.

Generate debate and policy-society dialogues also inviting citizens: since some have questioned the effect of democratisation of science and communication policy, starting dialogues can be perceived as a good way of enhancing trust in science, fighting fake news, and avoiding citizens' resistance to circumstances that are socially and economically relevant. Some current voices argue that sometimes public engagement may lead to another constraint, making public participation another political tool.

Do your work

Understanding of which level -local, regional, national or supranational- and type of policy maker -politician or policy maker, being part of the executive or the legislative power- is of interest to your project. Indeed, one of the main challenges at the European or international level comes from the diversity of cultures and legislation. For instance, European member states have different legislative frameworks in uncountable topics and areas. A previous research review on how and whom a territory is governed is of utmost importance to better understand how citizen science projects can be integrated in the political sphere.

In this regard, undertaking accurate research on policy priorities in each territory is recommended. Understanding of the policy agenda, its urgencies and priorities together with its pipeline should be coupled, when possible, with demonstrations of the citizens' science impact on constituencies. Find out which is the right policy maker who can facilitate what you need. Understanding the restraints is also important: There is nobody who can give you access to everything, each professional has its limitations. A clear communicative policy message for citizen science initiatives would help ensure they are perceived as useful tools for policy. A right communicative framework and strategy is needed to make sure citizens are heard and are an actual part of the solution that concerns policy-makers. Even a careful selection of the terminology used to describe citizen science in a way that is paramount to policymakers can make a great difference.

Timing

Connect to the policy agendas timings. It is also paramount to find the right momentum to collaborate, for instance, policymakers are usually more prone to participate in CS projects during working hours, while citizens after working hours. Plan and adjust time-dedication for each participant from the beginning until the end of any project.

Support evidence-inform public policies

Check out if your CS project can address any issue in the current political and public agenda so it can be useful for the decision-making process (without citizen support, policy makers are less likely to listen, however CS is not doing activism either).

Make sure you understand what their concerns on public issues are and include them in your research questions, and co-create the research project with policy makers. Contribute with your data and research outputs to more evidence-informed public policies so you can become a long-term partner for public agents.

Create specific materials to policy makers that offer solutions to public issues based on your research, and convey with government agencies, departments and bodies science-informed messages and recommendations based on your data.

Have a direct and concrete message

(Re)-define your message towards policy makers (such as raising funds for the project, a better understanding public problematics in order to design a CS project to address the issues, establishing a collaboration to better engage citizens, or influencing policy making by means of presenting scientific evidence to policymakers, among others).

Adjust your message to stakeholders which are usually extremely busy and dedicated to solving urgent matters at all times. Have a clear idea of what and how you want to transmit before meeting them. Simplify communication by using

leaflets or other visual materials, and maintain first "informal" conversations with technicians and/or assistants available before presenting the project to policymakers.

Team up with other organizations and let them see what we have in common

Coordinating across governance levels: Think globally, act locally. Work together with complementary CS projects. Make the case for CS as an innovative method to policies planning to help to give consistency to public policies. Despite the relative integration of CS projects into European, national and regional programs, few networks, or groups for lobby, connect emerging citizen science initiatives with each other, not to mention, with existing knowledge and policy schemes. Communication with clear definitions of the current opportunities, roles and responsibilities at different levels would strengthen coherence and expand the practice of CS into policy topics.

3.4.2. The challenges

Lack of awareness

In order to tackle lack of awareness, you would probably need to connect policy agendas with research agendas. Nowadays, it is clear that citizen science initiatives can be catalysts of innovation: their inputs can lead to more informed, robust and accountable outcomes in the policy and science agendas. By merging both agendas, we can expand the evidence towards a citizen-based policy making. This also implies an issue of boosting democratic rights as well as introducing an inclusive approach for both the research and policymaking bodies.

The policy ecosystem is complex and dynamic

The challenges for a supranational and complex institution such as the European Union is manifold, not to mention the policy interlinkages among Europe, its member states with their own and diverse national governments, regional administrations and local governments.

In order to run well-integrated and successful citizen science communication projects, the very first element with room for improvement is the institutional culture. We need a common definition of what is citizen science and its added value for everybody -science, policy-makers, business and citizens. In order to do so, we should continually adapt according to experiences, research in the field of operations, circumstances and specific needs.

Secondly, we would engage with diverse audiences in policy making by using a variety of tailored methods and tools. For instance, even a slight change of the used language would already be a positive step - to avoid the term "they" when we speak about the citizens.

Thirdly, navigating changes in local, regional, national and/or supranational governments, depending on their area of influence, due to new elections, switch of government officials and policy-makers, and change of policy priorities, among other things. We need to adopt a flexible mindset, and concrete coordination through the appointment of a suitable organization structure at a horizontal level willing to involve as many ideologies as possible, so changes in governments will not affect citizen science initiatives and its communications.

