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► **To cite this version:**

Ekaterina Smoliakova. Una.Resin, WP3, Co-creation workshop on Citizen Science, Report. Paris 1 Panthéon-Sorbonne. 2022. hal-04347602

HAL Id: hal-04347602

<https://hal.science/hal-04347602v1>

Submitted on 15 Dec 2023

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Una.Resin, WP3, Co-creation workshop on Citizen Science, Report

15/09/2022

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Context

About Una Europa

Una Europa is an alliance of nine leading research universities and is one of 41 emerging European Universities. Our goal is to create a truly European inter-university environment by triggering institutionalised cooperation in the area of education, research, and societal outreach. Una Europa has the long-term objective to transform the institutional framework of its member institutions to prepare for the next wave of global challenges. Una Europa leads: 1Europe (Erasmus+ pilot project) implementing Joint Innovative formats for education and mobility, and Una.Resin building common Una Europa eco-system of research and innovation.

Through the three-year ERASMUS+ 1Europe pilot project, Una Europa has taken initial steps towards creating a single educational eco-system for our students, by establishing a Europe-wide living lab for testing Joint Innovative Formats for education and mobility including joint degrees.

Through the three-year Horizon 2020 Una.Resin pilot project, Una Europa will determine the purpose and areas for future research collaborations within and beyond Una Europa. Una.Resin partners will create strategies for sharing Research & Innovation agendas, opening up and sharing Research Infrastructure and Resources, and strengthening Human Capital. Una.Resin will implement and evaluate pilot actions for the systematic support for excellence as well as create cross-disciplinary and cross-sectoral teams. During the process, non-academic partners of the universities will be reached out to strengthen the R&I ecosystem as a whole.

Citizen Science within Una Europa

Citizens' active participation in scientific development and knowledge production, commonly referred to as "**citizen science**" (CS), has received unprecedented attention in recent decades (Haklay et al. 2014; Hecker et al. 2018; Vohland et al. 2021). Because CS operates at the interface between science, policy and society, it has progressively appeared as a promising way to enrich research approaches and generate new knowledge, boost public engagement and increase trust in science.

While growing bigger, more ambitious and more integrated, CS has also adopted more and more varied forms. In this context, citizens are emerging as key contributors to an increasing number of projects, not only as passive data collectors but also as active agents of research activities and strategic agendas.

The Una.Resin project aims at strengthening the role of CS in the research activities by building a community of good practice inside the Una Europa alliance, encouraging the development of institutional frameworks necessary to promote citizen science, and implementing a program of actions for knowledge sharing, mutual learning and team cooperation. The pilot action produced for enhancement of citizen science projects will become one of the core components of the future Una Europa Human Capital Development Strategy.



What we have done so far

To achieve this goal, the WP3 team, in close collaboration with the Citizen Engagement Cluster, which gathers experts from the eight Una Europa universities, has investigated two key aspects of Citizen Science:

1. *How can citizen science transform science and society?*

Citizen science is definitely not limited to bumblebees counting. It encompasses a wide range of approaches and designations (Eitzel *et al.* 2017; Bedessem 2020, 2021), such as participatory science, community science, community-based research, contributory research, crowdsourcing, participatory action research... Since there is no “one size fits all”, designing and implementing such projects has inherent difficulties. Bearing in mind that each participatory approach is unique, we aim to encourage a joint reflection on what knowledge production through research characterised by greater openness and cooperation with citizens could look like, and what challenges this raises within our universities and in society at large.

2. *How to break down boundaries with Citizens in all their diversity?*

The growing importance of citizens in research shows that science is no exception to the broader “participation imperative” arising in our democracies (Godden 2017). Through the inclusion of more diverse groups of non-professional stakeholders, new perspectives on scientific approaches, discourse and governance modes are expected. Who are exactly the “citizens” giving time to gather data and contributing to research activities, knowledge production and strategic agendas elaboration? Who is participating and who is not? How does citizen science deal with the participation of generally less represented groups? How far should citizen scientists be representative of the broader society? These questions are crucial and relate to the many ways to engage with and for citizens (Pettibone *et al.* 2018, Kenens *et al.* 2020, 2022). During the last months, we further discussed the “double-edge” issue of ensuring sufficient degrees of representativity and inclusiveness while cooperating with targeted communities which usually have and express specific needs.

As already mentioned, most of the effort, since the beginning of the project, was put on circulating ideas as well as sharing experiences to form a broad community of practices and take the first steps towards a common Una Europa Strategy for strengthening Citizen Science.

To that end, a four-step approach was followed:

1. Citizen Engagement institutional strategies and policies were mapped through three questionnaires shared with administrative staff, heads of universities and researchers (achieved in January 2022, see DEL 3.1)

2. Citizen Science support activities within Una Europa institutions have been characterized based on a questionnaire devoted to Open Research support services and practices (achieved in April 2022, results are still being processed).
3. A series of brainstorming sessions and webinars devoted to Citizen Science projects and related issues (e.g. how to define Citizen Science, what are the main barriers drawbacks in Citizen Science projects, what kind of ethical issues does Citizen Science raise, how can support services accompany Citizen Science project teams...) were organized by and with the Citizen Engagement Cluster members (from October 2021 onwards).
4. A last step was taken with a co-creation workshop (July 2022), during which participants shared their expertise, their practices, the difficulties they have faced, and how these can be overcome, in order to create a broader understanding of what is – and what could be – citizen science within the Una Europa Alliance. The present document is a report on this co-creation workshop.

Objectives:

The Una.Resin co-creation workshop organised online by Paris 1 Panthéon-Sorbonne is a step towards fulfilling the above-mentioned goals.

The main objectives of the workshop can be formulated as following:

- **Gather knowledge** from experts (researchers having an expertise in the CS) for the definition of concrete grounding principles and common standards of CS. Rethink the definition of CS and analyse different types of CS projects.
- **Analyse barriers for** putting in place CS projects and **brainstorm on possible solutions**.
- **Collect a set of best practices** to promote CS at institutional and project levels, design and implement CS projects
- **Envision possible forms of cooperation** within and between citizen science teams. Imagine a perfect Una Europa platform for enhancing CS.
- **Build a community** of Una Europa researchers reflecting on CS and growing capacities in CS projects

Collected inputs and propositions elaborated during the workshop will invest in the conception of a pilot project on CS implemented within Una.Resin.

