

CITIZEN SCIENCE AS THE NEW PARADIGM FOR SCIENCE COMMUNICATION

How to cite

Magalhães J, Leguina L, Elorza A, Lacunza I, Luís C, Navalhas I, Pelacho M, Giardullo P, Citarella MA, Tola E, Arias R. NEWSERA Policy Brief 2. (D5.4).
Zenodo doi: <https://doi.org/10.5281/zenodo.7752561>



This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 873125

Open Science (OS) is moving at a steady pace to become the new *modus operandi* of modern science^{1,2}. **Citizen Science** (CS), **one of the eight ambitions of OS**, understood as the general public engagement in scientific research activities³, is both an aim and an enabler of knowledge-based decision-making for present and forthcoming societal challenges, such as the COVID-19 pandemics or the climate crisis. These have made evident the need of fostering equitable access to scientific information, facilitating the sharing of scientific knowledge, and enhancing scientific collaboration to respond to global and urgent emergencies and increase the resilience of societies. In this current context, **science communication** is key to involve quadruple helix stakeholders (citizens and society at large, academic scientists, public sector and policymakers, and industry and SMEs, 4H) in the solution and to avoid the propagation of misinformation and fake news, among others. However, the implementation of CS and the engagement of 4H stakeholders faces many challenges and barriers, including the lack of scientific recognition, long term engagement, data validation and quality, communication strategies, demonstrating impacts, project sustainability and funding⁴. In addition, an overall absence of specific knowledge and professional human capital in science communication within the team to reach their targeted audiences CS projects' has been largely observed, demonstrating an overall **need of**

specific training and capacity building.

A **survey** on the analysis of communication tools and strategies completed by **157 CS projects** across the EU, the UK, and Switzerland was conducted as the first NEWSERA external action. That analysis found that CS projects in the sample tend to interpret communication as a dissemination activity, mainly oriented towards educational purposes, presenting a quite low level of engagement of participants (principally involved as data collectors). As such, the commonly adopted top-down, one-to-many, unidirectional and oriented to a knowledge transfer science communication style, is still far from the full involvement of multiple stakeholders and the true dialogical potential of CS⁵.

This **policy brief** assesses the potential and challenges of Citizen Science as the new paradigm for science communication. It presents the NEWSERA methodologies, the evidence collected and the impacts achieved, including the exploration of new concepts such as **citizen science journalism** and **citizen science communication** to tackle misinformation. It explores the relationship and communication challenges and barriers experienced between researchers and policy makers, and makes recommendations to the European Commission to overcome them and increase the support to CS and science communication for the benefit of European citizens and society at large.

So how can we push the fast-forward button for Citizen Science and science communication?

NEWSERA aims to show the virtues of CS as an inclusive, broad and powerful science communication mechanism that increases trust in science communication and, in turn, in science overall, while opening up science and innovation to society, raising awareness and knowledge in science, and reducing the chances of incurring in fake news, by means of promoting critical thinking.

(1) UNESCO (2021). Recommendation on Open Science. <https://unesdoc.unesco.org/ark:/48223/pf0000379949.locale=en>

(2) European Commission (2016). Open innovation, open science, open to the world — a vision for Europe. Luxembourg: Publications Office of the European Union. <https://doi.org/10.2777/061652>

(3) Sanz, F., et al. (2014) White Paper on Citizen Science for Europe. <https://ciencia-ciudadana.es/wp-content/uploads/2018/09/WhitePaperOnCitizenScience2014.pdf>

(4) European Commission, Directorate-General for Research and Innovation, Mutual learning exercise on citizen science initiatives : policy and practice. Second topic challenge paper, Ensuring good practices and impacts : Horizon Europe policy support facility, Publications Office of the European Union, 2022, <https://data.europa.eu/doi/10.2777/17212>

(5) Giardullo, P, et al (2023) Citizen Science and Participatory Science Communication: An empirically informed discussion connecting research and theory. JCOM 22(2), A01. <https://doi.org/10.22323/2.22020201>

The NEWSERA methodologies, evidences and impacts

1.1 NEWSERA CO-DESIGN METHODOLOGY AND IMPACT FRAMEWORK: ESTABLISHING INNOVATIVE MULTI-TARGETED COMMUNICATION STRATEGIES

In 2020, **NEWSERA** embarked on a journey to answer a fundamental question:

Which are the most innovative communication strategies that CS projects can apply to better engage 4H-stakeholders and science and data journalists, while increasing their project impacts at the same time?

