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Deliverable D 5.4

Methodological study to support the representativeness of citizen's participation

Work Package 5

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Executive Summary

Background

The CITI-SENSE project involved support of so called Empowerment Initiatives (EIs) through various teams working together to establish a 'proof of concept' of the underlying vision of a Citizens' Observatory in different locations and contexts in Europe. Typically these EIs involved engaging citizens on the basis of their willingness to participate in projects whose purpose was well-defined by the CITI-SENSE team and involved modern sensor technology. This pilot study in one location (Scotland) was intended to investigate the wider acceptability of the idea of citizen science. This was done by determining whether people from diverse social groups saw benefits in using citizen science, in a low-technology way, on user-defined projects to help them take better care of the environment. Such projects could include measuring different characteristics of the environment or sharing information to bring about the changes the social groups sought. Although this may be considered a citizens observatory, it was decided that for the purpose of the Scottish case study the term citizen science would be adopted, as this is a term which is more recognised and used in Scotland

Overall Strategy and Methods

This work involved two complementary approaches.

1. The first approach involved making contact with organisations in Scotland to see if they would be interested or willing to participate in some form of citizen science / citizens' observatory. This was done using a two tiered approach:
 - a. The first tier involved making contact with national level organisations, with UK-wide coverage, and covering Scotland only, asking for agreement in principle to contact their local groups located in and around Edinburgh.
 - b. The second tier involved making direct contact with local groups in and around Edinburgh to identify their willingness and interest in engaging in some form of citizen science / citizens' observatory.

National and local groups were contacted by letter, email and web form. Through these routes, information on the project was distributed, highlighting what participation might involve.

2. The second approach involved a series of interviews with environmental organisations that are currently active in citizen science and citizens' observatories in Scotland, in order to learn from them what makes their citizen science work successful. Semi-structured interviews were carried out with staff and volunteers from five environmental organisations that were present at the Big Nature Festival in Scotland in May 2016.

Results

The main result from the first approach is that attempts to contact local organisations were dominated by non-response, regardless of method of contact (email, letter, web form), with only 4 local groups responding out of 92 contacted, one of which in due course engaged well with the project. Response at a national level was better, at 7/13 responding, but eventually none of the associated local groups participated. A follow up exercise with non-responders identified that the main barriers to engagement in this project for local groups included the group being too busy, or already having an environmental project or feeling that they could not engage with citizen science as it was not felt to be relevant to their group.

The local group that responded positively to participation was a tenants and residents association in a town near Edinburgh. The project team discussed with the group what changes they were looking for (the main issue identified was litter being dropped by school pupils at lunchtimes) and whether

citizen science could benefit the group and the environment with which they were concerned. Various ways of monitoring the litter were considered, especially through use of photographs, but the group did not go ahead with this because of fears for the personal safety of those taking photographs. However the project team helped to facilitate a process involving the local school and the local council to collectively focus on the issue with the tenants and residents association.

The semi-structured interviews with environmental organisations already doing citizen science in Scotland identified three main themes or dimensions of success, with associated sub-themes. These included (i) at the level of the organisation (sub themes: extending its networks, providing a wide variety information, using IT technology to manage the data, involvement of volunteers); (ii) at the level of the individual (sub themes: enjoyment of the activity, opportunity for social contact, finding meaning and purpose in the projects, enjoying learning about the environment and the training received); and (iii) how once established, a citizen science project can grow and develop (sub themes: from professionals only to including volunteers also; by volunteers expanding their role).

Main conclusions/lessons

There are 7 main lessons that are broadly consistent across the various elements of this pilot study and consistent also with the experience of CITI-SENSE more widely:

- There is an interest in /appetite for citizen science in the context of maintenance and improvement of the natural environment;
- There needs to be a sponsoring organisation and, to be successful, the citizen science project must help meet its legitimate needs, and do so in a way that fits with how the organisation understands its role, its resources and its method of working;
- It is essential also that the volunteering / citizen science project meets legitimate needs of the citizen participants, and does so in a way that fits their aims and resources / ability to participate;
- More generally, the quality of personal relationships is crucial to success, at least in the beginning phases of citizen science work;
- Once a citizen science project is in place, participants can adapt and/or extend it to their own needs and interests;
- It is essential that data be handled well; but the actual data collection itself need not be high-tech;
- Very limited involvement with one campaigning group raised interesting issues about the need for clarity about the purpose of engagement and the associated boundaries of project team involvement.

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1. Introduction

1.1 Background within the CITI-SENSE Project

1.1.1 The core vision and main work of CITI-SENSE

The work reported here is part of CITI-SENSE, a large multi-organisation, multi-disciplinary, multi-city research project which operated on the interface between (i) advanced technology: sensor technology for measurement of the environment and IT technology for handling the resultant large amounts of data and (ii) current social scientific knowledge about engagement and empowerment of citizens. It has done this in the context of improving people's engagement with environmental issues of consequence, and increasing their power to be active participants in improving environment and health, through development of citizens' observatories, i.e. *"communities that share technological solutions, information products and services and community participatory methods, to complement established environmental data and information systems and to improve local environmental decision making"*.¹

With these overall ambitions, CITI-SENSE developed as a project designed to use modern technology in support of the engagement and subsequent empowerment of citizens in a series of EIs in three different contexts:

- i. Outdoor air quality in 8 European cities;
- ii. Maintained public spaces in a 9th city;
- iii. Indoor environment in schools in initially 4, eventually 5, of the 8 cities where outdoor air quality was also being studied; an initiative which developed into multiple projects of learning in schools.

The considerable resources of CITI-SENSE were deployed principally in support of these EIs through various teams working together to establish a 'proof of concept' of the underlying vision of a citizens' observatory in different contexts and in a range of European cities. These teams included:

- a. a local (city-specific) engagement and empowerment team for each Empowerment Initiative;
- b. a series of technical support teams dealing variously with sensor technology; with IT technology for dealing with large amounts of complex data, including developing useful products of those data; and with outward-facing dimensions of the project, especially its website; and
- c. a methodological support team for engagement and empowerment.

1.1.2 Some limitations inherent in the core vision of CITI-SENSE

During the development of CITI-SENSE the methodological support team for engagement and empowerment noticed that, while the core design was good for the 'proof of concept' purpose of CITI-SENSE, it contained within it three characteristics which might limit its generalizability and consequently raise questions about the longer-term future of the idea of a citizens' observatory.

1. As a 'proof of concept' project, CITI-SENSE sought to engage those individual citizens and citizen groups (e.g. NGOs, schools) who were interested and willing to be part of monitoring the environment and engaging with the results to inform the development of policies. The CITI-SENSE EIs were expected to engage with participants drawn largely from groups with strong motivation, e.g. those who are already active on environmental issues, or groups of

¹ <http://social.citi-sense.eu/CitizensObservatoriesToolbox/Methods/CitizensObservatoriesConcept.aspx>

patients (e.g. people with asthma) whose condition may be affected by environmental exposures. It was explicitly not an aim of CITI-SENSE that its participants be representative of the wider city populations of which they formed a part.

This is a great starting-point for a citizens' observatory and the ideal testing-ground to establish what is possible. However participation is also needed from groups across society if the concept of a citizens' observatory is to be established effectively – otherwise the data gathered may be unrepresentative in important ways; the uses to which it is put may reflect the needs of some groups only; the aim of engaging the population as a whole in issues of environment (and health) can be met only partially; and the participation of citizens' observatories in decision-making about public policy may be challenged, on the grounds that they do not reflect a wide enough range of views, and so may increase rather than decrease environmental inequalities.

This prompts a question: To what extent was the idea of citizen science and of a citizens' observatory acceptable and of interest to the population more widely?

2. The EIs of CITI-SENSE involved going to communities with a very specific offer; i.e. CITI-SENSE was inviting participation into an EI whose fundamental purpose and framework was already determined by the project team. There would be not only room, but also encouragement for participants to shape the details of the methodology (co-design was an ambition which increasingly got realised) but the ultimate purpose of the EI was already set (i.e. as being about outdoor air quality, or maintained public spaces, or indoor environment in schools).

This prompts a question: Was it possible to go instead to citizens groups and communities with a more open-ended offer, find out and if needs be, help identify their needs and priorities, and see what useful role if any a citizens' observatory might have in meeting those needs? This more open-ended approach was consistent with empowerment as: *enhancing an individual's or group's capacity to make effective choices, effective in the sense of enabling them to transform those choices into desired actions and outcomes.*

3. Most of the core initiatives were, to begin with at least, heavily dependent on the use of new technology (modern sensors for measurement, advanced IT technology for data management).

