

D5.1: Evaluation and Impact Assessment Plan

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Abbreviations

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|---|
| APRE – Agenzia per la Promozione della Ricerca Europea |
| AU – Aarhus University |
| CC-CS – Competence Center - Citizen Science |
| CHX – Crowdhelix Limited |
| CRG – Fundacio Centre De Regulacio Genomica |
| CS - Citizen Science |
| DoA – Description of Action |
| EC - European Commission |
| ECSA - European Citizen Science Association |
| EPA - Environmental Protection Agency |
| ESE - Engagement & Public Education |
| ESF – Fondation Européenne De La Science |
| SFI - Science Foundation Ireland |
| GA – Grounding Actions |
| IA s - Intervention Areas |
| IPIC - SFI Centre for photonics, is Ireland’s centre of excellence for research, innovation and PhD training in photonics – the science and application of light |
| IRC - Irish Research Council |
| IUA - Irish University Association |
| KPI - Key Performance Indicator |
| KTU – Kaunas University of Technology |
| MQP - Management and Quality Plan |
| PI - Principal Investigator |
| RRI - Research & Innovation |

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|---|
| SDG -Sustainable Development Goals |
| SFI - Science Foundation Ireland |
| RFOs - Research Funding organizations |
| RPOs - Research Performing organizations |
| T-UCC – Tyndall National Institute University College Cork |
| UCL – University College London |
| UniSR – Università Vita-Salute San Raffaele |
| WP - Work Package |
| ZSI – Zentrum Für Soziale Innovation Gmbh |

Executive Summary

The current document, titled “Evaluation and Impact Assessment Plan”, has been developed within the framework of the TIME4CS project, which is funded by the European Union’s Horizon 2020 Research and Innovation Programme under Grant Agreement No 101006201.

Evaluation and impact assessment activities in TIME4CS aim to:

- jointly assess the progress of implemented institutional changes in the participating organizations and understand mutual learning effects between front-runners and implementers of the project.
- develop a set of indicators to assess institutional change to promote citizens engagement in science along the four intervention areas of “Research”, “Education & Awareness”, “Support Resources & Infrastructure”, and “Policy & Assessment”.
- provide research performing organizations (RPOs) and research funding organizations (RFOs) with a monitoring toolkit to self-assess and monitor their progress towards organizational change.
- learn about the implementation process of institutional changes in implementing organizations to understand the different pathways taken within the organizations and their intended and unintended consequences.

Thus evaluation and impact assessment comprises of:

- a summative evaluation of the project’s benefits in participating organizations where the challenge is to develop a comprehensive indicators’ set that links to the case study analysis in WP1 and adapts to the different Grounding Actions (GAs) realized in the implementing organizations.
- a formative evaluation of the implementation of roadmaps and Grounding Actions that helps to iteratively shape the Grounding Actions, the training formats, encounters and materials developed by the project, trying to detect the non-conformances that may occur during the implementation process as well as drivers for engagement and usage.

In TIME4CS, evaluation is integrated in all project activities from the very beginning, it is understood as a form of participatory evaluation that initiates the conversation on expectations, objectives, and impact already at the start of the project. Consequently, WP5 has started the evaluation process with representatives from the four implementing organizations - CRG, KTU, UniSR and Tyndall - from the beginning of the project. A first exercise was to understand the current situation in these organizations - an initial stock-taking - where the evaluation team collected data on the implementers' current status of institutional support for citizen science (CS) in the four intervention areas. Only when the baseline is known before starting the design and implementation of the roadmaps and Grounding Actions, a proper evaluation of the project’s benefits and outcomes at the end is possible.

To develop a set of indicators for institutional changes in RPOs towards more support of citizen science, WP5 closely cooperates with WP2 to accompany the development of roadmaps and Grounding Actions in the implementing organizations. These actions are expected to lead to the institutional changes in the implementing organizations and are assessed with regard to their usefulness and intermediate and long-

term outcomes. Additionally, the evaluation team took a closer look at the framework for setting up and looking at the case studies analysis, which was developed in WP1 and fed the indicators of WP5.

The outcome of this work is a set of indicators for institutional changes for each intervention area and a set of indicators that keep track of changes in individual participants, like researchers, management and students. Quantitative and qualitative instruments to collect data for these indicators are set up and will be more concretely elaborated and tested in cooperation with the implementing organizations and in parallel to the implementation of the Grounding Actions. A set of monitoring and reflection questions will be the focus of three-monthly monitoring meetings with implementers that help to learn from the implementation process and iteratively shape the developed trainings, workshops, documents, strategies, etc., developed by the project. Finally, a set of overall project key performance indicators (KPIs) is introduced together with their status when writing this deliverable.

Thus, this document is the basis for the further evaluation activities of the TIME4CS project. Based on this framework, the evaluation team will elaborate the detailed data collection instruments and launch these instruments in interdependence of the implemented Grounding Actions. The formative evaluation of the implementation processes in the four implementer organizations will start in January 2022. The outcomes of the data collection and analysis will be presented in the next deliverable D5.1 Interim evaluation report at the end of December 2022.

Introduction

The document presents the evaluation and impact assessment plan for the TIME4CS project and is structured along the following main chapters:

1. About the project

Provides a short introduction about the project and the applied methodology.

2. Indicators for institutional change - summative evaluation

Presents the TIME4CS indicators for institutional change at an organizational and individual level and it relates the indicators to MoRRI and SDG indicators.

3. Implementation process & mutual learning - formative evaluation

Introduces the key questions for the formative process evaluation and the timepoints and monitoring events.

4. Baseline and planned Grounding Actions

Describes the outcomes of the first stock-taking exercise in implementing organizations and relates this starting base to the planned Grounding Actions.

5. Collection instruments and time points of data collection

Provides a description of the data collection instruments and time points of data collection for the assessment of institutional changes.

6. Monitoring of KPIs

Presents the key performance indicators of the TIME4CS project and the actual status of reaching them when writing this deliverable.

7. Summary

Shows an overview of the main collection instruments and the timeplan, and points to the next steps taken in this work package.

1. About the project

TIME4CS aims at supporting and facilitating the implementation of sustainable Institutional Changes in Research Performing organizations (RPOs) to promote Citizen Science and public engagement (citizens and citizens associations) in science and technology.

Public engagement - in all its forms and applications, including Citizen Science - has a strong structural, transformative power at various levels of research and innovation processes. It incorporates a variety of viewpoints into problem formulation and research questions whilst taking into account moral or ethical societal concerns.

TIME4CS aims at facilitating a way in which the scientific ecosystem could better take societal views into consideration by supporting Research Performing organizations - i.e. research entities such as universities and research centres - in defining and implementing institutional changes that can lead to a better and more effective engagement of citizens in research and innovation. Those institutional changes inside RPOs will entail a transformation of their governance systems by taking into account both the social - mindset of people inside the organization – and the organizational - norms, protocols, procedures, policy - aspects of RPOs. To facilitate this process, TIME4CS has identified 4 Intervention Areas that alone or combined can stimulate the institutional changes necessary to promote public engagement in R&I activities:

1. Research
2. Education & Awareness
3. Support Resources & Infrastructure
4. Policy & Assessment.

For each Intervention Area, a set of Grounding Actions (GA) was defined. The Grounding Actions are to be considered as seeds to be sown, paving the way to Institutional Changes within RPOs. TIME4CS builds on the close collaboration between Front-Runners - RPOs with a comprehensive expertise in Citizen Science and that have already undergone Institutional Changes - and Implementers - beneficiaries still in the early stage of the institutional adoption and/or maintenance of Citizen Science in their organizations.

The specific objectives of the project are:

- To increase knowledge on the actions leading to Institutional Changes in Research Performing Organizations (RPOs) necessary to promote Public Engagement and Citizen Science in science and technology
- To support TIME4CS RPOs in the implementation of actions leading to Institutional Changes through continuous mutual learning and knowledge transfer programme
- To build a dynamic and inclusive Citizen Science stakeholder community
- To increase the awareness of the need for a sustainable and flexible organization of RPOs governance system to better respond to the evolving relationship between science and society.

In order to ensure a sustainable change towards public engagement in scientific processes, TIME4CS' work plan is structured in 7 interlinked Work Packages covering all stages of the institutional adoption of Citizen Science. A comprehensive analysis of the institutional adoption and maintenance of citizen science capacity from the literature and a systematic mapping of the knowledge provided by Front-Runners in relation to the 4 Intervention Areas, feeds the definition of tailored Roadmaps for Implementers, detailing specific Grounding Actions that will be carried out during the project. TIME4CS has established a knowledge transfer and mutual learning programme between Front-Runners and Implementers. Moreover, TIME4CS will build capacity to enable institutional and cultural changes needed for Citizen Science adoption. Training activities will be developed to contribute to raising awareness and creating a community around TIME4CS, as they will not be exclusive of TIME4CS beneficiaries but open to the whole Citizen Science community. The whole process is constantly monitored and assessed in work package 5, which is responsible for this document, through the development of a set of indicators to assess Institutional Change to promote citizen's engagement in science along the four Intervention Areas defined by TIME4CS.

2. Indicators for institutional change - summative evaluation

As outlined in Chapter 1, the evaluation and impact assessment work package of TIME4CS is responsible for the elaboration and evaluation of a set of indicators to assess Institutional Change. This chapter presents this set of common indicators that bring evidence for institutional changes across the implementing organizations along the four intervention areas, integrating both - the organizational and social - approaches of institutional change.

2.1. TIME4CS Institutional and individual indicators

In TIME4CS we understand institutional change as a type of change triggered in an organization and characterized by four main dimensions: a) the change is irreversible, which means that it may be visibly rooted and last in time; b) the change is comprehensive, referring to its capacity to exceed the changes only on rules and procedures and include other areas like culture, communication, etc.; c) the change is inclusive, as it should be a result of a collective result including all stakeholders; and d) the change is contextualized, as it may consider the background of the research organization and tailor specific measures for unique organizations.

In order to implement institutional changes, we find two theoretical models: On one hand, the **social approach** starts from the modification of social patterns such as cognitive, emotional, relational, etc. which are largely shared by the people within an organization. It supposes a major personal commitment of people to change their own behaviours, views and mindset^{1,2}. On the other hand, the **organizational approach** tries to modify the organizational structures (i.e. norms, procedures, protocols, etc.) that are the base of the organizational life. It primarily puts the efforts on the involvement of leaders and managers which will use the hierarchical relations to change the norms that lead to further behavioural change in time^{3,4}. While the social approach proposes a mostly bottom-up style of institutional change, the organizational approach works on a top-down basis.

In TIME4CS we believe that **both, the bottom up and top down approaches**, are needed. The social approach needs a certain level of stabilization of the new “behavioral” arrangement, which may be crystalised in clear norms, procedures and structures. Meanwhile, the organizational approach requires a certain level of consensus and involvement to legitimise the changes.

This is the reason why in the TIME4CS evaluation framework we consider both aspects of change: the changes that take place on an individual level of involved researchers, students and support staff from

¹ Berger, P. L., and T. Luckmann. 1966. *The Social Construction of Reality: A Treatise in the Sociology of Knowledge*. Garden City, NY: Anchor Books

² North, Douglass C. and Alt, John, *Institutions, Institutional Change, and Economic Performance* (1990). University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship

³ Coriat, Benjamin & Weinstein, Olivier. (2002). Organizations, firms and institutions in the generation of innovation. *Research Policy*. 31. 273-290.

⁴ North, Douglass C. and Alt, John, *Institutions, Institutional Change, and Economic Performance* (1990). University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship

RPOs; and the changes in organizational structures that are triggered by the involvement of managers and are expected to lead to further behavioural change (see Figure 1).



