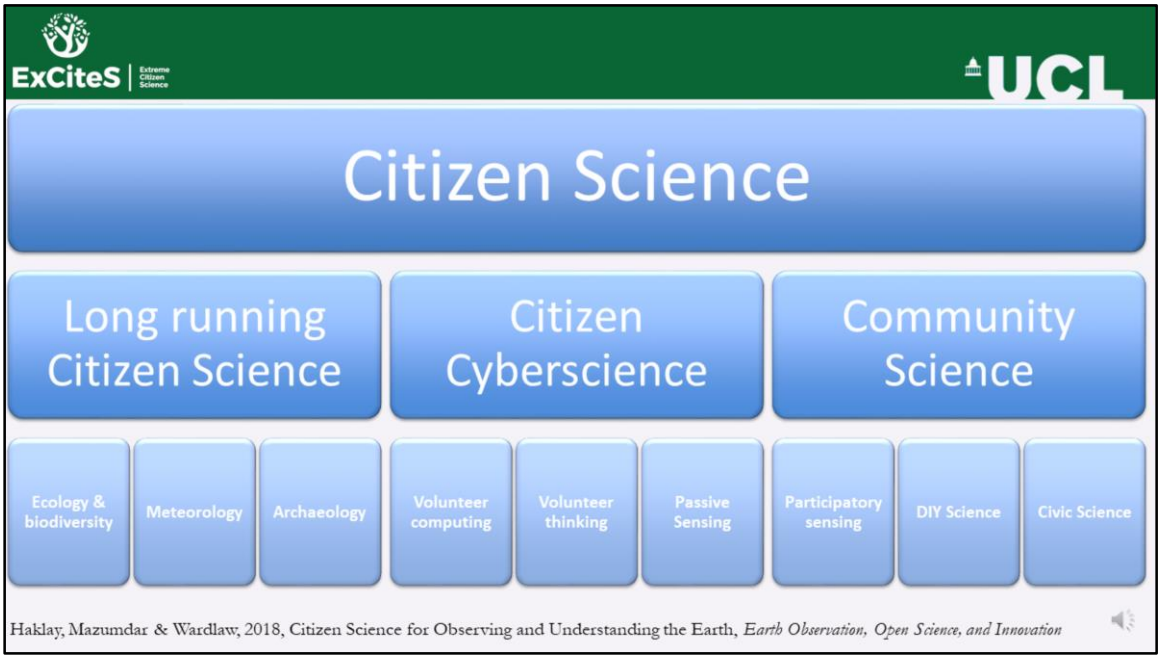
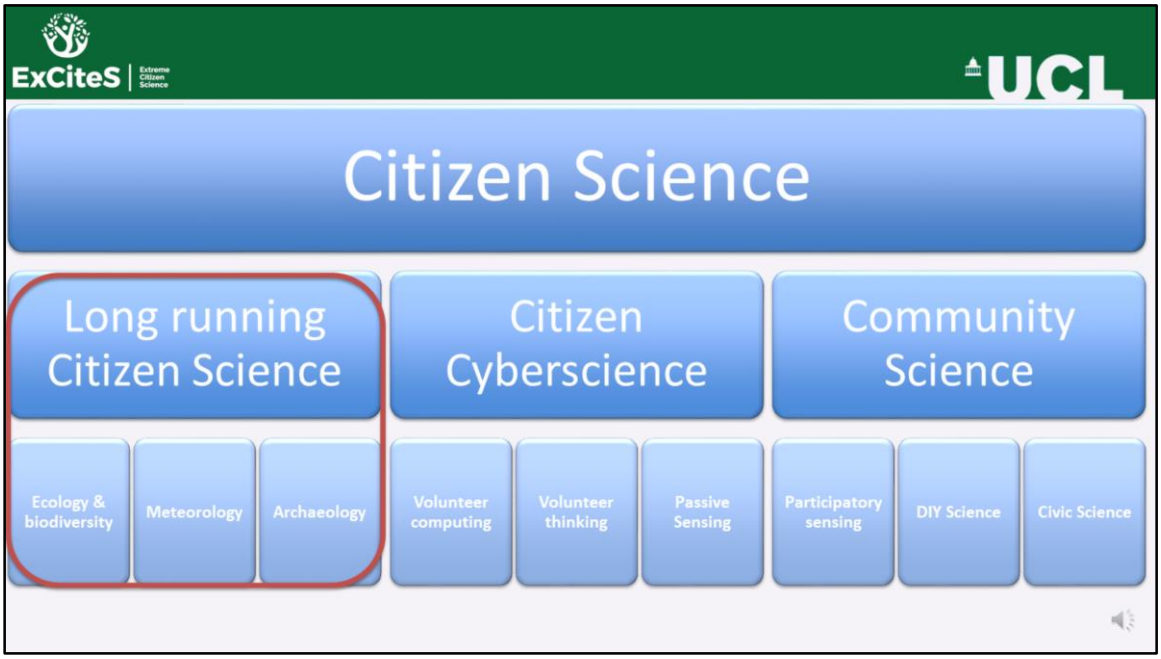
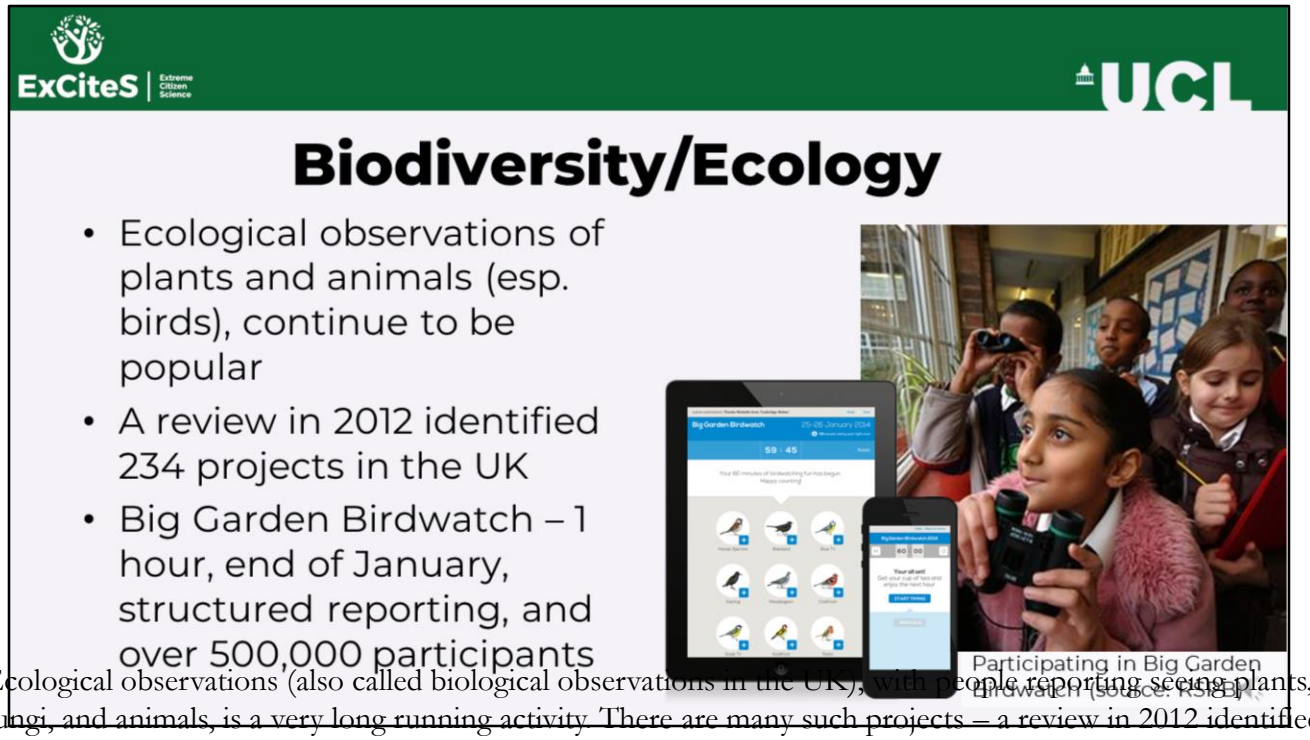


