



Thinking through citizen science – activities, policies, and disciplines

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Synopsis

- Overview of citizen science activities today: Modes of participation; Relationships between scientists and the public; The role of technology
- Citizen science and policy: policy cycle
- Citizen science across disciplines



Citizen Science

Long running
Citizen Science

Citizen
Cyberscience

Community
Science

Ecology &
biodiversity

Meteorology

Archaeology

Volunteer
computing

Volunteer
thinking

Passive
Sensing

Participatory
sensing

DIY Science

Civic Science



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Open Air Laboratories (OPAL)

The OPAL project, funded by the Big Lottery Fund, aims to (i) change lifestyles by encouraging people to spend more time outdoors; (ii) develop innovative educational programmes that can be accessed by all ages and abilities; (iii) enthuse a new generation of environmentalists; (iv) develop a greater understanding of the state of the natural environment especially in the most impoverished parts of the country; (v) develop partnerships between the community, voluntary and statutory sectors. 31 projects comprise the OPAL 'portfolio' to attain these aims. The OPAL Water Centre at UCL co-ordinated the national water survey and undertakes research at a lake site in each of nine regions of England. This research includes establishing a physical, chemical and biological monitoring programme and assessing the impact of toxic pollutants on freshwaters. Part of this involved assessing historical change through biological and geochemical analysis of sediment cores from each lake. The facility provided the sediment core chronologies.

Project web page: <http://www.opalexplornature.org/>

Davies, L., Bell, J.N.B., Bone, J., Head, M., Hill, L., Howard, C., Hobbs, S.J., Jones, D.T., Power, S.A., Rose, N.L., Ryder, C., Seed, L., Stevens, G., Toumi, R., Voulvoulis, N. & White, P.C.L. (2011). Open Air Laboratories (OPAL): A community-driven research programme. *Environmental Pollution* 159: 2203-2210.





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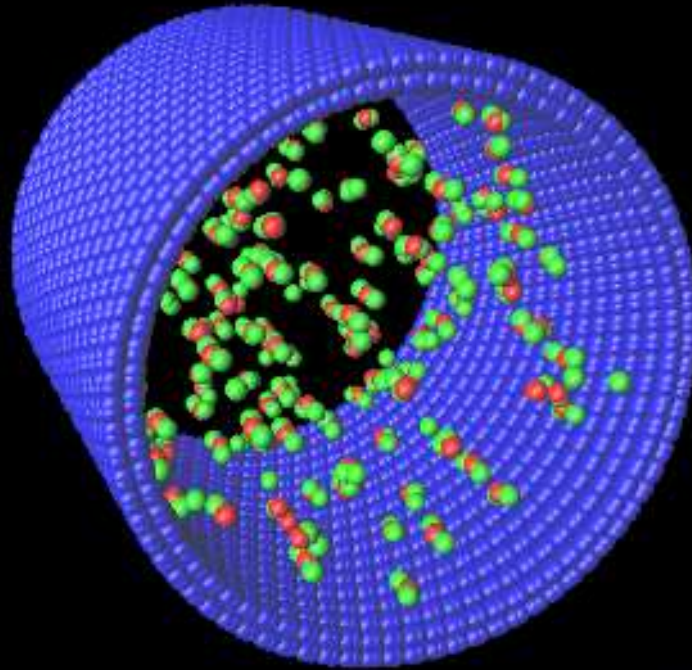
DIY Science

Civic Science






Volunteer computing


Computing for Clean Water 







Prog: 10.0%

 world community grid.
technology solving problems




Powered by  




Tasks 


 **FightAIDS@Home - Vina** 
World Community Grid
ready 75.0% 

Elapsed time: 04:03:30
Task Name: FAHV_x3NF6_B_IN_FBPb_rig_0205859_0382_8
Deadline: Sat 29 Mar 2014 07:10:29 pm

 **FightAIDS@Home - Vina** 
World Community Grid
ready 20.0% 

Elapsed time: 02:07:44
Task Name: FAHV_x3NF6_A_IN_Y3a_rig_0205304_2274_4
Deadline: Sat 29 Mar 2014 09:40:34 pm

 Computing will resume when battery charge reaches 90% (currently 73%)