This prompts a question: To what extent can people's needs be met, can engagement and empowerment be successful, can a citizens' observatory function, with more generally available technology, e.g. a smart-phone and social media?

The CITI-SENSE project leadership encouraged the methodological support team to develop a small pilot study to explore the importance of these limitations. This led to the "Methodological study to support the representativeness of citizens' participation", formally part of the CITI-SENSE Description of Work as Task 5.4, and known informally as the Scottish Case Study.

1.2 The Scottish Case Study

1.2.1 The original vision, as described in the CITI-SENSE Description of Work

“We assume that participants in the multi-centre Empowerment Initiatives will be drawn largely from citizens and citizens’ organisations with strong motivation on the various Empowerment Initiatives being addressed by CITI-SENSE. This task will explore empirically, issues of representativeness, i.e. to what extent different social groups will support the idea of the citizens’ observatories, and in practice show willingness to take part. It will do this by going with open questions to identify what people want changed, and to work out how their involvement in monitoring and decision-making might help. Using a tiered approach allowing different degrees of involvement and local choice of issues to be monitored, we will contact and aim to involve people from diverse social groups in a limited form of citizens’ observatories (i.e. using mobile phone technology only). Across a range of groups (e.g. by age; gender; socio-economic status) we will identify issues that matter, invite participation in monitoring and solving them, identify barriers to taking part, and how might these be overcome. This will be done initially in one country (Scotland), and may be generalised later. Results will feed into the co-ordinated analysis of participation and empowerment.”

1.2.2 Why do this in Scotland?

1.2.2.1 Why is Scotland favourable?

The original idea was proposed by the Institute of Occupational Medicine (IOM), a CITI-SENSE partner based in Scotland. The underlying idea drew on interesting developments in official policy making and in civic society in Scotland, which suggested an openness both to community empowerment and to linking evidence with policy making in Scotland. It also drew on IOM’s long-standing experience of environment and public health in Scotland, culminating in the multi-organisation, interdisciplinary research project EDPHIS (Environmental Determinants of Public Health in Scotland²) which IOM led 2008-12. And, once the idea was accepted within CITI-SENSE, it made sense to try it in Scotland, where IOM is located.

1.2.2.2 The policy context and civic society in Scotland

In Scotland there is a policy context that supports engagement and empowerment and a civic society that is moving in that direction also. This has a long history, linked with Scotland’s role and positioning within the UK (United Kingdom of Great Britain and Northern Ireland). An important milestone was the re-establishment of a Parliament in Scotland in May 1999, with a range of powers on health, education, transport and so on, ‘devolved’ from the UK Parliament in London. The movement towards winning greater democratic control in Scotland *from* the UK Parliament continued, leading to a Referendum in September 2014 on Scottish Independence. The ‘Yes’ movement for independence involved a broad-based movement for participation, empowerment and a different kind of Scotland, one which opposed the austerity politics of the UK Government and associated huge inequalities in wealth and other resources³. And although the Referendum result was a vote to remain part of the UK, the movement for greater democratic control in Scotland has continued.

² <http://www.edphis.org.uk/>

³ <http://www.allofusfirst.org/vision/>

In parallel with this movement about Scotland and the UK, there has been the development of official policy within Scotland on devolved issues. The Scottish Government has for many years had a policy⁴ on community empowerment and engagement, culminating in the Community Empowerment (Scotland) Act of 2015, designed especially to give communities greater rights and control over the ownership of land and other assets. This move towards empowerment of people currently marginalised is mirrored in other areas of policy. For example, health policy has a strong focus on reducing health inequalities⁵ centred on the Equally Well (Scotland) programme. “Good Places, Better Health”⁶, the Scottish Government’s strategy on Environment and Health, is embedded within the health inequalities framework and was launched as an adjunct to Equally Well (Scotland).

These movements for constitutional change and for Governmental policy could not have occurred without a plethora of ‘on-the-ground’ and ‘bottom-up’ initiatives for empowerment, engagement and social change. The Community Development Alliance website, with its multiple tags and links⁷, is a useful resource and is indicative of what was happening in Scotland when CITI-SENSE was being developed. The independence movement itself was formed by and in turn led to a huge increase in political engagement and envisioning of a different kind of Scotland – see for example the wide range of social policies developed under the umbrella of the think tank Common Weal⁸ its web-name of www.allofusfirst.org reflects clearly its anti-inequalities agenda or the discussions, including of arts and culture as well as politics and economics, of Bella Caledonia⁹.

When CITI-SENSE was being developed, Scotland looked to be a fertile place for community engagement and empowerment, and so an interesting place to seek to answer the question: “*Is citizen science or the development of citizens’ observatories seen as having a useful role in this wider movement for empowerment and engagement?*”

When developing this work we were guided by the following definitions:

- i. Citizen science: “Public-participation engagement and science communication projects” (Riesch & Potter 2014)
- ii. Citizens’ observatory: “the citizens’ own observations and understanding of environmentally related issues and in particular as reporting and commenting on them within a dedicated ICT platform” (Liu et al 2014)

The Scottish Case Study mainly focused around the potential for people to monitor the environment in some way and share data, and maybe being involved in how those data are then used. This fits closely the definition of a citizens’ observatory. However it is not misleading to consider it also as citizen science and it was decided that for the purpose of the Scottish Case Study, i.e. for communication with other individuals and organisations in Scotland the term citizen science would be adopted, as this is a term which is more recognised and used in Scotland. For consistency with what we did within the study itself, we have continued to use the term ‘citizen science’ in the present report.

⁴ <http://www.gov.scot/Topics/People/engage>

⁵ <http://www.gov.scot/Topics/Health/Healthy-Living/Health-Inequalities>

⁶ <http://www.gov.scot/Topics/Health/Healthy-Living/Good-Places-Better-Health>

⁷ <http://www.communitydevelopmentalliancescotland.org/>

⁸ <http://www.allofusfirst.org/>

⁹ <http://bellacaledonia.org.uk/>

1.2.2.3 Some specific resources and initiatives in Scotland: not specifically citizen science projects

For citizens and citizens' organisations in Scotland who are interested in the environment, there are numerous resources and initiatives that focus on the environment and some more specifically on citizen science projects. Below are a few examples of general resources about the environment:

- Keep Scotland Beautiful is "a charity that campaigns, acts and educates on a range of local, national and global issues to change behaviour and improve the quality of people's lives and the places they care for".¹⁰ As part of these activities Keep Scotland Beautiful manages the Eco-Schools programme in Scotland, which is managed internationally by the Foundation for Environmental Education. This Eco-Schools initiative is "an environmental management tool, a learning resource and a recognised award scheme which empowers children and young people to take action towards an economically, socially and environmentally just world".¹¹ At the current time over 98% of Scotland's local authority schools participate in this initiative.¹²
- Scotland's Environment Web is a gateway providing resources on "Scotland's environment, bringing together information and data from a range of organisations involved in protecting and improving Scotland's environment".¹³ As part of this gateway there is a "get involved" section where the public can discover ways to participate. This includes a project finder which provides details on specific citizen science monitoring or action projects and toolkits, useful links and case studies as well as a citizen science portal for sharing data and ideas.
- Scottish Environment LINK is a charity that provides a forum for Scotland's voluntary environment organisations. "LINK assists communication between member bodies, government and its agencies and other sectors within civic society. Acting at local, national and international levels, LINK aims to ensure that the environment is fully recognised in the development of policy and legislation affecting Scotland".¹⁴

1.2.2.4 Some specific resources and initiatives in Scotland: specifically about citizen science

And here also are some resources about citizen science from organisations based in Scotland or with a strong presence in Scotland:

- For those that are considering the development of a citizen science project the Centre for Ecology and Hydrology (CEH) provide best practice guidance 'Choosing and Using Citizen Science: a guide to when and how to use citizen science to monitor biodiversity and the environment' (Pocock et al, 2014). This presents ideas for setting up a project structured through a decision framework, followed by how to involve volunteers. In addition to this CEH also provide best practice on the running of citizen science projects 'Guide to citizen science: developing, implementing and evaluating citizen science to study biodiversity and the environment in the UK' (Tweddle et al, 2012).
- Where citizen science projects are specifically considering co-creation and community based environment monitoring The Conservation Volunteers have provided a good practice guide 'Top Tips for Developing Co-creation and Community Based Environmental Monitoring'.¹⁵ Within this guide there are examples of how these approaches have been piloted in Scotland.