Indicators for Institutional Changes to support citizen science in RPOs

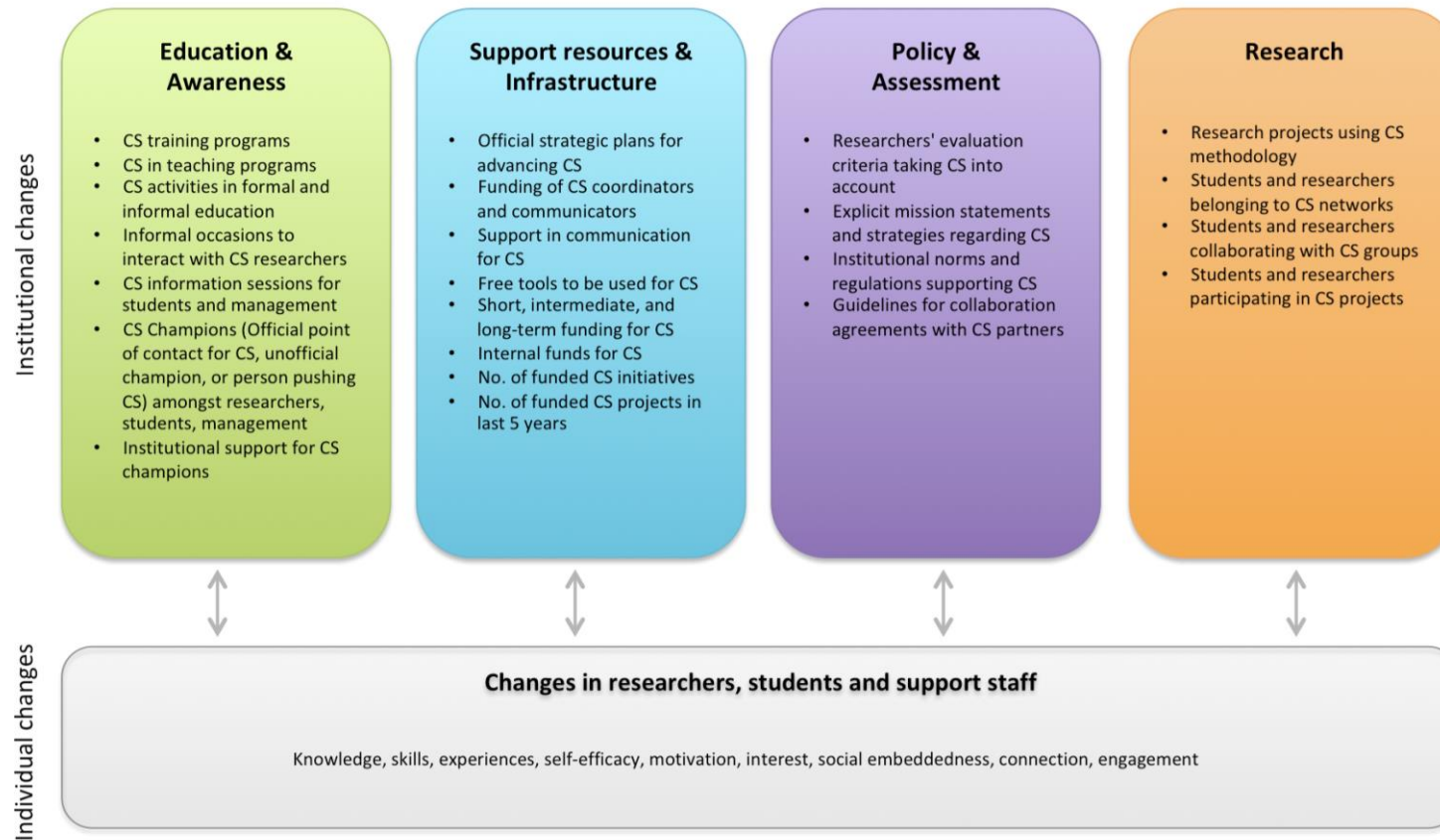


Figure 1: Indicators for Changes on institutional and individual level

Thus, in the evaluation we will consider keeping track of both:

1. **Changes at an institutional level:** These are structured along the four intervention areas “Education & Awareness”, “Support Resources & Infrastructures”, “Policy & Assessment”, “Research” and are presented in the upper four rectangles in Figure 1. The indicators for changes at an institutional level are aligned with the set of indicators developed in WP1 for the case study analysis. This alignment allows reflecting and presenting the TIME4CS implementing organizations according to the same framework as the other 30 international cases selected in WP1.
2. **Changes at an individual level:** These changes in researchers, students and support staff are presented in the bottom rectangle of Figure 1. They cannot be attributed to one specific intervention area only. For instance: Increases in knowledge and skills of individual participants is an expected outcome of institutional changes related to “Education & Awareness”; but can also be triggered by the implementation of a general contact point for citizen science, thus being related to “Support Resources & Infrastructures”. And aspects in individuals, like knowledge, motivation and interest, might not only be a consequence of institutional changes but also a pre-condition to drive institutional change.

We are aware that some of these changes might only take place in a **longer-run**, when the project runtime is over. For instance, the implementation of citizen science trainings is expected to result in increased knowledge and skills on citizen science - both to be measured throughout the project runtime. But, ideally, this increased knowledge leads to a higher number of citizen science projects and researchers collaborating with citizen science groups, which might only happen after the end of TIME4CS. Nevertheless, we expect that the Grounding Actions in the implementing organizations will lead to clearly measurable changes, which WP5 will bring evidence for. In addition, the evaluation team will elaborate and provide an **evaluation toolkit** to implementers at the end of the project to continue tracking institutional changes on organizational and individual levels. This evaluation toolkit will also be provided to other RPOs outside of the consortium who wish to monitor and evaluate institutional changes that support Citizen Science.

2.3. Mapping with RRI and other indicators

The MoRRI project⁵ aimed at developing indicators for measuring Responsible Research and Innovation (RRI) in its implementation on national levels in Europe. RRI refers to the inclusion of all citizens in research and innovation processes and has been championed by the European Commission. In regards to these objectives, the project TIME4CS aims at:

- a greater involvement of all stakeholders in R&I
- a better and more sustainable engagement with citizens and society as a whole
- a more scientifically interested and literate society

TIME4CS identified four intervention areas, and for each intervention area the project has identified a set of Grounding Actions, which will be elaborated further during the course of the project. Each implementer has worked out together with the Front-Runners and experts their own roadmap defining tailored

⁵ <https://morri.netlify.app/>

Grounding Actions that are described in detail in D2.1 and shortly introduced in Chapter 3 of this deliverable. TIME4CS will focus its efforts on the 4 implementers who will, at least, implement 16 GAs and involve the different expertise and commitment of their local stakeholders leading to institutional change and ensuring its sustainability.

It should be noted that the data collection process as performed by the MoRRI project couldn't be replicated as such in the context of the TIME4CS project as they refer mostly to national levels of implementation, but a certain mapping of the data collected in this framework with the MoRRI indicators can be achieved. In addition, TIME4CS will continually monitor and integrate the results of the Super MoRRI project.

As described in the description of work, the project aims to align its indicators with the **MoRRI indicators** PE5, PE7, PE8, PE10, OA1, OA3, SLSE4, GOV2 & GOV3 and **SDGs** (4, 5, 9, 12, 16 & 17). The following tables provide an overview, how and where the identified indicators are reported in the course of the project.

| MoRRI | Description | Project evaluation | How to measure | Report |
|-------|--|---|---------------------------|----------------------|
| PE5 | Public engagement performance mechanisms at the level of research institutions (universities & public research agencies) | Number of mechanisms the TIME4CS project partners apply to interact with citizens and societal stakeholders (e.g. GA that involve citizens and societal actors in research); strategic priority of public engagement in RPOs (e.g. defined in strategy papers, mission statements etc.) | quantitative, qualitative | Evaluation report |
| PE7 | Embedment of public engagement activities in the funding structure of key public research funding agencies | Funding that TIME4CS project partners use for projects or programs to target public engagement in their institutions; stressing the importance of public engagement towards local funding agencies. | quantitative, qualitative | Evaluation report |
| PE8 | Public engagement elements as evaluative criteria in research proposal evaluations | Stressing public engagement as an important criterion for the appraisal of research applications internally and on local level. | qualitative | Evaluation report |
| PE10 | National infrastructure for involvement of citizens and societal actors in research and innovation | Number of involved citizens and societal actors in research and innovation through TIME4CS project-related activities or projects, number of GA that provide access, representation, and availability of multiple channels for interaction with citizens. | quantitative | Evaluation report |
| OA1 | Open Access Literature | Number of TIME4CS publications that are sustainably shared openly e.g. Gold or Green OA | quantitative | Dissemination report |

| | | | | |
|--------------|--|--|---------------------------|----------------------|
| OA3 | Social media outreach/take up of Open Access Literature and open research data | Dissemination of Open Access Literature through TIME4CS Twitter-, Facebook-, Newsletter- -account and project's website with an online repository containing TIME4CS best practices and lessons learnt | quantitative | Dissemination report |
| SLSE4 | Citizen science activities in Research Performing organizations | Engagement in citizen science in projects or via scientific publications on the subject (no. of CS projects, no. of publications related to CS) | quantitative | Dissemination report |
| GOV2 | RRI-related governance mechanisms within research funding and research performing organizations | Number of established processes for managing citizen engagement in RPOs | quantitative | Evaluation report |
| GOV3 | RRI-related governance mechanisms within research funding and research performing organizations - composite index | Active encouragement of citizen engagement among researchers, employees or partner organizations | quantitative, qualitative | Evaluation report |

Table 1: MoRRI and project indicators

Similarly, this applies to the Sustainable Development Goals (SDGs) as defined by the United Nations. A first matching exercise between the project activities and SDGs was performed.

| SDGs | Description | Project evaluation | How to measure | Reports |
|-------------|--|--|---------------------------|--|
| SDG4 | Quality Education: ensure inclusive and equitable quality education and promote lifelong learning opportunities for all | As the involvement in CS projects presents a great opportunity for citizens of all age groups to acquire new skills, knowledge and experiences, TIME4CS will support this goal by a higher number of CS projects, outreach activities etc. | quantitative, qualitative | Evaluation report |
| SDG5 | Gender equality: achieve gender equality and empower all women and girls | Gender equality in staff of RPOs and citizens involved in the TIME4CS activities | quantitative | Evaluation, dissemination, management report |

| | | | | |
|--------------|--|--|---------------------------|-------------------|
| SDG9 | Industry, innovation and infrastructure: build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation | Fostering the involvement of citizens in research and innovation contributes to the goal of a more inclusive and sustainable innovation; no. of R&I projects involving citizens. | qualitative, quantitative | evaluation report |
| SDG12 | Sustainable consumption and production: ensure sustainable consumption and production patterns | No. of CS projects that foster sustainable consumption and production and are the outcome of the TIME4CS Grounding Actions. | qualitative, quantitative | Evaluation report |
| SDG16 | Peace, justice and strong institutions: promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels | no. of CS projects that foster peace, justice and strong institutions and are the outcome of the TIME4CS Grounding Actions; number of civil society organizations involved in research | qualitative, quantitative | Evaluation report |
| SDG17 | Partnerships for the goals: strengthen the means of implementation and revitalize the global partnership for sustainable development | Strong global CS partnerships that link actors of the quadruple helix in collaborative research activities via e.g. partnerships in the ECSA, the ECSA working group on SDGs | quantitative | Evaluation report |

Table 2: SDG and project indicators

As can be seen in the tables above, in the mapping of the TIME4CS project activities with the already identified MoRRI and SDG indicators, some adaptations and refinements were needed. The indicators relate to the impact of the implementation of citizen science in the implementing organizations, the project consortium, and the involved stakeholders. In a mixed approach, using both qualitative and quantitative methods, as described in this document, the experiences accumulated throughout the implementers' case activities will be captured. Some of the expected contributions can be measured in the lifetime of the project and with the planned instruments. However, it should be noted that some of the indicators would be measurable only after the end of the project since they represent mid-term or even long-term effects.

3. Implementation process & mutual learning - formative evaluation

3.1. Key questions of the formative evaluation

TIME4CS aims to foster a mutual learning experience between Implementers and Front-Runner organizations and also between Implementers. Part of this learning experience is to better understand the process of selecting, defining, planning and rolling-out the Grounding Actions within the different settings of the RPOs. With this aim a formative evaluation of the process is key.

The formative evaluation not only will allow the project to continually improve its interventions in the four areas, but also will support the outreach to other RPOs and their implementation of institutional changes.

Key questions for the formative evaluation are:

- What are the steps that implementers take to realize their Grounding Actions?
- Which of these steps are successful and which not?
- What are the intended but also unintended consequences of their implementation steps?
- What would they recommend to other implementers and what rather not?

