Crowd4SDG
Citizen Science for the Sustainable Development Goals

Deliverable 3.3

GEAR report cycle 1

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Abstract:

This deliverable reports the activities carried out during the first cycle of the Gather, Evaluate, Accelerate and Refine (GEAR) methodology over the first 12 months of the Crowd4SDG project. The GEAR methodology combines online coaching of teams with in-person challenge-based innovation for Citizen Science projects related with climate resilience.

In addition, this deliverable includes a policy brief about best practices for Challenge Based Learning as a new paradigm for tackling climate change, and building resilient societies.

For more information on Crowd4SDG, please check: http://www.crowd4sdg.eu/

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Project Partners

	Partner name	Acronym	Country
1 (COO)	Université de Genève	UNIGE	CH
2	European Organization for Nuclear Research	CERN	CH
3	Agencia Estatal Consejo Superior de Investigaciones Científicas	CSIC	ES
4	Politecnico di Milano	POLIMI	IT
5	United Nations Institute for Training and Research	UNITAR	CH
6	Université de Paris	UP	FR

Crowd4SDG in brief

The 17 Sustainable Development Goals (SDGs), launched by the UN in 2015, are underpinned by over 160 concrete targets and over 230 measurable indicators. Some of these indicators initially had no established measurement methodology. For others, many countries do not have the data collection capacity. Measuring progress towards the SDGs is thus a challenge for most national statistical offices.

The goal of the Crowd4SDG project is to research the extent to which Citizen Science (CS) can provide an essential source of non-traditional data for tracking progress towards the SDGs, as well as the ability of CS to generate social innovations that enable such progress. Based on shared expertise in crowdsourcing for disaster response, the transdisciplinary Crowd4SDG consortium of six partners is focusing on SDG 13, Climate Action, to explore new ways of applying CS for monitoring the impacts of extreme climate events and strengthening the resilience of communities to climate related disasters.

To achieve this goal, Crowd4SDG is initiating research on the applications of artificial intelligence and machine learning to enhance CS and explore the use of social media and other non-traditional data sources for more effective monitoring of SDGs by citizens. Crowd4SDG is using direct channels through consortium partner UNITAR to provide National Statistical Offices (NSOs) with recommendations on best practices for generating and exploiting CS data for tracking the SDGs.

To this end, Crowd4SDG rigorously assesses the quality of the scientific knowledge and usefulness of practical innovations occurring when teams develop new CS projects focusing on climate action. This occurs through three annual challenge based innovation events, involving online and in-person coaching. A wide range of stakeholders, from the UN, governments, the private sector, NGOs, academia, innovation incubators and maker spaces are involved in advising the project and exploiting the scientific knowledge and technical innovations that it generates.

Crowd4SDG has six work packages. Besides Project Management (UNIGE) and Dissemination & Outreach (CERN), the project features work packages on: Enhancing CS Tools (CSIC, POLIMI) with AI and social media analysis features, to improve data quality and deliberation processes in CS; New Metrics for CS (UP), to track and improve innovation in CS project coaching events; Impact Assessment of CS (UNITAR) with a focus on the requirements of NSOs as end-users of CS data for SDG monitoring. At the core of the project is Project Deployment (UNIGE) based on a novel innovation cycle called GEAR (Gather, Evaluate, Accelerate, Refine), which runs once a year.

The GEAR cycles involve online selection and coaching of citizen-generated ideas for climate action, using the UNIGE Open Seventeen Challenge (O17). The most promising projects are accelerated during a two-week in-person Challenge-Based Innovation (CBI) course. Top projects receive further support at annual SDG conferences hosted at partner sites. GEAR cycles focus on specific aspects of Climate Action connected with other SDGs like Gender Equality.

Grant Agreement description of the deliverable

GEAR report cycle 1 completed. This deliverable will include a short policy brief focused on best practices for Challenge Based innovation as a new paradigm for tackling Climate change and building resilience in societies.

WP3 in brief

WP3 aims at the creation of CS projects and studies the mechanisms that lead to improved citizen science skills and high-quality scientific outcomes. In addition, this work package aims at producing economic and social outputs relevant to achieving SDGs through challenge-based CS events, with a special focus on climate change resilience.

The objectives in this WP are to:

- Organize 3 full innovation cycles (GEAR), from a call for ideas to the deployment of CS projects;
- Test and validate the research findings and software development in WP2 in the CS projects created in each cycle;
- Coordinate the technical communication between the data produced by the CS projects and the needs of the National Statistical Offices to monitor climate change effects;
- Manage the selection process of ideas in a transparent and inclusive way;
- Ensure the exploitation of CS projects and maximize their social impact.

This deliverable reports on the following tasks:

T3.2: Communication on the call for ideas, selection and online coaching (UNIGE, all)

This task concerns the first two phases of the challenge-based innovation methodology GEAR, namely Gather and Evaluate.

During the Gather phase, the following activities will be carried out:

- Call for projects – a call for CS projects on a specific climate impact challenge will be launched and widely publicized, notably through related ongoing EU Support Actions and European networks such as LERU.
- Application and selection - citizen-innovators can apply with ideas for projects to solve the climate impact challenge.

Best ideas will be selected based on: (1) Impact, (2) Feasibility, (3) Citizen Participation, (4) Relevance of the data generated (a detailed selection criteria will be provided in D3.1). Once the most promising citizen-applicants and ideas have been selected, multidisciplinary teams of around 5 members are formed to participate in the coaching sessions.

The full application and selection process (incl. selection of applications by the expert committee) will take 10 weeks and result in a group of 50 citizen-participants.

During the Evaluate phase, online coaching will be provided to the selected citizen-innovators with context about the Climate Impact challenge, and they will become familiar with the knowledge and tools necessary to transform good ideas into viable innovation projects. The focus will be on making sure that projects are concrete, achievable and relevant to the SDGs, either at a local, or at regional or global level. The coaching sessions will be delivered virtually over a five weeks' period (one session of 2 hours each week). A typical session will include: mentoring by staff with skills-based knowledge, contributions by global subject-matter experts and peer-to-peer support. Skill-transfers include: problem definition, the concept of Open Innovation and the use of open data, crowdsourcing, participatory research and human centred design. During the coaching sessions, teams will become familiar with the CS Toolkit Solution and learn how to use the Toolkit when implementing CS projects. In-between coaching sessions, teams will also complete homework and may have one-on-one coaching

sessions. At the end of the Evaluate phase, the 2 best online teams (around 10 participants) will be selected and move on to the next phase: Accelerate (see Task 3.3). The selection criteria will be focused on the team cohesion, the evolution over the 5 weeks coaching period, the documentation provided using SDG in Progress tool (enhanced in WP4), and the quality of their pitches.

T3.3: Development of the Challenge Based Innovation programme (CERN, UNIGE)

The Accelerate phase of the GEAR methodology will be executed through the Challenge Based Innovation Programme (CBI). The CBI will be set up as a comprehensive set of training materials and methodologies to form a turnkey toolkit.

Based on prior experience in running programmes for fast product development challenges at their IdeaSquare lab, CERN will deliver a first version of the toolkit for a first course pilot and fine-tune it for each subsequent workshop cycle. Further CBI cycles (called CBIx) will be introduced at different locations to ensure flexibility across participating teams and expansion of the CBI approach. All the pedagogical experience, feedback from new metrics developed in WP4, and knowledge on how to run effective innovation-driven projects at IdeaSquare will be used to build a robust and hands-on training programme for the citizen science teams so that they can fast prototype their first Minimum Viable Solution and move on to the next step in the process. This step can be interalia: entering the political debate with their concept/prototype (by way of illustration: see the Ocean Clean-up initiative), submitting an application to a start-up incubator, putting together a consortium for a regional/national/European project, etc. CERN will also develop a 'train the trainer'-course for staff at off-site locations across Europe in order to expand the CBIx approach and establish and support more citizen science teams.

Assessment and evaluation criteria will be developed to measure the success and effectiveness of CBIx sessions in addressing SDGs. This starts by assessing whether an external location (called 'design factory' or 'makerspace') has sufficient resources and expertise to run a CBIx. A process for holding random audits will be formulated to test the quality of the CBIx workshops delivered and a system for the continuous collection of qualitative and quantitative impact data from completed CBIx will be developed. To maximise the visibility of successful CS projects, two CBI-team members will be invited to showcase their concept(s) during an international event on SDGs. This event, called SDG workshops, will be organized at the end of each GEAR cycle. The first SDG workshops will be in Geneva at Campus Biotech, the second will be in Paris at CRI, and the final one will be organised at IdeaSquare in CERN. Representatives of various stakeholders (UN agencies, National Statistical Offices, academic CS experts, private sector and NGO representatives) will attend these events and provide the teams with feedback. In addition, Crowd4SDG partners will also work with regional incubators to provide successful teams with opportunities for subsequent further development of their concept/prototype.

T3.4: Data collection and evaluation (UP, UNIGE)

This task will run at the end of each GEAR cycle to assess all data regarding citizen participation, gender balance, inclusion, new metrics from WP4, technical results achieved by each team, and their experience in using the CS Toolkit Solution. The data is important to validate and further improve the GEAR methodology for CS projects. The findings of T4.2. to assess the diversity, robustness and adaptivity/appropriateness of the knowledge produced in the context of each citizen-team as well as by the entire group of citizen-participants across all CS projects within Crowd4SDG.

1. Introduction

The goal of the Crowd4SDG project is to research the extent to which Citizen Science (CS) can provide an essential source of non-traditional data for tracking progress towards the SDGs, as well as the ability of CS to generate social innovations that enable such progress. The Crowd4SDG proposes a novel methodology which combines online coaching of CS teams with in-person challenge-based innovation for CS projects. The Crowd4SDG project carries out the execution of GEAR methodology 3 times, one per year of the project. Each GEAR execution is improved based on the feedback from the different work packages, including recommendation of CS data quality, usage of CS tools, and dynamic of the coaching sessions.

This deliverable focuses on reporting the activities carried out for the execution of the first GEAR Cycle. In addition, this deliverable presents the activities implemented at consortium level in response to the global pandemic.

This deliverable is organised as follows: section 2 presents a summary and origin of the GEAR Methodology. Section 3 reports the execution of the different phases of the GEAR cycle 1. Section 4 presents the activities related to Covid-19 which were not originally part of the Crowd4SDG project.

2. The GEAR Methodology

Crowd4SDG proposes a GEAR methodology, which combines online coaching of CS teams with in-person challenge-based innovation for CS projects related with climate resilience. The methodology, as illustrated in Figure 1 consists of a sequence of competitions leading over an 8-month period from a field of 250 applicants to a handful of CS projects that are judged to have significant social innovation potential for the SDGs, and in particular climate action.

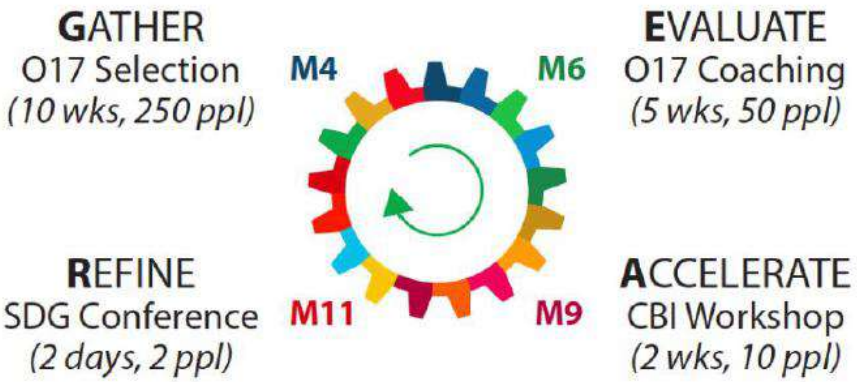


Figure 1. The GEAR phases

Crowd4SDG proposes three one-year cycles following a GEAR Methodology to iteratively develop, and test new citizen science projects. Each GEAR cycle is composed of 4 different phases:

1. Gather: In this phase of GEAR, a call for CS ideas on a specific SDG theme is launched and widely publicized, notably through related EU support actions such as EU-Citizen Science. This phase lasts 10 weeks, including a two-week period where a committee selects a set of 50 participants from a pool of 250 applicants, based on a series of objective criteria.

2. Evaluate: in the second phase of GEAR, the selected participants take part in the Open Seventeen Challenge (Open17) 5-week coaching programme, to develop their CS ideas in virtual teams towards compelling pitches. The objective of this phase is to challenge participants with real-world constraints that their CS projects would face if deployed. The pitches are judged by a panel in the final week of the coaching programme.

3. Accelerate: in the third phase, between 10 and 20 participants, corresponding to 2-4 projects, selected from the Open17, based on both the quality of their projects and specific soft skills demonstrated during the coaching sessions, are invited to participate in a two-week intensive workshop at CERN. During this workshop, participants work on improving their projects, create prototypes, and practice their pitching skills. Other participants are encouraged to develop their projects locally in satellite events held in parallel with the CBI workshop at CERN, using similar methods.

4. Refine: in the final phase, two participants representing the most promising projects from the CBI phase are invited to present themselves during an international event on SDGs, lasting two days, held in Geneva or Paris. Representatives of various stakeholders (UN agencies, National Statistical Offices, academic CS experts, private sector and NGO representatives) provide the projects with concrete feedback. Also in this phase, Crowd4SDG partners work with regional incubators for technology and social innovation to provide the projects with concrete opportunities for subsequent development.

Each phase of the GEAR methodology filters the field of participants by a factor of about 5, while helping the projects to advance towards practical deployment. Recognizing that some deserving projects may not pass through the filter, Crowd4SDG develops and provides a series of guidelines for running local CBI Training events, called CBIx, and actively reach out to partners in maker spaces in Europe and globally that can host these events, with technical support and guidance from the Crowd4SDG partners.

GEAR Origins

The GEAR methodology has been developed through successive iterations of education programmes for university students: the six-week Open Seventeen Challenge (Open17), an online coaching programme launched in 2015, and the two-month SDG Summer School launched in 2016. Both these programmes involved UNIGE as a lead, with key academic partners universities in Europe, USA and China. Further inspiration comes through over 30 CBI workshops for university students that CERN IdeaSquare has hosted over the past five years. While components of this methodology have been tested and refined with university students, their application to a broader audience of social innovators from all walks of life is inspired by experience of UP, CERN and UNIGE in hosting public hackathons, and in particular the Open Geneva festival of hackathons launched by UNIGE in 2015 (>30 hackathons and >1000 participants over two days in March 2019) and the Port Hackathon at CERN IdeaSquare (50 participants/year from around the globe, since 2014), where participation is carefully curated. Based on this track record, the partners have established fair, transparent and effective approaches to selecting people and projects for such events, which applies to the Gather phase of the GEAR methodology.

GEAR Cycles

Over the course of the three-year Crowd4SDG project, the GEAR methodology is executed three times. While the CS projects developed in the three GEAR cycles of Crowd4SDG all aim at SDG 13, as indicated below, each GEAR cycle explores a specific sustainability dimension of climate preparedness, in connection with another SDG: sustainable cities (SDG 11), women empowerment (SDG 5) and human rights (SDG 16).

Figure 2. GEAR cycles in Crowd4SDG

This approach emphasizes the fundamental interconnectedness of different SDGs, as well as the trade-offs that must be made when addressing simultaneously environmental and human development goals. The choice of complementary SDGs is made to build on areas where individual Crowd4SDG partners have relevant research track records.

3. GEAR Cycle 1 report

This section reports the activities carried out on the 4 different phases of the GEAR Cycle 1. Gather, Evaluate, Accelerate and Refine phases which have been executed over the first 12 months of the Crowd4SDG project.

3.1. Gather Phase

The first GEAR Cycle was themed on **Urban Water Resilience** linked with SDG 11 (Sustainable Cities) and SDG 13 (Climate Action). The Gather phase started on 5th September 2020. It started with launching a call for ideas, targeting students aged between 16 to 26 years old. The last date for submission was 4th October 2020. Figure 3 shows the execution timeline of the Gather Phase. Dedicated communication material and a communication plan were laid out beforehand by the Crowd4SDG Communication Strategy Group involving the communication representatives of all the Consortium members.

