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**Supplementary material – Table of Vignettes (case descriptions)**

Table 1 – Different typologies of citizen science and citizen science related activities

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| **Factor** | **Categories and explanation** |
| 1 Activeness | 1.1 Active- requires full cognitive engagement during participation  **1.2 Semi-active** - limited cognitive engagement (responding to short alerts in a micro-task)  **1.3 Passive** - no engagement beyond setup |
| 2 Compensation | 2.1 Volunteer - unpaid participation  2.2 Expenses - only expenses are paid  **2.3 Small incentives** - minimal payment or partial payment which is indirect to the activity (e.g. for coordinating, providing bikes for community-based monitoring that can be used for other purposes)  **2.4 Payment for the activity**  **2.5 Crowdworking** - small payment for tasks  **2.6 Subscription fee** - when participants pay to participate in a project  **2.7 Student** - compulsory part of studies |
| 3 Purpose of activity | 3.1 Scientific/research - scientific or research focused activity  3.2 Policy outcome- e.g. environmental management monitoring, action, or other policy actions  **3.3 Public engagement** - the main purpose is engagement  **3.4 Education** -focus on education outcomes  **3.5 Game** - focus on gaming environment  **3.6 Reuse of social media** - reuse of images or other information that was submitted in social media |
| 4 Purpose of knowledge production | 4.1 Scientific discovery - producing a scientific paper  4.2 Scientific management - producing data for policy  4.3 Personal discovery - personal level learning  **4.4 Local knowledge sharing** - sharing local lay knowledge within the community (not necessarily with researchers)  **4.5 Alternative knowledge -** non-science knowledge: e.g. perceptions and opinions  **4.6 Commercial knowledge** - for commercial applications |
| 5 Professionalism | 5.1 Anyone - no assumption about expertise  5.2 Self-selected - a barrier to entry or assumptions about prior knowledge  **5.3 Targeted** - aiming at a specific set of experts, for activities beyond their work |
| 6 Training | 6.1 No training/light training - project aimed at anyone, and doesn’t require training beyond immediate participation  6.2 Significant training – the activity requires prior training and possibly accreditation as a condition for participation  **6.3 Academically focused** - the activity requires participants to have a higher education degree  **6.4 High skills** - the activity expects people will hold higher degrees (MSc/PhD) to participate  **6.5 Specialists** - the activity is aimed at specialists |
| 7 Data sharing | 7.1 Open scientific/research data - collected by scientists/research institute and shared openly  7.2 Scientific data - collected by scientists/research institute but not shared  **7.3 Education/engagement only** - undertaken as part of education/engagement activity and not used beyond this activity  **7.4 Commercially aggregated** (N-of-many-1s) - data that is collected by commercial actors, such as health and activity and activity data  **7.5 Collected by non-professional(s), not shared**  **7.6 Public Authorities data** - in monitoring activities, where data is delivered to authorities (shared or not shared)  **7.7 Integration with official data**  **7.8 Data aggregation** - integration of data from multiple activities  **7.9 Voluntary personal data** - sharing personal data with researchers (e.g. health research, consumer behaviour research, mobility research) |
| 8 Leadership | 8.1 Scientists/Researchers - project led by scientists or researchers, or a research institution  **8.2 Individual** – self-led by an individual, with herself as the only participant  8.3 Community - community-led project  **8.4 Commercial** - led by a commercial company  8.5 Public sector - led by people who work in the public sector (e.g. environmental officers)  8.6 CSO - led by a civil-society organization such as a non-governmental organisation (e.g. environmental charity) |
| 9 Scientific field | 9.1 Life and Medical Science  9.2 Earth Science  9.3 Formal Science  9.4 Natural Sciences  9.5 Social Science  **9.6 Humanities**  **9.7 the Arts**  9.8 Inter/Trans/Multidisciplinary |
| 10 Involvement | 10.1 Multiple stages  **10.2 Single stage - Issue/topic identification/research question setting**  **10.3 Single stage - research design**  10.4 Single stage - Research tool/methods development  10.5 Single stage - data gathering  10.6 Single stage - data analysis and interpretation  **10.7 Single stage - data sharing and/or results communication**  **10.8 Single stage - policy design /management decision** |

**Table 2 - Case descriptions (vignettes)**

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| --- | --- | --- | --- | --- |
| **No.** | **Case Description** | **Factors (controversy in bold and text)** | **Source for inspiration** | **Potential alternative Names** |