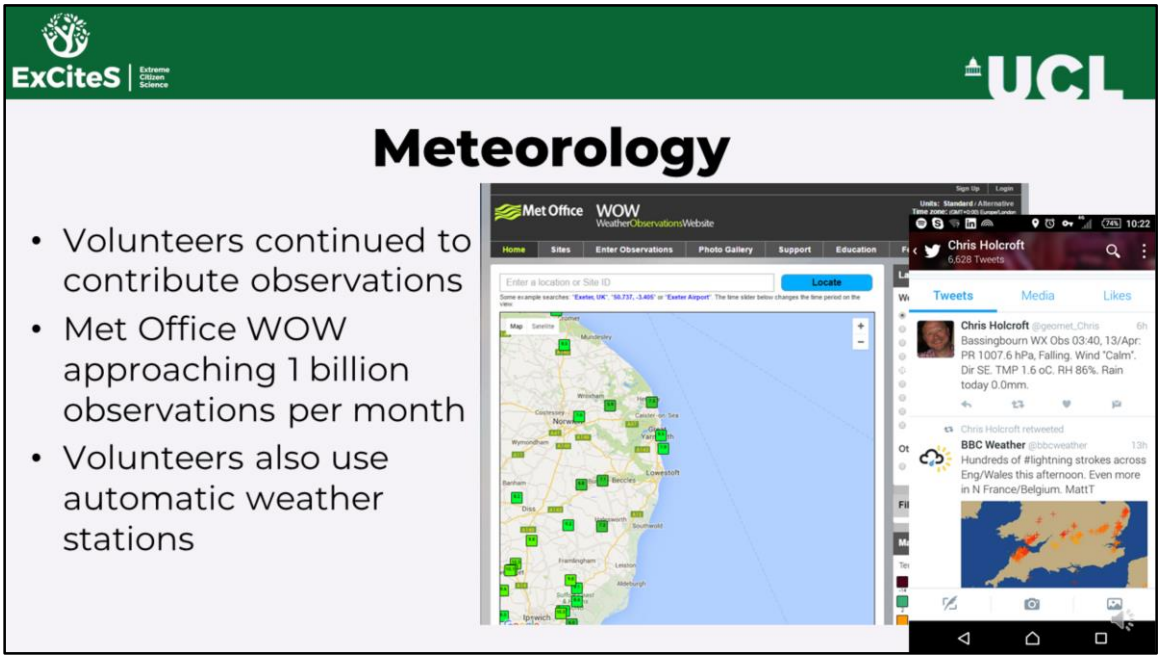
In the next few minutes, we will look at different types of citizen science projects so we see the wide range of activities that fall into the topic of citizen science. The overview will take us through different areas of science (domains), use of technology, and who is running the activity. You can find this overview in the additional reading for the class