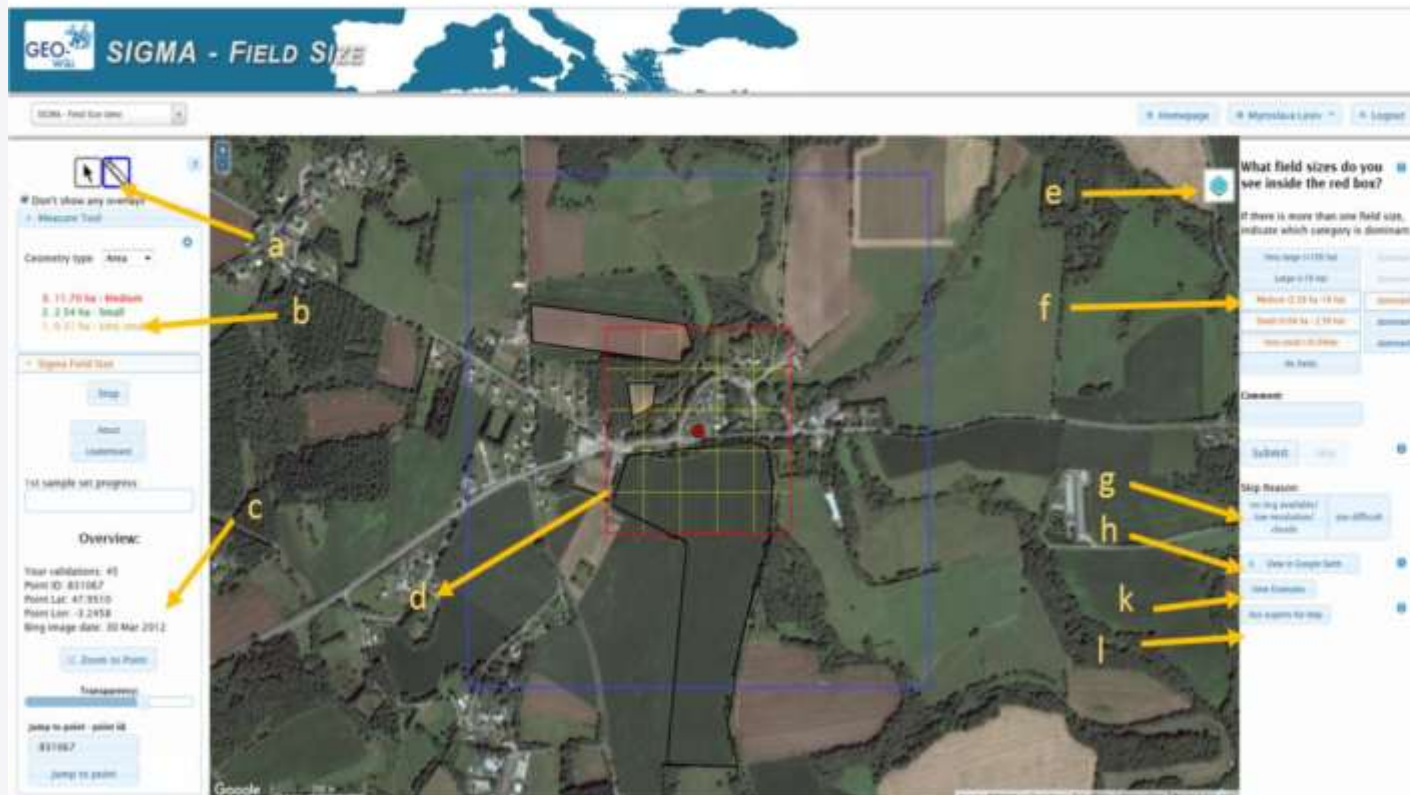




Volunteer Thinking



Geo-Wiki interface



- a) area measuring tool
- b) fields that has been delineated and measured by a participant
- c) overview board with a work that has been done by a participant
- d) system of grids
- e) access to different open layers, e.g. Google or Bing
- f) buttons to select fields a participant sees in a red box: very large, large, medium, small, and very small, no fields
- g) skip buttons
- h) button to open current location in Google Earth Application
- k) view examples
- l) ask experts for help



Search Where is this?

Welcome to OpenStreetMap!

OpenStreetMap is a map of the world, created by people like you and free to use under an open licence.

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[Learn More](#)

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Welcome to Transcribe Bentham!

By [uczwlse](#), on 6 December 2017



Jeremy Bentham

'Many hands make light work. Many hands together make merry work', wrote the philosopher and reformer, [Jeremy Bentham](#) (1748–1832) in 1793.

In this spirit, we cordially welcome you to *Transcribe Bentham*, a double award-winning collaborative initiative which is crowdsourcing the transcription of Bentham's previously unpublished manuscripts.

Anyone can start transcribing at our [Transcription Desk](#). Your transcripts will contribute to the production of Bentham's *Collected Works* and preserve Bentham's writings into the future.

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Passive Sensing

- In passive sensing, participants download a software, and sometimes connect a sensor, to allow for a wide network of observation.
- Quake-Catcher provide detailed seismographic observations



QCN

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Check out the new sensors!

The new Q-NAVI sensors have been received and are ready to ship!

READ MORE

The Quake-Catcher Network

The Quake-Catcher network is a collaborative initiative for developing the world's largest, low-cost strong-motion seismic network by utilizing sensors in and attached to internet-connected computers. With your help, the Quake-Catcher Network can provide better understanding of earthquakes, give early warning to schools, emergency response systems, and others. The Quake-Catcher Network also provides educational software designed to help teach about earthquakes and earthquake hazards.

SEARCH

LOG IN

Please use your BOINC account to sign in. If you don't have one, please

REGISTER!

Username

Password



BBC Pandemic experiment

2018





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Participatory Sensing



OdourCollect
392 Tweets

ODOUR COLLECT

Follow

OdourCollect
@Odourcollect Follows you

Mapping odours with #CitizenScience for citizens' empowerment. Smell and share!
Idea by @RosaAriasAlv developed by @ibercivis Seed and main tool of @dNOSES_EU

Barcelona, España odourcollect.eu Joined December 2016

428 Following 284 Followers

Followed by Citizen Science Global Partnership, CitSci TC, and 31 others you follow



[UCL Home](#) » [The Bartlett](#) » [UCL Institute for Global Prosperity](#) » "Rethinking what prosperity means for London": a new film for the London Prosperity Board

"Rethinking what prosperity means for London": a new film for the London Prosperity Board

15 March 2019

The Institute for Global Prosperity's London Prosperity Board has produced the short film, "Rethinking what prosperity means for London", presenting our work in East London and citizen science-led approach to research. Film credit: Matt Ballard