¹⁰ <http://www.keepsotlandbeautiful.org/>

¹¹ <http://www.keepsotlandbeautiful.org/sustainable-development-education/eco-schools/about-eco-schools/>

¹² <http://www.keepsotlandbeautiful.org/sustainable-development-education/eco-schools/>

¹³ <http://www.environment.scotland.gov.uk/about-us/>

¹⁴ <http://www.scotlink.org/about/>

¹⁵ http://www.tcv.org.uk/sites/default/files/1605/files/top_tips_for_developing_co-creation_and_cbem.pdf

As Scotland is part of the UK, insight can also be drawn from UK based resources, for example:

- When developing and conducting a citizen science project an important consideration can be the evaluation, costs and benefits of the undertaking. UK Environmental Observation Framework (UKEOF) have provided a report and evaluation tool on these issues to inform decisions 'Citizen Science and Environmental Monitoring: Towards a Methodology for Evaluating Opportunities, Costs and Benefits' (Blaney et al, 2016).

1.2.3 Aims

The aim of the Scottish Case Study was to involve people from diverse social groups in a limited form of citizens' science / citizens' observatory, as a means of:

- Engagement
- Finding out to what extent the ideas are accepted and welcomed
- Finding out what the barriers are, and how these might be overcome
- Finding out what works

From these aims the project looked to investigate ways to help people take better care of the environment, especially whether involvement in measuring the environment and sharing information with one another can help bring about some of the changes people may want to make.

1.2.4 Strategy, what happened, and structure of the present Report

The strategy for achieving this envisaged a tiered approach to making contact with organisations in Scotland, at national and at local level, to see if they already use citizen science and if not, whether they could see a benefit in doing so. At the national level the focus of the contact was concerned with getting agreement in principle for the local groups to be contacted, whereas at the local level the offer was to help in developing a current or new idea on taking care of the environment, as well as encouraging the development of links between local groups.

In practice, and as will be described in Chapter 2, this proved informative but led to very limited opportunities to engage directly with communities, much fewer than we had hoped for or envisaged. Consequently we supplemented this initial core part of the pilot study with a small but highly informative series of interviews with organisations currently active in citizen science / citizen observatories on environmental issues in Scotland – we report on this in Chapter 3.

Finally, Chapter 4 discusses what we did and what we found out, including lessons learnt.

2. Contacting environmental and other organisations in Scotland about citizen science

2.1 Objectives

The strategy for achieving the original aims of the Scottish Case Study involved a tiered approach to contacting environmental and other organisations in Scotland, about citizen science. Elements of this strategy then became the specific objectives of this part of the study:

- Design approaches for individuals and groups at different levels of intensity, so that the results of saying 'yes' at any particular stage imply an increasing level of commitment;
- Contact a variety of organisations, and use a variety of approaches, in a structured way;
- Record and track response rates at each stage and as far as practicable, the reasons for non-response;
- Discuss with the groups what they would like to change within their environment;
- Use simple technology only (no need for sensors) e.g. text message, smartphones; and so on;
- Form an evidence-based view of the opportunities for 'rolling out' the idea of citizens' science / citizens' observatory to various groups in society, identifying the opportunities and barriers, and suggesting ways in which the barriers may be overcome.

2.2 Methods: recruitment

Through the recruitment of groups to the Scottish Case Study we aimed to invite communities defined by identity (e.g. older people; black and minority ethnic communities) and communities defined by location; groups that have a specific interest in the environment and those that do not. In fulfilling the above recruitment aims, it was hoped that we would have involvement of groups both in rural and urban environments and also with the group members being of varying ages. As part of this recruitment we were interested in both groups that already had an idea for change or a citizens' science project, but also those that did not have ideas on these, with the understanding that discussions with the project team may inform a group of the possibilities and help develop ideas.

To reach groups that fulfil the above criteria we used two approaches. Firstly we targeted national level organisations that have a local group that meets in or around Edinburgh. The aim of this was to get agreement in principle at national level, that the local group could be contacted by the project team. Once in contact with the local group we aimed to discuss the idea of citizen science / citizens' observatory, what is involved in participating in it, and how the local group might be involved.

The second approach was through direct contact with local groups based in and around Edinburgh. By contacting groups at both national and local level we also hoped to identify if there was a difference in response based on level approached, for reasons such as national level having the authority to agree participation or local level groups being closer to the issue so having a greater interest in taking part.

The majority of national and local groups were identified through searching online for specific groups or for local groups that meet in and around Edinburgh. In addition to this, other groups were identified by the project team as groups they were personally aware of, or groups they thought might be interested.

Groups were contacted by letter or email and where these details weren't provided and a web-form was available on the group's website, then this method was used. When making contact with the groups an information sheet on the project was distributed; one for national level contact (Appendix

1) and one for local level contact (Appendix 2). By using different methods we hoped to identify whether there would be a difference in response as a result of the contact method – for example, emails in modern society might be less likely to be read due to the volume received on a daily basis, compared to a letter that might be seen as more unique and a novelty to receive.

2.3 Results

2.3.1 Results from Contacting National Organisations

As can be seen in Figure 1, 13 National level organisations were contacted. Of these 6 were contacted by letter and 7 by email, leading to responses from a total of 7 national organisations. Of these 7 responses 4 had passed on information to their local groups, either through social media or directly through email (identified in Figure 1 as those with blue shading). One of these groups explained that due to data protection issues, they could not provide names and email addresses of those at their local group for the project team to contact them directly, so instead sent the project leaflet on the project team’s behalf. There were three groups (identified in Figure 1 with orange shading) that responded but identified that they could not participate; one was unable to help but suggested another group for the team to contact, another did not have local groups that meet, they have organisations they collaborate with, the third was interested at local (Edinburgh) level but they were already doing citizen science work.

From the 4 national organisations passing on details about the project we were contacted by one local group but only for a limited time due to the group’s inability to make a time commitment for a meeting.

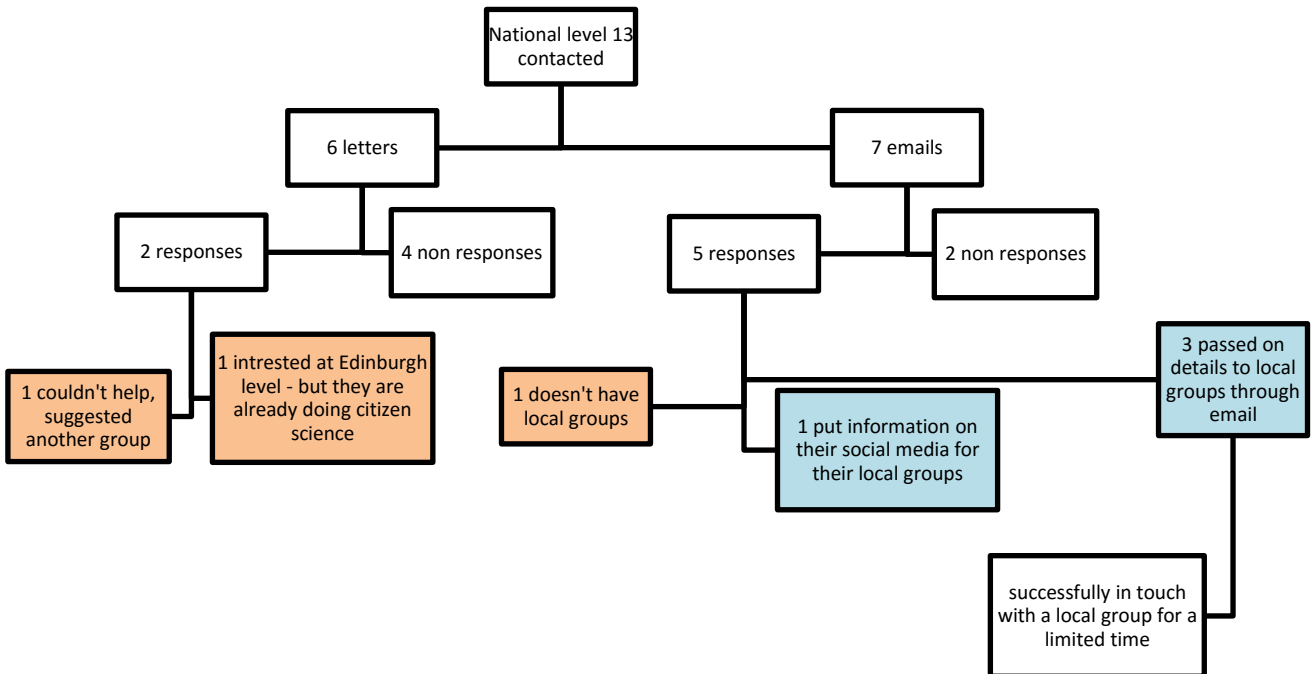


Figure 1 Schematic diagram of results from contacting national organisations

2.3.2 Results from Contacting Local Organisations

As can be seen in Figure 2 below, 92 local groups in and around Edinburgh were contacted. Of these, 35 were contacted by letter, 48 by email and 9 by web form. The 48 emails are subdivided as 30 were sent directly to local groups and 18 to centres where local groups meet, such as community centres – the centres were asked to share the information on the project with the groups that meet there.