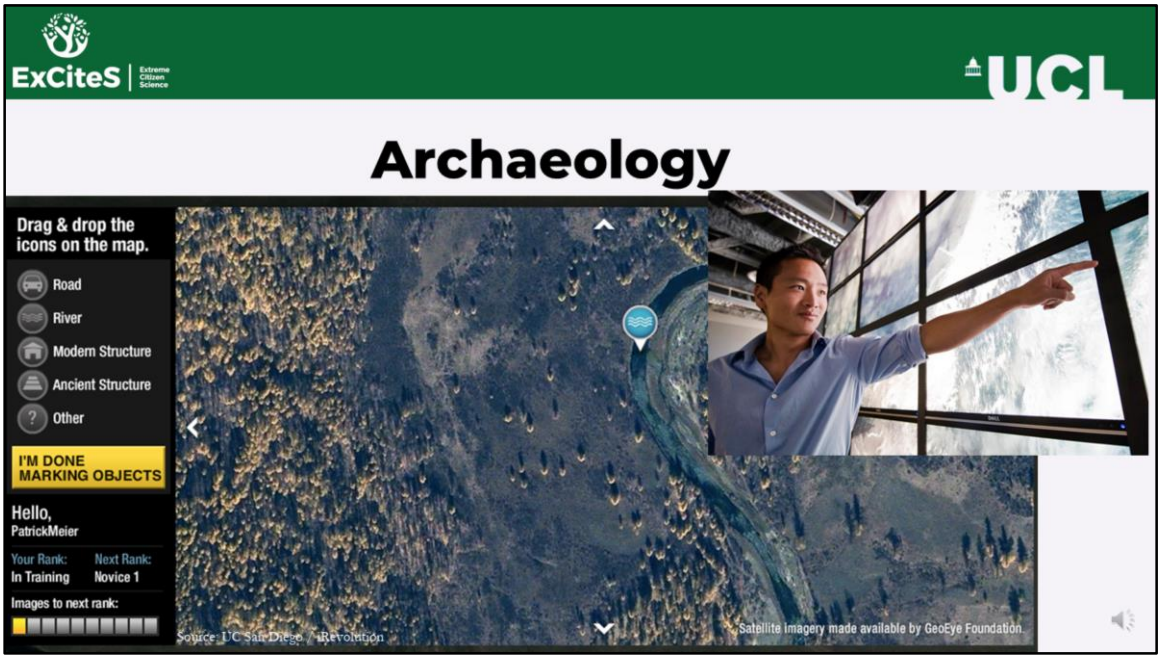
Let's start by looking at some of the areas where citizen science continued to be part of the scientific activities of an area, but changed with technology and participation. Here are some examples from three of the areas where citizen science have been going on for a long time.



