RI4C2
Research & Innovation
For Cities & Citizens

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

Citizen Science Champions

DELIVERABLE 6.1
MONTH 12

RI4C2
Research & Innovation
For Cities & Citizens

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

D6.1 – Citizen Science Champions

Table of Contents

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

I. Preamble

According to the European Research Area Policy Agenda, the Research and Innovation (R&I) landscape "has profoundly changed since the 2008 *Commission Recommendation on the management of intellectual property in knowledge transfer activities*" has been announced. An update is needed that moves from the traditional concept of knowledge transfer to the valorisation of knowledge assets, generated by different types of actors in a dynamic R&I ecosystem. New challenges must be addressed like the increasingly complex knowledge value-chains, new market opportunities created by emerging technologies, new forms of industry-academia collaborations and *involvement of citizens*, as well as reciprocity in the management of intellectual property in international R&I cooperation" (*European Research Area Policy Agenda: Overview of actions for the period 2022-2024*, p. 10).

At the European level, the 2015 *White Paper on Citizen Science* underlined the importance of creating a common strategy aimed at developing a framework that gravitates around three focus points: *public engagement, trust*, and *education*. Through the proposed actions, the White Paper emphasises the importance of contributing to a deeper analysis of Citizen Science practices and outcomes. By fostering the co-production of knowledge, significant advances can be achieved, from personal growth and learning to social innovation and policy impact (White Paper on Citizen Science, 2015).

This innovative approach of citizen science engagement can be applied across different areas of science, from physics to health and social science and humanities and it represents an ideal mean to build trust in science and to increase stakeholders' capacity in conducting excellent research and innovation. Citizen science can foster an open and participatory approach to science (Vohland et al., 2021) by diminishing the distance between science and society through public participation and collaboration. Citizen involvement in science and their environment has the potential to assure a collection of data at a much larger extent, allowing a cost-effective approach, and at the same time, providing the opportunity for volunteers, interested community stakeholders, or members of the general public to contribute to something important and valuable.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

II. Objectives of the report

The main objectives of this document are:

Objective 1 (O1): to provide a description of the concept of Citizen Science;

Objective 2 (O2): to provide a set of selection criteria for identifying the local Citizen Science Champions within the EC2U Alliance.

III. Conceptual framework

In the last decade, Citizen Science has received increasing attention among scientific institutions and the general public. Citizen Science a multifaceted concept that reduces the distance between science and society, contributing to the achievement of an enlightened society. Citizen Science refers to the active involvement of the general public in scientific research tasks. This collaboration between scientists and citizens aims at producing new knowledge which can play an important role in developing society, improving communities, and promoting public participation (Vohland et al., 2021). The higher awareness of the role of research and innovation and the precious contribution from society has the potential to improve the outcomes and reinforce societal trust in science (European Commission, 2021). However, the development and implementation of Citizen Science concept depends not only on public and scientific perception but also on policy development, support and framing of the process (Hecker et al. 2019). Table 1 summaries the definitions of Citizen Science, underlining some common aspects that emerge.

Table 1. Selected definitions of Citizen Science

Definitions of Citizen Science	Main aspects
"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". (OECD, 2017)	• Non-professional scientist • Collaborative process
"The term **Citizen Science** means a form of open collaboration in which individuals or organizations participate in the scientific process in various ways, including (A) enabling the formulation of research questions; (B) creating and refining project design; (C) conducting scientific experiments; (D) collecting and analysing data; (E) interpreting the results of data; (F) developing technologies and applications; (G) making discoveries; and (H) solving problems". (US Crowdsourcing and Citizen Science Act (15 USC 3724) 2016)	• Different levels of citizen involvement
"The efforts are driven by community concerns. These community-led projects may involve a partnership with an academic or research institution, where both parties work together to collect and share data. The goal is to address a community concern through collaborative research and to	• Community led projects

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

translate the research findings into public health action that benefits the community ". (O'Fallon, Finn, 2015)	
"**Citizen Science**" - is a form of public participation in research projects through which citizens are involved in different stages of the scientific research process. This involvement can range from being better informed about science, its results and the impact on society in a broad sense, to participating in the scientific process itself, by observing, collecting, identifying, processing and analysing data, but also by their financing of scientific research projects Citizens decide how to be involved based on personal interest, time and technological resources". (UEFISCDI)	• Different levels of citizen involvement and engagement
"**Citizen Science** can make science more socially relevant, accelerate and enable production of new scientific knowledge, increase public awareness about science and ownership of policy making, as well as increase the prevalence of evidence-based policy making". (European Commission, 2020a, SwafS work, 2018-2020)	• New scientific knowledge production
Citizen Science "is an ideal means to democratize science, build trust in science, and leverage the vast societal intelligence and capabilities to conduct excellent research and innovation ". (European Commission, 2020b)	• Building trust in science
"**Citizen Science** – where citizens become providers and users of data. This will reinforce and give new meaning to the policy of open access to publications and data; this openness should enable citizens and citizen groups to participate in evidence-based policy and decision-making ". (Wehn et al., 2020; Vohland et al., 2021)	• Open access

Source: Adapted after Vohland et al., 2021

The working definition has been chosen from the *White Paper on Citizen Science for Europe*, (2015) as being more comprehensive and explaining that: "**Citizen Science** refers to the general public engagement in scientific research activities when citizens actively contribute to science either with their intellectual effort or surrounding knowledge or with their tools and resources."

Dimensions of Citizen Science

The dimensions of Citizen Science can be framed using three main approaches:

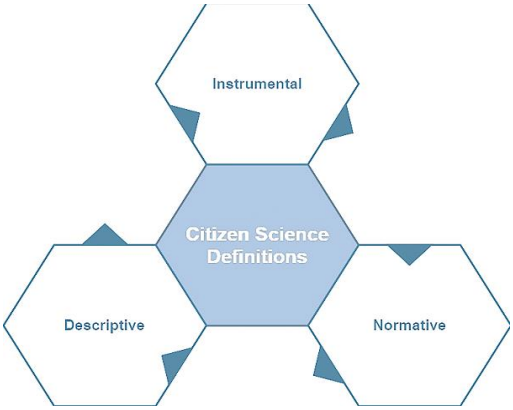
a) descriptive,

b) instrumental and

c) normative, which helps attaining a better understanding on the complexity of the phenomenon (see Figure 1.)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

Figure 1. Citizen Science dimensions



Source: Authors' adaptation after Vohland et al., 2021

The definitions of Citizen Science integrate a *descriptive framework* in their composition. For instance, according to the Oxford English Dictionary (2014), Citizen Science represents a collaborative process performed by professional scientists and the public that translates their research findings into public actions that are beneficial for the community (OED, 2014). The general public can be formed either by i) citizens who have not necessarily received any training in scientific research (e.g., non-professional scientists - see for instance Oberhauser and Prysby, 2008; voluntary participants - see for instance Dickinson et al., 2010), or by ii) trained individual working in isolation or virtual communities which develop projects in an uncontrolled environment (G7 Science Academies, 2019). Citizen scientific endeavours can include different activities within the knowledge ecosystem as: data collector, data processors, sensors, communicators, and disseminators (Nascimento et al., 2014).

The instrumental approach highlights that category of definitions that reflects two aspects: *first*, citizens objectives and their engagement in the open processes of generating scientific knowledge. Some examples of open activities may include enabling the formulation of research questions, constructing, and executing different project designs, running experiments, gather and examine data, explain the results, develop different technologies and application, making scientific discoveries and problem-solving (US Crowdsourcing and Citizen Science Act (15 USC 3724), 2016; UEFISCDI; Citizenscience.gov (US)). *Second,* the citizen participatory practices need to match the organization goal and objectives, which are clearly linked to the community's concerns. That means that a project is community led and implemented to support community goals throughout collaborative research (US National Institutes of Health).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

The normative aspect of Citizen Science definitions encapsulates the expectations of the different actors across Citizen Science projects such as normative pressure (Venkatesh et al. 2003) or social regulations and imposed norms (Venkatesh and Davis 2000).

III.A. Criteria of selection used in Citizen Science projects

Table 2 presents the forms of participation that different Citizen Science project implies, using different criteria: how activities are coordinated and distributed among participants; what level of knowledge and skills the participants need so they can actively be involved in such activities; the community degree of involvement; outcomes evaluation; the degree of openness, sources of funding, stakeholder's role, and their aligned goal (Prainsack, 2014).

Table 2. Different approaches in selecting Citizen Science projects.

Coordination: Who has influence in:
1. Agenda setting
2. Determining the terms of the execution of the idea/procedural aspects
3. Deciding what results are (and what 'good' results are)
4. Deciding what will be done with results
5. Deciding on intellectual property questions
Participation
6. "Who participates (demographic and social parameters of those who participate)? Why, and how do they participate?"
7. "How much, and what kind of, training, skill, or expertise is required to participate in this project?"
8. "Are there cultural, institutional, or other differences in perception and framing of core issues and stakes?"
Community
9. "What forms of community pre-exist this project, if any? Which new communities does the project facilitate or give rise to? What is the constitutive factor for the feeling of belonging on the side of the participants?"
Evaluation:
10. "How and by whom is it decided what good outcomes are?"
11. "What happens to the results of these evaluations?"
Openness:
12. "Do participants in the project have access to the core datasets?"
13. "Can participants in the project edit the core datasets?"
14. "Is the contribution of participants adequately acknowledged in published materials?"
15. "Are datasets made publicly accessible (open source/open access)?"
16. "Are main findings made publicly accessible (open source/open access)?"
Entrepreneurship:
17. "How is the project funded?"

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

18. "What is the role of for-profit entities in this project? Are these small, medium-sized, or large entities, and where are they located?"
19. "How are for-profit and other interests aligned in this project (and/or do they conflict, and where?)"

Source: Prainsack, 2014, p.7

- The first dimension focused on **coordination** and helps attain a better understanding of who influences setting the agenda of the project, how the project will be carried out and what should the expected results be like and what should be done with them, and any issues related to intellectual property surroundings (Prainsack, 2014).

- **Participation-related** questions are useful in considering who participates in the project and what characteristics the actors have in common; in terms of skills, talents, and capabilities what requirements should be taken into consideration; do formal and informal institutional contexts impede achieving efficient open-ended solutions?;

- **Community** refers to whether the formation of new communities is facilitated by a citizen social science project or if the project taps into pre-existing communities. The questions include: „What forms of community pre-exist in the project if any? Which new communities does the project facilitate or give rise to? What is the constitutive factor for the feeling of belonging on the side of the participants?" (Prainsack, 2014).

- **Evaluation.** It's a crucial step in any ongoing or completed project, as it helps to assess the relevance and the level of achievement of the established goal and objectives, as well as the wider societal, educational, and economic impact. In other words, it helps determine the success and impact of the project. Two main questions can be used in evaluation assessment: "How and by whom is it decided what good outcomes are?" and "What happens to the results of these evaluations?", thus reaching out to the needs of researchers, citizens, and funders.

- **Openness.** It can refer to citizens who may actively and openly participate in various project steps (including data collection, analysis, monitoring, and evaluating among others), and the data collected is made accessible for both participants and the general public. Some of the questions may include the following: „Do participants have access to core datasets and they can edit them?" „Their contribution is adequately acknowledged?" „The datasets are open source/open access?" and finally, „ The main findings are freely available to the public?" (Prainsack, 2014).

- **Entrepreneurship.** The concept is evaluated based on three main questions related to: a) support and funding of the projects (e.g., grants, local charities, informal groups, Non-profit

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

organisations); the role of the for-profit entities and their location; and the stakeholders' interest and their alignment with the common goal (Prainsack, 2014).

III. B Citizens main levels of participation in R&I activities

To increase societal engagement in R&I processes and make this engagement successful, it is necessary to build strong partnerships between various stakeholders and also to create proper structures and mechanisms. By including citizens in policy-making processes they can have a sense of ownership of the proposed solutions and they could feel that are taking part in creating the kind of environment in which they wish to live now and in the future. Also, meaningful societal engagement could be achieved by using proper incentives, which can be used as a stimulus for societal engagement in R&I for scientists. People¢s civic engagement means overstepping the deficits that appear in the relations between society and science to achieve a democratic decision-making process and share responsibility.

In terms of citizen level of participation, we could distinguish between the following forms: nominal, instrumental, representative, and transformative participation (Singh, 2022). The dynamic differences between actors (bottom-up or top-down interests; different perceptions; level of participation) may conduct to a clearer understanding of the politics of participation.

- Nominal participation - at the "grassroots" level of involvement (less powerful individuals become involved in the process, minimum changes)

- Instrumental participation – addresses the efficient use of individual skills and talents to obtain open-ended solutions.

- Representative participation – active community members' involvement or "*the community voice*"; the outcome directly affects the community members; sustainable interventions are directly related to the level of power of the participants.

- Transformative participation - permits the empowerment of the actors, and at the same time alters the institutional structures that lead to marginalization and exclusion (Singh, 2022).

III.C Citizen engagement measurements at European level

Flash Eurobarometer (FL4023) from 2020 commissioned by the European Parliament realized a survey for measuring people's civic engagement. According to the results of the survey personal engagement of the citizens from Romania with Civil Society Organizations was reduced. 69% of the respondents declared that they are not engaged with Civil society organizations, 6% said that they are actively encouraging other people to engage with Civil society organizations, while 5% declared

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

that they have taken part in demonstrations or similar activities organized by Civil society organizations. But 15% of the respondents, the highest percentage compared with the other countries from the European Union, said that they don't know about this.

The study also measured if the Civil society organizations which citizens are involved with deal with European Issues or European Institutions. 72% of respondents from Romania said no to this question, only 22% said yes.

In this survey were analysed also the motives that would stimulate the active citizenship. 12% of the respondents from Romania said that their involvement with Civil society organizations would increase if they would be convinced that their engagement will have a real impact. 8% said that they will be motivated if they received feedback on what has been achieved, and 7% will be motivated if they were regularly informed on organizations ongoing activities and projects.

Flash Eurobarometer 2020 also measured the participation in public consultations at the local level by country. For Romania, 53% of the respondents said that the city, town, or village where they live had not a public consultation in the last 12 months, where citizens could get involved in discussing or talking decisions about what is happening in their area. 25% declared that they do not know about this. While only 7% say that such consultations were organized and that they took part. In this regard, Romania has the lowest percentage in the European Union. On the other hand, regarding the usefulness of public consultations, 82% of those who stated that they participated in such events considered them to be a good way to give citizens a say in the formulation of local policies but that they are also a very good way of information.

