Deliverable 4.2:

Citizens requirements report

Project Title: Towards a pan-European Research Infrastructure for Excellent Citizen Science
Project Acronym: RIECS-Concept

Contract Nº. 101188210
Programme: Horizon Europe (HORIZON)
Topic: Research infrastructure concept development HORIZON-INFRA-2024-DEV-01-01
Project start date: 01 January 2025
End date: 31 December 2027

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

Deliverable title	Citizen requirements report
Deliverable number	D 4.2
Deliverable version	1.0
Contractual date of delivery	30/06/2026
Actual date of delivery	30/06/2026
Nature of deliverable	R
Dissemination level	PU
Work Package	WP4 – Targeted stakeholder engagement
Task(s)	T4.2 Mapping of citizens needs through citizen engagement
Partner(s) responsible(s)	ECSA
Author(s) in alphabetical order	Alberto Anticoli, Romane Blassel, Franziska Stressmann
Contributor(s) in alphabetical order	Jovana Anđelković, David Cuartielles, Enrico Guarini, Bojan König, Kristina Kovaitė, Monika Mačiulienė, Elisabetta Marafioti, Rosy Mondardini, Elisabeth Schauermann, Francisco Sanz, Fermin Serrano Sanz, Petra Siegele, Karen Soacha, Paulius Šūmakaris, Martin Stojanov, Kai-Ti Wu. All participants of engagement activities: We sincerely thank all participants for their valuable contributions to this project. Their insights have been instrumental in shaping the future RIECS. Those who consented to be named will be acknowledged by name in the final version of this deliverable.

Description	Report of engagement activities carried out with citizen scientists, students and the general public for the co-design of RIECS
Key words	Citizen science, research infrastructure, participatory design, stakeholder engagement, citizen needs

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

Reviewers

Reviewer(s) name	Reviewer(s) organisation
Pablo Bes	Ars Electronica
Jovana Anđelković	Center for the Promotion of Science (CPN)

Version History

Version	Date	Comments
0.1	16/04/2026	Template
0.2	17/06/2026	First draft
0.3	22/06/2026	First version sent to reviewers
0.4	25/06/2026	Version integrating reviewer feedback and
0.5	26/06/2026	Final edits and alignment with D4.3

Disclaimer
This document reflects only the authors' view. The European Union and the European Research Executive Agency are not responsible for any use that may be made of the information it contains. This deliverable has been prepared in the framework of the RIECS-Concept project, grant agreement Nº 101188210 under the HORIZON-INFRA-2024-DEV-01-01 topic.

AI use
Parts of the analysis and drafting of this deliverable were carried out with the assistance of AI tools, including Anthropic's Claude, Microsoft's Copilot and a locally-run large language model (via Ollama) for offline text processing. AI was used as a co-analyser under human direction, to support the labelling and clustering of user stories, the summarisation and coding of engagement notes, the consolidation and mapping of the technology and needs material, and the drafting and editing of text, and not as an autonomous author.
All AI-generated outputs (labels, clusters, mappings, summaries) were reviewed and validated by the responsible consortium partners, who remain responsible for the content of this deliverable. No personal data was sent to external AI services: workshop material was processed locally on consortium machines in line with the project's GDPR and data-management arrangements.

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

After human creation, this document has been refined with the assistance of Generative AI (Claude Sonnet 4.6, Anthropic) for enhancing clarity of formulations, and structuring of sections. The authors have reviewed and validated all AI-generated content to ensure accuracy and compliance with project requirements.

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

Executive summary

Deliverable D4.2 presents the results of the first phase of stakeholder needs analysis conducted within RIECS-Concept, focusing specifically on citizen scientists, citizen science (CS) practitioners and early career researchers. Stakeholder perspectives were gathered through 24 co-design engagement activities across 10 countries between October 2025 and May 2026. One of the key innovations of RIECS-Concept is the active inclusion of citizens not only as beneficiaries but as users of the research infrastructure in their own right.

The findings are based on 378 user stories, representing a substantial subset of the 823 user stories collected across the project, complemented by facilitator observations. Following a consortium-wide labelling process, 37 distinct needs were identified and grouped under eight thematic areas: Access and Discoverability, Data Quality and Trust, Data Governance and Compliance, Tools, Platforms and Infrastructure, Training and Capacity Building, Recognition and Engagement, Governance and Sustainability, and Policy and Impact.

Key findings include:

- **For citizens, engagement begins with being able to find and enter citizen science activities**: participants consistently ask for a single, reliable place to find and match to citizen science projects, alongside networking spaces, low-barrier participation pathways and quick access to tools and resources.
- **Training materials and shared resources constitute the largest citizen need cluster**: Training materials and documentation (Need_ID 16; N16) was the most frequently cited, reflecting strong demand for practical, reusable, support, and workshop observations revealed this demand extends to researchers and coordinators, not only citizen participants.
- **Recognition, feedback and trust are conditions for sustained engagement:** Needs around credit for contributions (N19), feedback on results (N20), and transparency and provenance (N06) rank consistently high. Citizens expect to know what happens to their data and to be acknowledged for their effort.
- **Open science and data governance are baseline expectations:** Open Science, FAIR and CARE compliance (N08) is among the top five most cited needs. Citizens are willing to share data, but only under conditions that are clear, trustworthy and respect their rights.
- **Citizens expect a public European connective layer, not another platform**: RIECS is expected to connect the fragmented citizen science landscape rather than duplicate or centralise it, functioning as a shared public resource that supports existing initiatives while preserving local autonomy.

The results presented in this deliverable provide an evidence base for the ongoing co-design of RIECS. The findings build directly on D2.1 and inform the technical requirements of D2.2 and the

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

preliminary catalogue of services in D2.3. Together with D4.3 and D4.4, they provide a comprehensive view of user needs across the future RIECS ecosystem, and will inform WP3 and WP5 activities from July 2026 onwards.

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

List of acronyms

Acronym	Open form
AAI	Authentication and Authorisation Infrastructure
CARE	Collective benefit, Authority to control, Responsibility, Ethics (data principles)
CS	Citizen Science
D	Deliverable
ECSA	European Citizen Science Association
ECR	Early Career Researchers
EOSC	European Open Science Cloud
ESFRI	European Strategy Forum on Research Infrastructures
FAIR	Findable, Accessible, Interoperable, Reusable
GDPR	General Data Protection Regulation
GA	Grant Agreement
KER	Key Exploitable Result
M	Month (project month; M1 = project start)
NFDIs	National research data infrastructures
REA	European Research Executive Agency
RI	Research Infrastructure

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

RRI	Responsible Research and Innovation
RIECS	Research Infrastructure for Excellent Citizen Science
SH	Stakeholder
T	Task
WP	Work Package
WPL	Work Package Leader

Table of Contents

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

Index of Figures

Index of Tables

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

1. About RIECS-Concept

RIECS-Concept “Towards a pan-European Research Infrastructure for Excellent Citizen Science” is a 36-month Research and Innovation Action funded under HORIZON-INFRA-2024-DEV-01 (grant agreement N° 101188210).

The project responds to growing recognition within the European Research Area, Open Science policies and international sustainability agendas that citizen science plays an increasingly important role in knowledge production, societal engagement and evidence-informed decision making.

Despite the rapid growth of citizen science initiatives across Europe, the landscape remains fragmented, with projects, platforms, tools, datasets and expertise often operating in isolation. RIECS-Concept takes a deliberate first step towards addressing this situation.

Structured around two consecutive phases, the project combines desk research, participatory co-design activities and synthesis work to map stakeholder needs, define technical and governance requirements, and develop a roadmap for RIECS implementation and sustainability. Central to its methodology is the use of agile user stories to translate stakeholder perspectives, gathered from citizens, CS practitioners, researchers, education systems, NGOs, CS networks, other EU RIs and policymakers across Europe and beyond, into concrete infrastructure requirements. A CS Stakeholder Summit hosted at the Ars Electronica Festival in Linz between 9th - 13th September 2026 serves as the pivotal event connecting both phases.

The project will deliver six Key Exploitable Results spanning a catalogue of RIECS services and resources (KER1), a technological integration and cross-disciplinarity feasibility study (KER2), a data and metadata framework (KER3), a sustainability roadmap (KER4), an impact assessment framework (KER5), and an engagement model for co-creating the roadmap (KER6). Together, these outputs aim to provide the evidence base and strategic pathway needed to initiate an ESFRI application, establishing citizen science as a recognised pillar of the European Research Area.

This deliverable is produced in the first phase of the project (M1–M18) and contributes to Key Exploitable Result 1 (Catalogue of services and resources) and Key Exploitable Result 2 (Technical integration and cross-disciplinary feasibility study).

This project has received funding from the European Union’s research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author’s view and the Commission is not responsible for any use that may be made of the information it contains.

2. Introduction

2.1. Purpose and scope of this deliverable

This report belongs to Work package WP4, *Targeted stakeholder engagement*, which engages RIECS's stakeholder groups in structured co-design activities to ensure the future infrastructure responds to real needs and challenges. The methodology for these engagement activities was laid out in Deliverable 4.1 (M6).

Delivered at the closing of the first phase of the project (M1-18), this D4.2 reports on the engagement activities carried out with citizen scientists, citizen science practitioners, and students/early career researchers under Task 4.2 *Mapping of citizens' needs through citizen engagement*.

Given the participatory nature of citizen science, citizens occupy a central position among RIECS stakeholder groups. While RIECS is designed to serve a broad community, including researchers, institutions and policymakers, one of its key innovations is the active inclusion of citizens as users of the research infrastructure (RI), as well as their integration as contributors to the scientific process itself. As participants in data collection, project design and knowledge co-creation, their needs and constraints have a direct bearing on the scientific quality and societal relevance of RIECS outputs. For this reason, the consortium treats the mapping of citizens' needs not as a consultative exercise, but as a crucial input to the infrastructure's conceptual design for RIECS to fulfil its core mission of enabling excellent citizen science at pan-European scale.

Under the umbrella “citizens", this deliverable covers three closely related stakeholder (SH) groups: i) **citizen scientists and CS practitioners**, who we anticipate to be the most direct and experienced future users of the RIECS, to ensure that the infrastructure meets the diverse needs of various citizen science initiatives ii) **students and early career researchers** who are currently engaged in or are seeking to enter CS, as contributors to projects and/or as practitioners , and iii) where relevant **researchers** whose user stories speak directly about the CS participation experience rather than institution or scientific priorities. The inclusion of the last group reflects an analytical choice, insights from researchers that illuminate citizen-facing dimensions of CS (e.g. participant recruitment, recognition) and is considered within scope, while the broader infrastructure and governance needs are captured in D4.3. The decision to include all these groups in the umbrella terms “citizens” was agreed by the consortium in the in-person consortium meeting on 24 September, 2025 in Milan.

This document clusters citizens' needs as input to the technical requirements of D2.2 and catalogue of services D2.3. It presents the raw citizen evidence: participants and workshop logistics, the citizen user stories, their thematic clustering, a subgroup synthesis, and other important considerations raised. Evidence of the other stakeholder groups is reported separately in D4.3 and D4.4 and technical synthesis takes place in D2.2 and D2.3.

This project has received funding from the European Union’s research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author’s view and the Commission is not responsible for any use that may be made of the information it contains.

2.2. Related tasks and deliverables

This deliverable sits within the RIECS-Concept workflow, as illustrated in Fig. 1. Stakeholder input is gathered as challenges and needs in the form of user stories and workshop discussions. D4.2 owns the raw citizen-facing evidence, D4.3 the evidence of all other SH groups, D4.4 synthesis needs and recommendations from UN agencies and international organisations. Needs documented in D4.2, D4.3 and D4.4 are translated into infrastructure requirements (D2.2), and ultimately into a list of services and functionalities (D2.3), further informing activities of WP3 (Roadmap & sustainability) and WP5 (continuous engagement) in phase 2 of the project (M19-36). All stakeholder needs are tagged in D2.2 with Aspect IDs. Needs with low frequency of mention, below threshold in D4.3, unresolved or non-technical in nature are tagged with these Aspect IDs (e.g. WP3-01), and are carried forward from D4.3 into D2.3, and then routed into WP3/WP5.

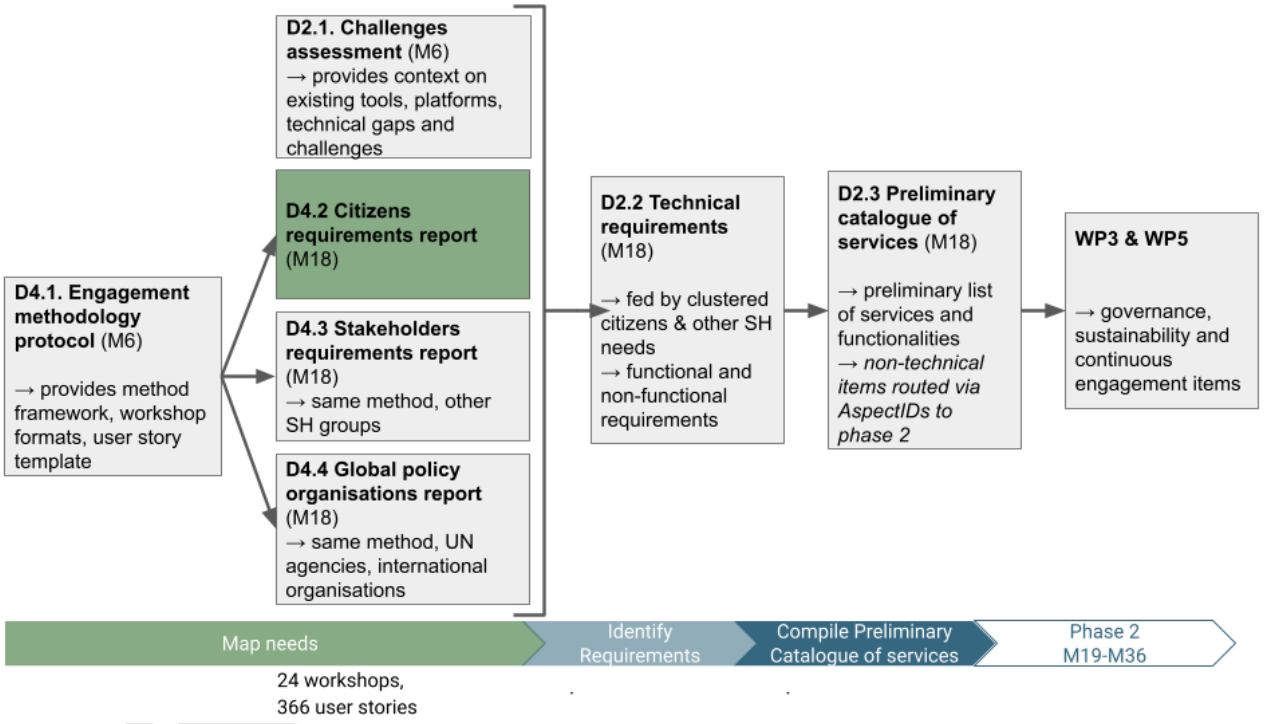

Figure 1. RIECS-Concept workflow for evidence collection and analysis from stakeholder engagement.

2.3. Intended audience

This deliverable is primarily intended for internal use within the RIECS-Concept consortium, serving as a key source of evidence for D2.2 and D2.3. After deliverable submission, it will also be addressed to the External Advisory Board for strategic overview, and to reviewers as a demonstration of the participatory methodology in action. Beyond the consortium, the report will be of interest to the broader citizen science community, sister projects funded under Horizon

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

Europe, educators and training providers, and platform developers seeking to understand citizen-expressed needs for CS infrastructure.

2.4. Structure of the document

Following this introductory section, Section 3 describes the engagement methodology applied across all citizen-facing activities, including workshop formats, the user story approach, GDPR and ethical considerations, and the accessibility and inclusion measures adopted. Section 4 summarises the characteristics of the participants involved across all engagement activities. Section 5 presents the user stories gathered from citizens, CS practitioners, students and early career researchers, organised by thematic category, including a deeper analysis, clustering citizen needs into coherent themes that will eventually inform the candidate requirements and the catalogue of service. Section 6 synthesises findings across participant subgroups, highlighting commonalities, singularities and potential tensions. It also demonstrates how citizens' needs feed into D2.2, D2.3 and the phase 2 activities of WP3 and WP5.

The report closes with Section 6, which draws together key findings, reflects on limitations of the engagement process, and outlines next steps.

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

3. Engagement methodology

This section briefly re-states the engagement methodology presented in full in D4.1 (Engagement methodology protocol, AE, M6) so that the present report can be read on its own. We explain engagement principles, workshop design, and GDPR, ethical and inclusion considerations.

3.1. Principles

In line with D4.1, the engagement methodology promotes the following principles:

- Co-design approach: participants are engaged from the earliest stage of concept definition.
- Inclusiveness: workshops are designed to lower barriers to participation (language, accessibility, digital literacy).
- Research Infrastructure (RI) User-Story format: needs are captured in a shared template — "As a ‹type of user› I want to ‹task/need› to ‹achieve goal/outcome›".
- Ethics & GDPR compliance: informed consent, minimal data collection, right to withdraw.
- Traceability: every captured need is linked to its source workshop, participant category, and date.

3.2. Workshop format and design

Overall design

Workshops were facilitated by a lead facilitator, supported by additional facilitators where participant numbers allowed or required breakout groups, and a dedicated note-taker. Workshops followed a common format and structure across the partners with slight variations in terms of tools and materials. A general workshop flow with elements common to the partner workshops is shown below:

Workshop flow

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

Citizen workshops were designed as 2 hours session[1], structured in seven parts:

1. Welcome (15 minutes): Introduction to the RIECS-Concept project, the objectives of the workshop, and an icebreaker activity to set a collaborative tone.
2. Intro round (10 minutes): Participants introduced themselves and briefly described their experience with citizen science.
3. Challenges and needs (40 minutes): Facilitated discussion in which participants explored the challenges they face when participating in or facilitating CS activities, culminating in a group synthesis or rating of key issues.
4. Break (5 minutes)
5. From needs to solutions (35 minutes): Participants were invited to propose possible solutions to the issues identified, with an explicit focus on services, tools and functionalities, and without restriction to what is currently feasible, in order to encourage exploratory thinking.
6. Filling of user stories (see below).
7. Optional: Prioritisation (10 minutes): on paper or Mentimeter, participants rated the importance of identified solutions, and/or a set of pre-identified tensions (Open data vs Privacy, Standardization vs Flexibility, Centralization vs Decentralization, Attribution vs Anonymity, Scientific control vs Participant autonomy), and could suggest additional tensions.
8. Closing (5 minutes): Overview of next steps in the RIECS-Concept project and information on how participants could stay engaged.

Facilitators noted that the concepts of research infrastructure and, to a lesser extent citizen science itself required more contextual explanation than anticipated, particularly in workshops involving students and participants with limited prior exposure to structured CS activities.

Tools and materials

For in-person workshops, data collection relied on printed user stories, following the shared RIECS template introduced in D4.1: "*As a [type of user], I want to [perform some task], so that I can [achieve some goal]*" and consent forms (D1.4) to ensure GDPR compliance. For the user story template, see Annex 1 D4.1, for more details on data collection via user stories, see 3.3 “User story collection”. Group synthesis activities used flipcharts and sticky notes. Participants interested in further engagement with the project were invited to share their contact details, which were collected and stored in compliance with GDPR.

For online workshops, Padlet or Miro were used to gather digital contributions during the challenges and needs exercise and the needs-to-solutions exercise. Mentimeter was used to prioritise tensions. An evaluation survey was distributed after the workshop, asking participants to give feedback and suggestions for improvement on the workshop, as well as collecting demographic

[1] This represents around 1028 hours given to RIECS workshops by participants.

This project has received funding from the European Union’s research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author’s view and the Commission is not responsible for any use that may be made of the information it contains.

information (age, gender, country of work, main field of work and level of experience with citizen science). Following each engagement activity, facilitating partners completed a structured workshop documentation sheet (see Annex 2 D4.1 for the template, and for more details on the actual data collection see 3.3 “Contextualisation with workshop reporting templates”).