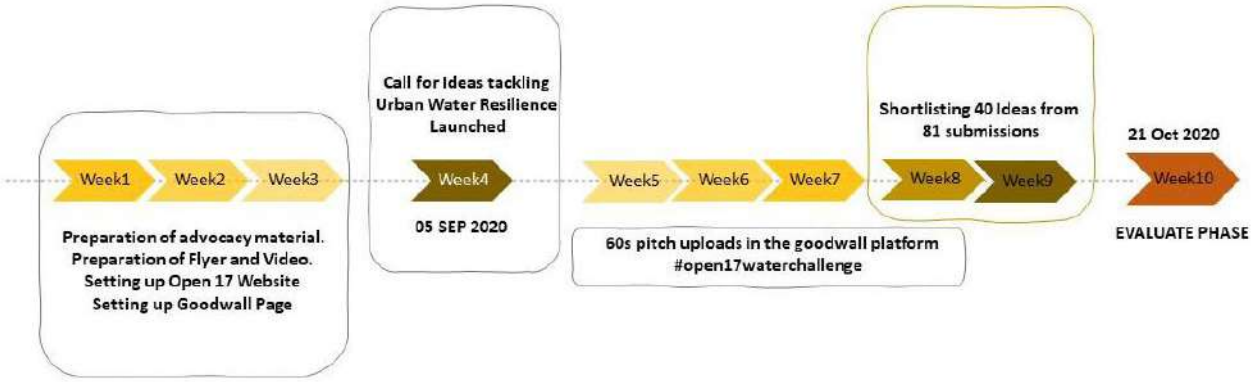


Figure 3. Execution timeline of the Gather Phase

The backbone of this launch campaign was communication through social media with posts regularly put on the Crowd4SDG Twitter and LinkedIn accounts featuring:

- A leaflet detailing the call (Annex 2);
- A video[1] that showcases the benefits to potential participants taking the example of a success story from a past challenge and;
- A number of reminders as the deadline was approaching.

The Consortium partners shared within their Twitter and LinkedIn networks the above information adding as well their own Facebook and Instagram accounts when available. Through these actions multiple organisations like the Guild network[2] and the Circle-U European University Alliance[3] were informed and relayed the information to their memberships.
Twitter and LinkedIn posts launching the Call for participants are still recording the highest scores. On Twitter 6000 impressions were recorded with an engagement rate of 2%. On LinkedIn an engagement rate of close to 30% was recorded over a total of 500 impressions.

[1] https://videos.cern.ch/record/2729303)
[2] https://www.the-guild.eu/
[3] https://www.circle-u.eu/

A sponsored launch event of the call for participants was organised as part of the ECSA conference in September 2020 to ensure that the European Citizen Science community was informed of this initiative as well and relay it within its own networks.

Direct contacts were also taken by the consortium partners to share the information of the call within their networks of high schools and up to PhD students programmes. Dedicated information sessions were organised for these target audiences as well as articles published in the Consortium partners internal newsletter and/or magazine (D6.4 Interim-report on dissemination events and outreach activities aligning with the EU-Citizen.Science CSA).

Besides the elements of communication referred above, the challenge was displayed on the Open17 website[4] and the Goodwall[5] platform.

3.1.1. Submission of Ideas through the Goodwall Platform

Goodwall is a professional development network and a next-generation community for students and young professionals, with over 1.7 million users across the world. Goodwall was the platform used for the registrations and submissions of the proposed ideas. The collaboration with Goodwall enabled us to reach out to a vast network of next-generation innovators. In the call for ideas provided at the Gather Phase the participants were invited to upload a one min video pitch, using the hashtag #Open17Water[6] on the Goodwall platform.

An exclusive tag page (Annex 3) was set up for the submissions, which eases the management of submissions while keeping it transparent to other users. The Participants were encouraged to apply either as individual participants or as teams. Within 2 weeks, we received a first batch of 28 pitches and by the end of the deadline, we had received around 86 applications, from approximately 150 participants, with a good global representation from 18 countries. As soon as the call for ideas was closed, we started a process to select the best ideas and invite those participants to the Evaluate phase.

3.1.2. Ideas selection process

In order to simplify the selection of best ideas we used the Citizen Science Project builder[7] **(CSPB)** tool supported by the Crowd4SDG project.

The **Citizen Science Project Builder (CSPB)** is an online tool that enables people with limited technical knowledge of crowdsourcing to create citizen Science Projects. It also allows volunteers to collaborate on solving complex data classification tasks.

The selection process was carried out by the Crowd4SDG consortium partners and the Open17 Core team members. Each pitch was reviewed at least 3 times by different reviewers.

Figure 4 presents a screenshot of the interface used for reviewing the ideas. Each of the submitted ideas is presented at the right side in the form of text and/or video. On the left side, there is the form to score the pitches based on the following criteria:

- Novelty (whether the pitch is based on a new idea or concept)
- Relevance (whether the pitch talks about water related issues in the urban context)
- Feasibility (whether the project is doable with reasonable time and effort)

[4] https://openseventeen.org/
[5] https://www.goodwall.io/
[6] https://www.goodwall.io/tags/open17waterchallenge
[7] https://lab.citizenscience.ch/

- Crowdsourcing (whether the pitch has a crowdsourcing component)

The people participating in the selection process were also requested to leave a comment on ideas which showed high potential. A total of 258 reviews were collected, where each submitted idea was reviewed 3 times. Out of the 86 ideas initially reviewed, 40 were selected based on their overall scoring.

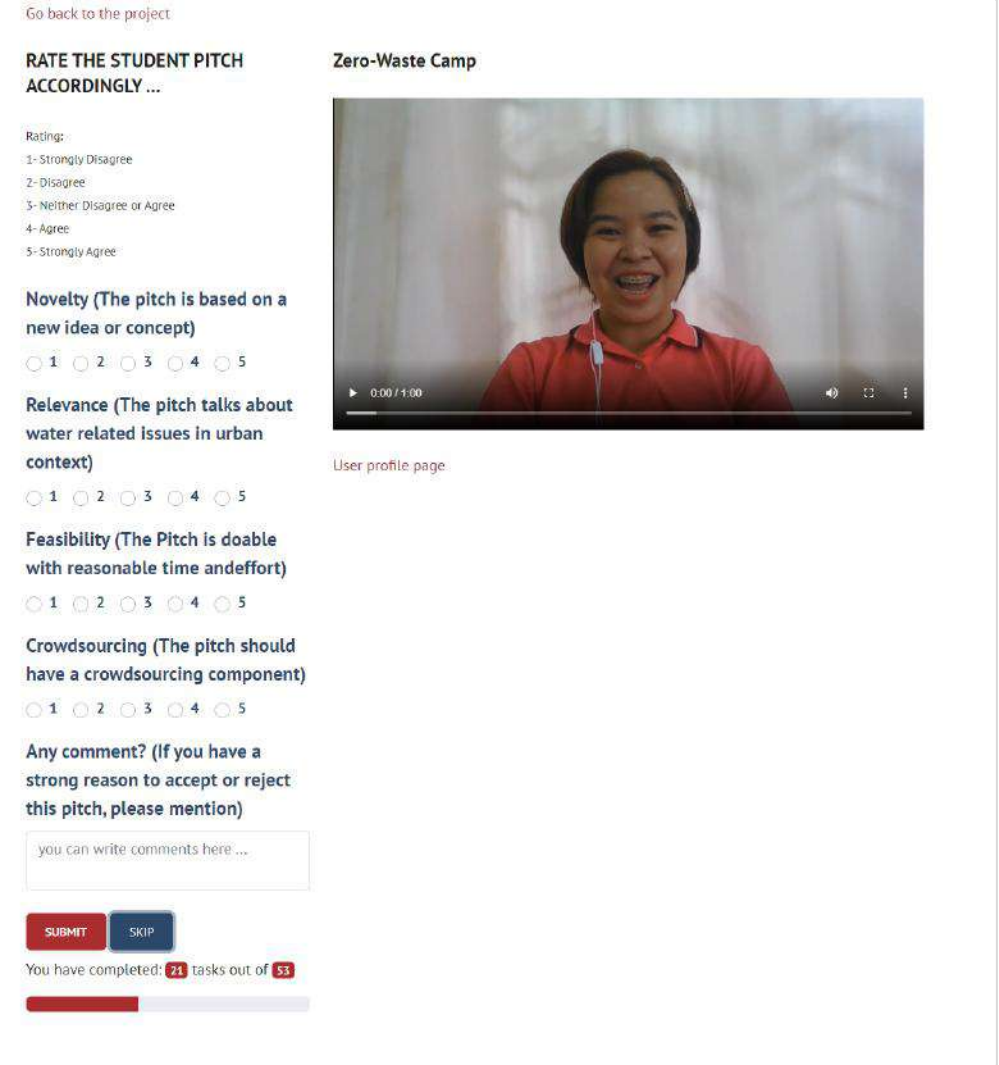


Figure 4. Screenshot of CSPB interface set up to select the submitted ideas

3.1.3. Evaluation of Gather Phase

From the initial data gathered from Goodwall, 86 participants/ideas had applied for the Call, with a good global representation from 18 countries, with a major concentration from Nigeria (See Figure 6). This major concentration from Nigeria is explained due to the recent activities GoodWall has been doing in that country and the increasing number of people from Nigeria joining the GoodWall Community.

A number of submissions applied as a group, i.e. one idea was submitted with a group of participants behind that idea. These groups were composed by 2-4 people which increased the total number of participants at the Gather phase to more than 150 people. Among all participants we found 37% were Female, 56% male and 7% unknown. Figure 5 shows the gender distribution of applicants who submitted their ideas as a 1 minute pitch.

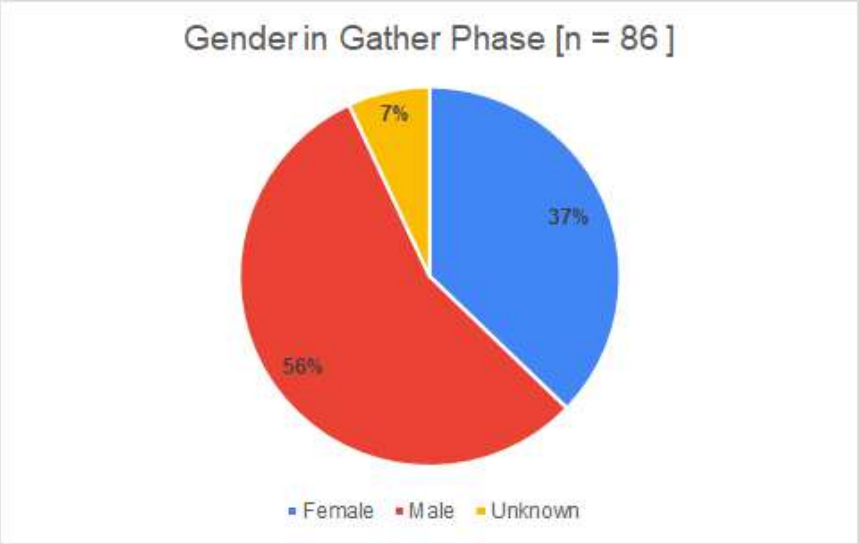


Figure 5. Gender distribution of applicants to the Gather Phase

Figure 7 shows the age of the participants (left) and the source of their information about the challenge (right) indicates that a good number of participants learnt about the Open 17 Water Challenge via the Goodwall platform. This Sankey diagram also shows the preferred age group (16 to 26) are well covered within Goodwall. It is interesting to see how another set of participants have learnt about this challenge from their peers and their university or schools.

For the second GEAR cycle we plan to address European Communities to maximise the participation of people from Europe.

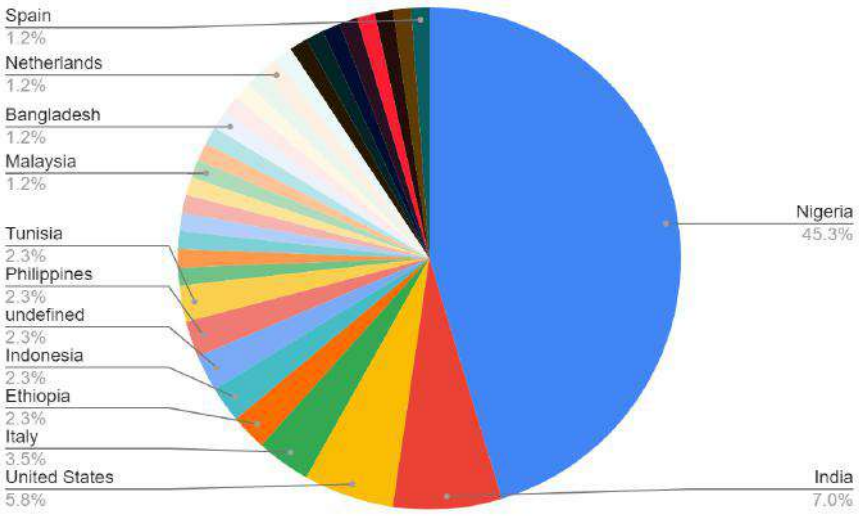


Figure 6. Geographical distribution of applicants

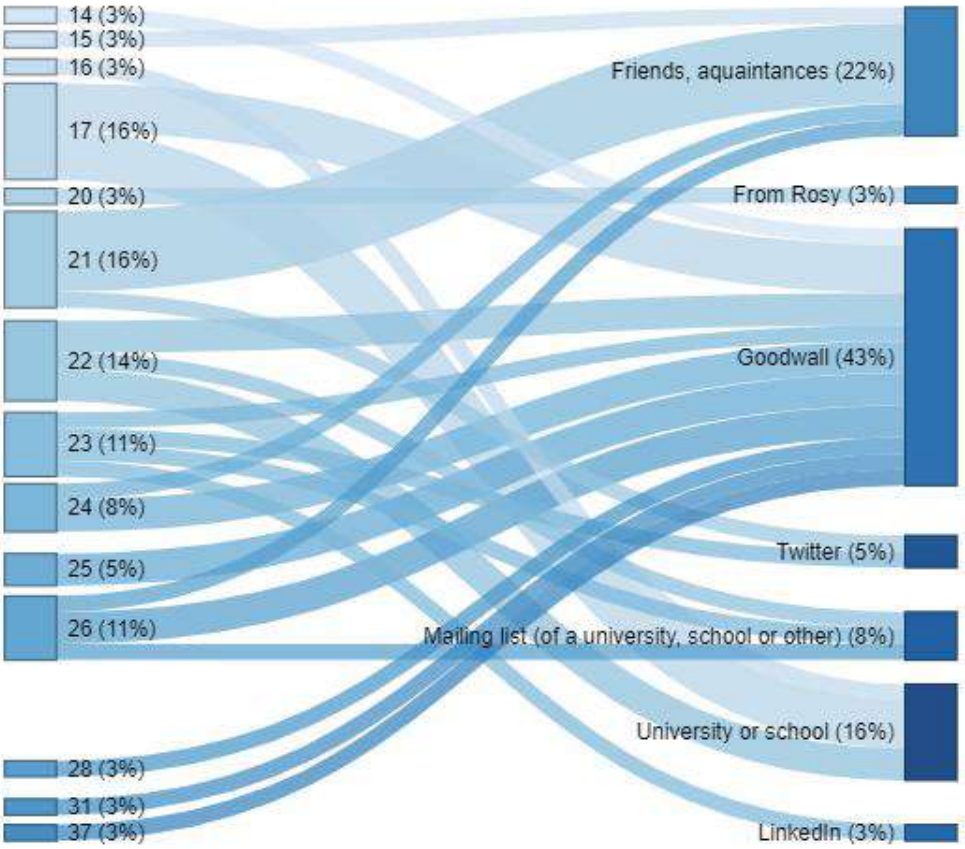


Figure 7. Sankey showing the participant age (left) and their source of information about the challenge (right).

3.2. Evaluate Phase

The Evaluate phase is structured over 5 weekly 2h online sessions. The teams received interactive online mentoring and coaching from international experts and coaches, to conceive ways to use open data, crowdsourcing technologies, and low-cost open source solutions to develop prototypes suitable for deployment and tackle sustainable development, and ultimately to achieve concrete steps towards the SDGs, at a local, regional or global level.

40 ideas from the Gather Phase were selected and 54 participants were invited to the second GEAR Phase. The *Evaluate Phase* took part in the Open17 program.

