

**Handout 1****What is Citizen Science?**

Today professionals carry out life science. That means people who have qualifications and are paid. Citizen Science is science that involves amateurs. It was once the norm but after a long period of decline is making a resurgence.

For the purposes of today's discussion we will not include amateur bionengineering.  
(Science = Knowing things. Engineering = Making things)

Three main forms of citizen science today are:

*Public Participation Projects (PPPs)*

Members of the public are invite to take part in gathering or analyzing data as part of a larger research project.

*Community labs*

Members of the public coming together in dedicated community research spaces. Often mentored by professionals, members of the public-learn about the scientific method, devise their own projects or assist in ongoing work.

*Crowd funding*

Researchers make a funding page on a website such as Experiment.com and invite members of the public to contribute funding to their project. In return funders will receive access to extensive information on the progress and findings of the research.

## Why – the purpose of citizen science

### Big Data

#### *Collection*

PPPs can be used to gather really large data sets. In particular observations of natural phenomena and collecting botanical/zoological samples.

#### *Analysis*

PPPs can also use the processing power of members of the public. Analyzing images or completing tasks in a gamified setting (e.g. Foldit).

### Money

Crowd-funding allows researchers to carry out work that might not have been funded via traditional outlets.

### Education

Most Citizen Science projects also explicitly aim to educate the public both in terms of specific knowledge topic-based knowledge and understanding of the scientific method itself.

### Participatory research

A fundamentally different motivational model for research. Instead of experts deciding what is of interest, researching and publishing in inaccessible journals, members of the public come together and with the assistance of expert's research things that directly effect their lives and put the results of that research into action within the community. Examples include Maryland's Save our Streams, and HiveBio's Citizen Salmon.

### Further reading

#### Articles:

[http://www.science20.com/anthrophysis/brief\\_history\\_citizen\\_science-93317](http://www.science20.com/anthrophysis/brief_history_citizen_science-93317)

<http://www.bbc.com/future/story/20120329-citizen-science-enters-a-new-era>

#### Resources:

<http://scistarter.com/>

[https://en.wikipedia.org/wiki/List\\_of\\_citizen\\_science\\_projects](https://en.wikipedia.org/wiki/List_of_citizen_science_projects)

Of 170 on-going Citizen Science projects on Wikipedia

73 are Natural History (field-based botany and zoology)

22 are Astronomy

3 are Molecular Biology

also...

1 Art History ([ARTigo](#))

1 Sex Studies (Kinsey Reporter)

1 Quantum Physics (Quantum Moves)

## Handout 2

### Citizen Science is a threat to normative science

#### Funding:

Crowdfunding challenges existing power structures by taking power away from funding agencies, often tightly linked to states and advised by panels of 'senior scientists'. The assessment of good, fundable, science will no longer rest in the hands of professional scientists.

#### Qualification:

Community labs invite non-professionals to work alongside professionals. This could be seen as democratizing. Not only does it challenge the notion that PhD and salary are prerequisites to participation. It also challenges the normal hierarchical power structure.

#### Work practices:

PPPs use the skills of interested members of the public on a large scale. This challenges the traditional role of the lab scientists as data-gatherer and processor; instead the lab scientist is planner, organizer and interpreter of data.

#### Accountability:

PPPs, Community labs and crowd funding all alter the traditional balance of accountability. Most scientists feel accountable to their direct supervisor, their collaborators and their funders. Now they may feel directly accountable to the public.

#### The end is nigh?

The growth of citizen science is occurring alongside a number of major shifts in normative life science. Namely:

Closed access → Open Access

Anonymous pre-publication peer review as gold standard → Open peer review as gold standard

Increase in number of PhD students, without an equal increase in University tenure positions.

Boom in biotechnology research and start ups.

New academic research models such as the Allen Institutes in Seattle.

Growth of Big Data approaches.

The practice of life science research in 2050 will barely resemble that of 2000.