Examples of all workshop materials used during the activities can be found in Annex A (including agenda, slides, surveys).

3.3. Data collection and analysis

Across all 42 engagements conducted in the first project phase 514 reported participants were reached (23 on-site, 17 online, 2 hybrid)[2].

Note taking, recording and transcription

Online workshops were conducted on Zoom and were recorded and transcribed using Zoom's built-in transcription tool. For in-person workshops, dedicated note-takers documented the discussions, capturing key contributions and group synthesis outputs, as well as particular priorities or emphasis stressed by the participant groups. These notes were summarised in workshop reporting templates (see below).

User story collection

User stories were collected through several complementary approaches, using the shared template following the format introduced in D4.1, and once digitalised, assigned a unique ID including the partner and activity the user story was generated by (e.g. ECSA_CSF_001 - generated during the Citizen Science Festival by ECSA, user story 1). In most workshops, participants completed the user story form directly, either on printed forms during in-person sessions or via a digital form distributed following online workshops. In a number of cases, the form was distributed after the workshop rather than completed during the session, in order to maximise discussion time. When direct participant completion was not feasible, facilitating partners generated user stories from workshop outputs through one of two approaches, either they manually summarised participant contributions on challenges, needs, solutions into the user story format after the workshop, or they used AI-assisted tools (ChatGPT, Claude, Gemini) to derive user stories from workshop transcripts (for recorded online sessions) or written workshop summary reports. In all cases, the resulting user stories were reviewed by the facilitating partner to ensure accuracy and fidelity to participant intent before being submitted to the shared corpus. This approach was considered appropriate for the exploratory nature of Phase 1, where capturing unexpected insights was prioritised over strict within-session completion. The diversity of collection methods reflects the varied formats and

[2] This represents around 1028 hours given to RIECS workshops by participants.

This project has received funding from the European Union’s research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author’s view and the Commission is not responsible for any use that may be made of the information it contains.

constraints of the engagement activities, and is acknowledged as a source of variability in the dataset.
User stories from all engagement activities were consolidated into a shared corpus of 823 stories. While RIECS engaged a total of 514 participants, the number of user stories exceeds the number of participants because some participants expressed multiple needs or challenges either via completing more than one user story, or in the case of individual user stories containing multiple distinct needs/challenges, these were disaggregated into separate user stories by partners. For the citizen stakeholder group, a total of 24 (6 online, 17 in-person, 1 hybrid) engaged 264 participants, generating 378 user stories.

Contextualisation with workshop reporting templates

To strengthen the findings, the data collection via user story analysis is complemented by data collected via workshop reporting templates (introduced in D4.1) that facilitators were responsible for filling after each engagement activity. This workshop documentation sheet captures key logistical information, methodological choices, strengths and limitations observed, and a summary of key learnings. These sheets also included an open field for facilitators to record personal reflective observations and insights, including points of emphasis, disagreement or unexpected findings, that go beyond what is captured in the structured user story outputs. The completed documentation sheets were compiled and analysed thematically to identify cross-cutting patterns across workshops and partners.

Anonymisation and participant acknowledgement

Partners who facilitated the workshops were responsible for anonymising transcripts and user story submissions prior to sharing them with the wider consortium (see section 3.5 Personal data and GDPR). In line with the principle of data minimisation, demographic and background information was requested on a voluntary basis in online workshops together with the evaluation survey, which accounts for the limited number of responses reported in Section 4.

In line with the ethical procedures established for RIECS-Concept, participants had to sign a consent form on which they were informed about how their contributions and personal information would be used. On this form, they were able to indicate their preferences regarding acknowledgement. Where participants consented to being identified, they will be acknowledged by name in the relevant project outputs or dissemination activities. Participants who preferred not to be identified directly, or for whom no explicit consent for attribution was provided, are represented anonymously throughout this deliverable and any accompanying analyses.

The findings presented in this report are therefore primarily reported in aggregated form, with illustrative user stories and quotations anonymised where necessary to prevent the identification of individual participants. This approach balances transparency and recognition of participants'

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

contributions with the project's commitment to ethical research practices, data protection, and respect for participants' privacy and preferences.

Analysis process (labelling, clustering)

The analysis of engagement data followed a structured, multi-stage synthesis pipeline. User stories collected through workshops were harvested and labelled by consortium partners during a dedicated labelling session (13 partners, May 2026), using a shared labelbook, respecting different EU dictionaries, with clear definitions and the possibility of adding new labels. Each story was tagged with target user, story concept, thematic labels and relevance, with double-labelling used for conflict detection. Stories were then clustered into thematic needs based on label co-occurrence. A total of 27 stories were excluded as not relevant, not citizen science, project-specific, duplicate or unparseable.
Needs were derived from the labelled stories by clustering co-occurring labels into a smaller set of named, defined needs (N01–N37), each grouped under a higher-level theme. The result is a four-level hierarchy (theme → need → label → user story) in which a need is the named and defined abstraction of a recurring cluster of labels. Because stories are multi-labelled, these clusters overlap, one story can contribute to several needs, which is why mention counts sum to more than the total number of stories. The needs are therefore not disjoint bins but overlapping clusters that preserve the richness of what participants expressed.

The full description of the methodology, including the synthesis pipeline, tools developed by the consortium partners for this process, and a visual representation of the analysis pipeline is documented in D4.3 (Section 3, incl. Figure 2).

3.4. Ethics

All engagement activities reported in this deliverable were conducted in accordance with the Ethical Management Plan (D1.3, M5), following the principles of Responsible Research and Innovation (RRI) and in compliance with applicable national and European regulations.

Participation was voluntary throughout. All participants were informed of the purpose of the activities, how their contributions would be used, and their right to withdraw at any time. Consent was collected via consent forms (Data management plan, D1.4), signed paper forms in person and digitally (return of signed pdf) for online workshops.

The project's Ethics Manager, established under Task 1.4, provides independent oversight on ethical, legal and data management matters. The Ethics Manager was informed of the engagement methodology set out in D4.1 and the procedures applied across WP4 activities.

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

Facilitators followed the procedures set out in D1.4, and no significant ethical concerns or incidental findings arose in the course of the activities reported in this deliverable.

3.5. Personal data and GDPR

All personal data collected during the engagement activities reported here was processed in full compliance with GDPR and in accordance with the Data Management Plan (D1.4, M6). The legal basis for processing personal data collected during engagement activities is scientific research (Article 89 GDPR), as the activities are conducted for the purposes of conceptualising a future research infrastructure of public interest. All identifiable information, including participant names, institutional affiliations and project names was removed or replaced with standardised placeholders. Sources are identified by organisation and workshop only. A replacement log is maintained internally for review purposes. Personal information was collected separately from user story content to minimise privacy risks. Raw personal data is held securely by the facilitating partner, and will be securely deleted within 6 months following the official end of the project, according to D1.4 and overseen by the data controller Data Protection Officer Maite Pelacho (Fundación Ibercivis).

3.6. Accessibility and inclusion

The consortium applied the following measures to ensure engagement activities were accessible and inclusive across all citizen-facing activities reported in this deliverable.

- **Recognising existing barriers to participation:** Meaningful engagement with science and research infrastructures is not equally accessible to all. Structural, social, and individual barriers, including low scientific literacy, lack of familiarity with research processes, socioeconomic constraints, disability, and exclusion from academic spaces can prevent many citizens from meaningfully participating in or benefiting from scientific activities. People with disabilities, in particular, may face additional challenges in accessing both physical workshop spaces and digital participation tools, including visual, auditory, cognitive, or motor impairments that standard engagement formats do not always accommodate. The consortium acknowledges these pre-existing inequalities as a broader challenge that shapes who engages with RIECS and how, and is committed to progressively addressing them across the project's engagement activities.
- **Language:** Workshops were conducted in the local language of the facilitating partner wherever possible, with user story forms and materials translated accordingly.
- **Geographic and digital access:** Activities were conducted across more than 10 countries, using a mix of online and in-person formats to balance reach and depth of engagement. The consortium acknowledges that online participation may present barriers for individuals with limited digital access or literacy.

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

- **Content accessibility:** Workshop materials were designed to be accessible to participants without prior knowledge of research infrastructures or CS terminology. Visual and interactive tools (Padlet, Mentimeter) supported varied modes of participation. Facilitators adapted their approach where participants needed additional contextual explanation. It must be noted however that written user story forms may disadvantage participants with lower literacy levels or limited familiarity with structured formats. These limitations are noted as areas for improvement in the WP5 engagement activities.
- **Inclusion of underrepresented groups:** At least two workshops per country were dedicated to students/early career researchers to account not only to potential current users but also to future ones. Activities were facilitated in ways designed to minimise hierarchical dynamics.

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

4. Overview of workshops and participants

Table 1 below provides an overview of the citizen-facing and mixed workshops conducted under Task 4.2 during the first project phase (M1–M18). Task 4.2 aimed to conduct four engagement workshops per country across more than seven European countries, involving at least 10 participants per workshop. In practice, the consortium exceeded the target in terms of geographic reach and total number of workshops: 24 workshops were conducted across 10 countries and regions (Austria, Germany, Spain, Switzerland, Finland, Italy, Lithuania, Serbia, Sweden, and Tanzania (online), involving 8 consortium partners and 264 reported participants across the workshops for which attendance was recorded. Several workshops, particularly the mixed and conference based sessions, did not report participant numbers (marked as 'n/r'), meaning the true total of participants engaged is likely higher than 264. Of the 24 workshops for which data is available, the majority met or exceeded the 10-participant threshold. The workshops falling below this threshold (WS27: 6 participants; WS29: 6 participants; WS36: 8 participants) were student-dedicated sessions where smaller group sizes were considered appropriate to minimize power dynamics and make participants more comfortable to express their experiences. For WS23 there were many unforeseen adhoc cancellations, and as WS14 had twice the amount of required participants, no corrective action was taken. Overall, while the per-country target of four workshops was not uniformly met across all participating countries, the total volume and geographic spread of activities met the DoA commitment.

Country of partner	Audience	Workshop	Participants	Modality
Austria	citizens	WS26	13	On-site
Austria	students	WS27	6	On-site
Austria	citizens	WS28	11	Online
Austria	students	WS29	6	On-site
Switzerland	health CS (mixed)	WS02	n/r	On-site
Germany	citizens (CCC community)	WS14	20	Online
Germany	citizens	WS23	7	On-site
Spain	mixed national SH (mixed)	WS01	n/r	On-site
Spain	symposium (mixed)	WS03	n/r	On-site
European	conference co-design (mixed)	WS22	30	On-site
European	students	WS24	10	Online
European	students	WS25	10	Hybrid
Finland	conference (mixed)	WS21	22	On-site
Italy	students	WS35	10	On-site
Italy	students	WS36	8	On-site
Lithuania	researchers + citizens (mixed)	WS38	20	On-site
Lithuania	students	WS39	12	On-site
Lithuania	researchers + citizens (mixed)	WS41	20	On-site

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

Lithuania	students	WS42	10	On-site
Serbia	citizens	WS15	15	On-site
Serbia	students	WS17	10	Online
Serbia	citizens + researchers (mixed)	WS18	10	Online
Sweden	students	WS06	14	On-site
Tanzania	open science forum (mixed)	WS13	n/r	Online
Total	—	24 workshops	264	6 online 17 On-site

Table 1. Citizen/student-facing and mixed workshops.

'n/r' = not reported in the documentation sheet. Mixed workshops also appear in D4.3, but participants are counted once specific according to which SH group they belong to. Country = where the workshop was conducted (or the organiser's country for online events) - not participants' nationality or country of origin.

Participant/user story profile

After labelling, 397 user stories were tagged to D4.2. A June 2026 review removed 16 out-of-scope stories and 3 duplicates (see Table A2, Annex B), leaving 378 user stories for analysis.
User stories were assigned a user type during the consortium labelling process, with a final review by ECSA in June 2026 to address any blanks or inconsistencies. The distribution of user subgroups within the broader "citizen" umbrella category, as assigned by partners, is shown in Table 2 below.

"Citizen" stakeholder subgroup	N
Citizen scientists	146
CS practitioners	141
Students and early career researchers	91
total	378

Table 2. Distribution of user stories by stakeholder subgroups within the citizen SH group.

It is important to note that across all categories there is some degree of overlap between a participant's actual profile, the profile they attributed to themselves in their story, and the profile assigned by labelling partners. This reflects a number of practical realities of the engagement process:

- **User stories can be written from any perspective.** Participants were not required to write from their own standpoint, and some chose to write on behalf of a group or to imagine a different user type. This means the assigned label may not always reflect the person who was physically present in the workshop.
- **The boundary between student and early career researcher is blurred.** Some participants who identified as students may in practice be PhD candidates or early career researchers, and vice versa. This is reflected in the self-attributed labels found in the story

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

texts: when the word "student" was searched verbatim across all stories, it appeared in 81 stories, a figure considerably higher than the 25 stories assigned the student label by partners. This gap suggests that the student category is likely underrepresented in the labelled data, and that a portion of stories labelled as citizen scientists or researchers may have been contributed by people at early stages of their academic career. To reduce this gap, we re-assigned individuals identifying as “student", “postdoctoral researcher", and “young professional” into a “student and early career researcher” user group, thereby increasing the “student” category from 25 to 91 stories.

- **The CS practitioner category is broad.** It covers a wide range of roles, from project coordinators and educators to museum professionals and community organisers. Stories in this group therefore reflect a particularly diverse set of needs and perspectives.

These caveats should be kept in mind when interpreting the needs analysis by subgroups presented in the following sections.

Stakeholder maturity: Following the stakeholder maturity framework introduced in D4.1 which considers awareness, experience, institutional integration, attitudes and openness, participants varied considerably in their prior familiarity with citizen science, ranging from experienced practitioners with years of project involvement to students and members of the general public with little or no prior exposure. Most participants were aware of or had some experience with CS activities, but few operated within institutionalised CS frameworks or had systematic knowledge of CS infrastructure needs. This was reflected continuously in the workshop design, facilitation approaches, materials and explanations were adapted accordingly, with additional contextual framing provided for groups with less prior exposure. This diversity of maturity levels was deliberately sought, as it ensures that the needs captured reflect the full spectrum of potential RIECS users, from first-time participants to experienced contributors.

Age groups, gender balance and education level: In line with the project's data minimisation policy, demographic information, including age, gender and education level, was not systematically collected across all workshops. When collected, it was requested on a voluntary basis through the consent form or post-workshop surveys, meaning that responses are incomplete and not representative of the full participant group. As a result, no reliable aggregate figures or conclusions can be reported for these variables. This is acknowledged as a limitation of the current dataset.

5. Citizens needs

5.1. Needs captured from user stories

As outlined in Section 3, needs were generated from the labels assigned to the user stories (see Annex D) Table 3 shows the 37 needs identified from the analysis of citizen user stories, each

This project has received funding from the European Union’s research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author’s view and the Commission is not responsible for any use that may be made of the information it contains.

assigned a unique identifier (N01–N37) and accompanied by a working definition, and their frequency of mention within the citizen stakeholder group.

need_id	need_name	definition	Citizen total mention
N01	Project discovery and matchmaking	A single place to find ongoing CS projects, events and calls, and to match volunteers, schools and researchers to projects relevant to them.	51
N02	Networking and collaboration spaces	Spaces and mechanisms to connect coordinators, researchers, volunteers and organisations across projects, disciplines and countries.	56
N03	Low-barrier, accessible participation	Participation paths that work regardless of language, disability, age, digital skills or location.	42
N04	Data quality control and validation	Quality assurance, validation and calibration pipelines so citizen-generated data can be trusted and reused by science and policy.	31
N05	Shared data and metadata standards	Common data/metadata standards and standardisation support enabling cross-project and cross-domain reuse.	21
N06	Trust, transparency and provenance	Visibility of where data goes, who uses it and how decisions are made; provenance records that build mutual trust.	30
N07	Data ownership, privacy and consent	Clear rules on who owns contributed data, privacy protection, consent management and handling of sensitive data.	30
N08	Open Science, FAIR and CARE compliance	FAIR/CARE-aligned, openly licensed data, software and outputs as the default mode of operation.	45
N09	Legal clarity and digital sovereignty	Legal certainty for data use and ownership across borders and public/European control over infrastructure and data.	9
N10	Shared digital infrastructure and hosting	Common hosting, storage, repositories and computing so projects do not have to build and maintain their own stack.	32
N11	Data collection and crowdsourcing tools	Mobile/field data-collection tools, crowdsourcing workflows and sensor support for contributors.	49
N12	Analysis, visualisation and decision support	Online analysis and visualisation of project data, including AI-assisted tooling and outputs usable for decision-making.	20

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

N13	Usability and user-centred design	Interfaces designed for non-experts, with workflows that fit how volunteers actually work.	36
N14	Interoperability and platform integration	Connecting existing CS platforms, apps and repositories through APIs and shared interfaces rather than replacing them.	16
N15	Federated, modular and secure architecture	A federated/modular technical design with shared identity and access management, security and reliability.	10
N16	Training materials and documentation	Ready-to-use training, manuals, templates and documentation for participants, teachers and coordinators.	68
N17	Support services and expertise access	Helpdesk-style support, peer-to-peer learning, expert/organisation databases and proposal support.	36
N18	Scientific literacy and public engagement	Outreach, literacy-building and engagement formats that bring new audiences into citizen science.	21
N19	Recognition and credit for contributions	Acknowledgement, certification and credit mechanisms for citizen contributions, including non-institutional expertise.	40
N20	Feedback and communication of results	Closing the loop: participants receive feedback on their contributions, see what happened with their data and what the project achieved.	40
N21	Volunteer recruitment and retention	Sustainable recruitment of new participants and strategies to keep them engaged over years.	11
N22	Long-term funding and institutional support	Funding models and durable institutional backing so projects and platforms survive beyond project grants.	19
N23	Participatory and equitable governance	Citizens and stakeholders represented in decision-making, with co-creation and equitable participation protocols.	13
N24	A public European resource against fragmentation	RIECS as a public, Europe-wide resource that connects rather than duplicates the fragmented CS landscape.	11
N25	Policy readiness and evidence pipelines	Making citizen-generated evidence usable and used by policy-makers: quality seals, official-statistics integration, policy interfaces.	23
N26	Impact assessment and valuation	Methods and indicators to assess and demonstrate the scientific and societal impact of citizen science.	22
N27	Cross-domain and transdisciplinary	Linking datasets, methods and communities across domains and disciplines.	8

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

	research		
N28	Scalability and performance	The infrastructure must scale across users, data volumes, computation and geography.	2
N29	Shared resource and materials library	A curated library of reusable resources — protocols, worksheets, equipment guides, best-practice examples that projects and citizens can draw on.	24
N30	AI transparency/algorithm accountability	Clear and accessible explanations of how automated and AI-driven tools process, filter or act on citizen-contributed data, including transparency about which data are used, by whom, and under what conditions, so that participants can understand, question and trust algorithmic decisions.	2
N31	Career recognition for researchers	Formal recognition of citizen science contributions within academic evaluation frameworks, including publication pathways, funding criteria and professional development systems, so that engaging in CS does not disadvantage researchers' careers.	11
N32	Feedback mechanism from policy, how CS data influenced policy	A return mechanism or channel informing citizen contributors when and how their data has shaped a policy decision, regulatory action or official reporting process, closing the loop between scientific contribution and societal outcome.	7
N33	Scientific principles	Support for embedding recognised scientific standards, including reproducibility, peer review and disciplinary rigour, into citizen science practice, so that CS outputs are accepted as legitimate contributions to knowledge.	3
N34	Physical infrastructures	Access to shared physical resources such as laboratory spaces, field equipment, sensors and hardware that participants and projects can borrow or use without needing to own or maintain them independently.	4
N35	Quick availability	Resources, tools, support and data that can be accessed immediately/as quickly as possible when needed, without lengthy application processes, waiting periods or technical barriers, so that participants and projects can act on opportunities in real time.	1
N36	Data storage	Secure, reliable and long-term storage of project data in a trusted environment, ensuring	3

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

		that citizen-generated datasets remain accessible, preserved and reusable beyond the lifetime of individual projects.	
N37	Ethics framework / guidelines	Practical guidance, templates and support for implementing ethical principles in citizen science projects, covering informed consent, participant rights, responsible data use and compliance with relevant regulations.	3

Table 3. Needs captured from user stories and their frequency of mention.

