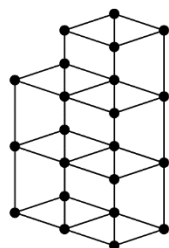**Grant agreement**
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doing it
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Doing It Together science
Coordination & Support Action

D6.6 Innovation Management Plan: "Making citizen science work"

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2 Definitions and Acronyms

Acronyms	Definitions
CSA	Coordination and Support Action
DITOs	Doing It Together science
EC	European Commission
ECSA	European Citizen Science Association / Verein der Europäischen Bürgerwissenschaften
ESSG	Environmental Social Science Research Group
eutema	EUTEMA GMBH
EWI	Earthwatch Institute
GRIN	GRIN: How to let people be themselves
H2020	Horizon 2020 Programme
ICM	Institut de Ciències del Mar
KI	Kersnikova Institute
KPI	Key Performance Indicator
Meritum	Centrum Szkolen I Rozwoju Osobistego Meritum
MP	Medialab Prado, Madrid
RBINS	Institut Royal des Sciences Naturelles de Belgique
RRI	Responsible Research and Innovation
SCIS	Sci Starter
Tekiu	Tekiu Limited
UCL	University College London
UNIGE	Universite de Geneve
UPD	Universite Paris Descartes
WS	Waag Society

3 Management Summary

This report provides a preliminary study that gives an overview of the main archetypes of operations in citizen science and DIY science (which we call "business models" or "modes of operation"), and identifies gaps that will require further developments. The very nature of the DITOs project is such that it has enabled us to encounter a wide variety of different types, scales and aims of citizen science projects; and to better understand the array of types of funding models, and ways in which citizen science projects take place. Thus, this report sets out the findings from such encounters, and provides a description of the citizen science funding landscape.

Through a comparison of 35 different types of citizen science and DIY science projects, we focused on the following criteria: the individual or organisation running the project, how the project was funded, the length of time the project has been running, and also the scale of the project's operation. This last criterion includes the geographical scale, funding scale and the scale of operation of the project. From these comparisons, we developed five broad archetypes of business models in citizen science: Motivated Individual (MI); Small Crowdsourcing (SCS); Outreach (Outreach); Research and Innovation (R&I); Long Term NGO (LT NGO). These are not straightforward archetypes, and owing to the unique nature of the formation and aims of each project considered in this report, this typology represents an experiment in attempting to articulate the different types of business models in citizen science.

The analysis presented in this report provides a preliminary overview, and there is a clear need for a more detailed study, in which more information will be added to a specific project, and a better understanding of the innovation path. What is clear is that the landscape of citizen science, while similar to the social innovation landscape, is a more complex landscape that requires special attention. As a result, the instruments and approaches that are appropriate for this field need to be developed and adapted, while taking into account the unique characteristics of citizen science. At this point in time, the landscape includes islands of activities with multiple discontinuities. The clustering of specific operational models (e.g. LT NGO) are an indication that we can find commonality, and that this landscape can be understood, and therefore supported.

D6.6 Innovation Management Plan: "Making citizen science work" is Deliverable 6.6 (D6.6) from the coordination and support action (CSA) Doing It Together science (DITOs), grant agreement 709443.

4 Introduction

In accordance with DITOs project Description of Action, the objective of this deliverable is "to provide information on the way that the DITOs consortium identified, developed and nurtured ideas that emerge from project activities and beyond". It is also to "discuss the potential of innovation management within the context of a distributed network of citizen science and DIY science activities." In this section, we explain how we approached the issue of innovation management planning for this project.

Innovation management is a well-established practice within technological and scientific research as well as regular business practice in large and small companies, with its roots in the post-World War II suggestion that the role of science in society is to generate new products and services that improve life through technological developments that stimulate economic growth (Benessia and Funtowicz 2016). Within general scientific and technological Research and Development activities (R&D), interest in innovation management emerged in the 1980s and the 1990s, with the creation of a host of mechanisms. Examples of these mechanisms include: the establishment of Technology Transfer Offices (TTOs) in universities (Siegel et al. 2007); the development of networks of academic entrepreneurship (Chapman et al. 2011); and the creation of funding programmes that were designed to overcome the "Death Valley" of innovation - between the end of the research phase, and the point at which an innovation demonstrated enough impact to attract investment (Wessner 2005). In addition to these examples, it is worth noting that there is a complex web of expertise, investment sources and types, dedicated loans, and tax incentives, and many more elements.

However, innovation management inside a firm is concentrated on product development and process innovation, while at the larger scale that analyses the social process of moving from research and innovation in research institutions, innovation management the focus was mainly around spin-off companies and the licencing of research Intellectual Property (IP) for commercial purposes. In contrast, the area of social innovation was largely overlooked until the mid-2000s, when identifying the mechanisms to support the development of social enterprises, not-for-profit, and charities, as well as support for social entrepreneurs, began to receive attention (as noted by Nicholls 2008; and Mulgan et al. 2007). Governmental bodies started to pay more attention to social investment only a decade ago (Nicholls and Pharoah 2008), while recommendations on how universities and other research institutions could manage social innovation have only appeared in the past five years (UCL Business 2013; Oham and McDonald 2016). In addition to the revenue incentive for social innovation, they present a more complex case for innovation management since they are trying to achieve business, social, environmental, and health benefits, whilst also committing themselves to high standards in their business interactions (such as ensuring that all their source material is produced ethically). This is a tall order for a nascent business that is emerging from R&D efforts. In addition, many of those that are involved in the research basis for these businesses do not see the direct link between their effort and the potential for setting up an innovative organisation, unlike the practices in scientific and technological disciplines. Social innovation management requires different expertise from general innovation management - to take one example, legally, the organisational structure can include different charity formations, other not-for-profit structures, or structures that were created for social enterprise such as a Community-Interest-Company (CIC) - all these potential structures are a challenge to develop on top of the

common structures of commercial companies, which are also open. Furthermore, the potential to accredit the company as a "Benefit Corporation" (B-Corps) confuses matters even more, since this accreditation has no legal status, but can be valuable for the founders and clients of the new business. Another aspect that complicates the management of social innovation is the difference in the funding landscape (Murray et al. 2010) between social entrepreneurship and R&I. For example, until the establishment of bodies such as the Skoll Foundation in the US or UnLtd, the foundation for social entrepreneurs in the UK at the turn of the millennium, there was a lack of funding for the people who initiated innovation, and they could only secure support for their projects, but not for their own subsistence and salaries, as is common in commercial activities. These and other differences might explain why social innovation management is challenging for R&I organisations. Indeed, the EU is starting to wake up to the need to support social innovations in a specialised way (Roberts 2018).

Citizen science, as a recent newcomer in the field of social innovation, is arguably in even more challenging a position than other social innovation, since it is the epitome of the Quadruple Helix (Carayannis & Campbell 2009) or "Mode 3" innovation. In these models, we expect to see the co-production of innovation between universities and research institutions, governments, civil society, and business and industry. The expectations from citizen science projects are high: they are expected to promote scientific education, produce high-quality scientific outputs, reach out to groups that are underrepresented in science, create meaningful and enjoyable engagement, perform the research in an ethical way that includes a duty of care towards participants, and contribute to environmental sustainability and economic development. As the famous Frank and Ernest cartoon pointed out, this is akin to the position of Ginger Rogers, in the iconic dance duo, "who did everything that Fred Astaire (her dance partner) did, but backwards and in high heels". In this way, citizen science is required to do everything that a "regular" social innovation organisation has to do, but all the while ensuring high quality scientific outputs, ethical and engaging outreach work, and much more.

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The level of expectation on a citizen science project demonstrates the challenge that the Quadruple Helix is setting, in particular in terms of innovation management. Furthermore, as this report demonstrates, the landscape of citizen science includes multiple "valleys of death" for innovation, and this is something that the recommendations of this report return to. For example, there is no simple route from innovating in developing a successful local environmental monitoring project (e.g. in air quality or biodiversity monitoring) and scaling them up to a significant research project, and then to a sustainable national programme.

Part of the challenge with citizen science is the multiple goals of projects - some research funders consider citizen science mostly under "public engagement" or

"informal education" and therefore do not perceive it yet as a central methodology in the R&I landscape (for example, DITOs itself is funded from the stream "Science with and for Society" and not from one of the core streams of H2020 funding). The same can be said about the current level of policymakers' and scientists' acceptance of citizen science (see Nascimento et al. 2018; Bonn et al. 2018). We are therefore at a very early stage in the development of innovation management for citizen science and the understanding of the appropriate mechanisms that are required to streamline it.

As with social innovation, citizen science includes specific challenges that need to be addressed before an innovation management approach can be developed. For example, because of the strong commitment to Open Science within citizen science practitioner communities (see DITOs Consortium 2018), many projects openly share their methodology, blueprints for the tools that are in use, the code of the software, and the data that is emerging through them. This *prima facie* raises concerns for investors about the potential to create a robust business in such areas. In addition, Intellectual Property Rights issues can also emerge from participants' contributions, another area that requires careful consideration (Scassa and Chung 2015). More generally, studies of innovation management in the open and user innovation environment indicated that there is a need for further development of models for the strategic utilisation of distributed, open, and user innovation (Bogers and West 2012).

Within the DITOs project, DITOs innovation hubs (see Deliverable D3.2) are demonstrating a range of innovation paths in the field of citizen science, and in some cases the development of viable businesses that emerge from such innovation - for example 'Mapping for Change' which emerged from UCL which provide the know-how on carrying out participatory mapping and community-led social enterprises. Moreover, some innovations were created specifically for DITOs, such as the Science Bus touring exhibition which travelled across Europe and provided DIY science workshops to hard-to-reach places that do not benefit from science centres or museums (see Deliverable D6.5 and Figure 2). Another innovation is linked to the formats of the Policy Round Table in conjunction with Discovery Trips, in which a group of officials and policy makers are invited to take part in a learning tour a day before participation in a round table, a method that has proven to provide more focused discussions, and to establish long-lasting links and capacity building between participants.

Figure 4.2: DITOs science bus

Yet, because of the early stage of the innovation ecosystem, the activities of the DITOs innovation hubs were not geared towards sustaining the activities beyond the current funding. For example, although some potential opportunities for the continuation of the science bus emerged, the amount of effort that was required to turn it into concrete and successful operations, beyond the few months of its existence, was too high for the DITOs consortium (and its partners) to follow up. The cost of hiring the bus, equipping it, and providing subsistence for the drivers/engagers, and providing ongoing management and promotion across traditional and social media reached about €100,000, and required an effort by a team of 6 experts from the Waag Society over 3 months. While replication could be done with less resources, the initial effort exhausted most of those that were available within the project. We can estimate that merely the effort of securing the funding and people for another iteration of the science bus would have required 12-24 person months.

In light of this, and due to the lack of understanding of the landscape of innovation in citizen science, this report will focus on presenting a landscape analysis. The report aims to give a brief overview of different types of approaches to organising and funding citizen science projects. The research for this report was carried out as a preliminary study that was aimed to provide a description of the citizen science operation models (business models) landscape, as to give an overview of the main

archetypes of operations and identify gaps that will require further developments. The very nature of the DITOs project is such that it has enabled us to encounter a wide variety of different types, scales and aims of citizen science projects, and to better understand the array of types of funding models and ways in which citizen science projects take place. Thus, this report sets out the findings of such encounters and provides a description of the citizen science funding landscape.

4.1 Definitions and Aims of this report

To understand the innovation landscape of citizen science, we have decided to focus on two critical elements - the organisational structure within which citizen science projects happen, and the form of funding that is used to finance these projects. These aspects can be defined as the "operational models" or the "business models" of citizen science projects. We use geographical and participation scale on the one hand and the temporal scale of the project on the other, in order to identify the areas of operation and grouping of activities. Significantly, we do not put project sustainability as critical criteria, since some projects have a clear endpoint (e.g. the development of a citizen science instrument or establishing a baseline of air quality conditions for community action) while others are set to do continuous work that can continue indefinitely (e.g. the annual Big Garden Birdwatch in the UK, set and run by the RSPB). We will point to the type of projects that are the short or long term and their potential as we go along.

Importantly, although we will use the term "business model", we are not trying to capture the value of volunteering work, the value for money of citizen science project, or the full economic value of the project (for this see Blaney et al. 2016). Instead, by "business model" we mean "how are the fundamental costs of the project being covered? What is the organisational structure, the source of the funding, and the things that are being paid from it?". We also analyse specific projects where we can come up with a reasonable statement about their nature. We decided to look at the organisational structure in tandem with the funding, since in the areas of citizen science and DIY science, the type of organisation influences what sort of funding is available and relevant - for example, the privileged access to research funding of universities.

In this report we identify "archetypes" of business models. This is based on the observation that the simplest example of a citizen science project will be of a project that is run only by volunteers for a relatively short time (several weeks or months), uses free services such as Google Docs for managing the data, and does not have any other source of income. Such a project does not have an official organisation, or membership structure that is associated with it. This, quite simply, can be seen as an archetype of a business model - which we have called Small Crowd Sourcing (SCS). We will see the business model archetypes in section 5.

In addition, we define "Popular Topics" - in particular areas of citizen science, there are topics that are more likely to attract attention because of an already established community of amateurs, volunteers, or interested publics and an economic activity. For example, birds are attracting much attention from the public have a significant economic activity associated with them; astronomy, weather observations, or research about dinosaurs are also popular topics - where there is a large public with an interest in them and that is also willing to spend money on these areas by buying a telescope, weather monitoring station, or pay for an exhibition where they are on display. It is easier to reach out to general media with stories about them. In comparison, a project that focuses on roadkill or prime numbers is starting from a

more challenging position since these are areas with limited interest, as well as lack of economic activity around them.

4.2 Assumptions and Principles

In this report, we took an approach that is "scientific discipline agnostic". While, as noted above, we recognise that some areas of research are attracting more public interest than others, for the selection of projects we analysed, we attempted to have examples from different disciplines of science. The reason for this is that much attention has been paid to environmental citizen science, and in particular biodiversity observations. With such a focus, it is possible to select examples from this area alone; however, this might lead to the overlooking of gaps and challenges in the ways in which citizen science is operating. We therefore examine a broad range of projects from different areas of science and social science.

Another aspect of our analysis is that we do not seek to provide a wider explanation on why a specific project chose the business model that is using. Our aim in this preliminary study is to better understand the landscape; and the understanding of the details of the business models is beyond our scope. In the same way, we ignore the values and philosophical or practical reasons behind the specific structure and funding.

4.3 Some Examples

The mode of operation of citizen science, especially when it relates to popular topics, seems to be easier in areas where economic activities - either commercially or in the not-for-profit sector - are well established. However, economic activity does not necessarily translate to direct support to citizen science, for example in the case of biotechnology and DIY Biology. Indeed, one of the most established areas in citizen science, bird and wildlife watching, has been identified as having a significant economic value, estimated at around $32 billion in the USA. Furthermore, a study by the Royal Society for the Protection of Birds (RSPB) estimated that between $8-12 million is spent annually by tourists wishing to see White-tailed Eagles on the Isle of Mull alone (UNEP 2012). Within the UK, a national survey of 36,000 people in the UK April 2014 - March 2015 found 7.8 million people to have "an interest" in bird watching, 3.7 million said they went bird watching occasionally and 1.9 million go birdwatching regularly (Sleight, A., Bird Watching Magazine, 2015). In the United States, approximately 46.7 million people observed birds around the home and on trips in 2011, according to the U.S. Fish and Wildlife Service (FWS) national survey. A large majority, 88% (41.3 million), observed wild birds around their homes, while 38% (17.8 million) took birding trips away from home. Birders averaged a startling 110 days of birding in 2011. Away-from-home birders averaged 13 days (US Fish and Wildlife, 2011). It is therefore not surprising that a small fraction of the total economic activity that is linked to this area ended in supporting citizen science projects.

Another popular area is weather observations (WMO 2001), with the Weather Underground using this interest to promote the purchasing of a weather station (from $150 to $1000), and then offering a "hyper local weather prediction" in return for the contribution of data. In fact, Weather Underground is one of the early examples of commercial crowdsourcing, existing since 1995. Projects such as "Community Collaborative Rain Hail and Snow (CoCoRHaS) network" is currently benefiting from this existing interest.

Other areas, such as or Do-It-Yourself Biology (DIYBio) or Science (DIY Science) have a lower level of general interest with only few thousand participants worldwide (Seyfried et al. 2014), and require different mechanisms for funding and the development of business models. An example of this is available with some of the early low-cost air quality monitoring projects - with devices such as Air Quality Egg or the Smart Citizen Kit, which emerged from maker-labs about 5 years ago. One of those - the Smart Citizen Kit - was integrated into a Horizon 2020 project and received significant funding. However, while the websites about these devices are still active, the number of active sensors is very small - a few hundred at best (see Nold 2017). Leaving aside the technical problems of calibration and data quality from low-cost sensors (Lewis and Edwards 2016; Castell et al. 2017) which have contributed to the challenges of turning these innovations into successful enterprises, there seem to be wider challenges and issues, such as abandonment, similar to other smart devices (Lazar et al. 2015; van Dam et al. 2010). Similarly, innovations that are emerging from DIYbio - for example, the Opentrons, which emerged from the New York-based genspace, is now an established company; but this is an exception, not the rule.

In summary, we can see that by looking at various examples of projects in the area of citizen science, we can learn about the innovation landscape and some of the organisational and funding characteristics that typify different projects. We also need to acknowledge two important limitations: first, it is beyond of the scope of this study to analyse the innovation infrastructure that enabled (or hindered) the projects that we are analysing, as this will require a much more detailed examination of each case and its history; and second, we need to acknowledge that we are looking at a case of "survival bias" - the cases that we are seeing are the successful ones that got funded and evolved into projects that can be documented. For example, in crowdfunding, the success rate can be between 18% and 46%, and it is important to understand what happens to the rest of the projects which have not received funding (Cordova et al. 2015; Mollock 2014; Experiment.com 2018).