Methodology & Agenda

The WP3 co-creation workshop “Breaking down boundaries with citizens” was scheduled over one day and held online on the 1st of July 2022 from 10:00 to 16:30 CET.

The workshop was divided into two parts: a plenary session in the morning and parallel discussions in the afternoon which ended with a joint wrap up.

A **plenary session** (10:00-11:30) was open to all the communities of Una Europa’s universities. It started with a welcoming word and an introduction by Cécile Faliès, Vice-Rector for Research, University of Paris 1 Panthéon-Sorbonne. Then, Seth Amanfo, Una Resin Project Manager, University of Edinburgh, gave a brief overview of Citizen Science & Citizen Engagement as a priority issue within the Una.Resin project.

Two keynote speakers presented their projects related to two different approaches to CS. These introductory presentations opened the discussion.

- **Keynote 1, Dr Baptiste Bedessem**, University of Namur/FNRS/MNHN-CESCO.

Science learning in citizen science: inputs from the analysis of online social interactions within a biodiversity contributory science project.

- **Keynote 2, Citizens Dr Joke Kenens**, KU Leuven

Measuring Fukushima by with and for Citizens.

In the afternoon, **four breakout sessions** were held in parallel (13:00-16:30). Participants were brought together in four small working groups of about four experts. Each session was moderated by a facilitator who took care to record the participants' answers in a Miro board designed to organise responses and synthesise ideas.

The participants were invited to the workshop not as representatives of their institutions but as independent experts. That way, they could express everything they face in their own practice and also make focus on their own discipline.

Three main stages structured the working sessions:

- Ice breaker:

Participants were given the opportunity to get to know each other. Each participant was invited to introduce her/himself through a short biographical presentation explaining their background, current position, and interest in participating in the workshop.

- Discussion:

Group assignments with a set of questions (see below in “**Questions discussed during workshop**”) were communicated before the workshop. Participants were encouraged to prepare

their answers to these questions ahead of the workshop by filling in the preparatory template document.

Each group had to answer seven questions and reflect on two overarching problematics that were attributed to the group before the workshop:

Groups 1&2: *How can citizen science transform science and society? (impact)*

Groups 3&4: *How to break down boundaries with citizens in all their diversity? (stakeholders)*

- Wrap up and final discussion:

This session was held in a plenary format and was open to the whole Una Europa community. It was led by Bartosz Brozek, academic coordinator of Citizen Engagement Cluster of Una.Resin, Jagiellonian University. Each working group, represented by one of the participants, reported on its main findings. As a result, four different perspectives were presented, allowing for a comparison of different views and for a broader understanding of the CS issues.

Questions discussed during the workshop:

Q1 - From your experience of citizen science (CS), which of the definitions listed below is the most relevant in the Una Europa Alliance context?

Citizen science relates to extremely diverse practices, encompassing various forms, depths, and aims of collaboration between academic researchers and citizens. In this burgeoning field, what exactly falls under the umbrella of citizen science remains unclear, as illustrated by the definitions gathered below.

1. RIS4CIVIS Alliance, D1.1 Benchmarking Report, 2021, p. 11

Citizens (such as in Citizen science): Active and “locational” set of people participating to a research/science project/activity that directly addresses local/regional/national or international objectives/challenges; can include both novice, students and professional classes of people.

Citizen science: practices in which Science is conceived as the result of integral collaboration between professional researchers and the citizens. This mutual collaboration in scientific research overpasses the simply volunteer participation by its active incorporation to one or several steps of the scientific processes, e.g., data collecting, monitoring, result interpretation, etc.

2. EU, Horizon Europe Programme Guide: v1.4, 2021, p.52
- Citizen science involves citizens (individuals acting on own initiative and not on behalf employers or sectoral interests) directly in the development of new knowledge or innovations, through a range of different levels of participation. These could include identifying R&I questions to be tackled by the project, developing a methodology, observing, gathering and processing data, right up to the publication and presentation of results."
3. EU-Citizen.Science, 2021, website
- Citizen science actively involves the public in scientific research that generates new knowledge or understanding, and thus has the potential to bring together science, policy makers, and society as a whole in an impactful way. As a core dimension of Open Science, it opens up the opportunity for all members of society to take an active role in research, innovation and the development of evidence-based policy, at local, national and EU levels. Citizen scientists can participate in many stages of the scientific process, from data collection and volunteer mapping, through data interpretation and analysis, to publication and dissemination of results
4. SCIVIL, Communication in Citizen Science, 2019, p 6.
- Citizen science is defined as scientific work undertaken wholly or partially by members of the public, often in collaboration with or under the direction of professional scientists (2, 3, 4). Citizens may act as contributors or collaborators in the project and offer up new knowledge and understanding. Citizen science can be employed in the exact sciences, applied sciences and human sciences.
- Citizen science is different to science communication. Citizen science is a 'new' form of science, in which members of the public actively participate in the research work. Through it, citizens are no longer the target of science communication, but actively engaged in the scientific process.
5. Hecker et al., Green Paper Citizen Science Strategy 2020 for Germany, 2016, p.13
- Citizen science describes the process of generating knowledge through various participatory formats. Participation can range from the short-term collection of data to the intensive use of leisure time to delve deeper into a research topic together with scientists and/or other volunteers, to ask questions, and to get involved in some or all phases of the research process.

6. OECD, 2017* At the heart of the scientific process, it can be more narrowly understood as people, who are not professional scientists, taking part in research, i.e., co-producing scientific knowledge. This involves collaborations between the public and researchers/institutes but also engages governments and funding agencies
7. UNESCO, 2013* The participation of a range of non-scientific stakeholders in the scientific process. At its most inclusive and most innovative, citizen science involves citizen volunteers as partners in the entire scientific process, including determining research themes, questions, methodologies and means of disseminating results.
8. Irwin A., Citizen science. 1995 Developing concepts of scientific citizenship which foregrounds the necessity of opening up science and science policy processes to the public

Q2 - In your field of activity, which type of CS projects: a) are the most represented; b) are less frequent; c) should be more frequent

- 1. Contributory projects** **Designed by scientists and for which non-professional scientists (citizen scientists/members of the public) primarily collect and contribute data and/or samples.**
- Non-professional scientists usually collect samples and/or record data; analyse data (sometimes); disseminate conclusions/ translate results into action (sometimes).
- 2. Collaborative projects** **Designed by scientists and for which non-professional scientists (citizen scientists/members of the public) contribute data but also help to refine project design, analyse data, and/or disseminate findings.**
- Non-professional scientists usually assist scientists in developing a study and collecting and analysing data for shared research goals; design data collection methodologies (sometimes); collect samples and/or record data; analyse samples; analyse data; interpret data and draw conclusions (sometimes); disseminate conclusions/ translate results into action (sometimes)