From all contacts at a local level we had 4 responses; 2 from letters and 2 from emails. Of the 2 responses to the letter, one group identified that it was not appropriate for them to participate as they felt that the type of work they do was not relevant and the other was already involved in an environmental education and conservation program. Of the 2 responses to the email contact, one was from a community centre that notified us that they had passed on the information and the other was directly from a local group, this group volunteered to participate in this research.

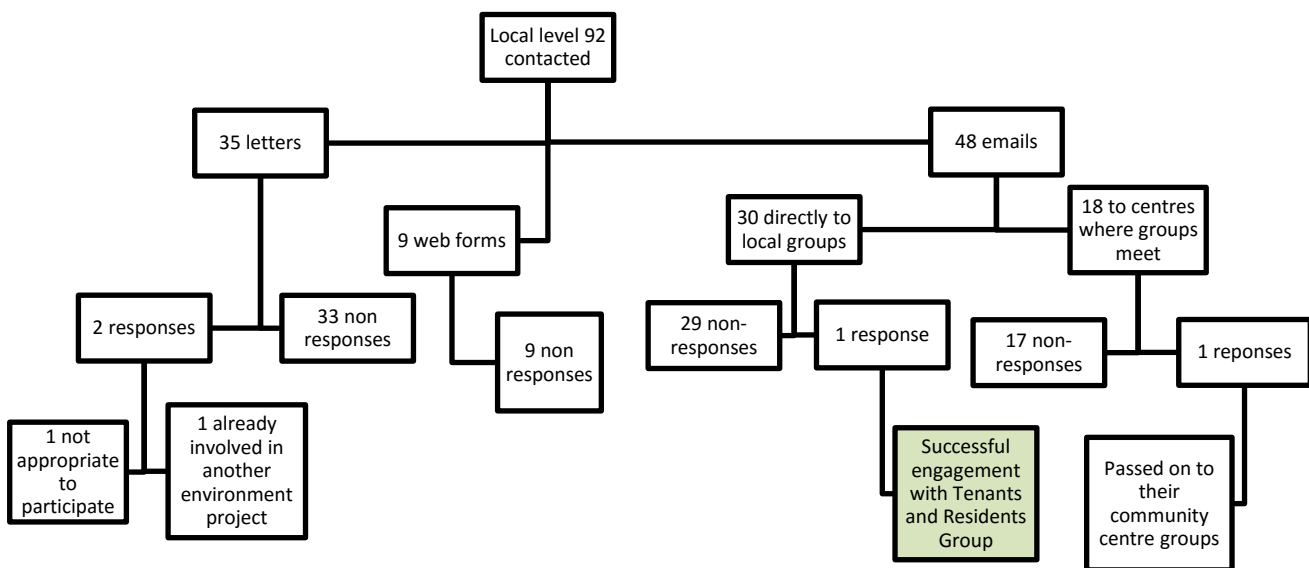


Figure 2 Schematic diagram of results from contacting local organisations

From the results presented in Figure 1 and Figure 2, it can be seen that there was a much higher response rate from those at a National level (7/13, i.e. just over 50%) than from those at a local level (4/92, i.e. <5%). Overall there was little difference in response rates according to whether contact was made by email or by letter – both methods gave a very poor response rate. Among the various combinations of national and local level organisation and mode of contact, the most successful response rate was from emails being sent to National level groups (5/7), and the least successful was from sending web forms to local groups (0/9).

2.4 Follow-up exercise 1: On barriers to engagement

To try to understand why some local groups want to engage in work of this kind and others do not, we emailed a sample of 23 local groups that had not responded to our initial contact to ask what the barriers were to them getting in touch. Of these, 21 were initially contacted by email and 2 by letter. We provided them with the following list and asked them to tick all that applied to them:

- We were/are too busy to take part
- We are not interested in measuring or sharing information on environmental issues (“doing citizen science”)
- We would have needed approval from a group/National level before participating
- We already participate in environment initiatives
- We didn't see the correspondence
- Other – please specify
- Any additional comments

We received responses from two local groups that were initially contacted by email. The first was a group concerned with the environment and making positive changes; their barrier for taking part was that they were too busy. The second was a group that is not directly concerned with the environment; they identified they have an average of 60-70 members, so a discussion on the project would not be practical and they do not have time for it at their meetings.

2.5 Follow-up exercise 2: Tenants and residents association case study

As identified above, one of the local groups initially contacted by direct email engaged with the current project. This group was a tenants and residents association that represents a council estate¹⁶ area built in the 1960s. The council estate is located in a town that dates back to the 17th century that initially developed due to farming, followed by mining and more recently engineering.

The group meets regularly every 2 months at the community centre, with those that attend including tenants and residents as well as invited council (local authority) and housing association¹⁷ representatives. The group officials consist of a chair and treasurer and for each meeting there is an agenda and meeting minutes are taken.

2.5.1 First meeting with the tenants and residents association

Once the initial email contact had been made, the group invited project team members to their next scheduled group meeting on the 18th March 2016 to learn about the project and what it could offer to their group. During this meeting the project representatives provided an information sheet as a takeaway information resource (Appendix 2) on what the Scottish Case Study might involve and led the discussions starting with a description of the wider CITI-SENSE project. While it was important to use the CITI-SENSE project as an example, the researchers did not push air quality as the only relevant environmental project. This was to try and reduce any bias in the following discussions. Following this introduction to the wider project they asked the group to identify environmental issues they considered relevant to themselves and the estate on which they live, and also let it be known that one of the project representatives was a parent of a pupil at the local school.

¹⁶ In Scotland a “council estate” is a neighbourhood of houses originally built for and owned by the local authority (“the council”) and then made available for renting. On average residents tended to be poorer than those in owner-occupied housing. However, in Scotland as elsewhere in the UK, many houses or flats formerly owned by the local authority were sold to their residents as part of a UK Government scheme, initiated in the 1980s, to increase home ownership via mortgages and reduce social housing

¹⁷ A “housing association” is a non-profit organisation that offers housing to those on low incomes or who require extra support

Through discussion the group identified three principal issues where they would like to see their local environment improved: reduce or eliminate dog mess (dog fouling), litter generally and cigarette butts in particular. More specifically the cigarette butts were identified as being dropped around bus stops and the litter was identified as being dropped most frequently during school lunchtimes. The project team agreed to investigate possible approaches that the group could take either to measure and/or manage these issues, including identifying solutions and ideas from how similar issues are dealt with elsewhere in the UK.

2.5.2 Second meeting with the tenants and residents association

At the following group meeting on the 13th May 2016 the project team provided a short document detailing possible solutions and ideas. These included the use of citizen science, by monitoring littering through the collection, collation and sharing of information through sharing photographs or using social media. This included the possible use of “Fix My Street”¹⁸, a UK website to “report, view or discuss local problems (like graffiti, fly tipping, broken paving slabs, or street lighting)” that shows issues already identified in the local area as well as allowing for the upload of additional issues and photographs of these issues. This information is then sent directly to the relevant local authority. Other methods discussed included the Facebook page of the estate's community centre, as a method of collating and sharing photos.

In addition to these methods, the document highlighted that solutions would vary depending on who is littering. This would be an important issue to consider when deciding on the best ways to address the issue. It had been suggested at the first meeting that it was mainly school children dropping litter at lunchtimes, and so the document included the suggestion that perhaps the school should be involved. The document also noted that the local school had a commitment to a good environment – it had an Eco Schools award as part of ‘Keep Scotland Beautiful’.

The main points of the discussion that followed are presented here:

2.5.2.1 Using photographs to monitor littering behaviour

The suggestion posed was that the use of photographs could help to build a more detailed picture of what was happening. An example was that photographs could be taken before and after the times during which most litter is dropped and before it is cleared by the council (local authority). It was not proposed to take photographs of people dropping litter, but only of the street and litter left. This could then provide evidence of the extent of the problem. However the local group was concerned over the safety of members of the group taking photos as although photos are not intended to be of people dropping litter, the taking of photographs might not be welcomed, whether or not they were intended to be used for “Fix My Street”. It was considered that photos taken by a community warden might eliminate this safety issue, and this was discussed in the meeting but not investigated further.