5 Activities Carried Out and Results

5.1 Activities Carried Out

To gather the data necessary to develop this report, we undertook desk research to enable an initial accumulation of information about specific projects. We then contacted those responsible for projects to check that the information gathered was accurate. A snowball sampling approach was used to identify specific citizen science projects. The information was then sense-checked with experts in the field to ascertain as diverse a selection of projects, and thereby business and funding models, as possible. The activities carried out thus formed an iterative cycle of gathering information, sense checking, asking for further recommendations of projects and adding to the project summaries presented in Appendix 1.

The results from this research are presented below. Through a comparison of 35 different types of citizen science and DIY science projects, we focused on the following criteria: the individual or organisation running the project, how the project was funded, the length of time the project has been running, and also the scale of the project's operation (see table 5.1). This last criterion includes the geographical scale, funding scale and the scale of operation of the project. From these comparisons, we developed five broad archetypes of business models in citizen science: Motivated individual, Small Crowdsourcing (SCS); Outreach (Outreach); Research and Innovation (R&I); and Long Term NGO (LT NGO). It is important to note that these are not straightforward archetypes, and owing to the unique nature of the formation and aims of each project considered in this report, this typology is by no means straightforward. We suggest the key characteristics of each archetype below. However, some aspects of the projects might arguably fit within a different archetype. In this sense, the typology represents an experiment in attempting to articulate the different types of business models in citizen science. As stated above, the classification is also an attempt to remain value neutral and 'science discipline agnostic'. There are a wide variety of business models and funding mechanisms in citizen science and this report is an attempt to describe these different mechanisms.

In order to see if such archetypes are useful, it is necessary to consider how much we can learn from a project that operates in a specific discipline or activity area, and then to examine other areas or projects that might be equivalent. For example, can we learn from the many projects that are linked to birdwatching, whilst taking into account the potential "popular topic" aspects that facilitate them? The following table 5.1 lists all 35 projects examined in this report and assigns them an archetype business model, as specified above.

No.	Project	Run by	How funded	Length of project	Scale of operation	Archetype
1.	Crowdfunding air quality monitoring	NGO	Crowdfunded	One-off	Small scale	**SCS**
2.	Science and city - Barbican air quality	NGO	Charity grant	Year-long	Small scale	**SCS**
3.	BTO Garden Birdwatch	NGO	Crowdfunded	Multi-year	National	**LT NGO**
4.	RSPB Big Garden Birdwatch	NGO	Subscription & crowdfunded	Multi-year	National	**LT NGO**

5.	UK Glow Worm Survey	Ad-hoc	Self-funded	Multi-year	National	**Motivated Individual**
6.	Fungal Records Database	NGO	Membership fee	Multi-year	National	**LT NGO**
7.	Hackuarium	NGO	Subscription & crowdfunded	Ongoing but with specific goal	Small scale (site specific)	**SCS**
8.	Computing for clean water	University	University & private company	Specific task	Medium scale	**R&I project**
9.	City Nature Challenge 2018 Bioblitz	NGO	Museum/ Charity funded	Specific task	Small scale	**Outreach**
10.	Slavery From Space	University	University funded	Specific task	Small scale	**R&I project**
11.	Massively Multiplayer Online Science - Project Discovery in EVE Online	Private Company	EU funded	Multi-year	Large scale	**R&I project**
12.	Stall Catchers	Non-profit research institute	Grant from non-profit foundation.	Game of open-ended duration	Medium scale	**R&I project**
13.	Citizen Crane	Charity partnership	Commercial body	Multi-year	Small scale	**LT NGO**
14.	Great Twin Pond Dig	PhD Student and academic	Ad hoc	Ongoing	Small scale	**Motivated Individual**
15.	Engaging Kayamandi Youth	PhD student	Crowdfunding	Specific task	Small scale	**SCS**
16.	Open Lab Net Citizen Projects	Research Institute	Flash-grant funding	Specific tasks for one year	Small scale	**SCS**
17.	YES! – Young Economic Summit	Research infrastructure provider, library and charitable foundation	Charitable foundation	Multi-year	Medium scale	**SCS**
18.	Riverfly Partnership	NGO	Government funding	Multi-year	Medium scale	**LT NGO**
19.	Hero Coli	PhD student	PhD grant	Ongoing	Small scale	**R&I project**
20.	Galaxy Zoo	Non-profit partnership of astronomers	Multiple sources including small grants & grants from charitable foundations.	Multi-year	Medium	**Outreach/ R&I**
21.	Widenoise/ Every Aware	University	EU Funded	Short term	Large scale	**R&I project**
22.	Parenting Science Gang	Charitable partnership	Ad hoc	Specific tasks	Medium scale	**Motivated Individual**
23.	Public Lab	Non-profit	Multiple sources including small grants & grants from charitable foundations	Multiple tasks	Large scale	**LT NGO/ Outreach**
24.	Hush City App	Academic researcher	Academic and grant funding	Ongoing	Large scale	**R&I project**

25.	iNaturalist	LLC (private/for profit entity).	LLC (private/for profit entity) partly owned by non-profit and for profit investors.	Ongoing	Large scale	**LT NGO**
26.	Bighorn Basin	Non-profit Institute	Crowdfunding	Multi-year	Medium - Big scale	**R&I project**
27.	COCoast	Collaboration of Marine Biology organisations	Heritage Lottery Funding	One-off with intention of creating ongoing communities	Large scale	**Outreach/ R&I project**
28.	Big Bumblebee Discovery	Partnership of ecologists	Charity Partnership	Short term	Medium	**Outreach**
29.	UK Ladybird Survey	Collaboration of ecologists	Self-funded	Multi-year	Small scale	**Motivated Individual**
30.	CoCoRaHS: Rain, Hail, Snow Network	Non-profit, community-based network of volunteers	University funding, as well as some state funding and funding from other foundations, and participant contributions.	Ongoing	Medium to large scale	**LT NGO/ Government**
31.	LiquenCity	Local community	Local funding agency	Ongoing	Small scale	**SCS**
32.	Project Soothe	University	University funding	One-off	Big scale	**R&I project**
33.	Fix My Street	Charity	Local Authority payments	Ongoing	Big scale	**LT NGO/ Government**
34.	Citizen Science to Cure Social Conflict	Local group	Crowdfunding	Ongoing	Small Scale	**SCS**
35.	Varieties of Elitism	Local group	None	Ongoing	Small Scale	**SCS**

Table 5.1 Review of citizen science projects categorised according to archetype business model

5.1.1 Archetypes of Business Models

Motivated Individual:

Many projects are the result of a commitment of a researcher (either at a university or outside), with a strong interest and adherence to the topic in question. These are projects which are largely driven by motivated individuals, and would not necessarily have come about without the impetus and motivations of that individual, or small group of individuals. Importantly, these individuals continue to drive and run the project, frequently without resources or by investing personal time and effort. These are commonly small-scale projects, often with little to no funding, apart from funding that the leaders of the project secure through their entrepreneurial activities inside their organisation, or the environment within which they operate. For example, a small group of like-minded individuals can be interested in a specific species and dedicate personal resources such as free time, travel costs, and so on, in the pursuit of observations. If they operate within a university, they might develop undergraduate and postgraduate projects or teaching activities that progress their project.

Examples for such projects are: the UK Glow Worm Survey (5); UK Ladybird Survey (29); Adopt A Pond (14); Parenting Science Gang (22).

(Image by Carl Sayer)

Great Twin Pond Dig (14)

Funded by the British Ecological Society, the Great Twin Pond Dig is a project that is co-run by two motivated individuals, an academic researcher and a PhD student. The project aims to engage local people with their local farmland ponds, pond species and with pond conservation and restoration – in the photo above, members of the citizen science team are measuring pond alkalinity in the field. The Great Twin Pond Dig is only part of the wider, largely unfunded Norfolk Ponds Project, a project engaging with many local residents in Norfolk, who get involved in numerous different ways. The Norfolk Ponds Project aims to reverse the decline of Norfolk's ponds so that agricultural landscapes contain a mosaic of clean water ponds with fewer ponds overgrown by trees and bushes. The project aims to achieve this by seven key areas of activity: providing advice to landowners on how best to restore and manage farmland ponds; establishing a fund that can be used to support practical pond restoration including the re-excavation of "Ghost Ponds", ponds lost to agricultural land reclamation; encouraging and supporting the creation of new ponds; integrating ponds into other conservation projects in Norfolk; promoting the conservation of key pond species, in particular threatened and culturally important species such as great crested newt, crucian carp, water vole and plants such as stoneworts and pondweeds; educating the public and landowners on the value of ponds in farmland through site visits and open days; and establishing community pond restoration projects that re-connect landowners and people with Norfolk's ponds.

Small Crowd Sourcing (SCS):

A key characteristic of these types of projects is that they are task specific, or one-off, though in some instances the intention is that the communities generated around such projects will be ongoing. These projects tend to be funded through a crowdsourcing model, or a small amount of funding from different resources. They are of a limited scale in time and place, but many of them hold the potential for replication and expansion.

Examples for such projects are: Crowdfunding air quality monitoring (1); Science and city - Barbican air quality (2); Hackuarium (7); Engaging Kayamandi Youth (15); Open Lab Net Citizen Projects (16); YES! – Young Economic Summit (17); LiquenCity (31); Citizen Science to Cure Social Conflict (34); Varieties of Elitism (35).

Engaging Kayamandi Youth (15)

This project is a clear example of a small-scale crowdsourcing project, whose primary goal was to engage around 40 young people in undertaking citizen science. Cape Citizen Science is a project that engages the public in research about plant disease in South Africa. Youth from Kayamandi, enrolled in the Vision Afrika program run by Cape Citizen Science, indicated that they would like to participate in the project, but could not afford to travel to natural areas to do the research. Through participation in the crowdfunding platform, Experiment.com, Cape Citizen Science was able to secure crowd funding to provide these learners with an opportunity to become microbe hunters, by covering the costs for a day of learning and sampling at a nearby nature reserve. The project is an example of a small scale, one off crowdsourced approach to funding a small citizen science project.

Outreach:

Projects in this archetype tend to be primarily concerned with outreach and engaging participants on as broad a scale as possible. Importantly, outreach might mean that the organisers of the activity are doing it in order to encourage people to learn and engage with an issue, as well as being involved in a scientific project and creating information that can be used for research and monitoring. Other outreach projects are aimed at reaching out to audiences that usually do not engage with science. The extent of funding of such projects might vary considerably, but the scale of operation tends to be larger than other citizen science projects.

Examples for such projects are: City Nature Challenge 2018 Bioblitz (9); Big Bumblebee Discovery (28); Galaxy Zoo (20); CoCoast (27). RSPB Big Garden Birdwatch (4) can also be associated with this category.
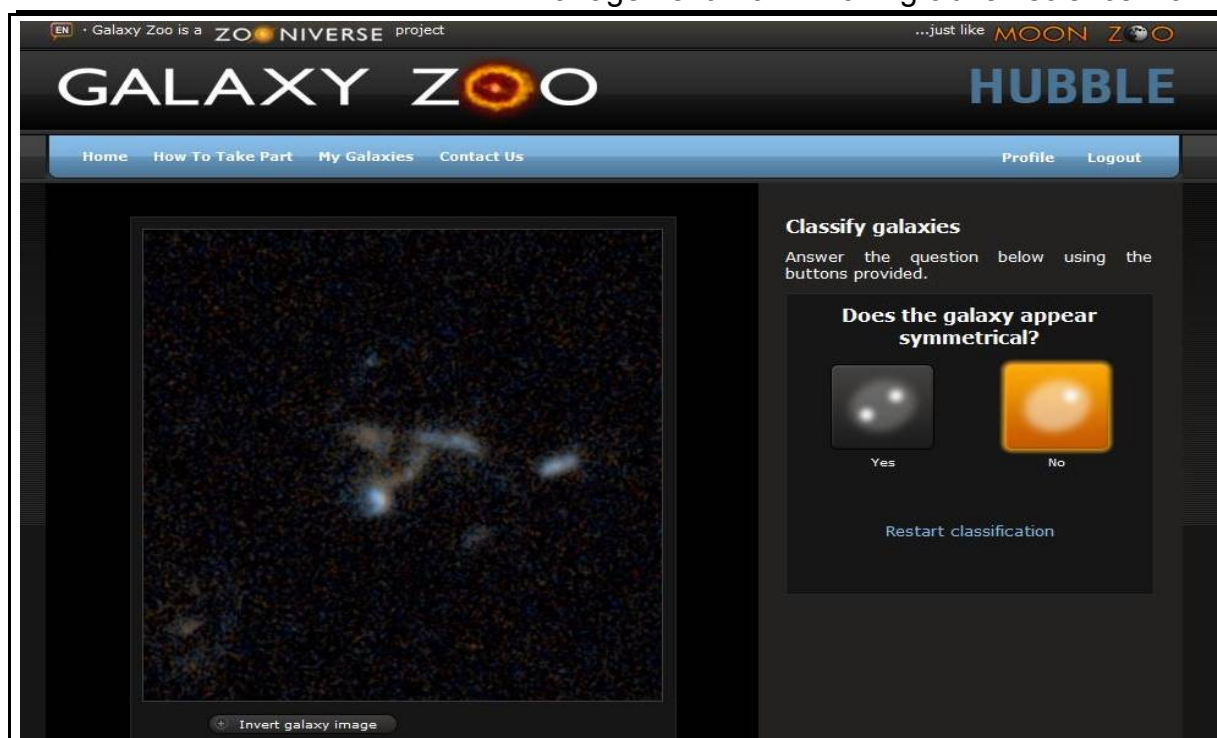
(Image by Gwydion M. William)

Galaxy Zoo (20)

The Galaxy Zoo project is an interesting example of a project that does not fully conform to either the archetype Outreach business model, nor the archetype Research and Innovation (University) business model. Galaxy Zoo is a project run by a consortium of university-based researchers who use their research time to build, develop and run the project as well as to make use of the results. It was originally built by volunteers, and then supported by a small grant from Microsoft Research. No other specific funding has been received by the project, which makes use of the freely available Zooniverse platform. PhD students working with Galaxy Zoo data have been supported by STFC in the UK, NSF in the US and the Swiss research agencies.

Research and Innovation (R&I) project:

A Research and Innovation project takes its name from the classification in the Horizon 2020 framework. These projects, like most others of our cases, are aimed at creating new scientific or technical knowledge, and a key characteristic of this type of project is that it is run by a university or consortium of organisations including a university. These are potentially large scale, well-funded projects. Yet, they are time limited - from a few months to five years, and while they are operating within the tradition framework of innovation management, in the case of citizen science, they require different support and development beyond the end of the funding.

Examples for such projects are: EveryAware (21); Project Soothe (32); Hush City App (24); Computing for clean water (8); Slavery From Space (10); Eve Online (11); Stall Catchers (12); Hero Coli (19); Galaxy Zoo (20); Bighorn Basin (26).
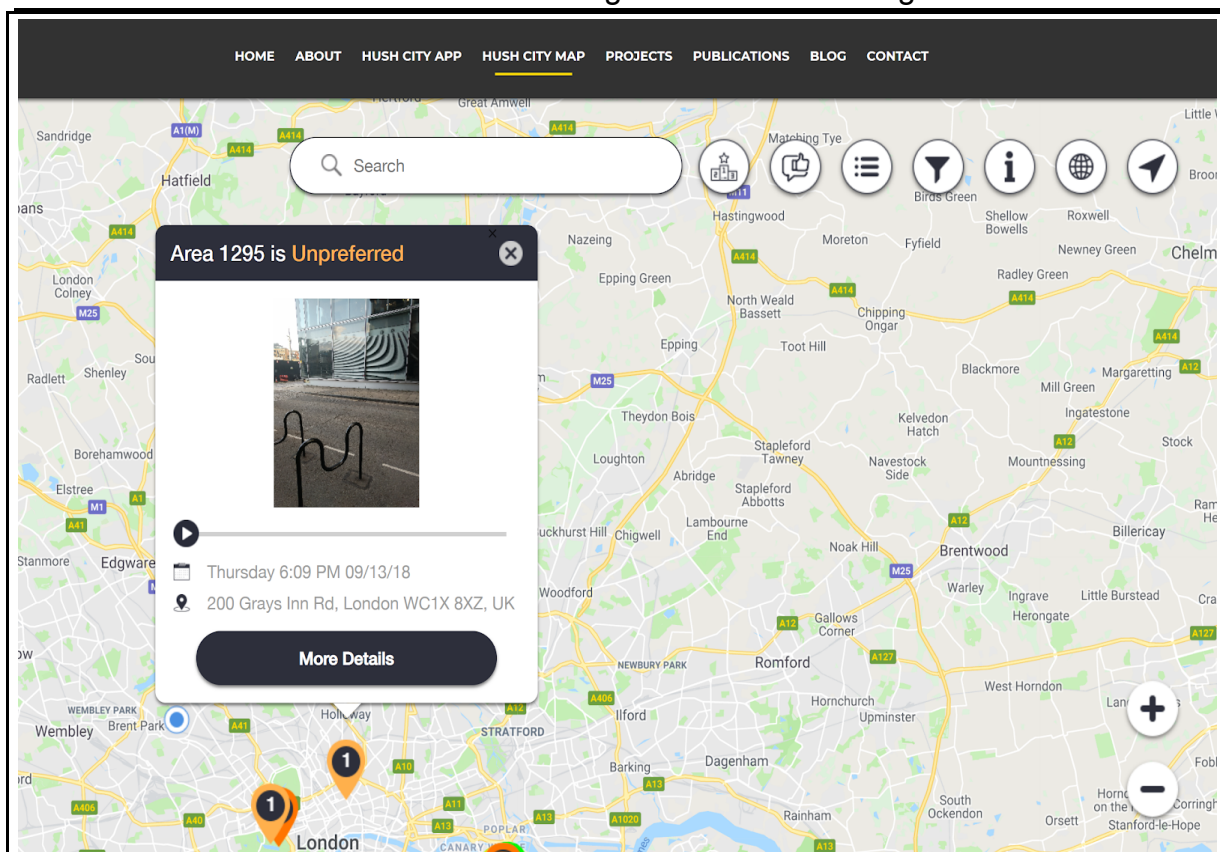
(Image from Hush City website)

Hush City App (24)

Hush City App is a free mobile application, which runs on both iOS and Android operating systems, and constitutes the key aspect of a global ongoing project to identify and map the "everyday quiet areas" in cities. The first version of Hush City app was developed within the framework of the "Beyond the Noise: Open Source Soundscapes" project, which validated a novel mixed methodology to identify, assess and plan such quiet spaces, by implementing the soundscape approach, the citizen science paradigm and open source technology. The second version of the Hush City app was developed in the framework of the project: "Hush City Mobile Lab" (2018-2020). The Hush City mobile app was derived from the concept of the HUSH EXPO app envisioned by Dr Antonella Radicchi for the EXPO Milan 2015. The HUSH EXPO mobile app's user interface was designed by Antonella Radicchi in collaboration with Roberto Lombardo. The project: "Beyond the Noise: Open Source Soundscapes" received funding from the IPODI-Marie Curie Fellowship – People Program (Marie Curie Actions) of the European Union's Seventh Framework Program (FP7/2007-2013) under REA grant agreement no. 600209 (TU Berlin/IPODI). The project: "Hush City Mobile Lab" received funding from the HEAD-Genuit Foundation.