3. co-created projects **Designed by scientists and non-professional scientists (citizen scientists/members of the public) working together.**

Non-professional scientists develop a study and work with input from scientists to address a question of interest or an issue of concern; choose or define questions for study; gather information and resources; develop explanations (hypotheses); design data collection methodologies (sometimes); collect samples and/or record data; analyse data/samples; interpret data and draw conclusions; disseminate conclusions/ translate results into action; discuss results and ask new questions

4. Community-led projects **Designed by community members who reach out to scientists with an issue of mostly local concern to the community and are the main drivers in the CS research process.**

Non-professional scientists (citizen scientists/members of the public/community) choose or define questions for study; gather information and resources (sometimes); interpret data and draw conclusions (sometimes); disseminate conclusions/ translate results into action (sometimes); discuss results and ask new questions.

Q3 - Considering your answers to Q2c, what kind of obstacles or difficulties are critical at project and institutional levels and how can they be overcome?

Please, consider the whole project lifecycle.

BARRIERS (e.g. data/samples and results quality, engagement & community building, dissemination and communication, ethical compliance, IP rights, funding...):

1. Project level: ...
2. Institutional level: ...

ENABLERS and ADVICE (e.g. data/samples and results quality, engagement & community building, dissemination and communication, ethical compliance, IP rights, funding...):

1. Project level : ...
2. Institutional level : ...

Q4 – Let’s now dream a little bit: according to you, what would a perfect CS Cooperation Hub look like?

- Key aims (max. 3 features, listed by order of priority)
- Core Activities (max. 3 features, listed by order of priority)
- Community actors
- Type of cooperation (interaction) space (1 feature):
- CS driving principles (max. 3 principles selected from the ECSA 10 principles)

One basic aim within Una Resin/Una Europa is to set the ground for the development of a platform for strengthening citizen science and cooperation with citizens in all their diversity. Digital platforms are often seen as a key tool in CS in supporting cooperative work. Yet, as tools without knowledge and practitioners remain empty boxes, establishing and supporting a sustainable community of practice is here a prerequisite and a priority.

The concept of “communities of practice” has been frequently put forward to approach cooperation. According to Wenger et al.(2002:4)*, communities of practices are “groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis”.

TIP: Q4 is a speculative exercise. While imagining your ideal CS Cooperation Hub, you can either select amongst the features proposed below or propose new ones. Don't hesitate to be creative, fun, provocative, disruptive!

Please use the features listed below, provided as examples. Feel also free to think « out of the box » and propose other features

Key Aims

- Research & Innovation
- Management, Monitoring and evaluation
- Awareness raising
- Capacity building
- Mutual learning and networking

Core Activities

- CS projects support services (Incubation and Acceleration activities)
- CS online tools & sharing/meeting spaces
- Communication & Dissemination
- Innovative training formats for mutual learning, capacity building and education
- Policy recommendations and lobbying

Community actors

- Senior researchers, early-stage researchers (incl. PhDs), engineers...
- Students: undergraduates, graduates, middle school students, other ...
- Support staff, experts in funding, legal issues, ethical compliance, data management, communication, engagement, management ...



- Citizen scientists: individual volunteers, community-led citizen groups, informal clusters of citizens, citizens associations
- ...
- National, regional, local government agencies, public organisations (glams)
- Civil society organisations: NGOs, associations, policy-oriented organisations/networks ...
- Large-scale regional, national, European or international CS associations, networks, Infrastructures (give examples)
- Companies: media, industrial companies, private cultural actors, consulting companies...

Cooperation space

- Science Shops: small entities carrying out scientific research (usually free of charge) on behalf and in response to citizens/local civil society
- Makerspace/FabLabs: collaborative workspaces providing facilities for making, learning, exploring and sharing
- Extreme Living Lab: user-centred, open-innovation ecosystem, integrating concurrent research and innovation processes within a public-private-people partnership
- Smart Village: involvement of local people in improving economic, social or environmental conditions, through cooperation with other communities, social innovation and the development of strategies and policies
- CS Clinic: mutual learning working space to share best practices and find solutions to face challenging issues

CS Principles

- Please see below

The ECSA ten Principles of Citizen Science

The ECSA ten Principles of Citizen Science (<https://zenodo.org/record/5127534#.YpcOcN8682x>)

1. Citizen science projects actively involve citizens in scientific endeavour that generates new knowledge or understanding. Citizens may act as contributors, collaborators, or as project leader and have a meaningful role in the project.
2. Citizen science projects have a genuine science outcome
3. Both the professional scientists and the citizen scientists benefit from taking part.

4. Citizen scientists may, if they wish, participate in multiple stages of the scientific process.
5. Citizen scientists receive feedback from the project.
6. Citizen science is considered a research approach like any other, with limitations and biases that should be considered and controlled for.
7. Citizen science project data and meta-data are made publicly available and where possible, results are published in an open access format.
8. Citizen scientists are acknowledged in project results and publications.
9. Citizen science programmes are evaluated for their scientific output, data quality, participant experience and wider societal or policy impact.
10. The leaders of citizen science projects take into consideration legal and ethical issues surrounding copyright, intellectual property, data sharing agreements, confidentiality, attribution, and the environmental impact of any activities.