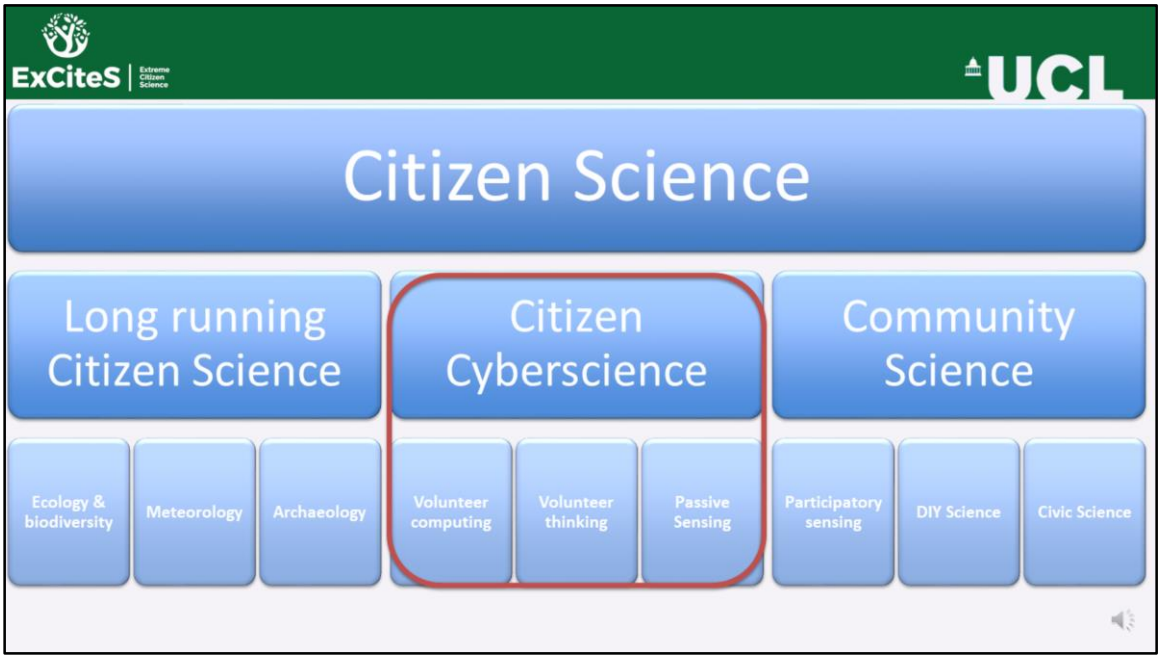
Ecological observations (also called biological observations in the UK), with people reporting seeing plants, fungi, and animals, is a very long running activity. There are many such projects – a review in 2012 identified over 230 projects in the UK. A good example for this is a Big Garden Birdwatch – a mass participation project run by the Royal Society for the Protection of Birds (RSPB) and engaging over half a million people to spend one hour, on a weekend, at the end of January, looking to the garden and reporting on the birds that they see. "A long-running citizen science project, the strengths of Big Garden Birdwatch are more obvious on engagement and communication aspects than they are on science. This activity involves an extremely large number of people, many of whom would not class themselves as birdwatchers but are encouraged to watch the familiar birds in their garden for an hour. This raises awareness and, through this engagement, allows the RSPB to build more support for conservation. The release of the results to the media provides the RSPB with its largest media story each year – thereby reaching more people." (Dr Mark Eaton, RSPB)