| 1 | Sharman is a science writer and teacher of English literature. In her free time, she decided to study the tiger beetle at the Gila River, close to her home in Arizona, USA. This is a personal project. She is growing larvae in a terrarium at home to learn about their physiology. On specific questions, she is supported by a retired professor of entomology. Eventually, she writes an academic paper that describes her findings, that is published in the journal of the entomological society and receives feedback from entomologists. She does not share her primary data with anyone except the entomologist. | 1.1, 2.1, 3.1, 4 .1, 5.2, 6.2, 7.2, **8.2**, 9.1, 10.1  (Individual) | Russell (2014) | Amateur naturalist |
| 2 | Ernesto is earning some extra income on Amazon Mechanical Turk, in which he completes tasks that are suggested on the platform. He joins a task of classifying galaxies, set up by interaction design researchers who are examining interfaces for citizen science projects. For each classification, he received $0.01. The Human-Computer Interaction researcher publishes an academic paper, but they have not contacted Ernesto about this publication and do not mention him or any other contributors in the paper. They do not publish their primary data. | 1.1, **2.5**, 3.1, 4.1, 5.1, 6.1, 7.2, 8.1, 9.3, 10.6  (crowdworking) | Lee et al. (2016) | Crowd worker, crowdsourcing |
| 3 | Jane is a long-time supporter of the charity British Trust of Ornithology (BTO) work, as she cares about birds. She is an active supporter of the Garden Birdwatch programme (GBW), and happy to give it £17 a year. However, she doesn’t have time to carry out the birdwatching survey. She is reading with interest the reports from the BTO GBW and finds the information motivating to continue her support of the project. | 1.1, 2.6, 3.1, 4.2, 5.1, 6.2, 7.2, 8.6, 9.1, **10.7**  (subscription fee) | British Trust for Ornithology (2020) | Crowdfunding |
| 4 | James heard about the BBC Four Contagion! Experiment while watching TV, and is happy to help the scientists that are running it. He downloads the BBC Pandemic app, sets up Bluetooth to “On” position, and uses his phone regularly over the next weeks without any further action. The phone collects information about interactions with other people who have downloaded the app. After several months, he watches the Pandemic programme that shows the experiment and learns about the open-access paper that was based on it. The project helps with the production of a science TV programme, but also contributes to the modelling of disease spread. | **1.3**, 2.1, 3.1, 4.1, 5.1, 6.1, 7.2, 8.1, 9.1, 10.5  (passive) | Klepac et al. (2018) | Passive sensing, crowdsourcing |
| 5 | Jess and Francesca are living near Euston station, London, which is going through major development. They are concerned about the impacts of the project on local air quality. They borrow fine particles monitoring equipment (PM2.5 and black carbon) from a local university. They carry out a study in their area and record the information on an online map that integrates the data with local authority data. The information is shared in the neighbourhood to encourage community awareness, and with the local authority to ensure that they will act to maintain the air quality in the area. | 1.1, 2.1, 3.2, **4.4**, 5.1, 6.2, 7.7, 8.3, 9.4, 10.1  (Local knowledge sharing) | Haklay and Eleta (2019) | Community science |
| 6 | Yonas is an Ethiopian smallholder farmer, and he participates in an experiment on the impact of phosphorus on chickpea crop. The study is carried out with Dutch scientists. Once a day he receives an SMS that asks him to reply with predefined codes about the agricultural activities that he carried out. Yonas agreed to participate in the study voluntarily, to improve his crops. The information is collected by the scientists, visualised, and shared back with the smallholders and in scientific papers. | **1.2**, 2.1, 3.2, 4.2, 5.2, 6.1, 7.2, 8.1, 9.1, 10.5  (semi-active) | Beza et al. (2018) | Survey, participatory agricultural research |
| 7 | Maria lives in Germany and contributes voluntarily to a university-led project focusing on migraine attacks. Each time, Maria has a migraine attack she reports it via the project app and provides data on date, time and weather as well as personal data on diet and medical treatment. As a result, Maria can see each entry point of all participants in a web portal and she can download her data from the webpage. The scientific outcomes of the project are communicated via the media and published in scientific medical journals. | 1.1, 2.1, 3.1, 4.1, 5.1, 6.1, **7.9**, 8.1, 9.1, 10.5  (voluntary personal data) | Similar to <https://www.migraene-radar.de/>  (In German – IISYS 2018) | Participatory Health Research |