In addition to measuring these aspects related to people's civic engagement through surveys, a series of indicators were also used by the European Commission, in a study from 2015. These indicators for measuring civic engagement of people are: participation in formal or informal voluntary activities, which express active citizenship by gender, age and educational attainment level and also by income, household type and degree of urbanization. Also, there are a couple of indicators that measure the reasons of non-participation in formal or informal voluntary activities, active citizenship in the last year broken down by sex, age and educational attainment level but also by income, household type and degree of urbanization.

Analysing the values for the above-mentioned indicators for the case of Romania we observe that, in 2015, the share of the Romanian population aged 16 and over that participated in active citizenship was 3.2%, the lowest level from all the EU countries. Moreover, a slightly higher share of women (3.4 %) compared with men (11.7 %) were active citizens. People with a higher level of educational attainment and those in the top income quintile had the tendency to participate more than average in active citizenship.

As regards age of citizens the highest share of active citizens for Romania was recorded for the age group 16-24 years (6.8%), and as age increases, the percentage of active citizens is decreasing (to 1.1% for the age group over 75 for years).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

IV. Researching Citizen Science in the cities of the EC2U Alliance

a. Research design

To identify the Citizen Science Champions from the EC2U Alliance cities and regions, we have designed and conducted a focused survey.

It is available at https://survey.ec2u.eu/index.php/918627:

b. Research stages and timeline

The Table below presents the main 5 stages involved in the research conducted on citizen science various aspects and the timelines for such activities.

Table 3. Stage involved in research and timelines.

Research stage	Timeline
(1) Developing the survey questionnaire	February/March 2022
(2) Pre-testing the research instrument	April 2022
(3) Reviewing the questionnaire after pre-testing	May 2022
(4) Conducting the survey: 2 rounds involved	Round I in June/ August 2022, Round II in September/October 2022;
(5) Preliminary analysis of collected data	October 2022

Source: author's contribution

The questionnaire was organized into four sections as follows (see Annexes section):

- **GENERAL INFO**
- **RESEARCH & INNOVATION BACKGROUND**
- **CITIZEN SCIENCE**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

❖ **SOCIO-DEMOGRAPHIC DATA**

The questionnaire comprises two types of questions: some questions where the answers are formulated according to the Likert scale of 5 points (1- total disagreement; 2- partial disagreement, 3- neutral, 4- partial agreement, 5- total agreement), other questions with only one allowed answer, and with open answers. The questionnaire ends with some socio-demographic questions. The research instrument was translated into all seven languages of the project partners.

In the first stage, we made a qualitative and quantitative pre-test, on a small number of respondents (10 people) to verify the understanding of the content and to make changes so that the questions are as clear as possible and follow our main objective. Starting from the recommendations received in the pre-test phase, we adjusted the questionnaire, and then we applied it at an extended level.

c. Key actors: the stakeholders

In the Knowledge ecosystems, we identify regional talents (successful local/regional stakeholders, including within the seven EC2U universities) who serve as models for the successful engagement of citizens, civil society, local/regional communities, and public/municipal authorities in different stages of R&I process.

The EC2U Alliance stresses the link between universities and their host cities and in a global way the daily cooperation with other local actors of the Knowledge Square, including associations, regional higher education, and socio-economic stakeholders (public and private).

The emphasis is on identifying solutions to promote a vibrant Citizen Science community by bringing together major stakeholders and individuals to improve research, understanding, and engagement in society, policy, education, innovation, and academia (ECSA, 2015).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

Figure 2. Key actors of the Pan-European Knowledge Ecosystem

Stakeholder's categories (main):

- **Universities and Research Entities** (Universities/ University Alliances/Associations, Research Institutes/ Researchers communities/ Public research institutions Research & Industrial parks Research Centres/Hubs or Think Thank, Research clusters/platforms)

- **Innovative start-ups** (Innovation Associations/Programs/Bootcamps, Entrepreneurs)

- **Local authorities** (Regional Agencies, Local Public Administration, County councils, Representatives of municipalities, local government bodies; Public institutions; Social assistance service, Local authorities for social protection and rights, Public health authority)

- **Venture capital, sponsors** (Regional agencies (ADR-NE), Consulting companies/agencies, Start-up Nation, Investment groups, Business solution groups, Tech investors)

- **Service organizations** (Non-governmental organizations, Local and regional communities, Professional associations, Hospital research centres and institutes, Private hospitals)

- **Incumbent firms** (Entrepreneurs, creditors, investors, local and regional enterprises, Companies/Corporations, Private entities with R&I activities)

- **Citizen Science Entities** (European Citizen Science Association (ECSA); NGOs; Academia; citizen scientists).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

d. Quantitative methodology

To identify local **Citizen Science Champions**, an online questionnaire-based survey has started with the representatives of the 7 stakeholder categories from the EC2U alliance' cities: **Coimbra, Iasi, Jena, Turku, Pavia, Poitiers, Salamanca**.

e. Selection of participants. Rounds

The first stage of data collected through the online questionnaire survey was during the period July-October 2022. A second round will last until February 2023, and enhanced until the end of the project, as a Vivid Knowledge Ecosystem requests.

f. Selection criteria for identifying local/regional stakeholders:

- Background involvement in R&I activities
- Previous cooperation with research entities (e.g., universities, research institutes)
- Research & Innovation declared as activity object (e.g., NACE/ CAEN codes)

According to the **Nomenclature of Economic Activities** there are some specific codes for R&I activities:

7211 Research and experimental development on biotechnology

7219 Other research and experimental development on natural sciences and engineering

7220 Research and experimental development on social sciences and humanities

V. Preliminary key findings

In the following, we present the preliminary key findings obtained from the analysis of the data collected during the first year of project.

Based on the information reported by the LimeSurvey platform, there were 485 attempts to complete the questionnaire. The project team has checked all of them and chose for the current analysis only the complete ones, with valid data. These complete and valid answers are 112 (23.09% of the total attempts). Focus groups organized by each of the seven universities for the Local Knowledge ecosystems enrich the quality of collected data.

Out of the total number of respondents (N=112), 49 stated that they have been active or are still active in Citizen Science.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

Although the number of respondents is still not enough to perform a qualitative and quantitative statistical evaluation, it is possible to conclude on some aspects based on the preliminary results. The data collection is still in progress and the results could undergo further changes.

Out of the total of stakeholders carrying out Citizen Science activities (n=49):

- from Coimbra 9 of them are Universities and Research entities and 1 is Service organization;
- from Iași 2 are Universities and Research entities, 2 are Service organizations, 1 is Local or Regional authority, 1 is Citizen Science entity and 1 is from other category;
- from Jena are 6 Universities and Research entities;
- from Pavia 1 is Innovative start-up;
- from Poitiers 10 are Universities and Research entities, 1 is Service organization, 1 is Local or Regional authority and 1 is Incumbent firm;
- from Salamanca 6 are Universities and Research entities, 1 is Service organization, 1 is Local or Regional authority and 1 is Incumbent firm;
- from Turku 3 are Universities and Research entities.

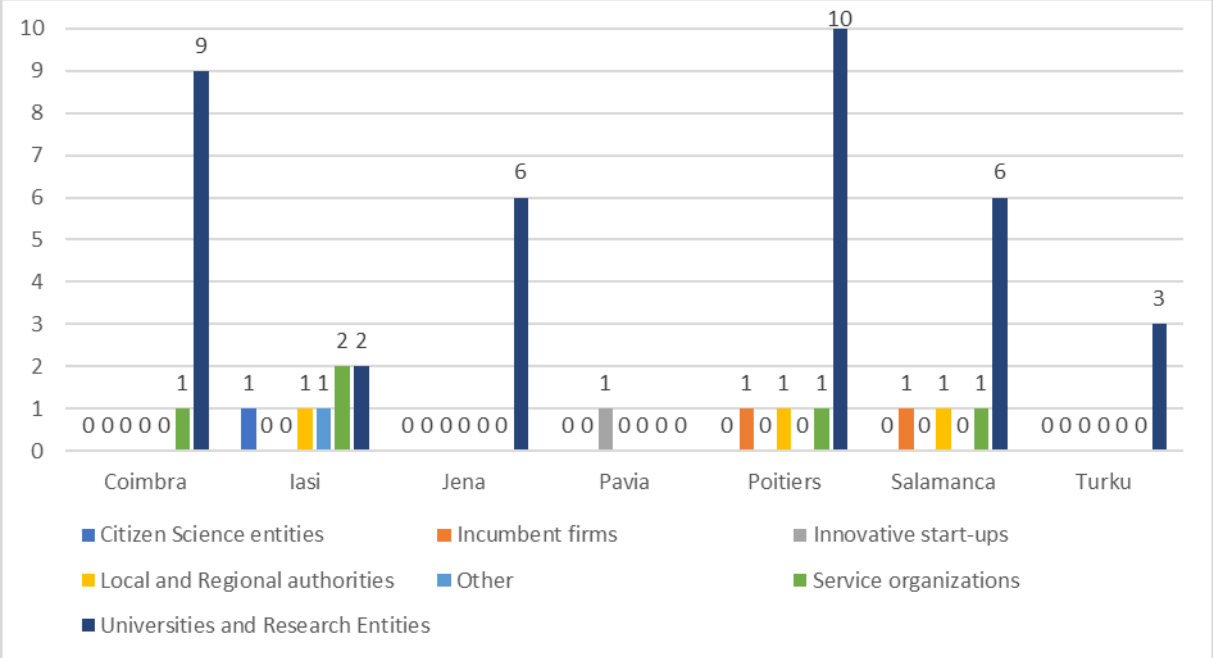


Figure 3. Respondents' profile by city and stakeholder's category

From **Figure 3** one could see the exclusive distribution of the respondents to one of the entities, however the analysis in these situations was performed on a very limited number of respondents.

Analysing the types of actors involved by stakeholders in Citizen Science, we can differentiate between:

- Individual citizens;

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

- Informal and formal networks of citizens (civil society organizations);
- Local communities and authorities;
- Regional communities and authorities.

Regarding the involvement of individual citizens in Citizen Science projects and activities by the cities (**Fig. 4**):

- 9 of the stakeholders from Coimbra involve this type of actors;
- 4 of the stakeholders from Iasi involve this type of actors;
- 3 of the stakeholders from Jena involve this type of actors;
- 1 of the stakeholders from Pavia involve this type of actors;
- 6 of the stakeholders from Poitiers involve this type of actors;
- 9 of the stakeholders from Salamanca involve this type of actors;
- 3 of the stakeholders from Turku involve this type of actors.

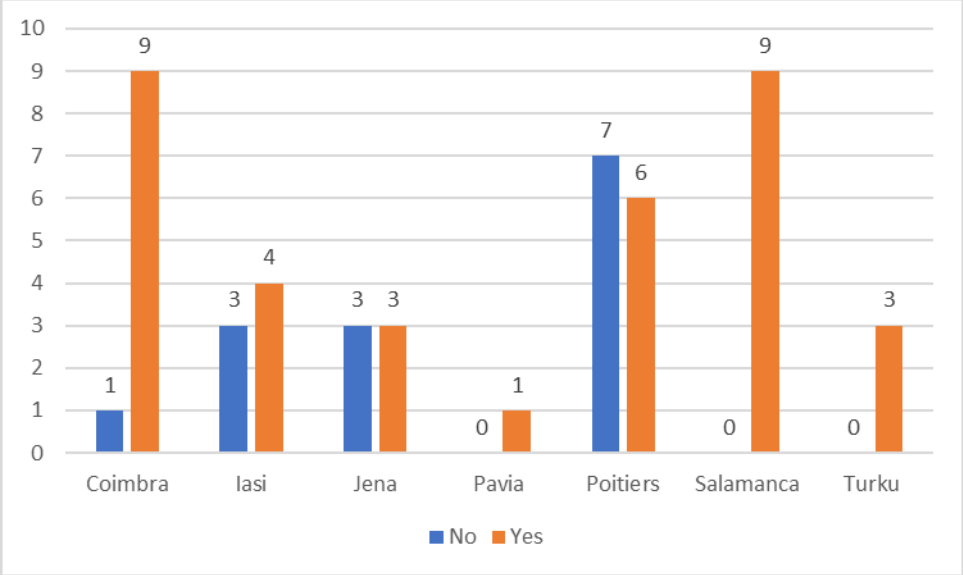


Figure 4. Individual citizens involved in Citizen Science

Other types of actors that are involved in Citizen Science actions are Informal networks of citizens and Formal networks of citizens, understood as civil society organizations (**Fig. 5**).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

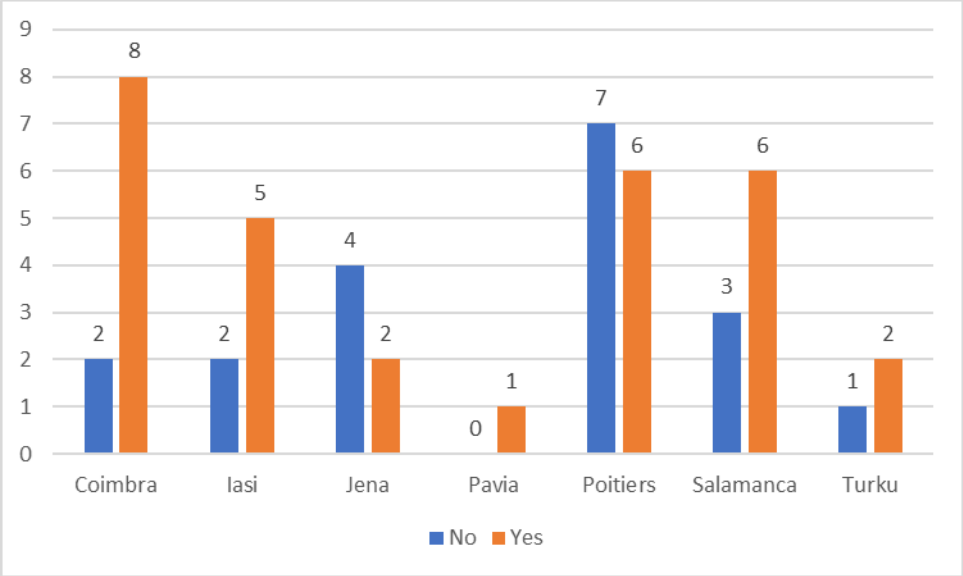


Figure 5. Formal and informal networks of citizens involved in Citizen Science

On the local level we can differentiate two types of actors used by the stakeholders in Citizen Science projects and activities: Local communities and Local authorities (**Fig. 6**).