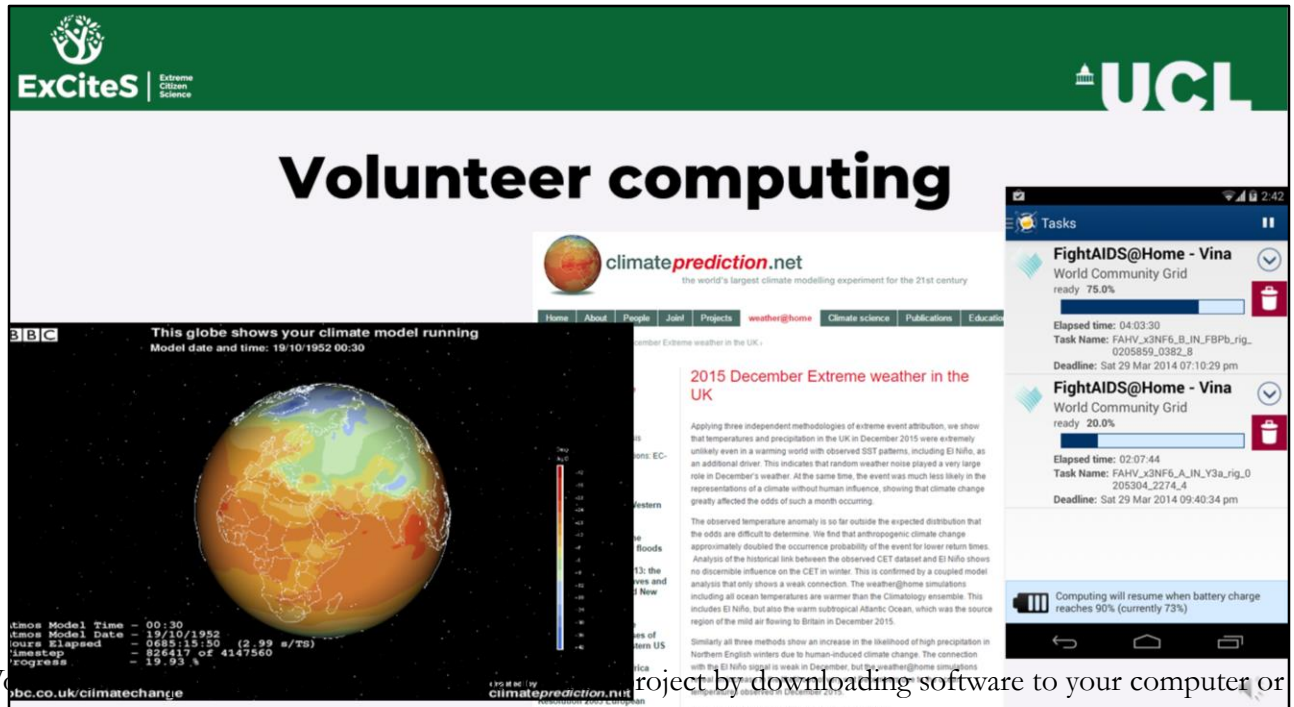
In the UK, we have long-running meteorological records for over 150 years. There is continuous participation of volunteers across the UK in weather observations, providing vital information. In its current incarnation, the Weather Observation Website – WOW is approaching a billion observations per month. Today, some volunteers link their automatic weather station to communication tools such as Twitter to share their observations – as you see in the report in one of my twitter links.



