

Deliverable 5.2 - Round 1

Report on citizen science in the Bergen case study

Author(s) and affiliation(s)	Date	Version
Diana Wildschut, UiB SVT Zhiwei Zhu, UVSQ CEARC	Nov 10, 2018	1

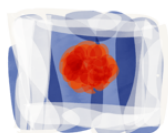


The CoCliServ project benefits from funding obtained through the ERA4CS Joint Call on Researching and Advancing Climate Services Development.

CoCliServ is funded by the following national funding agencies: Agence Nationale de la Recherche (**ANR**), France; Service public fédéral de programmation politique scientifique (**BELSP0**), Belgium; Deutsches Zentrum für Luft- und Raumfahrt EV (**DLR**), Germany; Nederlandse organisatie voor wetenschappelijk onderzoek (**NWO**), the Netherlands; Norges forskningsrad (**RCN**), Norway.

Table of contents

Table of contents.....	2
Executive summary/summary.....	3
Goal/Purpose of the document	3
Relationship to the Description of Work (DOW).....	3
1. Set up with the Meet je Stad experience	3
2. The participans	5
3. The workshops	6



Executive summary/summary

"Citizen science", entered the Oxford English Dictionary in June 2014, is defined as "scientific work undertaken by members of the general public, often in collaboration with or under the direction of professional scientists and scientific institutions".

Citizens want to formulate research questions, gather and analyse data, draw valid conclusions and get taken seriously by decision makers and scientists.

This report will show you how we have implicated citizen science in the case of Bergen.

Goal/Purpose of the document

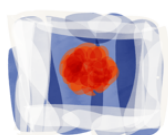
For the Bergen case study we have started to grow a citizen science group. The goal is to give the first inspiration and to provide tools to get started, and to see if we, from the beginning, can make the group independent. It is of course a bit strange to try and set up a bottom up initiative, from the top down. We will have to be really careful not to push the project in a certain direction, while still providing expertise or continuity when necessary.

Relationship to the Description of Work (DOW)

This report based on the Bergen case is the first version of the D5.2 Facilitation of intervention and exchange of experiences between the citizens involved in the case studies.

1. Set up with the Meet je Stad experience

For a start we have borrowed the setup of the Amersfoort University group that has set up Meet je Stad (Measure your City), a group of now over a hundred people who measure climate change on a really local level. We use the MjS sensor stations, which participants can solder themselves, and give workshops in Bergen in which participants build one and put it up at their homes.



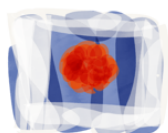
One of the reasons why this setup is not ideal is that the MjS sensor station has been designed and developed in Amersfoort, to suit the needs of the Amersfoort participants. It gave them great satisfaction and the feeling of ownership to design and tweak it. It measures the parameters that Amersfoort's needs. In Bergen we now drop a finished product on people, which is still tweakable and can have different sensors attached to suit Bergen needs, but it does not give the same empowerment as designing and building your own tools from scratch.

Furthermore the parameters measured in Amersfoort may not be the right ones for Bergen. The stations now measure temperature and relative humidity. In Amersfoort the most striking effect of climate change is the occurrence of heat islands in the city. The parameter of temperature is very relevant here. In Bergen, rainfall may be more problematic, which you cannot really measure with these sensors, but also relative humidity, which the sensors do measure, but not as accurately as we would like. It remains to be seen if we can improve the RH sensor or replace it with a different one.

Also, during the workshops a team of people from Amersfoort come to Bergen to teach the first two workshops, which feels a lot more top down than locals teaching it.

An advantage of using the existing kit from Amersfoort is that in Amersfoort a lot of documentation has already been figured out, so we do not have to invent the wheel on how to make the stations, how to teach the workshops, how to build the community. In Amersfoort, the development of the hardware took about two years. That time was lost for doing useful measurements.

The system of using LoRaWAN for the transmission of data from sensors to central gateways connected to the internet also works differently in a flat city like Amersfoort, compared to a mountainous city like Bergen. The sensors do very well with a line of sight connection to the gateways. In Amersfoort that can be done by finding some very high buildings, and then we cover the whole city. In Bergen there are great chances because we can put gateways on top of the mountains and reach a whole valley, but whenever there is a big rock in the way, like the one near the fortress, there is no way that the signal comes through. For measuring the inner city, as we originally planned, this is no problem because it lies in a single valley, but as we go we get more sensors in other areas of Bergen, that turn out to be hard to connect.



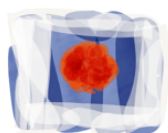
2. The participants

In order to find participants we have tried two separate tracks. The first attempt was to organise a kick off for which we have invited representatives of groups that are already active in Bergen, like Baerekraftig Liv (sustainable living) and also decision makers of the municipality and the fylke. This event did not give us many possible participants. The people there were not interested in participating themselves, and also saw no active role for their institutions to play. They also doubted that citizens would like to participate. One of the attendees said: but you have to give them a very specific question to answer, otherwise they will not participate. This was not what we intended to do. Our goal was and is to leave the group completely free and see what questions pop up and how they can be answered. The experience from the Amerfoort group is that, after a collection of data has been built, some of the people that have built a station, maybe 10%, start to wonder about what the data tells us, and what additional data is needed to answer the questions they have. But there are considerable cultural differences between Norwegians and Dutch. Maybe the attendees had a better understanding of participation in Norway.