| 8 | Bob, as a primary school graduate, is chosen by his community to collect data on child growth rates and nutrition as part of a community-based study in rural Jamaica, which is led by medical researchers. For his participation in this project, he received an incentive of $150, which he used to develop income-generating activities for himself (like the other volunteers who participated in the program) such as goat rearing and vegetable production. This one-off incentive represented 27% of the annual minimum wage at the time of the study. The data is used by medical researchers. | 1.1, **2.3**, 3.1, 4.1, 5.1, 6.2, 7.2, 8.1, 9.1 , 10.5  (small incentive) | Melville et al. (1995) | Community-based Monitoring (CBM) |
| 9 | Lilyana is living in Bulgaria, and she discovered the app FotoQuest Go through social media. With the app, she is directed to a place near her city. She takes pictures and classifies the location’s land cover, to assist scientists in IIASA, Austria. The scientists will be able to improve their monitoring of land use land cover changes in Europe and understand the quality of data generated by citizens. She can receive between €1 and €3 depending on the distance of the location she visits and if her submission passes the quality check. She receives updates about the project regularly. | 1.1, **2.4,** 3.2, 4.2,  5.1, 6.1, 7.2, 8.1, 9.2, 10.5  (payment for the activity) | Laso Bayas et al. (2018) | Crowdsourced geographic information |
| 10 | Patricia is visiting a science exhibition about blood in Ljubljana, Slovenia. As part of the exhibition, she looks at a screen that invites her to classify images of blood cells, which can help in the identification of malaria parasites. The exhibit is explaining the process of screening blood samples. The exhibit was designed by scientists who are working with the museum, and the images are from real cases. The classification is used to evaluate the potential of large-scale crowdsourcing project, and the ability of participants to classify such samples. | 1.1, 2.1, **3.3,** 4.1, 5.1, 6.1, 7.2, 8.5, 9.1, 10.6  (public engagement) | Stankovic et al. (2017) | Public engagement, Museum exhibit, education |
| 11 | Peter takes part in a butterfly project in his hometown Leipzig. Together with other citizens of different ages and backgrounds, he participates in a series of workshops with entomologists to learn about butterflies, how to attract them into his garden and how to monitor them. Over the course of the project, he learns a lot about the conservation of insect species in urban environments and how he can promote conservation interventions in his city. | 1.1, 2.1, **3.4,** 4.3, 5.1, 6.1, 7.2, 8.1, 9.1, 10.5  (education) | Created for this study | Educational activity, awareness raising |
| 12 | Jacques has joined a massive multiplayer game for which he pays a subscription fee. In the game, he is travelling through galaxies trading, mining resources, and competing with other players. He enters an area, where he classifies human proteins, for which he gets credits that can be traded throughout the game. The project was initiated by scientists and a gaming company. The classifications will eventually get published in the human protein atlas. | 1.1, 2.6, **3.5**, 4.1, 5.2, 6.1, 7.1, 8.1/**8.4**,9.1, 10.6  (game) | Sullivan et al. (2018) | Playing games, crowdsourcing |
| 13 | Dorota is a photographer in Katowice, Poland, and she specialises in sharing images of interesting wildflowers and insects on Flickr, where information about the location and time is recorded with the image. She is taking part with groups of photographers who are interested in the beauty of insect photography. Lena, an ecologist at the university, is scanning these groups regularly and using the images to identify invasive species - some of which are captured because they are often unfamiliar or visually interesting. Lena uses her finding with public authorities to support environmental management and also comments on Flickr to communicate with the photographers. | 1.1, 2.1, **3.6**, 4.2, 5.1, 6.1, **7.6**, 8.1, 9.1, 10.5  (reuse of social media) | Chapman (2017) | Photosharing, social media |
| 14 | Jason is taking part in a community study of alcohol harm in Newcastle, England. Researchers from the University of Manchester have organised the study, which focuses on perceptions of members of the community on the issue. He joined as a volunteer community-researcher. With the researchers, he is setting out the approach for data collection, carrying out interviews, and taking part in analysing the outputs from interviews and focus groups to suggest recommendations for public health practitioners in the area. | 1.1, 2.1, 3.2, **4.5**, 5.1, 6.2, 7.2, 8.1/8.3, 9.5, 10.1  (alternative knowledge) | Richardson (2014) | Participatory research, social science survey |
| 15 | Erik is a teacher in Uppsala, Sweden. For the past 15 years, he is running a weather station that is part of the Weather Underground’s Personal Weather Station Network with over 250,00 participants who share their observation data, just like Erik. In return for the data sharing, the company is providing tech support, data management services and customised, free-of-charge access to forecasts. The company uses the data to produce a global weather forecast as a commercial service. | 1.1, 2.1, 3.2, **4.6,** 5.1, 6.1, **7.4**, **8.4**, 9.2, 10.5  (commercial knowledge) | Weather underground (2020) | Crowdsourcing |