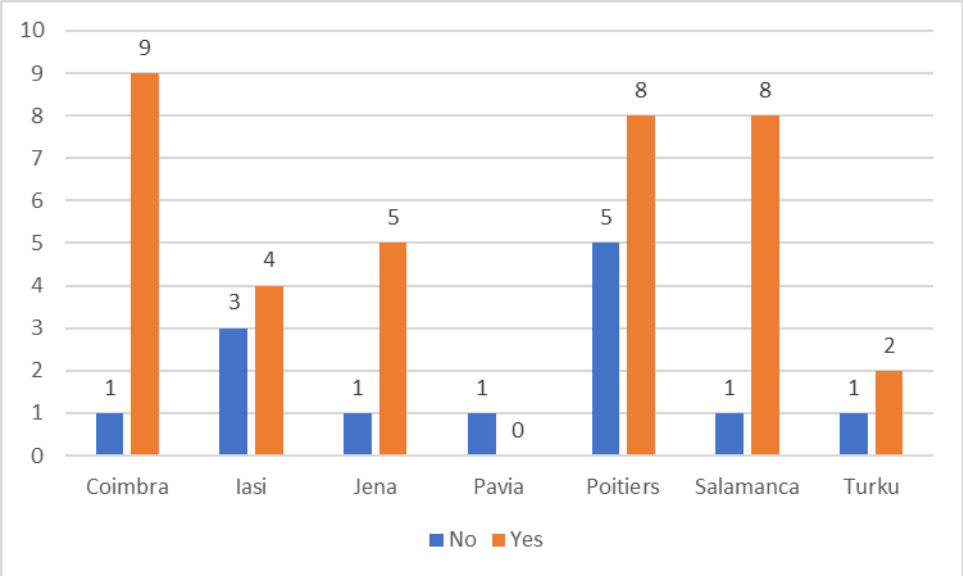


Figure 6. Local communities and authorities involved in Citizen Science

On the regional level we can differentiate two types of actors used by the stakeholders in Citizen Science projects and activities: regional communities and regional authorities (**Fig. 7**).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

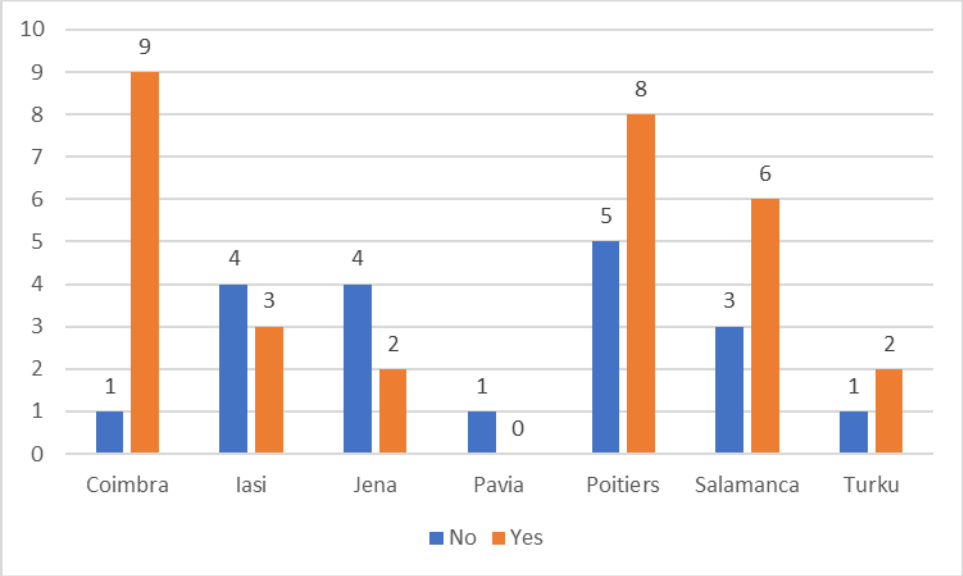


Figure 7. Regional communities and authorities involved in Citizen Science

Regarding the stages of Citizen Science projects and activities in which are involved citizens, we can differentiate between:

- Consultation (pre-testing of research tools, identification of community needs etc., **Fig. 8**);
- Data collection (**Fig. 9**);
- Data processing (**Fig. 10**);
- Valorification of results (**Fig. 11**);
- Dissemination and presentation of results (**Fig. 12**).

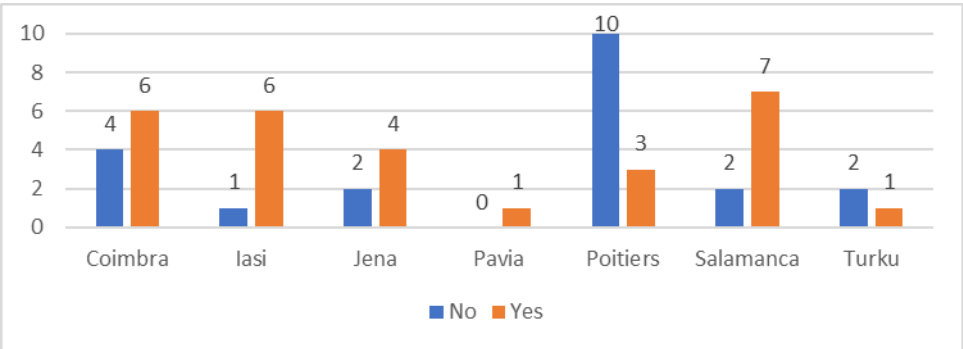


Figure 8. Consultation

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

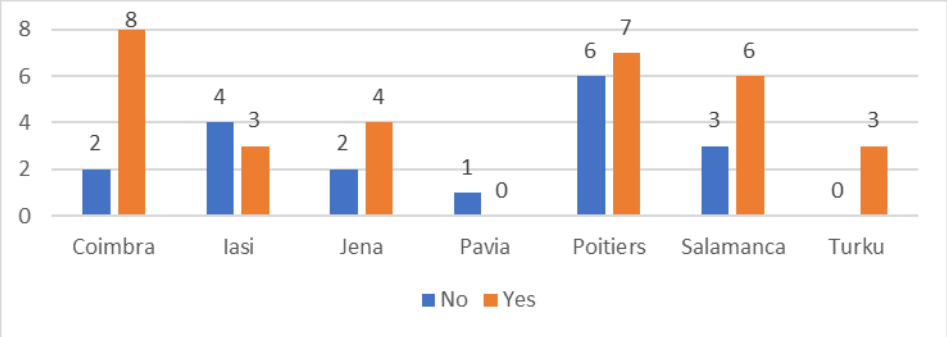


Figure 9. Data collection

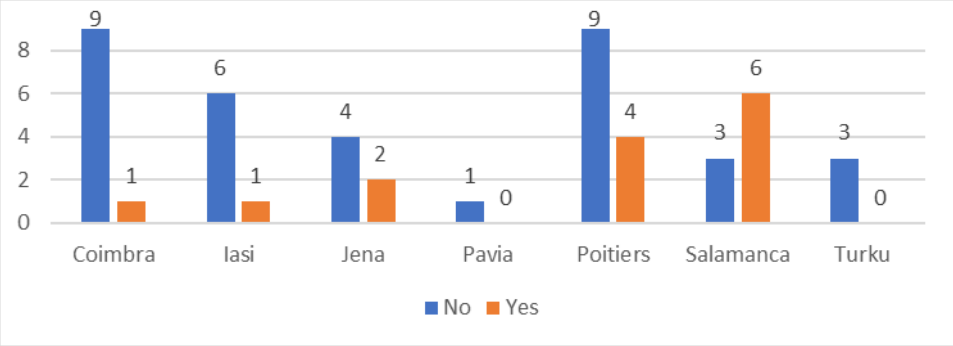


Figure 10. Data processing

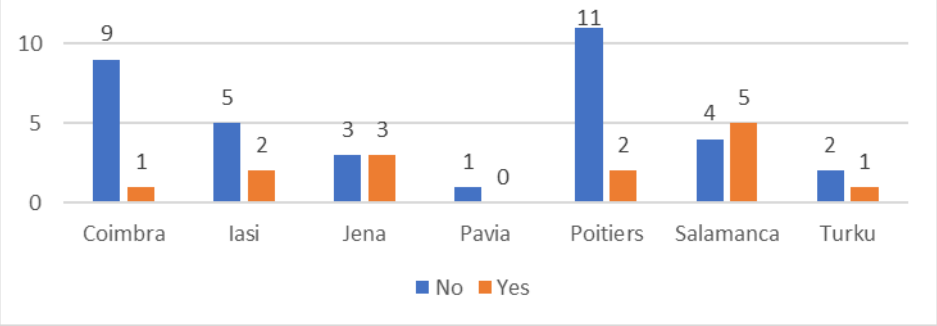


Figure 11. Valorification of results

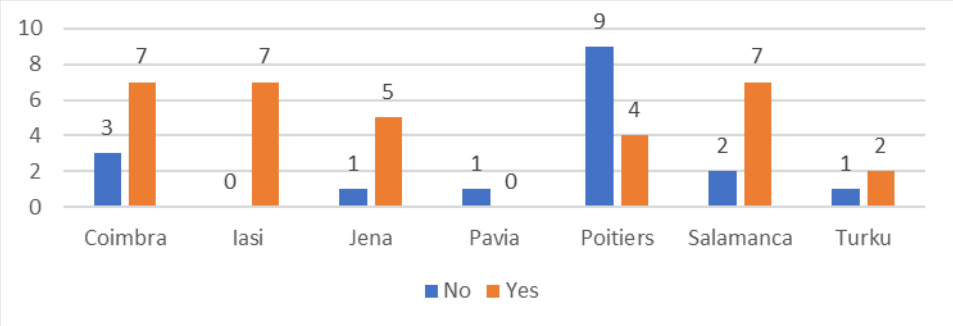


Figure 12. Dissemination and presentation of results

The projects and activities of Citizen Science targeted the following community issues:

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

- societal issues - inclusiveness, education, active citizenship (**Fig. 13**);
- economic issues - innovation, growth, employment (**Fig. 14**);
- environmental issues - ecology, nature, protection, sustainable use of resources (**Fig. 15**);
- health issues - prevention assessment, monitoring (**Fig. 16**);
- improving the access to science (**Fig. 17**);
- improving policy making and practices (**Fig. 18**);

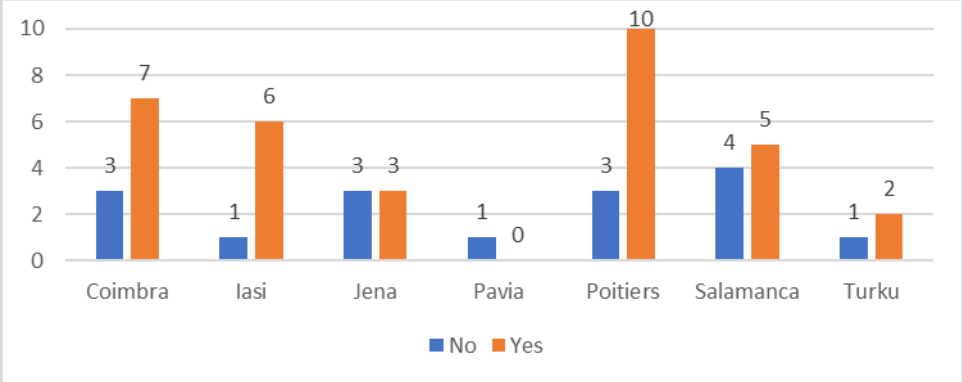


Figure 13. Societal issues targeted by Citizen Science projects

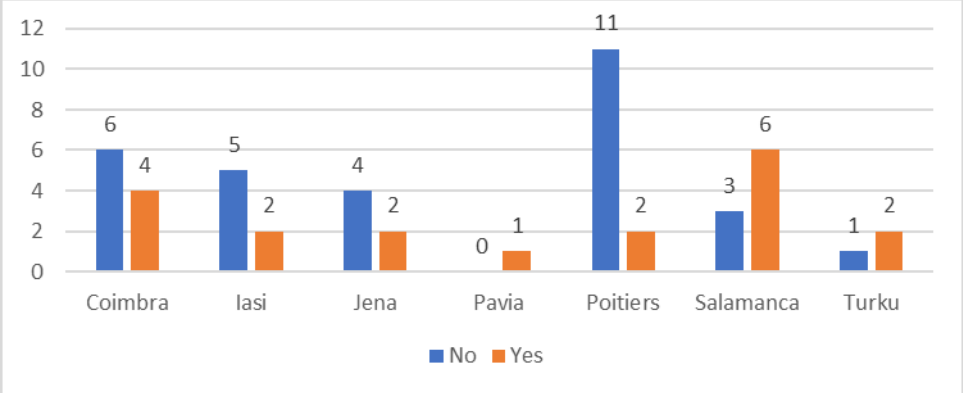


Figure 14. Economic issues targeted by Citizen Science projects

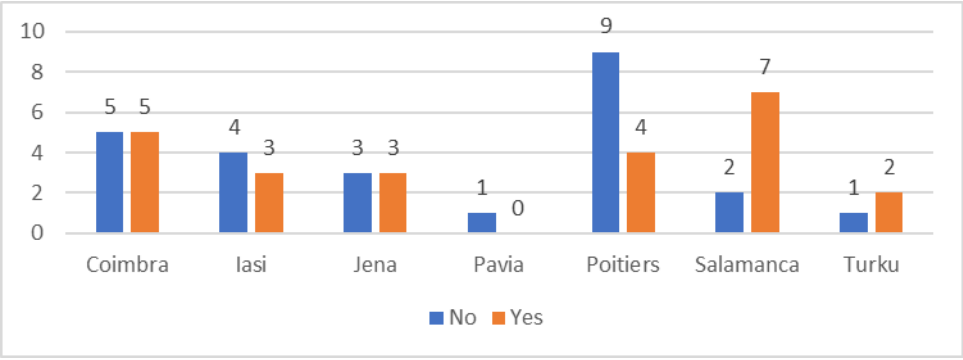


Figure 15. Environmental issues targeted by Citizen Science projects

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

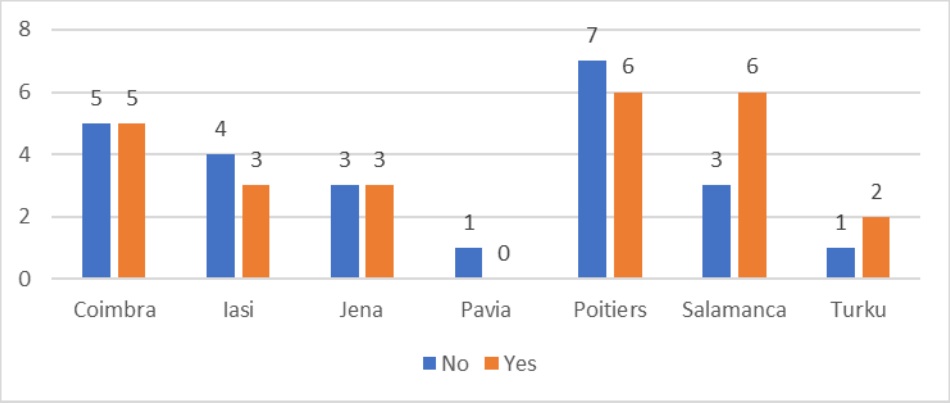


Figure 16. Health issues targeted by Citizen Science projects

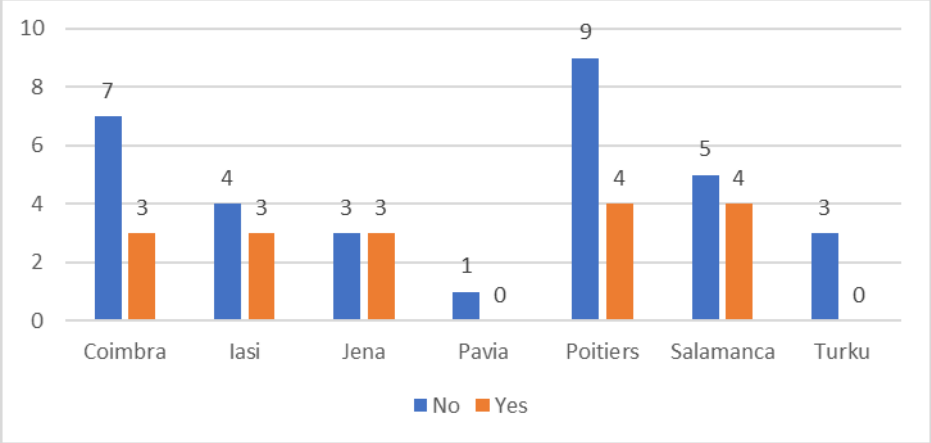


Figure 17. Improving the access to science - issues targeted by Citizen Science projects