The 2020 Open17 Challenge on Urban Water Resilience promoted challenge-based innovation through student teams working on the development of practical solutions to challenges related to innovating for urban water resilience.

The coaching program was completely online and was aimed at people between 16 and 26 years old. It took place over five weeks, from 28th October to 18th November 2020, with 2hrs/week of online classes, and 2-3hrs/week of team-based assignments (See Table 1).

During the program, participants refined their solutions iteratively, thanks to the feedback provided on a weekly basis by mentors and experts from UN organizations, NGOs and private sector partners from around the world. As part of the challenge, teams learned to structure and deliver a compelling pitch for their project. As well as doing project-based work,

participants benefited from the chance to meet experts from organizations such as WMO, UNOSAT/UNITAR and CERN.

The Evaluate phase promoted to the participants a collection of open-source digital tools supported by the Crowd4SDG project, called Citizen Science Solution Kit (CSSK)[8]. As presented in Table 1, each week a CS tool was presented to the participants.

The Citizen Science Solution Kit is a set of tools for developing and running Citizen Science (CS) projects. The tools enable anyone to design and launch their own CS project, and support teams that are developing innovative CS projects. Some of the tools are being enhanced with AI features by the Crowd4SDG partners (see Deliverable 2.1 for more details about the evolution of AI enhanced CS tools).

The tools were adapted from existing Open Source solutions that can support a wide range of crowdsourcing projects for the SDGs. They range from crowd-based data collection and classification to distributed volunteer computing to project design and community mapping tools. The tools are aimed to quickly build and test a crowdsourcing solution for the SDGs, ideally without coding skills.

3.2.1. Team Building and Communication

The Participants were advised to form teams with 2-4 members each after reviewing each other's pitches on Goodwall. The Open17 core team facilitated those who had issues in finding team partners, within the selected applicants. Exceptions were made in two instances, where they couldn't find interested team members within the participants, and they brought in additional members who later joined the program.

Though most participants had applied as teams, they reached out to each other to collaborate and form new teams because of aligned interest during the first two weeks. Both Goodwall and Slack facilitated communication among the participants. We had six teams (17 participants) composed of participants from different countries.

In addition to the Goodwall chat group, *a Slack channel* was created to coordinate the Evaluate phase and provide communication channels between the participants, mentors and the Open17 Core team. Even though emails remained as the official communication channel, Slack demonstrated to perform well facilitating discussions. A total of 69 people participated in the slack channel, 46 participants, 8 organisers, 7 mentors, and Crowd4SDG partners. A detailed analysis of the Slack usage and users' interactions can be found in the public deliverable D4.2. Figure 8 shows a screenshot of the slack channel used for the Evaluate phase.

[8] https://crowd4sdg.eu/about-2/tools/

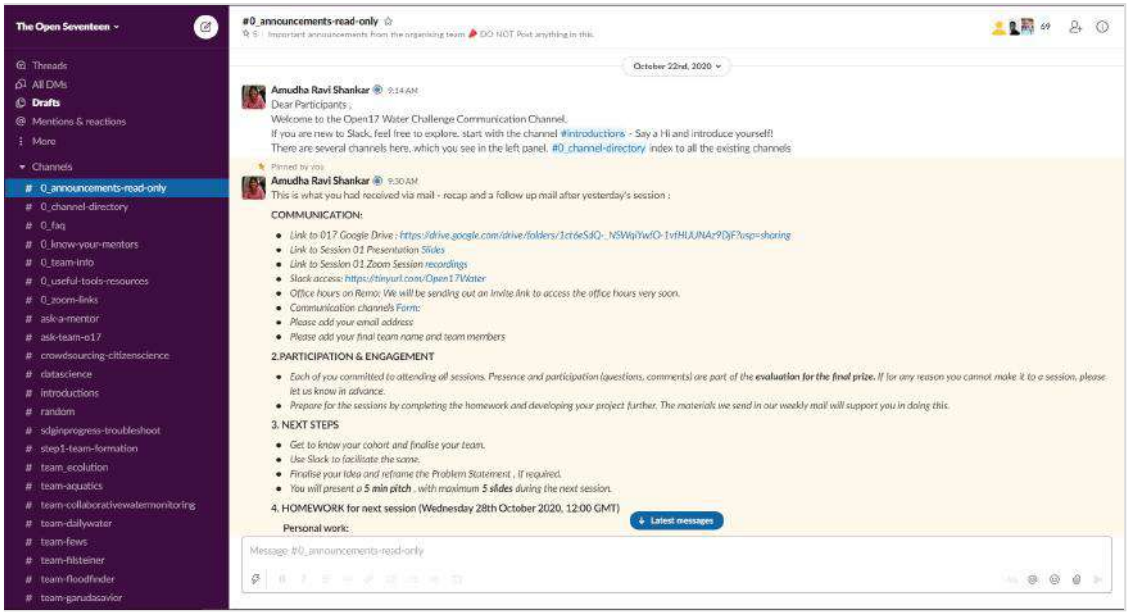


Figure 8. Screenshot of Evaluate Phase Slack channel

3.2.2. Evaluate Phase Program Structure

The Evaluate Phase program runs for 5 weeks, with 2 hours coaching per week. The learning outcomes included, without being limited to:

- How to design and manage a team based project, from problem identification to project conception;
- How to use open data, crowdsourcing and low-cost open source technologies in developing solutions to address the SDGs;
- How to document projects effectively;
- How to collaborate effectively with peers and mentors from different countries and cultures;
- How to communicate clearly and concisely about projects and goals through various rounds of pitching and project presentation.

Table 1 shows the overview of the Evaluate phase program.

	WEEK 01	WEEK 02	WEEK 03	WEEK 04	WEEK 05
TIME	21 October 2020	28 October 2020	4 November 2020	11 November 2020	18 November 2020
14h00	*Introduction to Urban Water Resilience;*	*Young Water Solutions; Geneva Water Hub ;*	*World Meteorological Organisation;*	*UNOSAT Flood Rapid Mapping;*	
14h15					
14h30	*Method: Problem Definition;*	*Method: Theory of Change;*	*Method: Personas;*	Elevator Pitch - Case Study	
14h45	*Tool: CS Project Builder*	*Tool: SDGin Progress*	*Tool: Kobo Mobile Collector App*	Tool: Decidim	
15h00					
15h30		*Student Pitches in breakout rooms*	*Student Pitches in breakout rooms*	*Student Pitches in breakout rooms*	
16h00	*Student Pitches & Team formation*				
					Final Pitch

Table 1. GEAR Evaluate Phase program

Every week, the online session featured as follows:

The first hour included:

- Presentation by invited experts, followed by a Q&A;
- Introduction to a Design Method (Problem Definition, Theory of Change & Personas);
- Introduction to one of the Citizen Science Toolkit (Project Builder, SDG in Progress, Mobile Data Collection & Decidim).

The second hour included a Pitching session from the participant teams. Each team was allotted a 5min pitching time followed by a 5-7min Q&A. The teams were divided into breakout rooms , with 4 to 5 teams and 2 to 3 mentors per room. After each weekly session, participants received homework preparing them for the following session and shaping their project. Figure 9 presents the canvas used by the participants to prepare their final pitch.

Week 1 : Team Building and Problem Definition

The first week, the participants received an overview of the program, the theme and the deliverables. Over this session and next the students got to further refine their problem and project description. The teams were also introduced to the CS Project Builder, as part of the Citizen Science Solution Kit (CSSK).The Participants were encouraged to post a 1min pitch in the goodwall page with the tag #Open17waterweek1[9].

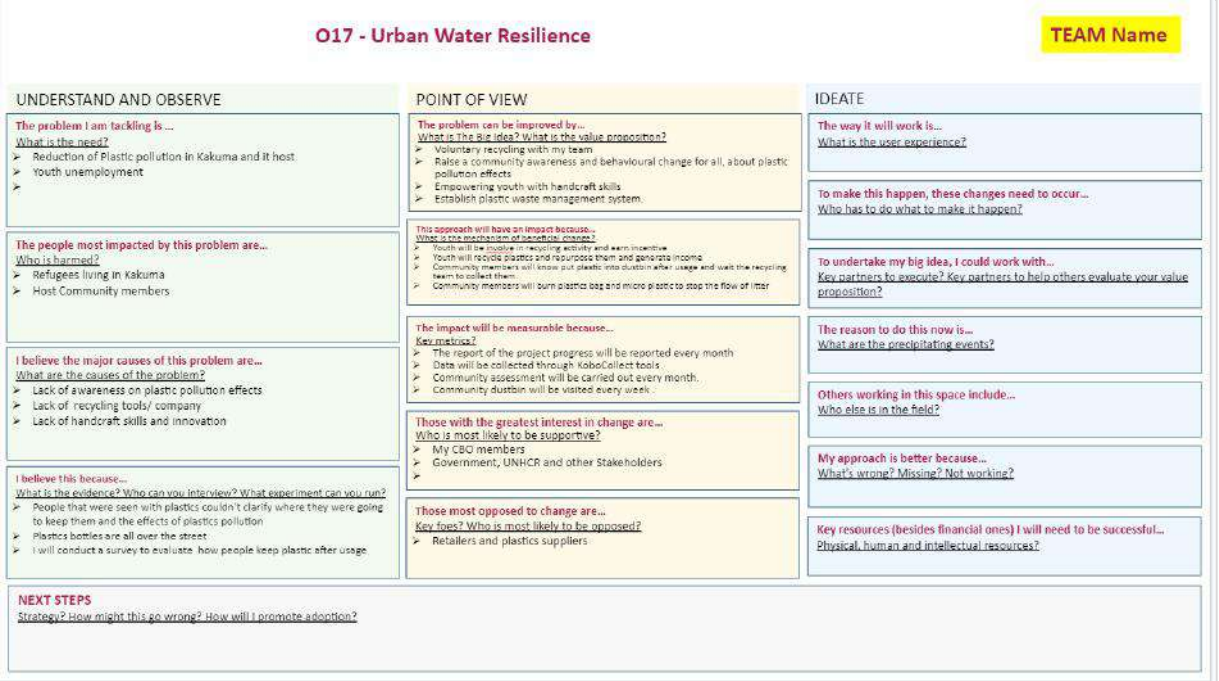


Figure 9. Canvas given to participants to prepare their pitching.

Week 2 : Testing the Methodology

In the second week, the participants attended the invited expert presentation by Young Water Solutions[10], an international non-profit organization, empowering young social entrepreneurs to kick start their water and sanitation solutions. Following this, the participants were introduced to the Theory of Change to better understand the problem they are trying to solve and the outcome they wish to achieve. The Participants also learned about the

[9] https://www.goodwall.io/tags/open17waterweek1
[10] https://youngwatersolutions.org/

documentation tool SDGinProgress[11] (see Figure 10). Project documentation was made mandatory for the teams.

Each team presented their problem definition and their progress during the first week, in a 5 min pitch in front of the coaches and mentors, where they were provided constructive feedback to shape their project further.

Week 3 : Personas and Open Technologies

During Week 3, the teams learned to do stakeholder analysis using Personas, and as part of the SDG toolkit, the teams learned to use Epicollect[12] for crowdsourced data collection. We had Dr Dominique Berod, Chief Hydrologist from the World Meteorological Organisation, presenting the hydrological aspects. During the Second hour of the session, we had student pitches. At least two mentors were assigned per team, and the mentors provided feedback in between the weekly sessions either via Slack, SDGinProgress or over a zoom call. Apart from the Open17 Core team, we had mentors from UNIGE and the Crowd4SDG Partners. In some cases, the participants were put in touch with external field experts.

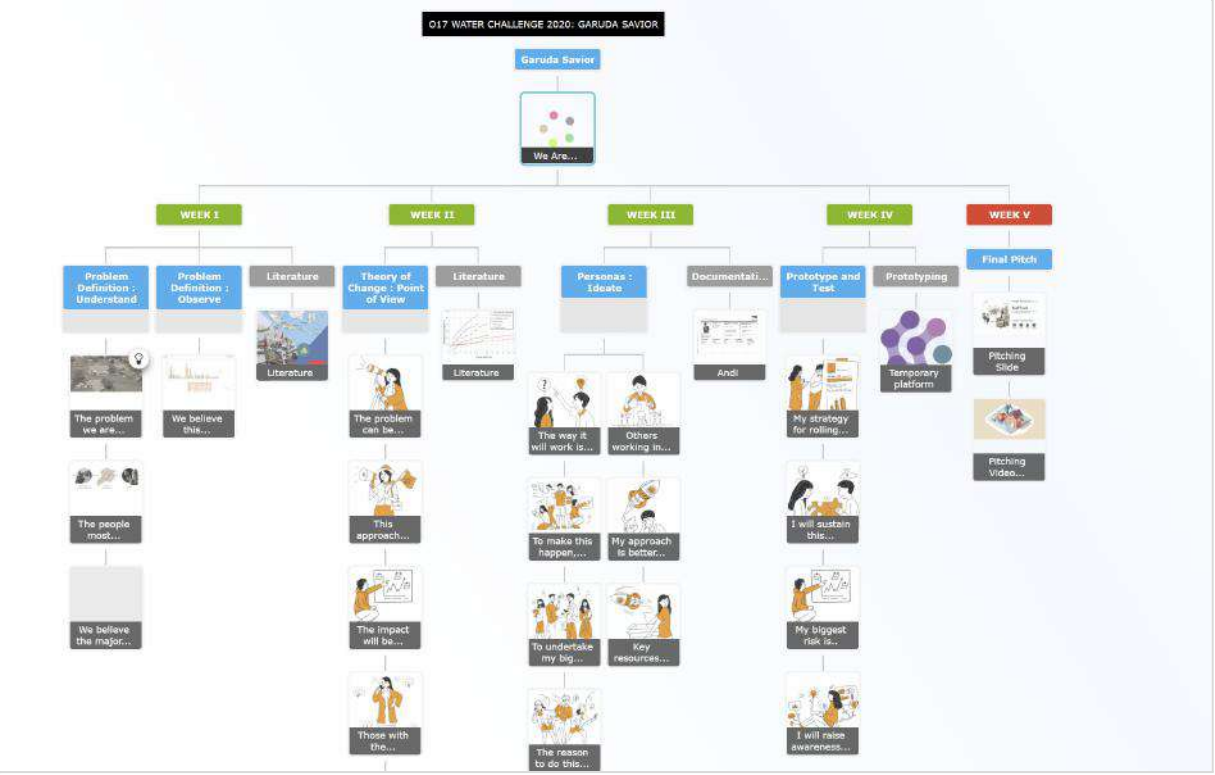


Figure 10: Team GarudaSavior's project documentation in SDGinProgress

Week 4 : Measuring Impact and Persuading the Audience

The penultimate week's objective was for the teams to have a business strategy for their project and start reaching out to the right people. This week encouraged teams to present a prototype where possible. We had an exclusive breakout room which had mentors with rapid-prototyping expertise. The teams also learned how to effectively pitch their project followed by a pitch from a similar student-led project from the GTI Masters Cohort. The

[11] https://sdginprogress.com/
[12] https://five.epicollect.net/

project partner from CSIC-IIIA presented ***Decidim***[13]**,** the crowd deliberation tool as part of the toolkit. We also had an expert presentation on Flood Rapid Mapping by **Luca Dell'Oro**, Head, Disaster Risk Reduction from the **UNOSAT - UNITAR's Satellite Analysis and Applied Research Program.**

The students homework for the week 4 included :

- 60s pitch on the Goodwall platform using the hashtag #open17waterweek5;
- One page write-up on their project;
- Updated documentation in SDGinProgress platform;
- 5 min presentation slides.

The evaluation criteria that would be applied to select best projects from the Evaluate Phase was presented to the students. Before the final pitch the students received necessary feedback on their progress and the presentation content.

Week 5 : Final Pitch and Planning for the future

On the final day of the Evaluate Phase, the EU Project Officer, **Ms Colombe Warin,** was invited to give a keynote presentation. Following this, Pablo Garcia Tello, Head (Development of EU Projects & Initiatives)- CERN, introduced the Accelerate Phase (Challenge Based Innovation Workshop). Twelve jury members (10 of them external to Crowd4SDG) were invited to evaluate the projects on their final pitch. Each team had 5 minutes of pitching time followed by a 3 minutes feedback time. In the interest of time, there were two break out rooms, with nine teams in each room who were pitching in parallel to a panel of jury members. Two Jury members were invited after every presentation by the room facilitator to provide oral feedback for each team. All the Jury Members were then invited to evaluate each team after their presentation using an evaluation form[14]. The team mentors were also evaluating the presentations. Table 2 shows the list of jury members and other evaluators within each breakout room.