The formative evaluation of the implementation process will be conducted in close collaboration with WP2.

3.2. Reflection instrument and time points

Together WP2 and WP5 will organize “**Implementers’ Journey Reviews**” that take place every three months starting in January 2022. These online workshops are dedicated to reflecting on the taken steps and thinking about future activities.

For the preparation of these meetings a template will be prepared and filled in by each implementing organization before the meeting. In this template implementers will not only document the main steps taken, but also the problems, solutions, outcomes and learnings from these steps.

In the Implementers’ Journey Reviews these entries will be discussed together. Experts from the Front-Runner organizations will join these meetings and provide advice to support solving challenges and answering open questions that arise during the implementation process. Every 6 months these meetings will have the format of an Implementer Forum where the implementing organizations will share questions and advice between them (supported by WP3).

4. Baseline & Planned Grounding Actions

4.1. Stock-taking of implementers

The first task that WP5 organized together with the four implementing organizations was to do an initial stock-taking of institutional changes in their organizations and learn about existing initiatives and institutional arrangements that involve Citizen Science practice. ZSI developed a template that integrated indicators in the four intervention areas and was provided to implementing organizations. In an online workshop with each implementing organization separately the filled-in templates were discussed and amended as a result of the discussion.

The following sections will provide the reader with the summaries of the stock-taking exercises and a list of planned Grounding Actions for each implementing organization. The evaluation team of WP5 will observe and regularly reflect upon the implementation of Grounding Actions and collect evidence of their impact on individual researchers, students and staff members related to the support of citizen science.

4.2. CRG - Centre for Genomic Regulation (Spain)

4.2.1. Stock-taking in CRG

The Centre for Genomic Regulation (CRG) is an international biomedical research institute of excellence, created in December 2000. The CRG is a highly competitive research centre, with a very high rotation

system of scientists (PhD students and postdoctoral researchers can stay a maximum of 5 years at CRG, and junior principal investigators 9 years). Citizen science requires time and dedication and does not always guarantee the production of publishable results in the medium term. This is very challenging for junior researchers, who need to publish in a relatively short time to advance their career when they leave the CRG. In addition, since CRG has a focus mostly on fundamental science, involving expensive and highly sophisticated technologies, the application of the citizen science methodology is not immediate (sometimes not possible) and requires CRG to consider very carefully how to involve citizens in some of the research projects.

Another barrier is the lack of knowledge or understanding of the citizen science methodology by CRG researchers. Even after leading two citizen science projects at the institute, the majority of researchers are still confused about the citizen science principles and the difference to other participatory research processes. They identify citizen science with some aspects of public engagement and are not aware of the fact that citizen science is a methodology to conduct real research in collaboration with the public. Scientists perceive that they need to involve more time in aspects like engagement and training, which are not necessary in a traditional research project. TIME4CS needs to support changing knowledge and attitudes about the benefits and methodologies of citizen science.

Research

CRG has been involved in two citizen science projects so far:

At the time of writing this deliverable, CRG is running a citizen science project called **GENIGMA**⁶ as an experiment within the EU project ORION Open Science⁷. It is a co-created mobile game app which has been in development for two years. The game was released in September 2021 and was tested with different groups of people for the validity of the data obtained. There is also a web-version to work with the tester communities to show the results obtained and give them feedback about their participation⁸.

Previously, CRG carried out a citizen science project on the mouth microbiome called **SACA LA LENGUA** (Stick out your tongue)⁹ with a high national impact. It ran for four years, has already been completed and the scientific results are being published.

The following scientific publications are related to the previous citizen science project and there are more in preparation:

- Citizen science charts two major “stomatotypes” in the oral microbiome of adolescents and reveals links with habits and drinking water composition (springer.com)¹⁰
- Oral microbiome in down syndrome and its implications on oral health (tandfonline.com)¹¹
- Citizen-science based study of the oral microbiome in Cystic fibrosis and matched controls reveals major differences in diversity and abundance of bacterial and fungal species (tandfonline.com)¹²

⁶ <https://genigma.app/en/>

⁷ <https://www.orion-openscience.eu/>

⁸ <https://genigmagame.app/en/resultados/>

⁹ <https://www.sacalalengua.org/stick-out-your-tongue/>; <https://www.sacalalengua.org/stick-out-your-tongue/>

¹⁰ <https://doi.org/10.1186/s40168-018-0592-3>

¹¹ <https://doi.org/10.1080/20002297.2020.1865690>

¹² <https://doi.org/10.1080/20002297.2021.1897328>

CRG is a member of the ECSA and member of the Barcelona Citizen Science Office promoted by the Barcelona City Council.

The CRG citizen science facilitator has also participated as an expert in the citizen science encounters organized by the Ibercivis Foundation¹³, to define a national strategy on citizen science, and participated in citizen science-related workshops and conferences. The Ibercivis Foundation brings citizen science at Spanish national level together and has collaborated with CRG on several occasions, but they do not have a membership. Whenever the opportunity arises, the CRG citizen science facilitator delivers talks and posters in conferences of the citizen science field.

Education & Awareness

CRG does not offer any training and teaching programs on citizen science yet, except a brief session about citizen science that was delivered to new PhD students during their induction course in 2019. There have been some informative talks for support staff about the first citizen science projects of CRG and one-to-one contacts with some scientists of these two projects.

So there is very limited knowledge about citizen science among researchers, however many CRG researchers are aware that a few groups have developed citizen science projects at the CRG. Some researchers also participated in info sessions organized within the Enigma project. The Saca la Lengua project gained high visibility also among the CRG research community.

These projects have been possible thanks to the participation of the citizen science facilitator. She is the citizen science champion in CRG, who has been training the team of researchers and working side by side with the scientists in engagement and communication. The scientists participate in the process of ensuring experimental data quality, and there is legal support regarding data privacy.

CRG had some occasional events where they involved the public in discussions about citizen science. For example, they organized a CRG Science Cafe about the project Saca la lengua¹⁴.

In Genigma CRG researchers organized co-creation events with representatives of the public to talk about citizen science and participated in several workshops or conferences.

Support Resources & Infrastructures

As mentioned before, CRG has one citizen science facilitator who supports researchers especially in the public engagement and communication activities. This citizen science facilitator is hired to support and guide the CRG citizen science projects, but the position is not structural and depends on the external funding of specific citizen science projects.

The citizen science facilitator is the contact point and also supports proposal preparation. To give an example: when ORION launched an open call for new citizen science projects, the citizen science facilitator got in contact with different scientists to try to identify research questions to be addressed with a citizen science approach. As a result, the call funded the Genigma project.

¹³ <https://ibercivis.es/>

¹⁴ <https://twitter.com/CRGenomica/status/1255500724643004419?s=20> ; <https://www.crg.eu/en/event/cafe-cientific-la-unio-fa-la-forca-ciutadania-i-comunitat-cientifica-juntes-en-lestudi-de-la-microbiota-bucal>

There is no specific website to communicate about citizen science activities with the public, so for the moment citizen science projects are included in the “Science and Society”- section of the CRG website¹⁵.

CRG's social networks are actively used to promote participation in citizen science projects (Twitter example: <https://twitter.com/CRGenomica/status/1381543456284229632?s=20>)

Moreover, the Bioinformatics Unit¹⁶, part of CRG's core facilities, and the IT Department were assisting in both citizen science projects.

There is no internal funding for citizen science in CRG. At the Spanish level, the FECYT Foundation has a specific funding scheme for citizen science (in addition to general outreach and engagement funding schemes), although grants in this call are not really substantial. CRG applies every year to this call without success so far.

The Sacala lengua project was supported by ‘la Caixa’ Banking Foundation (a private Foundation not exclusively dedicated to support citizen science) and the Genigma project funded by the European Commission. Funding for citizen science projects is an important challenge – funding that provides enough resources for the engagement of citizens but also for the research itself, including dedicated personnel for both types of activities.

CRG members are expected to be familiar and comply with the PRBB Code of Good Scientific Practice¹⁷, which defines and strictly bans scientific misconduct. CRG researchers are also bound by the CERCA Code of Conduct¹⁸ (CERCA being the public institution that supervises and supports all research institutes created by the Government of Catalonia). Every new researcher at CRG has to undertake an online certified course about research integrity.

Policy & Assessment

Science communication and public outreach is an integral part of the new Strategic Plan 2021-2024 of CRG, as it was integrated in the previous one. CRG has a Policy on Open Access to publications, and has just developed a Policy on Research Data Management. There is no policy or concrete mission statement regarding citizen science yet.

Participation in public engagement is positively appreciated in researchers' evaluation, but there is no dedicated consideration of citizen science activities.

The CRG director supports citizen science and has been promoting the two citizen science projects in different forums. The researchers are not explicitly encouraged to participate in citizen science projects yet, but the organization is currently looking for incentives for scientists to engage in citizen science (e.g. like new funding opportunities due to funding programs like ORION).

citizen science in general and results of the Sacala Lengua project have been presented to the management and the same is planned, when the Genigma project is ready to launch.

¹⁵ <https://www.crg.eu/en/content/about-us/science-and-society>

¹⁶ <https://www.crg.eu/taxonomy/term/45>

¹⁷ <https://share.prbb.org/public.php?service=files&t=2ce671a9a38e27574bbe52b9c5745188&download>

¹⁸ http://cerca.cat/wp-content/uploads/2018/11/Code-of-Conduct-CERCA_nov2018.pdf

4.2.2. Planned Grounding Actions in CRG

In total, 4 GAs are planned:

- GA1 – Planning changes in organizational structures [Research]
- GA2 – Raising internal awareness & train researchers on citizen science [Education and Awareness]
- GA3 – Developing institutional guidelines on the implementation of citizen science projects [Support resources and infrastructures]
- GA4 – Developing an institutional policy about citizen science projects [Policy & Assessment]



CRG: Starting situation and planned Grounding Actions

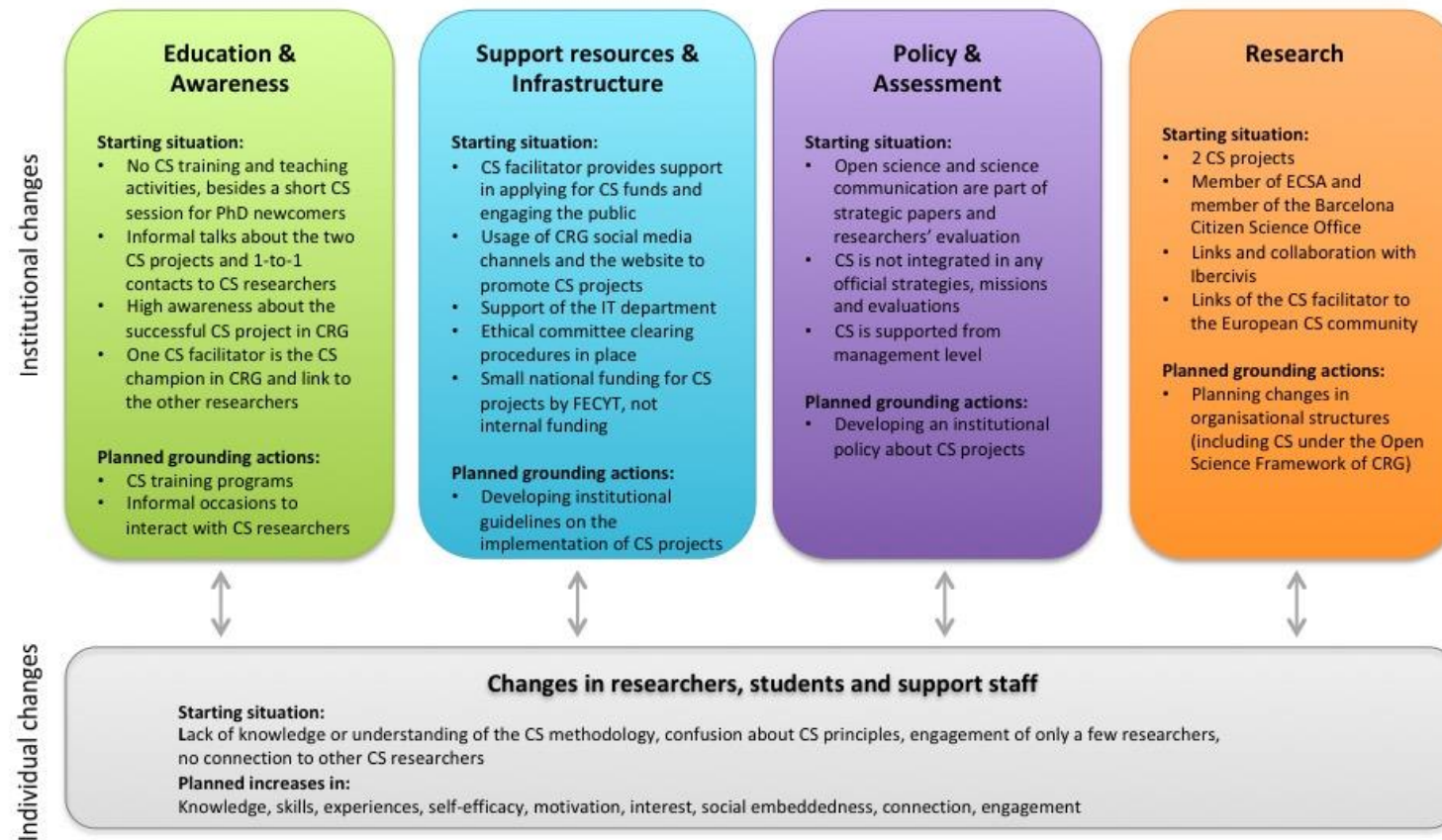


Figure 2: CRG: Starting situation and planned Grounding Actions

4.3. KTU - Kaunas University of Technology (Lithuania)

4.3.1. Stock-taking in KTU

Kaunas University of Technology is the largest technical university in the Baltic States. It seeks to become a strong science and innovation university, where the university studies are based on study and scientific research symbiosis.