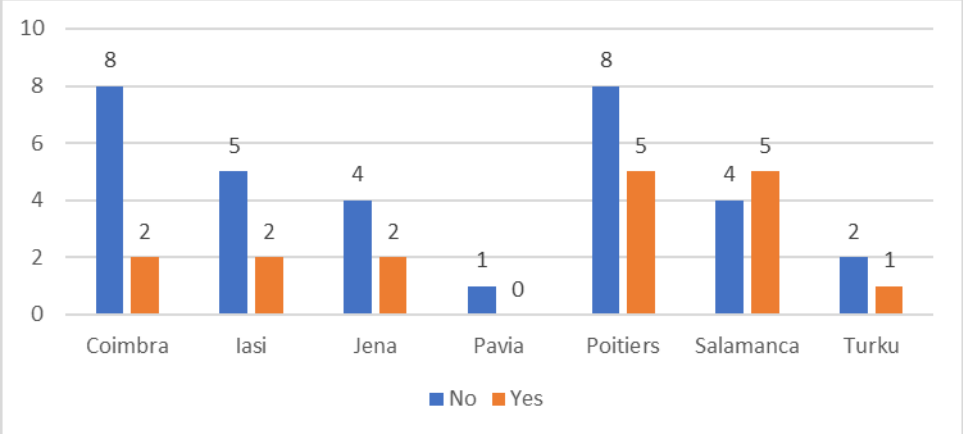


Figure 18. Improving policy making and practices - issues targeted by Citizen Science projects

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

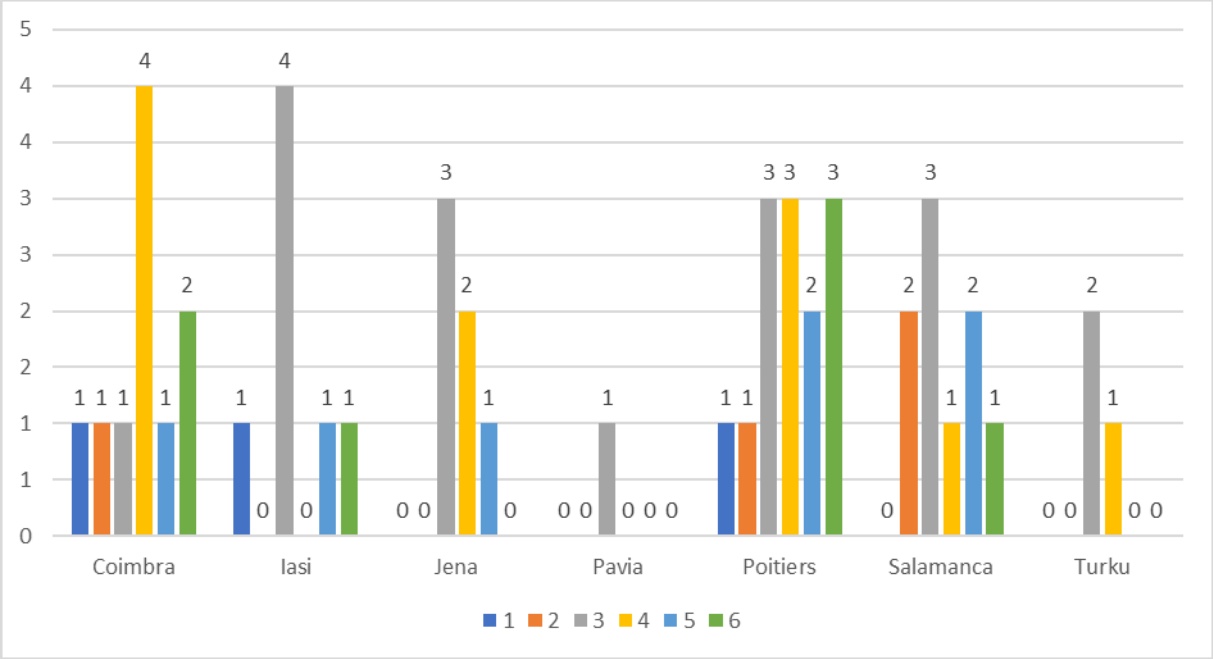


Figure 19. The impact level of Citizen Science project on the communities

In **Figure 19** we emphasize the estimated impact of Citizen Science projects and activities on the community, using a six-points Likert scale, ranging from 1=Very low impact to 6=Very high impact.

Although the effects of Citizen Science are wide ranging, influencing society, the economy, the environment, as well the individual participants, in our sample most of the respondents evaluate the overall impact at a moderate level.

Only 14.28% of our sample consider that Citizen Science projects have a high impact on the community, stimulating equitable and universal access to scientific data and knowledge.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

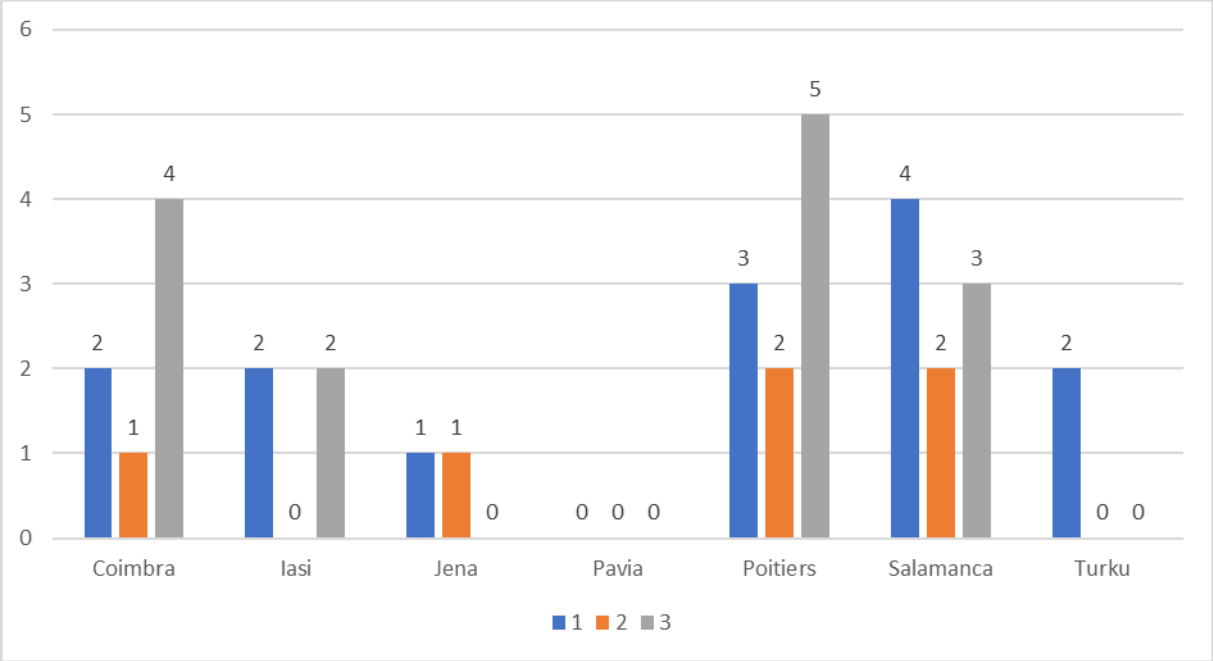


Figure 20. Citizen science projects implemented/developed.

In **Figure 20**, we estimated the number of Citizen Science projects implemented by different stakeholders. The answers were coded using a three points Likert Scale, where 1 indicates those entities that implemented/developed less than 2 projects; 2, indicate those who have implemented/developed between 3 and 5 projects, and 3, those organizations with more than 5 projects.

The results indicate the dynamic of the number of projects, with a vivid market in Poitiers, Coimbra and Salamanca and a promising one in the other cities.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

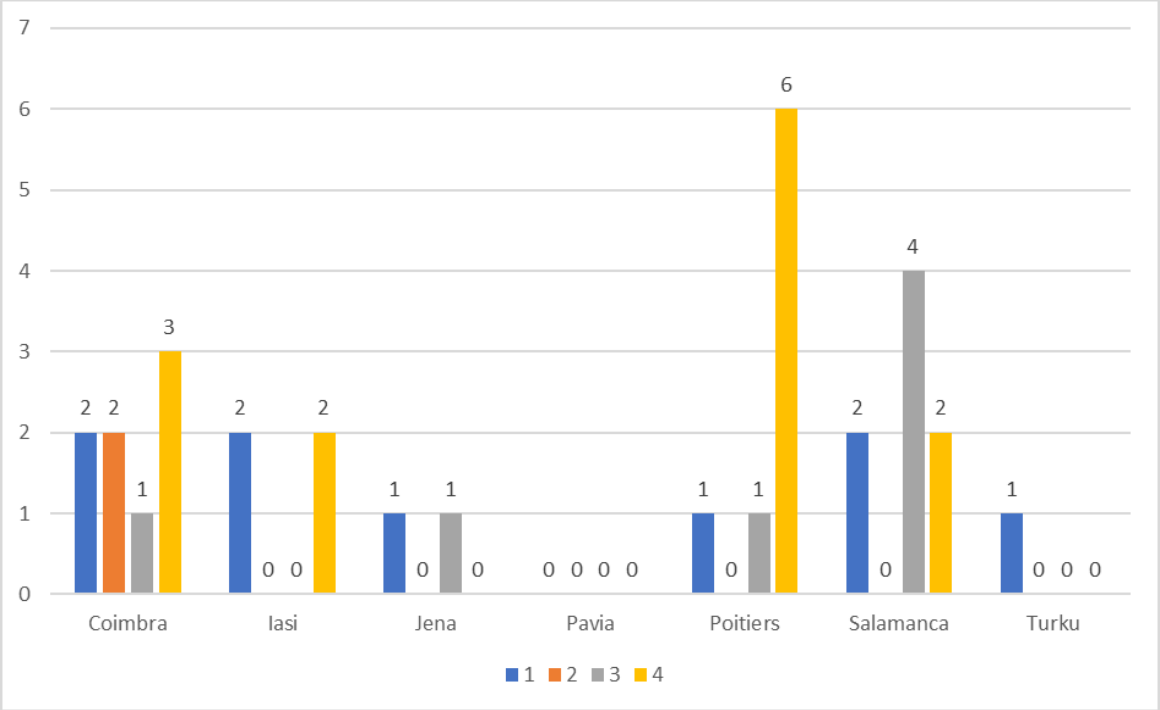


Figure 21. Starting year of first Citizen Science project/activity

Another key aspect regarding Citizen Science is the experience of the stakeholders, measured in number of years of experience, presented in **Figure 21**. The respondents were coded using a three points Likert Scale, where 1 indicates less than 3 years of experience, 2 equals between 3 and 5 years of experience and 3, indicates between 5 and 7 years of experience, and 4 more than 7 years of involvement in implementing/developing Citizen Science projects.

Our results indicate that 41.94% of our sample have started implementing Citizen Science projects more than 7 years ago, 22.58% of stakeholders have between 5 and 7 years of experience, 6.45% of the entities have between 3 and 5 years of expertise, and 29.03% of the entities have less than 3 years of experience.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

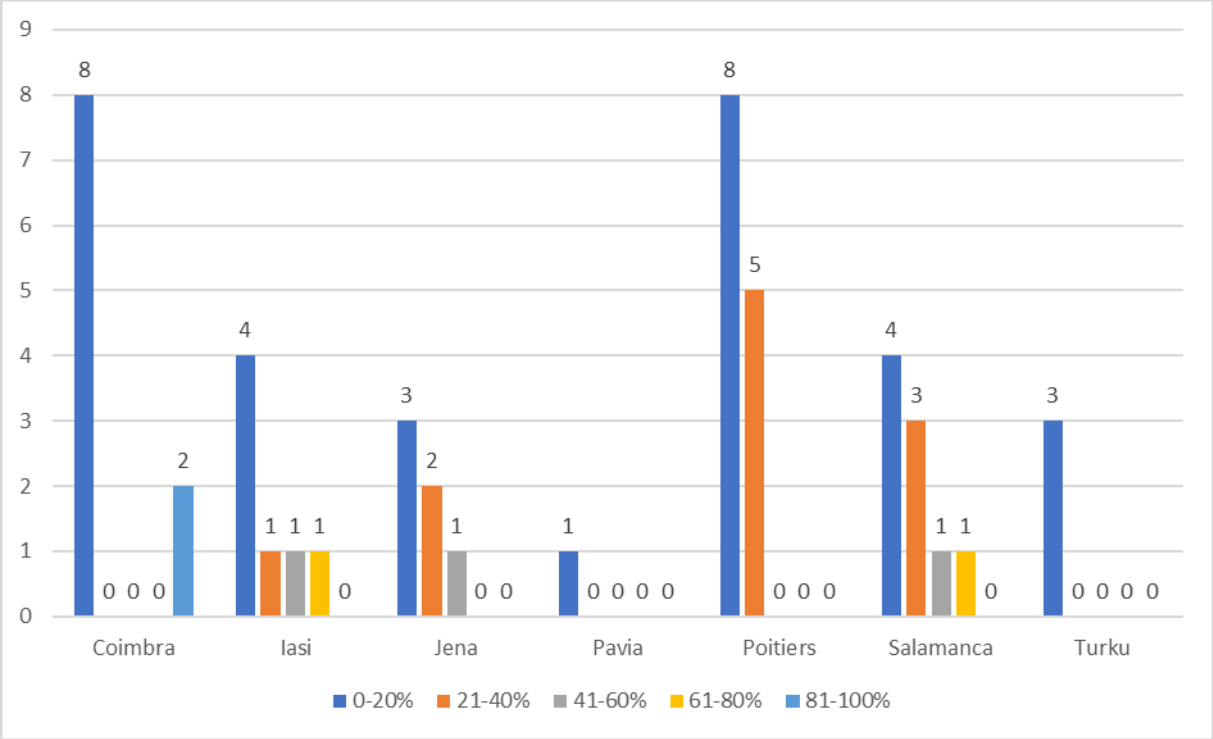


Figure 22. Budget allocated for Citizen Science project from the total R&I budget.