Room Facilitator	**François Grey, University of Geneva**
Jury Members	Barbara Pernici - Politecnico di Milano
	Christina Lee - Global Green Connect
	Christian Bréthaut - University of Geneva
	Pablo Garcia Tello - CERN Idea Square
	Gabriele Scalia - Politecnico di Milano
	Charlotte Poussin - University of Geneva
Team Mentors	Laura Wirtavuori - CERN Idea Square
	William Wynearson - University of Geneva
	Stephanie Chuah - University of Geneva
	Chiagozie Udeh - University of Geneva

[13] https://decidim4cs.iiia.csic.es/
[14] https://bit.ly/FinalPitch_EvaluationForm

Room Facilitator	Rosy Mondardini - Citizen Science Centre Zurich
Jury Members	Valerio Lorini - Joint Research Centre of the European Commission
	Kenneth Kwok - Global Citizen Capital
	Walid O El Cheikh - Pitching for Life
	Ingeborg Albert - GENEUS
	Julian Forbat - University of Geneva
	Helen Lee Curtis - University of Geneva
Team Mentors	Jose Luis Fernandez Marquez - University of Geneva
	Ana Deveza - University of Geneva
	Victoria Castro de Huber - University of Geneva
	Josefine Lynggaard - University of Geneva

Table 2 : Jury Members and Mentors at the final day - Evaluate Phase

The evaluation criteria were as follows :

- **Novelty**: is the pitch based on a new idea or concept or using existing concepts in a new context?
- **Relevance**: is the solution proposed relevant to the challenge or potentially impactful?
- **Feasibility**: is the project implementable with reasonable time and effort from the team?
- **Crowdsourcing**: is there an effective crowdsourcing component?
- How would you rate this team's overall **presentation skills** during this pitch?

Figure 11 shows a screenshot of the final day of the Evaluate phase.

Figure 11. Screenshot from final day - Evaluate Phase

Following the pitching session, there was a 15-minute jury deliberation for jury members and mentors in each breakout room. At the same time, the participants were asked to fill in a participant feedback form in the main room. The average scoring of all the jury members and mentors were computed, and the final results were announced a week later.

Five teams out of the eighteen teams who went through the Evaluate Phase were selected to move to the Acceleta Phase. The selected teams were:

- Collaborative Water Monitoring[15] (4 participants);
- Eco-lution[16] (3 participants);
- To See To Care[17](2 participants);
- Potamoi[18] (4 participants);
- Thousand Waters[19] (2 participants).

All participants received a Certificate of Participation[20] and a **Letter of Completion**, a summary of feedback from the jury members and mentors and suggestions on moving forward with the project. The Certificate was provided jointly by the Crowd4SDG partners. The Certificate of Participation was as per UN Institute of Training and Research (UNITAR) criteria of Certificate issuance; hence the Certificate is recognized by the UNITAR.

Apart from the five teams selected for the Accelerate Phase, three other teams with higher mentor scoring were selected to be presented at the SDG Accelerator[21], an external program run by the Geneva-Tsinghua Initiative[22]. The SDG Accelerator supports student teams working on SDG-related projects to scale up their innovations through the different innovation phases. The three teams that were selected were:

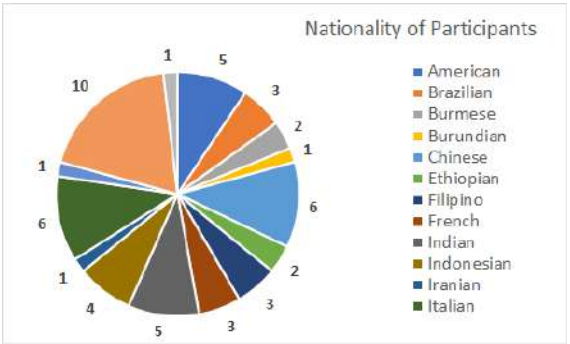
- Team Garuda Savior[23];
- Team FEWS[24];
- Team Flood Finder[25].

Following teams received digital badges for the following criteria: Team *Garuda Savior* and *Team Flood Finder* received a Special Mention Badge. *Team Flood Maps* and *Team Warbon Footprint* received the Best Pitch Badge, and *Team Aquatics* and *Team MNL* received a badge for Best Documentation.

3.2.3. Evaluate Phase Evaluation

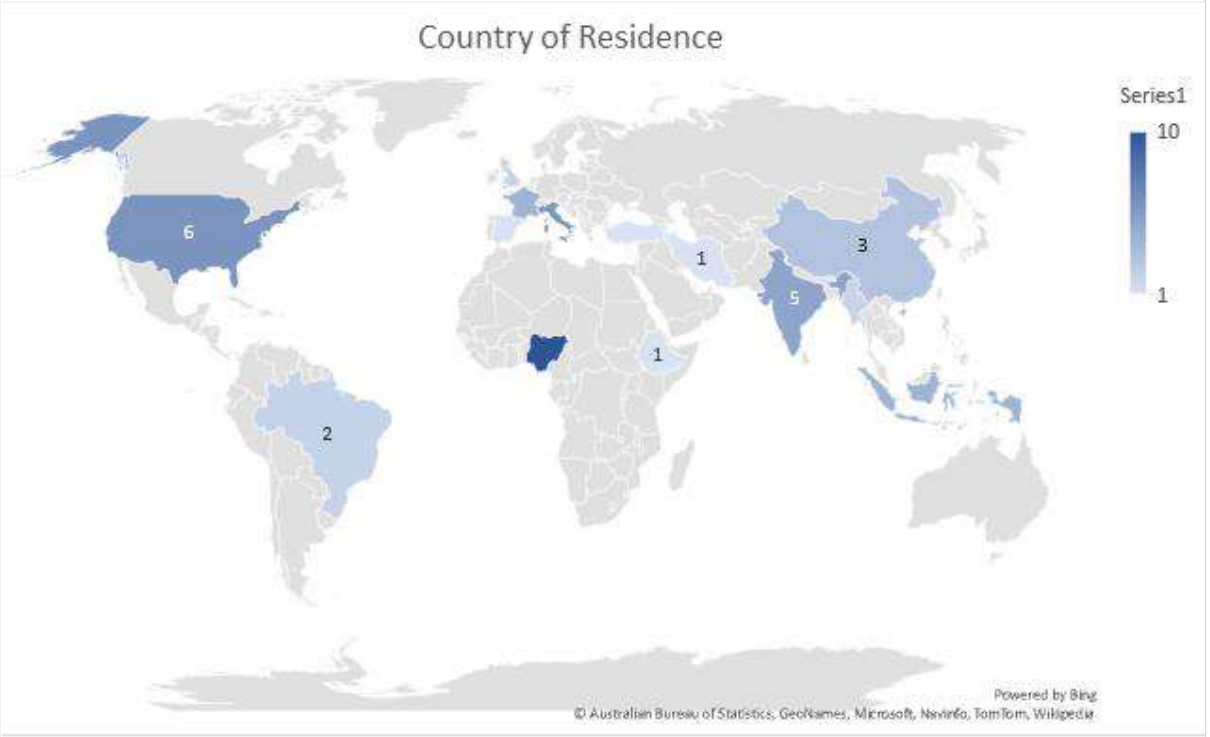
At the end of the Evaluate Phase, we had 18 teams and 48 participants. There were 27 female participants and 21 male participants. Even though at the previous phase the number of ideas submitted from male participants were significantly higher, a gender balance is being achieved through the selection process.

[15] https://sdginprogress.com/projects/802/steps
[16] https://sdginprogress.com/projects/789/steps
[17] https://sdginprogress.com/projects/807/steps
[18] https://sdginprogress.com/projects/813/steps
[19] https://sdginprogress.com/projects/825/steps
[20]https://docs.google.com/presentation/d/19frmyDJ4SaBC73Tpd9NAWEHT38ek6mYB/edit#slide=id
[21] https://gt-initiative.org/education-programs/accelerator/
[22] https://gt-initiative.org/
[23] team Garuda Savior: https://sdginprogress.com/projects/798/steps
[24] team FEWS: https://sdginprogress.com/projects/785/steps
[25] team Flood Finder: https://sdginprogress.com/projects/782/steps



(a) Nationality of participants

(b) Continents distribution



(c) Worldwide map with the geographical distribution of participants

Figure 12. Geographical Distribution of the Evaluate Phase participants

We had participants of 15 nationalities residing in 17 countries taking part in the Open 17 Water Challenge (See Figure 12). We had a maximum representation from Nigeria, which included 10 participants spread over 4 teams.

To assess the Evaluate Phase we shared a survey with the participants (see link[26] for a detailed analysis). 37 out of 48 participants filled the survey. Based on their answer, 50% of the participants were undergraduates, 25% of them were high schoolers, and 22% were post-graduates. The participants were from diverse fields of study with a significant representation from Life Science and Engineering (See Figure 13).

[26] http://bit.ly/EvaluatePhase_Feedback

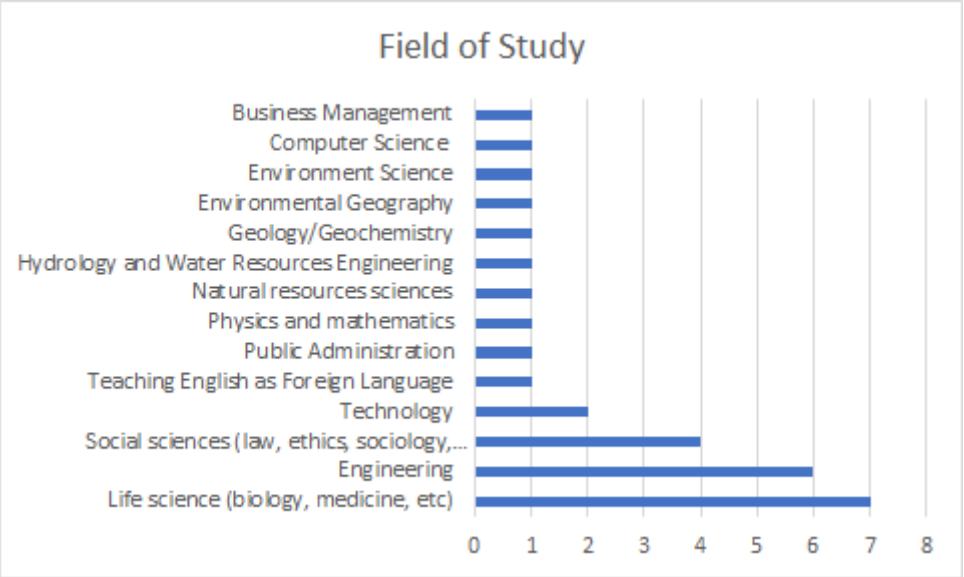


Figure 13. Participants field of study - Evaluate Phase

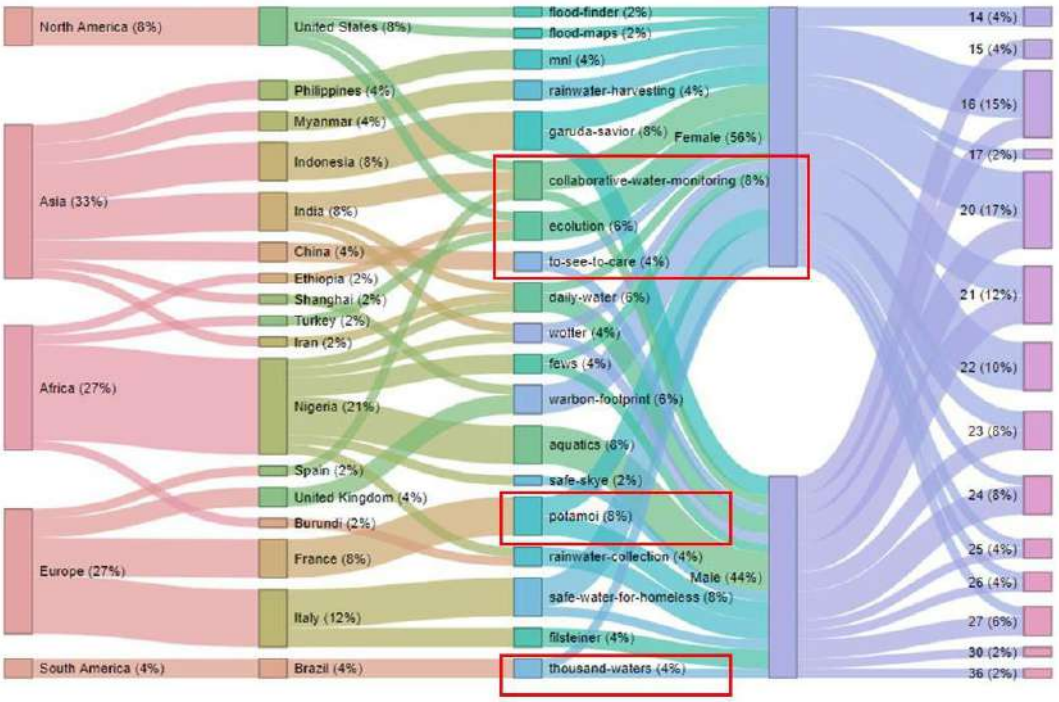


Figure 14. Sankey showing the participant team names with their geographical distribution(far-left) along with their gender and age (far-right).

About 20% of the participants came from Nigeria. The predominant continent among participants was Asia with 18 participants. Africa followed with 14 participants while Europe with 10 participants, and North America and South America with 3. Figure 14 indicates the geographical distribution, gender and age of each team member. The teams within the red box are the teams selected for the Accelerate phase.

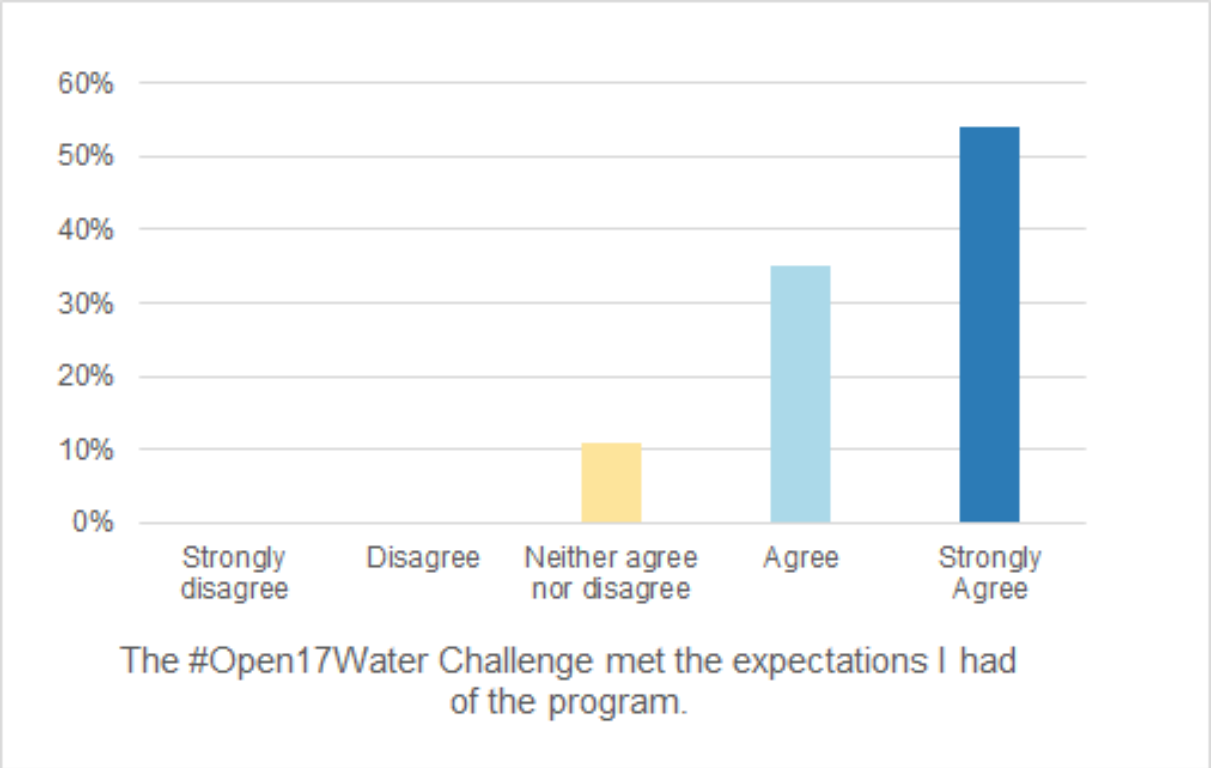


Figure 15. Participants expectations - Evaluate Phase

Based on the survey, 89% of the participants of the Evaluate phase met the expectations (See Figure 15). At least 90% of the participants indicated that their understanding of Crowdsourcing, Citizen Science and the SDGs has increased. 97% of the participants have stated that their ability to innovate and pitch has increased. At least 90% of the participants found each workshop helpful or very helpful.