Bighorn Basin Project (26)

The Bighorn Basin Paleontological Institute's public summer field expeditions provide people of almost any age, background, and interest level with an opportunity to work alongside, and as, field palaeontologists. Participants pay to be part of, and contribute to, long term research projects to collect and study ancient organisms and ecosystems in the Bighorn Basin. Participants are professionally trained on site to find, identify, collect, excavate, document and prepare fossils. The project relies on crowdfunding via the Experiment platform: https://experiment.com/ The project is run by the Bighorn Basin Paleontological Institute (BBPI), a non-profit 501(c)(3) organisation dedicated to palaeontology and earth science research and education. The project constitutes a core part of the BBPI's mission to collaboratively study, actively preserve, and dynamically interpret the paleontological treasures of the Bighorn Basin and the surrounding region, as well as to promote palaeontology and the natural sciences to life-long learners, wherever they may be.

Long Term Non-Governmental Organisation (LT NGO):

These projects tend to be quite well established, and have been in existence for over five years, and in some cases, many decades. A key characteristic is that they are run by an NGO whose predominant focus and mission is very well aligned with the project - for example, promoting the collection and sharing of information about Fungi in the UK. Since these projects are more long term, they may have experimented with different funding sources, before arriving at their current funding source.

Examples for such projects are: Garden Birdwatch (3); RSPB Big Garden Birdwatch (4); Fungal Records Database (6); Citizen Crane (13); Riverfly Partnership (18); iNaturalist (25). Projects (30) and (33) are **Long Term Government supported/driven** projects so are slightly different.

(Image by Muki Haklay)

Public Lab (23)

The Public Laboratory for Open Technology and Science (Public Lab) is a community - supported by a 501(c)3 non-profit - which develops and applies open-source tools to environmental exploration and investigation. By democratizing inexpensive and accessible Do-It-Yourself techniques, Public Lab creates a collaborative network of practitioners who actively re-imagine the human relationship with the environment. The core Public Lab program is focused on "civic science" in which they research open source hardware and software tools and methods to generate knowledge and share data about community environmental health. Their goal is to increase the ability of underserved communities to identify, redress, remediate, and create awareness and accountability around environmental concerns. Public Lab achieves this by providing online and offline training, education and support, and by focusing on locally relevant outcomes that emphasize human capacity and understanding.

Public Lab is a particularly interesting example in terms of its business model. It operates under the auspices of a Long Term NGO in terms of its methodology. However, in many ways it can be seen to be primarily focussed on outreach, since as an organisation it aims to democratise science to address environmental issues that affect people. The Public Lab non-profit supports specific projects in four topic

areas: Open Air, Open Water, Open Land and Civic Kits, to enable community collaboration in many different ways, including collaborating in building hardware and software, but also sharing expertise, and collaborating around specific locations. In each of these topic areas, the Public Lab community is increasing public access to open source data collection tools and techniques, sharing best practices for advocacy, and building networks across the globe.

BTO Garden BirdWatch (3)

BTO Garden BirdWatch was launched in autumn 1994 in readiness for recording to begin in January 1995. The idea for the project came out of discussions between Chris Mead and Nigel Clark, of the BTO, and Chris Whittles of CJ Wild Bird Foods. Earlier attempts to monitor those bird species using gardens, such as the BTO Garden Bird Enquiry, had always encountered the problem of funding the scheme for more than just a couple of years. What was needed was long-term funding. This problem was solved by making what was regarded at the time as a very brave decision - namely to ask participants in the scheme to make an annual contribution to its running costs. The project coordinators admit that it was with some trepidation that they first asked their supporters to take part in the project and make a contribution to its costs. However, impressively they had 5,028 participants by the end of the first year of recording. Since then, the project has gone from strength to strength, growing in size and publishing an increasing number of scientific papers, reports and articles. Over the period during which the project has been running, there has also been growth in the resources and level of technology used to manage the project. Initially, Garden BirdWatch was coordinated on a part-time basis by two individuals, both of whom were involved in other BTO work. The current team is supported by volunteers who come into the office to help with a wide variety of tasks including mailings and the post received.

5.2 Results

In order to reflect on the modus operandi of the 35 projects listed above, we compared the five archetypes with the different funding sources that projects described themselves as having. The types of funding are understood to be the following:

None / Self / Ad Hoc: projects that are in receipt of no funding, or are self-funded by those running them, or have received small amounts of ad hoc, one-off funding.

Crowdsourced: projects that have undertaken a concerted crowdsourcing campaign, often via a specific platform designed for crowdsourcing, such as, for example, Experiment.com

Membership: funding generated by membership subscription fees.

HLF/Charity/Grant: grant funding coming from larger-scale funding bodies, such as the Heritage Lottery Fund (HLF) or charities.

Wellcome / University / 2020: funding coming from large scale organisations such as the Wellcome Trust charitable foundation, Universities or the Horizon 2020 EU funding call.

Government: funding coming from specific government funded schemes or initiatives, or from government departments.

Private: funding coming from private companies or the commercial sector more broadly.

The comparison between funding types and archetype business models is shown in Figure 5.1 below, where the orange cells denote that our project examples for that particular archetype have that particular funding source. From this figure it is possible to observe the broad ways in which the citizen science projects examined in this report operate and function, i.e. how the archetypes relate to different modes of funding.

	None / Self / Ad Hoc	Crowdsourced	Membership	HLF / Charity / Grant	Wellcome / University / #2020	Government	Private
Motivated Individual	■						
SCS	■	■	■			■	
Outreach			■	■	■		
R&I		■	■	■	■	■	■
LT NGO		■	■	■	■	■	■

Figure 5.1 Modus operandi of citizen science projects (how archetype models relate to modes of funding)

It is worth mentioning a project called Project Splatter here, as an example of a self-funded R&I project. Project Splatter is a citizen science research project at Cardiff University that collates UK wildlife roadkill data reported by members of the public. Whilst Project Splatter does not feature as one of our 35 projects listed above, owing to not having further details on the project, it is an interesting example of a project that was largely set up and driven by a motivated individual, but would be classified as a self-funded R&I project because the project coordinator is attached to Cardiff University. Project Splatter is therefore an exception to the rule in terms of Figure 5.1.

5.3 Analysis

The projects as listed above have been qualitatively mapped onto an axis of geographical scale (y axis) and length of time (temporality) of a project (x axis). The following images make visible the clustering of different citizen science projects based on the criteria listed in table 5.1 above. Firstly, we mapped the 35 projects by scale of operation as shown in Figure 5.2.
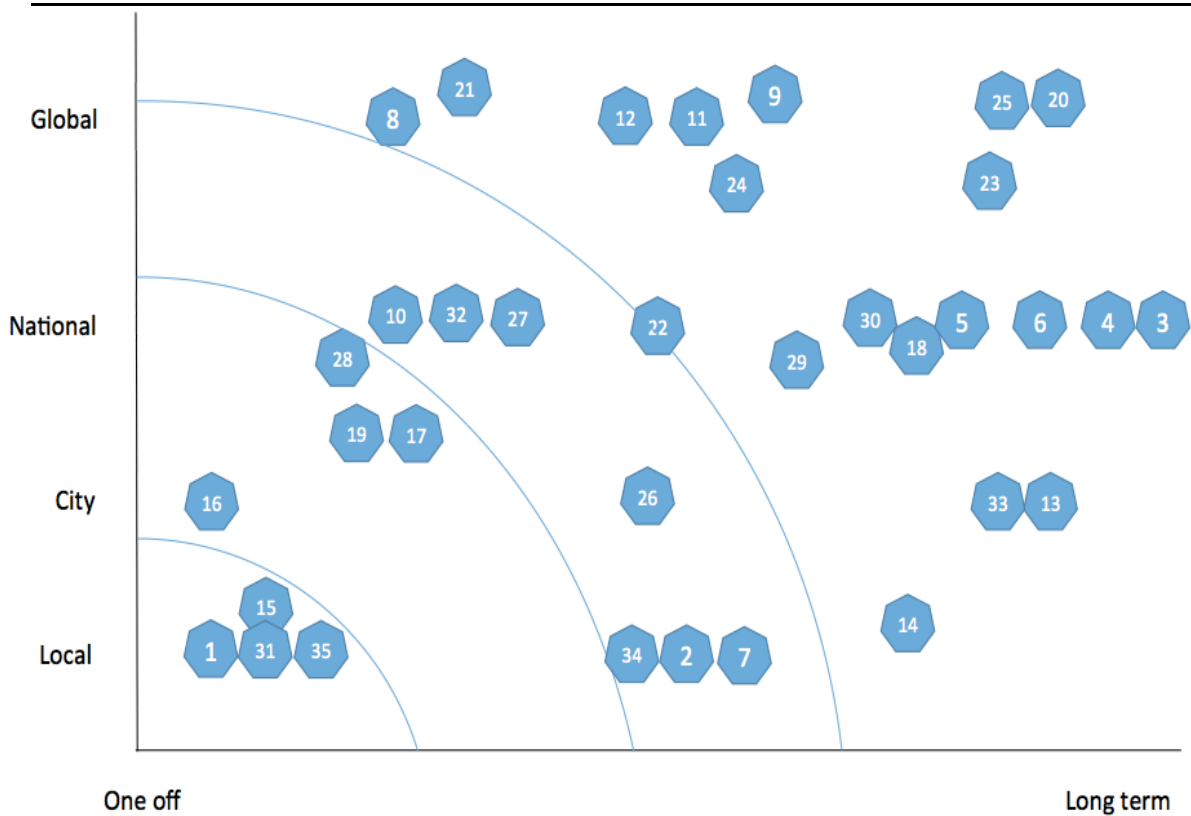
Figure 5.2 Initial project mapping

We then proceeded to add to this initial project mapping (Figure 5.2) by mapping out the assigned archetypes of business models onto each project as illustrated in figure 5.3 below.
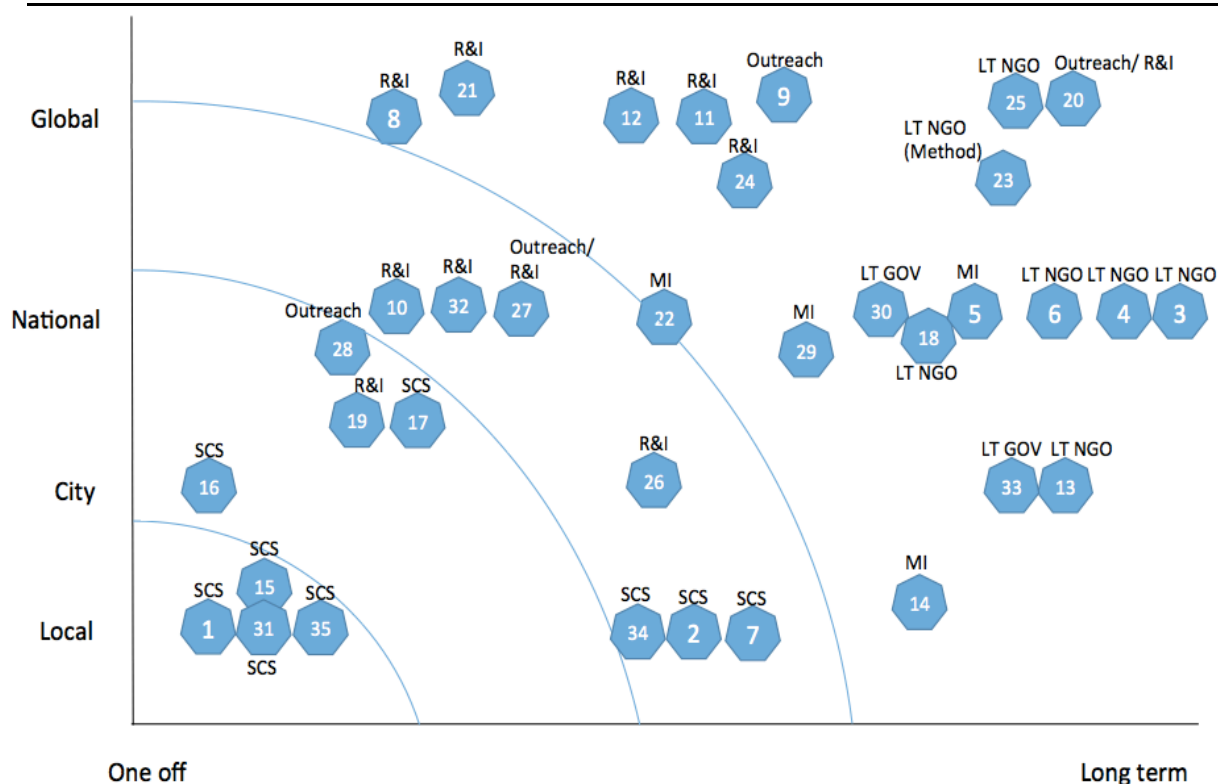
Figure 5.3 Project Mapping by assigned archetype business model

From Figure 5.3 above it is possible to observe potential clusters of projects where those with similar archetype business models appear to be situated in close proximity. For example, the small scale crowdsourcing projects can predominantly be found at the bottom of the figure, with one cluster in the bottom left corner, that are mainly local, one-off projects; and another cluster further towards the bottom middle of the figure, that are potentially better established projects that happen each year, but still on a local geographical scale. There is another visible cluster of R&I projects, some operating a national scale and some operating at a global scale and more long term. Furthermore, there appears to be a cluster of LT NGO projects that are, as the title of the archetype suggests, operating on a long term basis, and at a national scale. Perhaps unsurprisingly, it is possible to observe that all of the Outreach projects appear to operate at a national scale or above. There is no obvious clustering of the projects run by Motivated Individuals, although all those projects assigned that archetype appear to be ongoing, or towards the longer term timeframe.
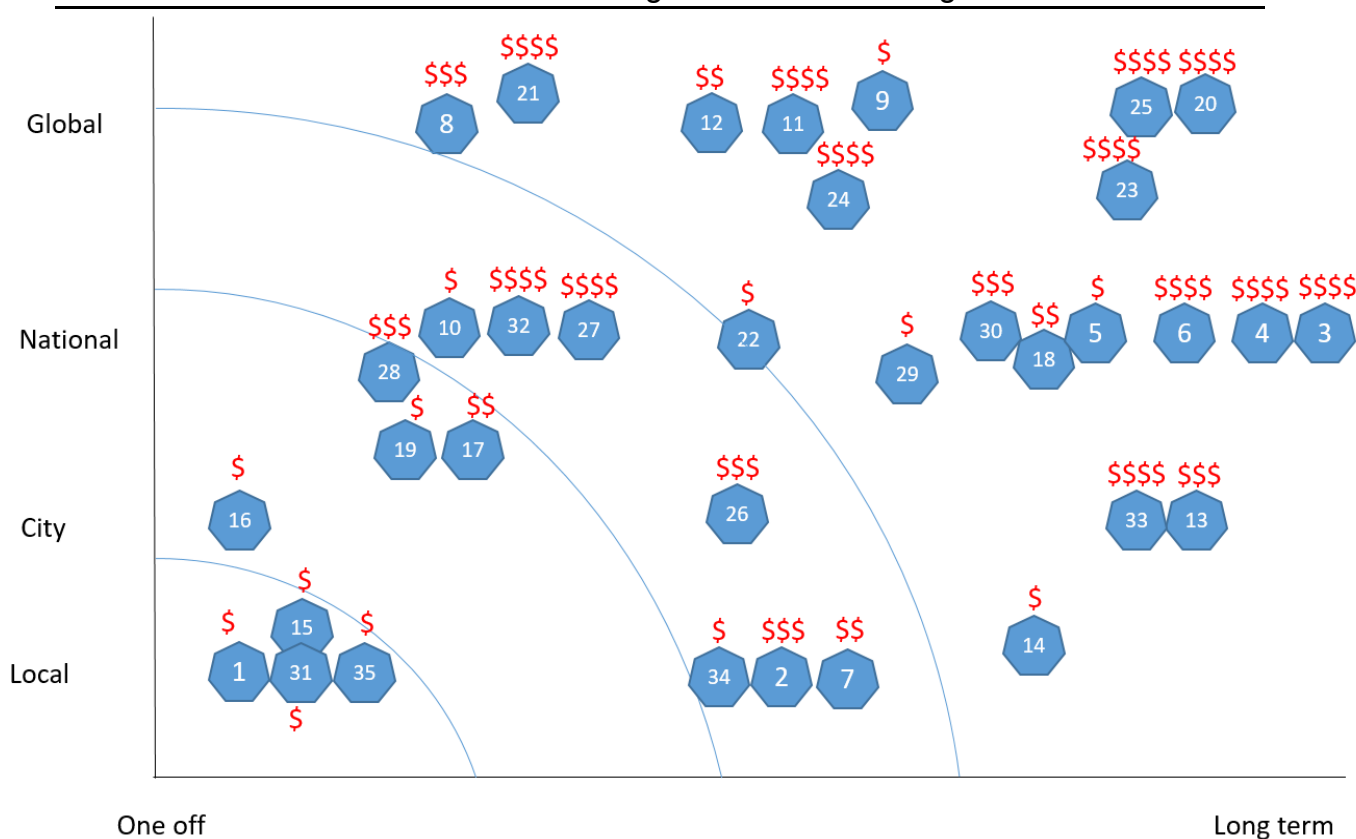
Figure 5.4 Project Mapping by scale of funding