5.2. Clustering of citizens needs

To support the design and prioritisation of RIECS platform features, the 37 identified needs were grouped into nine overarching thematic clusters (see 3.3), as shown in Table 4. Each need is illustrated by a representative user story drawn from the dataset, providing a participant-driven justification for its inclusion. This thematic structure will inform the functional specification and architectural design of RIECS, and is reflected in D2.2.

Theme	Need	User_story_written_out
Access and discoverability	Project discovery and matchmaking	"I want to participate to research studies that I can contribute to from home so that the research can benefit me indirectly."
	Networking and collaboration spaces	"There is a lack of mentorship and informal knowledge exchange in citizen science, even though a lot of learning happens informally. Connecting with mentors or peers would make it easier to learn and grow in this field. It would also strengthen the overall community."
	Low-barrier, accessible participation	"I would like my school to be provided with suitable equipment for data collection in an urban green area in all weather conditions, such as nets, tubes, protective clothing, and wind protection, so that we can collect data reliably and safely even when conditions are difficult."
Data quality and trust	Data quality control and validation	"I want data to be validated through crossed observations and repeated measurements, so that uncertainty can be reduced without overburdening individual participants."
	Shared data and metadata standards	"I want citizen science datasets to include rich metadata about methods and validation, so that downstream users can assess quality and fitness for purpose."
	Trust, transparency and provenance	"I want a secure, usable and trustworthy platform, so that children, older adults and other users feel protected when participating."

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

	AI transparency/algorithm accountability	"I want safeguards for AI trained on collective human effort, so that our contributions are not reused without transparency, attribution or ethical oversight."
Data governance and compliance	Data ownership, privacy and consent	"I want open data combined with data protection measures so that data can be shared responsibly while protecting contributors and sensitive information."
	Open Science, FAIR and CARE compliance	"I want RIECS to make it possible for me to access scientific datasets and literature so I can continue contributing to research. So that losing institutional library access and data subscriptions on retirement does not cut me off from the knowledge base I spent a career building."
Tools, platforms and infrastructure	Quick availability	“As a citizen science community member, I want open access to RI data, so that knowledge generated through citizen science remains available and useful to society.”
	Data storage	"I want access to a trusted data repository so that I can store, share, and preserve project data in line with FAIR and CARE principles"
	Legal clarity and digital sovereignty	"I want access to legal guidelines and counselling support so that I can navigate regulatory requirements and address legal challenges confidently."
	Ethics framework / guidelines	"I want ethical and legal guidance so that I can manage participation, data and responsibilities correctly."
	Shared digital infrastructure and hosting	"I want thematic groups or interest areas so that a large infrastructure remains navigable and relevant to different communities."
	Data collection and crowdsourcing tools	"I want to add and update projects, resources and events directly so that the portal remains current and does not depend on a single central editor."
	Analysis, visualisation and decision support	"I would like to have had more access to different promotional techniques to market the research to younger audiences. So that I could ensure a higher number of young people get engaged, and also to increase overall participation (and survey responses) so that our research is more legitimate."
	Usability and user-centred design	"As a citizen scientist I want to have an intuitive, accessible, technically reliable and legally compliant platform to facilitate the submission of my contributions and my understanding of the project"
	Interoperability and platform integration	"I want modular and interoperable infrastructure components so that my platform can connect with others without losing its own identity or community."
	Scalability and performance	"I want federated governance models so that different actors, regions and levels of maturity can participate fairly."

This project has received funding from the European Union’s research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author’s view and the Commission is not responsible for any use that may be made of the information it contains.

	Physical infrastructures	"I want a place where we can borrow research equipment (sensors, loggers, microscopes, etc.) so that we can conduct high-quality science without needing large capital funding."
	Federated, modular and secure architecture	"I want project-level customization within shared infrastructure standards so that my project can adapt tools to local needs while remaining interoperable."
Training and capacity building	Training materials and documentation	"I want to learn more about how public design research is done in the field so I can understand how to participate or conduct them in the future."
	Support services and expertise access	"I want support services for community-led research so that local priorities and non-academic actors can be part of excellent citizen science."
	Scientific literacy and public engagement	"I would like to see more educational materials regarding larger-scale citizen science promotion that could increase citizen participation. So that I can ensure citizens are better informed."
	Shared resource and materials library	"I want RIECS to make it possible for me to access scientific datasets and literature so I can continue contributing to research. So that losing institutional library access and data subscriptions on retirement does not cut me off from the knowledge base I spent a career building."
Recognition and engagement	Recognition and credit for contributions	"I want persistent identifiers for datasets, downloads and eventually records, so that use of my data can be tracked and credited."
	Career recognition for researchers	"I want to understand how citizen science connects to real scientific careers so I can see its relevance for my future"
	Feedback and communication of results	"I want feedback on whether my data identification is correct so I can improve my knowledge and feel confident that my data is reliable."
	Volunteer recruitment and retention	"As a scientist I want to be able to react to questions and reach potential citizen scientists so that I can spread information more easily and offer capacity-building in my field"
Governance and sustainability	Long-term funding and institutional support	"I want long-term hosting and preservation services so that project data and outputs remain available after the project ends."
	Participatory and equitable governance	"I want have clear the relationship between governance, technology and participation so that decisions about platforms, licences and workflows are coherent from the start."
	A public European resource against fragmentation	"I want clear governance rules before launching collaborative initiatives so that communities are not confused or weakened by later fragmentation or internal splits."
Policy and impact	Policy readiness and evidence pipelines	"I want regulatory recognition and acceptance so that citizen science outputs are taken seriously by institutions and decision-makers."

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

	Impact assessment and valuation	"Enough time in funded projects for citizen inclusion and a clearer framework to evaluate social impact, I can continue collaborating with citizens while being clear about benefits and risks."
	Feedback mechanism from policy, how CS data influenced policy	"I need to communicate my activities and results to different stakeholders. For me, it would be great to have higher diversity of communicator profiles and formats (website, webinars, podcasts, interviews, public gatherings) available to me to learn from and implement."
Scientific practice	Cross-domain and transdisciplinary research	"I think the greatest potential of citizen science is collaboration between different disciplines. In this way, natural and social scientists can see new angles of certain phenomena. I believe that citizen science can be used beautifully to connect different disciplines."
	Scientific principles	"it seems to me that it is very important that the academic community gets to know the concept of citizen science better. It seems to me that the majority of scientists are still a bit confused when it comes to this approach to research and may not fully understand all the benefits of this type of scientific research. Familiarizing the academic community with the concept of citizen science is very important because the academic community is, after all, the bearer of citizen science. It is very significant that during the CS open call, the CPN held a series of lectures aimed at exactly that. I believe that such a series of lectures needs to be held more often and continuously so that as many members of the academic community as possible can become familiar with the concept of citizen science."

Table 4. Thematic grouping of needs, illustrated by a user story example for each need.

5.3. Thematic analysis of needs

Overall, the needs were mentioned in the following order of frequency when grouped into themes: (1) Tools, platforms, and infrastructure (170 mentions), (2) Access and discovery (150 mentions), (3) Training and capacity building (149 mentions), (4) recognition and engagement (102 mentions), (5) Data quality and trust (95 mentions), (6) Data governance and compliance (90 mentions), (7) Policy and impact (52 mentions), (8) Governance and sustainability (43 mentions), and (9) Scientific practices (11 mentions). We will explore in more detail each theme.

Theme: Tools, apps and platforms

This theme brings together practical infrastructure needs, tools for collecting data, platforms for storing and analysing it, and architectures that allow existing systems to connect. As these are the

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

most common entry-point for participants contributing to citizen science, its high number of mentions is not surprising.

Data collection and crowdsourcing tools (N11, 49 mentions) was one of the most frequent needs. Citizens and students asked for mobile tools to upload observations, photos, videos, environmental measurements or local reports (MAU_S01_021; VT_01-SH01-001; CPN_03-SH09-003). Teachers and student groups asked for tools that work in school or field contexts, including video upload, offline workflows and equipment suitable for difficult weather or safety conditions (OeAD_01_085; VT_02-SH02-006). Practitioners asked for tools that allow citizens to report urban problems, environmental risks or adverse health experiences so they can later support research or policy (ECSA_CSF_011; IBE_SW_051).

Shared digital infrastructure and hosting (N10, 32 mentions) was raised mainly by practitioners and coordinators. Stories asked for hosting, shared databases, repositories, computing resources and infrastructure that local projects do not have to build alone (IBE_OQ_10; ECSA_OCP_006; ECSA_PW_006). Several stories described the fragility of project-specific platforms and the need for stable infrastructure after funding ends. Several stories were particularly clear that RIECS should provide a shared layer that supports existing initiatives rather than forcing each project to develop its own stack.

Analysis, visualisation and decision support (N12, 20 mentions) showed participants wished to move beyond simple data submission. Participants wanted maps, dashboards, visualisations, AI-assisted tools and analytical outputs that help them understand what their data means (IBE_SW_014; OeAD_01_089; IBE_OSF_14). Students asked to see their contributions in dashboards or maps, citizens wanted to understand whether local observations contribute to wider trends, practitioners wanted outputs that could support reporting, policy or advocacy.

Usability and user-centred design (N13, 36 mentions) was a strong cross-cutting need. Participants asked for intuitive interfaces, smooth login, simple workflows, visually appealing apps, clear manuals and tools that reduce rather than increase effort (OeAD_01_044; VT_01-SH01-004; ECSA_CCC_016). Other stories mentioned that forms should not be tedious, apps should save login details, and interfaces should support quick submission from smartphones. Teachers stressed that tools must work in real school conditions, including limited time, variable internet access and different student abilities.

Interoperability and platform integration (N14, 16 mentions) is when practitioners asked for existing platforms, catalogues and repositories to be connected through APIs and shared standards rather than replaced (IBE_CAPS_01; IBE_CAPS_02; ECSA_CCC_019; IBE_OSF_07). Several stories stressed autonomy, local platforms and communities want to connect to RIECS without losing their identity or control.

Federated and modular governance/architecture (N15, 10 mentions) is mentioned in stories on governance models, national support nodes and modular infrastructure show that participants want

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

shared access and standards without loss of local autonomy (IBE_CAPS_01; IBE_OSF_20; MAU_R01_010). This is also a governance insight, many participants do not want a one-size-fits-all infrastructure, but a system that allows distributed actors to connect under shared principles.

Physical infrastructures (N34, 4 mentions) appeared in stories about equipment borrowing, specialist tools, protective clothing, sensors and open-source lab hardware (IBE_ECS_06; ECSA_CCC_008; ECSA_OCP_034; OeAD_01_037). Although not frequently mentioned, this shows that RIECS design should consider not only the digital, as for many field-based or school-based projects, access to physical equipment determines whether participation is possible.

Quick availability (N35, 1 mention) was raised by a single participant (IBE_ECS_10) in the context of ensuring continued, timely access to citizen science data after project completion. Although this need overlaps with concerns around data storage, data ownership, open science and long-term sustainability, the emphasis here was distinct, not just preservation, but rapid, open, and ongoing availability of data for societal use. Given this unique focus on timely, equitable access for society, the need was treated as a separate, high-value requirement within the thematic analysis.

Theme: Access and discoverability

Access and discoverability emerged as one of the clearest and most frequent themes in the citizen-facing dataset. Across countries and participant types, citizens, students, teachers, and practitioners repeatedly described a fragmented citizen science landscape in which opportunities exist, but are difficult to find, assess or enter.

Project discovery and matchmaking (N01, 51 mentions) was the most frequently mentioned need in this theme. Participants asked for a single, reliable place to find ongoing citizen science projects, events, calls, datasets and participation opportunities. This was expressed by university students wanting to know about upcoming research projects before they happen (MAU_S01_009; VT_01-SH01-007), by citizen scientists seeking up-to-date project directories (OeAD_01_090; CPN_04-SH09-001), and by practitioners asking for an overview of projects, results, lessons learned and previous failures (ECSA_PW_005; IBE_SW_083). The need is not only for search, but for matching, participants want to find projects relevant to their interests, location, capacities, values and available time.

Networking and collaboration spaces (N02, 56 mentions) was almost equally prominent. Participants described citizen science as dependent on relationships, but lacking stable places where those relationships can form. User stories asked for spaces to connect citizen scientists with one another (OeAD_01_033; VT_02-SH02-005), to link patients and researchers (IBE_CS4H_09; IBE_CS4H_17), to create communities of practice in regions where CS is still emerging (CPN_01-SH09-005; CPN_03-SH09-001), and to connect practitioners, teachers, funders and institutions across countries (ECSA_OCP_020; ECSA_STU_005).

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

Low-barrier, accessible participation (N03, 42 mentions) was mentioned across participants. Participants asked for ways to contribute from home, in small steps, without needing advanced scientific knowledge, high digital literacy or institutional affiliation (MAU_R01_018; VT_02-SH02-002; OeAD_01_039). Students asked for flexible tasks that fit school workload and urban contexts, while teachers asked for materials that work offline and can be used despite unreliable school infrastructure (ECSA_TCH_006; OeAD_01_083). Accessibility also included multilingual support and full accessibility features (ECSA_OCP_038). A subgroup of stories concerned accessibility, including the need for advanced information, predictability and reduced uncertainty for neurodivergent participants. Although this is currently captured under N03, it may warrant closer tracking in future analysis.

Overall, the access and discoverability theme shows that RIECS should not assume that participation begins with technical data submission. For many citizens, participation begins much earlier, knowing that a project exists, understanding whether it is relevant, feeling welcome, and having a clear route into action.

Theme: Training and capacity building

Training and capacity building is one of the strongest themes in the dataset. The stories show that participants are asking for practical, reusable, context-sensitive support that enables them to participate, coordinate, teach or design citizen science activities.

Training materials and documentation (N16, 68 mentions) was the dominant need in this theme. Citizens asked for onboarding materials, simple explanations and manuals that help them understand what is expected (OeAD_01_001; CPN_01-SH09-011; VT_01-SH01-012). Students asked for training in taking pictures, identifying species and revisiting learning materials after gaps between fieldwork sessions (OeAD_01_084; VT_02-SH02-009). Teachers asked for materials that can be used in class, adapted to curricula and printed or used offline (ECSA_TCH_006; CPN_04-SH09-008). Practitioners asked for templates, methodological support, guidance on engagement and documentation that can be reused across projects (ECSA_OCP_010; ECSA_OCP_016).

Support services and expertise access (N17, 36 mentions) reflected the need for human support, not only documents. Participants asked for troubleshooting, consultancy before and during projects, mentoring on repositories, guidance on legal issues, and expert databases (IBE_SW_055; ECSA_OCP_018; IBE_CAPS_18). Early career researchers and practitioners described relying on informal networks or self-learning, which creates uncertainty and inequity. Participants expect from RIECS not only to host resources but to connect users to people who can help them apply those resources.

Scientific literacy and public engagement (N18, 21 mentions) appeared in stories asking for ways to explain citizen science to new audiences, make science more understandable, and raise awareness of environmental, health or heritage issues (CPN_01-SH09-005; CPN_03-SH09-006;

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

MAU_S01_021). Participants often linked literacy to motivation, people participate when they understand the purpose of the research and the value of their contribution.

Shared resource and materials library (N29, 24 mentions) focused on reusable, curated resources such as protocols, worksheets, examples, project histories, teaching materials and best-practice cases (CPN_04-SH09-008; ECSA_OCP_016; ECSA_PW_015). Practitioners repeatedly described not wanting to "reinvent the wheel" and wanted examples of successful and failed CS projects. Teachers wanted searchable materials aligned with school needs. This need overlaps with project discovery but is separate, as it describes a need for reusable knowledge assets, not just participation opportunities.

Students and teachers tended to ask for concrete, ready-to-use materials, practitioners and researchers asked for methodological, legal and strategic support.

Theme: Recognition and incentives

Recognition and engagement are a strong theme among citizen user stories, participants expressed that they want to know that their time, knowledge and data matter.

Recognition and credit for contributions (N19, 40 mentions) appeared in many forms. Some participants asked for proper attribution when data is reused (IBE_CAPS_04; ECSA_CCC_010). Others asked for credits, badges, micro-credentials or certificates (IBE_SW_017; VT_02-SH02-004; Project Lead story on Europass/EQF). Several stories concerned non-institutional expertise, retired academics, hobbyists, independent researchers, practitioners and community knowledge holders wanted their knowledge to be recognised even without university affiliation (ECSA_CCC_012; ECSA_OCP_025; MAU_R01_015).

Feedback and communication of results (N20, 40 mentions) was equally important. Participants asked for regular feedback about how their data is used, project progress, validation of their contributions, and final results (OeAD_01_033; OeAD_01_034; CPN_01-SH09-008; VT_01-SH01-003). Students asked for feedback on whether identifications are correct, long-term volunteers asked for evidence that years of work are used by science or public management, practitioners asked for better communication channels to participants and the public.

Volunteer recruitment and retention (N21, 11 mentions) appeared less often but was linked to many other needs. Stories asked for ways to recruit patients, reach underrepresented groups, maintain long-term engagement and avoid relying on the same participants repeatedly (IBE_CS4H_18; VT_02-SH02-004; CGSP_01_003). Recruitment and retention were often linked to feedback, recognition and community-building. The need was especially visible in health-related and education-related stories, where continuity and representativeness are major concerns.

Career recognition for researchers (N31, 11 mentions) appeared in stories from students, early career researchers and project leads. Participants asked how citizen science connects to future

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

careers, how CS training could be recognised through micro-credentials, and how co-created outputs can be valued within academic assessment (MAU_R01_019; VT_02-SH02-010; IBE_SW_017). Although the frequency of mention is low, this need is important, if CS work is not recognised in educational and research careers, early career actors may be discouraged from engaging further.

Theme: Data quality and trust

The data quality and trust theme combines technical and relational concerns. Participants did not only ask for data to be accurate; they also asked for systems that make quality visible, understandable and trustworthy to citizens, researchers, policymakers and communities.

Data quality control and validation (N04, 31 mentions) was raised in many contexts. Students wanted feedback on whether species identifications or submissions were correct (OeAD_01_080; VT_02-SH02-009), while practitioners asked for calibration, quality flags, validation workflows and standards that would allow citizen-generated data to be reused by researchers and policymakers (ECSA_CCC_008; ECSA_CCC_009; IBE_SW_070). Stories from workshops run in Serbia described the need for validation mechanisms that improve data quality without discouraging contributions (CPN_03-SH09-008; CPN_03-SH09-011). Stories from open-source and DIY hardware contexts, highlighted the need for citizen-built tools and low-cost sensors to be accepted if they meet transparent quality requirements.

Shared data and metadata standards (N05, 32 mentions) was mentioned by participants who had experience combining data across projects, platforms or domains. Stories asked for metadata about methods, devices, calibration, validation and contributor roles (IBE_SW_064; ECSA_CCC_010; IBE_CAPS_05). Practitioners working with environmental, mobility, meteorological or cultural heritage data described the difficulty of using data that lacks documentation. The emphasis was on standardisation enabling reuse, knowing who collected data, how it was produced, whether it is reliable, and under which conditions it can be compared with other datasets.

Trust, transparency and provenance (N06, 30 mentions) was a recurring citizen concern. Participants wanted to know where their data goes, how it is processed, who uses it and whether it has an effect (IBE_SW_034; OeAD_01_040; VT_01-SH01-009). Several stories explicitly linked transparency to motivation, without feedback on data use, participation feels like sending information into a black box.