To answer this question, a co-design methodology was developed and implemented through the **NEWSERA #CitSciComm Labs**, addressing 4H-stakeholders and science and data journalists. We believe that co-creation is key!

The #CitSciComm Labs iteratively tested and evaluated **co-designed multidirectional communication strategies**⁶ in **39 CS projects** (the NEWSERA pilots), **across Europe (Italy, Portugal and Spain)**, with and for each of the 4H-stakeholder groups and science and data journalists, using a **novel impact framework**⁷ that considers CS project objectives, science communication activities and the Responsible Research and Innovation (RRI) dimensions⁸. The NEWSERA inclusive approach of building a dialogue, through co-creation with its target audiences, allowed to rethink science communication strategies and promoted mutual learning. At the same time, it brought into light several gaps felt by the pilots, who were relieved after noticing that most of them were commonly shared, such as the need for capacity building and mentorship. NEWSERA facilitated networking, training, meetings with experts and supported existing networks in various communication-related topics. Targeted mentoring was fundamental to the realisation of this enduring process.

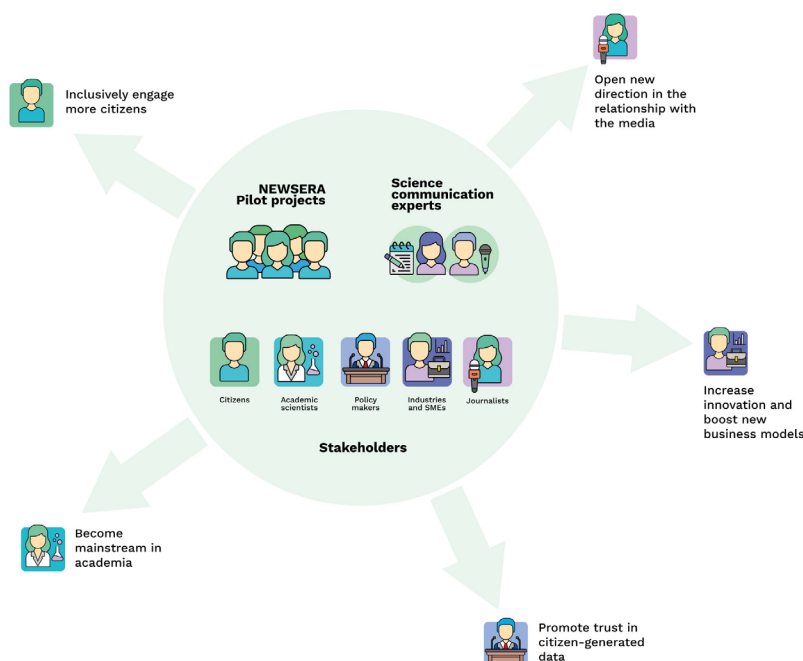


Fig 1. The NEWSERA #CitSciComm Labs addressed to 4H-stakeholders and science and data journalists. At each Lab session, representatives from the NEWSERA pilots and the stakeholder group, together with science communication experts and NEWSERA team members were involved in co-creation activities.

(6) Magalhães, J, et al. (2022). A methodological approach to co-design citizen science communication strategies directed to quadruple-helix stakeholders. JCOM 21 (04), A05. <https://doi.org/10.22323/2.21040205>

(7) Giardullo P, et al. (2023) NEWSERA Indicators for Communication Strategies of Citizen Science Projects. (Version 1). Zenodo. <https://doi.org/10.5281/zenodo.7744168>

(8) von Schomberg, R. (2013). A Vision of Responsible Research and Innovation. In Responsible Innovation (eds R. Owen, J. Bessant and M. Heintz). <https://doi.org/10.1002/9781118551424.ch3>

1.2 NEWSERA MAIN FINDINGS

- Citizen Science always requires generalist means of communication, regardless of the preferred interest groups or at any given time.
- The fact that CS is inherently participatory does not guarantee that its results are necessarily satisfactory, any more than they are guaranteed in professional science. Effective communication, internal and external, favours - as in science in general - the feedback necessary for the consolidation of both the knowledge generated and the communities that generate it.
- The identification of the challenges, mutual benefits and resources needed from the early beginning allows better planning and implementation of effective communication strategies.
- Establishing relations and multilateral communication, be they of influence, cooperation or demand, such as those with and for the public sector and policymakers, or industry and SMEs, is complex and requires specific training, capacity building and mentoring, such as the one offered in NEWSERA.