2.5.2.2 Highlighting the impact of the issue

Further discussion, of the nature of the problem and what could be done to raise awareness, highlighted that the litter dropping is often near the local chip shop (i.e. a traditional outlet for takeaway food) by school pupils at lunchtime, so the suggestion of raising awareness in school assembly or newsletters, using statistics to highlight the issue, was discussed. A specific example of using statistics was reporting the cost for the council to clear the litter near the chip shop and highlighting what this money could be spent on if the litter did not need to be picked up.

¹⁸ <https://www.fixmystreet.com/>

2.5.2.3 Communicating with the shops

There was a discussion around whether or not the shops that school children are using at lunchtimes could do anything to help. It was identified that the minister (i.e. local church leader) had previously spoken with the chip shop but the problem had persisted. However, as mentioned by the group it is not solely the chip shop that is being used at lunchtimes, there are also local shops being used by pupils.

2.5.2.4 Current initiatives in the area

Other initiatives in relation to the litter currently underway in the area were discussed. There was a suggestion that as an addition to local family events, perhaps a family litter pick could be organised. In doing this, awareness could be raised, perhaps with a reward that would be valued by the family, such as cinema tickets.

2.5.2.5 Overall outcome of the second meeting

The outcome of the second meeting was that the group agreed to approach the local secondary school. The aim of this was not to place blame, but was to find a way to work together to try to resolve the issue. The local group asked that the project team provide a first draft of a letter, explaining the environmental context of the issue and introducing the CITI-SENSE project. Following this the group added to the content of the letter and sent it to the school. As the summer holidays were approaching and during this time the tenants and residents group do not have meetings and the school is closed, the group proposed that the school attend their next meeting in September 2016.

2.5.3 Third meeting with the tenants and residents association

At the third group meeting that the project representatives attended on the 23rd September 2016 there were also representatives present from the school: the head teacher and 6 pupils who are heads of the houses (sub units of the school) and so represent the pupils.

At the meeting there was a good discussion around the issues and what both the school and the group would collectively like to achieve. As part of the school's current involvement in the Eco Schools award they have an organised litter month which takes place every October. As part of this litter month in October 2016 they have invited the tenants and residents association to the school to talk to pupils in an assembly.

At the meeting in September, the pupils suggested additional ideas for tackling the litter issues. One example was to ask the chip shop to use less paper wrapping around the takeaway food, as currently the chips are wrapped three times. Another example was the provision of an extra litter bin, placed halfway between the chip shop and the school.

After the September meeting when the association had engaged with the school, the project team then ended involvement with the resident's association in the context of CITI-SENSE. Contact has been maintained informally with the association to find out what the final outcomes are in relation to the litter issue.

2.5.4 Outcome of the work with the tenants and residents association

As a result of the contact that the group made with the school, the school and the local group are now in collaboration with the immediate focus of this being on the litter month of October. The residents association still has to send a representative to talk to the school pupils about the litter issue. The chip shop has also been approached and asked to reduce the number of paper layers around the food and to place a bin outside the shop during lunchtimes.

3. Lessons from organisations who use citizen science

3.1 An alternative approach to contacting organisations

The initial strategy of approaching organisations, either nationally or locally, by email or letter, had resulted in a very low response. This could be interpreted as evidence of a lack of interest in citizen science among environmental organisations in Scotland. From our general knowledge, however, we strongly suspected that that was not the case and that the problem was more to do with the impersonal methods of making contact, by email or letter or web form to people who did not know the project team personally. Although we use the term citizen science within this report, this may be considered a citizens observatory.

Consequently we developed an alternative approach based on contacting organisations face-to-face, or by contacting known individuals in relevant organisations. The purpose, as before, was to find out:

- Whether or not the organisation used citizen science as part of its work;
- If it did, what was its experience, and in particular, where it was successful, what helped this to happen (“what works”); and
- If it did not, did the organisation see potential for its use?

We sought a suitable opportunity to try this more direct and person-friendly approach.

3.2 Methods

We decided to gather information from groups at Scotland's Big Nature Festival¹⁹ held at Levenhall Links, Musselburgh near Edinburgh, May 21st -22nd, 2016. This was the second year of what is intended to be an annual event organised by the RSPB (Royal Society for the Protection of Birds) Scotland. “The RSPB is the country's largest nature conservation charity, inspiring everyone to give nature a home. Together with our partners, we protect threatened birds and wildlife so our towns, coast and countryside will teem with life once again. We also play a leading role in a worldwide partnership of nature conservation organisations”.²⁰

The Big Nature Festival is an opportunity for organisations with interests in wildlife and in the countryside to show and explain what they do and to engage people of all ages, but especially families with young children, in enjoying and appreciating the natural world. The Festival website listed 78 organisations as Exhibitors²¹. Although many of these were small niche producers of goods and services relating to nature (e.g. food, drink, clothing, books, photographs, equipment, tours, holidays, educational courses), there were also many organisations where a role for citizen science could be envisaged. This provided an opportunity for face-to-face contact and discussion to help us to understand the organisation's interest in and use of citizen science.

We developed a simple semi-structured interview schedule and recording form to be used at the Big Nature Festival (Appendix 3). Using this semi-structured approach allowed the project team to prepare guiding questions in advance of discussions, and also allowed interviewees the flexibility to provide information on their citizen science projects. After a brief introduction, the schedule seeks to establish if the organisation uses citizen science. If it does, the form guides an exploration of what

¹⁹ <https://bignaturefestival.org.uk/>

²⁰ <https://www.rspb.org.uk/about/>

²¹ <https://bignaturefestival.org.uk/whats-on/exhibitors/>

happens and what works. If they do not use citizen science the schedule guides an exploration of why not and whether there may be potential to use citizen science to help meet the organisation's needs.

3.3 Results

By walking around the Festival on Saturday 21st May 2016, and observing the organisations' descriptions of what they do, it was straightforward to identify several whose activities seemed to include citizen science activities. By engaging in conversation with the exhibitors, and explaining our interest in gathering information about citizen science, it was possible to have detailed and informative discussions with some of these. In the following sections the organisations and project names have been removed to ensure anonymity.

Those interviewed included five organisations and groups of the following types:

- Environmental organisation
- Ranger service that has various monitoring and maintenance projects
- College
- Conservation organisation
- Charity that has monitoring projects

All of the above organisations have current citizen science activities and projects. Their responses to the questions have been analysed to highlight the main themes or lessons that can be learnt about citizen science. The following sections identify the main themes and the sub themes encompassed within them.

3.3.1 Benefits to the Organisation

Through learning about the citizen science work being done in the case studies it is apparent that the organisation (or group) through which the idea for the project is created or through which the project is managed has an influential role. Within this theme of organisation there are sub themes to account for the influences from networks surrounding the organisation, the information being collected as part of the citizen science activities, the technology through which this is collected and the involvement of volunteers.

3.3.1.1 Network

The case studies identified that involvement in citizen science activities provides opportunities to both build and widen networks. For one of the case studies, this has resulted in the formation of a UK network of 55,000 people that contribute to its project. In addition to these networks of individuals, the case studies have shown that citizen science activities can also widen networks of organisations through collaborations for citizen science purposes. Through recruitment of volunteers, one of the case studies has widened their network to include schools and therefore the recruitment of school pupils in the citizen science activities.

In one of the case studies this network is often broadened further due to collaborations with different organisations depending on the topics surrounding particular citizen science activities. As part of these collaborations, one of the case studies identified that it is very much a two-way collaboration with all parties learning from each other. Similarly to this, where collaboration is present, it was noted as accepted practice that resources would be jointly developed and all data collected would be shared within the collaboration.

3.3.1.2 Information

From the case studies there were various points raised in relation to the information and data that is collected. One particular aspect of this relates to the different types of data being collected, depending on the citizen science activities and aims. For example for one of the case studies data would be a broken sign whereas for others it would be sightings of a specific species of wildlife.

When handling any information and data there was a clear need highlighted for there to be organisation, collation and release of the results to others. The technological aspects of collation were not included in the discussions of the case studies; however it was highlighted by one case study that as part of their citizen science activities the information collected from different areas is collated and standardised to allow for analysis. From this analysis the case studies identified that there is a need for them to report back in systematic ways.

3.3.1.3 Technology

The infrastructure through which information is reported and collated is important in relation to how the volunteers interact with it, and feel motivated to interact with it. In addition to this, it is important to consider the functionality of the collated results from the reporting, ensuring that these are in a usable format for analysis. In the case studies the citizen science activities typically involved low-tech or non-tech methods including the use of online surveys, notes, text messages and email for reporting. With 4 out of 5 adults now owning a smartphone²² using citizen science techniques that involve this technology should seldom act as a barrier to participation. It also has to be considered here that not all citizen science activities involve these kinds of reporting, such as more manual based activities of maintaining the environment for example, clearing and managing vegetation.