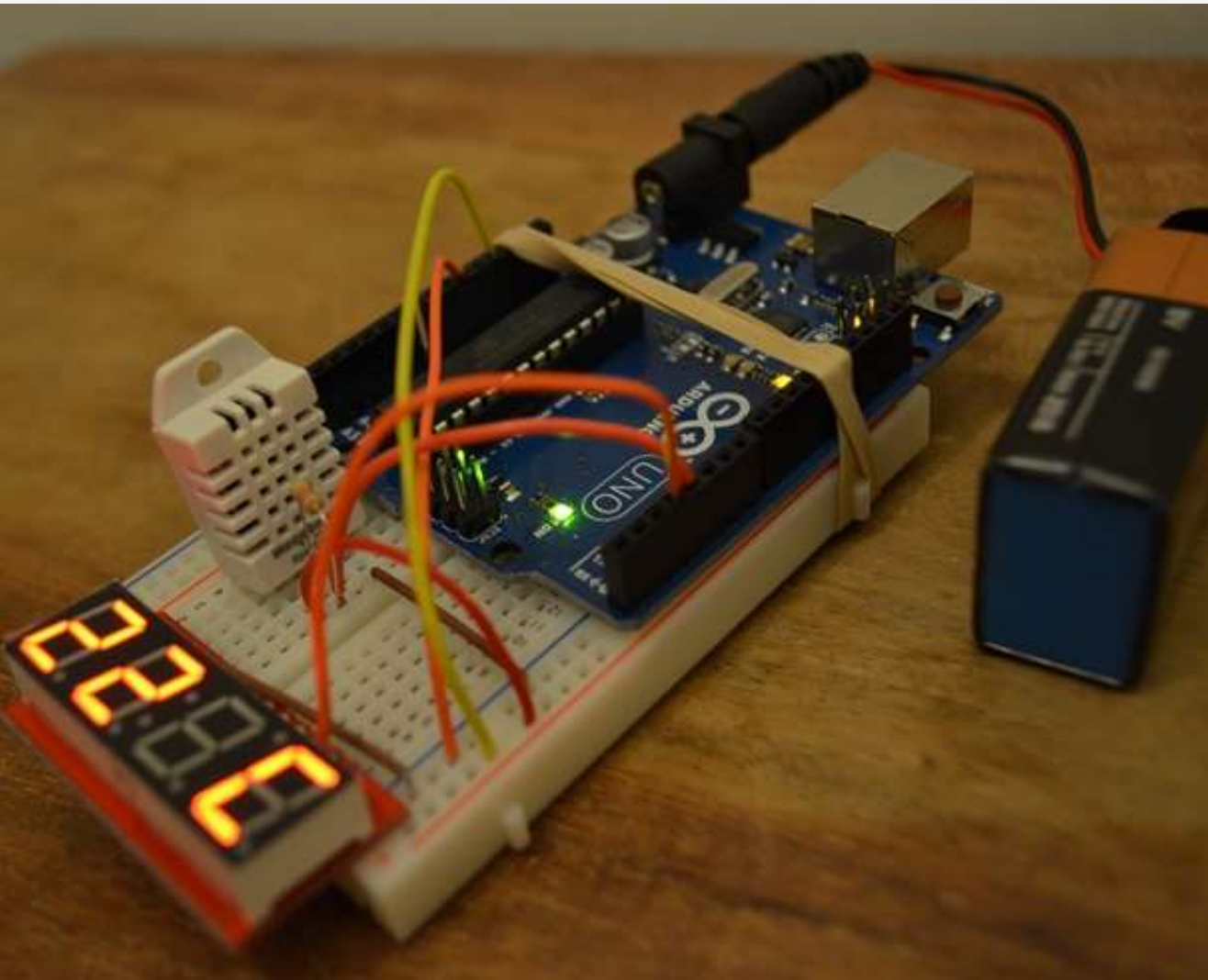
Visit the [London Prosperity Board website](#)



The London Prosperity Board is an innovative partnership between the Institute for Global Prosperity, UCL, London government, public agencies, businesses, the third sector, and local communities in East London.



DIY Science



Join the Flood Network Community



BECOME A FLOODWATCHER - KEEP AN EYE ON THE MAP

You don't need any fancy technology to become a Floodwatcher. You can take readings from gaugeboards or take photos and we can include them in our data. We're building a network of people and sensors around the country to monitor flooding at a local level.

The information helps people to make better decisions during floods and quickly shares knowledge of a changing situation. We combine Environment Agency data with crowdsourced sensors in ditches, streams, drains and even under floorboards to give a near real-time picture of levels.

INSTALL A FLOOD MONITOR

Do you live within 40m of a river or stream and have broadband? Would you like to know water levels when you're not home? Flood Monitor contributes to the resilience of your community by sharing this information.

You can install a Flood Monitor and see your readings live on the map every 15 minutes. Flood Monitors (£250) are available to groups or individuals who'd like an unobtrusive, low-cost way of monitoring water levels and contributing this to a bigger community.

If you'd like a sensor then email us and we'll get in touch. We have a small supply of sensors to donate to community groups and individuals can buy one for £250.