Fourthly, we also need to build standardized communication messages and potential barriers and mitigation strategies to overcome issues quickly. Finding the right channels to connect with policy makers would represent a great first step.

Lack of trust

Tensions are still evident between traditional lobby and consultation and the innovative way of bringing citizens at the forefront of policy making in science, overcoming these tensions is a long term fight. Nonetheless, from a citizens' perspective, calls for more openness and accountability in policy-making is a real issue, together with a profound interest and eagerness from legislators to better appeal to public opinions' and knowledge inclusion in the policy agenda. In order to face these issues, a twofold action would be implemented: Firstly, select and share only verified and relevant information based on factual data and scientific knowledge. And secondly, develop a science communication that is balanced, evidence-informed and up-front.

Lack of training

Promote specialized citizen science workshops among governmental policy makers. Capacity building inside the European Union, state members, regions and local governments to run citizen science initiatives is paramount: enhancing better coordination among territorial levels of government in order to avoid overlaps and to extract mutual learning experiences.

Communicating, assessing and evaluating good practices and the impact of previous citizen science initiatives by developing specific metrics for each context could be another way forward.

Lack of funding

Lack of funding is one of the most common challenges highlighted in the #CitSciComm Labs. Participants mentioned the availability and continuity of funding as a fundamental factor in CS projects. Being able to allocate time and specific funding to work for the long term has represented one of the highest concerns, finding resources to situate CS projects in the policy agenda and cover the costs of participatory processes. An option agreed by most participants was to lobby for an increase in the budget for CS initiative at an European, national and regional levels of administration.

3.5 Factsheet NEWSERA - data journalists

The stakeholder

The journalist target audience includes science journalists, who are specialized in science information, and data journalists, who use data as one of the main sources of reporting. They publish scientific or data content in generalist and specialized media, digital or non-digital, and may or may not be in touch with CS projects.

3.5.1 Take-away ideas on how to better communicate with data journalists

Build alliances with data journalists

Engage the community to work together with data journalists (open spaces for public debates). Citizen science projects can be an amazing source of information.

Partner with data journalists in joint endeavours (scientific issues can also become a hot topic, for instance climate change or COVID-19 diseases). They can push your project forward and provide more visibility. Then, the engagement approach with data journalists can become crucial for projects for a higher impact.

Share data and support evidence-inform public media

Engage with the media in order to encourage them to convey science-informed messages and news. Citizen science can be very helpful with framing the data collection and the analysis of problems with strong local expertise and cognition and fighting misinformation.

Co-create the research project with data journalists. Contribute with your data and research outputs to more evidence-informed media and news.

Be aware that journalists always look for other voices and should always verify your data (they should maintain their journalistic accountability).

Create specific materials to journalists that offer solutions to public issues based on your research.

Tell the story behind the data

Promote storytelling and "don't call it data". Journalists tell stories and therefore there has to be an angle, a story, a piece of results, an idea, and a solution that comes with the data.



Scientific data can be visualized and narrated through data journalism, but be patient! Long time is needed to have enough data to publish (1-2 years).

Prepare materials for (lazy) journalists: video, tables with data, pictures, etc. A press kit is a good idea!

3.5.2. Challenges

Lack of trust

Select and share only verified and relevant information based on factual data and scientific knowledge.

Develop a science communication that is balanced, evidence-informed and up-front.

Lack of training

Promote specialized citizen science workshops among reporters and media professionals.

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PARTNERS

The NEWSERA consortium is composed of six partners, experts in citizen science, science communication and with transdisciplinary expertise in co-creation, co-design, participatory strategies, data analysis and impact evaluation:

1. Science for Change (SfC) - Spain
2. Università degli Studi di Padova (UNIPD) - Italy
3. FCIENCIAS.ID Associação para a Investigação e Desenvolvimento de Ciências (FC.ID) - Portugal
4. Spanish Foundation for Science and Technology (FECYT) - Spain
5. Fundación Ibercivis (IBERCIVIS) - Spain
6. Formicablu (FB) – Italy

Acronyms

Acronym	Description
CS	Citizen Science
EU	European Union
FB	Formicablu
FC.ID	FCIENCIAS.ID Associação para a Investigação e Desenvolvimento de Ciências
FECYT	Spanish Foundation for Science and Technology
NEWSERA Labs	#CitSciComm Labs
SfC	Science for Change
UNIPD	Università degli Studi di Padova
WP	Work Package

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Annex: Co-creating the take-away ideas during the NEWSERA #CitSciComm Labs

As explained in D3.1, we used co-creation for developing innovative communication strategies for the CS projects involved in the Labs. Here are some examples of the graphic recording of the objectives of the citizens Lab, and the description, communication objectives, resources and Plan for some of the projects.