3.3.1.4 Involvement of volunteers

Involvement of volunteers is often an essential part of citizen science activities due to restrictions and limitations of funding. Therefore for the activities such as data collection and monitoring to be completed, there is a reliance and requirement for work to be done on a voluntary basis.

3.3.2 Benefits to the individual

The reasons why individuals initially participate and are motivated to continue participating in citizen science vary depending on the individual and their circumstances but include enjoyment of activities, social contact, meaning and purpose of participation, and the role of learning.

3.3.2.1 Enjoyment of activity

From the case studies it was reported that finding enjoyment through participating in the citizen science activities is an important reason for taking part. The frequency of these activities differed depending on the case study and the type of citizen science activity, from structured activity once a month, for 2 hours at day break, to gatherings happening on an occasional basis. This highlights that different citizen science activities may require differing levels of commitment and involvement depending on the nature of the issues and tasks. For example one of the case studies identified that the majority of the tasks completed as part of the citizen science work are recreational tasks, with

²² <https://www.deloitte.co.uk/mobileuk/assets/pdf/Deloitte-Mobile-Consumer-2016-There-is-no-place-like-phone.pdf>

any specialist and/or dangerous work being contracted out to specialists. For other case studies the activities were identified as being standardised with set routes and recording protocols.

3.3.2.2 Social contact

Due to the citizen science activities being mostly team tasks it was reported that this provides a sense of social gathering and working together through interaction. As part of this team work, it was reported that volunteers have a sense of initial involvement as well as continued involvement in meeting new people and taking part. When working in the team tasks it was highlighted that volunteers feel valued and empowered to be working with citizen science activity organisers.

3.3.2.3 Meaning and purpose

A common sub theme in the case studies was that of 'meaning' for those that volunteer in citizen science activities. The context of this meaning differed depending on the case study concerned from local level to national level contexts. For the citizen science projects that feed in to larger UK wider projects, it links individuals with UK wide initiatives adding meaning to the citizen science activities. For others it is more focused on local level contexts of seeing change due to their inputs, such as improvements in their local area. Through seeing these improvements being implemented the volunteers can see how the information they have been providing is not only useful, but also used. Having this visible implementation of data collected by volunteers being used to influence change was important in providing meaning to activities. As part of this implementation process it was highlighted by the case studies that there needs to be transparency in approach, letting volunteers know when work carried out as a result of their input, is planned to be done.

3.3.2.4 Learning and training

As part of the citizen science activities within multiple case studies the use of training was highlighted, involving learning on recognising and reporting species, to more manual skills of maintenance of the environment.

The nature of this training varied from more informal on the job learning and learning from one another to more formalised routes of having dedicated training sessions, or in some cases a mixture of both. The formalised training in one of the case studies involved monthly sessions led by experts in the area that share their knowledge, with this being backed up by good quality literature.

Through having learning and training as part of participation in citizen science activities it not only widens knowledge but also provides a social aspect to involvement, building up a sense of community and common purpose among those involved.

3.3.3 Project expansion

When, why and how citizen science activities and projects are initiated and expand varies greatly depending on the issue, existing networks and those involved. A theme from the case studies is therefore project expansion with sub themes on activities that expanded to include citizen science activities and on expansion of volunteer roles due to the changing nature of their role.

3.3.3.1 Professionals with expansion to volunteers

Through citizen science there is often a collaboration of organisations. With one of the case studies this started with a collaboration of 15 organisations developing an original concept. Following this concept development stage there was an expansion to include additional organisations due to grant-

funding. Following the success of this grant funding there was engagement with volunteers as part of a citizen science project. This is similar for another case study where the scheme has broadened to include volunteers. Project expansions such as this allow for organisation employees to work with the volunteers in a collaborative manner.

3.3.3.2 Expansion of volunteer role

Through being a volunteer as part of a citizen science project it is often the case that the volunteer joins an already established and running project, with their role fitting in to what is already happening. In the case studies a development of this was highlighted, whereby the volunteers that had been part of the citizen science activities take on co-ordinator, IT and admin roles. By doing this their role has expanded from joining an established project, to having a co-ordinating and leading role in the project and future activities. Similar to this, in another case study the expansion of the role started with volunteers engaging to learn and report on what they saw, to now having a role in developing management plans for the area and environment concerned.

In another case study the scheme has developed and expanded to now being a formalised charity with tools and clothing being supplied for those involved.

4. Discussion

4.1 Overview: achievement of aims

4.1.1 The core aim of checking acceptability to a more representative group

The pilot study reported here did not achieve what we hoped it would; and in particular it was not able to check, to what extent the idea of citizen science and of a citizens' observatory is acceptable and of interest to the population more widely, beyond the participation of groups who might be expected to be interested – groups among whom white, middle-class campaigners may be over-represented, compared to the population as a whole. Our strategy for checking willingness to participate was by engaging with the wide variety of groups, identified by common interests (specifically in aspects of the environment) or by locality; and we were unable to achieve this by 'cold-calling' organisations, either by letter or by email, including with follow-up requests to some.

There are, nevertheless, some limited suggestions that participation could be wide-ranging. Certainly, the tenants and residents group was open to the possibility of citizen science, and the volunteer participants that we met at the Big Nature Festival seemed to come from a wide variety of backgrounds.

This suggests an alternative research strategy: it may be possible, in collaboration with environmental projects which are successfully using citizen science, to do an analysis of the characteristics of their volunteer participants, to (i) get an overview of their diversity and (ii) to supplement this with interviews of or focus groups with volunteer participants identified as representing better the diversity of the population as a whole.

4.1.2 Overcoming other limitations identified in Section 1.1.2

The pilot study had at best limited success also in overcoming the other main limitation (in terms of engagement and empowerment) of CITI-SENSE as a whole, as identified earlier in this report (Section 1.1.2).

The lack of success in engaging with local groups meant also that we were unable to evaluate – except with one group of tenants and residents – whether an open-ended discussion of their needs and the possible role of citizen science in relation to those needs, would open the doors to wider use of the methodology. Though there is evidence that, once a citizen science project is in place, participants can adapt and/or extend it to their own needs and interests.

The limited engagement achieved, and in particular the interviews at the Big Nature Festival, did however suggest that while any successful citizen science project needs work on data handling / IT aspects, the use of advanced sensor technology is not needed.

Both of these aspects are discussed further under 'Lessons Learnt', below.

4.1.3 But success as a pilot study

Nevertheless, one of the main functions of a pilot study is to provide significant learning opportunities, and all three aspects of the work done succeeded from that viewpoint.

- a. The work of recruiting local organisations gave insight into what does and doesn't work, in seeking engagement.

- b. Work with the tenants and residents group gave insight into what is involved in linking a research project directly with a campaign for change.
- c. Interviews with successful citizen projects gave insight into what works in setting up, maintaining and developing a citizen science project.

From these experiences and from the work of CITI-SENSE more generally, we draw some tentative conclusions.

4.2 What have we learnt?

1. *There is an interest/appetite for citizen science in the context of maintenance and improvement of the natural environment.* This may seem a strange conclusion given the poor response to our attempts to contact environmental organisations in Scotland. However it is evidenced by:
 - a. Those organisations that got in touch to say they were currently doing citizen science related work;
 - b. Others that expressed an interest but were too busy to follow up;
 - c. The willingness of the tenants and residents group to consider citizen science in the context of their attempts to improve their local environment; and, especially,
 - d. The many success stories from the Big Nature Festival – and these were by no means a full list of citizen science activities by environmental organisations in Scotland.
2. *There needs to be a sponsoring organisation and, to be successful, the citizen science project must help meet its legitimate needs, and do so in a way that fits with how the organisation understands its role, its resources and its method of working.* This is unsurprising but was confirmed by our experience in all aspects of the work.
 - a. This was confirmed by our attempts to engage with local groups. The limited responses that we did get were from groups with an interest in citizen science. Some had this in place already and were not looking for help. Others were interested but were aware of barriers which they saw as insurmountable and prohibitive – not enough time / too busy; the group was too big to discuss the issue; there were data protection issues in national groups providing names and contact details of individuals in local groups.
 - b. It was further supported by our experience with the tenants and residents association who considered carefully the advantages and disadvantages to them of citizen science / monitoring of littering locally, and decided not to proceed.
 - c. There are numerous examples from the Big Nature Festival interviews – the main one being that, because publicly funded organisations have been struggling to maintain and develop services while funding is strongly limited or (in real terms) cut, there are many instances where volunteer participants have become an essential part of getting the work done; and this includes data collection / wildlife monitoring which simply would not be feasible otherwise, on anything like its current scale.
 - d. There are numerous examples also from within the main CITI-SENSE project. Here the 'sponsoring organisation' is to some extent CITI-SENSE itself, and the benefits to CITI-SENSE are obvious – citizen engagement and empowerment are its purpose. However, CITI-SENSE involved not only individual citizen participants but collaboration with a wide range of organisations, e.g.:
 - i. NGOs / campaigning groups (including e.g. groups of people affected by asthma) who saw citizen science / a citizens' observatory as a means of furthering their aims of improved air quality;