The most important opportunities and triggers to make citizen science an accepted research approach in KTU are:

- A strategic goal to implement university's third mission: cooperation between university and society
- To find out about pressing issues and challenges in the society

The key concerns/barriers that hinder citizen science becoming an accepted research approach in KTU are:

- The concept of citizen science is not widely used and understood in society
- Weak motivation for citizens to engage in citizen science projects
- Weak motivation of scientists to initiate, develop and implement citizen science projects
- Lack of competences in citizen science methodologies and approaches

Research

KTU has seven projects related to citizen science: three H2020 projects, two COST actions and one Erasmus+ project. Also there is one national project funded by the Research Council of Lithuania.

- H2020 project "Empowering Youth and Co-creating Social Innovations and Policy-Making Through Youth Citizen Social Science" (YOUCOUNT)¹⁹ (Call: H2020-SwafS-2018-2020 (Science for and with Society (SwafS), Topic: SwafS-27-2020, Type of action: RIA). 2021-Feb – 2024-Jan (ongoing)
- H2020 project "Supporting Sustainable Institutional Changes to Promote Citizen Science in Science and Technology" (TIME4CS)²⁰ (Call: H2020-SwafS-2018-2020 (Science for and with Society (SwafS), Topic: SwafS-23-2020- Grounding RRI in society with a focus on citizen science, Type of action: CSA). 2021-Jan – 2023-Dec (ongoing)
- H2020 project "ECIU University Research Institute for Smart European Regions (SMART-ER)"²¹. 2021-02-01 - 2024-01-31. WP5 is focussed on citizen science.
- COST Action 17127 "Building in Scientific Literacy in Evolution in Europe" (EuroScitizen)²². 2019 – 2023 (ongoing). WG5 is focussing on citizen science.
- COST Action CA15212 "Citizen Science to promote creativity, scientific literacy, and innovation throughout Europe"²³ 2016 – 2020 (ended).
- The European Union programme Erasmus+ project „ECIU University“. 2019-11-01 - 2022-10-31
- National project "Citizen Science as an Innovative Form of Citizen Participation for Welfare Society Development" (CS4Welfare) funded by Research Council of Lithuania (Contract No. S-GEV-20-6).

¹⁹ <https://cordis.europa.eu/project/id/101005931>

²⁰ <https://cordis.europa.eu/project/id/101006201>

²¹ <https://www.eciu.org/for-researchers/about#smart-er>

²² <http://www.euroscitizen.eu> ; <https://www.cost.eu/actions/CA17127/#tabs|Name:overview>

²³ <https://cs-eu.net>

KTU is constantly applying for H2020 (now Horizon Europe) projects, which have a dimension of citizen science (e.g. submitting proposals for Green Deal call, the COST action)

Publications, directly related to citizen science are:

- Butkevičienė, Eglė; Skarlatidou, Artemis; Balazs, Balint; Duží, Barbora; Massetti, Luciano; Tsampoulatidis, Ioannis; Tauginienė, Loreta. Citizen science case studies and their impacts on social innovation // The science of citizen science: [monograph] / editors K. Vohland, A. Land-Zandstra, L. Ceccaroni, R. Lemmens, J. Perelló, M. Ponti, R. Samson, K. Wagenknecht. Cham : Springer, 2021. ISBN 9783030582777. eISBN 9783030582784. p. 309-329. DOI: 10.1007/978-3-030-58278-4_16_.
- Albert, Alexandra; Balazs, Balint; Butkevičienė, Eglė; Mayer, Katja; Perelló, Josep. Citizen social science: new and established approaches to participation in social research // The science of citizen science: [monograph] / editors K. Vohland, A. Land-Zandstra, L. Ceccaroni, R. Lemmens, J. Perelló, M. Ponti, R. Samson, K. Wagenknecht. Cham : Springer, 2021. ISBN 9783030582777. eISBN 9783030582784. p. 119-138. DOI: 10.1007/978-3-030-58278-4_7_.
- Vohland, Katrin; Göbel, Claudia; Balazs, Balint; Butkevičienė, Eglė; Daskolia, Maria; Duží, Barbora; Hecker, Susanne; Manzoni, Marina; Schade, Sven. Citizen science in Europe // The science of citizen science: [monograph] / editors K. Vohland, A. Land-Zandstra, L. Ceccaroni, R. Lemmens, J. Perelló, M. Ponti, R. Samson, K. Wagenknecht. Cham : Springer, 2021. ISBN 9783030582777. eISBN 9783030582784. p. 35-53. DOI: 10.1007/978-3-030-58278-4_3_.
- Tauginienė, Loreta; Butkevičienė, Eglė; Vohland, Katrin; Heinisch, Barbara; Daskolia, Maria; Suškevičs, Monika; Portela, Manuel; Balázs, Bálint; Prűse, Baiba. Citizen science in the social sciences and humanities: the power of interdisciplinarity // Palgrave communications. Basingstoke : Palgrave Macmillan. ISSN 2055-1045. 2020, vol. 6, iss. 1, art. no 89, p. 1-11. DOI: 10.1057/s41599-020-0471-y.
- Mačiulienė, Monika; Butkevičienė, Eglė; Vaidelytė, Eglė; Balazs, Balint. Co-creating social change through citizen science: systematic literature analysis // Filosofija. Sociologija = Philosophy, sociology. Vilnius : Lietuvos mokslų akademija. ISSN 0235-7186. eISSN 2424-4546. 2021, t. 32, Nr. 2, p. 159-168. DOI: 10.6001/fil-soc.v32i2.4416.

KTU has two CS champions, a vice-dean of research and a senior researcher. The vice-dean is an individual member of ECSA, mainly engaged in two ECSA working groups on “Empowerment, Inclusiveness & Equity” and “Storytelling”. Both citizen science champions of KTU are founding members of **Piliečių mokslo asociacija**, the national citizen science association.

Education & Awareness

There is very limited awareness and knowledge about citizen science among researchers in KTU, however it is expanding. Also, the expertise regarding citizen science methodologies is quite low. However, data privacy issues are being under the responsibility and monitoring of the newly established Ethical Committee (November 2020).

There were no formal citizen science trainings offered to KTU members before 2021, but there were presentations on citizen science from the related projects. As mentioned above, the citizen science approach is currently driven by 2 champions inside KTU, who represent Sociology and Communication studies. There is no official contact point for citizen science yet.

Awareness raising practices are linked to the current citizen science projects and include:

- *For general public:* Publishing articles in media (e.g. <https://www.lrytas.lt/it/laboratorija/2020/12/16/news/lietuve-mokslininke-apie-pilieciu-moksla-arba-mokslininkus-neprofesionalus--17541649/>);
- *For local communities:* giving trainings for local communities on citizen science under the national project “Citizen Science as an Innovative Form of Citizen Participation for Welfare Society Development” (CS4Welfare).
- *For international academic community:*
 - 1) Giving presentations at the scientific conferences
 - 19th Annual STS Conference Graz 2021 "Critical Issues in Science, Technology and Society Studies". Presentation: "Transformative Potential of Citizen science for Social Research Democratization: comparing perspectives of citizen scientists and scientists from academia" (3-5 May, 2021)
 - International conference “Knowledge for Change: A decade of Citizen Science (2020-2030) in support of the SDGs”. Presentation (e-poster): “Citizen science as innovative form to solve social problems in local communities” (14-15 October, 2020)
 - European Citizen Science Association ECSA 2020 conference “Encounters in Citizen Science” (Virtual). Presentation: “Exploring synergies between citizen science and social sciences and humanities” (6 – 10 September 2020)
 - 12th International Social Innovation Research Conference (ISIRC) “Social innovation and enterprise for more prosperous, fair and sustainable societies” (Virtual). Presentation: “The transformative potential of citizen science for social innovations” (1 – 3 September 2020)
 - 11th International Social Innovation Research Conference "Social Innovation: Local Solutions to Global Challenges" (Glasgow, UK). Presentation: “Citizen science and social innovations: Using Citizen science for solving social problems” (2-4, September, 2019), etc.)
 - 2) Giving presentations at SMART-ER project webinars on Citizen Science: Examples of Citizen Science Approaches at ECIU University, which are open for all scientific community (see: <https://www.youtube.com/watch?v=mR34vpQZQ84>).

Support Resources & Infrastructures

KTU has a long successful experience in the implementation of science and innovation projects. Though citizen science is still not very well-known in Lithuania, international and national funding opportunities are available to implement citizen science projects. Different funding opportunities are available under H2020, Horizon Europe programs, also national programs coordinated by Lithuanian Research Council and the 2014–2020 Operational Programme for the European Union Funds’ Investments in Lithuania. Internal Research and Innovation Fund of KTU also funds research projects in different thematics including civil society building.

Researchers of KTU have access to the open data archive “Lithuanian Data Archive for Social Sciences and Humanities (LiDA)”²⁴. The archive is ready to deposit quantitative and qualitative data sets, also including data from citizen science projects.

KTU has an established practice and needed infrastructures to foster open science. KTU is a member of the European Open Science network “OpenAIRE”²⁵ that builds open science policies for the European Commission, provides training and contributes to developing open science services and infrastructures. KTU representative is the OpenAIRE National Open Access Desk coordinator.

The above mentioned KTU and the ECIU consortium project SMART-ER will establish and sustain a citizen science dedicated webpage under the ECIU consortium webpage, that will serve for citizen science community building and citizen science projects’ descriptions²⁶.

Policy & Assessment

In 2021 Kaunas University of Technology (KTU) adopted the KTU Strategy for 2021 – 2025 and the Action Plan 2021 – 2025 to implement this strategy. The document of open access to scientific publications and research data at KTU was approved in 2020. These documents do not explicitly include citizen science, but science communication and public engagement is integrated in all these documents. In the strategy one of the priority activities “Ensuring Effective Communication” is identified. The university’s communication system will be developed and expanded to effectively strengthen the image of KTU in the public domain, properly represent the achievements of the university’s employees and clearly reveal the added value created by the University’s community to all the interested parties. Priority “Smart cities and resilient communities” is one of the 3 priority activities of research and innovation identified in the strategy as well. The university also disseminates information about the open access and its benefits among the members of the university community, supports international and national initiatives promoting open access.

Science communication is one of the elements that is evaluated during the attestation of researchers and university teachers (for the position of professor, associate professor, chief researcher, and senior researcher).