| 16 | Jim is a master gardener in Oregon, USA. Being a master gardener means that he received specialist training from university experts, and his accreditation is helping in promoting his garden centre. With his specialist training, he is asked to monitor the distribution of invasive species in an area of the county where he lives, in his free time. He shares the information with other master gardeners and the researchers at the university, which is used to set the policy about noxious weeds. | 1.1, 2.1, 3.2, 4.2, **5.3**, 6.2, 7.2, 8.1, 9.1, 10.1  (targeted) | Rome and Lucero (2019) | Continual professional development |
| 17 | Andrei has completed his studies in chemistry in Bucharest, Romania and he is joining an openly accessible online effort of understanding the structure of chemical molecules that have biochemical functions. The project is producing open data on the structure of molecules, and because it uses professional jargon and annotation, it requires prior knowledge in chemistry to carry it out well. Participants go through an initial skills assessment to ensure they have the required knowledge and no further training is needed. The data is shared in an open repository. | 1.1, 2.1, 3.1, 4.1, 5.2, **6.5,** 7.1, 8.1, 9.4, 10.6  (Academically focused) | Created for this study | Expert crowdsourcing |
| 18 | Jonas has completed his MSc course in the use of satellite imagery and its analysis. He received an email from the university where he studied, in Vilnius, Lithuania, asking him if he can join an effort to analyse post-disaster damage after an earthquake in Nepal - the task is complex, and not suitable for people without experience. He is happy to volunteer and he analyses the images on an online platform that was set up for this. The data is assisting the disaster relief management in their plans for recovery. | 1.1, 2.1, 3,2, 4.2, **5.3**, **6.4**, **7.6**, 8.5, 9.4, 10.6  (High skills) | Kerle and Hoffman (2013) | Expert crowdsourcing |
| 19 | Ilja is an optometrist in Olomouc, Czech Republic. He is familiar with looking at retinal imagery to identify abnormalities. In the evening, after work, he volunteers to participate in a humanitarian effort to provide remote identification of conditions. He uses an online system where less trained volunteers have already suggested a classification of images for certain pathologies, and uses his knowledge to validate and moderate their decisions. He is part of a group of volunteer experts, who have been recruited by the medical charity which runs the system as validators and facilitators. The results are transferred to the field team of the charity to provide local medical support in Pakistan. | 1.1, 2.1, 3.1, 4.,2, **5.3**, **6.5**, 7.2, 8.6, 9.1, 10.6 **(**Recruitment of Specialists) | Mitry et al. (2013) | Expert crowdsourcing |
| 20 | Emma is studying in high school in Lausanne, Switzerland. As part of the biology class, the teacher explains the process of phenology observation and the Swiss Phenology Network, which observes about 26 plants in different stages of development throughout the year. She and her classmates follow the protocols of the phenology network and write a report that is evaluated in class. The data is not shared beyond the biology class. Data from previous years’ observations at the school is available to the class. | 1.1, **2.7**, **3.4**, 4.1, 5.1, 6.1, **7.3**, 8.5, 9.1, 10.5(Education/engagement not reused) | Created for this study, details on the Swiss phenology network (2020) | Class, education |
| 21 | Nathalie, an insurance expert in Luxembourg, is very interested in her genetic information. She purchases a genetic testing kit from a company that will provide her with an analysis of the health risks that she might be exposed to. She can also log in to the company website, select projects to which she gives consent to use her DNA data, and downloads the data to analyse on OpenHumans.org and share it with her local hospital for their research. The company has a large team of scientists and is researching the aggregated data from all its customers. | 1.1, 2.6, 3.1, **4.6**, 5.1, 6.1, **7.4/7.9**, **8.4**, 9.1, 10.1 (commercially aggregated data) | Based on 23andMe citizen science website and Prainsack (2014) analysis | Genetic testing, crowdsourcing |
| 22 | Jacob is an avid wild mushroom (fungi) collector in Ghent, Belgium. For the past twenty years, he travelled the forests and meadows of East Flanders in weekends and holidays from his work as a priest, recording the locations, dates, and occurrence of many species. This information is initially kept on files in his computer, and together with other fungi enthusiasts, he is planning to produce the atlas of fungi in East Flanders sometime soon. Until they publish the atlas, he does not want to share the information. | 1.1, 2.1, 3.1, 4.1, 5.2, 6.2, **7.5**, **8.2**/8.3, 9.1, 10.1 (collected by non-professional, not shared) | Created for this study | Amateur naturalist, biological recorder (in the UK) |