The budget allocated to Citizen Science projects out of the total research and innovation budget is presented in the **Fig. 22**, where 1 means between 0-20%; 2 means between 21-40%; 3 means between 41-60%; 4 means between 61-80% and 5 means between 81-100% from the total budget allocated for R&I. The results indicate that in our sample, most of the stakeholders (63.27%) allocated up to 20% of their budget to research and innovation activities.

Regarding the source of funding for Citizen Science activities and project, can be described multiple sources:

- self-finance (**Fig. 23**);
- private donation (**Fig. 24**);
- participant/membership fees (**Fig. 25**);
- national funding scheme (**Fig. 26**);
- European Commission funds (**Fig. 27**).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

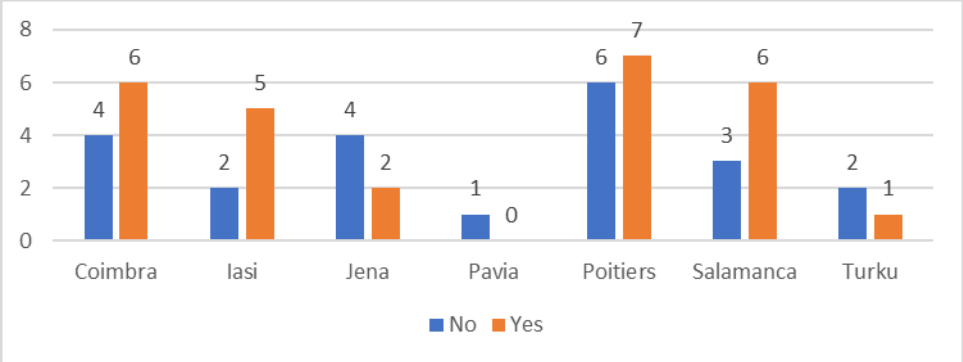


Figure 23. Sources of funding of Citizen Science – Self-finance

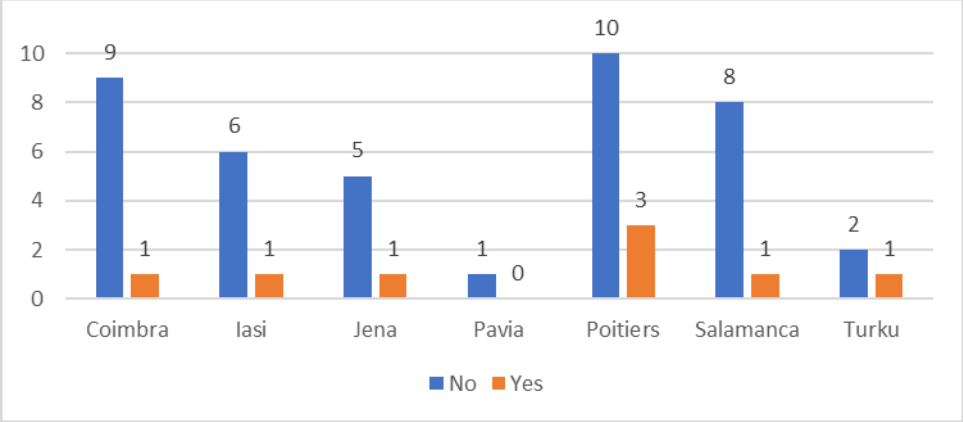


Figure 24. Sources of funding of Citizen Science – Private donation

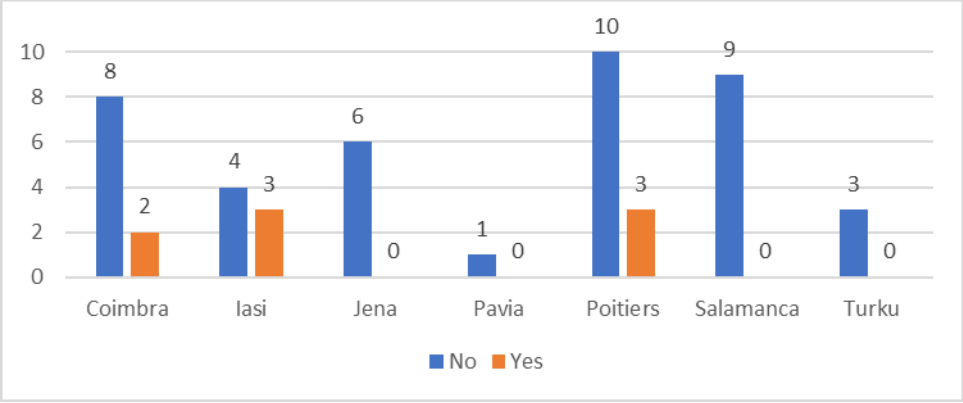


Figure 25. Sources of funding of Citizen Science – Participant/membership fees

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

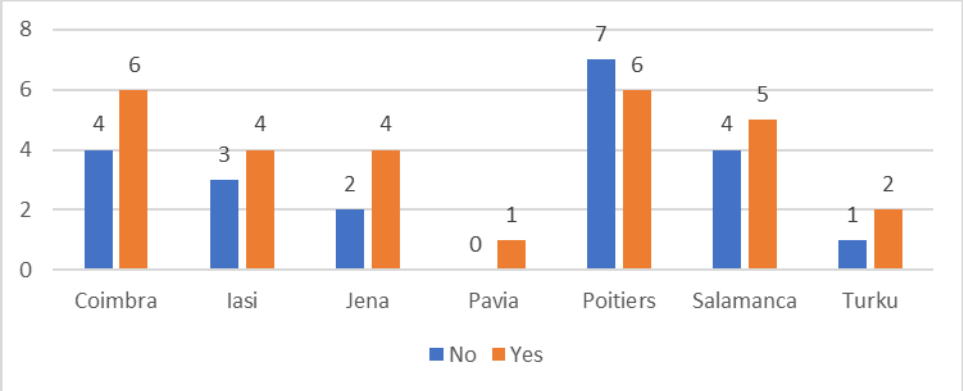


Figure 26. Sources of funding of Citizen Science – National funding scheme

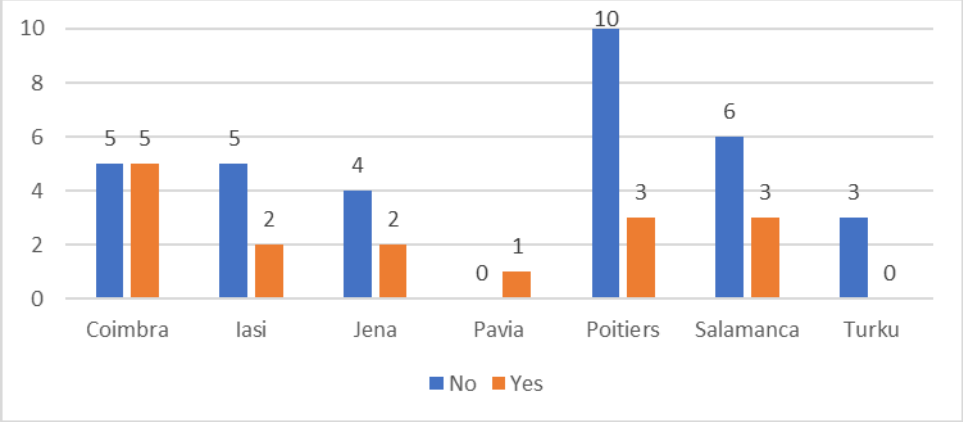


Figure 27. Sources of funding of Citizen Science – European Commission

The expertise of participants in Citizen Science projects and activities can be divided into the following categories:

- without expertise in the project areas (**Fig. 28**);
- partially trained in the project areas (**Fig. 29**);
- trained in the project areas (**Fig. 30**);
- self-trained in the project areas (**Fig. 31**);

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

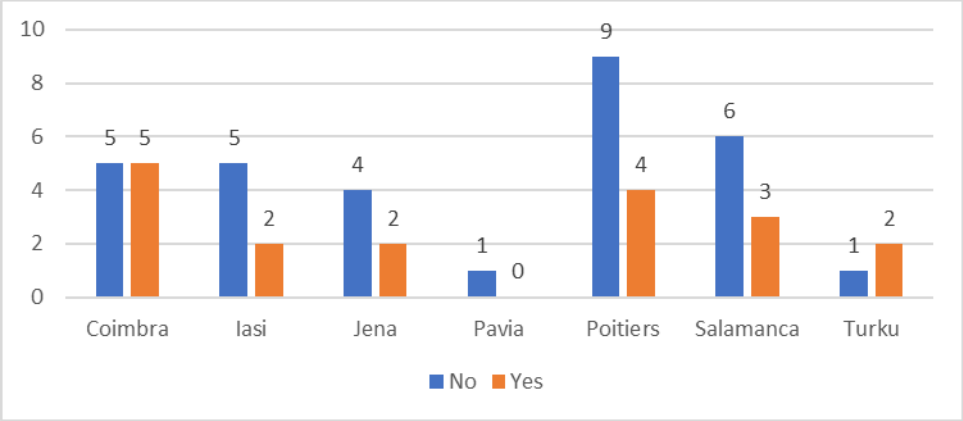


Figure 28. Participants in Citizen Science projects/activities – Without expertise in the project areas

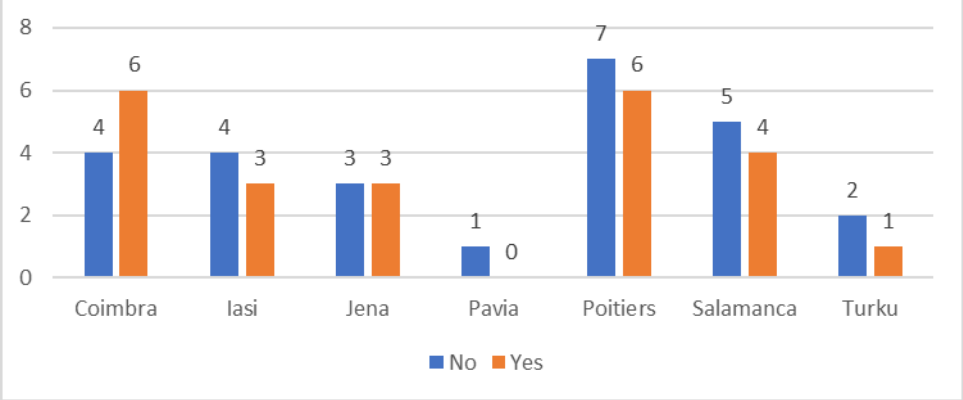


Figure 29. Participants in Citizen Science projects/activities – Partially trained in the project areas

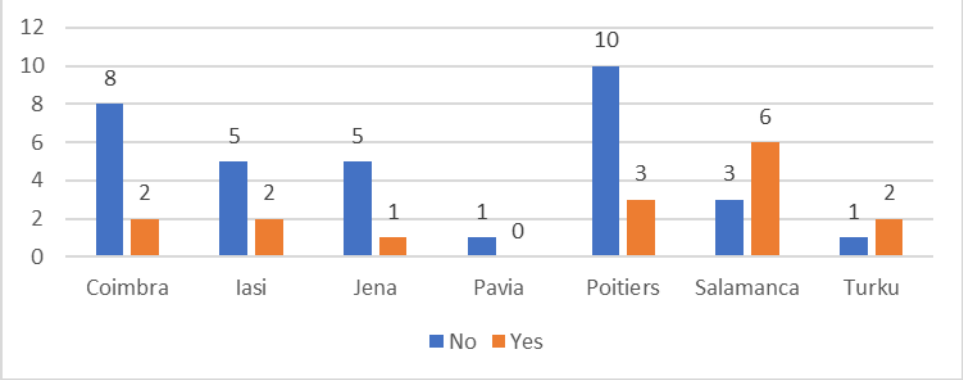


Figure 30. Participants in Citizen Science projects/activities – Trained in the project areas

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

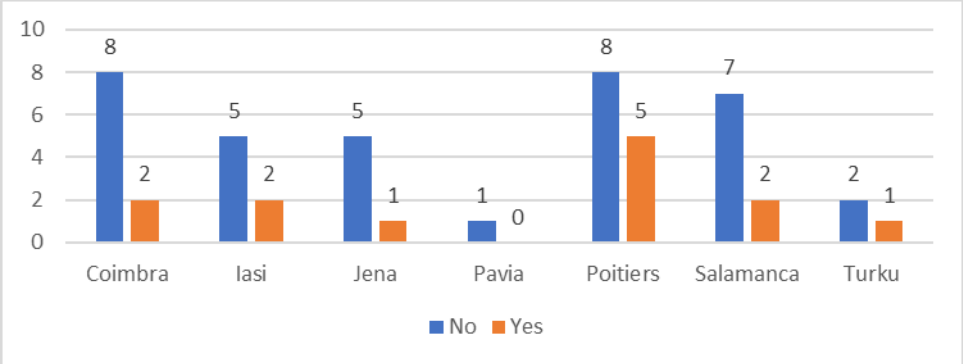


Figure 31. Participants in Citizen Science projects/activities – Self-trained in the project areas

The barriers and difficulties encountered during the Citizen Science and project activities can be classified in the following categories:

- political unwillingness/immaturity (**Fig. 32**);
- distrust culture (**Fig. 33)**;
- scepticism and opposition (**Fig. 34**);
- legal issues (**Fig. 35**);
- overregulation (**Fig. 36**);
- funding and resources (**Fig. 37**).