The second attempt was to find a hackerspace in Bergen. A hackerspace is a place where people do programming or electronics for a hobby. They are usually very skillful and passionate. They have a network of possible participants. We contacted Hackbergen and went to their open night. Immediately we found some people who were working on comparable projects individually, and within minutes we were comparing hardware. Half an hour later we were on the roof of the building to see what coverage we could have if we put a gateway there. We asked them to host the first workshop. They agreed and for the first workshop we had an unexpectedly high number of participants: 30. They came mostly from the network of the hackerspace, except for 3 who came through the network of the University of Bergen.

Ages were mainly between 20 and 40, and 30% were female. Most were interested in the soldering and in measuring their own house, not necessarily in measuring the whole city or in climate change or local resilience.

Of the sensors that were made, 28 in total, about 12 came online in the weeks following the workshop. This number is discouragingly low, but in line with the number that came online



in the first workshops in Amersfoort. In both cases the limited network coverage is partly to blame.

Between the first and the second workshop the coverage has improved, and after sending an email to the participants who did not have their sensor connected yet, 4 more have come online, and 1 will be returned by the participant who cannot find a suitable location. The rest of the participants will be phoned in the second week of November.

The second building workshop on 31 October again got 30 applications, of which 23 showed up. A total of 16 stations were built, because some people built one together.

Of the 23 participants, 6 were female, aged around 30, and one teenager. Of the males, 2 were aged 65+, 5 aged around 40, 10 aged around 30.

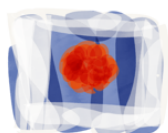
In this group there were more people interested in the outcomes of the project, and in doing data analysis. There was also interest in hosting a gateway, or even building one themselves. One participant wants to use the network for his own measurements of bee colony health.

In both building workshop, everybody succeeded in building a working sensor, sometimes after correcting a few small mistakes.

3. The workshops

In the first workshop, as well as in the Amersfoort workshops, we made people work together, sharing a manual and a soldering station between two participants, each making their own sensor station. People tended to help their neighbour and discuss the interpretation of the text and photographs. The second time we borrowed extra soldering stations and printed more booklets, and people worked alone. There seemed to be a bit more errors, but we did not count. We did notice that the way we have set up the building manual causes that some people who are insecure about starting in electronics have trouble getting started. This is probably fixed if people work in pairs. We will make some adjustments to the first pages to avoid this as well, but it is worth considering having people work in pairs again. Once participants have started, they finish without problems.

For the second workshop we have asked some local people who have participated in the first workshop to help teach the second, in order to slowly hand over the responsibility. Due



to some technical problems during the second workshop, we got into so much stress that this only partially worked out.

On the first data analysis workshop, held in the Hackerspace on the 1st of November, 9 of the participants of the second building workshop showed up, as well as 3 other people. None of the participants of the first building workshop came, even though they have been invited by email.

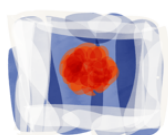
In the data workshop we taught people to work with the statistical programming language R. They worked with a text based R tool, which most people find somewhat scary. We have written a manual that does a lot of effort to take away any possible fear of math, computer code or anything else that gives people the feeling they do not understand.

The data analysis course we used was set up a year ago for the Amersfoort group, and had not been updated for half a year. We rewrote it rather a lot in Bergen, based on the Amersfoort experience. When on the day of the workshop we, as a final check, tried if all the links to documentation and other external sources still worked, it turned out that the online course of R that we used as a very basic introduction was no longer online. This course was both unique and essential, as it was very clear and written for complete beginners who had never seen computer code or statistics before. Most beginner courses or tutorials assume that people know what a variable is, what a data type is etc.

We quickly made an emergency plan on two tracks, one was to write a non-interactive tutorial ourselves to use that evening, and the other to find an existing tutorial that would be good enough. We did both at the same time, but we ended up using an existing system that we ran on our own server.

To avoid frustration if our system would not work, we told the participants at the beginning of the workshop that they would be trying out a new system. And indeed the system failed because too many people were using it at the same time, so the server ran out of memory. After changing some server settings, only one participant could not log on, and we gave him another tutorial, which worked because he was not a complete beginner.

The experience made us decide we will build our own online R tutorial, dedicated to this specific workshop, and makes the rest of the workshop interactive in the same system as well.



Another technical problem came to light this summer, which is that in Bergen, unlike in Amersfoort, the GPS modules have trouble finding their satellites, probably due to the mountains. The sensor does not show up on the map if it has no GPS position, even though it is working and sending data. We have decided to assume a sensor has not moved since the previous GPS fix, and to show it on the map in the old location. We will soon adjust the system that way, and we expect to almost double the amount of sensors on the map.

For cooperation at a distance we have set up a Riot chat room that can be used for questions, sharing of links, experiences and tricks, and starting (video)conferences. It is very well used for exchanges of technical information and less so for initiating meetings or sharing results. There is a lot of exchange between the Norwegian Meet je Stad and the Dutch. We have noticed that, in contrast to most WhatsApp groups, there is little social interaction, for instance no exchanges of interesting weather events, just technical things, and very relevant en very efficient. So for this goal the riot group works really well, but for keeping people motivated and in contact, it does not. For this goal we still use email, to ask people how their sensors are doing, to let them know there is a new workshop, to ask if they are still participating, email works better.

After having met interesting people in the workshops, that we feel should really be in contact with some interesting people developing the platform in the Netherlands, we have made preparations to invite 3 participants of the Bergen workshop to a citizen science unconference in Amersfoort, and ask them to stay a couple of days longer to work on expanding and improving the platform together. This will make the platform more useful for both the Bergen case study, but also for other citizen science projects in the world.