When the funding scale was mapped onto the projects, as demonstrated in Figure 5.4, another form of clustering can be observed. As to be expected, there is a cluster of those projects with little to no funding, or ad hoc funding, in the bottom left, operating at a local level and on more of a one-off basis. However, it is also possible to observe a relatively diverse spread of projects with little to no funding, or ad hoc funding, operating both at a larger geographical scale (National or indeed Global) and on a longer terms basis.
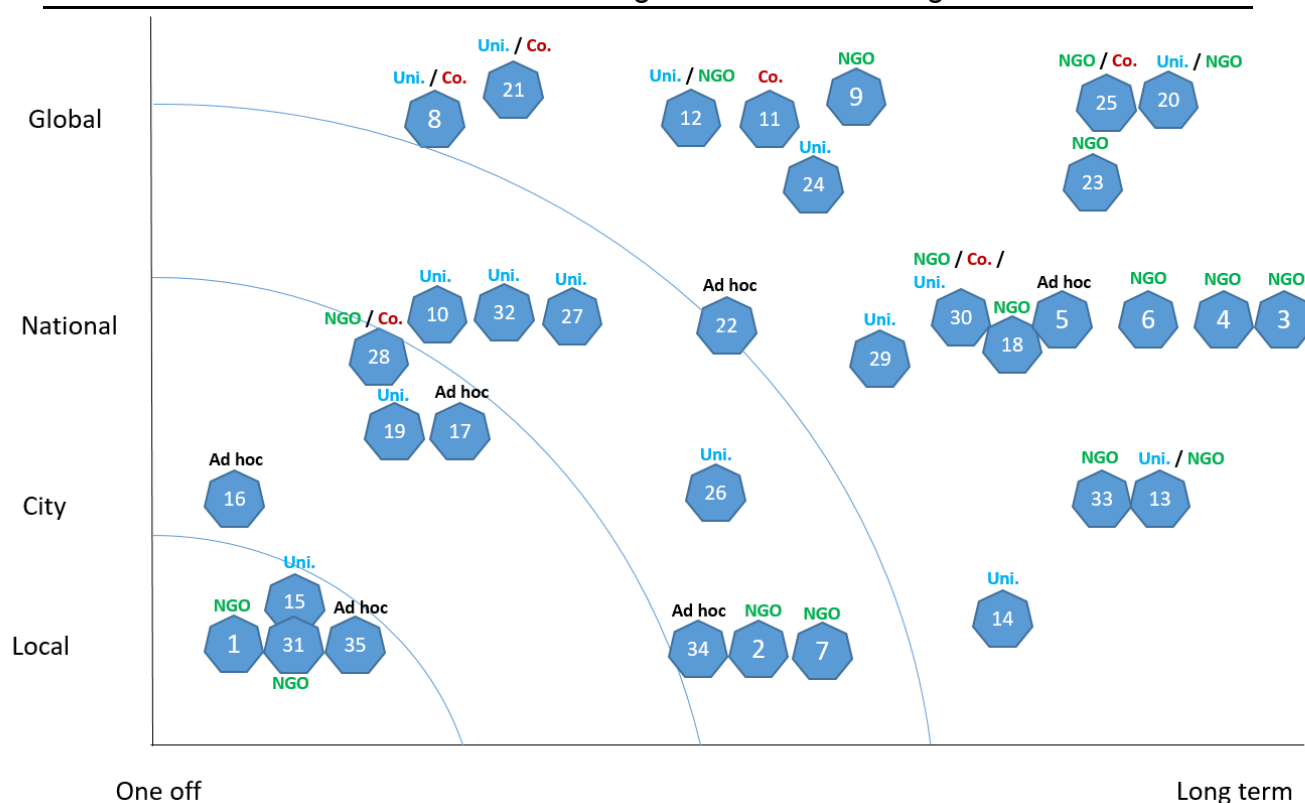
Figure 5.5 Project Mapping by organisation structure

Figure 5.5 sets out the projects with the organisation structure of the organisations that run them mapped onto them. This is interesting as it demonstrates that the long term projects that operate on a global scale tend to be run by NGOs. Furthermore, it is possible to observe a band of projects operating at a national to global scale, but for a middling amount of time, that are run by universities.

When mapping whether the projects were predominantly online or offline, or both, as shown in Figure 5.6 below, no immediately obvious clusters are apparent. However, it is worth noting that the question of IT infrastructure is an important one for citizen science projects, particularly in terms of, for example, creating and maintaining online membership portals, and also visualising the data collected in a project. Such aspects of IT infrastructure are particularly critical in terms of the scaling up of a project, either spatially, or temporally, or both, and further risk ultimately sinking many projects. IT infrastructure requires resources and intellectual capital (often technical) potentially outside of the capabilities of most institutions (unless such resources can be leveraged from a bigger institution). This is a particular area that requires further research and a deeper understanding of the role of IT infrastructure in innovation management in citizen science.
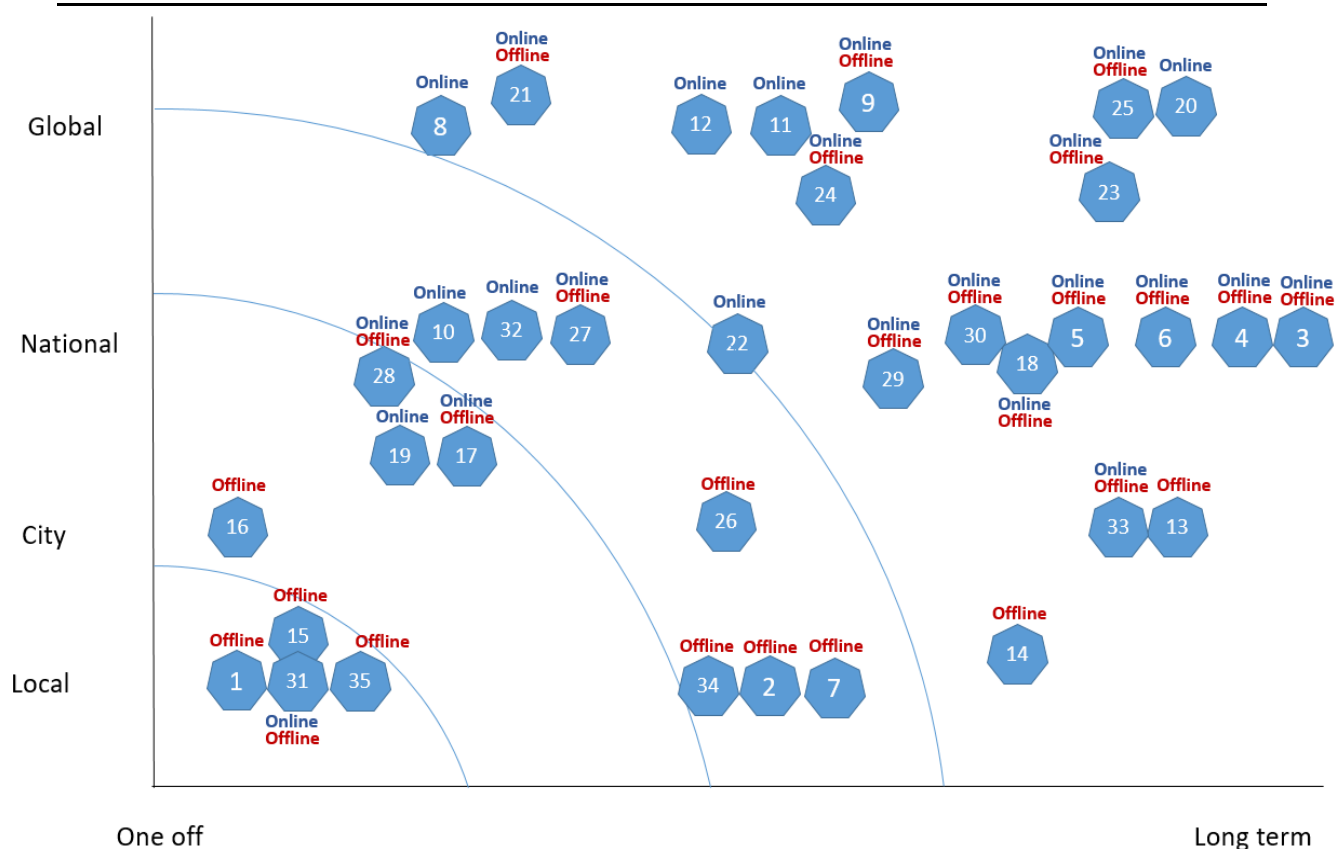
Figure 5.6 Project Mapping by online/offline activity

The preliminary analysis of these case studies raises interesting examples: the British Trust of Ornithology Garden Bird Watch is based on a sustainable funding model that emerged from the volunteers, who pay for participation through a membership subscription that is moderate - less than £20. Moreover, the statements from the BTO show that the number of paying participants (11,000) is bigger than the number of people who submit results (about 6,000). In effect, there are people who see their participation in the project through paying the membership fee, and not through the submission of results. This crowdsourcing model seems to work well and it balances the number of people that need to be reached in order to secure the funding, in comparison to handling the results and checking them.

However, wider observations emerge from the analysis of the clustering, funding, and the type of organisations. First, we can see concentration of types of organisations and funding at different areas in the landscape. While SCS are more local, and while Motivated Individual projects can also lead national projects, they have a lot in common. These projects represent significant volunteering time investment and effort by the organiser. In addition to the cases that we covered here in details, we should also point to Fraser Shilling's (UC Davis) Roadkill project, or Sarah Perkins' Project Splatter (as mentioned above), both monitoring animals that are reported dead on roads and using this information for ecological analysis. This mode of operation is often found with academics or researchers who can utilise the resources, such as maintaining the database, website etc., inside the organisation in order to progress their project. When such a project operates outside of an organisation, these resources have to be found externally. In the UK, local environmental records centres - which are partnership organisations established to bring together local information on wildlife, and to supply this to local users - and the national Biological Record Centre (BRC), provide such support to enable the

uploading of records to an online repository, and the sharing of the results from such projects. It is possible to observe a lack of funding and support mechanisms that can assist projects such as those categorised as Motivated Individual or SCS with increasing their scale and reach.

In addition to these issues, we need to point to the difficulties and challenges of crowdfunding. For popular topics, crowdfunding might manage to get the level of interest and contribution that will make the project possible. For other topics, and even within the context of a popular topic, we need to remember that most (at least two-third) of crowdfunding campaigns fail to achieve their goals. There is a significant upfront effort that is required to make crowdfunding a viable option (production of a promotional video, securing initial backers who will contribute in the first day and so on). This can be a notable hurdle for the use of this method, although crowdfunding can also occur through people contributing a small amount of money during a workshop and other similar forms. These aspects create the first observable "death valley" in terms of scaling up and sustaining projects that are in the Motivated Individual and SCS categories, and helping them to grow and expand.

At the next level, it is particularly noteworthy that R&I projects, despite their relative initial investment, do not show longevity and replication. For example, despite an effort in FP7 and Horizon 2020 to establish citizen observatories or some of the Collective Awareness Platforms that were geared towards citizen science did not yield sustainable outputs. We can therefore identify a second location of a "death valley" in the transition from R&I project into long term activities.

With longer term projects, the most successful model is the LT NGO, in which the project is aligned with the goals and objectives of the NGO running the project, and the NGO is also maintaining the knowledge of, and interest in, the project. Within this archetype, we see projects that can run for ten years or more, with membership fees that support the coordination of the project, and data management. The difference with universities and research institutions might be in the ability to sustain the focus on the mission, and the interest in the issue. The former operate on cycles of three (or sometimes five) year projects. Once such projects are completed, the researchers are expected to come up with the next innovation or research idea, instead of incrementally building on what was developed in the previous project. As a result, universities and research institutions appear to be suitable for running citizen science projects with clear goals, and for a specific temporal period, and less so for running long term projects. They are also suitable to develop a technology (e.g. an app) but without a long term maintenance and commitment - as the case of iNaturalist demonstrates. This is not dissimilar to the general role of these institutions in the innovation landscape, where they are expected to carry out early stage development and then commercialise it through mechanisms such as setting up companies. However, since citizen science has a symbiotic relationship with cutting edge research (e.g. the academic papers that are emerging from Zooniverse) it might be attractive to consider the project as part of research infrastructure and maintain them internally - we would suggest that this can be problematic.

6 Conclusions

In this preliminary analysis of the innovation landscape of citizen science and DIY science, we examined 35 projects across various geographical and temporal scales. The analysis only scratches the surface and there is a need for a more detailed study, in which the specificities of different citizen science and DIY science projects are explored in more detail. This includes giving consideration to the history of the project's funding sources and how these might have changed over time, the actions of projects owners and the costs of other resources such as IT infrastructure, materials, and a physical office space where appropriate. This will enable a richer understanding of the innovation paths of such projects. What is clear is that the landscape of citizen science, while similar to the social innovation landscape, is more complex and requires special attention. As a result, the instruments and approaches that are appropriate for this field need to be developed and adapted, while taking into account the unique characteristics of citizen science. At this point in time, the landscape includes islands of activities with multiple discontinuities - there are insufficient mechanisms and processes to encourage the growth of projects that are started by individual or groups to grow and expand, or clear guidance on how to turn a successful research project into a sustainable activity. The clustering of specific operational models (e.g. LT NGO) are an indication that we can find commonality, and that this landscape can be understood, and therefore supported.

6.1 Recommendations

We therefore offer the following, tentative, recommendations:

Citizen science could learn and adopt approaches from the field of social innovation and use them, but needs to take into account the unique characteristics of these projects such as the need to release the data under open science principles.

In the long term, we should aim to provide the infrastructure for innovation management in citizen science. Parts of this infrastructure are starting to emerge (e.g. Scassa and Chung 2015 analysis of Intellectual Property Rights) but there is a long way to go, and therefore this will require dedicated attention from funders.

In the current innovation landscape, NGOs seem to be the most capable of running long term projects, with membership being the most sustainable model. This should be taken into account when developing citizen science projects that are expected to last over a long time.

For universities and research institutions, it is recommended that they team up with NGOs with a mission that is closely aligned with the research area of the citizen science project as a potential legacy partner for their R&I project.

There is a specifically challenging situation for Motivated Individual and SCS projects, where there is currently plenty of innovation and evidence of entrepreneurship (sometimes inside an organisation). These efforts should be supported and enhanced, and mechanisms gained from social innovation might be effective here.

Research funders and policy makers should be especially aware that innovation in the area of citizen science and DIY science requires attention and support, as the field is only emerging and needs research, experimentation, and funding support.

Specific attention, and further research, should be given to those projects which have successfully transitioned from one archetype model to another and the

enabling factors, so as to better understand how best to provide support for such transitions to longer term and more stabilized models and funding sources.

6.2 Limitations and What Next

There are also many aspects that are not covered in this analysis - for example understanding the costs and models of funding of the Information and Communication Technology (ICT) which are a necessary part of citizen science projects, and if the project has chosen a bespoke ICT solution (e.g. an app), this can lead to a significant cost increases to deliver a project. Further attention should be given to the ICT infrastructure of citizen science projects and its role in business models.

In addition, since we are looking at the operational models, and are not trying to quantify the contribution of time by volunteers, even when this includes the project organisers themselves (in the case of the Motivated Individual and SCS projects), we are not attempting to evaluate the full value or benefits of the whole project. As noted, this is analysed in other projects and reports.

It is worth noting that this study is a preliminary sweep of the landscape and was only able to analyse 35 cases. These cases can be used as a basis for a bigger sample which can assist in understanding the concentration of funding and organisational structures, and therefore provide better guidance to future innovation management. The future direction of this work could include an examination of the typology and categories of citizen science business models with a bigger group of researchers, and the use of analytical techniques such as Qualitative Comparative Analysis to identify success factors.

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8 Appendices

8.1 Appendix 1

The following is a more detailed list of the summary reviews of each project featured in the report, informed by the desk-based research and consultation with experts in the field of science, namely project organisers.