AI transparency and algorithmic accountability (N30, 2 explicit mention) appeared only twice as a labelled need, but related concerns occur in several stories. One story asks for safeguards for AI trained on collective human effort (IBE_CAPS_11), while another asks that AI should show uncertainty so users can trust its output (ECSA_CCC_026). Other stories refer to AI-assisted qualitative analysis, image recognition and automated validation. These examples show this as an

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

important concern, participants want automated tools to be explainable, auditable and aligned with citizen science values.

Theme: Data governance and compliance

This theme includes concerns about rights, responsibilities, openness, consent and legal certainty. These issues were particularly visible in stories involving health data, sensitive biodiversity data, children, community knowledge and cross-border collaboration.

Open Science, FAIR and CARE compliance (N08, 45 mentions) was one of the most frequently mentioned needs overall. Participants asked for open access to research data, outputs, literature and infrastructure services, especially when these are publicly funded (CSZ_SG_008; IBE_CAPS_15; MAU_S01_020). Some stories focused on FAIR principles and long-term usability, others stressed CARE principles and community control. For example, stories about Indigenous or local community data asked that openness should not override data sovereignty (IBE_CAPS_13; ECSA_OCP_022). Retired or non-institutional contributors also stressed that losing university affiliation should not mean losing access to scientific knowledge (CSZ_SG_008; CSZ_CS4H_037).

Data ownership, privacy and consent (N07, 30 mentions) was strongly represented in stories about sensitive health data, location data, school participation and community-generated knowledge. Participants wanted clear and flexible privacy options, including the ability to decide whether data is open, restricted, anonymised or shared only under specific conditions (IBE_SW_019; ECSA_CCC_022; VT_01-SH01-011). Students and teachers raised concerns about personal data and consent in educational settings, while health-related stories emphasised sensitive data, adaptive consent and participant control. Stories repeatedly mentioned that citizens are willing to share data, but only if rules are clear, trustworthy and understandable.

Legal clarity and digital sovereignty (N09, 9 mentions) appeared less often. Participants asked for legal guidance on licensing, data reuse, cross-border collaboration, GDPR obligations and platform control (IBE_CAPS_13; ECSA_CCC_022; IBE_OSF_13). Some stories were concerned about dependence on non-European or commercial platforms, and about citizen science infrastructures being captured, locked down or made inaccessible after communities had contributed to them.

Quick availability (N35, 1 mention) appeared in a story asking for immediate, open access to research-infrastructure data, so that knowledge generated through citizen science stays available and useful to society (IBE_ECS_10).

Data storage (N36, 3 mentions) was mentioned in stories asking for trusted repositories for short and long-term storage (ECSA_OCP_012; ECSA_OCP_006; CPN_03-SH09-010). Although the

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

frequency is low, it connects to other needs such as open science, long-term funding, data ownership and infrastructure hosting. The underlying concern is that data needs to be easily accessible during the project and that data collected through years of voluntary effort disappear when projects end.

Ethics frameworks and guidelines (N37, 2 mentions) appeared in stories asking for practical ethical and legal guidance, especially in health or mixed settings (IBE_OQ_03; IBE_OSF_13; ECSA_OCP_016). Participants asked for usable templates, guidance and support that help projects manage consent, sensitive data and participant rights.

Theme: Policy and impact

Many participants want citizen generated evidence to influence decisions, policies, funding priorities and public action, and want to be informed when this happens.

Policy readiness and evidence pipelines (N25, 23 mentions) was raised in stories about climate adaptation, urban planning, health, public management and official statistics (ECSA_CSF_001; ECSA_CSF_011; IBE_SW_016; IBE_CS4H_19; CPN_04-SH09-010). Participants asked for quality-assured, policy-ready data, routes for citizen observations to reach municipalities, and tools that translate research findings into actionable evidence.

Impact assessment and valuation (N26, 22 mentions) reflected the need to demonstrate the value of citizen science to funders, institutions and participants (IBE_ECS_01; IBE_SW_058; CSZ_CS4H_037). Stories asked for monitoring of long-term impacts, social impact frameworks, evaluation of educational outcomes, and ways to show that public engagement activities create long-term impressions.

Feedback from policy to contributors (N32, 7 mentions) is a smaller but connected need. Participants did not only want data to be used by policymakers; they wanted to know how it was used. Stories asked for feedback loops showing how data informed policy or action, whether data changed local or national decisions, or where a contribution appears in the real world (IBE_CAPS_24; IBE_SW_058; VT_01-SH01-005; MAU_S01_005). This need links policy impact back to citizen motivation and trust. It is especially visible in environmental and biodiversity stories, where participants want to know whether their observations helped protect local places.

Theme: Governance and sustainability

Governance and sustainability needs were mainly raised by practitioners, coordinators, and experienced citizen scientists.

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

Long-term funding and institutional support (N22, 19 mentions) was raised in stories about project continuity, data preservation, funding schemes and institutional anchoring (IBE_OQ_10; ECSA_OCP_021; ECSA_OCP_023; CPN_03-SH09-011). Participants described a recurring pattern, projects create data, communities and tools, but these often disappear or become unusable when funding ends. Some stories asked for financial support schemes, others for long-term institutional backing, and others for funding models that support shared infrastructure rather than only new projects.

Participatory and equitable governance (N23, 13 mentions) was expressed through stories asking for citizens, practitioners, community actors and non-academic stakeholders to be represented in decision-making (IBE_ECS_08; ECSA_CCC_021; ECSA_OCP_024). Stories asked for citizens' councils, co-creation formats, transparent decision processes and governance rules.

A public European resource against fragmentation (N24, 11 mentions) appeared in stories asking RIECS to reduce duplication and connect existing platforms, national nodes, projects and resources (IBE_SW_020; ECSA_PW_003; ECSA_CCC_017). Participants often framed this not as a desire for centralisation, but for coordination. RIECS should function as a public connective layer, visible, trusted, and not dependent on commercial platform owners.

Theme: Scientific practice

Scientific practice needs were less frequent but important for the credibility and scope of RIECS. They show that participants want citizen science to be recognised as scientifically valid, and RIECS should have been strongly interdisciplinary. This theme was more visible among practitioners, researchers and coordinators. It points to an important role for RIECS as a bridge, supporting scientific rigour while preserving the openness, contextual knowledge and participatory character that make citizen science valuable.

Cross-domain and transdisciplinary research (N27, 8 mentions) appeared in stories asking for citizen science to connect disciplines, datasets and communities (CPN_04-SH09-004; CGSP_04_004; ECSA_OCP_026). Participants described the value of linking natural and social sciences, connecting environmental monitoring to health, integrating cultural heritage and qualitative data, and supporting transdisciplinary projects that address real-world problems.

Scientific principles (N33, 3 mentions) appeared in stories concerned with the legitimacy of citizen science outputs (IBE_OSF_18; CPN_04-SH09-010; IBE_CS4H_13). Participants asked that CS outputs should be recognised by institutions and decision-makers, and that academic communities better understand what citizen science is and how it can meet scientific standards. This need stressed the importance of giving CS the methodological support required to be taken seriously by researchers, funders and policymakers.

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

5.4 Cross-stakeholder subgroup analysis

All of the 37 identified needs are mentioned at least once in the citizen group. Across the citizen stakeholder group, the ten most cited needs are

- Training materials and documentations (N16, 68 mentions)
- Networking and collaboration spaces (N02, 56 mentions)
- Project discovery and matchmaking (N01, 51 mentions)
- Data collection and crowdsourcing tools (N11, 49 mentions)
- Open Science, FAIR and CARE compliance (N08, 45 mentions)
- Low-barrier, accessible participation (N03, 42 mentions)
- Recognition and credit for contributions (N19, 40 mentions)
- Feedback and communication of results (N20, 40 mentions)
- Usability and user-centred design (N13, 36 mentions)
- Support services and expertise access (N17, 36 mentions)

These top ten needs span four thematic clusters: access and discoverability, training and capacity building, tools and infrastructure, and recognition and engagement, suggesting that citizens prioritise a research infrastructure that allows ease of finding, ease of use, and where their contributions are acknowledged.

Rank	need_id	need_name	theme	Citizen total mention	Citizen scientist	CS practitioner	Student
1	N16	Training materials and documentation	Training and capacity building	68	25	20	23
2	N02	Networking and collaboration spaces	Access and discoverability	56	26	17	13

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

3	N01	Project discovery and matchmaking	Access and discoverability	51	24	14	13
4	N11	Data collection and crowdsourcing tools	Tools, platforms and infrastructure	49	21	11	17
5	N08	Open Science, FAIR and CARE compliance	Data governance and compliance	45	19	22	4
6	N03	Low-barrier, accessible participation	Access and discoverability	42	19	12	11
7	N20	Feedback and communication of results	Recognition and engagement	40	24	6	10
8	N19	Recognition and credit for contributions	Recognition and engagement	40	21	13	6
9	N13	Usability and user-centred design	Tools, platforms and infrastructure	36	15	12	9
10	N17	Support services and expertise access	Training and capacity building	36	8	17	11

Table 5. 10 most mentioned needs for citizen user group

Three needs are expressed by all sub-stakeholder groups as top 10-priority:

- N01 Project discovery and matchmaking
- N02 Networking and collaboration spaces
- N16 Training materials and documentation

While the order differs slightly, most stakeholder subgroups share similar needs. Citizen scientists and ECR are rather close (the only top 10 need mentioned by citizen scientists not mentioned by ECR not CS practitioners is N06 Trust, transparency, provenance). Both groups place emphasis on needs such as data collection tools, feedback on results, and recognition of contributions. citizen science practitioners, however, do not share several needs mentioned by ECR and citizen scientists. Needs that appear in the top-10 for CS practitioners only are N22 Long term funding and institutional support (rank 7 for citizen science practitioners, 21 for citizen scientists, 32 for ECR) and N07 Data ownership, privacy, content (rank 9 for CS practitioners, 14 for citizen scientists, and 17 for ECR).These differences reflect the greater degree of professionalisation within this sub-group. Coordinators and project managers, and citizen science practitioners are likely more aware of the institutional and infrastructure conditions that determine

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

whether citizen science projects can be sustained or scaled. Their needs are therefore less focused on individual participation and more oriented towards the systemic enablers of citizen science as a practice.

The full list of priorisation across the citizen stakeholder group can be found in annex E.

5.4 Insights from engagement activities: facilitator observations and critical voices

Extracted from the workshop report templates where facilitators noted key learnings or special observations, several important themes emerged that merit explicit attention, as they either add nuance to findings already reported or surface dimensions not yet fully captured in the deliverable.

- **Researchers and practitioners need training too, not just citizens:** One of the most striking findings across multiple workshops is that the demand for training and capacity building is not limited to citizen participants. Participants stressed that researchers themselves often lack the skills to manage citizen communities, design protocols and navigate CS-specific methodologies. This points to a need for RIECS to include "train the trainers" offers, a dimension that goes beyond what is currently described under the Training and Capacity Building theme. Source: WS18, WS02, WS24, WS25.

- **The legitimacy gap is a systemic barrier, not a technical one:** Workshop facilitators and participants repeatedly noted that the core challenge for citizen science is not only technical fragmentation but cultural and institutional, CS data and methods are frequently not taken seriously by the broader scientific community, funding bodies or policymakers. Several workshops described this as a "legitimacy gap" that RIECS must actively help to close, not only by providing quality assurance tools but by lending institutional weight, advocacy capacity and visibility to citizen science as a methodology. This dimension could be stated more explicitly as a design requirement. Source: WS18, WS17, WS23.

- **Engagement asymmetry across the research cycle:** citizen engagement is high during fieldwork and tangible data collection tasks, but drops significantly during data analysis, desk research and early co-design phases. This asymmetry has direct implications for how RIECS should design participation pathways, and suggests that the infrastructure should offer differentiated entry points that match varying levels of engagement readiness and time availability, rather than assuming uniform participation across the research cycle. Source: WS18.

- **Incentives for participation are contested:** Several workshops generated substantive debate about whether and how citizens should be incentivised to participate. While some participants supported financial rewards, certificates, gamification and symbolic recognition, others argued strongly that incentives risk undermining the authenticity of contributions or encouraging low-quality data submissions. This tension is not yet reflected in the deliverable

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

and represents an important design consideration for the recognition and engagement features of RIECS. Source: WS35, WS36, WS02, WS22.

- **Gamification should be implemented cautiously:** related to the above, multiple workshops raised concerns about gamification, while it can lower barriers and increase engagement, participants worried that it might trivialise participation, encourage performative or superficial contributions, and introduce security risks through platform integration. This deliverable currently presents usability and engagement tools in broadly positive terms, this critical voice should be acknowledged. Source: WS35, WS36, WS 17.
- **RIECS must go beyond data to support the full citizen science cycle:** several sessions explicitly stressed that RIECS should support not only data collection and storage but the full lifecycle of citizen science activity: co-creation, training, advocacy, open labs, community building and pathways from evidence to policy impact. This deliverable captures many of these as separate needs, the workshop learnings reinforce that they should be understood as an integrated cycle rather than isolated features. Source: WS21, WS01, WS03, WS24, WS25.
- **Cross-border governance is a practical, not only strategic, challenge.** One workshop explicitly raised the question of how a cross-border European structure will work in practice, stressing the importance of engaging national research data infrastructures (NFDIs) as both technical partners and political gatekeepers. This practical governance dimension, beyond the general call for federated architecture, is worth noting as an open issue for Phase 2. Source: WS23.

5.4 Full stakeholder synthesis and combined prioritisation - relationship to D4.3

The full engagement activities across all stakeholder groups are synthesised in D4.3 alongside the citizen evidence from this deliverable (D4.2), applying the same need framework (N01–N37) to the full stakeholder user story corpus. Rather than introducing a separate set of needs, D4.3 re-weights and reframes the needs identified here by comparing citizen and stakeholder priorities across nine stakeholder groups, identifying converging needs, diverging needs and tensions between groups. The full cross-group synthesis and combined prioritisation of needs can be found in Section 7 of D4.3.

6. Conclusions and next steps

Key findings

The analysis of 378 citizen user stories, complemented by workshop data, yields five key findings that should directly inform the design of RIECS:

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

- **Citizens' needs concentrate on access, usability and discoverability:** Project discovery and matchmaking (N01), low-barrier participation (N03) and usability and user-centred design (N13) are among the most frequently cited needs across all citizen subgroups, representing 35% of needs mentions in total. For many participants, the barriers to citizen science begin before any data is collected, finding a relevant project, understanding whether one is welcome, and navigating unfamiliar platforms are the first obstacles RIECS must address. The platform should offer a simple, reliable and inclusive entry point that reduces rather than compounds these barriers.
- **Training materials and shared resources are the largest single citizen need cluster:** Training materials and documentation (N16) is the most frequently mentioned need across the full citizen stakeholder group. This reflects a widespread demand, from citizen scientists and students to experienced practitioners, for practical, reusable, context-sensitive support. RIECS should not only host resources but curate and connect them, and offer human support where documents are not sufficient.
- **Recognition, feedback and trust must be designed in from the start:** Recognition and credit for contributions (N19), feedback and communication of results (N20), and trust, transparency and provenance (N06) are strongly emphasised by citizens, these 3 needs representing overall 30% of expressed needs. Participants consistently expressed that participation feels incomplete without knowing what happened to their data, whether their contributions were useful, and whether their effort was acknowledged. These are not optional features but design requirements for sustaining engagement over time.
- **Open science and data governance are an expectation, not optional:** Open Science, FAIR and CARE compliance (N08) ranked fifth overall among all citizen subgroups. Concerns about data ownership, privacy, consent and legal clarity (N07, N09, N37) appeared consistently across workshops, domains and participant types. Citizens are willing to contribute data, but only under conditions that are transparent, respectful of their rights and legally sound. RIECS should embed these principles as defaults.
- **Every high-priority citizen need is supported by multiple evidence sources:** The findings presented in this deliverable are triangulated across user stories, and workshop discussions analysed using complementary methods. The convergence of evidence across 24 engagement activities spanning activities by 9 partners in their respective countries and beyond strengthens confidence in the identified priorities, while also revealing nuanced differences between citizen scientists, CS practitioners and students and early career researchers that should inform service differentiation within RIECS.

Limitations

The findings presented in this deliverable should be interpreted in light of several methodological limitations:

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

- **Self-selection and network reach:** Participants were largely recruited through consortium partner networks, which biases the sample towards individuals already engaged with or aware of citizen science. Under-served communities, those with the lowest scientific literacy, the greatest digital access barriers, or the furthest from existing CS networks, remain under-represented in the dataset. This is acknowledged as a structural limitation of Phase 1 engagement and will be addressed in WP5.
- **Stakeholder attribution:** The boundary between citizen scientists, CS practitioners, students and researchers is not always clear-cut, and attribution of user stories to subgroups was partly inferred from labels during the consortium labelling process rather than based on explicit participant self-identification. In particular, the student category appears to be under-reported: a verbatim search for the term "student" across all stories returned 81 instances, considerably more than the 25 stories formally assigned the student label. This gap suggests that a portion of stories labelled as citizen scientists or researchers may have been contributed by early career individuals, and subgroup-level findings should be interpreted with this caveat in mind. This limitation will be addressed though clearer reporting and labeling guidelines in Phase 2.
- **Demographic data is sparse:** In line with the project's data minimisation policy, demographic information, including age, gender and education level,was not systematically collected across all workshops. When collected, it was on a voluntary basis, resulting in incomplete coverage. Gender data was available for approximately 20% of participants and age data for approximately 40%. As a result, no reliable aggregate demographic conclusions can be drawn, and equity dimensions of participation cannot be fully assessed at this stage. For phase 2, the consortium will revisit this approach and consider whether to maintain the data minimisation principle while specifically targeting engagement with underrepresented groups, or whether to introduce more systematic collection of demographic data for the purposes of equity monitoring and impact tracking..
- **Geographic coverage and country attribution:** While engagement activities were conducted across 10 countries, coverage across Europe was uneven. Country attribution is based on the location of the workshop or the organising partner's country rather than participants' nationality or country of origin, limiting the precision of geographic analysis. Online and conference-based workshops in particular involved participants from multiple countries whose individual origins were not systematically recorded. For Phase 2, the consortium will consider whether more systematic tracking of participants' country of origin is warranted, particularly for engagement activities involving policy-relevant stakeholder groups where geographic representation has direct implications for the scope and legitimacy of RIECS recommendations. For citizen-facing activities, the data minimisation principle may remain appropriate, as country-level differences are less analytically significant for this stakeholder group than for institutional or policy actors. A differentiated approach (collecting country of origin data for some activities depending on SH group and purpose) will be discussed and agreed within the consortium ahead of Phase 2 engagement.

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

- **Online versus in-person engagement quality:** The relative depth and quality of contributions from online versus in-person workshops could not be formally assessed, as the workshop documentation template did not include a dedicated field for this variable. This is noted as a gap in the current methodology and will be addressed in Phase 2.
- **CS practitioners reported with the citizen group:** Citizen science practitioners are currently included within the broader citizen stakeholder group for the purposes of this deliverable. Some practitioner stories, particularly those from coordinators acting as future RIECS service users, may analytically belong with the stakeholder groups covered in D4.3. A fuller differentiation of this subgroup should be carried out in WP5.
- **Workshop observations are qualitative and uneven in depth:** The cross-cutting findings reported in Section 5.5 are drawn from facilitator documentation sheets, which vary in length, detail and analytical depth across partners. While the patterns identified are consistent across multiple workshops, they should be understood as indicative rather than representative. This will also be reviewed and addressed before the start of phase 2.