Public engagement and societal impact (where citizen science is a contributor and catalyst for impact and engagement) are assessed as part of a national comparative qualitative evaluation of Lithuanian higher education institutions’ research units, conducted every five years. Institutions are developing impact cases that must make explicit the public engagement activities and the impact achieved.

4.3.2. Planned Grounding Actions in KTU

In total, 4 GAs are planned:

- GA1 – Research and Networks [Research]
- GA2 – Non-formal education programs [Education and Awareness].
- GA3 – Virtual hub and contact point for citizen science projects [Support resources and Infrastructures].
- GA4 – Strategic citizen science guidelines [Policy & Assessment]

²⁴ <https://lida.dataverse.lt/>

²⁵ <https://www.openaire.eu/>

²⁶ <https://www.eciu.org/smart-er-for-researchers#citizen-science>

KTU: Starting situation and planned Grounding Actions

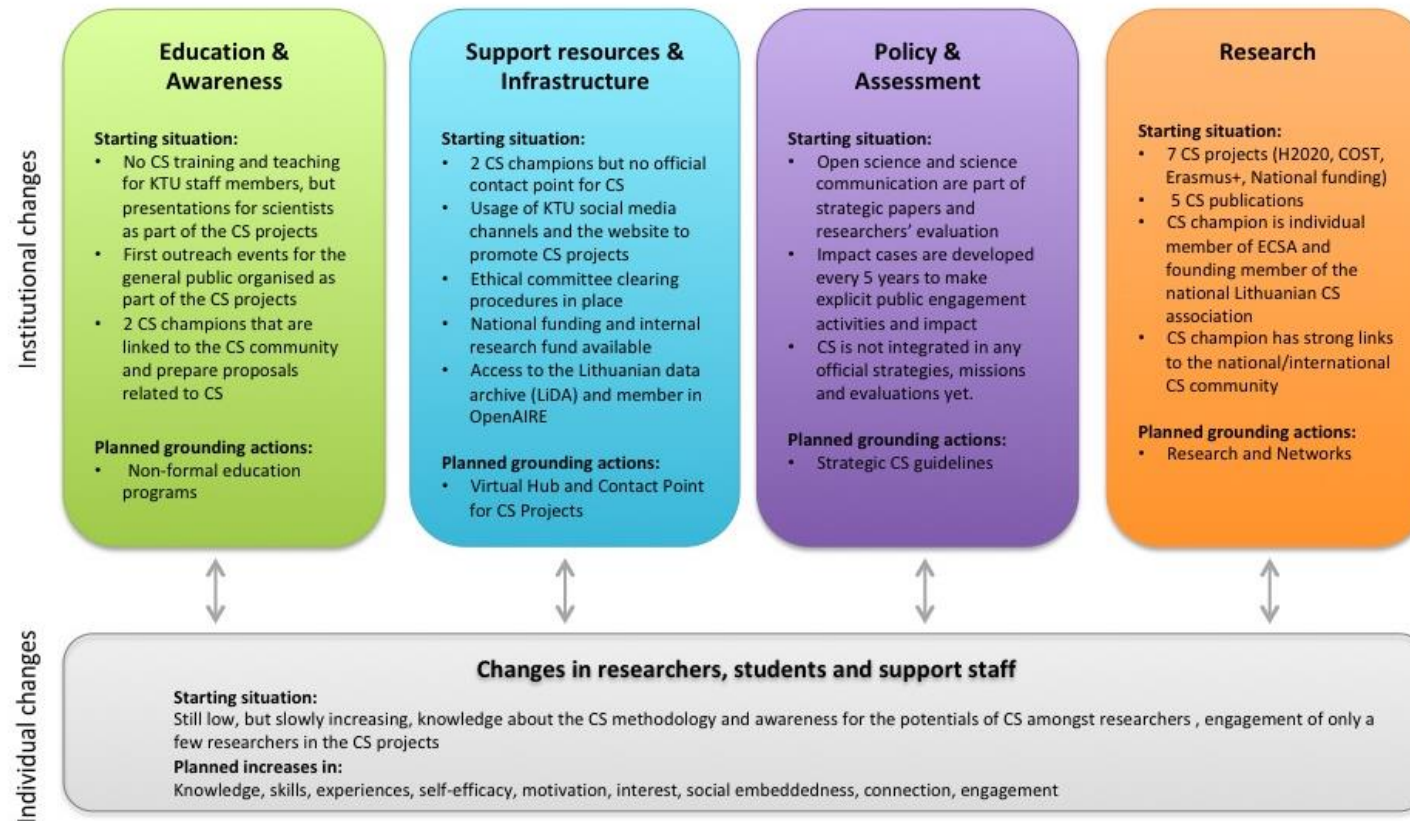


Figure 3: KTU: Starting situation and planned Grounding Actions

4.4. Tyndall - Tyndall National Institute (Ireland)

4.4.1. Stock-taking in Tyndall

Tyndall National Institute is part of the University College Cork (UCC) and a leading research centre in integrated ICT hardware and systems. The institute receives a large amount of funding from EU and local funding agencies such as Science Foundation Ireland (SFI), Irish Research Council (IRC) and the Environmental Protection Agency (EPA). Increasingly, there is an awareness for the necessity to co-design and co-develop research, in line with needs of end-users and the wider society. This aspect is still not widely taken in consideration neither during the initial phases of project design/writing nor after, during project execution. However, all funding agencies now require grant holders to engage with end users/tax payers. This is done mainly through Engagement & Public Education (EPE) activities aiming to raise awareness of the project to specialized audiences, wider public and students.

These forms of EPE are moving from “traditional” passive activities (lectures etc) to more interactive experiences, whereby demos and videos or interactive activities are developed allowing the audience to more actively participate and understand the technology. While there are occasional examples of citizen science projects (mainly in EPA funded projects), there is definitely an opportunity to implement citizen science, co-design and co-development of research. The main barriers at the moment are associated with lack of funding and lack of training at all levels (from undergraduate to experienced senior academics) to implement citizen science into projects and project proposals.

Citizen science might become more important in future. At the moment there is a commitment in engaged research, this is a new term used in Ireland. The aim is to involve the public from the start into research projects to make sure that research is done with the public in mind and the public can benefit from it. But this public engagement is a broad umbrella and not every research institute has to be good in all approaches. In Tyndall, for instance, there is rather a focus on school engagement, and providing researchers with more science communication skills.

There is a new organization called “Campus Engage” - a platform for the promotion of civic engagement activities in Irish higher education and based at the Irish University Association (IUA). It aims to strengthen the relationship between higher education and the wider society, through the promotion of civic engagement activities in higher education and facilitating the sharing of knowledge and resources between academic and civic communities. Also UCC is a member of the Campus Engage initiative and a first meeting with the UCC Civic and Community Engagement Officer has already been organized with representatives from Tyndall to inform about the TIME4CS project. Not only was he very enthusiastic about the project but also willing to support it, pushing citizen science forward mainly in Tyndall. So the UCC Civic and Community Engagement Officer will be the first “champion” involved for the TIME4CS project, as he has the experience, enthusiasm and the willingness to help. Numerous projects/initiatives related to citizen science exist at UCC and national level, but TIME4CS activities are focusing the attention on supporting the implementing organisation Tyndall. The Tyndall project team is now getting to familiarize with the initiatives in the wider UCC and national context and related champions as they will be crucial to support future action and activities.

Research

Tyndall does not have any citizen science research projects so far, but in the wider UCC area there are already successful citizen science projects (< 20) , for instance:

- Appetite for Knowledge
- Dingle Peninsula 2030 - A Model Enabling Community-led Climate Action
- Ireland's secret past - unlocking our fossil heritage
- NatureWatch: Exploring the Benefits of Nature to Wellbeing using Technology
- Redefining STEM: Science of Traveller Ethnicity and Microbiome
- Tree Explorers
- Science 4 Sight Loss
- OneGreenVillage
- MaREI - Stakeholder Collaboration and Engagement Case Studies²⁷
- Crowd4 access²⁸
- GRRIP - Grounding RRI practices in research performing organizations²⁹
- Campus Engage³⁰

There are no scientific publications relating to citizen science so far in Tyndall, but there are scientific publications from the projects in the wider UCC area.

Concerning the networking, Tyndall has no established links to citizen science networks and working groups yet, but is in the framework of the TIME4CS project reaching out to citizen science researchers in UCC, the UCC Civic and Community Engagement and Campus Engage as well as groups active in UCC.

Education & Awareness

The awareness for citizen science among the research personnel is low to medium in Tyndall, in the wider UCC environment it would be a bit higher. Citizen science is one of many other types of 'Public engagement' work, however it is also a separate special field within itself that differs again from the EPE activities done in Tyndall. It requires other sets of skills, time commitments and training. It's not often the first port of choice for researchers to choose due to the commitment it takes, lack of training available, funding etc.

The expertise in methodologies related to citizen science is low, researchers and students would not know the methodologies applied in citizen science unless they received training in this field or did it as part of their coursework within a module they selected.

There is no citizen science training offered in Tyndall, but In UCC there is a citizen science session within the "PG6029: Skills in science communication" module for postgraduate students. Many of Tyndall students have taken this module the past two years, so would have experienced the 2-3 hour session on citizen science within this module. The session on citizen science is delivered by Dr Mark Wilson (School of Biological, Earth and Environmental Sciences). He has incorporated a large-scale citizen science platform into his research that has over 10,000 active volunteers. There are no informal encounters, no presentations about citizen science for Tyndall staff. Also the public is not yet involved in any discussions

²⁷ <https://www.marei.ie/empowering-society/engagement-case-studies/>

²⁸ <https://crowd4access.insight-centre.org/>

²⁹ <https://grrip.eu>

³⁰ www.campusengage.ie

about citizen science, but in UCC there is the CARL program³¹ that invites voluntary and community groups to link with UCC students and do research together.

Support Resources & Infrastructures

Tyndall has two EPE officers who work under the umbrella of the funded SFI centres of excellence “CONNECT”³² and “IPIC”³³ with researchers and students on public and school engagement programmes. Tyndall is also part of three more SFI centres (VistaMilk, CONFIRM and Insight) who also have EPE officers working with researchers. The communication officers focus on building the science communication skills for researchers. But there is no specific contact point for citizen science in Tyndall and if a researcher wants to interact more with the public, that’s well perceived, but there is no specific support for that so far. Participation in EPE activities has been included in most job descriptions within Tyndall the last 2 – 3 years, but not citizen science.

There is no internal funding for citizen science activities at Tyndall. The SFI Discovery offers only small funding (50,000 Euro for 1 year; 200,000 to 300,000 Euro for a longer period) for public engagement activities and citizen science would fall into this category. But proposals need a very strict solid evaluation plan and evaluation in the context of engagement is still a topic where most researchers miss the required skills and experiences. Tyndall has already made use of this fund, but for public engagement activities only. In the Tyndall context, there is no access to tools or technical solutions to support the implementation of citizen science initiatives, as it’s not an area the RPO has been traditionally working in.

Policy & Assessment

As engagement and public education are important aspects for European and local funding agencies it is also part of the wider UCC strategy and defined in the Civic and Community Engagement Plan 2017-2022³⁴. In Tyndall, every year researchers have a performance evaluation and it is well perceived if researchers participated in public engagement activities. Also in any new contracts, as student or staff member, Tyndall members have to participate in public engagement and there is the commitment from their supervisors to allow students and researchers to do the public engagement work. So public engagement activities are important but not specific to citizen science.