Q5 – Considering your answer to Q4, what kind of: a) support services; b) platform or digital tools; c) training provided at the Alliance level could foster CS activities and projects

Some examples of services, platforms or digital tools and training formats that would be useful at the Una Europa level are listed below (for inspiration). Feel free to propose other features

SUPPORT SERVICES

- Methodological support (advice) to build early-stage CS projects and expand already established ones
- Methodological and managerial support to assess and evaluate CS projects and results
- Managerial support for calls for proposals applications
- Technical support for data management, ethical compliance, Intellectual property rights management
- Technical support to communicate and promote CS results and outputs,
- Technical support to make known and available open and free tools and/or existing tech solution
- Single point of contact to identify and know more on CS projects or teams active in other Una Europa institutions
- Single point of contact to recruit citizen scientist, academic and non-academic partners

PLATFORMS or DIGITAL TOOLS

- Catalogue to showcase CS projects, teams and results in the Una Europa ecosystem
- Matchmaking tools for CS teams, connecting citizen science actors to foster open research and innovation
- « Volunteers hub » to ease the recruitment of citizen scientists
- Online, easily accessible open and free toolkits for Citizen Science (scientific methodologies, practices and tools, community building, communication, ethical protocols, legal issues, assessment...)
- CS Coffee Machine: Informal digital space for mutual learning (to share best practices, pros and cons, projects achievements or issues...)
- Working space for CS projects management (whole or part of CS projects lifecycle)

TRAINING

- Short training modules or information sessions on CS methodologies for students and researchers
- Training modules or information sessions for project management
- training programs for students
- Training to trainers modules (bootcamps, summer schools...)
- Lifelong training for researchers
- Lifelong training for support staff
- Mutual learning (“live my life” formats, staff weeks, workshops...) with and for CS teams
- Challenge-based/learning by doing formats

Q6 – Is there any CS interdisciplinary topic that you would like to be addressed within Una Europa?

Q7 – Any best practice that you would like to be promoted within Una Europa?

Results and final solutions

Plenary session

To encourage debate and initiate joint reflection, two specialists of CS were invited.

Keynote 1: Dr Baptiste Bedessem – University of Namur/FNRS/MNHN.



Science learning in citizen science: inputs from the analysis of online social interactions within a biodiversity contributory science project.

Abstract: Biodiversity citizen science projects are both valued for their contribution to scientific research and for their impact on participants' science learning and engagement towards the environment. In this talk, we explore the impact of participation in a biodiversity citizen science project (the Spipoll, dedicated to pollinators' monitoring) through the analysis of online interactions within the program's data sharing platform. First, a quantitative analysis of the comments' distribution among participants reveals the multiplicity of epistemic and social roles they endorse: helping collective identification of plantstand insects, moderating the respect of the scientific protocol, or maintaining community's life. Second, by building a typology of these comments, we show how this space of discussion favours exchanges and reflections about aesthetical, interpersonal, biological and methodological aspects. Finally, we show that long-term participation is associated with the growing expression of scientific procedural skills: formulation of hypothesis and explanation, proposition of new research questions. We also show that long-term participation is associated with the growing attention to natural seasonal cycles.

This project demonstrates how a CS project can create a convivial and welcoming community for collective learning. To do so, it is important to let people choose the role they prefer whether it is passive or more proactive. However, it has been shown that the more participation is engaged, the more research questions the participant will have at the end of the day. Over the course of the project, participants develop the procedural skills necessary for the scientific approach, and above all, the critical form of thinking.

A double study was carried out in this project: one by the people involved in the collection of data and identification process, and the other by the researchers analysing the comments of the participants. Participants were therefore the subject and the object of the study.

The next stage in the project will be the diversification of participation. It is important to reach out to those who are not yet involved in environmental associations and for whom this activity would be completely new.

Keynote 2: Dr Joke Kenens – KU Leuven.

Measuring Fukushima by, with and for citizens.

Abstract: The 2011 Fukushima nuclear accident was one of the most severe nuclear accidents in the history of nuclear energy. It pushed ordinary citizens to collect their own radiation pollution data in unprecedented ways. The organizations that are born out of these citizen initiatives are referred to as Citizen Radiation Measuring Organizations (CRMOs). They have increased accessibility and transparency of information and data related to the accident for citizens and communities, filling knowledge and information gaps created by the inadequate disaster response of the Japanese government. Taking CRMOs as instances of grassroots citizen science, whereby citizens organize themselves independently from experts, this talk explores the issues and questions regarding citizenship, scientific practices and science-society relations that grassroots citizen science has unearthed in post-Fukushima Japan.

This project demonstrated that the term citizen science can differ across cultures and that the terms science and citizenship can be highly politicized. In cultures where citizen movements may have a negative connotation, citizen scientists do not want to view themselves as citizens, but

rather as concerned individuals. CRMOs also usually identify themselves as nuclear activists and talk about bringing science closer to society, rather than producing citizen science. Some of the participants finally become professional scientists themselves, although their activities go well beyond scientific research, and involve listening, sharing of emotional and life experiences.

Over time, CRMOs themselves have become a research object. The question that will always raise regarding their activities is how the CS knowledge produced is linked to official knowledge and data submitted by national governments. In other words, there will be always a question of trust between citizen knowledge and official science.

Break-out sessions

Q1 - From your experience of citizen science (CS) with or for citizens, which definition is the most relevant in the Una Europa Alliance context.

After discussing eight suggested definitions of CS, the workshop participants concluded that the definition of CS, which would address Una Europa's objective of enhancing CS projects, ought to be as broad as possible. CS comprises a wide variety of practices, usually discipline-specific, with different modalities of participation and roles assigned to stakeholders. A broad definition of CS ensures that every aspect of CS is covered and that all disciplines have their interest in it.

While defining what is CS it is essential to be mindful of the fact that citizens can be involved in a variety of ways, the definition must therefore consider a wide range of different forms of participation. Nevertheless, during the workshop, priority has often been given to the definitions that perceive citizens as true actors in a research project who must be involved in the formulation of problematic questions and research goals. Bringing down the hierarchy between academic researchers and citizens, involving them in the design of the project has a major impact on citizen engagement. Redistribution of the roles in initiating scientific projects has a strong transformative power that can alter the canvas of the society by making it more diverse and inclusive, open and just.

An important issue of the political aspect of both "citizen" and "science" has been raised by Una Europa's researchers. Citizenship as a concept can have different understandings across different political cultures. The problem of self-identification and the citizen identity can be faced by the participants during the research process and should be therefore taken into consideration by the project leads. Project participants might tend to identify themselves as mere concerned individuals and contest the identification as citizens. Any CS project, regardless of a research discipline or purpose, not only enables collaboration with citizens as co-producers of scientific knowledge but also turns them into an object of study. A transformation of the participants,

changes in their self-identification and in understanding of their social roles can be considered by some CS projects as one of the most important outputs of the project that impulse real change in society.

While talking about citizen's agency in the research activities and the distribution of roles in CS, the concept of community frequently emerged. CS projects can be envisioned as community making projects that aim to build welcoming and friendly environment for collective learning or they can be based on existing communities. The approach of existing communities to CS can differ significantly from the one individuals may have. Communities can be independent in articulating research problems and even in proposing solutions. The role of academics is then not to do science with citizens but to "bring science to society", to use their knowledge and methodology in order to make these solutions a reality. Researchers should reflect carefully on how to formulate the problem in order to produce knowledge appropriate to the communities' needs.