Bento lab – DIY biology tool

Take your lab wherever you go

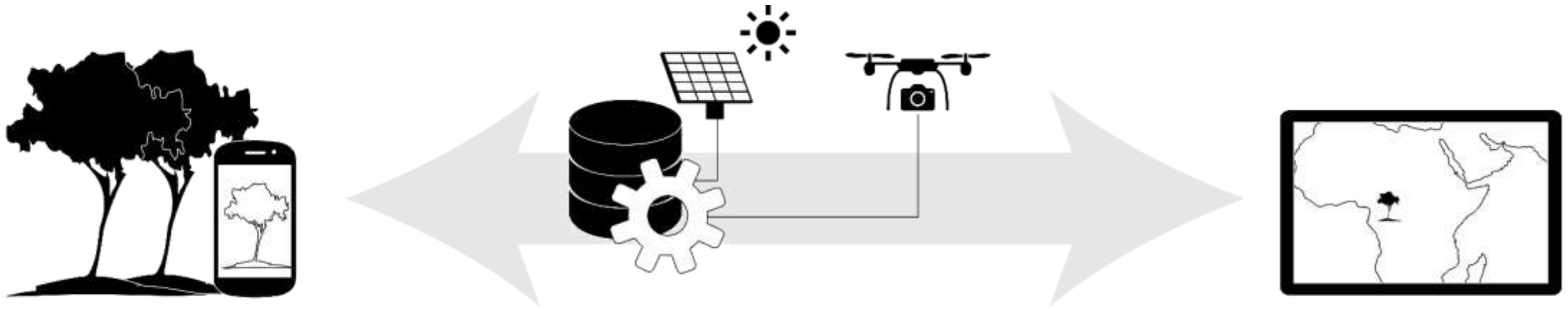
The mobile genomics setup.
Combines centrifuge, PCR and gel visualisation.
Portable and ready-to-go.

[Buy Now](#)

[Watch Video](#)



Geography, Anthropology, Computing: Towards Intelligent Maps



Data collection

Sapelli, ODK, EpiCollect, CyberTracker

Data repository and management

GeoKey

Data analysis and visualisation

Intelligent Maps



Sapelli | Collector



GeoKey



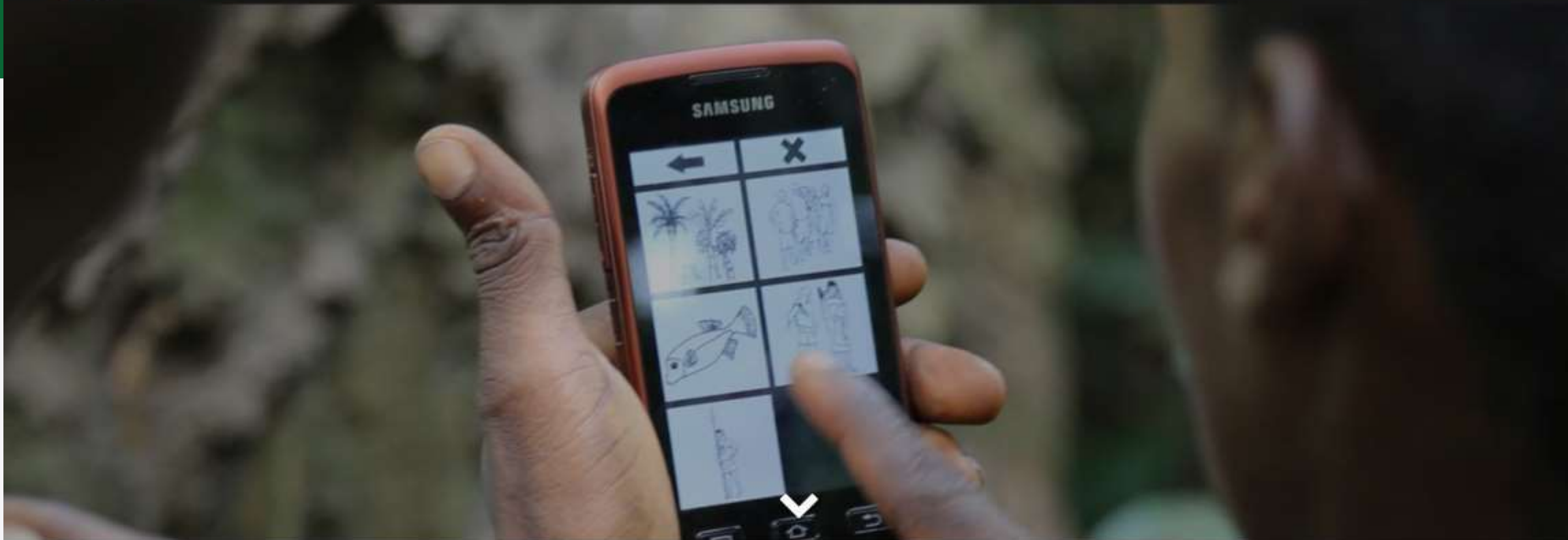
Sapelli | Viewer



This project has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (Grant agreement No. 694767)

EPSRC

Engineering and Physical Sciences
Research Council



Sapelli is an open-source project that facilitates data collection across language or literacy barriers through highly configurable icon-driven user interfaces. We encourage people to download the app from the [Google Play store](#), or from our [GitHub repository](#) and deploy it for their own purposes.

The sequence of interfaces that will be presented to the user in the project is described in the project's XML file. The transmission of complete records is handled autonomously by the Sapelli platform, which periodically checks for connectivity and determines the most appropriate means by which to transmit the compressed data to another phone or a [GeoKey](#) web server.