4.4.2. Planned Grounding Actions in Tyndall

In total, 5 GAs are planned:

- GA1 – Promoting and supporting submissions that incorporate the citizen science dimension into research projects [Research]
- GA2 - Development of a postgraduate module on citizen science [Education and Awareness]
- GA3 – Training program for researchers [Education and Awareness]
- GA4 – Funding Awareness [Support Resources and Infrastructures]
- GA5 – Supporting the development of an engaged research strategy [Policy & Assessment]

³¹ <https://www.ucc.ie/en/scishop/ac/>

³² CONNECT is Ireland’s national research centre for Future Networks and Communications, <https://www.tyndall.ie/connect>

³³ SFI Centre for photonics, is Ireland’s centre of excellence for research, innovation and PhD training in photonics – the science and application of light, <https://www.tyndall.ie/ipic>

³⁴ www.ucc.ie/engagement/civic-plan

Tyndall: Starting situation and planned Grounding Actions

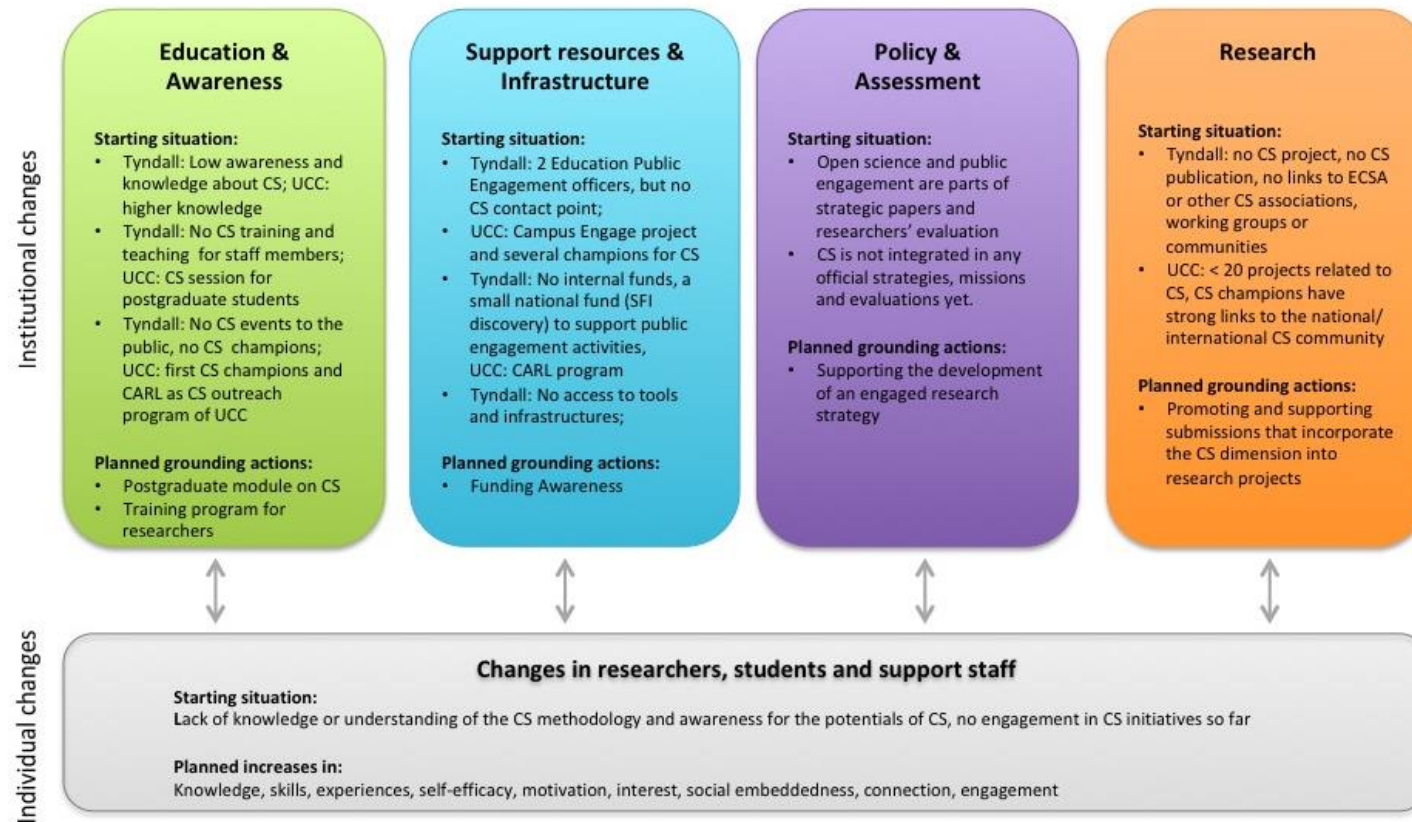


Figure 4: Tyndall: Starting situation and planned Grounding Actions

4.5. UniSR - Vita-Salute San Raffaele University (Italy)

4.5.1. Stock-taking in UniSR

Vita-Salute San Raffaele University is characterized by a strong integration of teaching and research and is part of the Gruppo Ospedaliero San Donato. Thus in UniSR the vast majority of the research activities are in life sciences, including a substantial proportion of work in clinical research. These areas are typically less amenable to citizen science approaches (also due to privacy and ethical concern), and require additional effort to identify appropriate activities. UniSR has a limited number of researchers in the areas of psychology and philosophy, which are more open to citizen science approaches. Next to the specific research area that makes the active involvement of citizens in research a challenge, researchers have insufficient knowledge of citizen science approaches, methodologies and benefits. Also there is a lack of institutional, financial and logistic support to the citizen science activities as can be seen in the next paragraphs.

Research

UniSR has not organised any citizen science related projects yet, but is a member of three H2020 projects that contain elements of the citizen science approach without seeing themselves as citizen science. These are:

- PERITIA³⁵ - investigating public trust in expertise
- RENergetic³⁶ - Community-empowered Sustainable Multi-Vector Energy Islands
- SMART-Bear³⁷ - Smart Big Data Platform to offer evidence-based, personalized support for healthy and independent living at home.

All of them are under the lead of one UniSR researcher and have not been actively communicated to other researchers at the university. There are no publications that specifically refer to citizen science and UniSR is not part of any citizen science networks yet. Collaborations with other partners in the field of citizen science are only due to the TIME4CS project.

There have been also some initiatives dedicated to “expert” patients who are more engaged in clinical activities and provided with information material, the possibility to join informative events and training (organized for example by the Diabetes Research Institute³⁸). But these initiatives do neither consider themselves to be citizen science.

As mentioned above the knowledge and interest in citizen science among UniSR researchers is generally low with a few exceptions in some research groups. Some researchers of UniSR have been involved in the three projects mentioned above.

Education and awareness

UniSR has not yet organized any teaching and training activities on citizen science for its researchers, students and support staff so far, nor are there any informal occasions to meet citizen science researchers or presentations of citizen science.

³⁵ <https://peritia-trust.eu/>

³⁶ <http://www.renergetic.eu/>

³⁷ <https://www.smart-bear.eu>

³⁸ <https://dri.hsr.it/il-dri-per-voi/>

Citizen science is not driven yet by any champions in the organization, but with the engagement in TIME4CS this is expected to change.

Support Resources & Infrastructures

UniSR has hardly any resources and infrastructures for citizen science established. The university does neither offer any funding to citizen science projects and initiatives, nor funding to citizen science communicators and coordinators so far. There is one Italian grant “DATA SCIENCE FOR SCIENCE AND SOCIETY” funded by Fondazione Cariplo³⁹, which also supports citizen science activities in Italy.

Clinical studies and other studies with human subjects are subject to national and international law. Thus the university has set up an ethical committee clearance procedure that could also be applied for an ethical clearance of future citizen science activities.

Policy & Assessment

The aim of supporting open science, science communication and public engagement is integrated in institutional research strategies and policies. UniSR is also in the process of preparing dedicated open science policies and has just hired personnel to establish an open science team. Citizen science is not specifically mentioned in any strategic papers yet, nor specifically supported.

Concerning researchers’ evaluation schemes, science communication and public engagement are considered but the active involvement of citizens is not.

4.5.2. Planned Grounding Actions in UniSR

Starting from this current situation UniSR plans the implementation of following grounding action within the TIME4CS project, which are described in more detail in TIME4CS D2.1 Compilation of roadmaps and Grounding Actions for the Implementers - First Version⁴⁰:

- GA1 – Participation in a citizen science network [Research]
- GA2 – Implement changes in the organizational structures or functions [Research]
- GA3 – Set up information initiatives for researchers and training programs for students [Education and Awareness]
- GA4 – Set up informal opportunities for interactions with researchers [Education and Awareness]
- GA5 – Identify an institutional contact point for citizen science [Support resources and Infrastructures]
- GA6 – Adopt evaluation criteria for researchers’ evaluation that consider citizen science [Policy & Assessment]

³⁹ <https://www.fondazione-cariplo.it/en/index.html>

⁴⁰ <https://doi.org/10.5281/zenodo.5743299>

UniSR: Starting situation and planned Grounding Actions

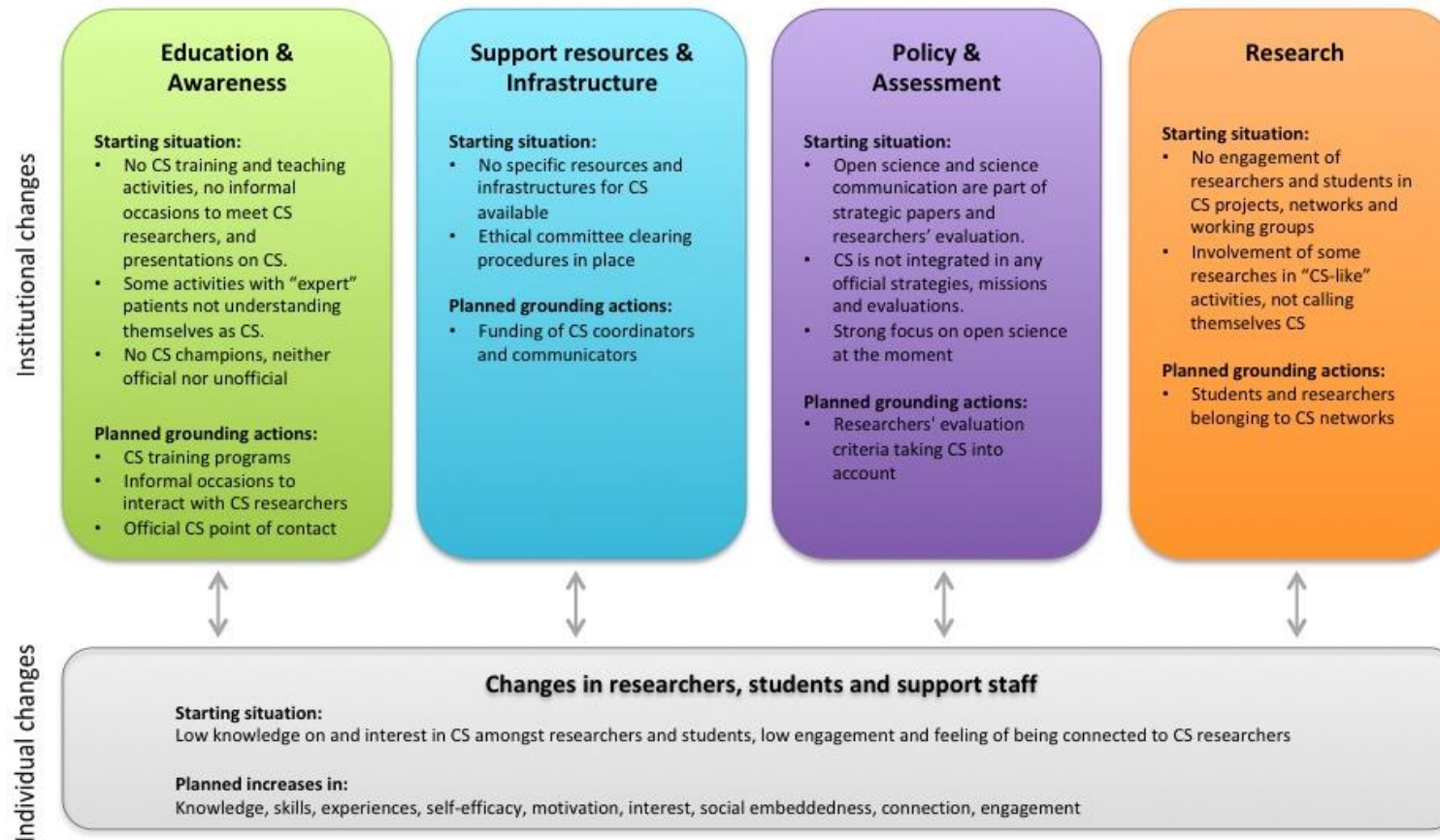


Figure 5: UniSR: Starting situation and planned Grounding Action

4.6. Summary and common points

The stock-taking exercise helped the Time4CS evaluation team to better understand where the implementing organizations are standing with regard to citizen science and institutional changes for citizen science before they carry out the Grounding Actions.