Next steps

The findings of D4.2 feed into several ongoing and upcoming activities within RIECS-Concept:

- **Feed into D4.3, D2.2 and D2.3:** All 37 citizen needs have been integrated into needs analysis in D4.3, and then mapped to candidate technical requirements in D2.2 and to catalogue families in D2.3, with shared Aspect IDs for ensuring full traceability across deliverables. Needs that are non-technical in nature or fall below the priority threshold are routed to WP3 and WP5 via the same Aspect ID system.
- **Validation at the CS Stakeholder Summit:** The clustered needs, priorisation and user stories identified in this deliverable will be presented and tested with a broader stakeholder community at the CS Stakeholder Summit hosted at the Ars Electronica Festival in Linz (T5.1, M21). This event represents a crucial moment for the project connecting Phase 1 evidence with Phase 2 co-design, and will provide an opportunity to validate, challenge and refine the findings with participants who were not part of the original engagement activities.
- **Continuous citizen engagement in WP5:** From M19 onwards, citizen engagement will continue under Task 5.2, with particular attention to the needs identified as highest priorities for the citizen group: recognition and credit mechanisms, access, usability and discoverability, training materials and resources, and open yet trustworthy governance.
- **Demographic monitoring:** In Phase 2, it will be revised how future engagement activities can introduce more systematic collection of demographic and background data, subject to GDPR and data minimisation requirements, to enable demographic and inclusion monitoring and to assess whether under-served communities are being reached more effectively in Phase 2.

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

References

Cuartielles, D. (2025) *RIECS Label Validation,* GitHub, https://github.com/dcuartielles/riecs-label-validation).

Cuartielles, D. (2025) *RIECS Interview Coding,* GitHub, https://github.com/dcuartielles/riecs-interview-coding).

RIECS-Concept (2024) RIECS-Concept proposal (funded under GA 101188210).

RIECS-Concept, Ars Electronica (2025) Deliverable 4.1 Engagement methodology protocol, https://concept.riecs.eu/deliverables/.

RIECS-Concept, CSIS (2025) Deliverable 2.1 Challenges assessment, https://concept.riecs.eu/deliverables/.

RIECS-Concept, Ibercivis Foundation (2025) Deliverable 1.3 Ethical Management Plan.

RIECS-Concept, Ibercivis Foundation (2025) Deliverable 1.4 Data Management Plan.

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

Annex A — Workshop materials

Citizen Scientist and practitioner Workshops

Agenda RIECS CS practitioner and citizen scientist workshops

Format: online and in person, 1,5 - 2h

Time	Content
15 min	Welcome: Introduction to facilitators Agenda and expected outcomes Short icebreaker: can you write a newspaper headline on a groundbreaking achievement of what a potential RI could be/of the inauguration of a RI Filling of consent forms
Expectations, RIECS overview and end goal	
10min	Intro to RIECS: What is a RI What is RIECS - Vision & Mission Introduction to the RIECS-Concept project, Overview of the co-design approach, Session goals: collect different inputs for needs (technical needs, ethical needs, etc) to help us with the infrastructure design
Group work	
20min	Split participants into groups of max 5-6 if many or 2-3 if few attendants. In groups: Introduce themselves & their CS work Agree who is the notetaker Talk about what challenges they face in their daily work Their needs How a RI could help
Individual work: user stories	

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

15min	Building the RI: Based on the challenges & opportunities, define list of services, functionalities using user stories (2-3 per participant) collect different inputs for needs (technical needs, ethical needs, etc) to help us with the infrastructure design. Reminder: there are no wrong answers.
Group work: refining the user stories	
15min	People sharing their user stories by placing them on the walls and talking to each other to improve their own user stories(15 mins)

Conclusion			
5-10min	recap Thank you How to sty engaged Good bye Collect user stories & consent forms.		

Slides

https://docs.google.com/presentation/d/1JkmJakWdLkkG4qaCtZMhyR1UcJyK1vN2/edit?slide=id.p1#slide=id.p1

Post-workshop evaluation survey

Survey sent asking for feedback on workshop, as well as demographic data: https://docs.google.com/forms/d/1iHDTcBx8bGtqoqnRF6XAcwm_bL8Yr30QSNJxyKpZ7vg/edit

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

ECR Workshops

Agenda RIECS Students and Early Career Researchers Co-Creation Workshops

Target group: students and ECR working with citizen science and engagement, or with prior knowledge

Format: online and in person, 2h

Aim:

- explore key challenges and needs you encounter in citizen science research or practice
- Understanding skills, training, and career-related gaps?
- discuss what kind of support a European infrastructure for citizen science could provide
- Co-develop ideas for tools, services, trainings, and research integration that reflect real user needs

Output: Needs → Requirements → Functionalities → User journeys

Pre-send 1-page RIECS explainer + consent form

Duration	Activity	Description
15 minutes	Welcome	Consent form, workshop objectives, introduction to RIECS-concept, icebreaker (Pick an object next to you in a colour that represents how you feel today)
10 minutes	Introduction	Round of introduction for the people in the room, mentioning individually their background and experience with citizen science.
35 minutes	Real world challenges and needs	With Padlet if online / with sticky notes if in-person In breakout rooms if the number of participants allows. Guiding questions: ● What challenges do you face when engaging in citizen science as a student/ECR? ● What makes it difficult to participate or lead projects? ● Where do you feel unsupported (skills, supervision, funding, recognition)? ● What works well already? ● How does citizen science “count” for your career? ● Do you have access to training, tools, or mentorship?
05 minutes	Group synthesis	Prioritise on padlet
05 minutes	Break	

This project has received funding from the European Union’s research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author’s view and the Commission is not responsible for any use that may be made of the information it contains.

35 minutes	From needs to solutions	With Padlet if online / with sticky notes if in-person In breakout rooms if the number of participants allows. If there was a RIECS, …how could it solve the problems you identified? Guidance: for Solutions, think of ● Services ● Tools ● Functionalities ● Wishes / dreams :)
10 minutes	Prioritisation on the tensions	Voting on mentimeter: What do you prioritize? For each pair, indicate what is the most important to you: - Open data vs Privacy - Standardization vs Flexibility - Centralization vs Decentralization - Attribution vs Anonymity - Scientific control vs Participant autonomy
5 minutes	Closing	Next steps in RIECS-concept

Slides

ECRs_RIECS_intro_22042026.pptx

Padlet

Responses on challenges and needs collected during the workshop were recorded via padlet: WS1
https://docs.google.com/spreadsheets/d/1XzdBlJzt-UC945gq6VaVi5h0DuSSFWW4/edit?gid=1448430097#gid=1448430097

WS2

https://docs.google.com/spreadsheets/d/1VPTW8FgIQ_-K3N_avIY3QO6urBQiGF2w/edit?gid=1009765645#gid=1009765645

Post-workshop evaluation survey

The same survey as for the citizen scientist/practitioner workshops was used.

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

Annex B — Raw user stories

[Full, anonymised list of user stories captured. Use the same table format as in the main body. If the list exceeds ~30 items, consider publishing it as a separate machine-readable CSV on Zenodo and referencing it here.]

The 378 analysable citizen scientist, CS practitioner and student/early career researcher stories will be published as a machine-readable CSV, outputs/csv/D4.3_user_stories_annexB_v003.csv (for Zenodo deposit) together with all user stories from D4.3.
Table A1 showing all user stories and their identified needs includes 7 stories reinstated from the original rejection list following the ECSA substance re-filter. The fourteen stories that remain excluded are listed in Table A2 at the end of this annex, along with the reason for their exclusion.

Notes on the flags
CONFLICT — the story was labelled independently by two different consortium partners, and their labels did not fully agree. The final set of labels and needs applied to the story combines both partners' labels, leaving out only those that were specifically overruled during a final manual review process on 18 June 2026.
Relevance — this column shows the highest relevance rating that any consortium partner gave to the story, using a three-point scale (Normal/High/Very High) during the labelling process. It is used only as a secondary criterion when prioritising needs (tiebreaker), and should not be read as an overall quality score, since partners did not always apply the scale in the same way.

Story ID	Workshop	Country	Need clusters	Relevance	Flags
IBE_ECS_01	SRC-ECS	European (cross-border)	N01, N10, N24	Normal	
IBE_ECS_02	SRC-ECS	European (cross-border)	N04, N05, N06, N08, N14	Normal	
IBE_ECS_04	SRC-ECS	European (cross-border)	N10, N11, N16	Normal	
IBE_ECS_05	SRC-ECS	European (cross-border)	N19	Normal	
IBE_ECS_06	SRC-ECS	European (cross-border)	N03, N10, N24	Normal	
IBE_ECS_07	SRC-ECS	European (cross-border)	N07, N08	Normal	
IBE_ECS_08	SRC-ECS	European (cross-border)	N23	Normal	
IBE_ECS_10	SRC-ECS	European (cross-border)	N08, N35	Normal	
IBE_OQ_02	SRC-OQ	Spain	N02, N12, N24	Normal	
IBE_OQ_03	SRC-OQ	Spain	N07, N08, N09, N26	Normal	
IBE_OQ_14	SRC-OQ	Spain	N05, N08, N12, N13, N14, N25	Normal	
IBE_OQ_15	SRC-OQ	Spain	N02, N19, N05	Normal	
IBE_OQ_21	SRC-OQ	Spain	N02, N25	Normal	

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

IBE_OQ_24	SRC-OQ	Spain	N05, N10, N11, N12, N14, N15, N28	Normal	
IBE_OQ_27	SRC-OQ	Spain	N10, N11	Normal	
IBE_OQ_30	SRC-OQ	Spain	N01, N02, N10, N12	Normal	
IBE_OQ_34	SRC-OQ	Spain	N04, N05	Normal	
CGSP_02_004	SRC-OTHER	International	N10	Normal	
CGSP_02_011	SRC-OTHER	International	N10	Normal	
CGSP_04_004	SRC-OTHER	International	N16, N23, N25, N27, N29	Normal	
ECSA_CSF_001	SRC-OTHER	International	N11, N18, N25, N27	Normal	
ECSA_CSF_002	SRC-OTHER	International	N11	Normal	
ECSA_CSF_003	SRC-OTHER	International	N06, N19	Normal	
ECSA_CSF_004	SRC-OTHER	International	N01, N02, N03	Normal	
ECSA_CSF_005	SRC-OTHER	International	N10, N28	Normal	
ECSA_CSF_007	SRC-OTHER	International	N11	Normal	REINSTATED
ECSA_CSF_008	SRC-OTHER	International	N03, N08	Normal	
ECSA_CSF_009	SRC-OTHER	International	N08, N11	Normal	
ECSA_CSF_011	SRC-OTHER	International	N03, N11, N18, N23, N25	Normal	
ECSA_CSF_012	SRC-OTHER	International	N18	Normal	
ECSA_TCH_006	SRC-OTHER	International	N11	Normal	
IBE_SW_003	WS01	Spain	N07, N10	Normal	
IBE_SW_004	WS01	Spain	N11, N13	Normal	
IBE_SW_009	WS01	Spain	N19, N26	Normal	
IBE_SW_014	WS01	Spain	N12	Normal	
IBE_SW_016	WS01	Spain	N20, N25	Normal	
IBE_SW_017	WS01	Spain	N19	Normal	
IBE_SW_018	WS01	Spain	N05, N08, N14	Normal	
IBE_SW_019	WS01	Spain	N07, N10, N11	High	
IBE_SW_021	WS01	Spain	N08, N15, N24	Normal	
IBE_SW_022	WS01	Spain	N06, N07	Normal	
IBE_SW_023	WS01	Spain	N10, N22	Normal	
IBE_SW_025	WS01	Spain	N12	Normal	
IBE_SW_026	WS01	Spain	N09, N12, N14, N23	Normal	
IBE_SW_028	WS01	Spain	N10, N16	Normal	
IBE_SW_034	WS01	Spain	N06, N12, N19, N20	Normal	
IBE_SW_035	WS01	Spain	N01, N08, N28	Normal	
IBE_SW_036	WS01	Spain	N04, N10, N11	Normal	
IBE_SW_037	WS01	Spain	N04	Normal	
IBE_SW_040	WS01	Spain	N11	Normal	
IBE_SW_041	WS01	Spain	N12, N28	Normal	
IBE_SW_042	WS01	Spain	N01, N10, N29	Normal	
IBE_SW_044	WS01	Spain	N02, N25, N27	Normal	

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

IBE_SW_049	WS01	Spain	N02, N19, N23	Normal	
IBE_SW_050	WS01	Spain	N02, N08, N20, N24, N28	Normal	
IBE_SW_051	WS01	Spain	N05	Normal	
IBE_SW_052	WS01	Spain	N22	Normal	
IBE_SW_053	WS01	Spain	N13, N16, N17, N29	Normal	
IBE_SW_054	WS01	Spain	N08, N22	Normal	
IBE_SW_055	WS01	Spain	N10, N16, N17	Normal	
IBE_SW_058	WS01	Spain	N10	Normal	CONFLICT
IBE_SW_059	WS01	Spain	N01, N03, N13, N16, N17	Normal	
IBE_SW_060	WS01	Spain	N18, N20	Normal	
IBE_SW_061	WS01	Spain	N10, N11, N12	Normal	
IBE_SW_062	WS01	Spain	N14, N05	Normal	
IBE_SW_063	WS01	Spain	N26	Normal	
IBE_SW_064	WS01	Spain	N03, N04, N05, N08	Normal	
IBE_SW_065	WS01	Spain	N11	Normal	
IBE_SW_066	WS01	Spain	N06, N19	Normal	
IBE_SW_068	WS01	Spain	N07, N10, N12, N15	Normal	
IBE_SW_069	WS01	Spain	N04, N06, N11, N22	Normal	
IBE_SW_070	WS01	Spain	N04, N05, N08, N14, N16	Normal	
IBE_SW_072	WS01	Spain	N10, N14	Normal	
IBE_SW_073	WS01	Spain	N11, N14, N29	Normal	
IBE_SW_075	WS01	Spain	N06, N07, N13, N14, N15	Normal	
IBE_SW_076	WS01	Spain	N19	Normal	
IBE_SW_081	WS01	Spain	N01, N02	Normal	
IBE_SW_082	WS01	Spain	N02, N18	Normal	
IBE_SW_083	WS01	Spain	N01, N03, N24	Normal	
IBE_SW_084	WS01	Spain	N02, N03, N20, N24, N27	Normal	CONFLICT
IBE_SW_085	WS01	Spain	N06, N10	Normal	
IBE_SW_086	WS01	Spain	N03, N13, N16, N19	Normal	
IBE_SW_087	WS01	Spain	N10, N11, N12, N14, N26	Normal	
IBE_SW_094	WS01	Spain	N13	Normal	
IBE_SW_096	WS01	Spain	N01, N10, N11, N22	Normal	
IBE_SW_098	WS01	Spain	N10, N11, N12	Normal	
IBE_SW_099	WS01	Spain	N11	Normal	
IBE_SW_100	WS01	Spain	N02, N10, N13, N16	Normal	
OeAD_01_086	WS01	Spain	N03, N12, N13, N20	Normal	
OeAD_01_087	WS01	Spain	N18, N22, N23	Normal	
OeAD_01_088	WS01	Spain	N10, N13, N14, N29	Normal	CONFLICT
CS4H_ZH_002	WS02	Switzerland	N03, N10, N22, N29	Normal	

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

CSZ_CS4H_007	WS02	Switzerland	N04, N10	Normal	
CSZ_CS4H_017	WS02	Switzerland	N14	Normal	
CSZ_CS4H_071	WS02	Switzerland	N09, N26	Normal	
CSZ_SG_008	WS02	Switzerland	N08	Normal	
CSZ_SG_011	WS02	Switzerland	N12	Normal	CONFLICT
CSZ_SG_012	WS02	Switzerland	N13, N18	Normal	
IBE_CS4H_03	WS02	Switzerland	N04, N14, N24	Normal	
IBE_CS4H_04	WS02	Switzerland	N02, N06, N17, N29	Normal	
IBE_CS4H_09	WS02	Switzerland	N02	Normal	
IBE_CS4H_10	WS02	Switzerland	N03, N07, N08	High	
IBE_CS4H_12	WS02	Switzerland	N02, N22	Normal	CONFLICT
IBE_CS4H_13	WS02	Switzerland	N01, N02, N29	Normal	
IBE_CS4H_17	WS02	Switzerland	N02, N18, N20, N28	Normal	
IBE_CS4H_19	WS02	Switzerland	N25	Normal	
IBE_CS4H_22	WS02	Switzerland		Normal	REINSTATED
IBE_CAPS_01	WS03	Spain	N10, N14, N15	Normal	
IBE_CAPS_02	WS03	Spain	N10, N11, N15	Normal	
IBE_CAPS_04	WS03	Spain	N19	Normal	
IBE_CAPS_05	WS03	Spain	N05, N06, N08, N26	Normal	
IBE_CAPS_06	WS03	Spain	N10, N11, N13, N14	High	
IBE_CAPS_08	WS03	Spain	N03, N16	High	
IBE_CAPS_11	WS03	Spain	N07, N08, N19	Normal	
IBE_CAPS_12	WS03	Spain	N05, N07, N10, N14	Normal	
IBE_CAPS_13	WS03	Spain	N05, N07, N08, N09, N15, N26	Normal	
IBE_CAPS_14	WS03	Spain	N07	Normal	
IBE_CAPS_15	WS03	Spain	N11	Normal	CONFLICT
IBE_CAPS_17	WS03	Spain	N03, N16, N18	Normal	
IBE_CAPS_18	WS03	Spain	N01, N13, N16, N17	Normal	
IBE_CAPS_19	WS03	Spain	N19, N22	High	
IBE_CAPS_20	WS03	Spain	N02, N19	Normal	
IBE_CAPS_21	WS03	Spain	N12	Normal	CONFLICT
IBE_CAPS_22	WS03	Spain		Normal	
IBE_CAPS_24	WS03	Spain	N06, N19, N20, N26	Normal	
IBE_CAPS_27	WS03	Spain	N22, N25	Normal	
IBE_CSN_01	WS05	Spain	N02, N03, N10, N17, N24	Normal	
IBE_CSN_03	WS05	Spain	N10, N01, N02	Normal	
IBE_CSN_06	WS05	Spain	N07, N10, N13, N14, N15, N24	Normal	
IBE_CSN_13	WS05	Spain	N03, N20, N28	Normal	
MAU_S01_001	WS06	Sweden	N20	Normal	
MAU_S01_002	WS06	Sweden	N01, N11, N19	Normal	
MAU_S01_003	WS06	Sweden	N16	Normal	REINSTATED

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

MAU_S01_004	WS06	Sweden	N01	Normal	
MAU_S01_005	WS06	Sweden	N11, N19, N32	Normal	
MAU_S01_006	WS06	Sweden	N10	Normal	CONFLICT
MAU_S01_007	WS06	Sweden	N07, N09, N15	High	
MAU_S01_008	WS06	Sweden	N16	Normal	
MAU_S01_009	WS06	Sweden	N01, N13, N18, N20, N29	High	
MAU_S01_010	WS06	Sweden	N19, N26	Normal	
MAU_S01_011	WS06	Sweden	N10, N11, N16	Normal	
MAU_S01_013	WS06	Sweden	N01, N02, N03, N18	Normal	
MAU_S01_014	WS06	Sweden		Normal	REINSTATED
MAU_S01_015	WS06	Sweden	N01	Normal	
MAU_S01_017	WS06	Sweden	N01, N06	Normal	
MAU_S01_018	WS06	Sweden	N11, N26, N29	Normal	
MAU_S01_019	WS06	Sweden	N10, N11, N16, N17, N29	Normal	
MAU_S01_020	WS06	Sweden	N08, N12, N16, N17	Normal	CONFLICT
MAU_S01_021	WS06	Sweden		Normal	
MAU_R01_010	WS07	Sweden	N24	Normal	
MAU_R01_015	WS07	Sweden	N01, N10, N13, N19, N21, N23	Normal	
MAU_R01_017	WS07	Sweden	N04	Normal	
MAU_R01_018	WS07	Sweden	N01, N03, N26	Normal	
MAU_R01_019	WS07	Sweden	N10	Normal	
ECSA_FSB_001	WS11	Germany	N18	Normal	REINSTATED
ECSA_NGO_025	WS12	European (online)	N13, N16	Normal	
IBE_OSF_01	WS13	Tanzania	N02, N08, N19, N20, N22, N26	Normal	
IBE_OSF_02	WS13	Tanzania		Normal	
IBE_OSF_03	WS13	Tanzania	N06, N07	Normal	
IBE_OSF_05	WS13	Tanzania	N08, N10	High	
IBE_OSF_08	WS13	Tanzania	N03, N10, N13, N16	Normal	
IBE_OSF_10	WS13	Tanzania	N06, N08, N10, N22	Normal	
IBE_OSF_11	WS13	Tanzania	N03, N05, N12	Normal	
IBE_OSF_12	WS13	Tanzania	N03, N10, N11, N22, N27	Normal	
IBE_OSF_13	WS13	Tanzania	N16, N26	High	
IBE_OSF_14	WS13	Tanzania	N12, N13	Normal	
IBE_OSF_16	WS13	Tanzania	N03, N16	Normal	
IBE_OSF_17	WS13	Tanzania	N02	High	
IBE_OSF_18	WS13	Tanzania	N09, N19, N26	Normal	
IBE_OSF_20	WS13	Tanzania	N15, N28	Normal	CONFLICT
IBE_OSF_21	WS13	Tanzania	N03, N15, N28	Normal	
ECSA_CCC_006	WS14	Germany	N10, N11, N12	Normal	
ECSA_CCC_007	WS14	Germany	N04, N19	Normal	