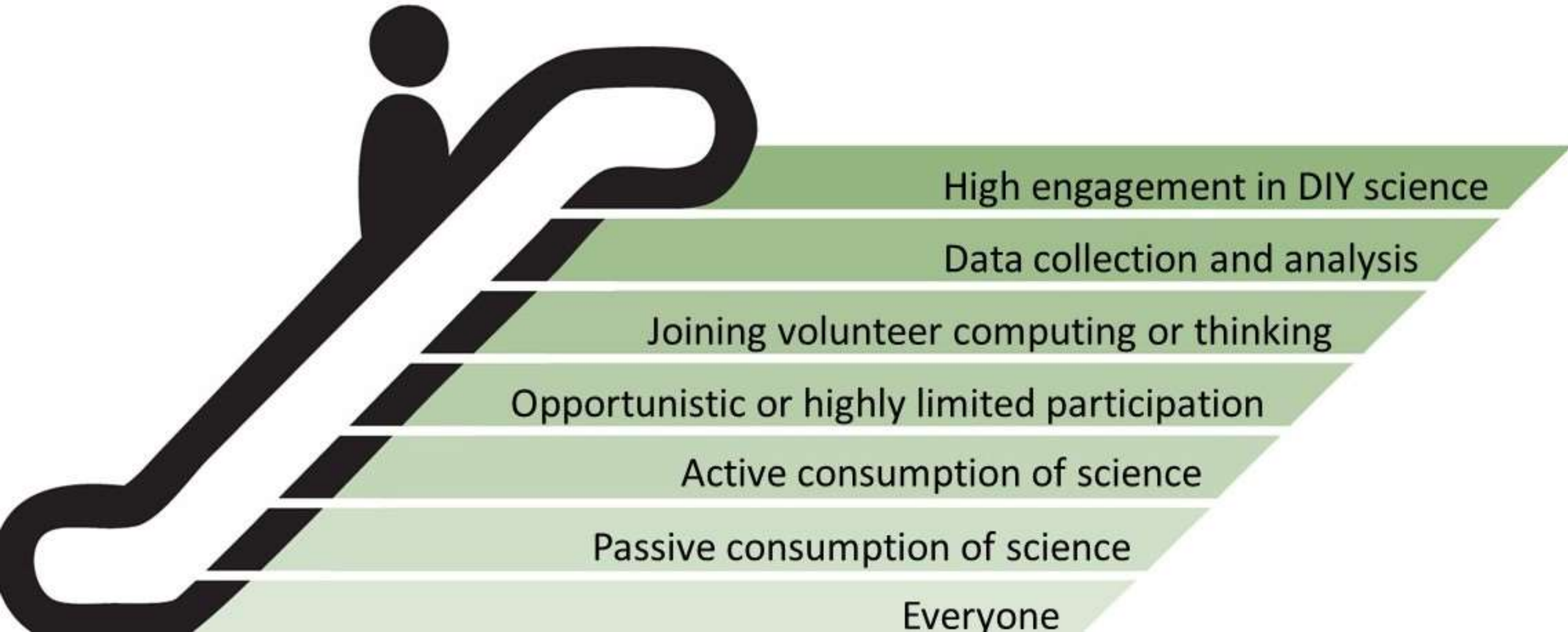
Maasai Mara, Kenya



This project has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (Grant agreement No. 694767)



Citizen Science with public engagement





THE POLICY CONTEXT OF CITIZEN SCIENCE: ENVIRONMENT, BIOMEDICAL, EDUCATION, AND SCIENCE



The role of policy in citizen science

- As an emerging practice *citizen science* needs:
 - Legitimacy and acceptance as an effective methodology in scientific practice, and in use of scientific information
 - Funding to support project personnel, equipment, digital and physical infrastructure
 - Support for coordination efforts across projects, sharing of best practice and new innovations



Policy Cycle

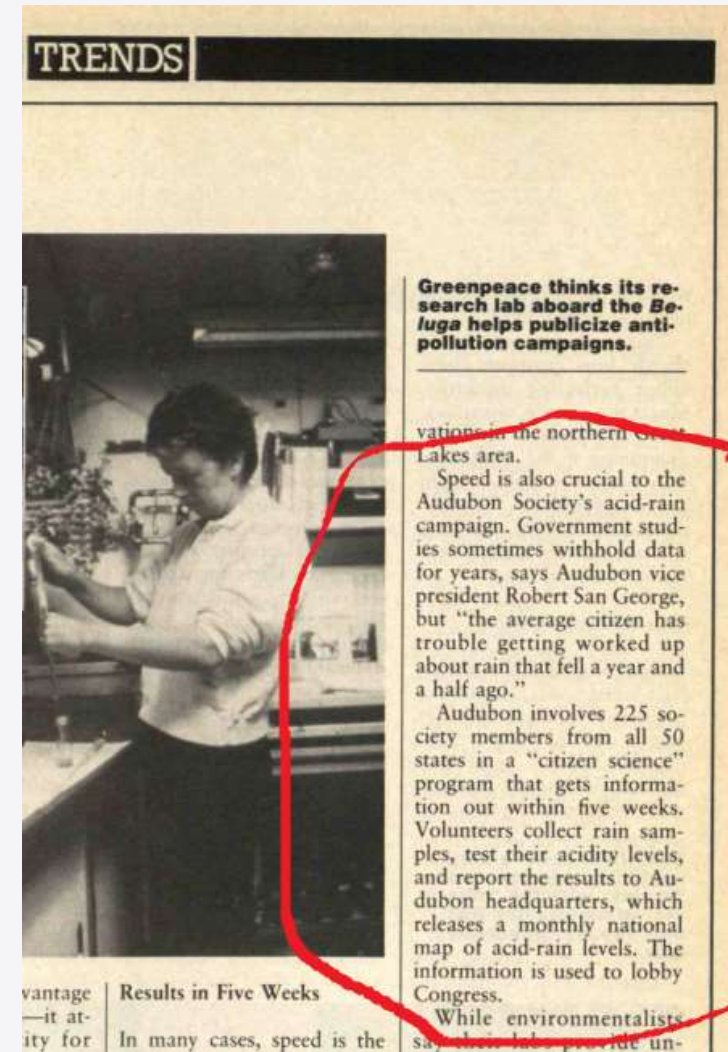
- We can look at the policy process as a cycle – agenda setting, formulation, decision-making, implementation, and evaluation