KTU is the largest technical university in the Baltic area. Having a faculty related to social sciences, arts and humanities, it eases the implementation of the citizen science approaches. The university is situated in a national context where the development of citizen science is just in the early adoption stage, but already has two strong citizen science champions. These champions have links to the national and international citizen science community and are responsible for the successful acquisition of seven citizen science projects. Starting from this initial success and a first number of researchers who are involved in citizen science, the main aim of KTU in the TIME4CS project is to spread the awareness and knowledge about citizen science even further to researchers and the non-academic communities, institutionalise the links to the national and international communities and create a dedicated contact point as well as guidelines for citizen science to be fostered and more largely applied in KTU.

Also, **CRG** has two successful projects and some researchers who have experience in citizen science, but still citizen science is not a commonly used approach due to the complexity of linking biomedical research to citizen science activities. CRG has a citizen science facilitator who supports other researchers in writing proposals and engaging citizens in research. The facilitator has established connections to the ECSA and national citizen science actors in Spain, but still no sustainable funding for this position is in place. So it is key for CRG to create a clearer understanding amongst researchers how citizen science can be of use in their specific context, have a sustainable funding for the citizen science facilitator and create the institutional guidelines and policies to support citizen science projects to take shape.

Comparable to CRG, **UniSR** is involved in research topics that do not link so easily to citizen science approaches. It has to be carefully investigated how citizens can become active partners in clinical research activities. Thus, in UniSR there are no citizen science projects implemented yet, nor are there any trainings, citizen science champions or a contact point for citizen science yet. However, UniSR has participatory projects with “expert patients”. These projects do not consider themselves to be citizen science, but have already actively involved patients into training, presentation and discussion of research results. In addition, there are three H2020 projects that contain elements of citizen science without calling themselves citizen science. Thus, when implementing the Grounding Actions, links could be established to these projects and researchers. For CRG it is important to raise the knowledge and awareness for citizen science amongst researchers via training and informal get-togethers, to establish a citizen science contact point and create first linkages to the national/international citizen science community.

Also **Tyndall** researchers do not have any knowledge and experiences in citizen science yet, as the topic of research - specializing in both electronics and photonics - makes it a challenge to actively involve citizens in research. There are no citizen science projects, no champions or contact points, but there are citizen science projects, researchers and infrastructures that support the active public engagement in the wider area of the University of Cork (UCC). Thus the aim is to benefit from the experiences of UCC, increase

awareness and knowledge for citizen science amongst Tyndall researchers, raise awareness for potential citizen science funding opportunities, and promote and support submissions that incorporate the citizen science dimensions in order to have first good practice examples in Tyndall.

Therefore, all implementing organizations will organize training or teaching on citizen science and mutual learning between implementers will be key in the implementation of this Grounding Action. Creating and supporting links to the national and international citizen science community is another Grounding Action that will be followed in all implementing organizations. Then we have more specific Grounding Actions, such as the creation of a citizen science contact point, drafting guidelines and strategies for citizen science, or the raising awareness for funding, where the implementers can also learn from each other on how the implementation of these activities impacted their institutional change processes.

To keep track of these institutional change processes WP5 will stay in continuous contact with the four implementer organizations and involve them in the collection and analysis of evaluation data. This will be done via the instruments described in the next chapter.

5. Collection instruments and time points of data collection

Indicators for **changes on an institutional level that are presented in Chapter 2 of this document** are collected and reflected at three time points of the project: 1) during the stock-taking exercise at the start of the project, 2) at the end of year two and 3) at the end of year three of the project. We expect that these indicators will change with the implementation of roadmaps and Grounding Actions in the four implementing organizations. For the indicator collection a template will be prepared and sent to the implementing organizations. In this template the implementing organizations will not only collect the indicators along the four intervention areas visualised above, but they will also be triggered to reflect on the aspects of:

- Irreversibility: ensuring long term sustainability of the ground actions
- Comprehensiveness: investigating influences on procedural and cultural changes
- Inclusiveness: investigating the change agents and key actors in the process
- Contextualisation: analysis of needs, obstacles etc.

The filled-in templates will be discussed in an online workshop with the WP5 team and experiences exchanged between implementing organizations and Front-Runners.

Indicators for **changes on an individual level** will be collected via instruments like pre/post questionnaires for training participants, a questionnaire for assessing the practical implementation of the newly gained knowledge and skills, and expert interviews with champions amongst researchers, management and students. The time points for this data collection will be adapted to the specific roadmaps of the implementing organizations (e.g. pre/post questionnaires distributed before and after training).

Pre/post questionnaires on intermediate-outcomes for training participants

All implementers are planning training activities on Citizen Science for their researchers. To measure the impact of these trainings in the four implementer organisations, a one-group pre/post design will be implemented. This design falls under quasi-experimental designs as the main premise of true experiments; namely the existence of a control or comparison group and the random selection and assignment of participants, is missing. As a result, although one would be able to assume that the changes from the pre-test to the post-test are due to the participation in the TIME4CS training of the implementers, unlike in true experiments, where such effects would be solely attributed to this participation; in this design, outside factors cannot be controlled or ruled out. Nevertheless, this design is more reliable or provides more data than a one-group post-only design, which - due to the lack of a pre-test - cannot show any change in relation to skills, knowledge, attitudes, behaviour, level of awareness, etc.

The survey will be composed of different elements to measure the general expected outcomes and impacts of the participation in the training of the implementers, as well specific expected outcomes and impacts for each implementer. As much as possible, existing and validated instruments will be used in their entirety or singular items will be used, depending on how well they fit to the defined expected outcomes and impacts. Where necessary, or in case existing instruments fall short, individual items will be developed to measure the defined outcomes and impacts. Should the entire questionnaire or parts of it be tailor-made to the defined outcomes or impacts, to determine its effectiveness, a survey pre-test will be performed. The aim is to have a reliable question format and a good wording and order. Altogether, cognitive pre-tests (comprehension probing)⁴¹ with a minimum of three participants will be performed. Cognitive pre-testing is a well-known method to collect verbal information regarding survey responses and to evaluate whether a question is measuring the construct that the researcher intends to measure. The results from pre-testing will then be used to adjust problematic questions in the questionnaire before fielding the survey instrument to the full sample. This method includes the following techniques: probing, confidence rating, paraphrasing and thinking aloud.

Once the questionnaire has been finalised, following the pre-test and adaptation process, it will be programmed into an online survey tool (preferably LimeSurvey, as the data will be securely saved on the ZSI servers) or provided in a paper-format. When users participate in the training of the implementers, the pre questionnaire will be handed out and collected at the beginning of the training and the post questionnaire at the end of the training.

The pre/post questionnaires will focus on **Kirkpatrick's Learning Evaluation Levels 1 and 2** (Kirkpatrick, 1998) and collect:

- 1) **formative input**: such as the training content, set-up, timing, speakers, preparatory information.
- 2) input on the **learners' intermediate benefits**: such as increases in knowledge and skills related to the understanding of citizen science and its methodologies, the perceived confidence in and intention of

⁴¹ Prüfer, P. & Rexroth, M., 2005. Kognitive Interviews. [Online] Available at: http://www.gesis.org/fileadmin/upload/forschung/publikationen/gesis_reihen/howto/ [Accessed 31 August 2016].

applying the knowledge from the course, the interest to follow-up with additional citizen science trainings, to keep engaged in citizen science, to stay in contact with citizen science researchers and trainers, etc.

Practical application questionnaire

For the assessment of the training's practical relevance, six weeks after the training the participants are asked to fill in a "practical application questionnaire". This questionnaire will collect **input on the learners' longer-term benefits**: such as practical application of the knowledge from the course, active sharing and discussion of the learning from the course, sustained connections to citizen science researchers and trainers, perceived feeling of being embedded in a group of citizen science researchers and students being interested in citizen science, etc.

The different indicators of both questionnaires will be elaborated collaboratively as soon as the trainings are planned in more detail in each implementing organization. As said before the aim is to create a core construct of a questionnaire that can be applied in the different context but allows to get comparable data from each implementer training activity.

Expert interviews with semi-structured interview guidelines

Qualitative research methods are best used to explore emerging concepts, where statistical data is not yet available⁴². This has also the advantage of a possible in-depth exploration and follow-up on topics that seem rich of interpretations. For this purpose, we are going to develop a **semi-structured interview guideline**, i.e. a set of interview questions that can be used in a flexible manner, while still preserving coverage of similar topics across multiple interviews⁴³. In other words, the interviewer is requested to ask all the questions, but is free to add additional ones in case a topic needs to be explored in more detail. The interview guidelines for the interviewees (e.g. **champions** amongst the **researchers** and the **management**) are still too early to develop, as need to collect insights and understanding on the impact of the Grounding Actions, which are currently in the planning phase only. We expect these interviews to cover the following core aspects:

- Personal involvement in TIME4CS activities (in which of the TIME4CS Grounding Actions and activities were the interviewees involved?)
- Formative feedback on these activities (how were they personally perceived, what was liked/ longed for/lacked?)
- How far did the involvement of these activities affect the interviewees' awareness, interest, attitude towards citizen science?
- How far did it affect their working activities?
- Could interviewees observe effects on others (e.g. their students, other researchers) - intended and unintended ones?

⁴² Silverman, D. (2016) *Qualitative Research*. London; Thousand Oaks; New Dehli; Singapore: SAGE.

⁴³ Drever, E. (2003) *Using Semi-structured Interviews in Small-scale Research: A Teacher's Guide*. Scottish Council for Research in Education.

- From the interviewees expertise, what would it need to further drive citizen science in their organization and what should be avoided?

The evaluation team will start the interviews with the champions amongst the researchers, who will then guide the evaluation team - according to the specific context and implemented Grounding Actions - to other champions from research, the management and students. When selecting the interviewees, special care will be taken to aspects of gender equality and diversity intersected with socio-economic backgrounds.

Content analysis

The interviews will be recorded and then transcribed for detailed content analysis (e.g. labelling of text snippets according to a coding scheme)⁴⁴. In the coding process the researcher is going through the interview material with predefined codes and identifying new topics at the same time⁴⁵.

Thus, the transcript of the interviews will be analysed qualitatively⁴⁶ following a deductive and inductive coding approach and making use of the qualitative analysis software MAXQDA⁴⁷, supporting coding across multiple files. The deductive codes will be derived from the interview guideline, whereas inductive codes directly evolve from the interview data allowing for the unexpected⁴⁸. To enhance objectivity, two independent experts will go through all the material. The resulting coding tree allows then for easy extraction of text snippets that have been associated with a particular code.

⁴⁴ Krippendorff, K. (2012) *Content analysis: An introduction to its methodology*. Los Angeles, London, New Dehli, Singapore: Sage.

⁴⁵ Flick, U. (2014) *An Introduction to Qualitative Research*. London, Thousand Oaks, New Dehli, Singapore: SAGE.

⁴⁶ Mayring, P. (2010) *Einführung in die qualitative Sozialforschung: Eine Anleitung zu qualitativem Denken*. Beltz Verlag, Weinheim und Basel.

⁴⁷ <http://www.maxqda.com>

⁴⁸ Reichertz, J. (2012) 'Abduktion, Deduktion und Induktion in der qualitativen Sozialforschung', in Flick, U., von Kardoff, E., and Steinke, I. (eds) *Qualitative Forschung*. 9th edn. Hamburg: Rowohlt Taschenbuch Verlag, pp. 276–285.