| 23 | Bill is a resident of Charlotte, Vermont, USA. He is taking part in a water monitoring volunteering programme in his city. Twice a month, he goes to several streams near the city and collects water samples. He sends them to the municipal environmental lab and the data is used as part of the ongoing water quality monitoring of the water supplies of the city. Summary reports on water quality are published monthly on the city’s website, and Bill is pleased to receive an official acknowledgement letter every year. | 1.1, 2.1, 3.2, 4.2, 5.1, 6.2, **7.6**, 8.5, 9.1, 10.5(public authority data) | Stepenuck and Genskow (2018) |  |
| 24 | Lutsi, an outdoor and extreme sports enthusiast from Tartu, Estonia, is over the moon. She’s been selected by a major travel company as one of five people that will join a research expedition to Antarctica. The company will cover all the travel costs, and during the visit, the participants will be trained in taking ice samples and will work with scientists to sample microplastics. Daily blogs and videos will be shared on the company’s website, and the company will sponsor an open-access paper written by the scientists and participants about their discoveries. | 1.1, 2.1, 3.1, 4.1, 5.2, 6.2, 7.2, **8.4**, 9.2, 10.1 (commercial leadership) | Based on Airbnb citizen scientists call (Leasca 2019) | Publicity |
| 25 | Shlomo (Solomon) has a keen interest in medieval Jewish manuscripts. As he is living in Turko, Finland, he satisfies his interest through browsing the web. He is delighted to discover that he can join a research project about the Cairo Geniza, a collection of 300,000 documents covering 1000 years. He logs in to a site where scans of the documents are available, and he classifies and annotates a few aspects such as language, and the existence of illustrations. He discusses his findings with other participants and researchers from Oxford, Cambridge, Princeton and other universities. The results of this collective effort are shared as open data for other Geniza researchers. | 1.1, 2.1, 3.1, 4.1, 5.2, 6.1, 7.1, 8.1, **9.6**, 10.6 (Humanities) | Based on Eckstein (2018) <https://www.zooniverse.org/projects/judaicadh/scribes-of-the-cairo-geniza/classify> | Digital Humanities, crowdsourcing |
| 26 | Mona is running an errand when she comes across an interactive installation in the pedestrian area near her home. Some people are taking notes and pictures. She is curious and joins. She makes comments, performs a small act with the guidance of the organisers and collects data on a tablet. These uncomfortable, funny, confusing and emotional situations make her think about her role as a woman and after a discussion with other participants about gender issues she leaves. Two weeks later, she checks a website explaining the research and presenting the results of what happened in Plaça Orelia. | 1.1, 2.1, 3.1, 4.1/4.3/**4.5,** 5.1, 6.1, 7.1, 8.1,9.7, 10.1 (art) | University of Barcelona (2019) | Project in the arts |
| 27 | Ella is a web designer and interested in a healthy lifestyle and technology. She uses the TopFit smartwatch to collect her biodata throughout the day, to monitor and reach personal health and fitness goals including, exercise, sleep, weight and more. She also shares her data with the TopFit community, and sometimes participates in TopFit challenges. She pays a subscription fee and receives notifications, personal data dashboards or tips. She often follows the advice and has changed her routines accordingly. | **1.2,** 2.6,3.2, 4.3/ **4.6,** 5.2, 6.1, **7.4/7.9**, **8.4**, 9.1, 10.5 (quant-self, commercial, fitness) | Created for this study | Commercial project in health where data is aggregated from individuals, quantified self |
| 28 | Simon has been using the app Mappiness for a few weeks after he found out about it in the evening newspaper. The app prompts him a few times a day, at random times, to report how happy, relaxed, and awake they are. This app also notes the time, location, and a few other details. The information is shared with social science researchers at the London School of Economics, who are researching aspects of happiness and location. Simon reports about his feelings and perceptions. The data is used by scientists for their research and is not shared further, but Simon gets general feedback on the project’s website about the aggregated results. | **1.2**,2.1, 3.1, **4.5**, 5.1, 6.1, 7.2, 8.1, 9.5 | MacKerron and Mourato (2010) | Social survey |