1 – Agenda setting

- Audubon Society 1989 Acid rain campaign was set to show the geographical scale and prevalence of a problem
- Also relevant in raising interest, consultation and lay participation in formulation of issues





2 – Policy Formulation

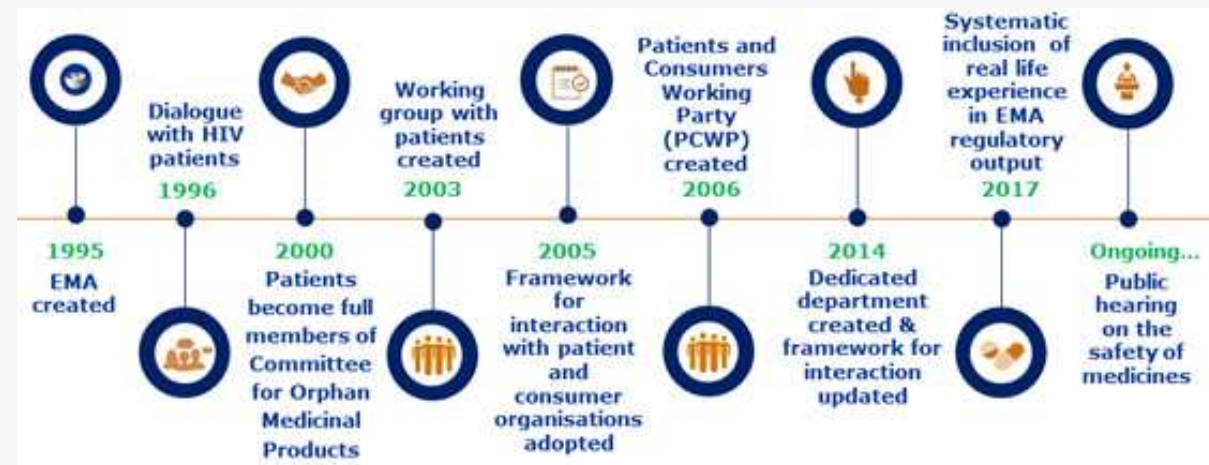
- Discovery trips in Doing It Together Science project – e.g. bringing Polish policy makers to London to learn about citizen science on air quality (2017)
- Policy formulation require a deeper understanding of the issues, evaluation of possible steps and their impacts





3 - Decision making

- Usually done by state entities
- Potential to influence through lobbying and direct communication with decision makers
- Example: ACT UP FDA campaign - lobbying and action





4 – Policy Implementation

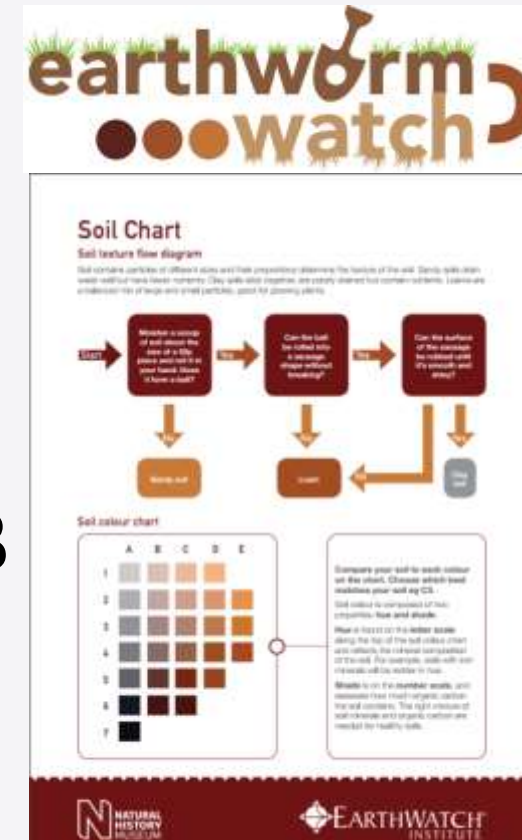
- Policy implementation require the active monitoring, data collection for enforcement, providing guidance on implementation and compliance
- Water monitoring in the USA, verifying that water quality is within the agreed standards.





5 – Policy evaluation

- Evaluation is aimed at ensuring that policy implementation is effective – achieving the expected outcomes that were set in the early stages
- Long term monitoring – for example running Earthworm Watch to understand changes in soil conditions over time. RSPB Big Garden Birdwatch examine changes over time.