6. Monitoring of project KPIs

Next to collecting data on institutional change processes in implementer organisations and analysing the implementation journeys, WP5 will be engaged in an overall project monitoring. The project developed a set of KPIs that are listed in the Description of Work of the Grant Agreement. Monitoring these KPIs supports the adaptive management in WP7 and allows keeping track of the overall project performance. The main KPIs are listed below together with a description of the status when writing the deliverable.

sOBJ1. to increase knowledge on the actions leading to Institutional Changes in RPOs necessary to promote Public Engagement and Citizen Science in science and technology through a complete and up-to-date picture built upon the identification, mapping, monitoring and analysis of ongoing practices.

| Expected Results at the end of the project: | Current situation: |
|---|--|
| Analysis of at least 30 case studies of institutional adoption of Citizen Science and Open Science | Contact to 37 RPOs, where 22 responded so far and provided the case information; the outcomes will be shared in D1.1. foreseen in December 2021, the lessons learnt repository foreseen in Feb 2022 and on the wordpress page that has already been set up (https://time4citizenscience.wordpress.com/case-studies/) |
| 1 peer review publication on the institutional adoption of Citizen Science and Open Science | to come in the second part of the project |
| 1 online repository containing all knowledge generated by the project (TIME4CS best practices and lesson learnt) | https://www.TIME4CS.eu/resources and https://www.zenodo.org/communities/time4cs/?page=1&size=20 will grow continually throughout the runtime of the project |

Table 3: KPIs for Objective 1

sOBJ2. to support TIME4CS RPOs in the implementation of actions leading to Institutional Changes through the continuous mutual learning and knowledge transfer programme and the continuous exchange of knowledge and best practices between the RPOs with more experience in Institutional Change to support citizen science and those RPOs with less experience in this field.

| Expected Results at the end of the project: | Current situation: |
|---|---|
| At least 7 knowledge transfer and mutual learning activities organized | 1 Introductory workshops has been organized by the Front-Runners in April 2020 to provide overview of their expertise on the Intervention Areas to the Implementers. |

| | |
|---|--|
| | <p>3 Front-Runner workshops have been organised for frontrunners and implementing organizations to meet and exchange in WP3 (each focuses on at least 1 Intervention Area)</p> <p>4 co-creation workshops have been organised within the implementing organizations to extend the core team working on the Grounding Actions</p> |
| At least 8 members of the personnel of implementer institutions trained about necessary actions leading to Institutional Changes | At least 8 members of implementing institutions participated in the three Front-Runner workshops. The co-creation workshops hosted by Implementers had overall 55 participants (6 CRG, 10 KTU, 32 Tyndall, 7 UniSR) |
| 16 actions leading to Institutional Changes implemented by TIME4CS Implementers | 19 actions leading to Institutional Changes defined and planned by TIME4CS Implementers (see D2.1) |
| 1 TIME4CS statement on how to promote Public Engagement and Citizen Science in RPOs through Institutional Changes | to come at the end of the project |
| A set of indicators to assess Institutional Changes to promote public engagement in science and citizen science | First indicators are already in use during the stock-taking exercise, others defined in collaboration with WP1 for the case analysis. This document contains an overview of institutional and individual indicators. |

Table 4: KPIs for Objective 2

sOBJ3. To build a dynamic and inclusive community through the engagement of the most relevant stakeholders in the field of citizen science from academia, industry, government and civil society to include input to the RPOs from different actors.

| Expected Results at the end of the project: | Current situation: |
|--|--|
| At least 40 stakeholders representing industry, governments, research and society mobilized by TIME4CS Implementers | We are currently mobilizing the personnel within the implementing organizations, as can be seen from above (55 participants so far in the co-creation workshops). But also reach out to other RPOs during the analysis of the 30 case studies in WP1 |
| At least 14 training activities organized to support TIME4CS Implementers and build TIME4CS community | <p>All Implementing organizations plan to do training as part of their Grounding Actions, which will be organised in the second part of the project.</p> <p>TIME4CS will also organize webinars and workshops aimed at</p> |

| | |
|---|--|
| | participants outside the consortium in the frame of WP4 (starting in December 2021). |
| At least 150 stakeholders engaged on Citizen Science Helix | Currently the Citizen Science Helix profiles 121 organizations and 344 users |

Table 5: KPIs for Objective 3

Expected Results:

sOBJ4. to increase the awareness of R&I actors of the need for a sustainable and flexible organization of RPOs governance system to better respond to the evolving relationship between science and society.

| Expected Results at the end of the project: | Current situation: |
|---|---|
| 1 website collecting relevant information about the implementation of Institutional Change to promote citizen science | https://www.TIME4CS.eu/ will be further developed to not only provide information on Institutional Change but also to collect it. The case studies repository (WP1) will support this work. |
| At least 4 members of the governance of TIME4CS Implementers attending the mutual learning and knowledge transfer activities | 4 members of the governance level were involved in the co-creation workshops, more involvement is foreseen for the second part of the project |

Table 6: KPIs for Objective 5

In addition to the above KPIs that relate to reaching the project objectives, TIME4CS has defined a number of outreach indicators.

| Outreach KPIs | Outreach/KPIs | Current situation |
|--|---|---|
| Website. An advanced website, providing information about the project's results, including a detailed list and overview of all good practices collected by the consortium. In addition, the website will publish project's news and will act as a communication channel for the stakeholders. | ~10000 total visits, 12 newsletters sent, 250 newsletter signed members | 3300+ website visits 2 newsletter sent 60 subscribers to the newsletter |
| Visual Identity. visual identity, comprising a logo, standard presentation, brochure and roll-up in line with the H2020 visual guidelines. | 1500 Brochures distributed during external events | No face-to-face event organized so far due to COVID-19 restrictions |
| Social Media Accounts. The project activity will be distributed on Twitter, LinkedIn and Facebook | 1000 total followers among social medias | 369 total followers among social medias |
| Media presence, provided by interviews, journalistic articles, a video news release, complemented by info-graphics and fact sheets. | 10 journalistic articles / interviews | no journalistic articles so far |
| External events such as fairs and conferences that provide opportunities for in-depth discussions and exchange of knowledge. | Participation in 5 external events | Participation to 1 online external event and some in planning (e.g. Austrian Citizen Science Conference) |
| Clustering activities to support close cooperation and joint dissemination strategies with other EU projects tackling similar issues. Periodic bilateral exchange of news & results, joint presence in events. | Cooperation with 5 initiatives | Currently in touch with 10 other EU funded projects, and participate in the Community of Practice for Training Coordinators in EU projects as well as the SwafS Projects CoP |
| Workshops, webinars, participation in fairs. In order to support the dissemination of the project, the consortium partners will attend and/or organize various events, workshops and training activities. All events will be announced on the project's website and communicated via social media. | Organization of 4 workshops Organization of 10 webinars | These workshops and webinars will be organised when we have advanced with our project goals in the frame of WP4 activities and in coordination with the GAs selected by Implementers. |

| | | |
|---|---------------------------------------|----------------------------------|
| Citizen Science Helix. A virtual ecosystem/community tailor made for the TIME4CS Consortium as a launching pad to consolidate their ideas, harvest expertise from the wider CHX Network, build collaborative partnerships and to continue to function as a Citizen Science focused online community | 150 stakeholders engaged on the helix | 344 users from 121 organisations |
|---|---------------------------------------|----------------------------------|

Table 7: Outreach KPIs

7. Summary and outlook

The work package on evaluation and impact assessment in TIME4CS will collect indicators for institutional change that take place at organizational and individual level; in addition the evaluation team will conduct a formative evaluation of the implementation processes of road maps and Grounding Actions in the different contextual settings of the four implementer organizations. Table 8 provides an overview of the described evaluation instruments introduced in Chapter 3 and 5 of this document.

| Level of evaluation | Evaluation instruments | Target group of evaluation | Moment of measurement |
|-------------------------------|-------------------------------------|---------------------------------|--------------------------|
| Institutional change | stock-taking exercise | implementers | once a year |
| Individual change | pre/post questionnaire | participants in training | before/after a training |
| | practical application questionnaire | participants in training | 6 weeks after a training |
| | expert interviews | researchers, managers, students | continuously |
| Implementation process | Implementers' Journey Review | Implementers | 3 monthly jour-fixe |

Table 8: Overview of evaluation instruments

The following time-line (Figure 5) shows the planned evaluation activities throughout the 3-year project runtime.

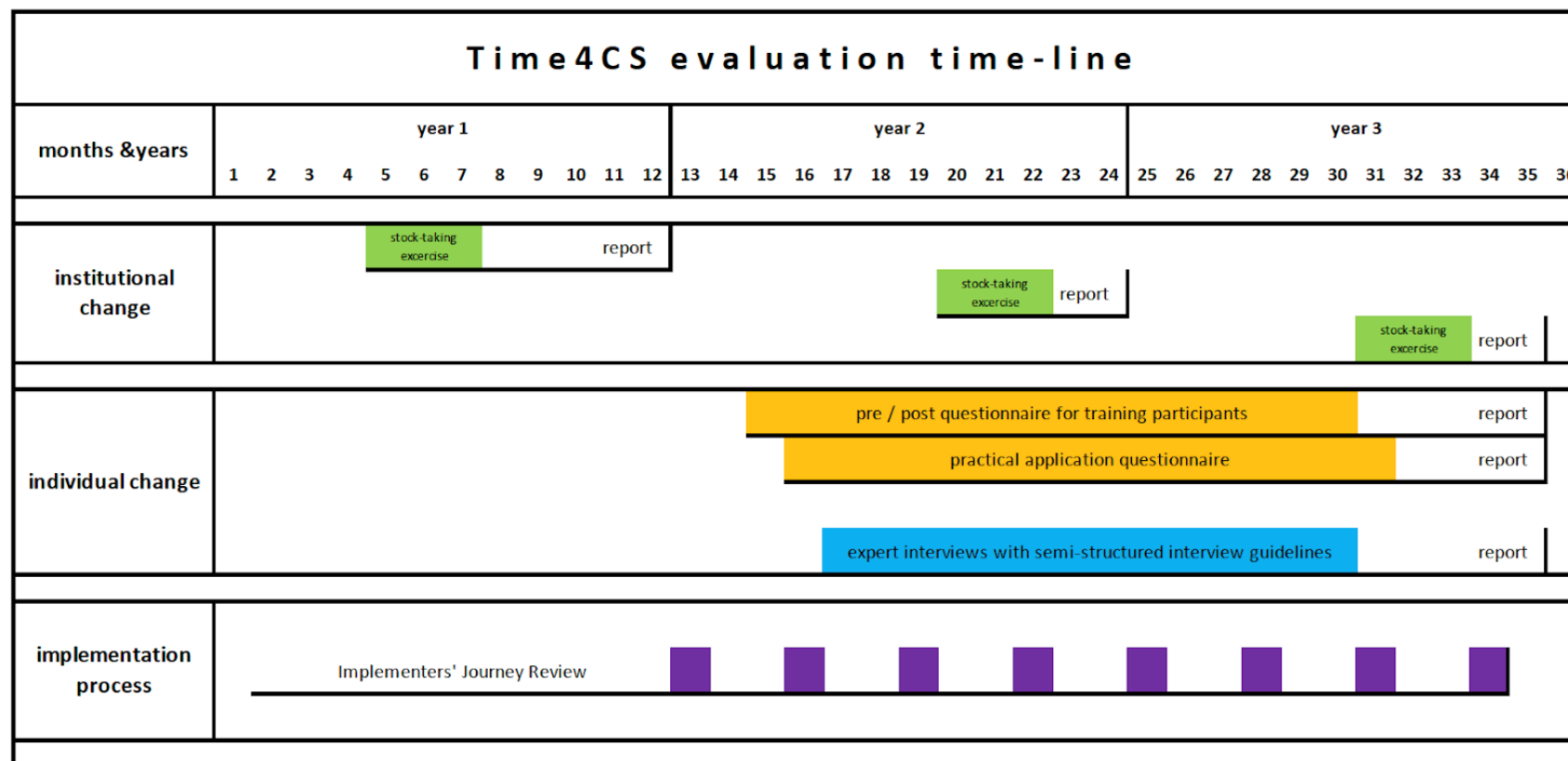


Figure 6: TIME4CS evaluation time-line

In a next step the evaluation team will elaborate the detailed evaluation instruments that were introduced in this document. This will be done in close collaboration with the four implementing organizations and in continuous reflection with the Front-Runner organizations in order to integrate their expertise and experiences with the evaluation of supporting activities for citizen science. The first collected data from both, the formative and summative evaluation, will be summarized and analysed in the next deliverable D5.2 (due by M24). Overall project KPIs will be continuously monitored and presented in the next deliverable as well. Generally, the evaluation team will not only support bringing evidence for institutional changes to promote citizen science in RPOs, but also deliver the data for an adaptive management to continually improve the developed project materials and flexibly react to any challenges and opportunities that might arise throughout the runtime of the project.