| 29 | Bethan is a university lecturer, in Minneapolis, Minnesota, USA. She is teaching a unit on research methods to undergraduate students in education. As part of this unit. her students join the Monarch Larva Monitoring Project (MLMP), an existing large scale project that includes volunteers from many walks of life. For her class, she asked the students to carry out the project’s protocol, and they are tasked in analysing their data in comparison to the project data from other sites as part of their assignment. Their effort is assisting the overall data collection effort of MLMP. | 1.1, **2.7**, 3.1, 4.1, 5.1, 6.2, 7.1, 8.1, 9.1 | Oberhauser and LeBuhn (2012) | Class activity |
| 30 | Roy is part of the San people (an indigenous group) in the Kruger Park, South Africa. He is an expert tracker and familiar with the different patterns that animals leave as they move around the area. However, he never attended school. Using specialised software that includes icons of the different species in the park, he records the location and details of the different animal tracks in the park. This information helps the ecologists in the park to understand the route that rhinos use and supports the management of the park. | 1.1, 2.1, 3.2, 4.2, 5.1, **6.5**, 7.2, 8.1, 9.1, 10.5 (Training: specialists) | Liebenberg et al. (1999) | Indigenous knowledge, Traditional Ecological Knowledge |
| 31 | Elizabeth is living next to a major hog farm and has been concerned with the air, water and odour pollution from the farm for a while. Together with other resident activists in her area, they organised an effort to monitor for pollution. Using instructions on the web and support from other groups, they have created a Do-It-Yourself aerosol sampler, which allows them to capture the spray from the farm that is reaching their neighbourhood. The content of the aerosol is analysed in the local college, and information about the pollution and reports about health impacts and personal stories from residents about their feelings are used to make the case for environmental harm to the state environmental authority. | 1.1, 2.1, 3.2, 4.2/**4.4**, 5.1, 6.2, 7.2, 8.3, 9.1, 10.1 | Wing et al. (2008) | Community science |
| 32 | Rob, a biology teacher is using his free time in a DIYBio Hackerspace in Amsterdam, the Netherlands. He experiments with new yeast strains by trying to add new properties to them - for example, making some of them glow. Operating a “wet laboratory” is challenging and he spends many hours in it. He follows and shares his research with other international hackerspaces through online forums. He shares lab-notes, experimental settings, and results. He feels frustrated with the scientific establishment who are excluding this work, and therefore he cannot publish in scientific journals. | 1.1, 2.1, 3.1, 4.1/4.3, 5.2, **6.4**, 7.1, **8.2**, 9.1, 10.1 | Based on lessons from DITOs consortium (2017) & Nascimento et al. (2014) | Do-it-Yourself movement  Hackerspaces |
| 33 | Suzy lives in Melbourne, Australia, where she is working from home. Her smartphone is an important working tool for her. She’s using the DreamLab app, which shares her phone computing ability with cancer researchers in Sydney and London while it charges. Her phone receives packets of data for processing and sends it back when it is completed. She does not pay much attention to the app, though she is pleased to notice, when she wakes up, that the phone is slightly hot as a result of the processing work. The analysis leads to scientific publications by the researchers. | **1.3**, 2.1, 3.1, 4.1, 5.1, 6.1, 7.2, 8.1, 9.1, 10.6 | van Dorn (2016) and MacRae (2018) (Dreamlab) | Volunteer computing - |
| 34 | Peteris is an engineering student, in Valmiera, Latvia, where he is one of the core contributors to OpenStreetMap, a project to create an accurate digital map that is open for reuse by anyone. He regularly goes around his area, recording every tree, addresses of buildings, and other details of land use. Then he uploads the information on the project’s website and enjoys the knowledge that his data additions are immediately visible on the map, and support multiple applications - from bike routes to land use analysis. | 1.1, 2.1, 3.1, **4.4/4.5**, 5.1, 6.2, 7.1, 8.3, 9.8, 10.1 | Budhathoki and Haythornthwaite (2013) | Volunteered Geographic Information (VGI), crowdsourcing geographic information |
| 35 | Mia is an 8-year-old girl from Graz, Austria, whose parents are divorced. In school, she was approached by her teacher if she wanted to participate in drawing cartoons. Together with other kids her age and assisted by a child psychology researcher Mia expresses her feelings about the divorce of her parents and how she deals with it in cartoons. The participating children develop brochures for adults on how to deal with their kids during a divorce, a brochure for fellow children of divorce, and a board game. The researchers publish their findings on how children perceive fairness in the case of divorce in an international journal. | 1.1, 2.1, 3.2, 4.2, 5.3, 6.1, 7.3, 8.1, **9.5** | Based on a Sparkling Science project in Austria | CS in schools |