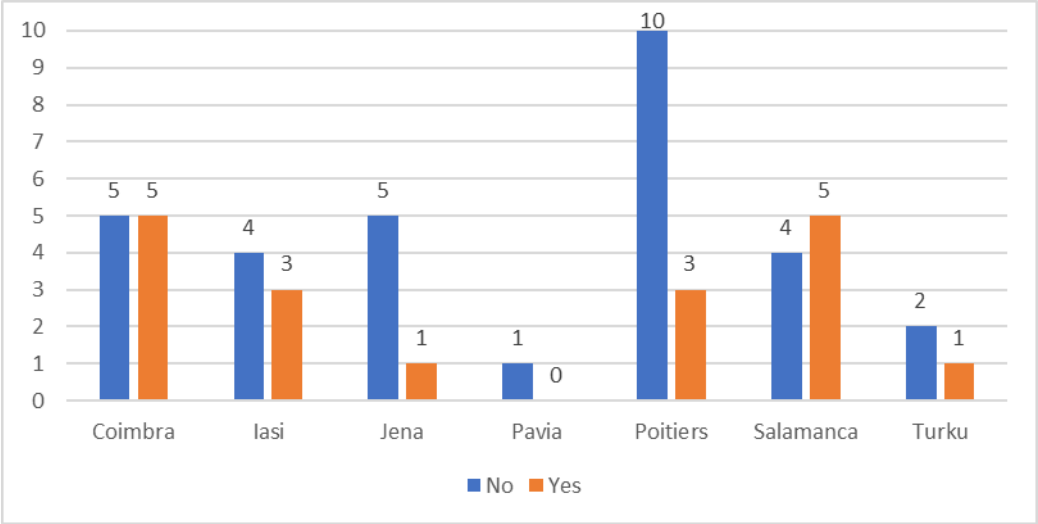


Figure 32. Difficulties encountered in Citizen Science project/activities - Political unwillingness/immaturity

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

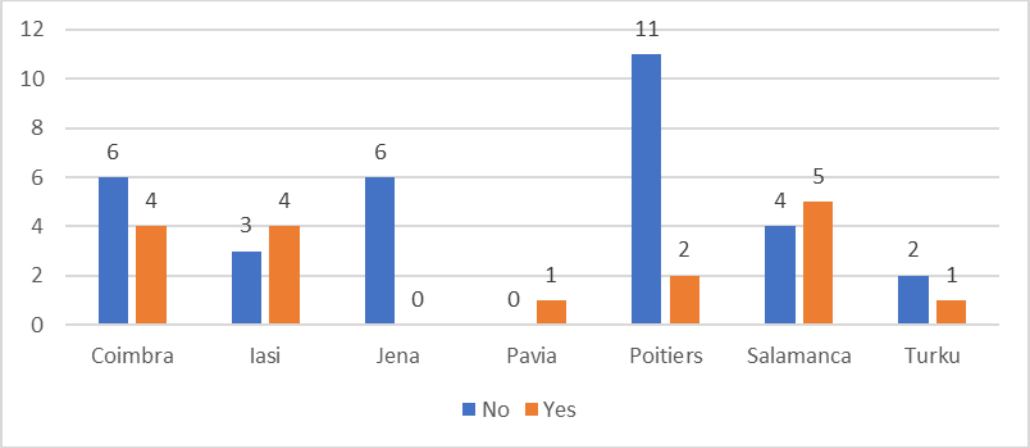


Figure 33. Difficulties encountered in Citizen Science project/activities - Distrust culture

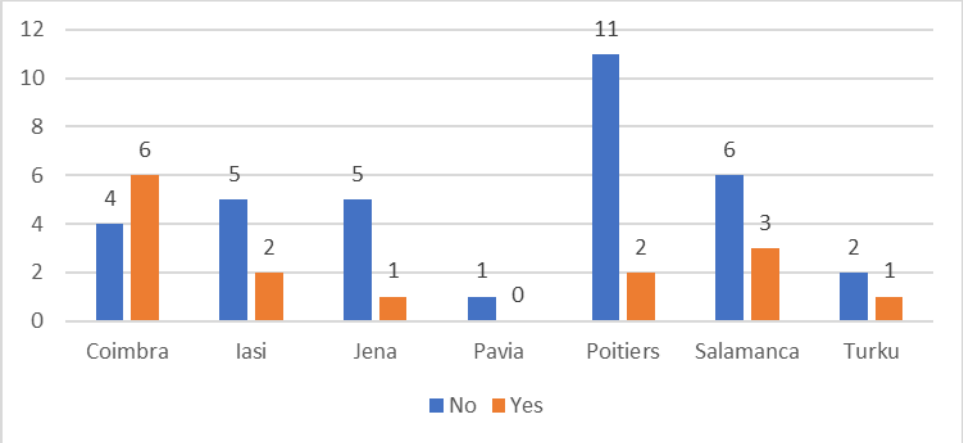


Figure 34. Difficulties encountered in Citizen Science project/activities - Scepticism and opposition

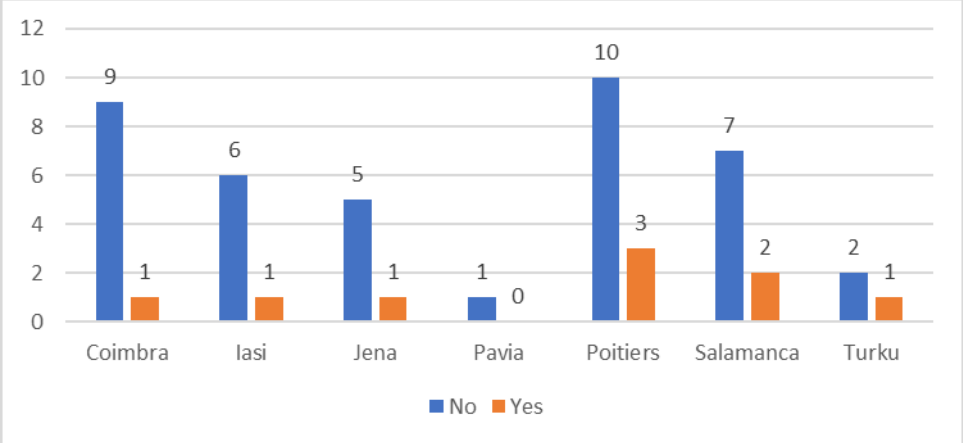


Figure 35. Difficulties encountered in Citizen Science project/activities - Legal issues

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

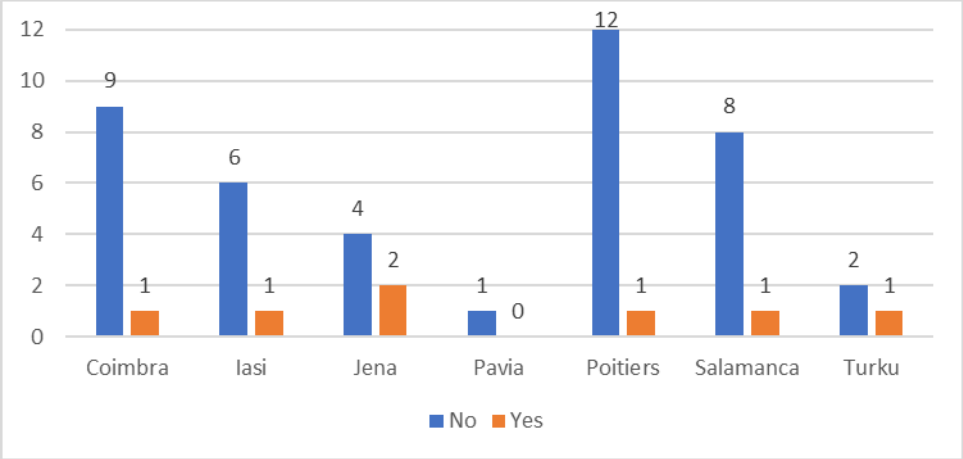


Figure 36. Difficulties encountered in Citizen Science project/activities – Overregulation

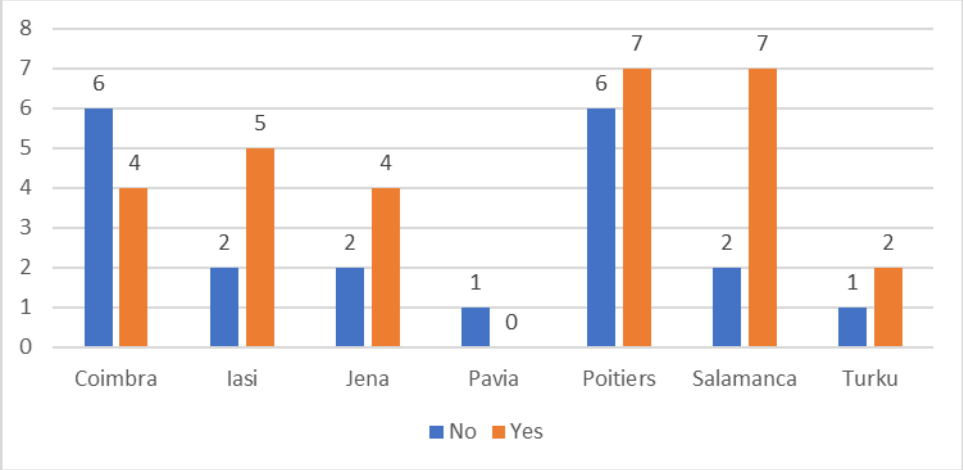


Figure 37. Difficulties encountered in Citizen Science project/activities - Funding and resources

VI. Universities and research institute: champions of innovations

a. Champions of Citizen Science: categories in the vivid Knowledge Ecosystem

One of the roles of Citizen Science Champions is to raise awareness of local and regional research and the opportunity to become a Citizen Scientist via diverse projects addressing different societal issues. Citizen Science actors are champions of change that operate the wheels of knowledge production together with everyday people motivated to make a difference every day. All Citizen Science Champions collaborate to better align both processes and outcomes with the values, needs and expectations of society (European Commission, 2015).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

The Citizen Science Champions were identified from the analysis of the answers received from the respondents. The methodology elaborated for the selection of the large database of the respondents has been refined and adjusted to identify the champions.

The activities of the Citizen Science Champions will be further the establishment of the Living lab profile. In order to identify the Citizen Science champions in promoting and implementing R&I we have established the following **qualitative** and **quantitative selection criteria**:

a) Qualitative criteria

- Role and impact of stakeholders' research related with local initiatives;
- Main roles of stakeholders (e.g. developers, promoters, supporters, knowledge providers);
- Level of activities performed (local, regional, national, international);
- Engagement phases of the policy cycles:
    - **in agenda setting,** where citizens can participate in the identification of relevant problems and challenges, and of their relative priority;
    - **in policy formulation**, where citizens can participate by helping policymakers to build the scenario on how to address the challenges, or to understand the desirability of that scenario or even by proposing possible specific solutions to the challenges;
    - **in decision-making**, where citizens may have a precious contribution on understanding the feasibility and usability of specific measures;
    - **in policy implementation,** where citizens have a key role in terms of diffused behavioural changes, granularity and diffusion of solutions, compliance, commitment to voluntary and non-regulated actions;
    - **in policy evaluation**, where citizens are precious in providing feedback and contributing to learning from the actual implementation and impact of programmes.

b. Quantitative criteria

- Number of R&I programs or projects carried out;
- Number of the people involved in Citizen Science activities;
- Budget allocated to R&I activities.

Based on the mentioned criteria every university from Consortia are selecting series of Citizen Science Champions in multiple stages during the project life. Results are updated regularly, as the actions in the local Knowledge Ecosystems are vivid.

The first lists of champions are detailed below in accordance with the universities proposals. The data is organised by: city of residence, the entity name, the name of the project, contact person, email address, web address, criteria for nomination and short description of the projects (See **Table 4** and **Annex 3**).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

Table 4. From CITIZEN SCIENCE PROJECTS TO CITIZEN SCIENCE CHAMPIONS

Citizen Science Champions – University of Coimbra proposals

City	Entity	Project Name	Contact person	Email	Webaddress	Criteria for nomination (People engagement; Number of activities; Proximity to the University structure; Easy to Contact)	Short description of the project
Coimbra	MARE-UC	lixomarinho.app	Filipa Bessa	afbessa@uc.pt	https://lixomarinho.app/	More than 258 contributions	This project calls upon citizens to share their photographs of beach litter they find, promoting clean up of Portuguese beaches as well as the production of statistical data surrounding beach litter
Coimbra	CFE/MyCoLAB	Cogumelos na Cidade	Susana Gonçalves	scgoncal@uc.pt	https://www.biodiversity4all.org/projects/cogumelos-na-cidade	214 observers, 137 identifiers; more than 2000 uploads and 343 species identified;	This is a project created in 2020, dedicated to "encourage people to establish personal relationships with the natural world, with benefits for their mental health, and in particular with the mushroom world", through the identification of mushrooms specimens, on the platform Biodiversity4All/iNaturalist, where citizens of the Coimbra region are incentivised to search for macrofungi and share with the community

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

Coimbra	CFE	INVASORAS.PT	Elisabete Marchante	invader@uc.pt	https://invasoras.pt/	This project counts with almost 5000 citizen-scientists, 74 invaders species, more than 25 000 approved sightings and 62 control actions	this project aims at sharing and educating, and raising awareness to the general public about biological invasions, stimulating the general public participation in the process of mapping the different species, the control of plant populations and education.
Coimbra	Herbário da Universidade de Coimbra	EXPLORATOR - Explore o mundo das plantas	Fátima Sales Joaquim Santos Paulo Rupino da Cunha	coi@bot.uc.pt	https://coicatalogue.uc.pt/explorator/	-	This project, promoted by the University Herbarium has the goal of, in a collaborative way, computerizing of the largest Portuguese biological collection, being that this is a long and strenuous, process, counting with 392.353.689 specimens. This way, with the help of the citizens help, the herbarium can streamline this process
Coimbra	CEIS20	Reseed	Dulce Freire	dulce.freire@fe.uc.pt	https://reseed.uc.pt/	-	Reseed is a ERC project with the goal of understanding and exploring the history of seeds, examining the changes in agriculture throughout the years from 1750 to 1950, as a means to map the "social and institutional networks that allowed the circulation of old and new seeds". With the help of citizens,