1. Crowdfunding air quality monitoring

Type of business model	Run by NGO, crowdfunded, one-off, small scale - campaign, offline.
Project website	https://www.crowdfunder.co.uk/community-air-pollution-monitoring
Country/City of operation	London
Online/Offline	Offline (with recording of location online)
Field of Science	Environmental science
Purpose of project	Crowdfunding air quality monitoring
Description of main project activity	Raising funding to provide communities with 10 NO_2 diffusion tubes (indicative of traffic air pollution) that they can install in an area of interest to them, at the same time as their local authority. At the end of the data collection period, the tubes are collected, and sent to the lab for analysis. Participants are also assisted in entering in the results on a community map to visualise them.
Length of time of project	One month monitoring effort (early 2016)
Number of participants	6 groups in different areas of London
Number of submissions	About 60 data points
Funding source	Crowdfunding and match donation
Cost of IT infrastructure	Community maps for air quality - about £500, running as part of the operations of the organisation generally.
Cost of materials	Diffusion tubes - about £50 per each case
Cost of human resources (%FTE)	5 hours of effort for each community installation, in addition another 10 hours for organising meetings, liaising with the lab and setting the community map.
Other costs eg promotion, communications etc	20 hours of preparing the campaign and promoting it
Scale of funding	£3000 - £1445 through crowdfunding and addition £1445 match funding
Organisation running project	Mapping for Change
Organisation website	http://mappingforchange.org.uk
Organisation structure	Social Enterprise (CIC)
Organisation	2009

established	
Relationship of project to organisation's core business	Part of a range of projects using diffusion tubes and community mapping that the organisation carried out.
Source of information	Project organiser

2. Science and city - Barbican air quality

Type of business model	Run by NGO, charity grant, year-long, small scale, offline.
Project website	http://mappingforchange.org.uk/2015/03/barbican-citizen-science-documentary/
Country/City of operation	London
Online/Offline	Offline (with recording of location online)
Field of Science	Environmental science
Purpose of project	Engaging communities in air quality monitoring
Description of main project activity	Providing residents of the Barbican and the nearby area with NO_2 diffusion tubes (indicative of traffic air pollution) and other equipment that they can install in places in the estate at the same time as their local authority, at the end of the period collecting the tubes, sending them to the lab and helping the participants to enter the results on a community map to visualise them.
Length of time of project	One year 2013-2014
Number of participants	About 20 participants with further 50 in community meetings, surveys etc.
Funding source	Local authority (Mayor Air Quality fund)
Cost of IT infrastructure	Community maps for air quality - about £500, running as part of the operations of the organisation generally
Cost of materials	Diffusion tubes - about £50 per each case
Cost of human resources (%FTE)	10 hours each month - in total about 120 hours on the project, and additional 50 for reporting, coordination etc.
Other costs eg promotion, communications etc	30 hours of preparing a video documentary
Scale of funding	Small to medium (about £25K)
Organisation running project	Mapping for Change
Organisation website	http://mappingforchange.org.uk
Organisation structure	Social Enterprise (CIC)
Organisation established	2009

Relationship of project to organisation's core business	Part of a range of projects using diffusion tubes and community mapping that the organisation carried out.
Source of information	Project organiser

3. Garden BirdWatch

Type of business model	Run by NGO, crowdfunded, multi-year, national scale, online.
Project website	https://www.bto.org/volunteer-surveys/gbw
Country/City of operation	UK - Thetford, Norfolk
Online/Offline	Online and offline
Field of Science	Ornithology/Ecology
Purpose of project	To monitor bird usage of gardens in UK throughout the year
Description of main project activity	Garden BirdWatch monitors the changing fortunes of birds and other garden wildlife through its network of 'citizen scientists'. Observations collected by BTO Garden Bird Watchers are analysed by BTO researchers and published in leading journals. Garden BirdWatch gathers information in a way that makes it possible to measure relative change in the use that birds make of gardens. This approach is similar to that used in many other long-running BTO surveys and it is particularly suited to large-scale projects covering a wider range of different species at many different recording sites.
Length of time of the project	It takes place over three days at the end of January each year.
Number of participants	15000 - Last year (2017) 6,651 participants
Number of submissions	In 2017 there were 272,063 submissions in Britain and Ireland (excluding the Channel Islands)
Funding source	Membership subscriptions and donations - £17 annual membership. Options for finding the money to run the project are limited to 1) Government funding, 2) commercial sponsorship, 3) money given to the BTO by its supporters. Government funding has been targeted towards other habitats and high profile species of conservations concern, so is not available for Garden BirdWatch. BTO received some support through commercial sponsorship in the past (but not enough to cover all the running costs) and sponsorship tends to be short-term, while the key to long-term monitoring is long-term financial support. BTO is a charity and does not run Garden BirdWatch to make a profit. The annual subscription is kept as low as possible.
Cost of IT infrastructure	Participants can also submit data online. This is managed within the wider BTO IT infrastructure.
Cost of materials	The type of information gathered can be either readily coded on forms that can be automatically decoded by a scanning machine or entered using interactive web applications online. Currently, the relative proportions of participants submitting returns on paper and online are similar. Both are equally acceptable, though the web system allows users to submit greater detail and also view previous observations, no matter how submitted.
Cost of human resources (%FTE)	Coordinated from the BTO headquarters by a team of five, helped by other staff, regional ambassadors and, at busy times of year, by other volunteers.
Scale of funding	about £150,000-190,000
Organisation running project	British Trust of Ornithology (BTO)

Organisation website	https://www.bto.org
Organisation structure	Independent charitable research institute
Organisation established	1932
Relationship of project to organisation's core business	An important part of the BTO's remit.
Source of information	Website / Online documentation

4. RSPB Big Garden Birdwatch

Type of business model	Run by NGO, subscription and crowdfunded, multi-year, national scale, online.
Project website	https://www.rspb.org.uk/get-involved/activities/birdwatch/
Country/City of operation	UK wide
Online/Offline	Observation offline, and data recording online
Field of Science	Ornithology/Ecology
Purpose of project	To engage with a mass audience on the subject of garden birds; to raise interest in birds with an audience not always reached by normal conservation engagement, to highlight conservation concerns for such species (e.g. House Sparrow), and to encourage positive responses such as wildlife-friendly gardening and further monitoring activities.
Description of main project activity	The Big Garden Birdwatch takes place at the end of January each year. It takes place over three days each year. Big Garden Birdwatch allows the RSPB to monitor trends and understand how birds are doing. As the format of the survey has stayed the same, the scientific data can be compared year-on-year, making the results very valuable to scientists. The RSPB are able to create a 'snapshot' of bird numbers across the UK. The results also help them to spot problems, but more importantly, they are also the first step in putting things right.
Length of time of project	One hour at the end of January every year
Number of participants	420,000-500,000
Funding source	Charity internal funding
Cost of IT infrastructure	Dedicated website, cloud capacity to collect information during the BGBW weekend
Cost of materials	Forms and posting
Other costs eg promotion, communications etc	National media, web, face-to-face promotion and collaborations with partners (e.g. supermarkets). RSPB members are engaged through members' magazine. Data can be submitted by paper form (distributed in newspapers and magazines) or online (currently 75% of all submissions received) (Roy 2012 report).
Scale of funding	Large scale
Organisation running project	Royal Society for the Protection of Birds

Organisation website	https://www.rspb.org.uk/
Organisation structure	Non-statutory body incorporated by Royal Charter
Organisation established	1904 (with BGBW starting in 1979)
Relationship of project to organisation's core business	Increasing awareness of birds, engaging young audience
Source of information	Website/Online documentation

5. UK Glow Worm Survey

Type of business model	Ad-hoc, self-funded, multi-year, national scale, offline.
Project website	https://www.glowworms.org.uk
Country/City of operation	UK Wide with links to rest of EU
Online/Offline	Observation offline, and data recording both offline and online
Field of Science	Environmental Science
Purpose of project	To gather information about an insect that most people don't even realise exists in Britain.
Description of main project activity	The survey is run by Robin Scagell, and has no official status, funding or affiliation. Information comes mostly from members of the public who see glow worms and want to know more about them. Participants are asked to send in their observations of glow worms, to help to chart the existing numbers and geographical distribution for future reference. An accurate grid reference to the site is helpful to the project, and online maps make it a simple matter to find it. The data is stored on the iRecord system set up by the Biological Records Centre, so data will be held permanently for future use. Though records can be viewed by anyone who registers with the site, it is possible to 'blur' the accuracy to which anyone can view a location, to avoid anyone identifying homes. Participants can either fill in the online form or send an email.
Length of time of the project	The UK glow worm survey began in 1990.
Number of participants	346,637 visits to the survey since 2005
Funding source	No funding. There are no costs associated with the glow-worm survey. It would be self-funded. In the past, when things had to be sent out in the post, Robin just accepted the costs himself. Until 2017 he used a biological recording system called MapMate, which cost around £30 to purchase and with a support fee of about £15 a year, again funded by Robin. Robin runs Google ads on the website, which brings in a tiny amount of funds so the final cost to Robin is pocket money. Since 2017 the report form and database have been provided by the Biological Records Centre, at no cost - it's part of the nationwide iRecord system.
Cost of IT infrastructure	Moving to outsourcing it on BRC
Cost of materials	N/A
Scale of funding	None
Organisation	The survey is run by Robin Scagell, and has no official status, funding or

running project	affiliation.
Organisation website	https://www.glowworms.org.uk/
Organisation structure	N/A
Organisation established	1990
Relationship of project to organisation's core business	N/A
Source of information	Project organiser

6. The Fungal Records Database of Britain and Ireland

Type of business model	Run by membership NGO, membership fee, multi-year, national scale
Project website	http://www.frdbi.info/
Country/City of operation	Great Britain and Ireland
Online/Offline	Observation offline, and data recording online
Field of Science	Ecology
Purpose of project	To emphasise the crucial importance of fungi to life on this planet, by promoting and learning about the world of fungi. It has member sections devoted to particular aspects of the fungal world including cutting edge research into many aspects of fungal science, the conservation and recording of fungal fruit bodies and the provision of educational resources for use at all ages and experience.
Description of main project activity	The FRDBI has features that allows for participants to interact with the records in enhanced ways. Records can be entered either by using the entry forms, or via Local Recording Groups. Local Fungus Recording Groups now exist in many parts of the country helping to put mushrooms on the map in the UK. They are run on a voluntary basis by enthusiasts seeking to share their knowledge of wild fungi and improve identification skills. The network is loosely coordinated by the Network coordinator who passes on appropriate items of news and happenings, arranges a biennial weekend meeting for group leaders and coordinates the affiliation and BMS public liability insurance scheme. The Fungus Records Database of Britain and Ireland is a working database, in constant upgrade and improvement. Quality of data with regard to the presence of a species in any particular locality varies from 'high' where the record is based on material of known provenance to 'low' where a record is based on, for example, an unvouched field observation. The degree of editing of the primary record varies from an initial check to ensure that the name of the species is spelt correctly through to examination of a voucher specimen to re-assess the original identification. Appropriate specialists must be consulted whenever there is any doubt about the presence or absence of a species in any particular locality. Records are made available 'as is' with no implied fitness for purpose. The records on this FRDBI website are made available under a Creative Commons BY-NC-SA Attribution - Non-commercial - Share Alike licence.
Length of time of the project	Since 2006

Number of submissions	1,085,625 records
Funding source	Donations and legacies, charitable activities and investments of the British Mycological Society
Cost of IT infrastructure	Most of the records of fungal fruiting observed by members or groups of the Society in Britain and Ireland have been added to the Fungal Records Database of Britain and Ireland (FRDBI). Records added after 2016 can be found at www.frdbi.info whereas older records are still available at www.fieldmycology.net prior to transfer to the new site. The database is hosted by the National Biodiversity Network.
Scale of funding	Large scale (£233,470 in 2016)
Organisation running project	British Mycological Society
Organisation website	http://www.britmycolsoc.org.uk/
Organisation structure	Registered charity
Organisation established	1896
Relationship of project to organisation's core business	Core
Source of information	Website/Online documentation

7. Hackuarium

Type of business model	Run by a membership non-profit, crowdsourced funding, ongoing but with a goal, site specific and online community
Project website	http://www.hackuarium.ch/en/
Country/City of operation	Renens, Switzerland
Online/Offline	Offline
Field of Science	DIY Bio
Purpose of project	To bring biology (and biologists) to the world, and the real world back to biology. The laboratory is an excuse to meet and discuss, build and develop ideas in a neutral, open, non-competitive and not-for-profit environment. The goal of Hackuarium is to democratise research for all.
Description of main project activity	Hackuarium is open to anyone sharing the values of the association and who is dedicated to follow the DIYbio Europe ethical guidelines. Hackuarium's projects are initiated and carried out by scientists and non-scientists from a variety of backgrounds. They are passionate about tinkering with biology in particular, and technology in general. Some are engineers, architects, designers, IT and computer scientists or retired professionals, but others have no scientific education. They are mostly citizens interested in open and participatory research and innovation, outside the constraints of traditional institutions. Hackuarium members want to investigate new ways of carrying out interdisciplinary research and innovation, by making their results accessible (low-cost), simple and easily reproducible (low-tech) and by promoting an open-source philosophy.

Length of time of the project	Since 2014. The projects are mainly short term and task specific.
Number of participants	40 paying members, and a large following on social media.
Funding source	Crowdfunding and membership subscriptions. Hackuarium had a sponsor for the first 4 years, but is now moving on and hoping to develop a sustainable business model.
Cost of IT infrastructure	The cost of much IT infrastructure (wifi connection etc) was previously provided by the old sponsor, the Foundation Inartis, but member fees have always paid for the domain name, etc, and members have done the coding in general.
Cost of materials	Equipment is mostly upcycled material from institutions and industries from western Switzerland.
Scale of funding	Small scale
Organisation running the project	Hackuarium
Organisation website	http://www.hackuarium.ch/en/
Organisation structure	Not for profit
Organisation established	2014
Relationship of project to organisation's core business	The project is part of the organisation's aim to investigate new ways of carrying out interdisciplinary research and innovation, by making the results accessible (low-cost), simple and easily reproducible (low-tech) and by promoting an open source philosophy.
Source of information	Website/Online documentation and Project organiser

8. Computing for clean water

Type of business model	Run by university and company, global, specific task, online
Project website	https://www.worldcommunitygrid.org/research/c4cw/overview.do
Country/City of operation	Geneva/ Beijing
Online/Offline	Online
Field of Science	Nanotech/environment
Purpose of project	The mission of Computing for Clean Water is to provide deeper insight on the molecular scale into the origins of the efficient flow of water through a novel class of filter materials. This insight will in turn guide future development of low-cost and more efficient water filters.
Description of main project activity	A project to develop and run a volunteer computing model to analyse nano-tubes ability to filter water, carried out by the citizen cyberscience centre. Given the very large computing requirements for pursuing this research, which far outstrip the capabilities of the in-house cluster available to the Tsinghua team, World Community Grid and volunteers provide access to far more computing power than researchers could otherwise afford. The result of this project will not only allow the researchers to test the predictions of Navier, thus contributing to fundamental knowledge about hydrodynamics on the nanoscale, but should also provide insight in how to further optimize fluid flow

	through carbon nanotube membranes and other forms of nanoscale membranes. Researchers led by the Center for Nano and Micro Mechanics at Tsinghua University in Beijing performed vast simulations using the donated, surplus processing power of IBM's World Community Grid, which harnesses three million linked computers from more than 700,000 "citizen scientist" volunteers worldwide. The nearly 100 million calculations performed by IBM's virtual, crowdsourced supercomputer for the Computing For Clean Water project would have cost USD $15 million had they been performed commercially, and would have taken more than 37,000 years had they been performed on a single-processor PC. Instead, the work was completed at no cost to scientists and in a fraction of the time.
Length of time of the project	Since 2010
Number of participants	World Community Grid and the 150,000 volunteers
Number of submissions	N/A
Funding source	This work was a result of a global collaboration between researchers from China, Switzerland, Israel, the United Kingdom and Australia.
Cost of IT infrastructure	None because of using the World Community Grid.
Scale of funding	Medium to Large
Organisation running the project	This work was a result of a global collaboration between researchers from China, Switzerland, Israel, the United Kingdom and Australia. A team of international researchers led by scientists at Tsinghua University, Beijing. World Community Grid is a philanthropic initiative of IBM Corporate Citizenship, the corporate social responsibility and philanthropy division of IBM.
Organisation website	http://cnmm.tsinghua.edu.cn/en/#!/
Organisation structure	Universities + IBM
Organisation established	World Community Grid was established in 2004
Relationship of the project to the organisation's core business	World Community Grid is a philanthropic initiative of IBM Corporate Citizenship, the corporate social responsibility and philanthropy division of IBM. Through Corporate Citizenship, IBM donates its technology and talent to address some of the world's most pressing social and environmental issues.
Source of information	Website/Online documentation

9. City Nature Challenge 2018 Bioblitz

Type of business model	Museum (charity NGO), small scale funding, specific task
Project website	http://citynaturechallenge.org/
Country/City of operation	International
Online/Offline	Observation offline, and data recording online
Field of Science	Ecology

Purpose of project	The City Nature Challenge is an international effort for people to find and document plants and wildlife in cities across the globe. The mission is to record as much wildlife as possible over the course of 4 days per year.
Description of main project activity	Invented by citizen science staff at the Natural History Museum of Los Angeles County (Lila Higgins) and California Academy of Sciences (Alison Young). The City Nature Challenge is an international effort for people to find and document plants and wildlife in cities across the globe. It's a bioblitz-style competition where cities are in a contest against each other to see who can make the most observations of nature, who can find the most species, and who can engage the most people.
Length of time of the project	4 days per year, every year with 65 competing cities across 5 Continents. In 2017, it included several cities in the USA, and in 2016 it was only 2 cities in the USA. The project grows every year.
Number of participants	In 2018 17,000 people participated.
Number of submissions	In 2018 over 441,000 observations, finding 8,600 species, and documenting 599 rare / endangered / threatened species.
Funding source	Natural History Museum, Los Angeles County, and California Academy of Sciences.
Cost of IT infrastructure	The project encourages participants to use the iNaturalist app to upload and share their observations.
Cost of materials	A smartphone or tablet device is needed to access the iNaturalist device.
Scale of funding	Small scale
Organisation running the project	Natural History Museum, Los Angeles County and California Academy of Sciences
Organisation website	https://nhm.org/site/ https://www.calacademy.org/
Organisation structure	NHM is a museum and research centre. CAS is scientific educational institution and a world-class aquarium, planetarium, and natural history museum.
Organisation established	NHM was opened to the public on November 6, 1913. CAS was established in 1853.
Relationship of project to organisation's core business	Not core
Source of information	Website/Online documentation