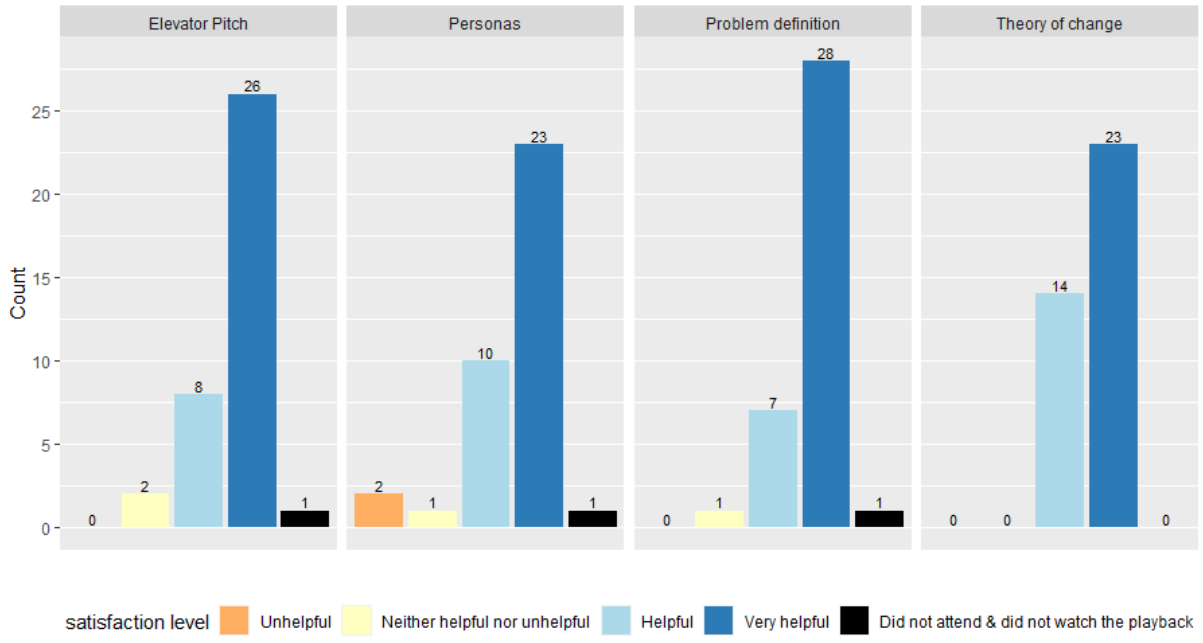


Figure 16. Participants' evaluation of the content - Evaluate Phase

Between 90 to 95% of the participants found the expert presentation helpful or very helpful.

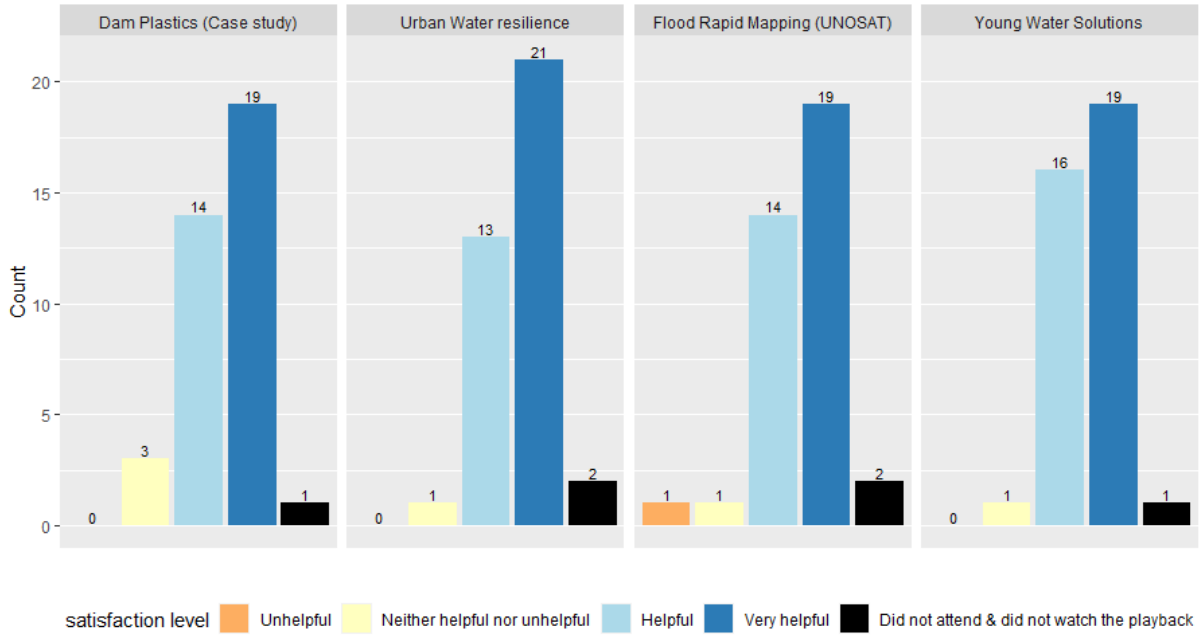


Figure 17. Participants' evaluation of the Expert presentation - Evaluate Phase

At least 90% of the participants agree that their understanding of Crowdsourcing, Citizen Science and SDGs increased since their participation in the Evaluate phase. Among the tools presented, SDG in Progress was most helpful since that was the most used tool..

94% of the participants declared that they would use the knowledge gained during the Evaluate Phase to develop their project. 84% of participants reported that their team received frequent feedback from the Open17 team about their project and 92% of the participants found the feedback useful.

3.3 Accelerate phase

The Accelerate phase was built following the philosophy of giving a "license to dream". Inspiration was drawn from the accumulated experience on the challenge based innovation courses organised for a total of over 900 students by IdeaSquare and its university partners since 2014.

When teams enter this phase, they already have a project they want to work on including a defined challenge and suggested solution, a pitch, and a low-fidelity or no prototype. The event is a two-week intensive workshop during which the teams work on moving their projects further, in order to convince a jury, and potential investors or other stakeholders, that their project is feasible and impactful.

The Accelerate phase aims at 4 major objectives:

- **Identify and validate critical aspects of the project**: the teams identify what hypothesis they have made, and validate them through stakeholder interviews.
- **Reinforce the pitches**: the teams will work further on their pitches in order to reinforce and argument solidly the potential validity of their project case and envisioned solution.
- **Create a prototype**: the teams will work on a prototype that allows tangibly illustrating their envisioned solution to their selected problem towards an audience whose support the teams need in order to continue. This does not need to be a fully functioning

prototype, it needs to be a way to communicate the team's vision to potential stakeholders.

- **Create a path forward:** the teams create a timeline with set steps on how to move forward after the CERN workshop, and have a clear understanding of the effort required to implement their project.

Two weeks is a short time to fully implement all these steps. For this reason, the key outcome is to foster a sense of self-efficacy in the participants and provide needed tools, so they become capable of taking their projects into implementation after the GEAR cycle ends for them.

3.3.1. Communication channels

The initial contact with the selected teams was handled through email, after which each participant was required to join a dedicated Slack channel. Since then, all of the written communication should have happened on Slack. There were separate channels for:

- Each team, in which they could ask directly from the organisers;
- General chat about the programme;
- Giving feedback after each day;
- Sharing materials, such as presentations, useful links, and templates;
- "Watercooler chat" for informal discussion.

On top of the communications on Slack, e-mail was used to share communications deliverables. All of the sessions themselves were organised on Zoom, benefitting from breakout rooms.

The teams chose themselves what channel to use for communications between them. Participants used at least Zoom, Google Drive, and their own Slack. One of the teams was co-located, one was partly co-located, and three teams collaborated fully online.

3.3.2. Project teams and participants

From the Evaluate phase, five teams were selected.

Team **Well Yes** had four members, two based in India, one in the Netherlands, and one in the US. Their idea revolved around well water quality monitoring in rural India, and during the workshop evolved to also include a part on improving the water quality. They were chosen to move on to Refine.

Team **Potamoi** had four members, all based in France. Their idea was to provide a service that cleans data for flood forecast centers.

Team **Ecolution** had three members, two based in Cote d'Ivoire, and one in the US. Their idea was to increase public participation in water resource management.

Team **Thousand Waters** had two members, both from Brazil. Their solution was to provide a water collection and sanitization system to be implemented in a poor neighbourhood in Brazil.

Team **To See To Care** consisted of two members in China, who wanted to make the effects of climate change more real and personal to people across the world, through visualising the effects of sea level rise and temperature changes on a map app. They were chosen to move on to Refine.

All of the team one-pagers are presented in Annex 4.

3.3.3. Accelerate Phase program structure

In this first year of running the GEAR cycle, the Accelerate Phase was held fully virtual, although originally planned to be physical. The time and duration of the event remained the same (2 weeks), despite the change. However, the schedule and the content of each session were designed specifically for the virtual format. It remains to be seen whether the future GEAR cycles will have to be fully virtual or if the Accelerate and Refine phases can be organised as physical.

Table 3 presents the Accelerate Phase program structure as well as the given tasks. The program consisted of lectures with an interactive component such as time for teamwork, presentations, and pitching practice.

The flow of the Accelerate Phase was designed so that previous sessions would always support the later ones. In the first week, more time was reserved for inspirational sessions to encourage the participants to rethink their solutions, and for presenting the basics of prototyping, stakeholder mapping, and pitching. Also time was given for improving teamwork through a facilitated feedback session following the I like I wish[27] methodology developed at Aalto University Design Factory by Satu Rekonen.

The second week was more hands-on, and more time was reserved for the teams to work on their projects. The teams interviewed stakeholders, prototyped, and worked on their pitches. The teams also started to look forward through planning concrete next steps and a timeline, as well as how the project could be implemented in new contexts, such as new geographical areas.

On top of the daily sessions, the teams were given each day an obligatory homework and an optional task. They were always based on what had been done during the day, such as finalising something that was started in an interactive session, in preparation for the next day. The homework ranged from filling in canvases such as the stakeholder map or the impact canvas, to interviewing stakeholders, prototyping, and improving the pitches. The optional tasks focused on work that might require more time than one day, or to work on something discussed during the day, such as feedback given by the organising team. More detailed information about the Accelerate Phase structure can be found in Deliverable 3.2 Training Corpus

[27] https://ilikeiwish.org/

Week 1					
GMT+1	**Monday 18.1: Setting the scene**	**Tuesday 19.1: Our Impact**	**Wednesday 20.1: Impact and prototyping**	**Thursday 21.1: Pitching**	**Friday 22.1: Pitching and teamwork**
12:00 12:15 12:30 12:45	Introduction to IdeaSquare, CERN, (MN) and the agenda LW Getting to know each other: who you are	Presenting prototyping plans, 2' per team. Sustainable development goals and systems thinking, Kali Taylor.	Stakeholder mapping. Start to prepare for the interviews: contact people. TU	Icebreaker: your ideal cafe. LW	Pitch, feedback. WEC.
13:00 13:15 13:30 13:45	and want to be as a citizen scientist? LW Each team pitches, followed by feedback	Net impact. Upright project, Oula Antere.	Introduction to prototyping. Team based support. OL.	Intro to pitching. WEC.	
14:00 14:15 14:30 14:45	from other teams and assessment of prototyping capacity of the teams. LW, OL, PGT, RM, WEC	Scope and impact. Who is your proposed solution affecting? Can you quantify the impact? LW			Facilitated feedback sessions. One to two hours per team. Rest of time reserved for prototyping.
15:00 15:15 15:30 15:45					
Homework **Optional**	Create a prototyping plan Work on the feedback given.	Fill in impact canvas. Work on problem solution fit.	Prototyping, finalize stakehodler map. Work on scope and impact.	Work on pitch. Prototyping.	Prototyping.

Week 2					
GMT+1	**Monday 25.1: Stakeholders**	**Tuesday 26.1: Our projects**	**Wednesday 27.1: Moving forward**	**Thursday 28.1: Last preparations**	**Friday 29.1: Final pitches**
12:00 12:15 12:30 12:45	CERN e-visit to Antimatter Factory Interconnections: the deployment context and possible "side effects" RM, LW, TU	Present your prototype and results from interviews. LW, OL, RM.	Translation: other contexts. MN. Share your solution to other teams challenge. LW.	Pitching practice, teamwork, support from IdeaSquare team. LW, RM, PGT, MN, TU, OL.	Final pitches and prototypes.
13:00 13:15 13:30 13:45	Interviews. TU, OL	Sharing team challenges with other teams			I like, I wish, I learned, all togerher. LW, RM.
14:00 14:15 14:30 14:45		Meeting point with mentors	The next steps. TBC.		Closing words.
15:00 15:15 15:30 15:45					
Homework **Optional**	Interviews. Prototyping.	Work on other team's probeln. Continue interviews.	Work on pitch, include next steps. Work on next steps.	Finalise pitch and prototype.	

Table 3. GEAR Accelerate Phase Program

At the end of the Accelerate Phase, the teams had to deliver a pitch and a prototype of their projects. Smaller deliverables were the communications material (3 unedited videos, material for one pagers) and impact canvases of their projects. They were also encouraged to share their team documentation, like stakeholder maps, to receive feedback.

In addition to the program, the IdeaSquare team was available for providing support outside of the sessions, and could be contacted via Slack. Mentors were assigned to the teams after having confirmed their participation in the Accelerate Phase. Mentors support was crucial and helped them reaching a better outcome.

3.3.4. Projects selection for the Refine Phase

As part of the GEAR methodology, 2 teams were selected to move forward to the Refine Phase. The selection of the projects was carried out using a similar evaluation criteria than the previous phases. Namely, the projects were evaluated based on the following criteria:

- **Novelty**: is the pitch based on a new idea or concept or using existing concepts in a new context?
- **Relevance**: is the proposed solution relevant to the problem the team is aiming to solve?
- **Impact**: does the potential impact of the solution justify the effort and costs that the project requires to be implemented?
- **Feasibility**: based on the team and the plan forward, how convinced are you that the solution will be implemented?
- **Crowdsourcing**: is there a meaningful crowdsourcing component?
- **Communication**: was the team able to present their project in a convincing way?

The jury that evaluated the projects was comprised of Dr Belinda Bell from Cambridge Judge Business School, Ben Constantini from Startup Sesame, Jose Luis Fernandez-Marquez from University of Geneva, Carmen Calindo Rodrigues from EIT food, Jose Iglesias from TechStars, Dorte Riemenschneider managing director of ECSA, and Radboud van Kleef from Aquasuite.

Based on the Jury evaluation the 2 projects selected to go to the next phase were ‘To See to Care’ and ‘Well yes’.

3.3.5. Accelerate Phase Evaluation

The Accelerate phase was evaluated through both qualitative feedback gathered from the participants on Slack, orally, and through questionnaires, and quantitative feedback gathered through questionnaires. Also the jury members were asked for feedback on how to best improve the level of the projects. In deliverable 3.2 the different qualitative improvement ideas and successes are detailed further.

The specific Slack channel for feedback on daily sessions was used to gather qualitative feedback when it was still fresh in mind. The result of this method was mixed, as not all participants were active on Slack, and as the pressure of the intensive workshop started to mount at the end of the first week. It was decided to focus on the feedback questionnaires in order to ease the burden on the participants.