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

Coimbra	CES	25AprilPTLab - Laboratório interativo da transição democrática portuguesa.	Natércia Coimbra Pedro Miguel Réquio Pierre Marie Rui Bebiano (coord):	pedrorequio@hotmail.com pedrorequio@ces.uc.pt pierremarie@ces.uc.pt ruibebiano@gmail.com	https://ces.uc.pt/pt/investigacao/projetos-de-investigacao/projetos-financiados/25aprilptlab	-	Through the development of an online platform about history of the democratic transition period in Portugal, directed at the educational community. The platform consists in a repository to help with various classes from 1st grade to high school, dynamizing the learning experience and providing useful and dynamic information, promoting the creation and building of knowledge by teachers and students, encouraging dialogue and the reinforcement of the democratic convictions of the new generations.
Coimbra	Geophysical and Astronomical Observatory of the University of Coimbra	Sun4all	João Fernandes	jmfernan@mat.uc.pt	https://webcache.googleusercontent.com/search?q=cache:0Dy70fUbxKcJ:https://www.publico.pt/2013/10/07/ciencia/noticia/sun4all-ou-como-qualquer-um-de-nos-pode-identificar-manchas-solares-1608325&cd=3&hl=en&ct=clnk&gl=pt&client=avast-a-2	Contributes to the identification of more than 30000 entries of the sun	This project has the main goal of observing and analyzing the 30.000 entries of the sun made by the Geophysical and Astronomical Observatory of the University of Coimbra.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

Coimbra	CES	Toilet Talks	Marcus Erridge	marcuserridge@ces.uc.pt	https://marcuserridge9.wixsite.com/toilettalks/	-	Toilet Talks is a project that aims to generate discussion around the human right to sanitiation, discrimination and marginalization, as well as WASH (water sanitation and hygiene) access, Inviting professionals, acedemics, students and others to share personal stories and professional experience with these topics
Coimbra	CES	Projeto TROPO	António Carvalho (PI)	amcarvalho@ces.uc.pt a.carvalho@fe.uc.pt	https://tropo.ces.uc.pt/	-	This projet has the main goal of understanding "How the advent of the Anthropocene generates a wide range of technological and political devices enrolled to avoid the negative effects of climate change."
Citizen Science Champions – University of Jena proposals							
Jena	Research institute - DLR	Join_In_Lab – Das bürgerwissenschaftliche Labor Jena	Prof. Christian Thiel		https://www.dlr.de/dw/desktopdefault.aspx/tabid-12919/22558_read-52209/ Further weblinks: His public lecture on Opportunities and Challenges of Citizen Science:	Actively conducting and promoting Citizen Science, Sharing Best Practices,	Join_In_Lab, the Citizen Science Lab Jena, sees itself as a teaching, learning and working place for citizen science projects at the DLR Institute for Data Science. As a meeting place for science and society, they pursue the goal of allowing citizens to actively participate in scientific processes - from planning to

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

					https://www.dataliteracy.uni-jena.de/veranstaltungen/dalije-ringvorlesung-sose2022-3 ; An article about he becoming the first Citizen Science Professor in Germany: https://www.buergerschaffenwissen.de/blog/erste-citizen-science-professur-deutschland		completion. They see their mission as using the tools of modern science communication, in addition to pursuing their scientific concerns, in order to get the broadest possible public excited about science. To this end, in addition to providing modern infrastructures for scientific work, we are also planning various event formats in the future, such as workshops, teacher training courses, science roundtables and science slams.
Citizen Science Champions – University of Poitiers proposals							
Poitiers	University of Poitiers	"Droit Devant ! ",ça match", "Qui sont elles?"	Timon OLIVIER	timon.olivier@univ-poitiers.fr	https://sciences-et-societe.univ-poitiers.fr/ressources-en-ligne/nos-jeux/	Criteria to choose the Citizen Science Champions at the University of Poitiers: 1) The kind of projects realized (interesting, ambitious); 2) The level of experience in Citizen	The serie of the boardgames which were created with researchers of the University of Poitiers to popularize science to children. The games cover many topics, for example Law, Paleobntology, Social Science (Gender balance) and they increase an awareness and interest of the children to science, what can attract them to choose the scientific career in the future.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

						Science projects;	
Poitiers	University of Poitiers	BD	Timon OLIVIER	timon.olivier@univ-poitiers.fr	There is no website at the moment		BD is a project in progress where every laboratory in the University of Poitiers will propose a small story to create a comic book. The goal of the project is to show what activities run in every laboratory in the format of colourful comics, popularise science and increase public awareness about scientific research, the life of the researchers, and social and environmental problems.
Poitiers	University of Poitiers	Expedition5300	Aurelien Pichon	Aurelien.pichon@univ-poitiers.fr	https://expedition5300.com/		Since 2018, Expedition 5300, the first scientific team in the world has been trying to understand the mechanisms of adaptation at altitude, in a hypoxic environment in Rinconada (Perou). The scientists were working with the citizens of Rinconada to collect the data to reach the objectives of the project
Poitiers	CHU (Public research hospital) and University of Poitiers	Le QG	Laurent Bosquet	laurent.bosquet@univ-poitiers.fr	https://www.qg-sport-sante.fr/		"Le QG sport sante" is a project of the University of Poitiers and CHU (public research hospital). The project will attract citizens to participate in the activities based on the research results of the University of Poitiers and CHU, popularizing science in the fields of

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

							Sport and Health. The main objectives: 1) Develop complementary actions to medication treatment for people suffering from chronic diseases. These actions are grouped around 3 pillars: Physical activity, Nutrition, and Stress management. 2) Support the regional companies in their employees' quality of life approach at work. The model used is based on 4 axes: -Physical activity/nutrition/stress management -Work environment -Management Practices -Work/Life Balance
Citizen Science Champions – UAIC proposals first round							
Iasi	**UAIC, IPARC**	Researchers Night	assoc.prof. Ionut Topala	ionut.topala@uaic.ro	https://noapteacercetatorilor.ro/ https://www.plasma.uaic.ro/	People engagement; Number of activities; Proximity to the University structure	The project addresses curious minds, from enthusiastic to skeptical, offering a wide variety of scientific and educational activities. The researchers invite the general public to participate in unique experiments, conferences, debates and games for children that stimulate their creativity and critical

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

							thinking. "Researchers' Night" is organized in all the countries of the European Union, with the financial support of the European Commission. The event is coordinated by the "Alexandru Ioan Cuza" University in Iaşi in collaboration with the University of Bucharest, Babes Bolyai University in Cluj Napoca, West University in Timisoara, University of Craiova, as well as the Institute of Atomic Physics and the National Institute of Laser and Plasma Physics and Radiation.
Iasi	**Centrul de Transfer Tehnologic iTransfer - UAIC** **Technology Transfer Center iTransfer UAIC**	Conversational user interface for visually impaired people	Director, prof. univ. dr. Lenuța Alboaie	lalboaie@gmail.com	https://itransfer.space/	People engagement; Number of activities; Proximity to the University structure	This prototype "Conversational user interface for visually impaired people" it is an ongoing project that aims at safely moving visually impaired people to points of interest using by creating Electronic Orientation Aids (EOA) that provides feedback by a conversational user interface. The iTransfer mission is to stimulate innovation and technology transfer in order to capitalize on research results by introducing them into the economic circuit in the form of innovative products and services.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

Iasi	**CODE932**	ICONIC – Interactive Cluster of New Media Industry City of Iasi	CEO Andrei Dănilă	andrei@code932.com	https://iconic.ro/ https://www.code932.com/	People engagement, Number of activities, Easy to Contact	Iconic Cluster is a regional ecosystem of related industries and competences featuring a broad array of inter-industry interdependencies. The cluster is formed by a group of companies, related economic actors and institutions that are located near each other and have reached a sufficient scale to develop specialised expertise, services, resources, suppliers and skills. The founders of the cluster set out to create a network of companies and other support organizations that will contribute to transforming the Northeast region into an important hub of the creative industries and especially the IT&C sector by capitalizing on creativity and new technologies based on intensive use of knowledge, support for entrepreneurial initiatives, encouraging innovation and connecting to the global market.
Iasi	**Direcția de Asistență Socială, Primăria Iași** **Iaşi Council – Direction of Social Work**	Granting aid with food packages under POAD, SMIS code POAD/411/1/1/125099	Luminita Munteanu, Cristina Danilov	nluminita@yahoo.com, cristinadanilov70@gmail.com	https://www.dac-iasi.ro/	People engagement; Number of activities; Proximity to the University structure; Easy to Contact	The projects's aim is to reduce the number of people at risk of poverty and exclusion social by providing packages with food aid in the 6 distributions in the period 2018 – 2021. The Directorate of Social Assistance is the public institution, with legal personality, which carries out, at the

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

		and Volunteer activities to support vulnerable people					local level, social assistance measures in the field of child protection, family, single people, homeless people, young people from the centers of placement, for elderly people, victims of domestic violence, people with disabilities, as well as any individuals/families in difficulty.
Iasi	**Camera de comert și Industrie Iași** **Iași Chamber of Commerce and Industry**	Support services for the business environment	Sorin Gheorghiu Director of the Promotion and Member Relations Departmen t	sorin.gherghiu @cciasi.ro	www.cciasi.ro	People engagement; Number of activities; Proximity to the University structure; Easy to Contact	The Iasi Chamber of Commerce and Industry is an autonomous, non-governmental, public utility, apolitical, non-patrimonial, non-profit organization with legal personality, created to represent, defend and support the interests of its members and the business community in relation to public authorities and bodies from the country and abroad.
Iasi	**Fundația Serviciilor Sociale Bethany Iași** **Bethany Social Services Foundation Iași**	ACCESS HUB – Increasing active citizenship for people with disabilities, with the financial support of Active Citizens Fund Romania	dr.Beatrice Darie Manager programs	beatrice.darie @bethany.ro	https://bethany.ro/prog rame-si-proiecte/comunitate/acc esshub/ http://bethany.ro/	People engagement; Number of activities; Proximity to the University structure; Easy to Contact	ACCESS HUB proposed the empowerment of vulnerable groups in Iași County, affected by the disability issue, in order to increase the proactive and reactive capacity to solve problems and exercise their own rights in relation to decision-makers at the local level. During the project, steps were taken to increase the capacity of parents and young people with disabilities regarding access to rights, services, but also personal development, in order to acquire a series of skills and practices

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

							necessary to participate in face-to-face debates with local authorities in Iași county, with the aim of influencing the decisions that concern them.
Iasi	**Continental Automotive Romania SRL**	Corporate Citizenship	Ciprian Romeo Comșa, Academic Liaison &Innovation Management, dr. Ing.	ciprian.comsa@continental.com	https://www.continental.com/ro-ro/sustenabilitate/societate/ www.continental-corporation.com	People engagement; Number of activities; Easy to Contact	The Continental Company is involved in multiple regions and markets that are directly influenced by their business activities. The Company' commitment focuses on local social challenges and aims to make long-lasting, positive changes to people's living conditions and the environment. Community projects, donations and other charitable activities are therefore initiated and managed at a local level and also at the discretion of the decentralized units. In particular, these include donations and corporate volunteering, as well as partnerships with public and non-profit organizations, schools and universities. Projects within education, diversity and equal opportunities, as well as environmental protection and road safety are particularly important.
Iasi	**Antibiotice SA**	Fundatia "Antibiotice Stiinta si Suflet"/ Foundation	Ioan Nane, Director, Sorin Ibănescu, Petronela	office@antibiotice.ro	https://www.antibiotice.ro/responsabilitate/science-and-soul-foundation/	People engagement; Number of activities; Easy to Contact	Through the "Antibiotics - Science and Soul" Foundation, the company runs its own charitable actions, humanitarian projects, but also educational and cultural programs.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

		"Antibiotics - Science and Soul"	Horlescu, researchers		www.antibiotice.ro		The Foundation offers support children from disadvantaged families, elderly people in distress, people in difficulty, through dedicated corporate social responsibility programs, some of which have become traditional.
Salamanca	USAL	Medialab-usal		medialab@usal.es	https://medialab.usal.es/	Number of activities; Proximity to the University structure	The main objective of this line of work is to involve and train the university community to provide more creative solutions to real problems that can have a positive impact on society. To do this, we start from some of the foundations of social innovation: we provide spaces for the development of new ideas, we experiment with new technologies, we connect people and areas of work and knowledge. Meeting point in Salamanca for the university community and society with the new work and learning processes, from digital technologies, collaborative, interdisciplinary work and practical learning.
Salamanca	SAVIA	LIFE Vía de la Plata		info@lifeviadelaplata.com	https://www.lifeviadelaplata.com/	People engagement; Number of activities; Proximity to the University structure; Easy to Contact	The main objective of the project is to create a model of adaptation to climate change in Salamanca, a world heritage city, through the construction of a green infrastructure and the improvement of ecosystem services. It involves all citizens in the process through citizen participation, training and

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

							dissemination, so that citizens have more knowledge to adapt to the challenges of climate change.
Salamanca	USAL/CSIC	Micromundo		bsr@usal.es	https://swiusal.wixsite.com/micromundousal	People engagement; Number of activities; Proximity to the University structure; Easy to Contact	The Micromundo project is a research and teaching project that aims to bring science closer to young people in society and raise awareness among new generations about antibiotic resistance. The project originated at Yale University under the name of the Small World Initiative in 2012 and was adapted as Tiny Earth by the University of Wisconsin in 2018. Micromundo is the Iberian branch of the project with nodes in different parts of the Iberian territory.
Salamanca	USAL	Red4C,			https://red4c.es/universidad-de-salamanca-hace-ciencia-ciudadana-frente-al-cambio-climatico/	People engagement; Number of activities; Proximity to the University structure; Easy to Contact	Teaching, research and innovation swell Red4C, created by Red Cambera, with the incorporation of the University of Salamanca (USAL). USAL adds a valuable contribution to the observation of biological systems through citizen science. Since the perceptions that are made from social groups linked to the environment represent an important contribution to scientific advances. They implement the effort, which has been carried out from different educational fields, to increase confidence in science.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

Salamanca	Fundación ASPRODES	Barriólogos		asprodes@asprodes.es	https://asprodes.es/barriologos-basuraleza-y-pringate-proyectos-medioambientales-que-desarrollamos-en-nuestros-entornos/	People engagement; Number of activities	"Barriólogos": brings the scientific method closer to ordinary people and will study the relationship between climate and the presence of plants and animals in the urban environments of our city. We will work together with the technical support of the company Vive Ambroz. We will study, in a practical way, the wild plants of the gardens, the daytime butterflies and insects such as the dragonflies of the Tormes River, making an observation, analysis and learning. Teamwork and the search for collaborators are keys to the success of our research.
Salamanca	Fundación ASPRODES	Basuraleza		asprodes@asprodes.es	https://asprodes.es/barriologos-basuraleza-y-pringate-proyectos-medioambientales-que-desarrollamos-en-nuestros-entornos/	People engagement; Number of activities	“Basuraleza”: collection of garbage, debris and waste in nature in Salamanca and Béjar. The last action was on March 16 with the collection of more than 100 kg of garbage in the surroundings of the Barrio de Garrido. These collections are always carried out jointly with different social entities in Salamanca such as: Plan B, Cepaim, Fridays For Future, among others. The purpose of these actions is not only the removal of waste but also the analysis of visibility and awareness as methods of impact on the behavior of people and environmental agents.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