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

ECSA_CCC_008	WS14	Germany	N04, N10, N11, N29	High	
ECSA_CCC_009	WS14	Germany	N04, N05, N10, N14	High	
ECSA_CCC_010	WS14	Germany	N05, N19	Normal	
ECSA_CCC_011	WS14	Germany	N02, N03, N19, N23	Normal	
ECSA_CCC_012	WS14	Germany	N04, N05	Normal	
ECSA_CCC_013	WS14	Germany	N03, N08, N10, N15, N29	Normal	
ECSA_CCC_014	WS14	Germany	N02, N17, N23	Normal	
ECSA_CCC_015	WS14	Germany	N23	Normal	CONFLICT
ECSA_CCC_016	WS14	Germany	N10, N11, N13, N20, N29	Normal	
ECSA_CCC_018	WS14	Germany	N02, N19	Normal	
ECSA_CCC_019	WS14	Germany	N02, N03, N14, N19, N23, N24, N27	Normal	
ECSA_CCC_020	WS14	Germany	N03, N16, N23	Normal	
ECSA_CCC_021	WS14	Germany	N05, N18, N23, N27	Normal	
ECSA_CCC_022	WS14	Germany	N01, N07, N09	Normal	
ECSA_CCC_023	WS14	Germany	N07, N11, N13, N25	Normal	
ECSA_CCC_024	WS14	Germany	N07, N15	Normal	
ECSA_CCC_025	WS14	Germany	N19	Normal	
ECSA_CCC_026	WS14	Germany	N04, N12	High	
CPN_01-SH09-001	WS15	Serbia	N16, N18, N20, N26	Normal	
CPN_01-SH09-003	WS15	Serbia	N02, N06, N08, N20, N26, N27	Normal	
CPN_01-SH09-004	WS15	Serbia	N02, N18	Normal	
CPN_01-SH09-005	WS15	Serbia	N02, N18	Normal	
CPN_01-SH09-006	WS15	Serbia		Normal	REINSTATED
CPN_01-SH09-007	WS15	Serbia	N18, N20, N26	Normal	
CPN_01-SH09-008	WS15	Serbia	N06, N11, N20	Normal	
CPN_01-SH09-009	WS15	Serbia	N03, N16, N22	Normal	
CPN_01-SH09-010	WS15	Serbia	N16	Normal	
CPN_01-SH09-011	WS15	Serbia	N08, N16, N18	Normal	
CPN_01-SH09-012	WS15	Serbia	N12, N16, N17, N25	Normal	
CPN_01-SH09-013	WS15	Serbia	N02, N16, N19, N20	Normal	CONFLICT
CPN_01-SH09-014	WS15	Serbia	N07, N08, N16, N26	Normal	
CPN_01-SH09-015	WS15	Serbia	N10, N16, N19, N26	Normal	
CPN_01-SH09-016	WS15	Serbia	N01, N20, N21	Normal	
CPN_01-SH09-02	WS15	Serbia	N03, N04, N11	Normal	
CPN_02-SH01-004	WS16	Serbia	N03, N16, N17, N22	Normal	
CPN_02-SH01-006	WS16	Serbia	N31, N20	Normal	
CPN_02-SH01-008	WS16	Serbia	N21	High	
CPN_02-SH01-009	WS16	Serbia	N02, N18	Normal	
CPN_02-SH01-014	WS16	Serbia	N02, N17	Normal	
CPN_02-SH01-018	WS16	Serbia	N11, N33	Normal	

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

CPN_02-SH01-020	WS16	Serbia	N10, N11, N17	Normal	
CPN_02-SH01-022	WS16	Serbia	N02, N03, N08, N19, N20	Normal	
CPN_03-SH09-001	WS17	Serbia		Normal	REINSTATED
CPN_03-SH09-002	WS17	Serbia	N10, N12	Normal	
CPN_03-SH09-004	WS17	Serbia	N10, N11, N12	Normal	
CPN_03-SH09-005	WS17	Serbia	N01, N10, N28, N29	Normal	
CPN_03-SH09-006	WS17	Serbia	N03, N16, N18, N20	Normal	
CPN_03-SH09-007	WS17	Serbia	N03, N16, N18, N20, N28	Normal	
CPN_03-SH09-008	WS17	Serbia	N03, N04, N06, N08, N11, N16, N18, N29	High	
CPN_03-SH09-009	WS17	Serbia	N10, N11	Normal	
CPN_03-SH09-010	WS17	Serbia	N08, N10, N11, N16, N18	Normal	
CPN_03-SH09-011	WS17	Serbia	N04, N23	Normal	
CPN_04-SH09-001	WS18	Serbia	N01	High	
CPN_04-SH09-004	WS18	Serbia	N02, N20, N27	Normal	
CPN_04-SH09-005	WS18	Serbia	N04, N11	Normal	
CPN_04-SH09-007	WS18	Serbia	N18, N19, N26	Normal	
CPN_04-SH09-008	WS18	Serbia	N01, N02, N16, N29	High	
CPN_04-SH09-010	WS18	Serbia	N20, N25	Normal	
CPN_04-SH09-011	WS18	Serbia	N05, N11, N13	High	
CGSP_01_003	WS19	International	N03, N20	Normal	
CGSP_01_011	WS19	International	N05, N07, N12	Normal	
CGSP_01_012	WS19	International	N10	Normal	
CGSP_02_013	WS20	International	N08, N26	High	
CGSP_02_018	WS20	International	N01, N02	Normal	
CGSP_02_021	WS20	International	N11	Normal	
CGSP_04_001	WS20	International	N11	Normal	
ECSA_OCP_002	WS22	European (cross-border)	N03, N04, N05, N06	Normal	
ECSA_OCP_003	WS22	European (cross-border)	N07, N19	Normal	
ECSA_OCP_006	WS22	European (cross-border)	N10	Normal	CONFLICT
ECSA_OCP_007	WS22	European (cross-border)	N03	Normal	
ECSA_OCP_010	WS22	European (cross-border)	N16, N20, N23	Normal	
ECSA_OCP_012	WS22	European (cross-border)	N08	Normal	
ECSA_OCP_013	WS22	European (cross-border)	N05, N08, N09, N14	Normal	
ECSA_OCP_014	WS22	European (cross-border)	N06, N07	Normal	
ECSA_OCP_015	WS22	European (cross-border)	N09, N13, N16, N17, N23	Normal	
ECSA_OCP_016	WS22	European (cross-border)	N06, N07, N12	Normal	

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

ECSA_OCP_017	WS22	European (cross-border)	N13, N15	Normal	
ECSA_OCP_018	WS22	European (cross-border)	N17	High	CONFLICT
ECSA_OCP_019	WS22	European (cross-border)	N16, N22, N26	Normal	
ECSA_OCP_020	WS22	European (cross-border)	N02, N10, N20, N24	Normal	
ECSA_OCP_021	WS22	European (cross-border)	N22	Normal	
ECSA_OCP_022	WS22	European (cross-border)	N06, N08, N10	High	
ECSA_OCP_023	WS22	European (cross-border)	N10, N22	High	
ECSA_OCP_024	WS22	European (cross-border)	N06, N08, N23, N24	Normal	
ECSA_OCP_025	WS22	European (cross-border)	N19	Normal	
ECSA_OCP_026	WS22	European (cross-border)	N03, N18, N24, N27	High	
ECSA_OCP_028	WS22	European (cross-border)	N01, N05, N13	Normal	
ECSA_OCP_034	WS22	European (cross-border)	N02, N03, N22, N24	Normal	
ECSA_OCP_035	WS22	European (cross-border)	N02, N06, N12, N13, N19, N20, N21, N24	Normal	
ECSA_OCP_036	WS22	European (cross-border)	N19, N25, N26	Normal	
ECSA_OCP_038	WS22	European (cross-border)	N03, N05, N24	Normal	
SH02	WS22	European (cross-border)	N01, N05, N10, N26, N28	Normal	
ECSA_STU_001	WS25	European (online)	N10, N11, N12	Normal	
ECSA_STU_002	WS25	European (online)	N01, N02, N16	Normal	
ECSA_STU_003	WS25	European (online)	N01, N03, N16, N18, N23	Normal	
ECSA_STU_004	WS25	European (online)	N05, N10, N11	Normal	
ECSA_STU_005	WS25	European (online)	N02, N16, N26, N29	Normal	
ECSA_STU_006	WS25	European (online)	N02, N16, N17	Normal	
ECSA_STU_008	WS25	European (online)	N16, N17, N20, N26, N27	Normal	
ECSA_STU_009	WS25	European (online)	N04, N06, N16	Normal	
ECSA_STU_010	WS25	European (online)	N04, N06, N12, N16, N29	Normal	
ECSA_STU_011	WS25	European (online)	N05, N10, N14, N24	Normal	
ECSA_STU_012	WS25	European (online)	N03, N07, N08, N22	Normal	
ECSA_STU_013	WS25	European (online)	N01, N02, N08, N10, N22, N29, N36	Normal	
ECSA_STU_014	WS25	European (online)		Normal	
ECSA_STU_015	WS25	European (online)	N02	Normal	
ECSA_STU_016	WS25	European (online)	N11	Normal	
ECSA_STU_017	WS25	European (online)	N01, N02, N17, N23	Normal	
ECSA_STU_018	WS25	European (online)	N01, N14, N16, N17, N23	Normal	

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

ECSA_STU_019	WS25	European (online)	N05, N07	Normal	
ECSA_STU_020	WS25	European (online)	N04, N05, N14, N27	Normal	
ECSA_STU_021	WS25	European (online)	N02, N20, N29	Normal	
ECSA_STU_022	WS25	European (online)	N08, N12	Normal	
ECSA_STU_023	WS25	European (online)	N05, N08, N10, N11, N12, N13, N14, N15, N24	Normal	
ECSA_STU_024	WS25	European (online)	N16, N17	Normal	
ECSA_STU_025	WS25	European (online)	N16, N27	Normal	
ECSA_STU_026	WS25	European (online)	N02, N03, N29	Normal	
ECSA_STU_027	WS25	European (online)	N02, N03, N11, N16, N17, N23	Normal	
ECSA_STU_028	WS25	European (online)	N10, N17, N37	Normal	
ECSA_STU_030	WS25	European (online)	N04, N31	Normal	
ECSA_STU_031	WS25	European (online)	N10, N12, N13	High	
ECSA_STU_032	WS25	European (online)	N11	Normal	
ECSA_STU_033	WS25	European (online)	N06, N07, N08, N09, N14, N25	Normal	
OeAD_01_033	WS26	Austria	N01, N02, N12, N17, N27	Normal	
OeAD_01_034	WS26	Austria	N16, N18, N20	Normal	
OeAD_01_036	WS26	Austria	N11, N20	Normal	
OeAD_01_037	WS26	Austria	N10, N11	Normal	
OeAD_01_038	WS26	Austria	N08, N29	Normal	
OeAD_01_039	WS26	Austria	N01, N02, N03, N18, N20	Normal	
OeAD_01_040	WS26	Austria	N04, N06, N07, N16	Normal	CONFLICT
OeAD_01_041	WS26	Austria	N10, N16, N24	Normal	
OeAD_01_042	WS26	Austria	N16, N19, N20	Normal	
OeAD_01_043	WS26	Austria	N12	Normal	
OeAD_01_044	WS26	Austria	N07, N13, N14, N15	High	
OeAD_01_045	WS26	Austria	N01	Normal	
OeAD_01_080	WS26	Austria	N02, N04, N06, N19	Normal	
OeAD_01_081	WS26	Austria	N11, N13, N16	Normal	
OeAD_01_082	WS26	Austria	N03, N11	Normal	
OeAD_01_083	WS26	Austria	N16	Normal	
OeAD_01_084	WS26	Austria	N04, N16, N18, N29	Normal	
OeAD_01_085	WS26	Austria	N03, N17, N18	Normal	
OeAD_01_089	WS26	Austria	N12, N20, N26	Normal	
OeAD_01_090	WS26	Austria	N01	Normal	
OeAD_01_001	WS28	Austria	N01, N13, N16, N20, N21	Normal	
OeAD_01_003	WS28	Austria	N06, N11	Normal	
OeAD_01_004	WS28	Austria	N04, N20, N23, N27	Normal	
OeAD_01_005	WS28	Austria	N02, N19	Normal	

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

OeAD_01_006	WS28	Austria	N08, N12, N19	Normal	
OeAD_01_007	WS28	Austria	N03, N08, N19, N20, N22	Normal	
OeAD_01_008	WS28	Austria	N12	Normal	
OeAD_01_009	WS28	Austria	N01	Normal	
OeAD_01_046	WS28	Austria	N02, N08, N18	Normal	
OeAD_01_047	WS28	Austria	N10, N11, N12, N13, N17	Normal	
OeAD_01_048	WS28	Austria	N12, N13, N19	Normal	
OeAD_01_049	WS28	Austria	N10, N29	Normal	
OeAD_01_050	WS28	Austria	N16, N19	Normal	
OeAD_01_051	WS28	Austria	N02, N20, N27	Normal	
OeAD_01_053	WS28	Austria	N12	Normal	
OeAD_01_054	WS28	Austria	N19, N23	Normal	
OeAD_01_015	WS30	Austria	N10, N11	Normal	
OeAD_01_020	WS30	Austria	N10, N18	Normal	
OeAD_01_021	WS30	Austria	N01, N21	Normal	
OeAD_01_022	WS30	Austria	N10, N11, N22	Normal	
OeAD_01_024	WS30	Austria	N05, N08	Normal	
OeAD_01_025	WS30	Austria	N11	Normal	
OeAD_01_027	WS30	Austria	N10	Normal	
OeAD_01_065	WS31	Austria	N02, N17, N20, N22	High	
OeAD_01_070	WS31	Austria	N16	Normal	
OeAD_01_072	WS31	Austria	N11	Normal	
OeAD_01_073	WS31	Austria	N16, N22	Normal	
OeAD_01_077	WS31	Austria	N11	Normal	
OeAD_01_078	WS31	Austria	N01, N02, N29	Normal	
OeAD_01_079	WS31	Austria	N19, N21	High	
OeAD_01_058	WS32	Austria	N03, N06, N11, N16, N33	Normal	
OeAD_01_059	WS32	Austria	N06, N07, N10, N23, N34	Normal	
OeAD_01_060	WS32	Austria	N11, N17, N20	Normal	
OeAD_01_061	WS32	Austria	N06, N19	Normal	
OeAD_01_062	WS32	Austria	N02, N03, N13, N16	Normal	
OeAD_01_063	WS32	Austria	N08, N12, N18, N20, N25	Normal	
ECSA_PW_003	WS33	Germany	N01, N02, N16, N22, N24, N26	Normal	
ECSA_PW_005	WS33	Germany	N01, N29	Normal	
ECSA_PW_006	WS33	Germany	N10, N12	Normal	
ECSA_PW_010	WS33	Germany	N06, N10, N16, N24	Normal	
ECSA_PW_012	WS33	Germany	N02, N03, N19, N26	Normal	
ECSA_PW_015	WS33	Germany	N01, N02, N13, N17, N22, N29	Normal	

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

VT_01-C01-010	WS37	Lithuania		Normal	
VT_01-SH01-001	WS39	Lithuania	N11	Normal	
VT_01-SH01-003	WS39	Lithuania	N10, N11, N13, N15, N29	Normal	
VT_01-SH01-004	WS39	Lithuania	N13, N15	Normal	
VT_01-SH01-005	WS39	Lithuania	N10, N11, N12, N19, N26	Normal	CONFLICT
VT_01-SH01-006	WS39	Lithuania	N11	Normal	
VT_01-SH01-007	WS39	Lithuania	N01	High	
VT_01-SH01-008	WS39	Lithuania	N02	Normal	CONFLICT
VT_01-SH01-009	WS39	Lithuania	N06, N13	High	
VT_01-SH01-011	WS39	Lithuania	N07, N15	Normal	
VT_01-SH01-012	WS39	Lithuania	N16, N17	Normal	
VT_02-SH02-002	WS42	Lithuania	N01, N03, N23, N27	Normal	
VT_02-SH02-003	WS42	Lithuania	N06, N07, N18, N20	Normal	
VT_02-SH02-004	WS42	Lithuania	N19, N21	Normal	
VT_02-SH02-005	WS42	Lithuania	N02, N18, N20	Normal	
VT_02-SH02-006	WS42	LT	N10	Normal	
VT_02-SH02-007	WS42	LT	N19, N20, N26	Normal	
VT_02-SH02-008	WS42	LT	N03, N06, N08, N13, N16, N20	Normal	
VT_02-SH02-009	WS42	LT	N08, N04	Normal	
VT_02-SH02-010	WS42	LT	N01, N18, N26, N27	Normal	

Table A1. List of all 378 analysable user stories, their origin (engagement activity), country the workshop was held in, assigned needs, relevance assigned by partners during labeling and any potential flags.

Rejected stories (excluded from analysis)

Following the ECSA substance re-filter (2026-06-15), a story is excluded only if it is not citizen science, not relevant for RIECS, project-specific, a duplicate, or has no parseable content. Stories originally rejected for other reasons were reinstated into the analysis. Excluded user stories, and the exclusion category is shown for each story in Table A2 below.

Story ID	Workshop	Exclusion category	Original reason
ECSA_CSF_006	SRC-OTHER	Not citizen science	No direct mention of citizen science.
IBE_OQ_01	SRC-OQ	Not citizen science	Relates to outreach on a certain topic (non-citizen science), not a need or requirement for the RI.
IBE_OQ_35	SRC-OQ	Not citizen science	No mention of citizen science.

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

MAU_R01_006	WS07	Not citizen science	Relates to biodiversity awareness, not ctizen science and contains no need or requirement for the RI.
VT_01-SH01-010	WS39	Not citizen science	No direct mention of citizen science.
CPN_04-SH09-009	WS18	Not relevant for RIECS	This is not related to digital services.
CSZ_SG_002	WS02	Not relevant for RIECS	Personal motivation for nature observation, not a need or requirement for an RI.
MAU_R01_008	WS07	Not relevant for RIECS	How is this related to a CS research infrastructure specifically? This seems to be a task for science in general.
MAU_S01_016	WS06	Not relevant for RIECS	Describes a specific initiative, not a need or requirement for the RI.
OeAD_01_002	WS28	Not relevant for RIECS	CS project specific, no relevance for RIECS.
VT_01-SH01-002	WS39	Not relevant for RIECS	No relation to RIECS, personal goal/motivation.
ECSA_CSF_010	SRC-OTHER	Project-specific	This user story is too specific, I do not see how such a specific need (rubbish local company needs to change their schedule) could help for
IBE_SW_012	WS01	Project-specific	More project than RIECS-related.
VT_02-SH02-001	WS42	No parseable content	[no reason recorded]

Table A2. Rejected user stories.