Three questionnaires were given to the participants, a starting survey (n=14 out of 15), a first week evaluation (n=10), and a combined second week evaluation with full programme evaluation (n=6). In hindsight, the awarding of the completion diplomas should have been conditional to filling in all of the surveys.

The starting and end surveys included questions on how the participants would rate their understanding of how their project can contribute to the SDGs, their ability to prototype, their ability to pitch, and their confidence in launching their project. These were corresponding to the four categories the work was divided into: identifying and validating critical aspects of the project, reinforcing the pitches, creating a prototype, and creating a path forward.

Figure 18 shows the results of the self-evaluation done both before and after the Accelerare Phase.

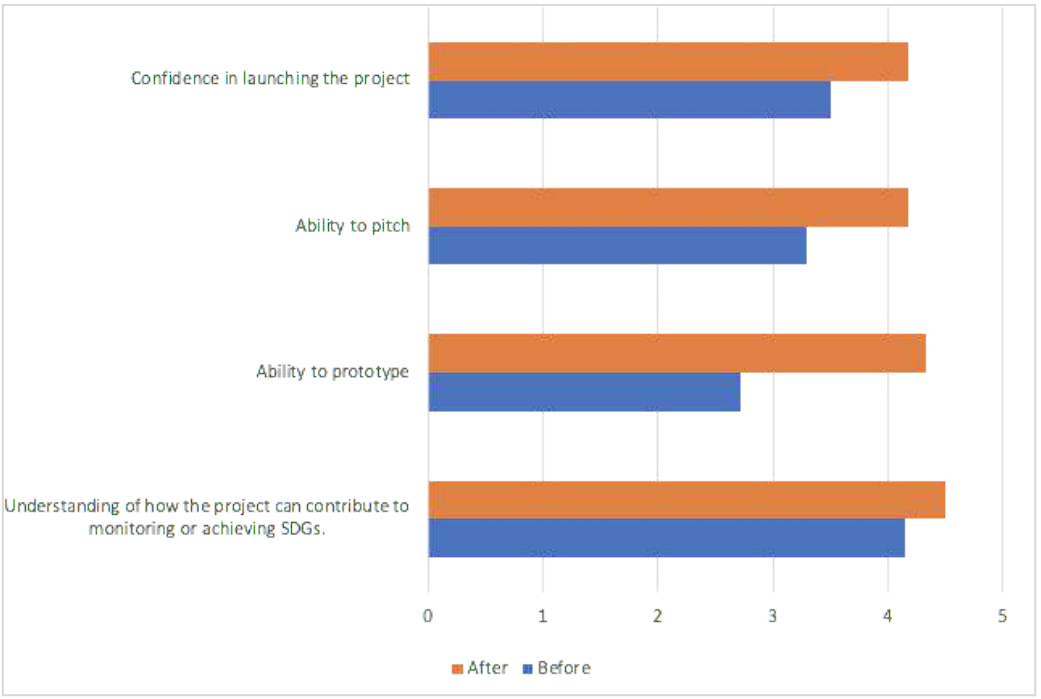


Figure 18. Participants self-evaluation - Before/After Accelerate Phase

Based on these results, the Accelerate workshop can be said to have achieved the goals of increasing the participants' capabilities in the four categories they worked in.

On the qualitative side, the participants mentioned having improved their self-efficacy, critical thinking, project management skills, teamwork skills, and personal time management skills, among others. Some participants mentioned that they would have hoped to learn also about user acquisition and retention.

In the first and second week evaluations the participants were asked to qualitatively give their likes and wishes on sessions and on the overall flow of the programme, and quantitatively evaluate the inspiration (how inspiring did you find these sessions?) and usefulness (how useful did you find these sessions?) of the sessions, grouping sessions on the same area and same week into one. The evaluation scale was from 1 (not inspiring / useful) to 5 (very inspiring /useful). The results are presented in the table below.

Activity	Inspiration	Usefulness
Supporting the dynamic in your team and in the overall group (intro session, getting to know each other, courage to speak)	4,67	4,67
Stakeholder mapping	4,33	4,33
Pitching (two sessions)	5	4,78
Prototyping	4,67	4,67
SDGs and impact (three sessions)	4,44	4,22
Second week		
Activities related to supporting the dynamic in your team and in the overall group (sharing team challenges, virtual visit of IdeaSquare)	4,67	4,5
Interconnections and interviews with stakeholders	4,67	4,5
Pitching	4,83	4,5
Translation (other contexts)	4	3,5
Planning and next steps	4,33	4,17
Mentoring	4,33	4,5

Table 4. Participants evaluation - Accelerate Phase

From these quantitative evaluations it seems clear that all of the sessions served their purpose. Only one evaluation score is below 4, all others are below 4 and 5. Interestingly, only one session had a higher score for usefulness than inspiration, mentoring. The goal of mentoring was to be very hands-on to help the teams move forward in practical terms, and it seems to have achieved its goal.

The qualitative feedback was also overarchingly positive, with relevant improvement suggestions. These are taken into account in the deliverable 3.2.

"I'm able to visualize more our project, its impact and how important all projects to achieve SDGs are and how to do that effectively. I am able to be more myself, also, the workshop pushed me to work and search harder, think outside the box. Every single person and facilitator on the workshop have taught me a lot and I am leaving this more matured and ready to work more in this project, more projects yet to come and to help other people with some tools I have learned." - Feedback from the anonymized final questionnaire

3.4 Refine Phase

The goal of the Refine Phase is to expose the project to major stakeholders bringing them opportunities to collaborate and to increase the chance of broadening their impact.

In this final phase, two projects selected from the Accelerate Phase (Well Yes!, and To see to Care) were presented during an international event on SDGs organised by UNIGE and hosted online due to the current Covid-19 restrictions. This SDG event called GenevaTrialogue[28] gathers academic, private sector and multilateral stakeholders to discuss knowledge and learning tools, platforms and initiatives for the Sustainable Development Goals (SDGs). The Geneva Trialogue was held on the 18th of March and opened an open innovation festival called Open Geneva[29], which lasted for 10 more days.

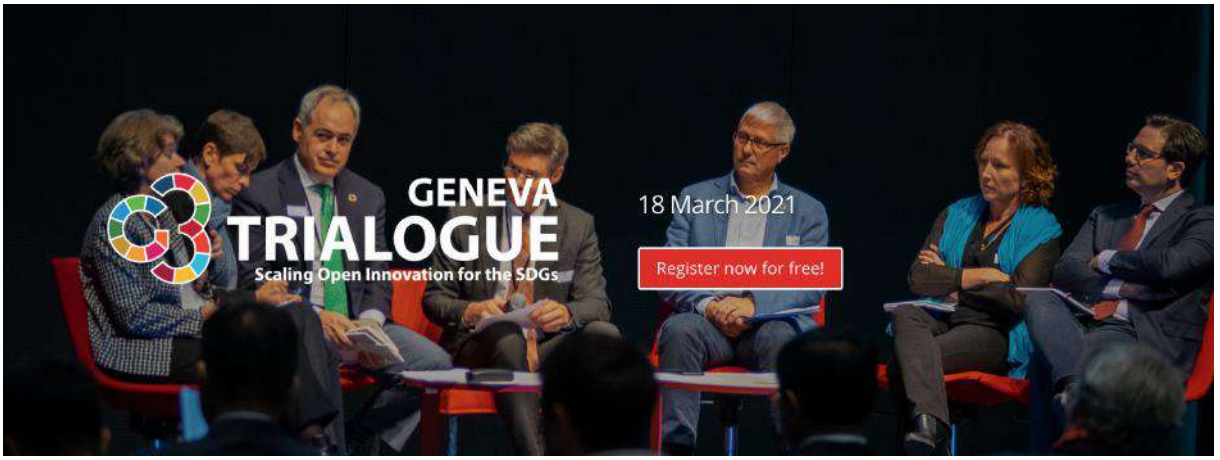


Figure 19. Geneva trialogue website - Refine Phase

Figure 20 presents the Geneva Trialogue program where a specific session for the first GEAR cycle projects was hosted from 17h to 18h on the 18th of March 2021. The name of the session was ' Helping young Innovators to turn their ideas into action', and it was coordinated by the Crowd4SDG consortium. In this session the projects 'To See to Care' and 'Well Yes' were presented to a panel composed by stakeholders who provided the project with concrete feedback. This panel was composed by:

- Christina Lee, Global Green Connect
- Mohamed Ba, ITU
- Omar Bawa, Goodwall
- Nadine Reichenthal, UNIGE Entrepreneurship Lab
- Jose Iglesias, TechStars
- Miles Bell, Young Water Solutions

The session was moderated by Romain Muller from CERN.

[28] https://gt-initiative.org/events/geneva-trialogue/
[29] https://opengeneva.org/festival2021/

Figure 20. Geneva Trialogue Program - Refine Phase

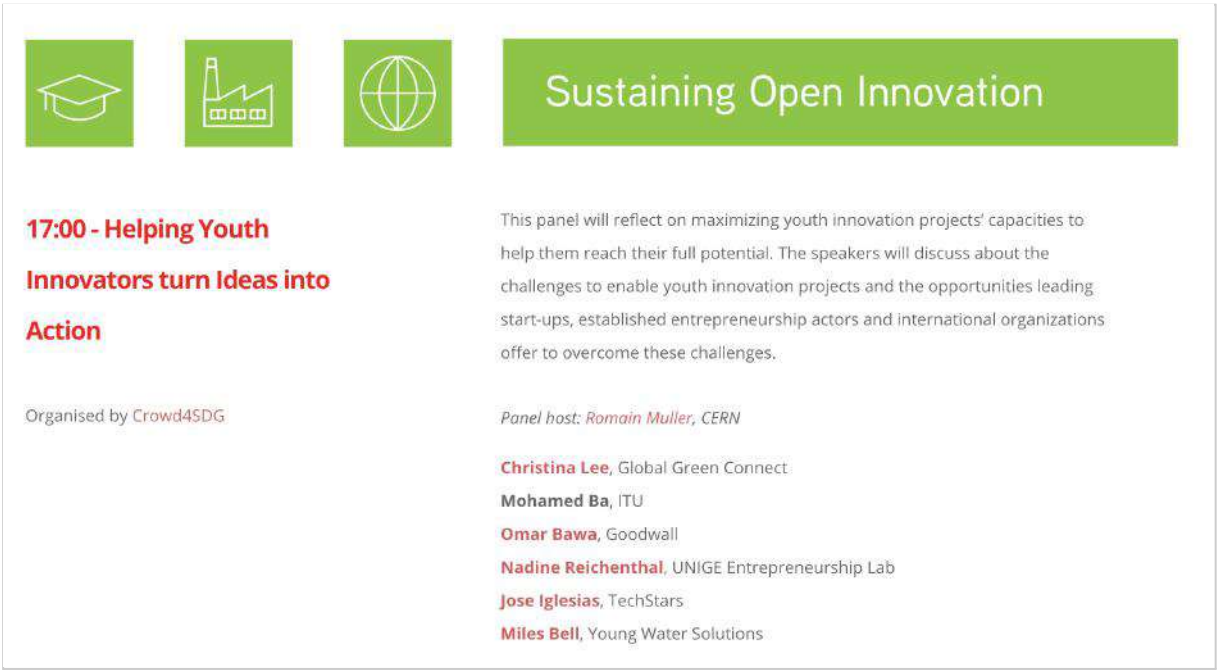


Figure 21. Helping Youth Innovators turn Ideas in Action - Crowd4SDG Session - Refine phase

To prepare the discussion at the Geneva trialogue event we organised 2 meetings of one hour where each of the selected teams presented their project. A panel of experts attended the presentations and participated in a discussion about the best ways of helping the project to move forward. 'Well yes!' project presented on the 3rd of March 2021 and 'To See To Care' presented on the 10th of March 2021. The experts invited to those sessions were: Jose Iglesias from TechStart, Miles Bell from Youth Water Solutions, Christina Lee from Global Green Connect, Omar Bawa from GoodWall and members of the Crowd4SDG consortium.

The Crowd4SDG session at the Geneva Trialogue conference attracted a total of 109 participants. These participants were coming from 23 different countries with a majority representation coming from Europe.

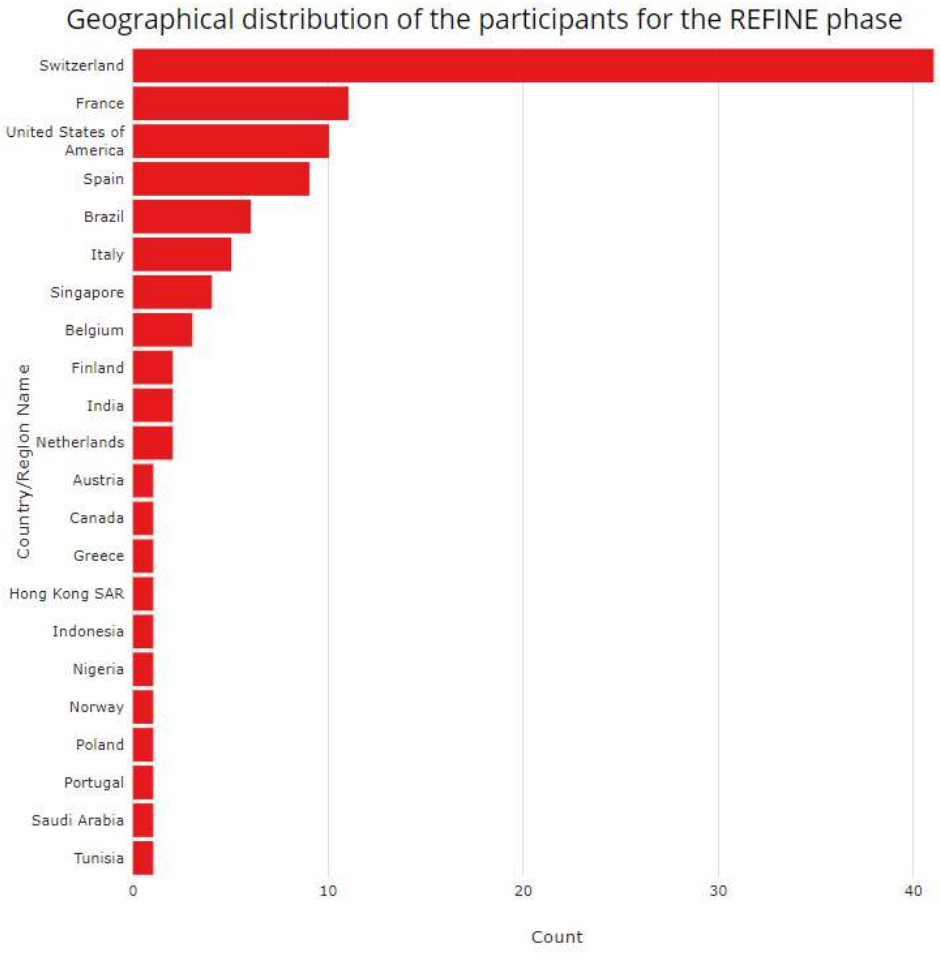


Figure 22. Participation at the Crowd4SDG session - Refine Phase

Regarding the Geneva Trialogue conference, it attracted more than 600 participants and out of those an average of 100 participants were present for each of the sessions.

4. COVID-19 extra activities carried out by Crowd4SDG

In response to the Global pandemic, the Crowd4SDG project consortium in agreement with the Project Officer organised two extra activities targeting the Covid health crisis. This activities are: (1) an O17 Summer Challenge on "Innovating for a Sustainable Post-Pandemic World"and (2) the participation of Crowd4SDG in the swiss online hackathon VersusVirus and European online Hackathon EUVersusVirus[30] under the team's name CrowdVsCovid.

4.1. CrowdVsCovid

CrowdVsCovid[31] was a team of citizens and scientists from research institutions in France, Italy, Spain, Switzerland and the UK, keen to provide policy makers with relevant and actionable information on a range of Covid-related issues, as quickly and reliably as possible.

At both national and European levels, policy makers urgently need the best scientific information in order to make informed policy decisions. When should schools be re-opened? What proportion of the population is wearing masks in public? How is confinement affecting the mental health of different age groups?