Policy fields

Policy field	Type of issues and activities
Environmental management	Monitoring water quality, biodiversity observations, meteorological measurements
Education	Science, Technology, Engineering and Mathematics (STEM) focus education; Science teaching; Informal education
Culture & Museums	Deeper engagement with visitors and wider educational mission of institutions
Science	Allocation of budgets to different science activities; maintaining public trust and support of science; public engagement
Health & medicine	Patients engagement; DIY biology experimentation

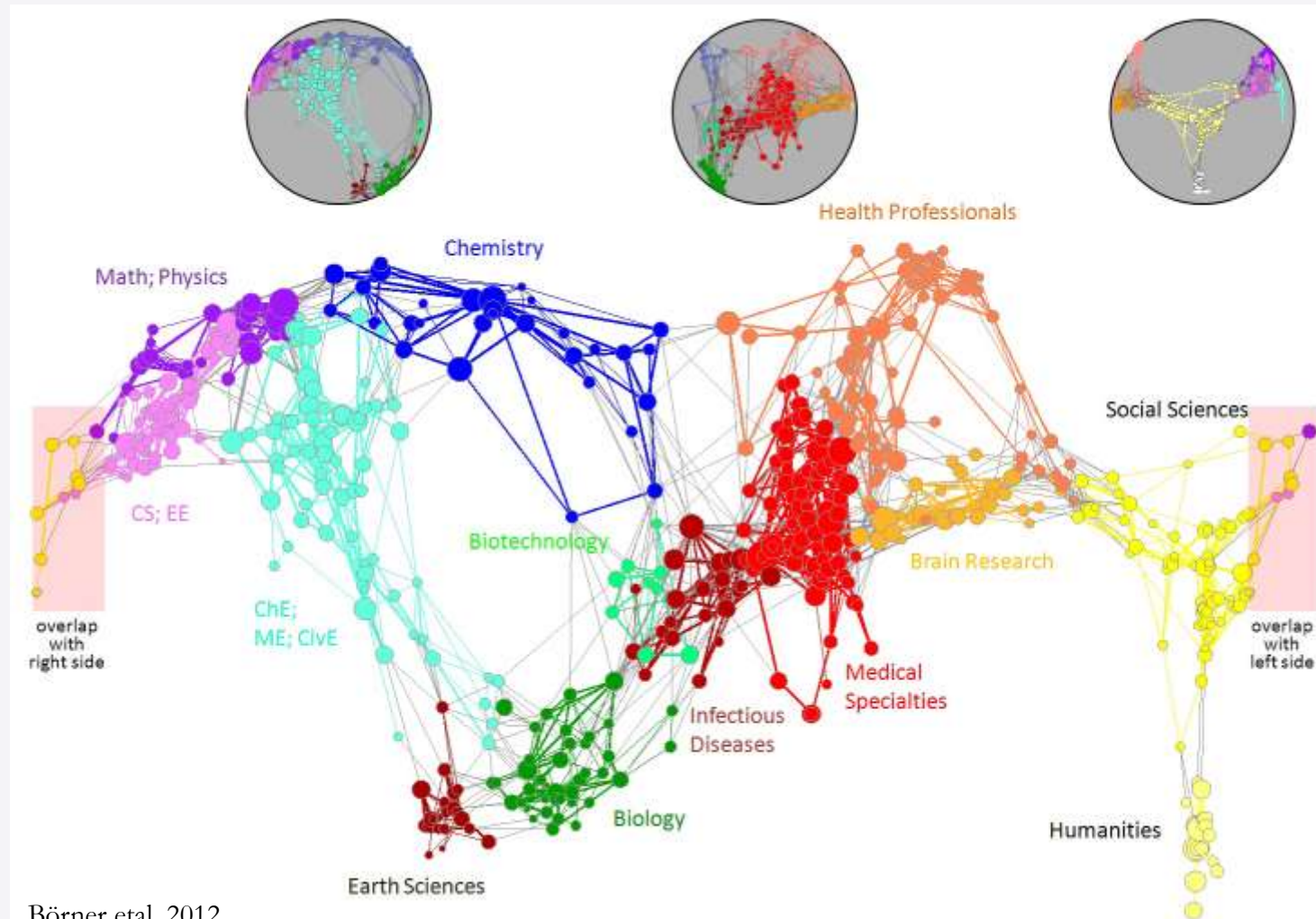


CITIZEN SCIENCE ACROSS DISCIPLINES



Scientific disciplines

- Form of organisation of knowledge – especially in research institution and universities
- Defined by departments, journals, conferences, and learned societies
- Influence what is studied and how





Epistemology and ontology

- Two critical terms to understand academic disciplines ways of developing their knowledge.
- **Ontology:** what is reality?
- **Epistemology:** how do you know about it?
- **Methodology:** how do you find out what you know?

- In most scientific disciplines, these “infrastructure” concepts are taken for granted



Ecology: biodiversity observations

- Part of biology
- Focusing on the interaction between organisms and their environment: behaviour, evolution, and understanding ecosystems
- Looking at complex environments and using holistic approaches
- Working through inductive and deductive cycles of inquiry



Citizen science in ecology

- Need for an holistic data collection
- Organised activity: BioBlitz
- Opportunistic activity: iNaturalist projects





Hypothesis-led citizen science



The LeafWatch app makes it easier than ever to take part in Conker Tree Science. Taking part with the app means you can report damage done by the horse-chestnut leaf-miner while you are out-and-about, and it is free to download.

Take part: [Leafwatch app for Android](#) | [Leafwatch app for iPhone](#) | [via the website](#)

You can also report trees without damage caused by the leaf-miner - making the overall data of even greater value to scientists in tracking the latest spread of the leaf-miner.

By using the app you can automatically get your location (via your phone's GPS) and easily take a photo allowing us to verify your record.

When using the app, make sure that you do not confuse it with damage caused by the fungal leaf blotch. The simple rule is: if it has a **yellow ring** around the brown irregular patch of damage, it is **not the leaf-mining moth** the fungal leaf blotch - the leaf-mining moth never has yellow around the blotches.

You can still make reports via the website as well, and your login works for both the app and website, making it easy for you to keep track of your own records and your contribution to Conker Tree Science.