The political dimension of the term "science" also cannot be ignored. Production of data and knowledge always induce an issue because of what it enacts. CS projects put in front of themselves the question of knowledge production and the role of science in it. Scientific production of knowledge is characterised by the scientific approach and methodology, although in CS the question of methodology might become a corner stone. The reason is that the issue of methodology is specific to the discipline: whereas some disciplines require strict adherence to the established methods, the others can leave room for different forms of knowledge exchange and the imposition of methodology risk to bring the hierarchical approach back. Citizens can invest with emotional and life experience that doesn't have a place in the policy making. Thus, this question should be approached on a case-by-case basis and according to the needs of the discipline, whether in the hard sciences or the social sciences, and make allowance for flexibility and innovative approaches. The flexibility turns CSs into a process and not a strict procedure and endows the development of critical forms of thinking.

Q2 - In your field of activity, which type of CS projects: a) are the most represented; b) are less frequent; c) should be more frequent

During the workshop Una Europa's researchers have discussed the typology of the CS projects based on stakeholders' roles and their level of engagement. It appears that the most common and frequently organised type of projects, in which Una Europa's researchers participate through their institutions, are so called "contributory projects". These projects are designed by scientists while citizens are involved in the process by collecting data/samples and their role in other parts of the project is incidental. On the contrary, projects aimed at more active and committed citizens participation, "collaborative" and "co-created" projects, are much less common. The same applies to "community-led" projects.

As mentioned above, the Una Europa's researchers are in favour of the broadest definition of CS which includes the full range of practices. Consistent with this view, they concluded that all types of CS projects are important and should therefore be encouraged by the institutions. It was also

pointed out that the project type should be better driven by the initial interest, reason or change sought and not by the level of stakeholders' involvement. Thus, the projects should be purpose-led as well as they should be appropriate and sustainable. No quota should be foreseen for a particular type of the project as it goes against the objective of diversity.

However, since “collaborative” and “co-created” projects are less common in the current practices of Una Europa researchers, less supported by the institutions, and more difficult to organise – Una.Resin pilot for CS can reflect more deliberately on these two types of projects while developing guidelines and methodologies for CS implementation. “Collaborative” and “co-created” projects may potentially become strategic for Una Europa as the outcomes of these projects go far beyond the completion of its research objectives and meet the overarching goal of the socially responsible research: inclusion of society in research development as well as better alignment of social concerns and research interests.

Co-created projects imply that the scientists and citizens start collaboration from the very beginning of the project: they first formulate the research questions together. It is essential to find a common language, to harmonize interests and to strengthen trust among the various stakeholders from the outset. This approach combines different fields of expertise and leave room to citizen knowledge that they have as practitioners. It also challenges traditional narratives and thinking patterns and stimulate new ways of thinking and innovation. By considering citizens as actors already in the proposal stage, research may become more relevant to society. Co-created CS projects have the potential to increase not only the social impact of science, but also the economic impact as solutions consistent with citizens' perspective avoid tunnel vision or ignorance of potential impediments to the implementation of research.

Engaged citizens can inspire scientists to reflect on new topics: interested in the challenges that concern them directly (for example pandemic) they should be able to address to scientists who can help them in understanding of their challenges as well as in formulating solutions. Involving citizens enlightens the researcher, contributes to excellence and openness of research. It does not merely reinforce the university's role in the social contract in the city, but also contributes to capacity building and skills upgrading, which could result in the emergence of community-led projects. These latter address the problem of power imbalances by giving voice to local communities, bring people together as equals and therefore increase the democratic impact of the CS. Overall, projects that involve co-creation rather than mere stakeholder participation led to innovative knowledge sharing for an equal society.

Q3 - Considering your answer to Q2c, what kind of obstacles and difficulties are critical citizens enrolment and engagement at project and institutional levels, and how can they be overcome?

Many of the barriers are not unique to SC projects. For example, lack of funding and time is often an issue for various research activities. These obstacles are more than relevant to CS projects because the institutions still lack knowledge on the subject.

However, there are also some unique challenges that CSs face both in the preparation and implementation of projects and at the institutional level.

To begin with, it might be difficult for researchers to identify the right actors outside of academia. The title "Citizen Science" project may already be an issue by itself being obscure to the public. It is particularly challenging to find participants for the long-term commitment, especially for co-created projects that foresee a significant dedication. Generally, no support is offered for this tedious process of finding a group of committed citizens willing to collaborate despite the workload, the long duration of the project and the potential fatigue of volunteers. It is easier for researchers to address well-known communities that are sometimes over-studied, while other potential stakeholder groups are not considered. Furthermore, researchers may not know the specificity of CS, they may not know which different approaches, different modes and levels of involvement of citizens might be appropriate for their projects. This makes the search of relevant stakeholders even harder.

First challenge that researchers may encounter once their interlocutors are identified is communication. Academic language can become an important obstacle in communicating the aims of research to citizens and aligning it with the interests and concerns of society. Competencies to initiate an open and inclusive conversation and clearly explain tasks and procedures are required in CS projects. The lack of clarity and trust between the participants, unarticulated communication of goals, methods and results outside of the research domain may seriously impede the achievement of project's objectives. To sum up, the scarcity of communication, management and cross-cutting skills may become an obstacle to carrying out CS projects.

Then, the most common and overarching problem for the researchers is a lack of time. CS projects may require far more commitment than other research projects, so the issue of availability is crucial. Researchers may be less motivated because participation in CS projects is sometimes incompatible with teaching and administrative tasks or requires major schedule changes. Moreover, very strong administrative support is needed for the management of citizens: their selection, discussion of their concerns, organisation of data collection or recording of their opinions, etc. It is therefore both a matter of time and staff.

More barriers come from the institutional perspective. CS lacks visibility not only outside academia, but within institutions as well: many researchers, for whom public collaboration projects are not vital to do research, are not sufficiently familiar with CS formats. The CS might not be verbalised in the institutions: although a lot of activities can be organised in the form of CS projects, they are simply not called that way. There is no unique language between the different research units and university departments to talk about CS. This occurs when the definition of CS is not clearly formulated at the institutional and strategic level and cannot be adopted by researchers who need to feel a strong commitment from institutions.