10. Slavery from Space

Type of business model	Run by university, small scale funding, specific task, online
Project website	https://www.zooniverse.org/projects/ezzjcw/slavery-from-space
Country/City of operation	Currently India.
Online/Offline	Online
Field of Science	Humanitarian
Purpose of project	Slavery from Space is a University of Nottingham's Rights Lab project that analyses satellite images to identify signs of human activity associated with slavery with distinctive aerial signatures, e.g. brick kilns, to help monitor

	progress towards UN Sustainable Development Goal 8.7. Information can then be passed onto local non-governmental organisations (NGOs) and government officials to support lobbying and action on the ground, and also help policy makers reach more educated, evidence-based decisions. As well as improving our understanding of modern slavery, it is hoped that crowdsourcing will engage the online community and raise awareness of modern slavery.
Description of main project activity	Volunteers tag georeferenced satellite images for the presence or absence of specific features, for investigation on the ground
Length of time of project	There are multiple projects but the first project started in 2017.
Number of participants	106 volunteers
Number of submissions	13,109 classifications
Funding source	The Rights Lab is a Beacon of Excellence at the University of Nottingham.
Cost of IT infrastructure	The project has publicly collaborated with DigitalGlobe, both to feed data into a Zooniverse project (https://www.zooniverse.org/projects/ezzjcw/slavery-from-space-punjab) and two Tomnod campaigns (https://www.tomnod.com/campaign/campaign_2341/ and https://www.tomnod.com/campaign/campaign_2389/).
Cost of materials	The project invested in a collaboration with DigitalGlobe. Technical support came with this and data has been accessed directly from DigitalGlobe's servers.
Scale of funding	Small scale.
Organisation running the project	The Rights Lab is a wider initiative by the university to put an end to slavery around the world.
Organisation website	https://www.nottingham.ac.uk/world/beacons/rights-lab/
Organisation structure	Cross-faculty University Beacon of Excellence.
Organisation established	2017
Relationship of project to organisation's core business	The project is one of many projects undertaken by The Right Lab.
Source of information	Project organiser

11. Massively Multiplayer Online Science - Project Discovery in EVE Online

Type of business model	Run by private company, EU Funded, medium scale, multi-year.
Project website	http://mmos.ch/ https://www.eveonline.com/discovery/
Country/City of operation	Switzerland/Monthey Iceland/Reykjavik Sweden/Stockholm
Online/Offline	Online
Field of Science	Exoplanet research / Proteomics

Purpose of project	Finding new exoplanets in the CoRoT database Classifying subcellular protein locations in the Human Protein Atlas Subcellular Atlas
Description of main project activity	Exoplanets: making transit events on light curves from the CoRoT mission (tools: zoom, pan, detrending, phase folding) and classifying stellar activity Proteins: selecting one or more reference locations where a certain protein is expressed in the cell
Length of time of project	Project Discovery Exoplanets: 2017.07.11 - Project Discovery Proteins: 2016.03.08 - 2017.07.05
Number of participants	Project Discovery Exoplanets: - players: ~250k Project Discovery Proteins: - players: ~320k
Number of submissions	Project Discovery Exoplanets: - classifications: ~170 mill Project Discovery Proteins: - classifications: ~33 mill
Funding source	Founders' investment EU H2020 GAPARS grant University of Geneva projects Service contract
Scale of funding	Large scale
Organisation running the project	MMOS Sarl CCP hf.
Organisation website	http://mmos.ch/ https://www.ccpgames.com/
Source of information	Project organiser

12. Stall Catchers by EyesOnALZ

Type of business model	Run by a non-profit research institute, funded by a grant from BrightFocus Foundation. Moving towards a funding model where researchers pay for the data analysis.
Project website	https://stallcatchers.com
Country/City of operation	USA / International
Online/Offline	Online
Field of Science	Biomedical
Purpose of project	EyesOnALZ is a citizen science project aiming to find effective Alzheimer's treatment targets in just a few years with the help of the crowd. The project crowdsources Alzheimer's disease research data from Cornell University via Stall Catchers - an online citizen science game.
Description of main project activity	Stall Catchers is an online game that anyone can play - no experience necessary. In the game, you look at movies from the brains of mice and try to identify vessels as flowing or stalled. This helps to speed up Alzheimer's disease research at Cornell University. To test hypotheses related to Alzheimer's disease and stalls, there's still lots of data to be analysed. But since data analysis is so time-consuming, and no computer algorithm can do this job as well as humans for now, it could take decades to find treatment targets. With the help of citizen scientists in Stall Catchers, the project is attempting to do the same in just a couple of years.
Length of time of the project	The EyesOnALZ project began on February 19, 2014 and Stall Catchers was launched October 1, 2016. The project duration is open ended.
Number of participants	As of October 2018, Stall Catchers has over 13,000 players

Number of submissions	3.4 million annotations as of Oct. 31, 2018
Funding source	The project began Feb. 19, 2014 and was funded Jan. 1, 2016 by the BrightFocus Foundation, a non-profit organisation that supports research and provides public education on brain and eye diseases. EyesOnALZ includes collaborators from the Schaffer-Nishimura Lab at Cornell University, stardust@home team at U.C. Berkeley and SciStarter.com. Previous collaborators include Sebastian Seung's Laboratory at Princeton University, WiredDifferently and others.
Cost of IT infrastructure	Infrastructure costs have varied over the project's life but are on the order of magnitude of $1000/month and growing as the project scales, though the project has received donated infrastructure support from various organisations, which helps offset some of these costs.
Scale of funding	Medium
Organisation running project	Human Computation Institute
Organisation website	hcinst.org
Organisation structure	Non-profit corporation - geographically distributed team
Organisation established	2014
Relationship of project to organisation's core business	Project involves the design and development of a collective intelligence system and the advancement of both AI and human computation research in support of high impact societal benefits.
Source of information	Project organiser

13. Citizen Crane

Type of business model	Run by partnership coordinated by a charity, funded by commercial body, multi-year, city scale
Project website	http://www.cranevalley.org.uk/projects/citizen-crane.html
Country/City of operation	West London, UK
Online/Offline	Offline
Field of Science	Ecology
Purpose of project	Citizen Crane is a citizen science project designed to investigate the key causes of water pollution in the River Crane in west London and to identify, support and optimise measures to improve the river condition.
Description of main project activity	The "Citizen Crane" project is the Crane catchment area's citizen science project, monitoring chemical and biological water quality. The Citizen Crane project is developing from recording and assessing the condition of the river ecosystem to actively engaging to deliver improvements.
Length of time of the project	The project started with a feasibility study in 2013 and the main data collection exercise commenced in April 2014.
Number of participants	For data collection alone, more than 1200 hours of volunteer time has been logged by the end of year 3. This equates to over 160 working days. It should be noted that volunteering involvement with Citizen Crane stretches beyond data collection and the total figure for volunteer hours will be much higher.
Funding source	Thames Water has committed funds to support the Citizen Crane project from May 2017 up to April 2020. £30,000 has been received by the Citizen Crane

	project team to continue with project coordination and delivery monitoring and reporting activities in Year 4, 5 and 6. Thames Water has also committed to use of resources at their UKAS accredited lab for a corresponding period of time. The use of Thames Water lab for water analysis is valued at over £2,000 per annum. Accredited lab results with appropriate collection and storage protocols give confidence to the data and support the use of Citizen Crane data in strategic decision-making. In addition, Thames Water are key members of the steering group and have been very supportive of the project. In total the budget for the project was circa £70,000.
Scale of funding	Medium scale (circa £70,000)
Organisation running the project	Crane Valley Partnership
Organisation website	http://www.cranevalley.org.uk/index.html
Organisation structure	The Crane Valley Partnership (CVP) is a collaboration between charities, community groups, borough councils, private businesses & government agencies in the five boroughs that border the River Crane (London Boroughs of Harrow, Hillingdon, Ealing, Hounslow and Richmond-upon-Thames).
Organisation established	2014
Relationship of project to organisation's core business	One of multiple projects ran by the partnership.
Source of information	Website/Online documentation

14. Great Twin Pond Dig

Type of business model	Run by motivated individuals, voluntary basis (little to no funding, using MSc students time), small scale
Project website	https://www.geog.ucl.ac.uk/research/research-centres/pond-restoration-research/files/image001.jpg/view
Country/City of operation	Norfolk and Lancashire, UK
Online/Offline	Offline
Field of Science	Ecology
Purpose of project	To engage local people with their local farmland ponds, pond species and with pond conservation and restoration.

Description of main project activity	The Great Twin Pond Dig is only part of the wider, largely unfunded Norfolk Ponds Project The Norfolk Ponds Project aims to reverse the decline of Norfolk's ponds so that agricultural landscapes contain a mosaic of clean water ponds with fewer ponds overgrown by trees and bushes by: • Providing advice to landowners on how best to restore and manage farmland ponds • Establishing a fund that can be used to support practical pond restoration including the re-excavation of "Ghost Ponds", ponds lost to agricultural land reclamation • Encouraging and supporting the creation of new ponds • Integrating ponds into other conservation projects in Norfolk • Promoting the conservation of key pond species, in particular threatened and culturally important species such as great crested newt, crucian carp, water vole and plants such as stoneworts and pondweeds • Educating the public and landowners on the value of ponds in farmland through site visits and open days • Establishing community pond restoration projects that re-connect landowners and people with Norfolk's ponds
Length of time of the project	Since 2014
Funding source	The British Ecological Society
Scale of funding	Small scale (less that £2,000)
Organisation running project	Co-run by motivated individuals but within the wider Norfolk Ponds Project. In June 2014 Norfolk wildlife Trust, in partnership with University College London, Norfolk Rivers Trust, FWAG and the Norfolk Non-Native Species Initiative (NNNSI) set up the Norfolk Ponds Project
Organisation website	https://www.norfolkwildlifetrust.org.uk/wildlife-in-norfolk/habitat-explorer/ponds-and-pingos
Organisation structure	Partnership between university, and charitable trust and others.
Organisation established	2014
Relationship of project to organisation's core business	Core
Source of information	Website/Online documentation and project organisers

15. Engaging Kayamandi Youth

Type of business model	Run by PhD student, crowdfunding, specific tasks, small scale
Project website	https://experiment.com/projects/engage-kayamandi-youth-in-cape-citizen-science-with-vision-afrika?s=search
Country/City of operation	Cape Town, South Africa
Online/Offline	Offline
Field of Science	Biology
Purpose of project	The primary goal of this campaign was the engagement of ±40 learners in the scientific process. Cape Citizen Science is a project that engages the public in research about plant disease in South Africa. Youth from Kayamandi, enrolled in the Vision Afrika program, would like to participate in the project,

	but cannot afford to travel to natural areas. The aim of the project is to provide these learners with an opportunity to become microbe hunters by covering the costs for a day of learning and sampling at a nearby nature reserve.
Description of main project activity	Learners of Vision Afrika in Cape Citizen Science are involved in a sampling activity in an area of the Jonkershoek Nature Reserve. They will learn about the importance of biodiversity, the threats posed by invasive species, and microorganisms as the cause of disease, all while contributing to research and releasing their inner scientist. The success of this campaign demonstrates that there is public support for engaging disadvantaged youth in research and give these learners a chance to show the world that they can be scientists.
Length of time of the project	2015/2017
Number of participants	40
Funding source	Crowdfunding via the Experiment platform.
Other costs eg promotion, communications etc	Transport for participants $200. Costs for healthy lunch for participants $150. Cost of incentives for participants $50.
Scale of funding	Small scale ($626)
Organisation running project	Cape Citizen Science
Organisation website	http://citsci.co.za/
Organisation structure	PhD research project. Cape Citizen Science is a project that offers many opportunities to participate in scientific research.
Organisation established	2015
Relationship of project to organisation's core business	Core part of the project.
Source of information	Website/Online documentation

16. Open Lab Net Citizen Projects

Type of business model	Flash grant model of funding for small projects.
Project website	https://openlab-halle.de/openlab-net-make-science
Country/City of operation	Halle (Saale), Germany
Online/Offline	Offline
Field of Science	Open
Purpose of project	Open call for anybody to submit citizen science projects that are related to the region to receive small grants.
Description of main project activity	OpenLabNet - Make Science! is a Citizen Science project in Halle (Saale). Make Science! offers all those interested in science the opportunity to actively participate in research questions.
Length of time of the project	max. until end 2019

Funding source	The project is funded by the Federal Ministry of Education and Research (BMBF).
Scale of funding	Small Scale (Interested citizens can apply with their project and win up to € 7,500 per project).
Organisation running project	Open Lab Net Halle. OpenLabNet - Make-Science! is professionally guided by scientists from the Fraunhofer Institute IMWS Halle, the founders service of Martin Luther University Halle-Wittenberg and science2public- Gesellschaft für Wissenschaftskommunikation eV
Organisation website	https://openlab-halle.de/openlab-net-das-netzwerk
Organisation structure	Network for science culture in Halle (Saale). OpenLabNet unites partners from research, science, economy, education, technology, multimedia as well as art and design.
Organisation established	2016
Relationship of project to organisation's core business	One of multiple research projects
Source of information	Website/Online documentation

17. YES! – Young Economic Summit

Type of business model	Run by research infrastructure provider, library and charitable foundation, medium scale, multiyear.
Project website	https://www.young-economic-summit.org/en/
Country/City of operation	Germany
Online/Offline	Online and Offline
Field of Science	Economics, Social Sciences
Purpose of project	The YES! enables the youths to take an active part in finding solutions for national, European and global challenges.
Description of main project activity	The YES! – Young Economic Summit is the largest German school competition on economic, environmental and social challenges for teams of the grades 10 to 12. Students, in close cooperation with researchers of renowned economic research institutions, develop their own solutions for national. European and global challenges in the economy, society, politics and environment. They present their ideas at regional conferences and discuss them with experts from the fields of business, politics, academics, media and international institutions. The best solutions of each region – selected only by the participating students – compete at the national final in September to become the winning solution of the YES! – Young Economic Summit, and to be presented in the German Federal Ministry for Economic Affairs and Energy.
Length of time of the project	Since 2015
Number of participants	12 scientific partner institutions in 5 regions. More than 120 researchers have taken part in the YES! and more than 65 different challenges were introduced by the researchers to over 100 teachers and more than 1000 students worked on YES! Solutions. More than 100 international experts from politics, business, and civil society joint the discussions with the teams.
Number of submissions	>120

Funding source	The YES! – Young Economic Summit is a joint project of the ZBW – Leibniz Information Centre for Economics and the Joachim Herz Stiftung under the patronage of the Federal Ministry for Economic Affairs and Energy. The ZBW is the world's largest research infrastructure for economic literature, online as well as offline. The Joachim Herz Stiftung is a financially independent and politically neutral German foundation. It promotes education, science, and economic and scientific research, as well as the personal development of young people and young adults.
Scale of funding	Medium scale
Organisation running the project	The ZBW – Leibniz Information Centre for Economics and the Joachim Herz Stiftung under the patronage of the Federal Ministry for Economic Affairs and Energy.
Organisation website	https://www.zbw.eu/en/ https://www.joachim-herz-stiftung.de/en/
Organisation structure	National economics Library and research institute.
Organisation established	1919 and 2008 (respectively)
Relationship of project to organisation's core business	Not part of core business, and part of core business (respectively).
Source of information	Website/Online documentation and project organiser

18. The Riverfly Partnership

Type of business model	Multi-year, National Scale, NGO partnership
Project website	http://www.riverflies.org/contact-us-0
Country/City of operation	Cumbria (UK)
Online/Offline	Both
Field of Science	Ecology
Purpose of project	The Riverfly Partnership is an independent organisation operating through charitable status of the Freshwater Biological Association. It consists of a network of over 100 supporting organisations representing anglers, conservationists, entomologists, scientists, water course managers and relevant statutory bodies. The Riverfly Partnership is a dynamic network of organisations, representing anglers, conservationists, entomologists, scientists, water course managers and relevant authorities, working together to protect the water quality of our rivers; further the understanding of riverfly populations; and conserve riverfly habitats.