Salamanca	Fundación ASPRODES	Pringate		asprodes@asprodes.es	https://asprodes.es/barriologos-basuraleza-y-pringate-proyectos-medioambientales-que-desarrollamos-en-nuestros-entornos/	People engagement; Number of activities	"Príngate": is a project that combines training, environmental education, community work, volunteering and networking where all the people who participate are an active part of the organization. Príngate has generated a network of regular partners such as the María Auxiliadora de Béjar School, where environmental awareness talks are held. We have worked with them on the importance of caring for the environment and we have participated in an online chat with Kilian Jornet Burgada, an ultra-distance runner, who has created a foundation to protect the mountains and their environment.
Salamanca	Junta de Castilla y León	Biblioteca Pública de La Casa de las Conchas		bpsalamanca@jcyl.es	http://www.bibliotecas.jcyl.es/salamanca	Proximity to the University structure	The public library of La Casa de las Conchas in Salamanca organized a citizen science experiment, consisting of, through an interactive and dynamic task, assessing the "neological feeling" towards the new words identified in the Castilian-Leonese press. Participants were asked questions about new words, collecting the answers in real time, so that at the end of the activity the results of the experiment could be known.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

VII. References

1. Apajalahti, E.-L. (2018). Large Energy Companies in Transition -From Gatekeepers to Bridge Builders; Aalto University: Helsinki, Finland.
2. Archer-Brown, C.; Kietzmann, J. (2018). Strategic Knowledge Management and Enterprise Social Media. J. Knowl. Manag., 22, 1288–1309.
3. British Academy and Royal Society. (2017). Data management and use: Governance in the 21st century: A joint report by the British Academy and the Royal Society. https://royalsociety.org/-/media/policy/projects/data-governance/data-managementgovernance.pdf
4. Clarysse, B.; Wright, M.; Bruneel, J.; Mahajan. (2014) A. Creating Value in Ecosystems: Crossing the Chasm between Knowledge and Business Ecosystems. Research Policy, 43, 1164–1176.
5. Dickinson, J. L., Zuckerberg, B., & Bonter, D. N. (2010). Citizen Science as an ecological research tool: challenges and benefits. *Annual review of ecology, evolution, and systematics*, 149-172.
6. ECSA (European Citizen Science Association). (2015). Ten Principles of Citizen Science. Berlin. http://doi.org/10.17605/OSF.IO/XPR2N
7. European Commission (2020), Citizen Science and Citizen Engagement. Achievements in Horizon 2020 and recommendations on the way forward, Directorate-General for Research and Innovation, ISBN 978-92-76-17928-3 doi:10.2777/05286.
8. European Commission (2020a), Science with and for Society (SwafS) 2018-2020 Programme, Available at: https://www.sfi.ie/funding/international/european-research-area/horizon-2020/swafs/swaf-pdf-1.pdf.
9. European Commission (2020b), Citizen Science and Citizen Engagement. Achievements in Horizon 2020 and recommendations on the way forward, Directorate-General for Research and Innovation, ISBN 978-92-76-17928-3 doi:10.2777/05286.
10. European Commission. (2013). https://ec.europa.eu/international-partnerships/local-authorities_en
11. European Commission. (2015). Decision C (2015)2453: European Commission Decision of 17 April 2015 on the Horizon 2020 Work Programme 2014-2015, 16. Science with and for Society (revised). http://ec.europa.eu/research/participants/data/ref/h2020/wp/2014-2015/main/h2020-wp1415-swfs_en.pdf
12. European Commission. (2020). New Era for Research and & Innovation.
13. European Commission. (2021). Romanaien, J., Mahieu, B., Zeqo, K. Briefing Note for Stakeholder Consultation, WP1-3, Knowledge Ecosystems and their Actors across the ERA. https://www.earto.eu/wp-content/uploads/Briefing-note-public-consultation_ERA-HUbs-1.pdf
14. European Commission: Manzoni, M., Vohland, K., Schade, S. (2021). Exploring Citizen Science Strategies and Initiatives in Europe. Vohland, Katrin, Anne Land-Zandstra, Luigi Ceccaroni,

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

Rob Lemmens, Josep Perelló, Marisa Ponti, Roeland Samson, and Katherin Wagenknecht. *The science of Citizen Science*. Springer Nature.

15. Friends of Smart Specialisation (FoSS). (2021). Knowledge Ecosystem in the New Era, WP1-3, Knowledge Ecosystems and their Actors across the ERA, https://friendsofsmartspecialisation.eu/system/files?file=2021-09/FoSS%20Comments%20ERA-Hubs%20Clean%20Final%2016th%20Aug.pdf
16. Hawley, A.H. (1986). Human Ecology: A Theoretical Essay, 1st ed.; The University of Chicago Press: Chicago, IL, USA.
17. Hecker, S., Wicke, N., Haklay, M., & Bonn, A. (2019). How does policy conceptualise Citizen Science? A qualitative content analysis of international policy documents. Citizen Science: Theory and Practice, 4, 1. https://doi.org/10.5334/cstp.230.
18. Järvi, K.; Almpanopoulou, A.; Ritala, P.. (2018). Organization of knowledge ecosystems: Prefigurative and partial forms, Research Policy, Volume 47, Issue 8, p. 1523-1537.
19. Kelly, E. (2015). Business Ecosystems Come of Age; Business Trends; Industry Report; Deloitte University Press: London, UK, 2015; pp. 1–17.
20. Maglyas, A.; Smolander, K. (2014). Eight Types of Relationships between Stakeholders in ERP Development Networks: A Case Study of Three Large Enterprises. In: Commisso T.H., Nørbjerg J., Pries-Heje J. (eds) Nordic Contributions in IS Research. SCIS 2014. Lecture Notes in Business Information Processing, vol 186. Springer, Cham. https://doi.org/10.1007/978-3-319-09546-2_5
21. Manzoni, M.; Vohland, K.; Schade, S. (2021). Exploring Citizen Science Strategies and Initiatives in Europe, European Commission.
22. Nascimento, S., Pereira, A. G., & Ghezzi, A. (2014). From Citizen Science to do it yourself science. *Joint Research Centre, European Commission, Ispra, Italy*.
23. Nascimento, S.; Pereira, A. G.; & Ghezzi, A. (2014). From Citizen Science to do it yourself science. *Joint Research Centre, European Commission, Ispra, Italy*.
24. O'Fallon L., Finn S., (2015) Community-engaged Research and Citizen Science Community-engaged Research and Citizen Science, National Institute of Environmental Health Sciences (NIEHS). Available at: https://www.niehs.nih.gov/research/supported/translational/community/index.cfm, http://digital.aphl.org/publication/?m=29124&i=279800&p=6&ver=html5 (Access on 7th July 2022).
25. Oberhauser, K S and Prysby, M D (2008). Citizen Science: Creating a research army for conservation. *American Entomologist* 54: 103–104, DOI: https://doi.org/10.1093/ae/54.2.103
26. Organisation for Economic Co-operation and Development (OECD) (2017), OECD Global Science Forum, Open Research Agenda Setting, Available at: https://one.oecd.org/document/DSTI/STP/GSF(2017)3/FINAL/en/pdf (Access on 7th July 2022).
27. Oxford English Dictionary. (2014). Citizen Science. Oxford: Oxford University Press
28. Ramanauskaitė, J. (2021). Incumbents in sustainability transitions in the context of transitioning economy: An onlook of incumbent actors' initiatives. In Proceedings of the ISDRS 2021: The 27th International Sustainable Development Research Society

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

Conference: Accelerating the Progress towards the 2030 SDGs in Times of Crisis, Östersund, Sweden, 13–15 July 2021; Johansson, C., Mauerhofer, V., Eds.; Mittuniversitetet: Östersund, Sweden, 2021; p. 392.

29. Reichert, S. 2019. The Role of Universities in Regional Innovation Ecosystem; Study of European University Association, p.22.
30. Ruppert, E.; Isin, E.; & Bigo, D. (2017). Data politics. Big Data & Society, 1-7. DOI: 10.1177/2053951717717749.
31. Thomas, L.D.W.; Autio, E. (2020). Innovation Ecosystems in Management: An Organizing Typology. In Oxford Research Encyclopedia of Business and Management; Oxford University Press: Oxford, UK.
32. UEFISCDI, Initiative Citizen Science - Știința cu cetățenii, Available at: https://uefiscdi.gov.ro/news_initiative-citizen-science-stiinta-cu-cetatenii (Access on 7th July 2022).
33. US Crowdsourcing and Citizen Science Act (15 USC 3724) (2016). Crowdsourcing and citizen science, Available at https://uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title15-section3724&num=0&edition=prelim, (Access on 7th July 2022).
34. US National Institutes of Health Citizen Science, https://search.nih.gov/search?utf8=%E2%9C%93&affiliate=nih&query=citizen+science&commit=Search
35. Venkatesh, V.; & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. Management Science, 46(2), 186–204.
36. Venkatesh, V.; Morris, M. G.; Davis, G. B.; & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS Quarterly, 27(3), 425–478.
37. Vohland, K., Land-Zandstra, A., Ceccaroni, L., Lemmens, R., Perelló, J., Ponti, M., Samson, R. and Wagenknecht, K., (2021). *The science of citizen science*, Springer Nature.
38. Wehn, U. Göbel C., Bowser A., Hepburn L., Haklay M., (2020). Global Citizen Science perspectives on Open Science: Written input by the CSGP Citizen Science & Open Science Community of Practice to the UNESCO Recommendation on Open Science, Available at: https://osf.io/6qjyg (Access on 7th July 2022).
39. Prainsack, B. (2014). Understanding Participation: The 'citizen science' of genetics. In: Prainsack, B., Werner-Felmayer, G., Schicktanz, G. (eds). Genetics as Social Practice. Farnham: Ashgate.
40. Singh, M.K. (2022), "Forms of Participation", *Community Participation and Civic Engagement in the Digital Era*, Emerald Publishing Limited, Bingley, pp. 19-26.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

VIII. Annexes

Annex 1. Stakeholders Identification Form

Characteristic	Stakeholder information
Name	
City	
Country	
Institution and department	
Position held in the institution*	

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

Activity Sector	Agriculture, forestry and rural areas Bioeconomy Energy Environment Food systems Frontier research Health Industry Information and communication technologies Oceans and seas Security Small and medium-sized businesses (SMEs) Social sciences and humanities Space Synergies with structural funds Transport
Type of stakeholder (main)	**Universities and Research Entities** (e.g. Universities/ University Alliances/University Associations, Research Institutes/ Researchers communities/ Public research institutions, Research Camp, Industrial parks. Research Centers/Hubs or Think Tank, Research clusters/platforms, Research Departments in Companies)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

	Innovative start-ups (e.g. Innovation Associations/ Programs, Bootcamps, Entrepreneurs, Unicorns, Spin-offs)
	Local and Regional authorities (e.g. Local and Regional Public Administration/Authorities, County councils, Representatives of municipalities, local government bodies; Public institutions; Social assistance services, Local authorities for social protection and rights, Public health authorities)
	Venture capital, sponsors (e.g. Local and Regional funding/investing agencies, Consulting companies/agencies, Start-up Nation Program, Investment groups, Business solution groups, Tech investors, Private equity Firms**)**
	Service organizations (e.g. Non-governmental organizations, Associations of patients, Local and regional communities (neighborhood associations), Professional associations, Student Associations/Organisations, Vendors, Intermediaries, any other support entities)
	Incumbent firms (e.g. Existing Companies as users of research and innovation results: local and regional enterprises, Companies/Corporations)
	Citizen Science entities (e.g. European Citizen Science Association; Local or regional Citizen Sciences Entities, citizen scientists)
Level of intervention/power (International, national, regional, local)	

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

Field of expertise (**) **(e.g., business, urban management, public health, environmental engineering, computer science)**	
Valid email address	

(*) Note that “position held” is understood as a job title, an official position related to the role in the institution of work.

(**) If doubts, please refer to the activity sectors.

Annex 2. Links for the survey

- English (Base language):

https://survey.ec2u.eu/index.php/918627?lang=en

- Finnish:

https://survey.ec2u.eu/index.php/918627?lang=fi

- French:

https://survey.ec2u.eu/index.php/918627?lang=fr

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

- German:

https://survey.ec2u.eu/index.php/918627?lang=de

- Italian:

https://survey.ec2u.eu/index.php/918627?lang=it

- Portuguese:

https://survey.ec2u.eu/index.php/918627?lang=pt

- Romanian:

https://survey.ec2u.eu/index.php/918627?lang=ro

- Spanish:

https://survey.ec2u.eu/index.php/918627?lang=es

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803

Annex 3. Additional Citizen Science projects: University of Coimbra

Citizen Science Project	URL
Cogumelos na Cidade	https://www.biodiversity4all.org/projects/cogumelos-na-cidade
INVASORAS.PT	https://invasoras.pt/
lixomarinho.app	https://lixomarinho.app/
Registo de Trichilogaster acaciaelongifoliae	https://five.epicollect.net/project/registo-de-trichilogaster-acaciaelongifoliae
25AprilPTLab - Laboratório interativo da transição democrática portuguesa.	https://ces.uc.pt/pt/investigacao/projetos-de-investigacao/projetosfinanciados/25aprilptlab
EXPLORATOR - Explore o mundo das plantas	https://coicatalogue.uc.pt/explorator/
Fotossíntese	https://www.uc.pt/jardimbotanico/media/fotossintese
Memória para Todos	https://memoriaparatodos.pt/
Museu na Aldeia	https://www.samp.pt/samp-contigo/museu-na-aldeia/
Sun4all	https://webcache.googleusercontent.com/search?q=cache:0Dy70fUbxKcJ:https://www.publico.pt/2013/10/07/ciencia/noticia/sun4all-ou-como-qualquer-um-de-nospode-identificar-manchas-solares-1608325&cd=3&hl=en&ct=clnk&gl=pt&client=avast-a-2
Toilet Talks	https://marcuserridge9.wixsite.com/toilettalks/
Projeto TROPO	https://tropo.ces.uc.pt/
Reseed	https://reseed.uc.pt/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101035803