NEWSERA IN A NUTSHELL



5

**CitSciComm
labs**



44

Workshops
Including Newsera
Fridays



39

CS projects
From Portugal, Italy
and Spain



140

**4H stakeholders
and scicomm
experts**



50

Training session
Capacity building and
participatory events

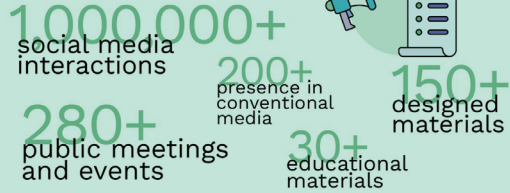


244

Mentoring hours

NEWSERA PILOTS' MAIN ACHIEVEMENTS

communication



4H-Stakeholder and more Engagement



other impacts



1.3 NEWSERA BLUEPRINTS - ENSURE A WIDER IMPACT OF CS PROJECTS

One of the main outputs from NEWSERA are the five Blueprints for #CitSciComm with and for 4H-stakeholders and science and data journalists⁹. These include good practices, barriers and mitigation strategies, mutual benefits for CS and each stakeholder, indicators, case-studies and recommendations to efficiently engage with stakeholders for wider impact and ensure replicability of the NEWSERA findings and science communication strategies in CS projects and beyond.

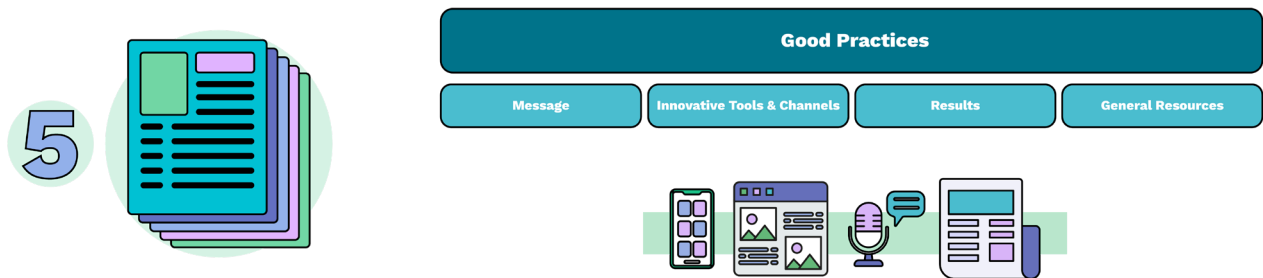


Fig 2. Summary of the contents of the 5 NEWSERA Blueprints.

(9) For more details on each of the blueprints, please visit the [NEWSERA website](#).

1.4 A NEW CONCEPT: CITIZEN SCIENCE JOURNALISM

CS projects can contribute to the generation of original datasets, focused on a range of diverse topics that can be of high public interest. However, citizen-generated data often remain confined to the domain of science and scientific publications, rarely reaching a broader public. Data journalism can be particularly useful when applied to issues of high public interest, using data and data visualisations to build stories that produce fact-based, reliable, verifiable and thus trustworthy information to the audiences. When relationships with the media are established from the beginning, the opportunity to raise new questions from a journalistic perspective can bring new avenues to the investigation, not only in terms of media interest but also scientifically or in terms of social and environmental justice.

Citizen science journalism combines citizen-generated data and engaging methodologies with the narrative power and investigative process of data journalism. This translates into a stronger opportunity to empower new forms of engagement, active participation, and dialogue over the significance of data, the way scientific knowledge is produced and validated, and ultimately the civic and ethical responsibilities of science agents and the choices the whole society makes on the basis of it.

The cross-cutting #CitSciComm Data and Science Journalists Lab opened new routes for collaborative work and perspectives into which communication can spur new research questions - a pairing program between NEWSERA pilots and data journalists gave rise to several **articles** published in the media. To showcase the impact on society and the innovation potential of Citizen Science Journalism, NEWSERA produced an itinerant art-science exhibition, in collaboration with the **ENJOI project**, as a **flagship to advance on this new concept - Data4CitSciNews**.