Figure 23. Screenshot of the Versus Virus Hackathon Zoom session

[30] https://www.euvsvirus.org/
[31] https://devpost.com/software/crowdvscovid

Some scientists from UNIGE have been asked by their national authorities to provide answers to such questions. So they brought their teams to the hackathon, to work together and with motivated hackers, to find better solutions to this problem.

Useful data can come from various sources: scientific articles and preprints, 'grey literature' reports published by a range of organisations, social media on different platforms and information scraped from a variety of websites. But the quantity of information involved is huge and growing rapidly, and the quality varies widely.

AI technologies can help to filter the most relevant results out of all this data. But the amount of information is often still overwhelming, and requires human intelligence to further extract the most essential facts for making policy decisions.

To tackle this challenge CrowdVSCovid proposed a solution combining automated filtering using AI algorithms with crowdsourced refinement of the resulting data, in a way that will enable motivated citizens to participate in the process, building on their collective intelligence to produce data that informs policy.

In other words, we aim to combine the speed of machines with the intelligence of people. And we aim to do this in a novel way that is financially sustainable, can scale to other urgent problems well beyond the immediate Covid crisis, and provides meaningful educational rewards to citizens.

4.1.1. Results achieved from the participation in the hackathons

Over the hackathons two fully functional demos were developed. The first demo focuses on reviewing scientific articles, and extracting key information based on specific policy concerns. For example, as European countries open up schools, policy makers want to know what the experiences have been in countries that have already opened schools or did not fully lock down, as well as experiences from other public health crises that may be relevant to this issue.

The second demo uses social media data from twitter. Especially during a lockdown, where standard survey techniques become impossible, analysis of social media provides useful insights, for example by analysing the types of masks that people are wearing in public places, or the sentiments of people from different regions during lockdown.

For this demo, we also created a mapping tool, so that the data resulting from the crowdsourcing could be mapped onto European countries or regions, to reveal significant variations across the continent more clearly.

Finally we ran discussion sessions with members of related hackathon projects, with mentors and with several external experts, including a researcher at a national statistical office, and the co-founder of a European crowdsourcing platform, called WeMakeIt, in order to build a sustainable business plan for deploying the AI and crowdsourcing solutions we were able to demo.

In brief, the business model is based on organisations such as public authorities sponsoring challenges in which motivated citizens crowdsource large amounts of pre-filtered data. Thus, the citizens provide in-kind contributions rather than cash, and in turn they earn certificates and credits from the Universities involved, to reflect the effort they invest in carefully reading technical articles or analysing other forms of data. The Universities manage the AI-to-crowdsourcing workflow and produce the resulting policy advice, thanks to the challenge sponsorship.

Here are the demo for publications: https://lab.citizenscience.ch/en/project/68 and the demo for tweet analysis: https://lab.citizenscience.ch/en/project/60

Here is the link to the crowdVsVirus final video: https://youtu.be/jFHGaNzB85M

In addition the work on tweet analysis produced an publication in the 43th International Conference on Software Engineering titled: **Image-based Social Sensing: Combining AI and the Crowd to Mine Policy-Adherence Indicators from Twitter**[32]

4.2. Open 17 Summer Challenge

In spring 2020, in the midst of the global COVID19 pandemic, we challenged students to come up with bold ideas for how to tackle pandemic and post-pandemic challenges with crowdsourcing and open source solutions. The competition was open to high-school students, undergraduate students and Master students, from any field and region, and was run as a Summer Challenge, with daily coaching sessions over the full month of July 2020.

Figure 24. Spring 2020 Summer School - Covid-19 Activity

Six different challenges were proposed, each of them mentored by an academic institution (see Figure 25).

[32] https://arxiv.org/abs/2010.03021

Figure 25. Spring 2020 Summer School Challenges - Covid-19 Activity

Information about the call for ideas and challenges[33], as well as information about the evaluation of the summer school and people participation[34] can be found online.

[33] https://openseventeen.org/past-challenges/innovating-for-a-sustainable-post-pandemic-world/
[34]https://www.researchgate.net/publication/353558459_Challenge-based_Learning_Youth-led_Innovation_for_the_SDGs_An_Analysis_of_the_2020_Open_Seventeen_O17_Summer_Challenge_Online_Transition

5. Planned improvements for GEAR Cycle 2

The Crowd4SDG consortium has analysed and debated extensively the results of the first GEAR cycle, and discussed its implications for the second GEAR cycle, including through a dedicated two-day workshop facilitated by some of the partners (CERN, UP). The result of these deliberations is the identification of key Issues that need attention and the Actions that will be taken to address those issues.

Issues:

- No CS data produced by the GEAR cycle projects that have been generated (so far);
- Limited use of CS tools that the partners presented during the Evaluate phase;
- Moving the Accelerate phase online due to the pandemic resulted in limited data being acquired about user interactions during this workshop.

Actions:

- Accelerate Phase will remain online for the next two GEAR cycles, due to pandemic uncertainties. Data gathering during this phase will be adjusted accordingly by WP4;
- Specifically, Google tag manager will be implemented for all CS tools, opening the possibility of monitoring digital traces of interactions between participants;
- Consortium will invite NSOs, IOs and humanitarian communities to provide challenges, thus helping to ensure data from resulting CS projects is more relevant;
- CBIx (satellite version of CBI workshop by external partner) will be supported over the 2nd and 3rd GEAR cycles, which should yield more projects with the potential to advance to the stage of generating CS data;
- Partners will improve communication of our CS tools to participants in the next GEAR cycles and make their use mandatory;.
- Efforts will be made to clarify the persona, challenge description, user experience, deliverables, level of involvement and recognition before launching the next GEAR cycle.

6. COVID-19 situation and deviations from Grant Agreement

Due to COVID-19 restrictions some activities in this WP were affected:

- Added extra activities related to COVID-19:
  - Participation in Versus Virus and EUVsVirus hackathons (activity undertaken with agreement of PO;
  - Open17 Summer Challenge, one month summer school (activity undertaken at the request of the Commission).
- The Accelerate phase was held online instead of as a two-week in-person event at CERN, as had been planned originally;
- The Refine phase was held online instead of as a one-day in-person event that was to be held originally in Geneva.

7. Conclusions

The four phases of the first GEAR cycle have been completed successfully. Individual evaluations and participant feedback exceeds initial expectations for this first attempt at combining different innovation programs (Open17 Challenge, CBI Workshop) in a coherent cycle. The deviations from the initial design of the GEAR methodology because of the COVID-19 restrictions have not had a major negative impact on the evolution of the project, although they have resulted in actions that will affect future GEAR cycles.

The two major limitations found are: (1) the lack of data coming from the CS projects generated over the first GEAR cycle, since even those with potential to generate data are in very early stage of their implementation, and (2) the fact that the the Citizen science tools proposed by the consortium partners were not widely used by the projects developed in the GEAR Cycle. To overcome these limitations, some modifications of the second GEAR cycle will be implemented, which will affect the evaluation criteria for the projects entering the Evaluate phase and the Accelerate phase.

Finally, the involvement of NSOs and existing humanitarian organisations in the identification of the challenges for the next GEAR cycle, thanks to a dedicated workshop organized at the end of the first GEAR cycle, should help ensure higher relevance of the data generated.

Annex 1 : List of abbreviations

Abbreviation	Description
AI	Artificial Intelligence
CBI	Challenge-based Innovation (in-person coaching)
CBIx	Challenge-based Innovation (remote location)
CS	Citizen Science
CSSK	Citizen Science Solution Kit
IO	International Organization
GEAR	Gather, Evaluate, Accelerate, Refine
GTI	Geneva Tsinghua Initiative
NSO	National Statistical Office
O17	Open Seventeen Challenge (online coaching)
SDG	Sustainable Development Goal

Annex 2: Gather phase: Call for Ideas - Leaflets

The #Open17Water challenge: How it works

Gather
Call for pitches on projects that tackle Urban Water Resilience with the help of crowdsourcing and citizen science.
From 7 September to 4 October 2020

Evaluate
Top 50 applicants participate in an online Open Seventeen Challenge, five weeks of expert coaching, 2hrs/week online.
From 19 October to 20 November 2020

Accelerate
Up to five teams invited to participate in a Challenge Based Innovation Workshop, organized by CERN.
From 18 to 29 January 2021

Refine
Top projects invited to present to potential investors and partners at an international event on SDGs.
March 2021

Register here

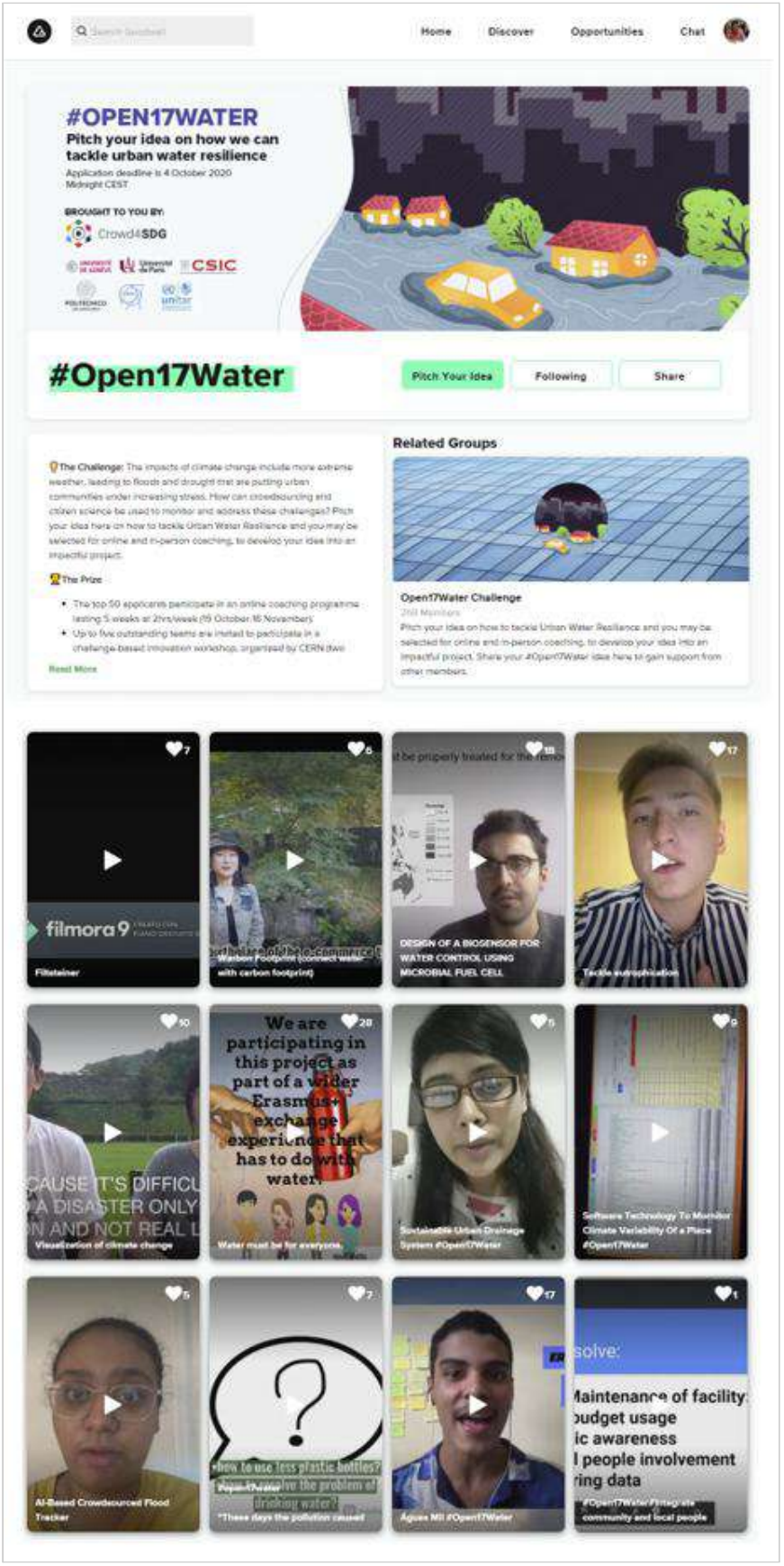
In partnership with:

GOODWALL

CITIZEN SCIENCE CENTER ZURICH

goodwall.io/tags/open17water

Annex 3: Submission of ideas on Goodwall using #Open17Water



Annex 4: One-pagers of the Accelerate phase teams and projects

Crowd4SDG

Potamoi

Providing an easy to use and customizeable data quality control service to flood forecasting centers

Objective of the project

Potamoi wants to optimize the process of cleaning hydrological data in order to allow the improvement of flood forecasts and, consequently, reducing the number of deaths from floods and damaged properties.

Problem addressed

Current flood forecasting systems are highly based on machine learning algorithms, consequently, the high quality and the large quantity of data available become indispensable for the proper execution of a flood forecast. However, the required cleaning process and data integration are costly and laborious, mainly for flood forecasting, where we have a real-time hydrological data collection system feeding the forecast models. The lack of infrastructure in poorly developed regions makes it impossible to access modern equipment necessary for data integration, stocking, and collection. Besides the lack of investments in personnel and the absence of dedicated permanent staff. There are few experts employed in the sector, and there's an even higher workload for rescue and post-disaster activities during major flood events. According to a survey led in 2020, 74% of the forecasting personnel confirm that their centers "do not have the experts and staff capable of integrating data, performing forecasts, and disseminating information." Unfortunately, these limitations delay the flow of data for forecasting and storage in historical databases. The results of this are detrimental, the accuracy of flood forecasts is reduced, the models are limited to short-range forecasts and the development of forecasting techniques is limited due to gaps in historical databases. In other words, more lives are at risk, and less time is available to prepare for a flood.

Solution proposed

Potamoi is a service that provides data quality control, it manages the data flow between data collectors and machine learning models. Our service focuses on providing an easy-to-use and highly customized data cleaning and data integration pipeline. It ensures data validity and completeness, statistical quality and missing values restoration. Potamoi wants to facilitate access and customization of data cleaning pipelines by outsourcing the data quality control process. In a way that the process is cheaper, because it does not require internal development, and fast, because it has an availability that supplies the collection and processing service of the forecast center in which the latter alone cannot handle. Potamoi also provides an interactive user interface that allows the user to customize their data cleaning pipeline according to their needs, without requiring a high level of knowledge on the subject. In addition to optimizing the data reporting cycle and analysis.

Expected impacts

The flood forecasting centers will not have to increase their staff, hire new specialists or relocate professionals who are working in other emergencies during the flood seasons. The use of an outsourced service will reduce costs related to employees, hours of work and infrastructure. The local system does not need to have the necessary infrastructure to maintain the flow without gaps, Potamoi's outsourced system will contribute with richer data and will not have gaps in sending clean and processed data. When improving data entry after adequate quality control, forecasting models are expected to perform better, therefore, more lives could be protected.

Current state of development and What is the project looking for?

We're currently working on Potamoi CS, as our prototype, which is an intuitive and easy-to-use data cleaning API for citizen scientists that wish to prepare their datasets for model training, exploratory analysis and research. This intends to be a service, where users can prepare their datasets for a range of different applications with the click of a button. Potamoi CS also allows the user to store the cleaned dataset at our databases, so that other users could have access to a catalogue of cleaned datasets for free, empowering the pillars of citizen science. Note: Fundamentally Potamoi CS is a simpler version with a few limitations of Potamoi, without the complexity and personalization that Potamoi provides for each forecast center contract service.

Contacts

We are a team of 4 students with experience in complementary areas, such as data science, econometrics, computer science and sustainable development. If you are interested in knowing more about the project, check our documentation (in progress) and our animation. - *Paris Mollo*
parismollochristondis@gmail.com

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Crowd4SDG

ÁGUAS RESILIENTES

An initiative to empower and provide safe water from rain

Objective of the project

Secure drinking water for vulnerable communities or people invisibilized by public policies through a simple, creative, and effective solutions.

Problem addressed

Brazil is one of the 15 richest countries in the world, yet, there are more than 35 million Brazilians without access to safe water for human consumption. One hundred million Brazilians lack access to sanitation and 233.000 people, 50% of which are less than 5 years old children, are hospitalized annually due to contaminated water.