| 36 | Bernd is a 16-year-old teenager living in Vienna, Austria. He dropped out of school and now has to attend weekly group meetings with a social worker. Social scientists attend this meeting and ask who wants to participate in developing better social policy measures for youth. Bernd starts discussing the questions he plans to ask his peers, how to conduct the interviews, how to document the information and how to process it with the social scientists. Together, the scientists and the participating youth group discuss their findings and suggestions with the Vienna Employment Promotion Fund (policy maker). | 1.1, 2.1, 3.2, 4.2, 5.3, 6.1, 7.5, 8.1, 9.5 | Scenario from the CoAct, project | Citizen Social Science |
| 37 | Simone is an artist that has been developing special self-tracking hardware and software that she uses to run public workshops. In the workshops that are hosted by arts organisations, people can walk the area and annotate their feelings and emotions using this hard- and software. When they come back a collective map is made of all the collected local knowledge. These maps have been used in local decision-making processes by politicians and NGOs. The data from the work and designed maps are publicly shared and have been internationally exhibited. | 1.1, 2.1, 3.2**/3.3**, **4.5**, 5.1, 6.1, 7.1, **8.2**/**8.3, 9.7** | Bio Mapping project – Nold (2004) | Socially engaged art practice |
| 38 | Josh is a plumber in Tacoma, Washington, USA. Every day, he is driving across the city’s neighbourhood to deal with different incidents. He is bothered by the state of the roads, and after hearing about an app that recognises potholes as you drive, he downloads and installs it on his phone. The app is collecting detailed information while he drives and shares it with the engineering department of the city. They evaluate the location of different responses from drivers and then use it in their repair schedule. | **1.3**, 2.1, 3.2, 4.2, 5.1, 6.1, **7.6**, 8.5,9.4, 10.5 | StreetBump -  Simon (2014) | Crowdsourcing, municipal improvement, Civic Tech |
| 39 | Eleni lives in Limassol, Cyprus, and has a rare form of skin disease. She is active in the association of patients with similar conditions. At the local university hospital, the researchers involve her in the design of a study that will address the reasons for a skin reaction to common home chemicals. She is involved in setting the research question and in the details of the study design, but the researchers will experiment in their laboratory, without her involvement. The results will be shared with her and the association at the end of the study. | 1.1, 2.1, 3.1, 4.1, 5.2, 6.2, 7.2, 8.1/8.3, 9.1, 10.2**/10.3** | Gristwood (2019) | Patient and Public Involvement (PPI), Consultation |
| 40 | Farah has completed her undergraduate studies in Chemistry and returned to Qayyarah, Iraq, where she grew up. A few years ago, at the height of an armed conflict with ISIL, heavy oil fires were raising much concern about widespread contamination. Now, she wants to investigate the impact on soil, especially in a children’s playing area. She’s using instructions from online resources on how to examine soil samples for heavy metals. She found a way to access and use the laboratory of one of the local oil facilities, and plans to share her results with other residents in her area. | 1.1, 2.1, 3.2,**4.4**, 5.2, **6.3**, 7.1, **8.2**, 9.4, 10.1 | Weir et al. (2019) | Civilian science, Toxic Remnants of war |
| 41 | Femke is a teaching assistant in Eindhoven, the Netherlands. She has heard about a website where you can help astronomers by classifying images of galaxies. She didn’t expect to get hooked on the experience, but after a few classifications, she finds that looking at these images is fascinating and in doing so, she has learnt new things about the universe and the composition of galaxies. She is dedicating significant time every evening to classify galaxies on the website. The results of her analysis will be used by the scientists who developed the platform to publish important scientific papers. (MH) (Reviewed: GH) | 1.1, 2.1, 3.1, 4.1, 5.1, 6.1, 7.2, 8.1, 9.4 (clear citizen science - Galaxy Zoo) | Based on Hanny van Erkel (Cho & Clery 2009) | Citizen Science, crowdsourcing |
| 42 | Sarah is a social worker, in Lewistown, Montana, USA. Her work is emotionally demanding, and she has discovered that watching birds helps her maintain her wellbeing. As a person new to birding, she is using a bird observation recording app on her phone. The app allows her to maintain a checklist of the birds that she observes. Observations are shared as open data and contribute to ornithological research and environmental management. (MH) (Reviewed: GH) | 1.1, 2.1, 3.1, 4.1, 5.1, 6.1, 7.2, 8.1, 9.4 (clear citizen science - eBird) | eBird (2019) | Citizen Science, crowdsourcing |