The Lab also made evident the **need for mutually gaining trust** from each of the communities towards the other, and the need for training to understand the different timings, priorities, methodologies and ways of work of **scientists and journalists**, while showing the **huge potential of citizen-generated data** to produce **newsable stories with societal relevance**.

The NEWSERA guide of science communication is a must-have resource for those who are starting¹⁰.

NEWSERA
#CITSCI IS THE NEW #SCICOMM

ENJOI

#DATA4CitSciNews

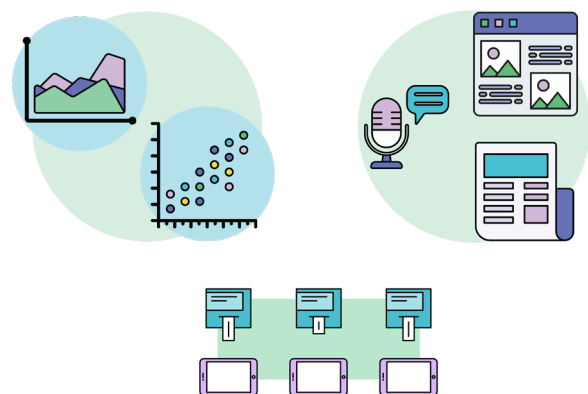
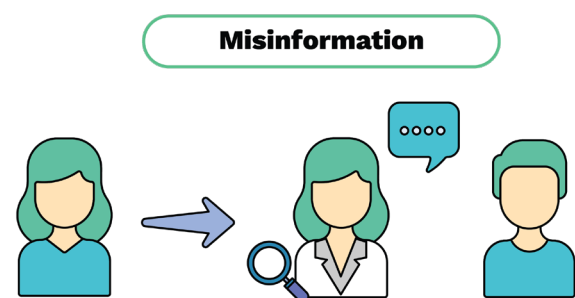


Fig 3. Visual representation of the Data4CitSciNews art-science exhibition.

1.5 CITIZEN SCIENCE COMMUNICATION TO TACKLE MISINFORMATION

Misinformation, disinformation and fake news are major concerns of democratic countries. Behind these, strategies are often articulated to manipulate public opinion. Solutions to counteract this problem are necessary and there is also a need to improve the use of traditional tools, such as checklists or online protocols. Citizens involved in CS projects become important data collectors and producers. By being exposed and possibly engaged in the full process of knowledge production, from data collection, analysis, interpretation, to dissemination, they can become **more informed** and better equipped to evaluate claims and understand scientific evidence, while raising their **critical thinking** skills. Additionally, **CS can also help to increase public trust in science** by providing a transparent and collaborative process. By applying digital tools in the present infosphere, citizen scientists can become the prime source of information on specific ethical-sensitive issues that they might have investigated in depth, contributing to deliver accurate and consistent information, and thus be an important vehicle to tackle misinformation.



Co-identifying misinformation and ethical issues in CS using case studies has proven to be very useful for projects. A checklist of good practices in embedding the ethics dimension in external and internal communication in CS projects¹⁰ as well as a decalogue on how to use data and information in CS projects to help tackle misinformation¹¹, can ensure quality, reliability and increased trust in science communication and science.

(10) Magalhães J, Matozinhos K, Navalhas I, Luís C, Pelacho M, Leguina L, Elorza A, Lacunza I, Tola E, Arias R. (2023). Guide of science communication in citizen science projects and citizen science journalism. D5.3. Zenodo doi: <https://doi.org/10.5281/zenodo.7752525>

(11) Leguina, L, et al (2023). Deliverable 3.7 Citizen Science as a communication tool in the Post-Factual Era. Deliverable report of project H2020 NEWSERA (grant agreement No 873125). (v1.2). Zenodo. <https://doi.org/10.5281/zenodo.7689045>

Exploring the communication between researchers and policymakers

2.1 HOW DO CS PROJECTS USUALLY REACH POLICYMAKERS? THE VIEW OF THE PRACTITIONERS

During the #CitSciComm Lab addressed to policymakers, the common barriers faced by CS projects that try to engage with decision makers to produce policy impacts were analysed, and specific mitigation strategies were proposed.