In many of Una Europa's institutions there is no support infrastructure for CS. Lack of administrative support, lack of dedicated personnel and digital infrastructure are significant

institutional barriers. Funding programs are not very developed or usually do not cover many of the costs that may arise during projects. Furthermore, the funding period is rather short, which is not entirely appropriate for CS projects that take a long time to implement. Funding schemes which require an enormous amount of bureaucratic work alienate the participants. And finally, the lack of recognition for CS projects in assessing researchers' CVs and careers can also be demotivating.

Some suggestions were made to overcome these barriers. Many difficulties can be prevented through the right approach to project design. This very first step implies that researchers strengthen their knowledge about CS before launching a project. Different meanings of citizenship and science along with the context of a particular discipline should be taken into consideration when designing a project. At the same time, the inclusion of experts from different disciplines with transversal competences can only be beneficial for the project. Preliminary to the research fieldwork to understand the local context and make initial contact with a local community should be carried out meticulously.

Communities should be approached with concrete projects/ideas expressed in plain language appropriate to the context. It is important that citizens clearly understand the expectations of researchers and the benefits of their involvement. Researchers must show how the project can become a cement for different stakeholders who will all benefit from the results of the project. CS projects should be inclusive and make it possible for citizens to submit their ideas. As mentioned earlier, communication plays an important role, and the only way to succeed in it is to make communication open and sustainable. Citizen feedback should be listened to and considered at any stage of the project. By giving citizens an active role, projects become inclusive and build trust between stakeholders, which is critical for shared responsibility. CS projects should contain elements of community building and aim to establish long-term relationships that will lead to the creation of a safe space for mutual learning opportunities.

Another part of the solutions consists in resolving time and procedural problems in project management. A structured time plan should be foreseen from the beginning and based on different forms of citizen's participation. Management procedures should be designed as easily as possible, although additional staff might also be a solution for management tasks, monitoring of the process and evaluation.

Ultimately, it is important to know how to finish a project. It should be clear when and how the project ends, and it should avoid being put on hold because of lack of funding. Following the completion of the project, the results of the research should be widely published. Dissemination of results is essential to build connections with other projects and networks that can facilitate the creation of more sustainable projects in the future.

Institutions also have to play their part in enabling CS projects to be implemented. Universities, in the first place, should provide a strategic vision on CS: their intentions to develop citizen engagement should be supported by an institutional policy linked to other missions of higher education and research. In order to incorporate the CS as a standard practice of research, some

changes should be made. Institutional change makers should approach researchers and work together to formulate clear benefits of CS for institutions. A unified vision of social engagement and other university objectives can be very fruitful. For instance, it can be associated with internationalisation strategies and impulse new international projects, create a network of researchers across institutions or a cluster of connected projects that will be more sustainable together. Formal acceptance of CS as a vital research practice may contribute to more planned funding from universities and outside. Additional funding can help change makers to launch pilot projects to detect limits/barriers and solutions for CS development in a particular institution.

To reach more researchers and increase the number of CS projects, universities should start by raising awareness among university communities. Sharing best practices among researchers through all means can help to develop CS knowledge both within and outside academia. It is also important to focus on the associated partners and the general public. Local public talks may be organised for this purpose. Due to the importance of networking, universities should develop closer cooperation with the local socio-cultural infrastructure.

In parallel with CS policies, a communication strategy may be envisaged to promote citizen involvement in science. The emphasis on projects will help them attract new participating citizens. The CS should be presented as a way of sharing scientific knowledge and not just as a research methodology. Social media and other digitized tools should all be used to carry out a large communication campaign.

Since project creation requires a lot of skills and knowledge, a roadmap on how to design a CS project and training may be suggested to researchers. Training modules can focus on specificity of CS projects or on the transversal competences and communication skills. Furthermore, recognition of the non-scientific efforts of researcher, such as training or science communication, should be considered in their evaluation.

The implementation phase of CS projects can be facilitated through a well-developed infrastructure. Practical tools to reach citizens, training in open science can be provided through a dedicated platform or already existing adapted platforms. The subject of open science is rather crucial for collaboration: institutions need to ensure access to data, libraries, statistics, publications, digital archives, online courses, etc. Universities can also cooperate with cultural institutions, archives, and museums to provide access to a wider public.

Q4 - Let's now dream a little bit ... according to you, what would a perfect CS Hub look like?

→ **Q5- Considering your answer to Q4 what kind of a) support services; b) platform; c) training at the Alliance level could foster cooperation with citizens?**

One of the main objectives of CS is to connect different stakeholders from different areas of expertise in order to bring science closer to society, to make it more inclusive, engaging and impactful. This means that a space, whether physical or virtual, where all these actors can meet,

express their problems and exchange ideas, learn to work together and disseminate the results of their work, should be at the centre of Una Europa's long-term ambitions. A perfect Una Europa CS HUB, which embodies its vision of CS and its goals, what would it look like?

The primary cause of CS is research and innovation, its quest for excellence, openness, and greater impact. For this reason, the HUB should first act an **incubator of projects** that foster excellence and innovation. It is expected that the CS HUB will facilitate collaboration between the various stakeholders, which will fuel the work of researchers and inspire new ideas. In addition, the HUB should also provide all other stakeholders with an opportunity to initiate a project. Citizens, for example, should be able to develop their own research questions through workshops that can be offered in the HUB by researchers. As a meeting point, the HUB should make it possible to find partners for projects from other institutions, while creating long-term networks between stakeholders. This process can be facilitated through a matchmaking tool that would allow projects to be combined for collaborative and comparative studies.

Ideally, the HUB should be adaptable to its mission formats: physical presence could be as important as digital infrastructure. Thus, a perfect CS HUB would take the form of a hybrid space that gives the possibility to meet and connect physically and virtually.

The CS HUB as a project incubator can perform different activities which are represented by different services or spaces listed below:

- « **Volunteers hub** », a space for the citizens interested in citizen science and willing to join a project as a volunteer. Having already a database of contacts of potentially interested participants will significantly facilitate the recruitment of citizen scientists.
- **Forum**, a space to suggest projects, where anyone can share a defined project for open discussion, receive feedback and recruit partners and participants.
- **Brainstorming sessions** suggested by researchers to help guide citizens in developing their own research questions and initiating community-based projects.
- **Matchmaking tool** for ready-to-go projects to help research teams connect with communities and other external actors with the same area of focus.
- **Platforms for managing interaction with citizens and between citizens**, a communication tool that will create lasting contact between stakeholders.