Description of main project activity	The project provides a forum for raising issues affecting riverflies and developing consensus and collaborative action, raising awareness of riverflies, and their importance to aquatic conservation and function, amongst the public and decision makers, involving people in monitoring and recording riverflies, offering leadership and disseminating expertise in the effective acquisition and interpretation of riverfly monitoring data, stimulating scientific research to answer key questions about issues affecting riverflies, improving the conservation status of riverfly species by securing healthy and sustainable populations, increasing and promoting knowledge about positive management techniques, seeking to form and influence debate of current issues. As well as increasing the availability of this information the Riverfly Partnership will address declines in riverfly populations, including declines in overall abundance and threats to individual species.
Length of time of the project	Since 2010
Number of participants	2400 active volunteers
Number of submissions	35 regional hubs and 1700 sites being monitored
Funding source	Freshwater Biological Association
Scale of funding	Small to Medium Scale
Organisation running the project	Freshwater Biological Association
Organisation website	http://www.fba.org.uk/
Organisation structure	Membership Association and charity since 1966
Organisation established	1929
Relationship of project to organisation's core business	One of multiple projects run by the FBA.
Source of information	Website/Online documentation

19. Hero Coli

Type of business model	Run by PhD Student, PhD grant funding, Ongoing, Small Scale, National, continuing to develop it as a game.
Project website	http://herocoli.com/
Country/City of operation	France, Paris
Online/Offline	Online
Field of Science	Education, Synthetic Biology, Serious Games
Purpose of project	The project has a number of goals which include: Educational - science outreach in synthetic biology and to design game challenges that stimulate scientific creativity. Simulation - the players can experiment with a flexible and realistic crafting system that uses BioBricks™ (a standard for DNA interchangeable parts, developed with a view to building biological systems in living cells). Research - Generate a community of players interested in the field and encourage them to use synthetic biology to solve real scientific problems;

	leading to creative research projects; and to get involved in research and other citizen science projects. Fun - Hero.Coli aims not to be just a serious game.
Description of main project activity	Hero.Coli aims to promote the promise and potential benefits of synthetic biology, as well as to warn the public about the risks and potential harms. This young interdisciplinary field has considerably grown over the past few years and raises concerns about (anticipated or unanticipated) risks to the environment, biodiversity, biosecurity, ethics, and health; nowadays it is crucial to raise awareness about these issues. Therefore, they aim to promote intellectual responsibility and ethics education regarding the design and engineering of living organisms.
Length of time of the project	4 years and more
Number of participants	Not available
Number of submissions	Not available
Funding source	PhD grant
Scale of funding	Small scale
Organisation running the project	Center for Research and Interdisciplinarity / Université Paris Descartes
Organisation website	cri-paris.org
Organisation structure	University
Organisation established	2001
Relationship of project to organisation's core business	Not core
Source of information	Project organiser

20. Galaxy Zoo

Type of business model	Global, multi-year. task based. Long term
Project website	https://www.zooniverse.org/projects/zookeeper/galaxy-zoo
Country/City of operation	Global
Online/Offline	Online
Field of Science	Astronomy

Purpose of project	The purpose of the Galaxy Zoo project is to answer a variety of scientific questions, to prepare the ground for morphological work using future instruments like the JWST, and to produce samples of morphologically selected high-redshift galaxies for follow-up using instruments like the extremely large telescopes and ALMA. Galaxy Zoo (Lintott et al. 2008, 2011) pioneered a novel method for performing large-scale visual classifications of survey datasets. Using more than half a million members of the general public, the project has classified – via direct visual inspection - the entire Sloan Digital Sky Survey spectroscopic sample and all existing Hubble Space Telescope surveys (around 1.5 million galaxies in total). With more than 40 classifications per object, Galaxy Zoo provides both a visual classification and an associated uncertainty (which is challenging to estimate if there are only a few human classifiers). The classifications themselves have been demonstrated to be of comparable accuracy to those derived by expert astronomers (see Lintott et al. 2008).
Description of main project activity	The task in the first Galaxy Zoo was slightly simpler than the current project; all volunteers were asked to do was to split the galaxies into ellipticals, mergers and spirals and — if the galaxy was spiral — to record the direction of the arms. But it was enough to show that the classifications Galaxy Zoo provides were as good as those from professional astronomers, and were of use to a large number of researchers. In the latest version of the project that started it all, Galaxy Zoo lets volunteers loose on images from the Dark Energy Camera Legacy Survey. This data set is 10 times more sensitive than the Sloan Digital Sky Survey used in the initial Galaxy Zoo project. You'll be asked to note each galaxy's shape, as well as any strange features such as tidal tails, dust lanes, gravitational lensing, or overlapping objects.
Length of time of the project	Ongoing since 2007
Number of participants	Using more than half a million members of the general public, the project has classified – via direct visual inspection - the entire Sloan Digital Sky Survey spectroscopic sample and all existing Hubble Space Telescope surveys (around 1.5 million galaxies in total).
Number of submissions	With more than 40 classifications per object, Galaxy Zoo provides both a visual classification and an associated uncertainty (which is challenging to estimate if there are only a few human classifiers). The classifications themselves have been demonstrated to be of comparable accuracy to those derived by expert astronomers (see Lintott et al. 2008).
Funding source	Galaxy Zoo was originally built by volunteers, and then supported by a small grant from Microsoft Research. No other specific funding has been received by the project, which makes use of the freely available Zooniverse platform. PhD students working with Galaxy Zoo data have been supported by STFC in the UK, NSF in the US and the Swiss research agencies.
Cost of IT infrastructure	The initial Galaxy Zoo website was hosted by John Hopkins University.
Scale of funding	Small scale
Organisation running project	Galaxy Zoo is a project run by a consortium of university based researchers who use their research time to build, develop and run the project as well as to make use the results. It was originally built by volunteers, and then supported by a small grant from Microsoft Research.
Organisation website	https://www.zooniverse.org/projects/zookeeper/galaxy-zoo/
Organisation structure	Project consortium of university based researchers.
Organisation established	2007
Relationship of	Core project of the organisation.

project to organisation's core business	
Source of information	Project organiser

21. Widenoise / Everyaware

Type of business model	EU Funded, large scale funding, global, short term.
Project website	http://cs.everyaware.eu/event/overview
Country/City of operation	Global
Online/Offline	Offline/online
Field of Science	Environmental
Purpose of project	WideNoise is an iPhone and Android app that helps you to monitor the noise pollution in your environment and understand the soundscape around you. Originally developed by WideTag Inc. in 2009 for iPhone, WideNoise underwent a thorough redesign thanks to a partnership between EveryAware and WideTag that led to the current version 3.0. The online map allows you to see the average sound level of the area around you.
Description of main project activity	EveryAware is an EU project intending to integrate environmental monitoring, awareness enhancement and behavioural change by creating a new technological platform combining sensing technologies, networking applications and data-processing tools. Thanks to the new mobile technologies (smartphone, tablet, etc.), people can monitor the pollution of their environment (a street, a room, a car) in any place and at any time.
Length of time of the project	2012 - 2014
Number of participants	Not available
Number of submissions	Not available
Funding source	EveryAware project receives support from the following organisations: ISI Foundation, Institute for Scientific Interchange, Turin, Italy; Sapienza University, Rome, Italy; CSP, Innovazione nelle ICT, Turin, Italy; L3S Research Center, Hannover, Germany; University College London, UK; and the VITO, Flemish Institute for Technological Research, Antwerp, Belgium.
Cost of IT infrastructure	The EveryAware platform provided the backend, data processing capabilities as well as several visualizations including a concise map view. With the shutdown of the EveryAware platform, online statistics and visualizations are not available anymore. Also, the functionality of the mobile apps is currently limited. They only support measuring noise neglecting subjective information. However, there is a plan to bring WideNoise back online in the near future as soon as we find a group of motivated students.
Scale of funding	Large scale
Organisation running the project	EveryAware
Organisation website	http://www.everyaware.eu/
Organisation structure	The EU project EveryAware, the EveryAware platform was developed by the KDE Group at the University of Kassel and the DMIR Group at the University of Würzburg together with the L3S Research Center at the University of Hannover.

Organisation established	2010
Relationship of project to organisation's core business	One of two core projects.
Source of information	Website/Online documentation

22. Parenting Science Gang

Type of business model	Run by motivated individual, funded by large charitable trust, ad hoc funding, National, ongoing, specific projects.
Project website	http://parentingsciencegang.org.uk/
Country/City of operation	Primarily a UK based project, with some non-UK members
Online/Offline	Online/Offline
Field of Science	Biology/Parenting
Purpose of project	Parenting Science Gang is a ground-breaking, user-led citizen science project. It brings groups of parents to together to answer the questions: What parenting questions do we need evidence-based answers for? How can we design experiments to answer those questions?
Description of main project activity	The project builds on the approach successfully piloted with Nappy Science Gang, which involved hundreds of volunteers over one year. They researched, designed and ran their own experiments related to reusable nappies. Among other successes, the group induced the NHS to change their guidelines on washing baby items and discovered an unexpected and interesting cloth nappy phenomenon. It is a co-production model. Most of the groups are collaborating with a researcher (or several) who helps them design and run the experiment, but the groups are firmly in the driving seat and setting the scope and research question. (It is called 'user-led' on the website as most ordinary parents might not be familiar with citizen science terminology like co-production.)
Length of time of the project	Since 2016
Number of participants	Approx. 2,500 volunteers
Funding source	Parenting Science Gang is funded by a two-year Society Award from the Wellcome Trust. It also receives varying amounts of in-kind support from the following partners: The Institute of Health Visiting (IHV); The National Childbirth Trust (NCT); Lancaster Babylab; Birkbeck Babylab; Durham University Parent-Infant Sleep Lab; Public Health England; I'm a Scientist, Get Me Out of Here!; The Ask for Evidence Campaign.
Cost of IT Infrastructure	Parenting Science Gang mainly uses Facebook as a very well-designed platform for getting large numbers of people discussing and communicating. Minor hosting and URL costs for the website. They pay about £60/month for an app called co-schedule, which allows them to schedule posts in all the groups.
Scale of funding	Medium scale
Organisation running the project	Instigated by science-communicator-turned-parent, Sophia Collins
Organisation website	http://parentingsciencegang.org.uk/
Organisation structure	User-led citizen science project

Organisation established	2016
Relationship of project to organisation's core business	Core
Source of information	Website/Online documentation and project organiser

23. Public Lab

Type of business model	Run by non-profit, multiple grants, on-going, multiple tasks, Large scale
Project website	https://publiclab.org/
Country/City of operation	Global
Online/Offline	Offline/Online
Field of Science	Environmental
Purpose of project	The Public Lab non-profit supports specific projects in four topic areas, Open Air, Open Water, Open Land and Civic Kits, in order to enable cohesive community collaboration across hardware, software, expertise, and locale. In each of these topic areas, the Public Lab community is increasing public access to open source data collection tools and techniques, sharing best practices for advocacy, and building networks across the globe.
Description of main project activity	The Public Laboratory for Open Technology and Science (Public Lab) is a community -- supported by a 501(c)3 non-profit -- which develops and applies open-source tools to environmental exploration and investigation. By democratizing inexpensive and accessible Do-It-Yourself techniques, Public Lab creates a collaborative network of practitioners who actively re-imagine the human relationship with the environment. The core Public Lab program is focused on "civic science" in which they research open source hardware and software tools and methods to generate knowledge and share data about community environmental health. Their goal is to increase the ability of underserved communities to identify, redress, remediate, and create awareness and accountability around environmental concerns. Public Lab achieves this by providing online and offline training, education and support, and by focusing on locally-relevant outcomes that emphasize human capacity and understanding.
Length of time of the project	Since 2010
Number of participants	Not available
Number of submissions	Not available
Funding source	The funders listed below support the Public Lab non-profit organisation. Other Public Lab community members and project partners have received funding from different organisations which are not listed below. Public Lab also creates earned revenue through sales of open hardware kits in the Civic Information Starter Kit program area. Current Support: Posner Foundation of Pittsburgh $50,000 General operating support; Gordon and Betty Moore Foundation $374,745 Support for research on the capacity of Public Lab's model of community science to both build confidence in scientific concepts and increase civic engagement, to be completed in partnership with the University of California, Davis; 11th Hour Project $350,000 Support for development of the Oil and Gas Accountability Toolkit; Claneil Foundation

	Emerging Leaders Fund $200,000 General operating support; National Academies' Gulf Research Program $158,000 Support for building scientific literacy and resilience through community science in the Gulf of Mexico; Rita Allen Foundation $150,000 Support for a snapshot evaluation of Public Lab and development of an evaluation framework for co-created citizen science projects in partnership with UC-Davis; Autodesk Foundation Fund, a corporate advised fund of Silicon Valley Community Foundation $100,000 General operating support; Fund for Shared Insight, a sponsored project of Rockefeller Philanthropy Advisors, Inc., with support from Rita Allen Foundation $60,000 Support under the Listen for Good to develop a robust systems for collecting and using feedback from stakeholders; Threshold Foundation $19,650 General support; Google $15,000 Support for development of Infragram; Google Summer of Code $5,200 Support for web development work; National Science Foundation $10,987 "EAGER: Collaborative Research: SmartPhone App for Residential Testing of Formaldehyde (SmART-Form)," award number 1645090; Rackspace * In-kind donation Server space for MapKnitter.org and Public Lab Archive; MIT Center for Civic Media In-kind donation Server space at MIT Media Lab for Public Lab infrastructure; Ashoka Recognition of Executive Director Shannon Dosemagen as an Ashoka Fellow.
Scale of funding	Big scale
Organisation running the project	Public Lab: a community and non-profit democratizing science to address environmental issues that affect people
Organisation website	https://publiclab.org/
Organisation structure	Non-profit
Organisation established	2010
Relationship of project to organisation's core business	Core
Source of information	Website/Online documentation

24. Hush City App

Type of business model	Run by academic researcher, grant funding, on-going, large scale
Project website	http://www.opensourcesoundscapes.org/hush-city/
Country/City of operation	Global
Online/Offline	Both
Field of Science	Environmental
Purpose of project	By using Hush City app participants can be as active members of a soundscape and citizen science research project to map and evaluate urban quiet areas so as to contribute to protecting them. The first version of the Hush City app was developed in the framework of the "Beyond the Noise: Open Source Soundscapes" project (2016-2018), which validated a novel mixed methodology to identify, assess and plan "everyday quiet areas" in cities, by implementing the soundscape approach, the citizen science paradigm and open source technology. The second version of the Hush City app was developed in the framework of the project: "Hush City Mobile Lab" (2018-2020).

Description of main project activity	The Hush City app aims to crowdsource quiet spots and share of them with the Hush City community. Participants identify and access quiet areas in their city or in other cities worldwide, shared by the Hush City users. They can filter the quiet areas according to their sound levels, descriptors used to tag them, perceived quietness, visual quality and accessibility, as perceived by the users who crowdsourced the quiet areas; and engage in gaming activities. They can also review their personal surveys and delete them if they are no longer happy with them. They can also provide feedback on the Hush City project.
Length of time of project	2016-2018 and 2018-2020
Number of participants	300+ participants worldwide
Number of submissions	1000+ quiet areas crowdsourced in 170+ cities worldwide
Funding source	The first version of the Hush City app was developed in the framework of the project: "Beyond the Noise: Open Source Soundscapes" (2016-2018). The second version of the app was developed in the framework of the project: "Hush City Mobile Lab" (2018-2020). The project: "Beyond the Noise: Open Source Soundscapes" received funding from the IPODI-Marie Curie Fellowship – People Program (Marie Curie Actions) of the European Union's Seventh Framework Program (FP7/2007-2013) under REA grant agreement no. 600209 (TU Berlin/IPODI). The project: "Hush City Mobile Lab" received funding from the HEAD-Genuit Foundation.
Cost of IT infrastructure	Hush City app is a free, native mobile application, which runs on both iOS and Android operating systems: iOS 9.0 and higher (iPhones 5/5C/5S/SE/6/6Plus/7/7Plus) and Android 5 and higher (any Android based smartphone).
Cost of materials	Approx. 15000 euros for the iOS and Android app and the webapp
Cost of human resources (%FTE)	Self-funded
Cost of physical office (Y/N)	Self-funded
Other costs eg promotion, communications etc	Self-funded
Scale of funding	Large Scale
Organisation running the project	Dr Antonella Radicchi running the project as a non-profit project.
Organisation website	http://www.opensourcesoundscapes.org/hush-city/
Organisation structure	Non-profit
Organisation established	2016
Relationship of project to organisation's core business	Core
Source of information	Website/Online documentation and project organiser

25. iNaturalist

Type of business model	LLC (private/for profit entity) partly owned by non-profit and for profit investors. long term. Global.
Project website	https://www.inaturalist.org/
Country/City of operation	US/Global
Online/Offline	Online/Offline
Field of Science	Ecology
Purpose of project	iNaturalist is a crowdsourced species identification system and an organism occurrence recording tool. It can be used to record your own observations, get help with identifications, collaborate with others to collect this kind of information for a common purpose, or access the observational data collected by iNaturalist users. The primary goal in operating iNaturalist is to connect people to nature, i.e. getting people to feel that the non-human world has personal significance, and is worth protecting.
Description of main project activity	iNaturalist is an online social network of people sharing biodiversity information to help each other learn about nature.
Length of time of project	Ongoing
Number of participants	391,1902 Observers. A community of over 750,000 scientists and naturalists.
Number of submissions	14,088,846 Observations
Funding source	Currently, the iNaturalist Network consists of five members: the iNaturalist Department of the California Academy of Sciences and National Geographic Society operating iNaturalist.org from the United States, the Comisión nacional para el conocimiento y uso de la biodiversidad operating NaturaLista in Mexico, the New Zealand Biodiversity Recording Network operating iNaturalist NZ — Mātaki Taiao (formerly NatureWatch NZ) in New Zealand, the Canadian Wildlife Federation and Royal Ontario Museum operating iNaturalist Canada in Canada, the Instituto Humboldt operating Naturalista in Colombia, and Biodiversity4All in Portugal.
Cost of IT infrastructure	The iNaturalist technology infrastructure and open source software is jointly supported by the California Academy of Sciences and the National Geographic Society.
Scale of funding	Large Scale
Organisation running the project	iNaturalist LLC
Organisation website	iNaturalist.org
Organisation structure	iNaturalist.org began as the Master's final project of Nate Agrin, Jessica Kline, and Ken-ichi Ueda at UC Berkeley's School of Information in 2008. Agrin and Ueda continued working on the site after graduation, with some additional help from Sean McGregor. Ueda began collaborating with Scott Loarie in 2011, when they organized as iNaturalist, LLC and began expanding the site through numerous collaborations. In 2014 iNaturalist became an initiative of the California Academy of Sciences and a joint initiative with National Geographic Society in 2017.
Organisation established	2014
Relationship of project to organisation's core	Core

business	
Source of information	Website/Online documentation

26. Bighorn Basin Project

Type of business model	Run by university, Crowdfunding, multi-year, ongoing.
Project website	https://experiment.com/projects/join-bighorn-basin-paleontological-institute-s-2018-field-expedition
Country/City of operation	US/Red Lodge, Montana and Philadelphia, PA
Online/Offline	Offline
Field of Science	Palaeontology
Purpose of project	The Bighorn Basin Paleontological Institute's public summer field expeditions provide people of almost any age, background, and interest level an opportunity to work alongside, and as, real field palaeontologists. You will be part of, and contribute to, decades-long research projects to collect and study the ancient organisms and ecosystems that existed here so many millions of years ago. You will be professionally trained on site to find, identify, collect, excavate, document, and prepare real fossils.
Description of main project activity	Each summer, volunteers and palaeontology students are invited to help excavate and prepare fossils that are found. This is Bighorn Basin Paleontological Institute's third year running the summer expedition on Experiment. Every expedition is different, and the latest one is the longest one yet. Participants spent seven weeks in the Bighorn Basin.
Length of time of the project	Multi-year since 2010
Number of participants	2017 - 100 participants 2018 - 165 participants
Funding source	Crowdfunding via the Experiment platform: https://experiment.com/ Fees for participants are $1,600/week
Scale of funding	Medium - big scale ($41,827)
Organisation running project	Bighorn Basin Paleontological Institute
Organisation website	http://www.bbpaleo.org/
Organisation structure	A non-profit 501(c)(3) organisation dedicated to palaeontology and earth science research, education, and outreach.
Organisation established	2017
Relationship of project to organisation's core business	A core part of the organisation's mission to collaboratively study, actively preserve, and dynamically interpret the paleontological treasures of the Bighorn Basin and the surrounding region, as well as to promote palaeontology and the natural sciences to life-long learners, wherever they may be.
Source of information	Website/Online documentation and project organiser