| Barriers | Mitigation strategies |
|--|---|
| CS is a field that deals with the complexity of modern societies and their wicked problems. | Build an interdisciplinary team. One scientist alone cannot and should not attempt to address everything. |
| Many CS projects lack specialisation and multidisciplinary teams are needed for success. | CS projects require specialised and multidisciplinary teams. Work with your peers and include SSH. |
| Feeling of professional intrusiveness when it comes to science communication and science to policy. | To improve communication and increase policy impact, consider integrating science journalists and science to policy experts into CS projects. |
| Feeling of a narrow academic and male gendered dominance in CS projects. | Be inclusive from proposal writing, train next generations, invest in gender equality plans, and seek external collaborations. |
| Lack of communication from Academic Knowledge Transfer Offices (KTO) to the public sector. | Orient KTO towards policy impact. Hire mediators and train scientists and policymakers on the importance of using KTO as a central point of knowledge connection. |
| Scientists are often not familiar with policy or journalistic language, making it difficult to convince those of the importance of their work. | Learn soft skills to strengthen communication among scientists, journalists, and policymakers, or include specialists in the working group. |

Lack of professional incentives for policy impacts in CS, along with bureaucratic barriers and lack of channels to accessing policymakers.

Create CS project alliances working on similar topics to effectively lobby, and incentivise teams to plan policy impacts and to involve decision makers from the start.

Lack of communication among scientists, journalists and public administrations.

Have your own agenda and build a network of CS policy champions whom you can contact on a daily basis.

Lack of funding schemes for CS projects with policy impact. Most calls do not contemplate the time and resources required. Underfunding holds back increased scientific policy impacts, which are usually achieved in the medium to long term and thus are difficult to demonstrate.

Build alliances and networking for greater lobby so various CS projects can align their scientific project with social and policy agendas. Take into consideration policy agendas and specific timings to build upon them and adapt your message to maximise success.

Public administration mistrust in citizen-generated data may close communication channels between scientists and policymakers.

Include public administrations from the beginning of the project in order to plan effective policy impacts and build CS champions for networking at any policy level.

2.2 HOW CAN POLICY MAKERS AND RESEARCHERS WORK TOGETHER TO INCREASE THE POLICY IMPACT OF CS PROJECTS?

Recommendations for researchers to successfully reach policymakers and increase the policy impact of their projects were produced. An important factor is that policymakers' main duty is to tackle societal challenges, while the societal impact of CS projects may be of relevance and their outcomes can contribute to design improved public policies aligned with society - so a win-win situation can be established. Involving the relevant decision makers in the process from the start, and considering aspects such as policy agendas, priorities, and timings, while producing short and visual documents easy to understand, are some of the keys.

Recommendations for CS projects to address policymakers



Timing is crucial:

connect with policy agendas and identify the right moment to collaborate with policymakers. To maximise impact, CS projects should take advantage of windows of opportunity throughout the policymaking process, from problem framing to policy analysis or new regulations.

Boost the potential of CS policy impact:

communicate good practices in CS and promote it as a utilitarian scientific field. CS is uniquely positioned to address societal challenges that matter to people, which can legitimise public policies in all the phases of the policy cycle, including design, implementation and evaluation. regulations.

Understand which governance level and type of policymaker is relevant to your project:

this requires an understanding of the topic studied and associated policies, of the differences between governance levels and their associated competences, or the differences between governmental/parliamentary bodies.

Grasp the attention of policymakers:

elaborate brief, visually attractive materials to present results. Consider human and emotional factors in the engagement. Use the WOW factor as eye catchy and demonstrate the societal relevance of your research.

Raise institutional awareness for creating Transfer Knowledge Units:

and mediators that can build bridges between scientists and policymakers. Boost the creation of common spaces to facilitate exchanges. It is also paramount to train and mentor young professionals for network transferring.

Consider a multi-level governance model to effectively garner support at all institutional levels:

EU, national, regional and local. Engage with local institutions from the beginning of your project (e.g. introduce CS project objectives and results in local elections programmes). By applying a bottom-up approach from the beginning it is easier to have further policy impact at other institutional and governmental levels.

Highlight the economic impact of the project:

policymakers are eager to hear how your project can positively impact the community in economic terms, including capacity building and increased scientific literacy of the involved citizens, improving their employability skills. Use the power of storytelling to explain how CS projects can tackle economic conflicts of interest by answering to social and public needs. Use former successful examples of CS projects' economical impact on the local level, including innovative business models.