A CS HUB is also expected to enable **mutual learning**. It will initially focus on the exchange of knowledge among researchers and other initiative groups on design, implementation, dissemination, evaluation of CS projects, etc. Una Europa CS HUB will be set to become a space uniting different researchers across the alliance. The constant sharing of knowledge, the showcase of activities and good practices will be more beneficial than one-off presentations which often do not reach the right audience. Together, researchers at Una Europa will be able to analyse the obstacles CS projects may encounter and provide solutions to mitigate them. As a result, the design and implementation capabilities for CS projects will increase through mutual learning.

Sharing good practices for mutual learning can take following forms:

- **Group exchange programs** in various formats: “live my life”, staff weeks, workshops.
- **Informal sharing** of positive and negative experiences, obstacles and enablers. A digital space for the informal discussion can be created (CS Coffee Machine).
- **Group brainstorming** on barriers/enablers.
- A **showcase catalogue** can also be provided on the online platform for easy access to a variety of examples of different formats and disciplines.
- **Digital archives** of Una Europa CS projects.

Learning through the exchange of practices and experiences can be strengthened by specific trainings. Capacity building in the design and implementation of CS projects can be achieved through professional, expert-led **online courses**. These courses should be accessible to all stakeholders and tailored to target audiences: not only researchers, but also citizens and local actors. It will make knowledge on CS more accessible, comprehensive and consistent.

Examples of training that can be integrated within the platform include:

- **Research training modules for citizens** (explaining research challenges). How to read science?
- **Short training modules** or information sessions on CS methodologies for students and researchers.
- **Lifelong training** for researchers and support staff.
- **Training to trainer** modules (bootcamps, summer schools...).
- Courses on **communication skills** needed to be able to engage different audiences.
- **Project management** training.

Another very important objective of the HUB is to offer services and support to those who wish to launch a CS project. Una Europa's universities will greatly benefit from the pooling of resources and the establishment of common rules for the management, monitoring and evaluation of CS projects. The services provided should facilitate the organisational part of the projects so that participants can focus on problem solving rather than conceding their time to bureaucratic procedures. One important task will be to put in place such a system which will help to mobilize funds easily. Strict use of funds was defined as one of the most important issues for CS as citizens are not familiar with the way the funds of a public institutions function (An example of Krakow city budget was given to show that some countries have a very easy system of using public grants for community projects).

Documentation, such as policy recommendations and roadmaps with best practices for putting in place a CS research project, will also be an important tool provided by support services.

The HUB will therefore be able to offer various types of support to the stakeholders:

Methodological support:

- Methodological advice on building a CS project
- Different roadmaps (design, implementation, communication, evaluation) and guidelines on ethical protocols and legal issues

Managerial support service:

- Staff accompanying project design (for instance, support for calls for proposals), implementation of funds, self-assessment and evaluation of projects.
- Support in communication and dissemination.
- Research of relevant funding programs.
- Working space for CS projects management.

Technical support:

- Support for data management, ethical compliance, intellectual property rights.
- Support for open and free tools, and any other existing technical solutions for project management.

Finally, an important advantage of a HUB is to have a space where other institutions will be able to communicate directly with researchers and citizens. Libraries, museums, archives, etc., can also be involved at different stages of a CS project. They can have an active role as participants, provide data, be a public space for workshops and open discussions, they may participate in communication and dissemination. In particular, they can give access to research results which is important for CS principles such as openness and transparency, accessibility to a wide public.

Ultimately, a CS HUB will be a cross point of different types of stakeholders who will all be able to have their role in the development and popularisation of CS.

Potential actors and stakeholders include, but are not limited to:

- **Academic actors:** Senior researchers, early-stage researchers (including PhDs), engineers, research institutes.
- **Institutional actors:** Support staff, experts in funding, legal issues, ethical compliance, data management, communication, engagement, management.

- **Civil society organisations:** NGOs, associations, policy-oriented organisations/networks.
- **Citizens:** individual volunteers, community-led citizen groups, informal clusters of citizens, citizens associations, community leaders, concerned citizens.
- **Authorities:** National, regional, local government agencies, public organisations.
- **Outside research centres:** FabLabs, Extreme Living lab, etc.
- **Industries.**

An ideal CS HUB should promote the definition and formats of CS defined during the workshop. Moreover, it should respond to specific principles Una Europa see for CSs. Some of these can be formulated in the following way:

- Promote free, open, transparent, non-discriminatory research.
- Take into consideration legal and ethical issues surrounding copyright, intellectual property, data sharing agreements, confidentiality, attribution, and the environmental impact of any activities.
- Make data and meta-data publicly available and where possible, publish results in an open access format.
- Foresee a larger impact, aim to global solutions.
- Lead to a better understanding of science by citizens.
- Actively involve citizens. Citizens may act as contributors, collaborators, or as project leader and have a meaningful role in the project.
- Ensure that every stakeholder have a benefit from the collaboration.
- Etc.

Q6-- Is there any interdisciplinary topic that you would like to be addressed in Una Europa?

Part of the researchers answered this question by indicating other problems that should be analysed in order to better assess the specificity of CS and its potential for innovation. The following problems were identified:

- Adverse side effects of CS: appropriation of knowledge, which is the process of building knowledge from social and cultural sources, and its integration into pre-existing schemes.
- Role of media in CS.
- CS in art and humanities and its specificity.
- Political agendas of institutions and its influence on CS.

- Ethical guidelines for CS projects.

Another part of the researchers was mainly focused on the interdisciplinary topics that can become a research question for the creation of a CS project.

- Climate change and sustainable development (“Sustainable alternatives for the use of wastes”, “Explore changing climate in cities together”).
- Different problems that impact everyday life of local communities.
- Participation: social participation, democracy and citizenship.
- Health as a cross-cutting global issue. The idea is to explore how different disciplines: music, engineering, social science, etc. can contribute to finding global solutions to health. Another interesting topic to focus on is aging.
- European history and European cultural heritage.

Q7-- Any best practice that you would like to be promoted within Una Europa?

The workshop concluded by discussing best practices to be promoted within Una Europa.