Volunteering in archaeology have a very long history – many people helped professional researchers during digs. In 2010, Albert Yu-Min Lin and colleagues devised a system based on high-resolution satellite imagery to engage over 10,000 volunteers in the task of assessing potential locations for the unknown burial site of Genghis Khan. The system asked volunteers to evaluate an area visually and mark locations that they considered as potentially interesting. The ability to engage a huge number of volunteers enabled the examination of a very large area (6000 sq km), yielding 55 candidate sites for further archaeological studies on the ground. The application that was developed for this task eventually evolved into the Tomnod system, now used by Digital Globe for humanitarian and other crowdsourcing efforts.

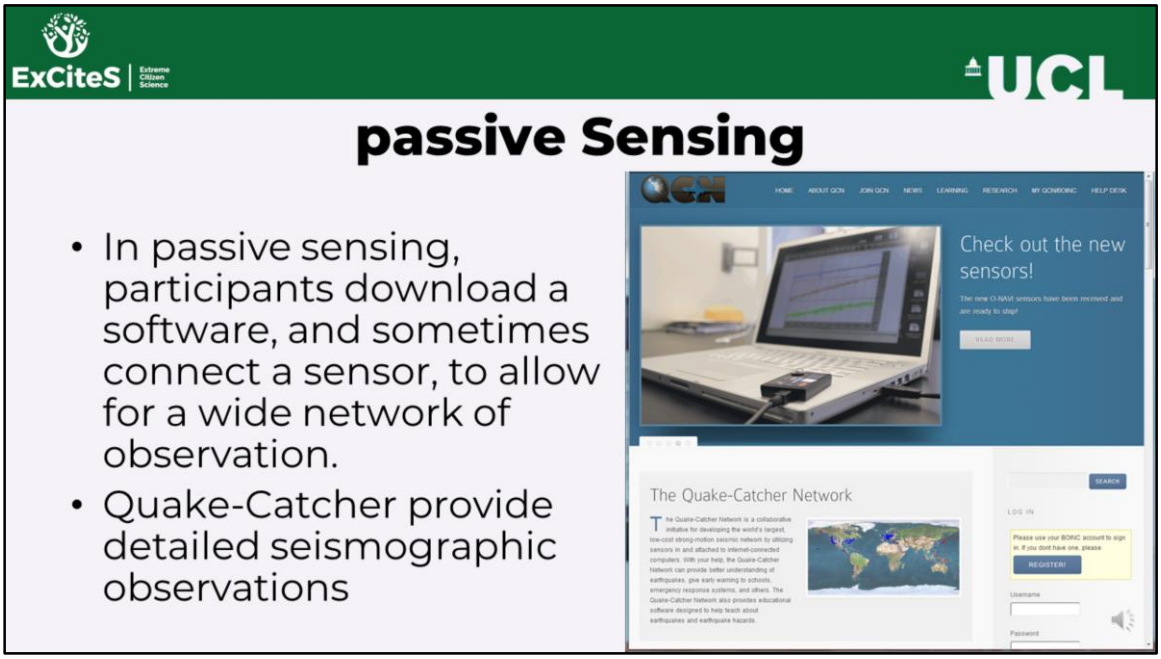


The next group of projects that we will look at are part of Citizen Cyberscience - a term that Francois Gray coined in 2009, defining citizen cyberscience as an activity that completely relies on the use of the internet and computing devices. Citizen cyberscience could not take place without the internet and therefore it is new.