| 43 | Marie is a retired lifeguard and artist, from Dryden, Canada, with a lifelong interest in bees. For the past four years, she has regularly photographed bees with her camera and uploaded the images using a dedicated website. She also volunteers to identify photographs from others uploaded to the site, while other people help her to identify the species that she has observed. The data is used by ecology researchers at York University (in Toronto) to create a live atlas of bumblebees in the pacific northeast. The data is shared on the project’s website. (MH) (Reviewed: GH) | 1.1, 2.1, 3.1, 4.1, 5.1, 6.1, 7.1, 8.1, 9.1 (clear citizen science - Bumble Bee Watch) | Chung 2019 | Citizen Science, crowdsourcing |
| 44 | Sandra from Birmingham, England, recently had her first child. On a forum that is dedicated to issues of using detergents with cloth nappies, she found a group of other young parents on Facebook, and together they are carrying out a double-blind test of different detergents and their impact on nappies. The results of the study are shared widely through a medical charity and can influence the National Health Service recommendations for using these nappies. (MH) (Reviewed: BK) | 1.1, 2.1, 3.2, 4.2, 5.1, 6.1, 7.2, 8.3, 9.1 (clear citizen science - Nappy science gang) | Parenting Science Gang, 2016 | Community science, citizen science |
| 45 | Sebastian lives in Hanover and is a hobby gardener with a local allotment garden. Last year, he did an online course on regenerative growing and signed up to a European wide growing experiment, comparing a polyculture with a monoculture setup. He followed instructions given to him and set up the experiment on his plot. He joined online meet-ups with other experimenters and collected data from his site and shared it via an online form. He also analysed his data himself and shared it via social media. He received the accumulated results of all experiments and joined a final online discussion. He also agreed to be named as a contributor in an academic paper about the experiment. | 1.1, 2.1, 3.1, 4.1/4.3, 5.2, 6.2, 7.1, 8.1, 9.4 Non-controversial case | The Great GROW experiment (Burton et al. 2019) | Hypothesis-driven citizen science |
| 46 | Margarita is working as a research assistant in an agricultural research centre in Spain. She has received a request to fill in a questionnaire about her experience as a resident of the area where she lives. She filled it in after work and sent it back to the transport researchers who are working with her municipality to improve the operational capacity of public transport. Once completed, the researchers will analyse the results and share the report with the authorities, with a summary shared publicly. | Not citizen science - survey | Created for this study | Social Survey |
| 47 | Yanis is a bus driver in Greece. He suffers from arthritis, a chronic condition, and was offered to participate, voluntarily, in a study about a new physiotherapy technique to manage his condition. He is asked to use an app to report on his symptoms several times a day. The study is run by medical researchers at his local hospital, and the results will be published in an open-access journal article. | Not citizen science - Clinical trial | Created for this study | Clinical Trial |
| 48 | Zeynep is living in a middle-class neighbourhood in Ankara, Turkey. She is part of a group of people that were recruited by a digital anthropology researcher who is interested in the way social media is being used. The researcher shares questions with her and the other participants in the research, and asks for her views and experiences. The researcher follows her social media profiles and joins online events that she is following. The researcher then uses this information to develop an anthropological account of social media in Turkey, and publish it in an open access book that Zeynep can access. | Not citizen science - Participation/ observation | Costa 2016 | Participant/observant |
| 49 | Stefano is studying at high school in Trento, Italy. During a visit to the local history museum, he spends time at an interactive exhibit that shows him the different mammal species in the area, which were photographed with camera traps. The exhibit encourages visitors to identify them, giving a score at the end. The exhibit was designed by the museum’s experts, and the data from the different interactions is not stored or used beyond statistics on how long sessions last, and how many visitors have used it. (MH) (Reviewed: BK) | Not Citizen science - public engagement | Created for this study | Public engagement, awareness, education |
| 50 | Patrick is a retired factory worker in Cork, Ireland. He is joining a meeting about new plans for flood defences in the River Lee. In the meeting, experts from the municipality and the environmental protection agency are sharing information about the plans. He shares his memories about past flood events and the woodland that used to be near the city when he was young. The discussion in the meeting includes other people from the area, who share their local knowledge about the river, and the experts inform the people in the meeting that they will take their comments when revising their plans. | Not Citizen Science - consultation | Created for this study | Consultation |

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