Monitoring public policies can be an important phase in a CS project:

it also allows citizens to participate in local decision-making, and increases the general value of public participation.

Create alliances with public institutions:

act proactively and ask public institutions which kind of data they are in dire need and build alliances. Also consider connecting with journalists, specially in local media, to produce innovative communication materials and formats to better engage with citizen-generated data. Regularly measure impact and success indicators.

Advocate to make the CS field a recognized monitoring tool:

create long-lasting institutional support to the CS field. Foster cross-border CS projects (e.g. Iberian level) to grasp the attention of policymakers to better monitor and harmonise common, transnational challenges.

Advocate for the creation of cascade funding:

for new and ongoing projects, and make public institutions participate in the standardisation and scaling of CS methodologies. Be creative and push the creation of new business models to contribute to the sustainability of CS projects.

Boost the social dimension of CS:

any CS project has a strong social component at different levels - from increasing public participation, raising awareness, to building bridges between citizens and public institutions (for example through **EU-Citizen Science** or the newly formed **Italian CS Association**). Take advantage of the very own CS methodology in engaging citizens in the policy process, and use the CS social impact to show policymakers the benefits of working together.

Lobby:

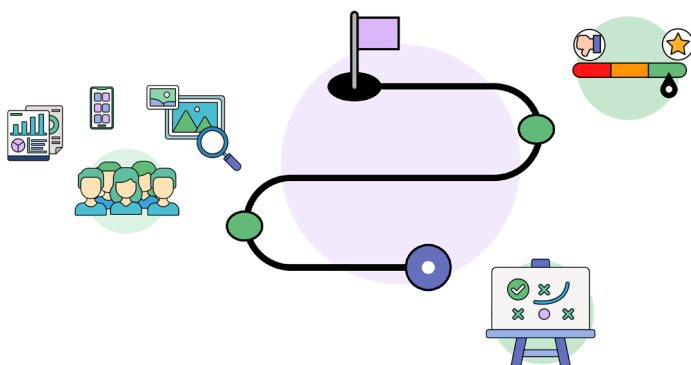
with each and every policymaker eager to hear you, from political parties to governmental bodies; advocating for the recognition of CS is an ongoing process.

Solutions to improve science communication recognition

To unleash the full potential of CS and science communication and their benefits for society, one aspect needs to be addressed to incentivize researchers to get involved in this type of activities. The incentives and disincentives for science communication activities outside academia for scientists are a concern for the European Commission and have been addressed before by NEWSERA sister projects funded under the topic

H2020-SwafS-19-2018-2019-2020, such as **CONCISE** and **RETHINK**. In a period when the **Declaration on Research Assessment (DORA)** is gaining track for developing and promoting best practices in the assessment of researchers, it is imperative to find solutions that counteract barriers to science communication, which is considered one of the main competences of the career development of academic researchers.

How can we push science communication recognition forward?



NEWSERA involved key players in the academic context, namely those in decision making positions and researchers from several areas of knowledge, to reach specific solutions and actions to involve career scientists in science communication, as well as the key actors in activating recognition mechanisms on the institutional, national and European levels. As part of the NEWSERA legacy and in collaboration with **ENJOI**, a roadmap will be developed to implement the suggested solutions at the European level.

Governance level

Proposed Solutions, Actions and Actors to be involved

Institutional

There was a consensus opinion that institutions should design and implement incentive mechanisms to recognise science communication activities, either by developing better evaluation indicators and metrics than those that currently exist to value these activities (involving in this action, actors at various levels within the academy - e.g. rectory, governing boards, research units, professors and researchers) or by creating incentive mechanisms such as institutional awards, or by giving increased visibility to those who perform these activities. Both citizen science and citizen participation and involvement were mentioned as ways to improve the quality and direction of research, and to help solving problems; however, it was mentioned that preparation is needed in case of conflict management to implement consensus in the involvement of the various actors while looking for a joint solution.

National

*Portugal was used as the national context during NEWSERA workshops

Overall, the general idea was that in order to increase the recognition of science communication activities in the research career it is necessary to increase funding in this area, as well as to include, from the beginning, a science communication component in each research project. Moreover, investing in cross-training, i.e. to equip and train researchers (bachelors, masters, etc.) in science communication (such as those offered by NEWSERA) and train professional science communicators in scientific aspects, should be more institutionalised to enable peer enhancement. To put these solutions into practice will require intervention from funding agencies and ministries, such as the Ministry of Science, Technology and Higher Education, but also targeting lower educative levels (high school) involving the Ministry of Education, so that science communication becomes an integral part of education and lifelong learning.