- ii. Groups of cyclists who have an interest in air quality but also in the safety and wellbeing of their individual members, and in the promotion of active travel – here, the promise of interesting and relevant information about individuals' routes of travel was important;
 - iii. The schools who adapted the project to their needs – see also Para 5, below;
 - iv. It was clear from engagement with policy makers in cities that their support for the project was linked to the probable usefulness to them of the data gathered by it; and indeed that they saw such a project as potentially unhelpful if the data was not of good quality but was being represented as good.

- 3. *It is essential also that the volunteering / citizen science project meets legitimate needs of the citizen participants, and does so in a way that fits their aims and resources / ability to participate.* Again, this is unsurprising / obvious; but again, it was interesting to have it confirmed clearly.
 - a. Within the present study, attempts to contact local organisations were not designed to give, and did not give, information on this aspect specifically – that was to happen when we engaged with particular local groups. By not approaching with a specific topic and leaving it open in terms of content this may have acted as a barrier due to the uncertainty around the proposal. When there is a concrete proposal and idea people have a clearer idea of what they are signing up to. With clearer ideas it is more straightforward to say yes or no to participation, therefore in this work by approaching with uncertainty of ideas this may have acted as barrier to saying yes.
 - b. It was evident in the only local organisation with whom we did engage successfully, i.e. the tenants and residents association – one of the reasons why they did not go ahead with monitoring of the litter (through using photography) was that the personal safety of individual participants could not be assured.
 - c. There are numerous examples from the Big Nature Festival interviews, including that:
 - i. Participation is a meaningful activity – though for this to be maintained, it is essential that the data being provided is actually used, *and that the volunteer participants know that it is being used and can see its usefulness;*
 - ii. There is a joy and achievement in learning, in becoming expert or relatively in something in which the participant is already interested – and so good quality training, ongoing, is another aspect which helps maintain interest and involvement;
 - iii. There is a social dimension: many of the successful projects were set up as involving small teams; and the wider gatherings, e.g. for training purposes, also had a very important social dimension and function.

- 4. *More generally, the quality of personal relationships is crucial to success, at least in the beginning phases of citizen science work.* While we have not shown this in any formal or scientific way, a multitude of experiences across CITI-SENSE support it – and again it is of course unsurprising.
 - a. Although we have no formal proof, we strongly suspected that the very low response to our attempts to engage organisations by email or by letter was because the method of contact was neither face-to-face, or to people that we know personally. One reason why we thought that the Big Nature Festival would be a fertile place for engagement is that the exhibition stalls not only allowed face-to-face contact, they were designed to facilitate it; and that contact was not conflicting at that time with other priorities – making contact was the organisations' purpose in being at the festival. And indeed engagement at the Festival was very easy.

- b. When, during the Big Nature Festival interviews, both staff and volunteer participants were present, observably there were good relationships between them, and each was willing, unprompted, to speak of the advantages of working with the other.
 - c. Within the main CITI-SENSE project the various EIs worked in the first instance with individuals and groups with whom they had already – from previous scientific work in those cities – established good working relationships; and one way that participation grew was by people telling others that they knew, whether the telling was face-to-face ('word-of-mouth') or electronically. This would suggest that engaging with known contacts does help to build an initiative.
 - d. It seems however (and we have not tried to assess systematically), that once a project reaches a 'critical mass' in terms of participating numbers of citizens *and* project visibility, then the project 'takes off' and grows in ways not driven by personal contacts and relationships, i.e. that the personal element is most important in the early stages. This seems to be the case with large-scale projects such as the RSPB Big Garden Birdwatch²³ and Big Butterfly Count²⁴.
5. *Once a citizen science project is in place, participants can adapt and/or extend it to their own needs and interests.* This had occurred already within CITI-SENSE, when the schools (teachers, students) took a CITI-SENSE Empowerment Initiative on monitoring indoor environment in schools, intended to empower the improvement of the school environment, and adapted it to become a monitoring project that empowered learning and an extension of the science and environment curriculum through monitoring and associated activities such as engagement with the public and development of apps.

Similarly within the present pilot study, the Big Nature Festival interviews included many examples of how, once a citizen science project was established (within a framework led by the sponsoring organisation), the volunteer participants develop ideas and plans for how to take participation to a higher level. For some, this can include mentoring or helping with management and administration. For many, it involves voluntary extensions of the original remit, e.g. taking members of the public on 'wildlife tours' of areas (e.g. walking or cycle routes) where the volunteers have learned to identify and report on the presence of particular kinds of wildlife. For a project like CITI-SENSE with an interest in empowerment, this is one of the most interesting and encouraging findings.

Something similar happened with the tenants and residents group. The CITI-SENSE project brought to it resources which it didn't previously have, or insofar as it did have them, it had not previously been able to harness them to help bring about the changes that it wanted. This included the project representatives' ability to find out what was done in other similar situations in the UK, to prepare a list of options, to have confidence in and experience of engaging with professionals (e.g. letter writing to the local school). And while none of this involved a citizen science project as such, it did help the local group take forward its plans to improve the environment of its neighbourhood.

These extensions to the citizen science project as originally envisaged are also examples of co-design, between professionals and volunteer participants, with the important additional

²³ www.rspb.org.uk/birdwatch/

²⁴ www.bigbutterflycount.org

characteristic that the co-design was initiated by the volunteers and then welcomed by the professionals, who actively helped develop it.

6. *It is essential that data be handled well; but the actual data collection itself need not be high-tech.* Both aspects matter.
 - a. Good data management, from data collection through to final use(s), is essential, both for efficiency and for effectiveness. For efficiency it is necessary to have a process that is managed as a process, where the various stages from data collection through to usage are seen as parts of an integrated whole and as far as practicable streamlined and made user-friendly. This is necessary also for effectiveness – else the usefulness of the data will be compromised and the purpose of the project undermined. This in turn will (understandably) adversely affect participation.
 - b. The Big Nature Festival interviews involved a wide variety of projects, with a wide range of data collection methods; none of them involved the advanced modern sensor technology which to begin with seemed central to the main Empowerment Initiatives of CITI-SENSE. Of course CITI-SENSE did over time develop other, less high-tech, products whose potential for empowerment is evaluated in CITI-SENSE Report D5.5.
 - c. To sum up: investment in IT / data management aspects is essential, but the actual data collection can take a wide variety of forms and isn't dependent on modern sensor technology.

7. *Very limited involvement with one campaigning group raised interesting issues about the need for clarity about the purpose and associated boundaries of project involvement.* There were numerous ways in which both the local tenants and residents group, and the CITI-SENSE project representatives, could see collaboration between the association and the CITI-SENSE project as being helpful, as the association tried to improve their local environment. But which of these were a legitimate activity within the boundaries of the project? The question became more acute when, during the second meeting, the project presented a range of options, including some with a monitoring / citizen science aspect; and the local association decided to follow up some of these but not the citizen science part. What then was the role of the project? The project representatives thought that, having offered help, it would be dis-respectful simply to withdraw that offer because the citizen science aspects were not favoured; and so continued to give some limited background support, while encouraging the local association to lead both on decision making and on external visibility. We saw this as consistent with the underlying aim of supporting empowerment, even though the means to empowerment were not via citizen science.

As one of the project representatives was a parent at the school involved, this needs to be considered in relation to the impact this might have had. This is something that came up in the first meeting; it shows there is an interest not just from the perspective of the project but also an interest as a parent from the school. This knowledge of the school from a parental perspective of knowing about the eco schools scheme and who to contact was useful in discussions with the group. It was however discussed within the project team that although there is a link there, it was not the role of the project to make the contact with the school; the purpose was to empower the group to do this, which is why the letter was from them and not from the project team or the parent on the groups behalf. This was about empowerment and not simply doing it for them. The role of the project team from IOM providing the drafted letter reflects the IOM mission statement; *“to benefit those at work and in the community by providing quality, research, consultancy and training in health, hygiene and safety and by maintaining our independent*

*impartial position as an international centre of excellence*²⁵. Reflecting on the role in the case study this went beyond science and research to provide consultancy for the benefit of the community.