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

Annex C. Labelbook

Label	Sublabel	Source	Description
Target user in story			(Expand as necessary)
	Citizen (scientist)	Project proposal: 2.1.1 Main target groups	with a strong emphasis on citizens that have already participated in CS projects and are familiar with CS. This group also includes grassroot communities.
	Citizen science practitioner	Project proposal: 2.1.1 Main target groups	A person who designs, facilitates, manages, supports, or implements citizen science activities in practice. Practitioners translate citizen science principles into real-world projects and programmes by coordinating participants, developing methodologies, building partnerships, managing data, facilitating engagement, or supporting learning and impact. They may work in academia, NGOs, museums, government, schools, community organisations, or the private sector.
	Researchers & scientists	Project proposal: 2.1.1 Main target groups	covering different scientific fields, including (but not limited to) climate change,health and earth observations. This group also involves researchers focused on CS.
	CS Networks	Project proposal: 2.1.1 Main target groups	This group includes national, international (AAPS, ACSA, RICAP, CitSci Africa, CitizenScience.Asia) and global CS associations (Citizen Science Global Partnership – CSGP).
	NGOs	Project proposal: 2.1.1 Main target groups	Non-profit Organizations that play a significant role in mobilising communities, raising awareness, advocating for policy changes, and implementing initiatives aimed at addressing societal challenges, such as (but not limited to) climate change, public health and environmental protection and conservation.
	Technology providers	Project proposal: 2.1.1 Main target groups	Technology providers offering solutions for enhancing CS-based research.
	Companies	Project proposal: 2.1.1 Main target groups	especially corporate social responsibility departments.
	Policy Makers	Project proposal: 2.1.1 Main target groups	including those responsible for supporting and funding RIs at national and European levels and policymakers regulating in areas

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

			susceptible to be informed or influenced by CS in general.
	Other EU RIs	Project proposal: 2.1.1 Main target groups	including representatives from ESFRI, EOSC, and other relevant RIs, especially those focusing their work on climate change, health and earth observations.
	Primary and Secondary Education	5.3 Domain focus	School use cases, youth engagement
	Post-secondary Education	5.3 Domain focus	University use cases
Challenge	yes/no	Project proposal: 2.2 Defintion of technical requirements	What stands in the way of the user doing what they want to do, an obstacle or impairment of concrete or abstract nature.
Solution	yes/no	Project proposal: 2.2 Defintion of technical requirements	An act or means of solving a problem or challenge.
Technical requirement	yes/no	Project proposal: 2.2 Defintion of technical requirements	Technical requirements are specific, actionable, and mandatory criteria that define how a system, product, or process must be designed and implemented to meet functional goals. They cover performance, hardware, software, security, and compatibility constraints
Resource	yes/no	Project proposal: D2.3. Catalogue of Services, Resources, and Functionalities	Resources are the "what": the assets — tangible or intangible — that exist or are made available through RIECS that will aggregate, provide, or interconnect to enable and support excellent citizen science. They may originate within the consortium, be linked from external sources, or come from citizens. They include tools, datasets, educational materials, community knowledge, and more.
Service	yes/no	Project proposal: D2.3. Catalogue of Services, Resources, and Functionalities	Services are the "how": the processes and human support from RIECS that make those resources useful i.e. usable, discoverable, integrated. Services ensure that users can effectively access, understand, and apply the resources.
Functionality	yes/no	Project proposal: D2.3. Catalogue of Services, Resources, and Functionalities	Functionalities are the “features”: the built-in capabilities that RIECS will do by design. Functionalities act as technical and organisational enablers, supporting the delivery of services and access to resources, and allowing RIECS to operate as a coherent, scalable, and trustworthy platform and ecosystem. They show how RIECS enables

This project has received funding from the European Union’s research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author’s view and the Commission is not responsible for any use that may be made of the information it contains.

			users to do things effectively, securely, and inclusively.
Architecture & Modularity		D2.1: 3.3 Operational perspective p.9-11	
	Interoperability	D2.1: 3.3 Operational perspective p.9-11	ability to switch between implementations
	Flexibility & Modular Design	D2.1: 3.3 Operational perspective p.9-11	ability to automatically grow, shrink, or reorder
	Distributed & Federated Design	D2.1: 3.3 Operational perspective p.9-11	network of networks, or "modules" located on multiple networked sites
	Architecture interfaces & Middleware	D2.1: 3.3 Operational perspective p.9-11	Technical components to interact, communicate and operate together
	Security	D2.1: 3.3 Operational perspective p.9-11	Ensure user safety, data integrity, and privacy, attack-ready
	Reliability	D2.1: 3.3 Operational perspective p.9-11	fault-tolerant operation, robust performance and uptime
	Platform integration	D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	ability to integrate with the host system to provide a native-like experience
Scalability & Performance		D2.1: 3.3 Operational perspective p.9-11	
	User Scalability	D2.1: 3.3 Operational perspective p.9-11	Ability to scale in terms of users
	Data Scalability	D2.1: 3.3 Operational perspective p.9-11	Ability to scale in terms of volume (storage, hosting)
	Computational Scalability	D2.1: 3.3 Operational perspective p.9-11	Ability to scale in terms of processing load
	Geographic Scalability	D2.1: 3.3 Operational perspective p.9-11	Language, and other regional and cultural challenges
	Performance Optimization		Improving speed, latency, and resource efficiency;
Data and Software Standards		D2.1: 3.3 Operational perspective p.9-11	

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

	Community standards	D2.1: 3.3 Operational perspective p.9-11	Agreed norms, practices, and guidelines defined by a community
	Data & Metadata standards	D2.1: 3.3 Operational perspective p.9-11	Concrete technical specifications for structuring data, describing it with metadata, and exchanging it between systems.
	Open-source software	D2.1: 3.3 Operational perspective p.9-11	source code is made available under an open-source license.
	Data standardizatio n	D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	Refers to the process of developing and implementing voluntary technical or quality standards for products, services, and processes. In the EU, these standards aim to ensure compatibility, safety, and interoperability.
	API and service integration	D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	Rules and protocols allowing software and machines to communicate or exchange data in a shared and clear way
	Legacy system integration	D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	connecting or wrapping outdated software/hardware with modern platforms to enable data exchange without replacing core systems
Infrastructure and connectivity		D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	
	Digital Infrastructures	D2.1: 3.3 Operational perspective p.9-11	integrate both data and computing layers but go further in supporting broader interoperability, access, and scalability across disciplines and communities. In ESFRI's classification, digital infrastructures act as enablers of cross-domain integration, combining data services, computational tools, middleware, and user interfaces into cohesive, reusable, and accessible ecosystems.
	Physical Infrastructures		places to support CS, external physical laboratories, External institutionally managed facilities (e.g. Libraries, fablabs, wetlabs, science shops, etc. providing controlled environments. Community labs, maker spaces, schools, museums, town-halls, etc.
	Network connectivity	D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	Support for reliable internet, GPS signals connectivity (even in rural, and underground areas where Wi-Fi and mobile signals are unstable)
	Computing & Cloud infrastructures	D2.1: 3.3 Operational perspective p.9-11	provide the high-performance computational capacity and processing capabilities necessary for advanced modelling, simulation, and large-scale data analytics. These include

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

			high-throughput computing clusters, cloud services, and specialised platforms that enable intensive scientific computation.
	Data & Server infrastructure	D2.1: 3.3 Operational perspective p.9-11	systems primarily concerned with the long-term stewardship, sharing, and preservation of research data, covering both curated repositories and distributed data services that support FAIR principles and open access policies
	Citizens' resources	Important for roadmap according to consortium	Citizens' owned devices and tools (e.g. smartphones, sensors, personal computers) contributing data collection and processing
Hardware and sensor technology			The physical devices and sensors used to collect data, and the challenges related to their operation and use.
	Sensor accuracy, reliability and calibration	D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	how precise sensor data is, how stable measurements are over time, and whether calibration is needed or maintained
	Environmental durability	D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	Severe environmental conditions prevent installation, Water damage and theft issues, Bio-fouling corruption in marine environments, Temperature effects on battery life and performance
	Hardware Failures	D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	Breakdowns or malfunctions of devices, sensors, or components that interrupt data collection.
	Device compatibility	D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	Issues with older smartphones, Different camera and sensor capabilities, White balance procedure variations, Hardware specification limitations
	Installation difficulties	D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	Complex sensor installation procedures, Requirement for technical supervision, Physical access challenges, Equipment security concerns
	Hardware		Individual physical objects like weather stations, binoculars, microscopes, cameras, drones, and sampling kits.
	Sensors		Any type of sensor used for data collection such as air quality sensors, water parameter sensors etc.
Software and application development		D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

	Cross-platform development	D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	It applies to barriers that affect participation, onboarding, task execution, and overall user experience, especially for non-expert or first-time users.
	Application stability	D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	This includes issues where applications do not behave predictably, fail during use, or introduce risks such as data loss, excessive resource consumption, or incompatibility over time.
	Feature limitations	D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	Missing or restricted functionality that limits participation, data collection contexts, accessibility, or feedback loops, even when the application itself is stable.
Data quality and management		D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	
	Data quality control	D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	It covers mechanisms, workflows, and tools for detecting errors, inconsistencies, or bias in data, and for managing variable data quality at scale without relying solely on manual review.
	Data completeness	D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	issues related to missing records, insufficient volume, uneven spatial or temporal coverage, or datasets that are too partial to support reliable conclusions.
	Data processing	D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	It applies to requirements dealing with data conversion, normalization, aggregation, fusion from multiple sources, or managing irregular and heterogeneous data flows.
	Metadata management	D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	This includes requirements for consistent metadata, standardized formats, contextual information (e.g. location, methods)
	validation and callibration procedures	based on mentions in user stories	It applies to workflows that validate observations, document calibration of instruments or methods, and provide transparency about data reliability.
Human capacity and training		D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	
	Technical skills requirements	D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	when technical complexity becomes a barrier for citizens, project coordinators, or facilitators, and where requirements aim to reduce skill thresholds or compensate for limited digital literacy.
	User support needs	D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	This goes beyond initial training and focuses on sustained operational support within Citizen Science infrastructures. Eg. help-desk, AI chatbot

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

	Enhanced learning / interactive engagement	D2.1: 3.1/Citizen science based taxonomi (Soacha-Godoy et al. 2025)	using interactive technologies—such as gamification, 3D tools, and machine learning—to deepen engagement, support scientific understanding, and involve participants more actively in citizen science
	Training & Documentation	D2.1: 3.3 Operational perspective p.9-11	Mentoring, Technology Literacy Training, Methodology Training and Resources, Citizen Science Literacy & Awareness, Curriculum Integration, Accredited Training, Trainer Training,
Workflows and user experience	User interface & usability	D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41 (moved from Software and application development)	Descriptions of user experience, refers to needs related to interfaces, their user-friendliness, usability,
	Collaboration	D2.1: 3.3 Operational perspective p.9-11	support collaboration between any user type of RIECS, including within-user group collaboration, e.g. scientists and volunteers, between practioners
	Project discovery	D2.1: 3.1/Citizen science based taxonomi (Soacha-Godoy et al. 2025)	refers to the process and platforms that help individuals find and engage with active citizen science projects by offering searchable directories that match volunteers with initiatives based on their interests, skills, or location, thereby simplifying connection and increasing participation. Eg. a catalog of projects
	Resource collection	D2.1: 3.1/Citizen science based taxonomi (Soacha-Godoy et al. 2025)	refers to centrally gathering and sharing tools, training materials, and guidelines to support citizen and open science
	Onsite data collection	D2.1: 3.1/Citizen science based taxonomi (Soacha-Godoy et al. 2025)	gathering, verifying, and managing field-based observations—typically within a defined area—using mobile, web, or sensor-enabled tools that support efficient, high-quality, and often real-time data generation by citizen scientists
	Crowdsourcing	D2.1: 3.1/Citizen science based taxonomi (Soacha-Godoy et al. 2025)	Crowdsourced data analysis, collaboratively classifying, annotating, and processing digital materials—such as images, videos, and archival records—through web-based platforms that harness collective volunteer effort to support scientific analysis.
	Online data analysis and visualization	D2.1: 3.1/Citizen science based taxonomi (Soacha-Godoy et al. 2025)	interpreting and exploring collected data through web-based tools that provide interactive maps, graphical displays, and analytical features, enabling researchers and citizen scientists to transform raw data into accessible, actionable insights. offering real-time data and analysis to address public health

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

			issues and environmental problems, among others
	Networking		Communities of Practice, forum, people and institution discovery, matchmaking.
	decision support	D2.1: 3.1/Citizen science based taxonomi (Soacha-Godoy et al. 2025)	decision support to guide users e.g. identifying correct tools, sensors, protocols etc.
	Workflow management	D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	Support for adapting and connecting diverse scientific workflows across communities and domains, enabling interoperable task coordination, data flows, and service integration.
Other	CS Insight platform	D2.1: 3.1/Citizen science based taxonomi (Soacha-Godoy et al. 2025)	Platforms in this category are dedicated to analysing and interpreting the evolving landscape of citizen science. They offer insights into trends, challenges, and opportunities within the field by reviewing best practices, evaluating project impacts, and fostering discussions among practitioners, policymakers, and funders. They often serve as bridges between theory and practice, contributing to the strategic development of citizen science as a field
	Impact		Impact management, impact assessment
	Policy readiness		Policy readiness encompasses actions strengthening the connection between scientific research and policy implementation such as specific resources for policy makers, support for data uptake and integration and awareness raising
Governance	financial sustainability	D2.1: 8.3 and 8.4 p. 69-71, D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	
	Cost & Resource Scalability	D2.1: 3.3 Operational perspective p.9-11	Scalability is not purely technical; it also has a cost dimension (i.e., sustainable funding for expansion) that will be considered as part of operational feasibility.
	legal frameworks	D2.1: 8.3 and 8.4 p. 69-71	legal frameworks not covered by other labels
	funding models	D2.1: 8.3 and 8.4 p. 69-71	short-term project grants, volunteer effort, institutional or government funding, business models and funding schemes (such as integrating CS infrastructure into national

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

			research budgets, or developing services that could generate revenue) and concrete mechanisms.
	long-term institutional support	D2.1: 5.1 current active platforms and long-term functioning p 23	integrating into larger infrastructures, open-sourcing code, securing ongoing funding via institutions or communities, evolving into a permanent citizen observatory run by a museum or NGO
	representation in decision making	D2.1: 8.3 and 8.4 p. 69-71	Consortium vs new legal entity, representation of countries and stakeholder groups in decisions
	public resource	D2.1: 8.3 and 8.4 p. 69-71	open, free of charge, accessible to the public
	Platform misuse policy	D2.1: 8.3 and 8.4 p. 69-71	Establishing policies for defining and handling misuse of platforms, including illegal content
	Technology evolution	D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	Rapidly changing technology landscape. Need for continuous updates. Obsolescence of components. Keeping pace with standards evolution.
	Geographical distribution	D2.1 5.2 Geographical distribution p. 23-24	cross-border collaboration, national silos
	Fragmentation, superfluous redundancy	D2.1 5.3 Domain focus and fragmentation trends p.26, 5.6 p.30	“overlapping platforms serving similar purposes, often developed in parallel.”
	Digital sovereignity	D2.1 5.4, 5.5, EU dictionary (http://data.europa.eu/uxp/det_832)	"Capacity to exercise strategic independence in the digital domain—encompassing data governance, infrastructure control, and innovation—digital sovereignty aims to reduce vulnerabilities in economic, security, and technological spheres (EU dict)"
	tools for transparency	6.1.2 solutions and gaps	Tools that ensure openness, traceability, and accountability in citizen science
Data governance	Data ownership rights	D2.1: 8.3 and 8.4 p. 69-71	Data ownership rights refer to the authority to control, manage, and use data. Key rights include access, rectification, erasure, and data portability.
	Data Privacy	D2.1: 8.3 and 8.4 p. 69-71	GDPR, Privacy (Data Protection): Recognized as a fundamental right, this ensures that personal data can only be processed if there is a valid, lawful basis. anonymisation, pseudonymisation, Consent, access control, Data minimisation, lawful basis, privacy-by-design principles

This project has received funding from the European Union’s research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author’s view and the Commission is not responsible for any use that may be made of the information it contains.

	Data Consent	D2.1: 8.3 and 8.4 p. 69-71	Consent: Defined as a lawful basis for processing personal data (Article 6(1)(a)), it is not merely a checkbox but an "unambiguous" agreement to data usage
	Sensitive Data	Adapted from GDPR	Handling health data, personal stories, minors, vulnerable communities, cultural heritage. Personal data revealing racial or ethnic origin; political opinions; religious or philosophical beliefs; trade union membership. Genetic data. Biometric data (where used for identification purposes); data concerning health; a person's sex life; and a person's sexual orientation.
	Data provenance	https://link.springer.com/rwe/10.1007/978-0-387-39940-9_1305	refers to a record trail that accounts for the origin of a piece of data (in a database, document or repository) together with an explanation of how and why it got to the present place.
Inclusivity and participation		D2.1: 8.2 Inclusivity and participation p 68-69	
	barriers to entry to CS	D2.1: 8.2 Inclusivity and participation p 68-69	barriers to inclusivity and participation that are not related to digital divide or scientific literacy
	accessibility	D2.1: 8.2 Inclusivity and participation p 68-69, D2.1: 3.3 Operational perspective p.9-11	Accessibility of the platform to diverse users, including training and documentation
	multi-language support	D2.1: 8.2 Inclusivity and participation p 68-69	the capability of a software application, website, or service to function, display content, and provide assistance in multiple languages.
	outreach programs	D2.1: 8.2 Inclusivity and participation p 68-69	tools, activities and support in order to reach more and diverse potential users of RIECS or more and diverse potential citizen scientists and practitioners overall
	scientific literacy	D2.1: 8.2 Inclusivity and participation p 68-69	the ability to understand, evaluate, and apply scientific concepts, methods, and data to make informed decisions and engage with science-related issues
	digital divide	D2.1: 8.2 Inclusivity and participation p 68-69	the gap between individuals, households, businesses, and regions at different socioeconomic levels regarding their access to, use of, and skills for information and communication technologies (ICT).
Scientific principles and practices	Valuations of citizen science	Important for roadmap according to consortium	Any valuation of what is good/bad citizen science, eg. 10 principles of citizen science. Reciprocity, co-ownership of data, ethical sampling, non-extractive research

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

	Transdisciplinarity and interdisciplinarity	3.2 Polcy perspective 7-8	Transdisciplinarity in science is a research approach that integrates diverse scientific disciplines and non-academic stakeholders (practitioners, community members) to tackle complex, real-world problems. It goes "between, across, and beyond" disciplines. Interdisciplinarity in science is the collaborative process of integrating expertise, methods, tools, and perspectives from two or more distinct scientific disciplines
	Communication	Important for roadmap according to consortium	Communication of scientific results policy makers, citizens and other scientists. Communication of what citizen science is
	Open Science	3.1 theoretical perspective p 5	Making scientific knowledge accessible, transparent, and reusable.
	recognition mechanisms	6.1.2 solutions and gaps	Tracibilitiy of data contributions and ownership, Citizens recognition, acknowledgement of contributed knowledge, time, data, ideas, Micro-credentials, etc.
	TRUST	D2.1: 3.3 Operational Perspective	"Transparency, Responsibility, User focus, Sustainability, Technology"
	FAIR	Important for roadmap according to consortium	F — Findable; A — Accessible; I — Interoperable; R — Reusable. Principles on how data should be managed so it can be easily discovered, accessed, integrated, and reused. Exclude particular ways of achieving interoperability and use one of the other labels instead
	CARE	Important for roadmap according to consortium	C — Collective Benefit; A — Authority to Control; R — Responsibility; E — Ethics. Principes on how data should be handled ethically
Domain focus		5.3 Domain focus	Scientific, thematic, or disciplinary domains for tailored and cross-domain design
	Health data	5.3 Domain focus	Community-generated health observations, self-tracking. It includes medical, patient or physiological data requiring strict ethical safeguards. Also environmental health.
	Climate Change	5.3 Domain focus	Mitigation, adaptation, local observation networks
	Environment	5.3 Domain focus	Air quality, water, pollution, land use
	Biodiversity	5.3 Domain focus	Species monitoring, habitats, invasive species

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

<	Earth Observation	5.3 Domain focus	Remote sensing, GIS, Earth data from satellites
	Social Sciences and Humanities	Researchers Interviews	Behaviour, culture, history, linguistics, heritage, education, design, arts, anthropology, sociology, ethnology, philosophy, political science, archaeology, economics, geography, linguistics, demography, media and communication studies, public administration, international relations, literature, theology, languages, musicology, etc
	Technology	Researchers Interviews	Data, Computing & Emerging Technologies
	Other		A scientific domain not mentioned and not domain neutral
	Domain neutral		Applying to all domains or rather all RIECS aspects irrespective of domain.
Ethics	AI ethics framework	D2.1: 8.3 and 8.4 p. 69-71	Issues of consent, privacy, bias, fairness, transparency, accountability, and community control regarding artificial intelligence.
	Ethics Committee Support		includes application to ethics committee, ethics committee feedback, refusal, constraints, etc.
	Ethical Sandbox		Controlled environments for testing technologies, data flows or methods prior to real deployment
AI and advanced analytics		D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	
	Machine learning implementation	D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	A field of study in artificial intelligence concerned with the development and study of algorithms that can learn from data and generalize to unseen data, and thus perform tasks without explicit instructions.
	Process automation	D2.1 p. 6.1 Crossdicsiplinary challenges p. 34-41	using digital tools to automate repetitive tasks in scientific projects, such as data gathering, annotation, and analysis, particularly when dealing with large-scale citizen participation. European social science and political research, particularly regarding the analysis of online communication and political texts. Automated analysis is defined as a technique where the analysis of text (or other media) is, to some extent, automatically conducted by machines rather than manual coding

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

	AI data validation support		AI data validation and associated support services refer to a structured process of verifying that data for AI is accurate, consistent, and fits within predefined quality standards
	AI assisted species or object identification		Species Detection: Primarily used in environmental, biodiversity, and agricultural contexts to identify specific animal or plant species, particularly invasive alien species (IAS) or protected species.Object Detection: Refers to AI and computer vision techniques used to locate and classify items, often used for security, unmanned systems, or industrial automation
	Automated Decision support system		computerized information system or software program used to assist in organizational decision-making, particularly for complex, unstructured, or semi-structured problems
	Human in the loop review		key oversight mechanism defined as a process where a human actively participates in the operation, supervision, or decision-making of an AI system to ensure safety, accuracy, and accountability
	Capacity building for AI use		process of developing and strengthening the skills, instincts, abilities, processes, and resources that organizations and communities need to survive, adapt, and thrive; but applied to the context of AI

Table A3. List of labels used during the labelling process, including their higher grouping labe, source and description.