European

The solutions at this level were more diverse, ranging from implementing a key indicator for science communication, dedicating a specific percentage of the budget for communication in projects funded at the EU level, professionalising science communication at the EU level, i.e. funding EU projects with a mandatory and professionalised component in science communication to the idea that nothing needs to be changed at this level because science communication is already recognised.

Take home messages and call for actions

The NEWSERA Project, through its co-design methodology applied within the #CitSciComm Labs, has demonstrated the potential of citizen science as the new paradigm of science communication. It has shown the potential of CS to build newsable stories with societal relevance through data journalism, and how citizen science communication can contribute to tackle misinformation. However, in order to overcome the barriers towards communicating with and for multiple stakeholders, CS projects need funding, human resources, training, capacity building and interlinked communities of practice to reach their full potential

and benefit society. Moreover the practice (both CS and science communication) should be recognised through an improved evaluation system of research careers to motivate researchers for its adoption. Knowledge calls for knowledge: in science, in science communication and in ethical aspects associated with the development of science. Only the broad, transparent and open dissemination of knowledge - reaching all the agents in society - can generate this call to action effect, and we need further support, including European and national policies, to make it real.

NEWSERA LEGACY: towards a better communication and alliances among European Projects

NEWSERA has produced many co-created materials for use by any CS project interested in increasing their science communication outreach (videos, guides, policybriefs, academic articles, an impact framework, etc.). In addition, a twitter account was specifically designed (@citscicomm) to connect all those interested in citizen science and science communication, beyond NEWSERA. Moreover, during the last years, the eight SwafS-19 funded sister projects (TRESKA, GlobalScape, PARCOS, QUEST, CONCISE, ReThink, NEWSERA and ENJOI) have been meeting on a regular basis for mutual learning. Building on the outcomes of the different projects, the Horizon Europe project **“Coordinated Opportunities for Advanced Leadership and Engagement in Science Communication in Europe”** (COALESCE) was born. From April 2023, COALESCE will establish the **European Competence Centre**

for Science Communication to support, give recognition and mainstream science communication in the European Research Area (ERA) and beyond. COALESCE will allow the development, consolidation, and rapid mobilisation of excellent scientific knowledge and recommendations to act in times of crisis and counteract misinformation, disinformation and fake news. It will bring together all the SwafS-19 communities of practice and the multiple stakeholders involved, and further enlarge its scope of action together with other national, international and global networks of science communication and other related topics. It will also compile and build upon the main results of the SwafS-19 projects to foster replicability and increase impact. The Centre will operate under a virtual platform connected with local, regional and national hubs in order to adapt resources to local contexts, promoting a sustainable and long term approach. It represents the perfect opportunity to build upon the legacy of the SwafS-19 projects and continue advancing the state of the art of science communication in Europe for the benefit of all its citizens and society at large.

Deliverable 5.4. NEWSERA Policy Brief 2, submitted on March 31st 2023, was led by FECYT partner. The deliverable concerns WP5, led by FC.ID partner.

Authors

Joana Magalhães (SfC), Leire Leguina (FECYT), Ana Elorza (FECYT), Izaskun Lacunza (FECYT), Cristina Luís (FC.ID), Inês Navalhas, Maite Pelacho (IBERCIVIS), Paolo Giardullo (UNPD), Maria Angela Citarella (UNPD), Elisabetta Tola (formicablu), Rosa Arias (SfC)

Contributors

Lisa Lazzarato (formicablu), Anna Violato (formicablu), Julia de la Cruz (SfC)

Layout

Dario Valeri

NEWSERA project lasted from January 1st, 2020 to March 31st, 2023 (39 months)

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.

DISCLAIMER

This publication reflects the views only of the authors, and the European Commission/Agency cannot be held responsible for any use that may be made of the information contained therein.

CITIZEN SCIENCE AS THE NEW PARADIGM FOR SCIENCE COMMUNICATION



NEWSERA

#CITSCI IS THE NEW #SCICOMM



This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 873125