First, practices for promoting CS projects and communicating project outcomes should be shared across the alliance. The digital format such as **short free access videos** or **open webinars** will be the most suitable as these activities are aimed at a wide audience. In addition, knowledge on how to carry out CS projects can be shared through **open online courses** or through **public discussion** and debate of any format. In terms of sharing best practices and experiences, emphasis needs to be placed on examples of **transnational CS projects**. It is also important to share project management practices as well as open science principles between Una Europa universities.

Some guidance was given to researchers interested in carrying out a CS project: it is important to **finish the project well and share the evaluation report**. Also, for brainstorming sessions and group discussions with participants, **digital tools** (like Miro) can provide important help.

Overall, for Una Europa universities, there is a need to discuss the **responsibility** and **value** of facilitating the CS on the institutional level. As a first step, seed funding could be used to launch a call for Una Europa CS projects and start collaboration between researchers.

Conclusion

The co-creation workshop “Breaking down boundaries with citizens” gave rise to a fruitful discussion with a large amount of information that should be further analysed and used for the design of the pilot action.

Researchers of Una Europa had the opportunity to share their understanding of the term Citizen Science and come up with a common concept that will become the basis for the alliance's vision on citizen engagement. It was agreed to see the CS as a broad scope of practices that provides for different types of citizen engagement and can take different forms depending on the discipline.

Various CS project formats have been discussed, and the conclusion was that a format and roles of participants in the project depend, in the first place, on the discipline and the research objectives. It is the overall goal of the research project that should be considered while choosing a particular format. At the same time, in order to innovate and bring science closer to society CS projects should consider participants as real actors and then engage them in project development and formulation of research questions.

The most significant obstacles to the creation of CS projects were identified and analysed. It appears that many barriers are not unique to the CS: lack of time, funding, management support and communication. But there are still some specific barriers. As these projects involve collaboration with stakeholders outside of academia, they raise the issue of identifying the right participants and communicating with them. The methodology of the project can also become an obstacle and must be properly thought out to avoid establishing a hierarchy. Researchers may also lack important skills for communicating science outside of the research community. Some of them may be not familiar with CS principles and methodologies.

The workshop provided an opportunity to reflect on these barriers and come up with solutions: showcasing best practices, creating a roadmap for CS projects, developing an institution-level CS strategy and communication plan, providing support to researchers, etc. These solutions can henceforth be used for the design of the Una.Resin pilot action.

A significant part of the workshop was the task of envisioning an ideal Una Europa CS HUB. As a result, it has become possible to see the full potential and functions of a space, physical or virtual, dedicated to enhancing of CS projects. This space, bringing together all actors should enable communication between different stakeholders, incubate new projects and support projects at all stages of their life cycle: design, implementation, evaluation, dissemination.

At the end of the workshop, participants suggested some best practices they could have in their projects and gave advice on other topics that would be covered under the theme of citizen engagement in Una. Resin.

By summarizing the outcomes of the workshop, two overarching questions asked of participants can now be answered.

- **How do citizen science transform science and society?**

The CS strengthens social cohesion by bringing together various types of stakeholders. It enhances the openness of science to society and therefore the trust between citizens and scientists. The purpose of the CS is not only to carry out innovative projects which solve specific

problems, but to bridge the gap between science and society, share scientific knowledge and explain how to understand its language.

The CS requires us to rethink what science is and what knowledge is. It calls for awareness of the global objectives of science and its political aspects. CS projects engage researchers in challenging their ways of working, innovating and searching for new solutions. By collaborating with citizens, scientists are tackling more impactful issues and changing the science agenda around the world.

Being actively involved in scientific projects develops curiosity and critical thinking among the participants. Citizens who take an active role in CS projects can better understand their responsibilities as citizens and become proactive in changing the world around them.

- **How to break down boundaries with and for citizens?**

In order to break down the boundaries between academia and citizens, CS projects should first give careful consideration to the forms of participation they suggest. What role do citizens have in the project? This should be addressed at the design stage of the project and the response should be clearly communicated to participants. The feedback from participants should also be considered after the project is completed. How do citizens position themselves in relation to what the study is about? Can they appropriate the knowledge produced? Do they feel empowered and impact-generating? Responses to these questions should be included in the project evaluation.

Over the course of the workshop, it became clear that the project can only remove the hierarchy if citizens are perceived as co-creators. Thus, CS projects should accentuate their role as change makers who have a real agency in society. Open and transparent project mechanisms will help citizens understand the entire process and feel under control.

Inclusiveness is equally crucial for CS projects, and the possibility to build a project for any kind of public is a major advantage of CS. Citizen participation can be facilitated by developing a flexible model which can be tailored to the needs and constraints of stakeholders. The project's flexibility can also provide space for creativity and initiative on the part of citizens.

Recommendations

Developing CS is part of Una.Resin strategy for Human Capital strengthening. CS should be seen together with other alliance's objectives focused on building capacities in Responsible and Impactful research based on principles of Open science. CS should, thus, respond to Open Science principles, including transparency, verifiability and protection of data, compliance with ethical principles, etc. and promote it among all the potential stakeholders of CS.

One of the ultimate goals of the Una.Resin project is to develop an innovative collaboration format that would enhance the role of citizen science in research activities. A CS HUB would undoubtedly be the best answer to this objective, as it encompasses almost every aspect of CS and meets

many requirements. However, the results of the workshop are consistent with earlier findings of the benchmarking exercise: due to the rudimentary state of development of CS in most of Una Europa universities, some preliminary steps should be put forward in the pilot action before the development of digital tools and services.

During the discussion on the CS HUB, it was suggested to make an accent on the collaborative aspect which can be described as a “community of practice”. A strong and sustainable community can create a shared knowledge about CS, its methods, principles, etc., incept fruitful collaboration and then inhabit a CS platform. It is crucial to create an environment where researchers discuss and formulate CS principals that can be then represented in the Una Europa manifesto on CS.

In addition, it may be recommended to address some of the barriers that researchers face before they even begin a CS project. As a suggestion, emphasis can be put on the lack of awareness on CS and capacity for project design and implementation. Some enablers for these barriers have already been proposed during the workshop, and the main one is sharing of best practices. The exchange of experience may take form of training in project design (design of citizens’ participation, managerial aspects and form of evaluation), a project showcase or a brainstorm session. The workshop has highlighted a need to spread an idea of CS as a co-creation exercise and focus on how the collaboration is organised and how the roles between participants are distributed. When it comes to awareness-raising, the Una.Resin project and Una Europa as a whole can be seen as a platform to give visibility to CS projects at institutional, alliance and European level.