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

Annex D. Labels to needs

The “Source labels” column lists the labelbook entries that feed each need.

Need ID	Need	Source labels (group – sublabel → need)
N01	Project discovery and matchmaking	Workflows and user experience › Project discovery; Workflows and user experience › Participant onboarding; To Be Clasd › CS Insight platformsifie
N02	Networking and collaboration spaces	Workflows and user experience › Networking; Workflows and user experience › Collaboration; Infrastructure and connectivity › Collaborative innovation spaces; Infrastructure and connectivity › Community-centered infrastructure
N03	Low-barrier, accessible participation	Inclusivity and participation › accessibility; Inclusivity and participation › barriers to entry to CS; Inclusivity and participation › multi-language support; Workflows and user experience › Low-barrier participation; Governance › Accessible participation support
N04	Data quality control and validation	Data quality and management › Data quality control; Data quality and management › validation and callibration procedures; Data quality and management › Data completeness; AI and advanced analytics › AI data validation support
N05	Shared data and metadata standards	Data and Software Standards › Data & Metadata standards; Data and Software Standards › Data standardization; Data and Software Standards › Community standards; Data quality and management › Metadata management
N06	Trust, transparency and provenance	Scientific principles and practices › TRUST; Data governance › Data provenance; Governance › tools for transparency)
N07	Data ownership, privacy and consent	Data governance › Data ownership rights; Data governance › Data Privacy; Data governance › Data Consent; Data governance › Sensitive Data
N08	Open Science, FAIR and CARE compliance	Scientific principles and practices › FAIR; Scientific principles and practices › Open Science; Scientific principles and practices › CARE; Data and Software Standards › Open-source software
N09	Legal clarity and digital sovereignty	Governance › legal frameworks; Governance › Digital sovereignity
N10	Shared digital infrastructure and hosting	Infrastructure and connectivity › Digital Infrastructures; Infrastructure and connectivity › Data & Server infrastructure; Infrastructure and connectivity › Computing & Cloud infrastructures; Infrastructure and connectivity › Repository infrastructure; Infrastructure and connectivity › Independent project hosting; Infrastructure and connectivity › Physical Infrastructures; Infrastructure and connectivity › Network connectivity
N11	Data collection and crowdsourcing tools	Workflows and user experience › Crowdsourcing; Workflows and user experience › Onsite data collection; Hardware and sensor technology › (any); Infrastructure and connectivity › Real-time community reporting; Infrastructure and connectivity › Audio data infrastructures
N12	Analysis, visualisation and decision support	Workflows and user experience › Online data analysis and visualization; Workflows and user experience › decision support; Data quality and management › Data processing; AI and advanced analytics › (any)

This project has received funding from the European Union’s research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author’s view and the Commission is not responsible for any use that may be made of the information it contains.

N13	Usability and user-centred design	Workflows and user experience › User interface & usability; Workflows and user experience › User-centered design; Workflows and user experience › Workflow management; Software and application development › (any); Infrastructure and connectivity › Participatory prototyping
N14	Interoperability and platform integration	Architecture & Modularity › Interoperability; Architecture & Modularity › Platform integration; Architecture & Modularity › Architecture interfaces & Middleware; Data and Software Standards › API and service integration; Data and Software Standards › Legacy system integration
N15	Federated, modular and secure architecture	Architecture & Modularity › Distributed & Federated Design; Architecture & Modularity › Flexibility & Modular Design; Architecture & Modularity › Identity and Access Management (IAM / AAI); Architecture & Modularity › Security; Architecture & Modularity › Reliability; Infrastructure and connectivity › Participatory data ecosystems
N16	Training materials and documentation	Human capacity and training › Training & Documentation; Human capacity and training › Technical skills requirements; Human capacity and training › Enhanced learning / interactive engagement
N17	Support services and expertise access	Human capacity and training › User support needs; Human capacity and training › Peer-to-peer learning; Human capacity and training › expert database; Human capacity and training › organisation database; Human capacity and training › Scientific proposal support
N18	Scientific literacy and public engagement	Inclusivity and participation › scientific literacy; Inclusivity and participation › outreach programs; Scientific principles and practices › Public engagement; Inclusivity and participation › (any)
N19	Recognition and credit for contributions	Scientific principles and practices › recognition mechanisms; Governance › Public value recognition; Governance › Non-institutional expertise recognition
N20	Feedback and communication of results	Scientific principles and practices › Communication; Workflows and user experience › Feedback loops & mutual learning; Workflows and user experience › Participation metrics
N21	Volunteer recruitment and retention	Governance › Sustainable participant recruitment; Governance › Volunteer retention strategies
N22	Long-term funding and institutional support	Governance › financial sustainability; Governance › funding models; Governance › project funding; Governance › long-term institutional support; Governance › Cost & Resource Scalability
N23	Participatory and equitable governance	Governance › Participation governance; Governance › representation in decision making; Governance › Co-creation; Governance › Equitable participation protocols; Governance › Stakeholder engagement; Governance › Participatory infrastructure monitoring
N24	A public European resource against fragmentation	Governance › public resource; Governance › Fragmentation, superfluous redundancy; Governance › Geographical distribution; Governance › Citizen science mainstreaming; Governance › Technology evolution; Governance › Platform misuse policy; Governance › Shared terminology frameworks; Governance › Official statistics integration; Governance › National support nodes; Governance › Cross-framework alignment
N25	Policy readiness and evidence pipelines	To Be Classified › Policy readiness; To Be Classified › Geospatial mapping; To Be Classified › Platform independence
N26	Impact assessment and valuation	To Be Classified › Impact; To Be Classified › Impact indicators for project assessment; To Be Classified › Impact assessment methods; Scientific principles and practices › Valuations of citizen science

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

N27	Cross-domain and transdisciplinary research	Scientific principles and practices › Transdisciplinarity and interdisciplinarity; Scientific principles and practices › (any)
N28	Scalability and performance	Scalability & Performance › (any)
N29	Shared resource and materials library	Workflows and user experience › Resource collection; Infrastructure and connectivity › Citizens' resources
N30	AI transparency/algorithm accountability	Ethics › AI ethics framework (2); Governance › Co-creation (1); Infrastructure and connectivity › Participatory prototyping (1); AI and advanced analytics › Capacity building for AI use (1); Workflows and user experience › Low-barrier participation (1) — co-occurring (inferred need)
N31	Career recognition for researchers	Workflows and user experience › Crowdsourcing (2); Data quality and management › Data quality control (1); Domain focus › Health data (1); Infrastructure and connectivity › Digital Infrastructures (1) — co-occurring (inferred need)
N32	Feedback mechanism from policy, how CS data influenced policy	Scientific principles and practices › recognition mechanisms (1); Workflows and user experience › Crowdsourcing (1) — co-occurring (inferred need)
N33	Scientific principles	Workflows and user experience › Crowdsourcing (2); Scientific principles and practices › TRUST (2); Human capacity and training › Training & Documentation (2); Domain focus › Social Sciences and Humanities (1); Inclusivity and participation › accessibility (1) — co-occurring (inferred need)
N34	Physical infrastructures	Governance › Participation governance (1); Data governance › Sensitive Data (1); Infrastructure and connectivity › Data & Server infrastructure (1); Scientific principles and practices › TRUST (1); Infrastructure and connectivity › Physical Infrastructures (1) — co-occurring (inferred need)
N35	Quick availability	Scientific principles and practices › FAIR (1); Scientific principles and practices › Open Science (1); Workflows and user experience › Resource collection (1); Human capacity and training › Enhanced learning / interactive engagement (1); Inclusivity and participation › scientific literacy (1) — co-occurring (inferred need)
N36	Data storage	Data quality and management › validation and callibration procedures (2); Infrastructure and connectivity › Data & Server infrastructure (2); Workflows and user experience › Project discovery (2); Workflows and user experience › Resource collection (2); Workflows and user experience › Networking (2) — co-occurring (inferred need)
N37	Ethics framework / guidelines	Data governance › Data Privacy (3); Data governance › Data ownership rights (3); Scientific principles and practices › FAIR (2); Scientific principles and practices › TRUST (2); Domain focus › Domain neutral (1) — co-occurring (inferred need)

Table A4. List of needs, and the group of labels they were derived from.

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

Annex E. Priorisation across subgroups

1. Top 10 needs within the citizen subgroup

Rank	need_id	need_name	Citizen scientist
1	N02	Networking and collaboration spaces	26
2	N16	Training materials and documentation	25
3	N01	Project discovery and matchmaking	24
4	N20	Feedback and communication of results	24
5	N19	Recognition and credit for contributions	21
6	N11	Data collection and crowdsourcing tools	21
7	N08	Open Science, FAIR and CARE compliance	19
8	N03	Low-barrier, accessible participation	19
9	N13	Usability and user-centred design	15
10	N06	Trust, transparency and provenance	15

Table A5. 10 most mentioned needs for citizen scientists users

Rank	need_id	need_name	Count by CS practitioner
1	N08	Open Science, FAIR and CARE compliance	22
2	N16	Training materials and documentation	20
3	N02	Networking and collaboration spaces	17
4	N17	Support services and expertise access	17
5	N10	Shared digital infrastructure and hosting	16
6	N04	Data quality control and validation	15
7	N22	Long-term funding and institutional support	15
8	N01	Project discovery and matchmaking	14
9	N07	Data ownership, privacy and consent	14
10	N29	Shared resource and materials library	13

Table A6. 10 most mentioned needs for citizen science practitioners users

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

Rank	need_id	need_name	Count by ECR
1	N16	Training materials and documentation	23
2	N11	Data collection and crowdsourcing tools	17
3	N01	Project discovery and matchmaking	13
4	N02	Networking and collaboration spaces	13
5	N17	Support services and expertise access	11
6	N03	Low-barrier, accessible participation	11
7	N20	Feedback and communication of results	10
8	N13	Usability and user-centred design	9
9	N31	Career recognition for researchers	7
10	N29	Shared resource and materials library	7

Table A7. 10 most mentioned needs for students and early career researchers users

2. Full list of needs within the citizen subgroup

need_id	need_name	theme	definition	Citizen total mention	Citizen scientist	CS practitioner	Student
Total per group				378	146	141	91
N16	Training materials and documentation	Training and capacity building	Ready-to-use training, manuals, templates and documentation for participants, teachers and coordinators.	53	23	17	13
N02	Networking and collaboration spaces	Access and discoverability	Spaces and mechanisms to connect coordinators, researchers, volunteers and organisations across projects, disciplines and countries.	51	25	16	10
N01	Project discovery and matchmaking	Access and discoverability	A single place to find ongoing CS projects, events and calls, and to match volunteers,	49	25	13	11

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

			schools and researchers to projects relevant to them.				
N11	Data collection and crowdsourcing tools	Tools, platforms and infrastructure	Mobile/field data-collection tools, crowdsourcing workflows and sensor support for contributors.	47	24	8	15
N08	Open Science, FAIR and CARE compliance	Data governance and compliance	FAIR/CARE-aligned, openly licensed data, software and outputs as the default mode of operation.	40	19	19	2
N03	Low-barrier, accessible participation	Access and discoverability	Participation paths that work regardless of language, disability, age, digital skills or location.	37	19	8	10
N20	Feedback and communicatio n of results	Recognition and engagement	Closing the loop: participants see what happened with their data and what the project achieved.	37	24	3	10
N19	Recognition and credit for contributions	Recognition and engagement	Acknowledgement, certification and credit mechanisms for citizen contributions, including non-institutional expertise.	35	21	8	6
N13	Usability and user-centred design	Tools, platforms and infrastructure	Interfaces designed for non-experts, with workflows that fit how volunteers actually work.	34	15	11	8
N17	Support services and expertise access	Training and capacity building	Helpdesk-style support, peer-to-peer learning, expert/organisation databases and proposal support.	29	9	15	5
N10	Shared digital infrastructure and hosting	Tools, platforms and infrastructure	Common hosting, storage, repositories and computing so projects do not have to	29	12	13	4

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

			build and maintain their own stack.				
N04	Data quality control and validation	Data quality and trust	Quality assurance, validation and calibration pipelines so citizen-generated data can be trusted and reused by science and policy.	27	11	13	3
N06	Trust, transparency and provenance	Data quality and trust	Visibility of where data goes, who uses it and how decisions are made; provenance records that build mutual trust.	26	15	5	6
N07	Data ownership, privacy and consent	Data governance and compliance	Clear rules on who owns contributed data, privacy protection, consent management and handling of sensitive data.	23	6	14	3
N29	Shared resource and materials library	Training and capacity building	A curated library of reusable resources — protocols, worksheets, equipment guides, best-practice examples — that projects and citizens can draw on.	23	10	11	2
N25	Policy readiness and evidence pipelines	Policy and impact	Making citizen-generated evidence usable by policy-makers: quality seals, official-statistics integration, policy interfaces.	20	14	4	2
N26	Impact assessment and valuation	Policy and impact	Methods and indicators to assess and demonstrate the scientific and societal impact of citizen science.	19	12	2	5
N18	Scientific literacy and public	Training and capacity building	Outreach, literacy-building and engagement formats	19	12	2	5

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

	engagement		that bring new audiences into citizen science.				
N05	Shared data and metadata standards	Data quality and trust	Common data/metadata standards and standardisation support enabling cross-project and cross-domain reuse.	18	4	14	0
N12	Analysis, visualisation and decision support	Tools, platforms and infrastructure	Online analysis and visualisation of project data, including AI-assisted tooling and outputs usable for decision-making.	17	5	8	4
N22	Long-term funding and institutional support	Governance and sustainability	Funding models and durable institutional backing so projects and platforms survive beyond project grants.	17	6	11	0
N14	Interoperability and platform integration	Tools, platforms and infrastructure	Connecting existing CS platforms, apps and repositories through APIs and shared interfaces rather than replacing them.	13	4	7	2
N23	Participatory and equitable governance	Governance and sustainability	Citizens and stakeholders represented in decision-making, with co-creation and equitable participation protocols.	12	5	7	0
N24	A public European resource against fragmentation	Governance and sustainability	RIECS as a public, Europe-wide resource that connects rather than duplicates the fragmented CS landscape.	9	0	8	1
N21	Volunteer recruitment and retention	Recognition and engagement	Sustainable recruitment of new participants and strategies to keep them engaged over	8	1	5	2

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

			years.				
N31	Career recognition for researchers	Recognition and engagement	Formal recognition of citizen science contributions within academic evaluation frameworks, including publication pathways, funding criteria and professional development systems, so that engaging in CS does not disadvantage researchers' careers.	8	2	5	1
N15	Federated, modular and secure architecture	Tools, platforms and infrastructure	A federated/modular technical design with shared identity and access management, security and reliability.	7	5	0	2
N09	Legal clarity and digital sovereignty	Data governance and compliance	Legal certainty for data use across borders and public/European control over infrastructure and data.	6	1	4	1
N27	Cross-domain and transdisciplinary research	Scientific practice	Linking datasets, methods and communities across domains and disciplines.	6	1	5	0
N32	Feedback mechanism from policy, how CS data influenced policy	Policy and impact	A return channel informing citizen contributors when and how their data has shaped a policy decision, regulatory action or official reporting process, closing the loop between scientific contribution and societal outcome.	4	1	1	2
N34	Physical infrastructures	Tools, platforms and infrastructure	Access to shared physical resources such as laboratory spaces, field	4	1	2	1

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

			equipment, sensors and hardware that participants and projects can borrow or use without needing to own or maintain them independently.				
N33	Scientific principles	Scientific practice	Support for embedding recognised scientific standards — including reproducibility, peer review and disciplinary rigour — into citizen science practice, so that CS outputs are accepted as legitimate contributions to knowledge.	3	0	3	0
N36	Data storage	Tools, platforms and infrastructure	Secure, reliable and long-term storage of project data in a trusted environment, ensuring that citizen-generated datasets remain accessible, preserved and reusable beyond the lifetime of individual projects.	3	0	3	0
N37	Ethics framework / guidelines	Data governance and compliance	Practical guidance, templates and support for implementing ethical principles in citizen science projects, covering informed consent, participant rights, responsible data use and compliance with relevant regulations.	3	1	2	0
N30	AI transparency/ algorithm accountability	Data governance and compliance	Support for embedding recognised scientific standards — including reproducibility, peer review and disciplinary rigour — into citizen science practice, so	3	2	1	0

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.

			that CS outputs are accepted as legitimate contributions to knowledge				
N28	Scalability and performance	Tools, platforms and infrastructure	The infrastructure must scale across users, data volumes, computation and geography.	1	0	1	0
N35	Quick availability	Tools, platforms and infrastructure	Resources, tools, support and data that can be accessed immediately/as quickly as possible when needed, without lengthy application processes, waiting periods or technical barriers, so that participants and projects can act on opportunities in real time.	1	1	0	0

Table A8. Needs are shown in their thematic clusters in descending order of frequency of mention by the umbrella citizen group, including a breakdown into the citizen subgroups.

This project has received funding from the European Union's research and innovation programme Horizon Europe under the grant agreement No. 101188210. This document reflects only the author's view and the Commission is not responsible for any use that may be made of the information it contains.