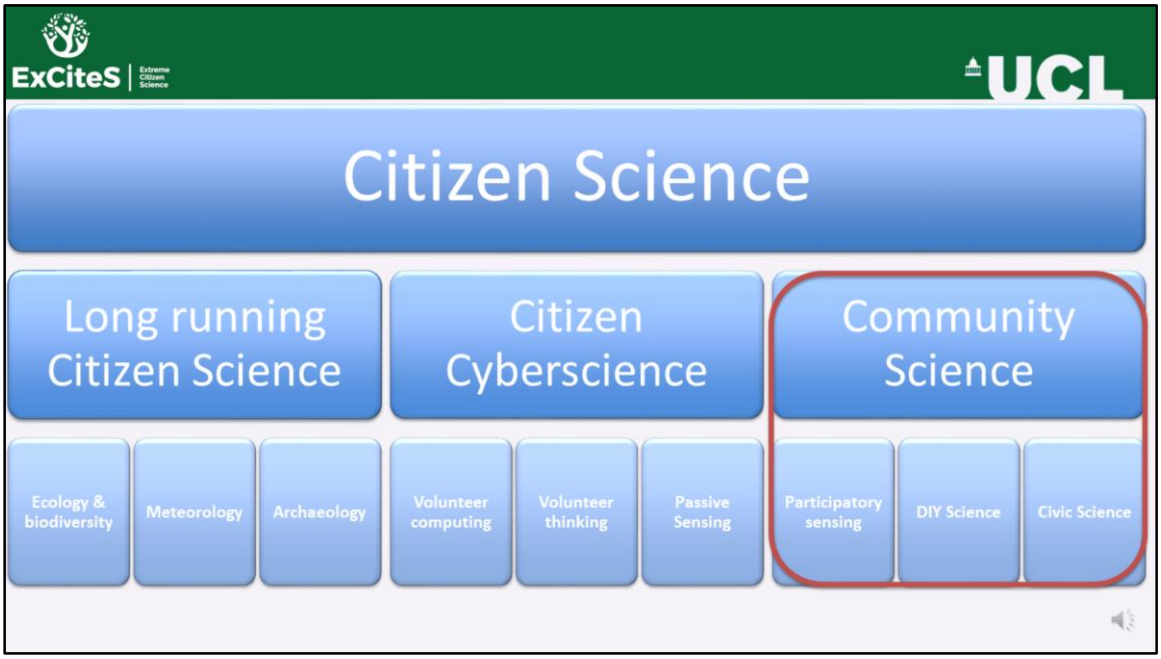


Volunteer computing projects allow you to participate in a research project by downloading software to your computer or smartphone, which allows it to use the device processing capacity when you are not using it (which is most of the time) and put it into good use. An example from earth sciences is the climate prediction project (weather@home), where people let scientists at Oxford University run climate models on their computers. There are also many health-related projects in this area.

Volunteer thinking is when people participate in a project that sends them information over the internet and asks them to classify or annotate it. Here is an example from Zooniverse, the largest collection of such projects which started with Galaxy Zoo (a project in astronomy) and continue to project like this one, Snapshot Serengeti, in which scientists are sharing images from movement sensitive camera (known as Camera trap) and then ask volunteers to classify which animal was seen in the image, or any other interesting detail.



Finally, passive sensing. Participants either connect sensors to their computers or smartphones or use the built-in sensors that are available in devices. Passive sensing is mostly based on automatic data capture and sharing, without the conscious intervention of the volunteer. The Quake-Catcher Network (QCN) is utilising the movement sensors that are integrated into some laptop computers, to enhance observations from existing seismic observation stations. QCN is improving the quality of seismic information that is emerging from events. Interestingly, QCN is utilising the BOINC framework which is widely used in volunteer computing but extends it by linking to sensors