More widely, considering and reflecting on the project team roles in this work, the tenants and residents group was approached within the context of the CITI-SENSE project. As part of this the project team brought with them knowledge from other work completed and underway as part of this larger project. The reality is that this will have impacted on the framing of the purpose of this Scottish Case Study work, from the content provided on the information sheet to the discussions with the group. The team members intentionally attempted to reduce causing bias by allowing the group to identify their own environmental issues, therefore providing a discussion facilitator role and not expert opinion role. This facilitator role continued in the following meetings, discussions and letter writing. However, it cannot be denied that our own experience may have influenced some of the framing and discussion with this particular group. That is the reality of participatory research that there has to be some influence from the experience of the participants, both the researchers and others involved.

The infrastructure of the group already having pre-booked meetings that happened every two months, allowed for the citizen science work to be discussed without a need for scheduling additional meetings, therefore facilitating the discussions between the project representatives and the group. By attending the full meetings it allowed the project representatives to gain a wider idea of the issues the tenants and residents are concerned with. In addition to this, by physically attending the meetings it allowed the project representatives to build a rapport with the group and the development of trust.

Similar issues arise in other contexts, e.g. participatory research, and have been well explored there. We are in no way suggesting that the very limited case study here adds in any significant way to that existing experience. But it does show that issues such as these will necessarily arise when citizen science work is focused not only on engagement (e.g. providing data on wildlife) but also on empowerment (the participants explicitly using citizen science to help bring about social and environmental changes that they anyway want to happen).

As part of the lack of clarity around purpose and keeping ideas and proposals intentionally vague, learning by doing was important within this work. Firstly this was with the tenants and residents association, through the iterative process of identifying the environmental issues they considered important in their local area. Secondly learning by doing occurred through the limitation of the Scottish Case Study work being done with the single group, therefore initiating the development of the interviews at the Big Nature Festival as a route to identify citizen science practice currently being done in Scotland.

4.3 Concluding remarks

The limitations of this small pilot study are numerous and obvious, and in particular, that the original vision of engagement with local organisations succeeded in only one instance, and that didn't lead to a citizen science project. But the three elements of the project (i) seeking to engage, including follow-up on initial non-response; (ii) working closely with one local organisation and (iii) interviews with successful environmental citizen science projects in Scotland, all provided interesting and useful

²⁵ <http://www.iom-world.org/about-us/our-mission/>

information. All suggested topics or lessons which seem important for the wide-scale adoption and use of citizen science / citizens' observatories to support wider public engagement in environmental issues and to empower citizens to help bring about changes and improvements.

Interestingly, these lessons seem broadly consistent across the various elements of this pilot study, and consistent also with the experience of the many EIs of the main CITI-SENSE study. Because of the limited scale of sometimes informal methodology of the present study, it would be presumptuous to look on these as anything more than providing useful guidance to future projects – guidance whose accuracy needs to be checked more thoroughly and on a wider scale, but guidance nevertheless, which we think is useful for future work. For example, while covering the topics of empowerment, engagement and decision making, what we have seen is that engagement is easier when there is a conduit (known contact) that can be approached or can help to introduce the researcher to a particular group. Furthermore, empowerment in this context is actually enabling individuals or groups to have the agency for decision-making when solving environmental problems (e.g. to decide what issues to prioritise and what strategies to adopt for solving them) and the agency to implement their chosen strategy (e.g. to take issues forward for discussion with other stakeholders to try and find some common ground for discussion).

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Appendix

Appendix 1 National organisation information sheet



Could citizen science be useful to you?

The project:

The Institute of Occupational Medicine (IOM) is currently working on a project called CITI-SENSE funded by the European Union (<http://www.citi-sense.eu/>). This project is investigating ways to help people take better care of the environment, especially whether involvement in measuring the environment and sharing information with one another can help bring about some of the changes people may want to make. As part of this work we are planning to make contact with a range of organisations and groups to discuss ideas and opportunities for making positive changes to the environment.

Who is the target audience for this project?

For this stage of work we are looking for people who are part of a local group or community in or near Edinburgh that shares similar interests. Examples of these interests could be shared activities such as cycling or walking, groups interested in similar hobbies such as history or bird watching, and other groups that support people (for example older people).

Does the local group need to know about the environment or changes that can be made?

We are interested both in those groups that already have an idea of how they could use environmental monitoring to take better care of the environment around them and in those that don't yet have a specific idea, but would like to discuss and develop ideas within this project.

So, if the project team are interested in local groups, why are they contacting National level organisations?

The purpose here is to get agreement in principle from the National level of the organisation so that the local groups can be contacted by the project team to discuss the project and what is involved in participating.

What do you need to do?

At the National level of the organisation we are simply asking for you to provide us with the details of a local group preferably in or near Edinburgh. They will then be contacted by the project team and it will be identified that we have already contacted you at a National level. If you are happy for us to contact the local group then please provide their email, phone or address, along with a contact name to focus our communication.

If you would be willing to do this, then please send these details to Dr Joanne Crawford (Joanne.crawford@iom-world.org) by the end of August.

If you have any questions on the project or participation please contact Dr Joanne Crawford:

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Tel: 0131 449 8037
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Appendix 2 Local organisation information sheet



Could citizen-science be useful to you?

The project:

The Institute of Occupational Medicine (IOM) is currently investigating ways to help people take better care of the environment, especially whether involvement in measuring the environment and sharing information with one another can help bring about some of the changes people may want to make. As part of this work we are making contact with a range of local groups to discuss ideas and opportunities for making positive changes to the environment.

What kind of local groups can take part?

Any! You might be part of a group or community in or near Edinburgh that shares similar interests (e.g. cycling, bird watching) or are based in the same location or neighbourhood. Whether or not you already have an idea of how you can take better care of the environment, this project could work for you!



What would participation involve?

We are looking to involve interested parties from January 2016 until April 2016.

Depending on the group and their interests, the methodology could involve:

- Identifying a local contact and organiser (unpaid, voluntary role) to act as a point of contact between the group participants and the project team,
- Surveys on expectations of taking part in this project,
- Development and discussion around possibilities of what could be changed in relation to the environment,
- Group discussions around ideas for change or obstacles to achieving change,
- Group discussions involving different groups to discuss ideas and encourage communication links.

What are the benefits of taking part?

We could help you to develop a current or new idea on how you could take better care of the environment as well as encourage communication links between your group and others.

Further information:

If you have any questions on the project or would like to find out more about participation, please contact Alice Davis on alice.davis@iom-world.org.



CITI-SENSE project
Grant agreement n°: 308524



Appendix 3 Semi-structured interview schedule for organisations

Prompts for Interview Questions for those being interviewed about Citizen Science
For use at the Big Nature Festival Scotland, May 21-22, 2016

Introduction

I'm Fintan Hurley, I'm part of a study about how environmental organisations use citizen science. I would like to ask you some questions about your organisation's use of citizen science, as we are trying to get a picture of what works in Scotland. It should take no more than 5 minutes.

Intro Question

1. Does [your organisation/group] use Citizen Science as part of your work?
 - a. If YES – go to 2; If NO – go to 6, overleaf
 - b. If 'You need to talk to someone else' or 'Don't know', then ask who, and take contact details – go to 8,
 - c. If 'What is citizen science'? then explain, with some examples.
 - i. RSPB Birdwatch
 - ii. Air quality and sensors
 - iii. Photographs – BBC Weather

And then go to Yes or No or 'You need to talk to', as required.

If YES

2. Can you describe how you use citizen science and citizen scientists? Can you tell me please what people do, and about how many are involved?
3. How do you recruit people to take part? Do you involve only your members or do you involve the wider public also? What works?
4. What helps keep people interested? Is there much feedback to participants?
5. How are the data used? Do participants get a chance to comment on the results? Do they get any kind of report?

If NO

6. Are you familiar with the idea of citizen science?
 - a. If YES – Go to next question Q7
 - b. If NO – explain – See Q1(c)
7. Do you know if [your organisation/group] has considered using it?
 - a. If YES – Do you know why they didn't proceed?
 - b. If NO – Can you see any ways that it might be useful?

If 'Don't Know' or 'Ask Someone Else':

8. Who do you think we should contact?

Final Remarks

9. Please can I have your own name and contact details?

Thank you for your help!

Here is a card with my contact info.