The first implementation area of the project is the Jardim Gramacho, located in the municipality of Duque de Caxias, in the state of Rio de Janeiro State in the South-east region of Brazil. For three decades, this neighborhood was the largest dumping ground in Latin America. Currently, its households lack water plumbing, sanitation, and even bathrooms; a reality that has repercussions on the low income and education of its population, not to mention the violation of women's rights.

Solution proposed

The goal to change this reality motivated us to create the Thousand Waters project, a 1000L rainwater harvesting and purification system designed for community use. The purification system consists of two main parts: first, pipes are used to harvest the rainwater, which are filtered by two hollow membrane filters in order to guarantee a safer water supply. As an alternative to the 1000L tank, we have also foreseen a compact version of a 50L tank, which takes up less space and provides quality water in a smaller reservoir, ideal to more populous and denser communities.

Additionally to the tanks, the project plans to distribute an educational and disinfection kit along with an app to strengthen the communication with the families impacted by the solution. The system will allow monitoring and data collection, ensuring its sustainability on the quality of the water and meet the needs of its beneficiaries.

Expected impacts

We estimate that one full 1000 L system can supply up to 10 people for 20 days without rain, considering that each person consumes, 5 L of water per day for drinking and cooking. Therefore, the 50L version shall supply enough water for a family of 5 people for 10 days. With 50 systems in hand, we hope to impact 175 residents of Jardim Gramacho.

Through the Thousand Waters project, we expect to reduce the rates of contamination by waterborne diseases, consequently improving the community health and well-being additionally to savings on water service costs. In the long term, we hope to increase children's schooling rates, house income, since mothers would not need to miss work due to children's health problems, in addition to promoting urban water resilience of communities.

Current state of development and What is the project looking for?

The proposal is currently in its ideation and prototyping phases. We are currently looking for partnerships and investors who can help us to test the protypes and develop a first social-environmental impact.

Contacts

Facebook: https://www.facebook.com/aresilientes
Twitter: https://twitter.com/AResilientes

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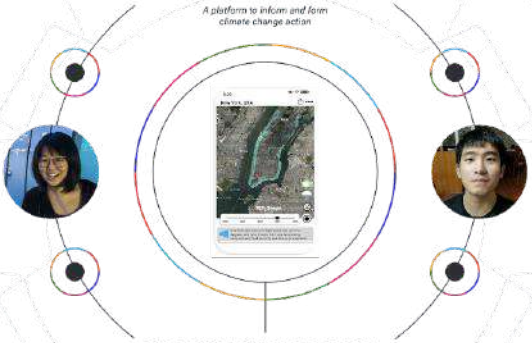
Crowd4SDG

To See To Care

A platform to inform and form climate change action



OBJECTIVE OF THE PROJECT:

The project aims at raising awareness of climate change and at encouraging more climate actions. In its initial stage, it is targeting those already aware of climate issues with the ultimate objective of influencing the general public.

Problem addressed

Unprecedented emissions of greenhouse gas have triggered climate change, which poses a series of threats including sea level rising, compromised food security, increased inequality, etc. The estimated costs amount to trillions of dollars, and millions are to be affected. However, despite the severity, people are not keeping emissions in check, and failing the goal of the Paris Agreement.

Solution proposed

To See To Care is an app that aspires to be part of the solution to climate change by creating an informed and vibrant community through two main functions:

- First, it visualizes specific outcomes of climate change on a map. This shows exactly what will happen triggering reactions amongst those at risk.
- Second, it provides a platform for users to communicate and socialize. Users are able to share stories and ideas on climate change, initiate online and offline non-profit activities, compete on practicing daily climate actions, etc.

Expected impacts

In general, the project is expected to encourage more people to participate in climate actions more actively and push the governments to make responsible choices. In this way, climate change and its disastrous outcomes will be alleviated. These impacts can be partially quantified by monitoring user data flow and analyzing the scales and the effects of the activities it helps organising.

Current state of development and What is the project looking for?

A prototype has been created, and plans for getting funded have been laid in view of the launch of the project. At the current stage, the project requires i) experience in creating an advanced prototype with actual coding and ii) funders that are willing to support this project.

Contacts

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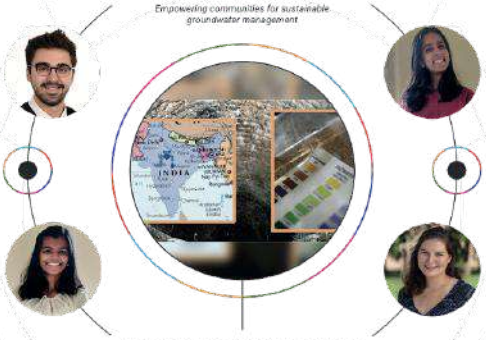
Crowd4SDG

Empowering communities for sustainable groundwater management



OBJECTIVE OF THE PROJECT:

The objective of our project is to further the principles of United Nations' SDG 6, by setting up a model for monitoring groundwater quality, to empower users, allow for potential policy change and better water infrastructure. Our target population includes rural communities in India that are heavily dependent on groundwater supplies.

Problem addressed

In a population of 1.39 billion in India, nearly 80% rely on groundwater for everyday use. Groundwater water quality assessments are carried out yearly in India. Illnesses associated with fecal contaminants, heavy metals and diffused pesticides are far more frequent, with remediation delayed by long. Very often, communities remain unaware and have generalized health concerns that are preventable. The current system of monitoring can do with some change, especially in terms of regularity. Our project aims to tackle this dearth of knowledge and data, through a model based on joint action.

Solution proposed

Our solution is envisioned to be carried out in two broad phases:
Phase 1 begins by initiating dialogue within the target community about the purpose of a groundwater quality monitoring system; followed by basic training workshops. An initial assessment of the area is performed in collaboration with the volunteers, identifying the most prevalent contaminants through the use of probes and testing kits. This, accompanied by relevant crowdsourced data would be analyzed, and parameters for long term monitoring determined. Phase 2 sees routine water quality tests conducted independently by the community, alongside systematic data reporting. Where feasible, remote sensing probes will also track water quality. A cloud-based setup enables sharing of the data generated on a public-platform. Users are notified of potentially dangerous readings via app/SMS alerts.
Once the system is established and functional, implementation of remedial measures, modes of augmenting existing water supplies through conservation techniques and reuse of greywater is considered; suited to resource availability.

Expected impacts

Prevention of health concerns (ideally both short and long term) through the consumption of contaminated groundwater, is our aim. In a country where approximately 27 million wells serve as sources of drinking water for 85% of the nation's population, an efficient system of monitoring is a necessity. We sincerely believe that conversations about water quality would eventually lead to better attempts at management of water reserves. We hope to widen our scope as we go and reach out to communities that can benefit from such a system in place.

Current state of development and What is the project looking for?

The first prototype and software proof of concept have been developed. We have also established connections with key contacts working in the field for support. Currently, we are looking for local NGOs/activists to pick pilot location, as well as mentor(s) to guide on-field implementation, besides capital.

Contacts

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Aneeta Jose (22aneetam.jose22@gmail.com),
Arushi Malhotra (niymail97am@gmail.com) and
Ellie Rubinstein (ellie.rubinstein18@gmail.com)

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Annex 5: Certificate issued for the completion of Evaluate Phase

Annex 6: Policy Brief: best practices for Challenge Based Learning as a new paradigm for tackling climate change and building resilience societies

EUROPEAN
POLICYBRIEF

Crowd4SDG

TITLE

Best practices for Challenge Based Learning as a new paradigm for tackling climate change and building resilience societies.

DATE 23 July 2021

INTRODUCTION

The Covid crisis has generated great interest in new paradigms for online and hybrid learning. When it comes to Challenge Based Learning (CBL) [1], where students or lifelong learners solve practical challenges, a traditional classroom setting, or the use of a maker space or fablab, has been the norm prior to Covid. But the pandemic has generated many experiments – most of them unintentional – in moving hands-on and team-based learning to online or hybrid online/in-person settings.

Citizen science (CS), and more generally public participation in data gathering, holds great promise in complementing traditional scientific processes for monitoring the effects of climate change and mitigating its societal impact. There is already a burgeoning literature[2] on connecting CS with the UN's 17 Sustainable Development Goals (SDGs), and more specifically with the hundreds of targets and indicators that underpin the SDGs.

In theory there are many ways that CS and public data gathering can supplement National Statistical Offices (NSOs) with non-traditional data sources of data for tracking progress towards the SDGs. Yet in practice, there are only a few topics for which such data gathering is commonplace, and then only in a few regions, such as citizen-based monitoring of plastics on beaches in Australia (see www.ausmap.org).

CBL provides a means of generating new CS projects that tackle specific SDG monitoring issues. The Crowd4SDG project (www.crowd4SDG.eu), launched at the height of the first pandemic lockdown in May 2020, has a mission to explore how CBL methods, in the form of short coaching sessions and workshops, can be used to generate such CS projects. This policy brief focuses on emerging best practices for using CBL to tackle climate change and help build resilient societies, based on the experience of having to manage online and hybrid forms of CBL during the pandemic.

[1] Willis, S., Byrd, G., & Johnson, B. D. (2017). **Challenge-based learning**. *Computer*, *50*(7), 13-16.
[2] Fritz, S., See, L., Carlson, T., Haklay, M. M., Oliver, J. L., Fraisl, D., ... & West, S. (2019). **Citizen science and the United Nations sustainable development goals.** *Nature Sustainability*, *2*(10), 922-930.

- EUROPEANPOLICYBRIEF -

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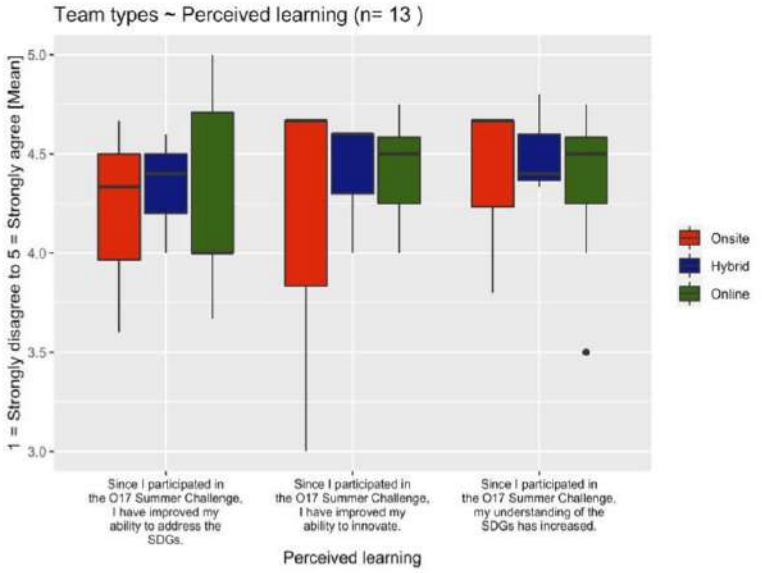
EVIDENCE AND ANALYSIS

As part of the Crowd4SDG's response to the EC's call for projects that address the Covid crisis, two SDG Summer Schools (https://gt-initiative.org/education-programs/summer-school/) have been run, on the themes of Innovating for a Post-Pandemic World (2020) and Open Source Health Solutions (2021). These summer schools used CBL to address challenges at the nexus between climate change and societal resilience. Participants in these summer schools include high-school, undergraduate and master level students.

Challenges addressed at these summer schools include the use of CS for tracking human-animal interactions relevant to the spread of zoonotic diseases, or using publicly gathered data about leaks in urban water systems to improve reduce water wastage in cities affected by drought. These summer schools have taken place over one month and simultaneously at different universities in Europe (University of Paris, University of Geneva) and other sites around the world, such as Yonsei University in South Korea.

Analysis of the results of these summer schools[3], which is still ongoing, reveals some important trends. One of these, illustrated in the figure below, concerns the perceived learning outcomes of teams of students developing CS projects. The result shows no marked difference between teams that work fully online, those that work in person, or those that adopt a hybrid strategy. A range of other indicators, monitored through surveying participants as well as external jury members, support the general conclusion that CBL can be carried out as effectively online, or in a hybrid mode, as it can be done in person.



[3] Chuah, S. Challenge-based Learning & Youth-led Innovation for the SDGs: An Analysis of the 2020 Open Seventeen (O17) Summer Challenge Online Transition (2020) Master Thesis published on Research Gate.

Policy Implications and Recommendations

These results, which will benefit in due course from further evidence gathered in a wider range of collaborative scenarios, are encouraging. They suggest that for educational institutions and authorities struggling to adapt CBL to a post-pandemic world, where waves of Covid variants may continue to disrupt normal face-to-face education for some time to come, online or hybrid participation is equally effective. This has important implications for collaboration between youth across Europe and around the globe, indicating that a younger generation is capable of applying CBL methods in a fully online or hybrid mode, just as effectively as in a traditional classroom mode.

A policy recommendation is to promote further development of hybrid or 'glocal' SDG Summer Schools, involving local hubs of student teams in university maker spaces tackling SDG challenges with CBL methods and CS tools, and collaborating on a pan-European scale, or even at a global level, with other teams in similar environments. Such a hybrid approach, considered exotic prior to the pandemic, now reveals several advantages, reducing student travel costs and CO2 impact while still providing some of the intellectual and cultural benefits of international collaboration.

Sustainability and Legacy

The Crowd4SDG project is embedding the learning from the SDG Summer Schools in two products that are designed to enable a much wider range of institutions to implement CBL for the SDGs. One of these is a reproducible methodology for Challenge Based Innovation, called GEAR (Gather, Evaluate, Accelerate, Refine) running over a six-month period. This methodology combines online coaching and a more intensive Challenge Based Innovation Workshop (CBIW) that take projects from initial concept to the stage of being able to deploy a functioning prototype of a CS initiative that addresses climate action and related sustainability issues. The GEAR Cycle will be refined over the three years of the Crowd4SDG project. The other product is CBIWx, which consists of a turnkey solution for institutions wishing to run their own CBIW.

Project objectives and methodologies

The overall aim of the Crowd4SDG project is to explore and assess whether, to what degree and according to which scientific standards Citizen Science (CS) can contribute to the twin tasks of tracking progress towards the SDGs and generating social and economic innovations that enable such progress, for the benefit of Europe and the wider world. To do this, Crowd4SDG will attract 750 applicants, engage with 150 participants and initiate 30 CS projects through online coaching events. Up to 12 projects will be further developed through in-person challenge-based innovation workshops.

Based on experience gained in running such events, over three one-year GEAR cycles, the Crowd4SDG partners aim to improve the GEAR methodology for developing CS projects. An overarching objective of the project is to produce data relevant to NSOs in their mandated efforts to track progress towards the SDGs. By integrating AI solutions in open-source tools for crowdsourced data collection, data analysis and policy deliberation, the Crowd4SDG project further aims to enhance CS projects that address the SDGs.

PROJECT IDENTITY

PROJECT NAME	Citizen Science for Monitoring Climate Impacts and Achieving Climate Resilience (Crowd4SDG)
COORDINATOR	François Grey, Citizen Cyberlab, University of Geneva, Switzerland francois.grey@unige.ch
CONSORTIUM	The Crowd4SDG consortium consists of University of Geneva (coordinator), the European Organization for Nuclear Research (CERN), the Spanish National Research Council (CSIC), Politecnico di Milano, the United Nations Institute for Training and Research (UNITAR), University of Paris and University of Zurich (Linked Third Party).
FUNDING SCHEME	H2020 Science with and for Society, Research and Innovation Action
DURATION	May 2020 – April 2023 (36 months).
BUDGET	EU contribution: 2 000 000 €.
WEBSITE	www.crowd4SDG.eu
FOR MORE INFORMATION	Rosy Mondardini, Director, Zurich Citizen Science Center, maria.mondardini@uzh.ch
FURTHER READING	A.M. Durso, I. Bolon, A.R. Kleinhesselink, M.R. Mondardini, J.L. Fernandez-Marquez, F. Gutsche-Jones, C. Gwilliams, M. Tanner, C.E. Smith, W. Wüster and F. Grey, *Crowdsourcing snake identification with online communities of professional herpetologists and avocational snake enthusiasts.* **Royal Society Open Science**, 8(1), p.201273. (2021). [this research was initiated through previous SDG Summer School project]