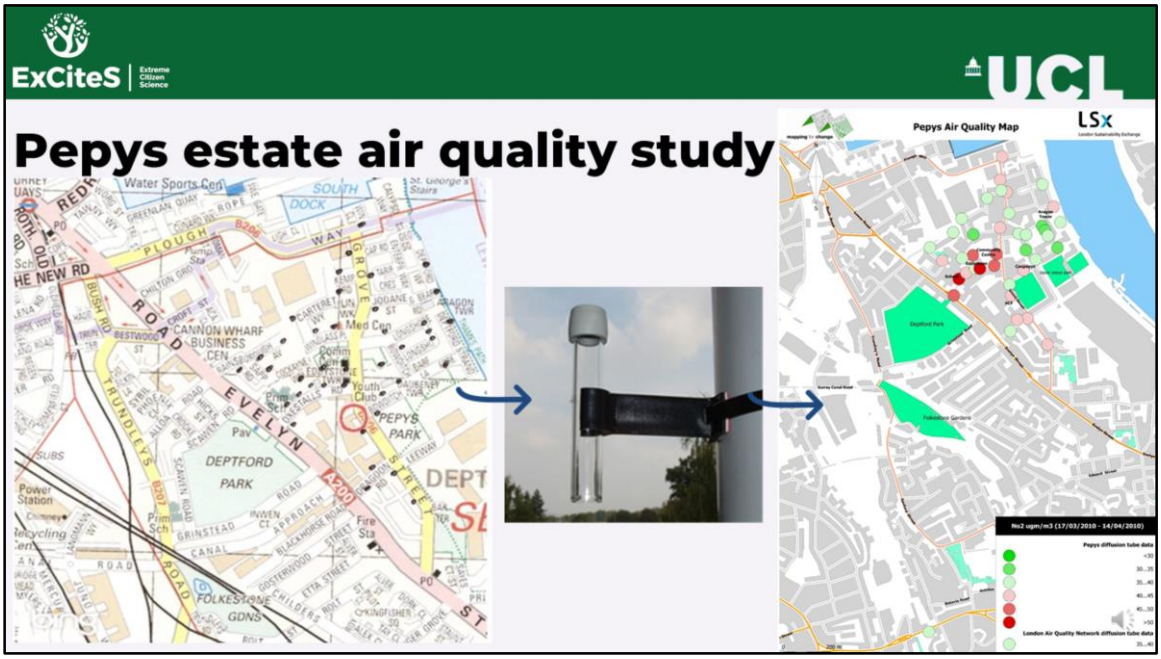


The final part of the tour will look at projects where participants have a wider role in shaping the project. The projects that we looked at so far are led by scientists who are setting the details of the project and then ask people to join in. The set of projects that fall under community science have an increasing role for the participants.

In participatory sensing, the participants in the project have a role to play in deciding the sensing is taken place. It is an activity in which a group of participants contribute together to a body of information. Importantly, while the term is now used liberally to describe a wide range of crowdsourced sensing activities with varying levels of active engagement with the citizen scientists who will carry out the sensing, in the original definition (Burke et al. 2006; Goldman et al. 2009), *"Participatory Sensing emphasizes the involvement of citizens and community groups in the process of sensing and documenting where they live, work, and play... "* . In the everyaware project, the WideNoise app was used with people who live near Heathrow airport, in which they have used the data collection process to demonstrate where they experience airplanes noise.

DIY science is happening when people are using Do It Yourself techniques and approaches to address issues that concern them, either in their environment or in a laboratory. At one end of the spectrum, there are projects of developing flood monitoring and other ways of monitoring the environment, while at the other hand, there are DIY Biology (DIY Bio) where people are exploring aspects of modern biology through exploration of what they can do with DNA analysis – this is called Biohacking.

Another version of DIY science is called civic science – it is when the activities are explicitly linked to community goals and questions the state of things. While some DIY science is done from such a perspective, civic science can also include work with indigenous communities in the use of smartphones to record community resources and other local features, even when the participants are non-literate. The Public Lab of Open Technology and Science is an organisation that develops DIY tools that can aim to assist communities in issues of environmental justice, when a specific community is experiencing more environmental pollution than other places.



Another example is a study that UCL was involved in 2010, in which after a study of noise at the Pepys Estate in Deptford, south London, we carried out a study of air quality in the area, using a simple device – a diffusion tube, which allows measurement of NO2 level – a pollutant from traffic. IT was possible to show that the area near a local scrapyard is especially polluted.