27. Capturing Our Coast (COCoast)

Type of business model	Run by collaboration of marine biology organisations, Heritage Lottery Funded, national, one off.
Project website	https://www.capturingourcoast.co.uk/
Country/City of operation	UK
Online/Offline	Online/Offline
Field of Science	Marine biology
Purpose of project	Capturing Our Coast aims to explore the degree to which members of the public could contribute robust and meaningful data, that leads to the testing of ecological hypotheses, and/or feeds in to conservation, and policy relevant evidence gaps.
Description of main project activity	CoCoast believe that the responsibility for protecting our seas and wonderful marine biodiversity belongs to all of us. The project offers opportunities for members of the public to become adept at identifying and quantifying intertidal species, to independently survey and submit this data, but also to contribute to investigations that test a series of ecological hypotheses, linked to key environmental challenges around invasive species, and climate-change related impacts (e.g. phenological change and increased storm disturbance). Training Days were delivered at Hubs around the coast of the UK. The team supports participants in developing the simple survey skills required. CoCoast is aimed at people who have opportunities to access the coast, and the choice of location is up to the individual volunteer. There is no cost involved in this training or participation. Volunteers need to 18 years of age or older.
Length of time of project	2015-2018
Number of participants	From 2015-2018 the CoCoast project trained almost 3,000 members of the public nationwide to gather data to help us understand in more detail the species that live on our coasts. In addition, non-registered (and therefore the number is not quantified explicitly) volunteers can engage by remotely downloading a series of protocols and uploading their data on such topics as environmentally cued breeding cycles (Spermwatch) and the distribution of invasive species (Marine Invaders).
Number of submissions	More than 20,000 quadrats from around 1,800 sites over the past three years. Further data has been returned by volunteers on each of the 14 ecological hypotheses.
Funding source	Heritage Lottery Funded
Cost of physical office (Y/N)	Training Hubs at 7 university, research and conservation organisations around the country
Scale of funding	Large Scale (£1.7m)
Organisation running project	Newcastle University
Organisation website	https://www.ncl.ac.uk/
Organisation structure	University
Organisation established	1831
Relationship of project to	Not core for the university, but aligns with core research business and core mission to engage with society and be a civic university.

organisation's core business	
Source of information	Website/Online documentation and project organiser.

28. The Big Bumblebee Survey

Type of business model	Run by ecologists, Charity Partnership (Short-term), national, medium scale
Project website	https://www.britishscienceassociation.org/the-big-bumblebee-discovery
Country/City of operation	UK
Online/Offline	Online/Offline
Field of Science	Ecology
Purpose of project	To roll out an ambitious data-gathering mission to address the question "how is the diversity and abundance of bumblebees influenced by the surrounding landscape at multiple scales?" The research helped to show how pollinators can thrive in urban environments.
Description of main project activity	The project was led by the research of ecologists, Dr Helen Roy and Dr Michael Pocock, at the Centre for Ecology and Hydrology (CEH). The experiment enabled families, individuals and over 400 schools to contribute a data set of bumblebee observations to a real scientific study. The citizen scientists were asked to observe a lavender plant for bumblebee sightings and upload their findings to EDF Energy's education portal, The Pod. The data was used to explore how environmental changes affect insect populations, an area of research that could have a potential huge impact on understanding the future of food security and climate change. The findings were published in a peer-review paper.
Length of time of project	August 2014
Number of participants	More than 400 schools took part, engaging up to 30,000 individuals
Number of submissions	27,000 bumblebees were counted
Funding source	The British Science Association in an award winning partnership with EDF Energy
Cost of IT infrastructure	EDF Energy's education portal, The Pod, hosted the data.
Scale of funding	Medium
Organisation running project	Centre for Ecology and Hydrology (CEH)
Organisation website	https://www.ceh.ac.uk/
Organisation structure	CEH is a public-sector research centre and part of the Natural Environment Research Council (NERC).
Organisation established	2000
Relationship of project to organisation's core business	Not core

Source of information	Website/Online documentation

29. The UK Ladybird Survey

Type of business model	Ecologist researchers, Volunteering, On-going, Multiyear, National, Small scale
Project website	http://www.ladybird-survey.org/
Country/City of operation	UK
Online/Offline	Online/Offline
Field of Science	Ecology
Purpose of project	The Ladybird Survey aims to facilitate the recording of all the UK's ladybirds.
Description of main project activity	Participants can submit records of ladybird observations electronically using our online recording form or mobile phone app. There are 46 species of ladybird (Coccinellidae) resident in Britain and the recent arrival of the harlequin ladybird has the potential to jeopardise many of these. Another subsidiary survey, the Harlequin Ladybird Survey, will monitor its spread across Britain and assess its impact on native ladybirds.
Length of time of project	Since 2005
Number of submissions	48,510 verified reports of the 'alien' Harlequin species in the UK have been contributed over 13 years,
Funding source	The project is supported by the following: the National Biodiversity Network (NBN), Defra, NERC, the JNCC, Potato Council Limited, the University of Hull, and Rothamsted Research. Researchers from three institutions have collaborated in the UK Ladybird Survey: Dr Helen Roy, Centre for Ecology and Hydrology; Professor Michael Majerus, University of Cambridge; and Dr Peter Brown, Anglia Ruskin University.
Scale of funding	Small
Organisation running project	Biological Records Centre at the Centre for Ecology & Hydrology
Organisation website	https://www.brc.ac.uk/home
Organisation structure	The work of BRC is a major component of the National Biodiversity Network.
Organisation established	1964
Relationship of project to organisation's core business	One of multiple projects.
Source of information	Website/Online documentation

30. Community Collaborative Rain, Hail, Snow Network (CoCoRaHS)

Type of business model	Run by non-profit, university and state funding, National, On-going, medium to large scale.

Project website	https://cocorahs.org/
Country/City of operation	US
Online/Offline	Both
Field of Science	Atmospheric Science
Purpose of project	CoCoRaHS is an acronym for the Community Collaborative Rain, Hail and Snow Network. CoCoRaHS is a unique, non-profit, community-based network of volunteers of all ages and backgrounds working together to measure and map precipitation (rain, hail and snow). By using low-cost measurement tools, stressing training and education, and utilizing an interactive website, the project aims to provide the highest quality data for natural resource, education and research applications.
Description of main project activity	CoCoRaHS (pronounced KO-ko-rozz) is a grassroots volunteer network of backyard weather observers of all ages and backgrounds working together to measure and map precipitation (rain, hail and snow) in their local communities.Volunteers submit their observations using the CoCoRaHS website or apps. Observations are immediately available to the public via maps and data analysis tools, and to data users via the CoCoRaHS Web API. Data users such as scientists, resource managers, decision makers and others have come to rely on the high density, high quality measurements provided by CoCoRaHS observers. The only requirements to join are an enthusiasm for watching and reporting weather conditions and a desire to learn more about how weather can affect and impact our lives.
Length of time of project	Ongoing since 1998
Number of participants	Over 20,000 active observers in the United States, Canada, Puerto Rico, the U.S. Virgin Islands and the Bahamas.
Funding source	Current CoCoRaHS Sponsors include a diverse range of university funding, as well as some state funding and funding from other foundations. The National Oceanic and Atmospheric Administration (NOAA) and the National Science Foundation (NSF) are major sponsors of CoCoRaHS.
Cost of materials	Other organisations have contributed either financially, and/or with supplies and equipment.
Cost of human resources (%FTE)	Other organisations and individuals have also contributed with volunteer assistance to keep our science-education network up and running.
Scale of funding	Medium
Organisation running project	The network originated with the Colorado Climate Center at Colorado State University in 1998 thanks in part to the Fort Collins flood a year prior. CoCoRaHS was born in 1998 with the intent of doing a better job of mapping and reporting intense storms. CoCoRaHS became a nationwide volunteer network in 2010 and is now international with observers helping provide critical precipitation observations, benefiting their country's needs.
Organisation website	http://climate.colostate.edu/
Organisation structure	The Climate Center is a recognized State Climate Office.
Organisation established	1998
Relationship of project to organisation's core business	Core project
Source of information	Project organiser

31. LiquenCity

Type of business model	Run by local community, local funding agency funding, Ongoing, Small scale.
Project website	http://liquencity.org
Country/City of operation	Spain
Online/Offline	Both
Field of Science	Environmental Science
Purpose of project	To monitor Lichens as bio indicators of the environmental quality of our cities. The project aims to obtain a detailed inventory of the lichen communities of cities that, subsequently, will be published through the GBIF network, the Global Information Infrastructure in Biodiversity, with the aim of being useful for other research studies (citizen science). If the experience is replicated over time in both cities, it will be possible to monitor the change in the lichen communities and see if the measures adopted to mitigate air pollution are effective.
Description of main project activity	LiquenCity is a citizen science project to find out what is the diversity of lichens that live in the trees of Madrid and Barcelona and relate it to air quality. The project seeks the participation of the inhabitants of both cities who, together with the collaboration of an expert team in lichens, will find and identify the lichens that live in both capitals. The project was designed for a local community of observers that, at present, are students form schools in Madrid and Barcelona. Due to the limited funding and the local target community, the website has been implemented only in Spanish and Catalan. Maybe in the future it will be expanded and the web will be translated in English and more languages, once the project becomes more international and well known.
Length of time of the project	Since September 2018
Number of participants	50 schools spread between Madrid and Barcelona will mobilize up to 1500 high school students
Funding source	A (local) funding agency: the Spanish Foundation for Science and Technology (https://www.fecyt.es/en).
Cost of IT infrastructure	The project is supported by Natusfera. The Natusfera community - which includes experts from the Royal Botanical Garden and the University of Barcelona - will help participants to identify the species of lichen seen.
Scale of funding	Small scale
Organisation running the project	A collaboration between the Royal Botanical Garden (RJB-CSIC); National Information Node on Biodiversity (GBIF.ES); Institute of Marine Sciences (ICM-CSIC); and CREAF.
Organisation website	http://liquencity.org/
Organisation structure	Collaboration of different institutions.
Organisation established	September 2018
Relationship of the project to the organisation's core business	Core
Source of information	Website/Online documentation and project organiser.

32. Project Soothe

Type of business model	Run by university researchers, university funded, National, One off
Project website	http://www.projectsoothe.com/
Country/City of operation	UK
Online/Offline	Online
Field of Science	Psychology
Purpose of project	The project aims to develop a bank of soothing photographs that can be shared with others to improve mental health and wellbeing. The organisers believe that Project Soothe is a unique and innovative project that combines world-leading research with public engagement.
Description of main project activity	In research and psychological therapy, research suggests that the ability to soothe ourselves at times of distress helps people stay well. However, little is known about how people soothe themselves in everyday life. The goal of this research is to learn more about the everyday experience of self-soothe. The team hopes to achieve this by inviting the public to contribute photos that make them feel soothed. The images are then posted on the website gallery and feedback is collected from viewers about whether these images make them feel soothed too. These images are being combined into a large bank of photos for use in future research and psychological therapies. All of the images are provided to the research team by members of the public around the world.
Length of time of the project	2014-2019
Number of submissions	Over 700 images in the research database that have been submitted by people from 29 countries since March 2015.
Funding source	The project has received funding from the British Academy/Leverhulme Trust (Small Research Grant), Wellcome Trust (Public Engagement Fund Grant) and University of Edinburgh (CAHSS Knowledge Exchange and Impact Grant, CAHSS Challenge Investment Fund Grant, ESRC IAA Impact Booster and Impact Grant) to support Project Soothe's research.
Scale of funding	Large scale
Organisation running the project	Collaboration of Clinical and Developmental Psychologists based at the University of Edinburgh and Anglia Ruskin University.
Organisation website	https://www.ed.ac.uk/health
Organisation structure	University collaboration
Organisation established	2014
Relationship of project to organisation's core business	One of multiple research projects.
Source of information	Website/Online documentation

33. Fix My Street

Type of business model	City level, funded by payment from Local Authorities, ongoing,

Project website	https://www.fixmystreet.com/
Country/City of operation	UK
Online/Offline	Both
Field of Science	Social Science
Purpose of project	Mapping and reporting street problems to the councils responsible for fixing them – anywhere in the UK.
Description of main project activity	FixMyStreet is an independent website, built by the charity mySociety to make it easier to report problems in the community. FixMyStreet send reported issue to the people whose job it is to fix it. FixMyStreet covers the whole of the UK. Councils read or act on FixMyStreet reports. Councils have the option to integrate directly, so report details can be directly placed into their systems, saving them time and money.
Length of time of the project	Since 2007
Number of submissions	More than 25,000 problems have been reported in the UK since its launch in February 2007.
Funding source	The site was initially funded by the Department for Constitutional Affairs Innovations Fund and built by mySociety, in conjunction with the Young Foundation.
Cost of IT infrastructure	A FixMyStreet app was developed in 2008 to enable iPhone users to report problems using their phones, and since then volunteers have written apps for Nokia and Android, as well as another app for the iPhone.
Scale of funding	Big scale
Organisation running project	My Society
Organisation website	https://www.mysociety.org
Organisation structure	mySociety is a not-for-profit social enterprise, based in the UK and working internationally. mySociety Limited is a project of UK Citizens Online Democracy, a registered charity in England and Wales.
Organisation established	1996
Relationship of project to organisation's core business	One of multiple projects
Source of information	Website/Online documentation

34. Citizen Science to Cure Social Conflict

Type of business model	Small group like a bible-study that meets on a regular basis and will use crowdfunding if needed
Project website	https://osf.io/td2mx/
Country/City of operation	Belleville, WI, USA
Online/Offline	Offline

Field of Science	Behavioural Neuroscience
Purpose of project	Test replicability of a surprise result published by a professional scientist (because professional scientists clearly agree the result would need independent testing, but none are providing that)
Description of main project activity	Replicate an experiment. Clinical trial with N=160.
Length of time of project	About two years
Number of participants	5-person core team
Number of submissions	n/a (not crowd-sourced)
Funding source	Moving to crowdfunding
Cost of IT infrastructure	Use free apps like the Open Science Framework
Cost of materials	Compensation for human subjects is the biggest expense. Also need to pay for surveys (office supplies/printing), drug and independent testing of drug efficacy.
Cost of human resources (%FTE)	Volunteer
Cost of physical office (Y/N)	Will pay local high school $10/room/day for space for the experiment. Space for regular meetings is free.
Other costs eg promotion, communications etc	For equitable recruitment, need to blanket the entire town with a direct mail piece
Scale of funding	Small scale ($10,422)
Organisation running the project	Citizen Science Belleville
Organisation website	https://osf.io/fqn7v/
Organisation structure	Like a bible-study group that meets every two weeks.
Organisation established	2016
Relationship of project to organisation's core business	Central. The organisation exists to do such projects like a bible study exists to study the bible.
Source of information	Project organiser

35. Varieties of Elitism

Type of business model	A couple of guys collaborate on a project in their spare time. Like open source software. No funding, small scale.
Project website	https://figshare.com/articles/Varieties_of_Elitism/7052264
Country/City of operation	Belleville, WI, USA
Online/Offline	Offline so far, but hosted on GitHub, so could expand online

Field of Science	Computational sociology
Purpose of project	Anticipate the consequences of potential forms of social organisation.
Description of main project activity	Develop open-source computer simulations
Length of time of project	About six months
Number of participants	2
Number of submissions	2
Funding source	None
Cost of IT infrastructure	Use free apps like GitHub and FigShare
Cost of materials	None (use personal laptops)
Cost of human resources (%FTE)	Volunteer
Cost of physical office (Y/N)	None
Other costs eg promotion, communications etc	None
Scale of funding	None
Organisation running the project	GRIN
Organisation website	http://grinfree.com/
Organisation structure	Personal blog
Organisation established	2013
Relationship of project to organisation's core business	The blog assumes responsibility for a field of study (outside academic disciplines) and the project addresses an important open question in that field of study
Source of information	Project organiser