OPEN ACCESS Freely available online



The Success of the Horse-Chestnut Leaf-Miner, *Cameraria ohridella*, in the UK Revealed with Hypothesis-Led Citizen Science

Michael J. O. Pocock^{1*}, Darren M. Evans²

¹Centre for Ecology & Hydrology, Wallingford, Oxfordshire, United Kingdom, ²School of Biological, Biomedical and Environmental Sciences, University of Hull, Hull, United Kingdom

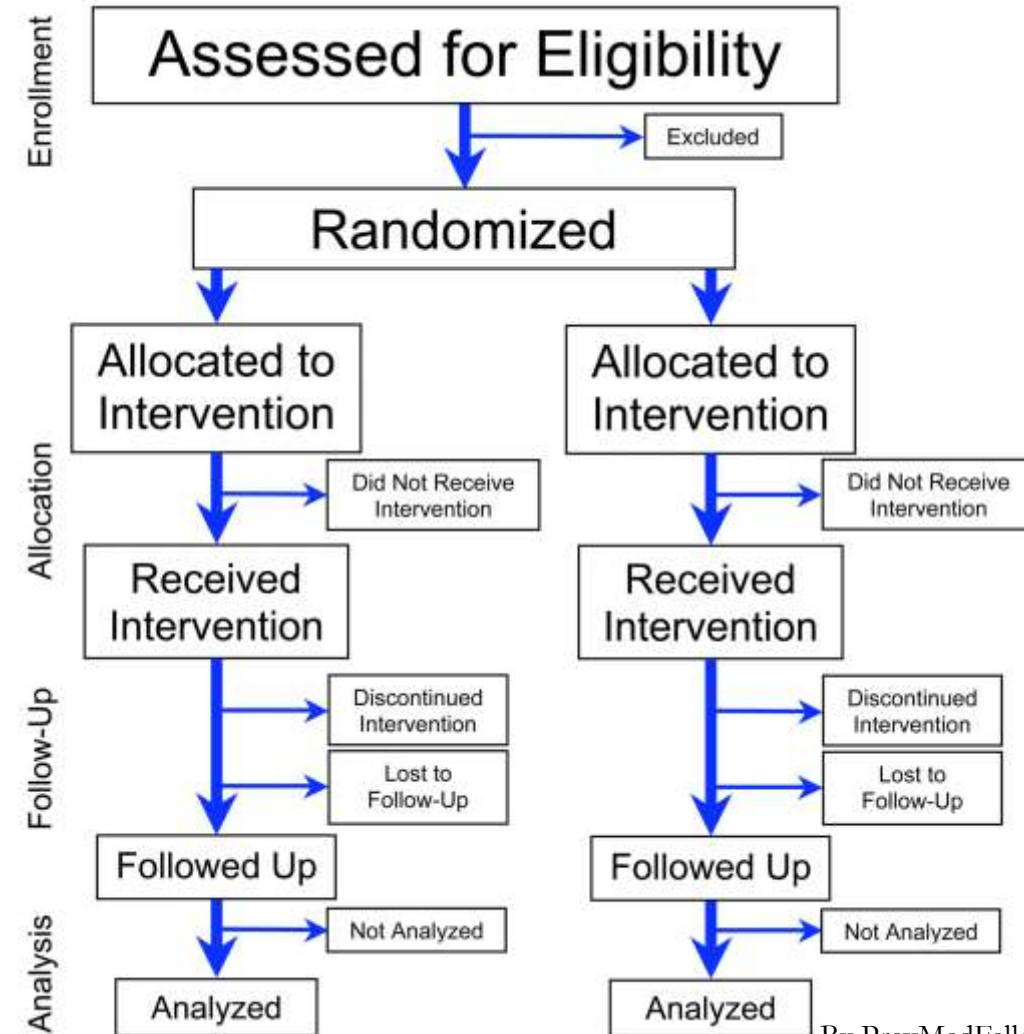
Abstract

Citizen science is an increasingly popular way of undertaking research and simultaneously engaging people with science. However, most emphasis of citizen science in environmental science is on long-term monitoring. Here, we demonstrate the opportunities provided by short-term hypothesis-led citizen science. In 2010, we ran the 'Conker Tree Science' project, in which over 3500 people in Great Britain provided data at a national scale of an insect (horse-chestnut leaf-mining moth, *Cameraria ohridella*) undergoing rapid range-expansion. We addressed two hypotheses, and found that (1) the levels of damage caused to leaves of the horse-chestnut tree, *Aesculus hippocastanum*, and (2) the level of attack by parasitoids of *C. ohridella* larvae were both greatest where *C. ohridella* had been present the longest. Specifically there was a rapid rise in leaf damage during the first three years that *C. ohridella* was present and only a slight rise thereafter, while estimated rates of parasitism (an index of true rates of parasitism) increased from 1.6 to 5.9% when the time *C. ohridella* had been present in a location increased from 3 to 6 years. We suggest that this increase is due to recruitment of native generalist parasitoids, rather than the adaptation or host-tracking of more specialized parasitoids, as appears to have occurred elsewhere in Europe. Most data collected by participants were accurate, but the counts of parasitoids from participants showed lower concordance with the counts from experts. We statistically modeled this bias and propagated this through our analyses. Bias-corrected estimates of parasitism were lower than those from the raw data, but the trends were similar in magnitude and significance. With appropriate checks for data quality, and statistically correcting for biases where necessary, hypothesis-led citizen science is a potentially powerful tool for carrying out scientific research across large spatial scales while simultaneously engaging many people with science.



Biomedicine: randomised control trials

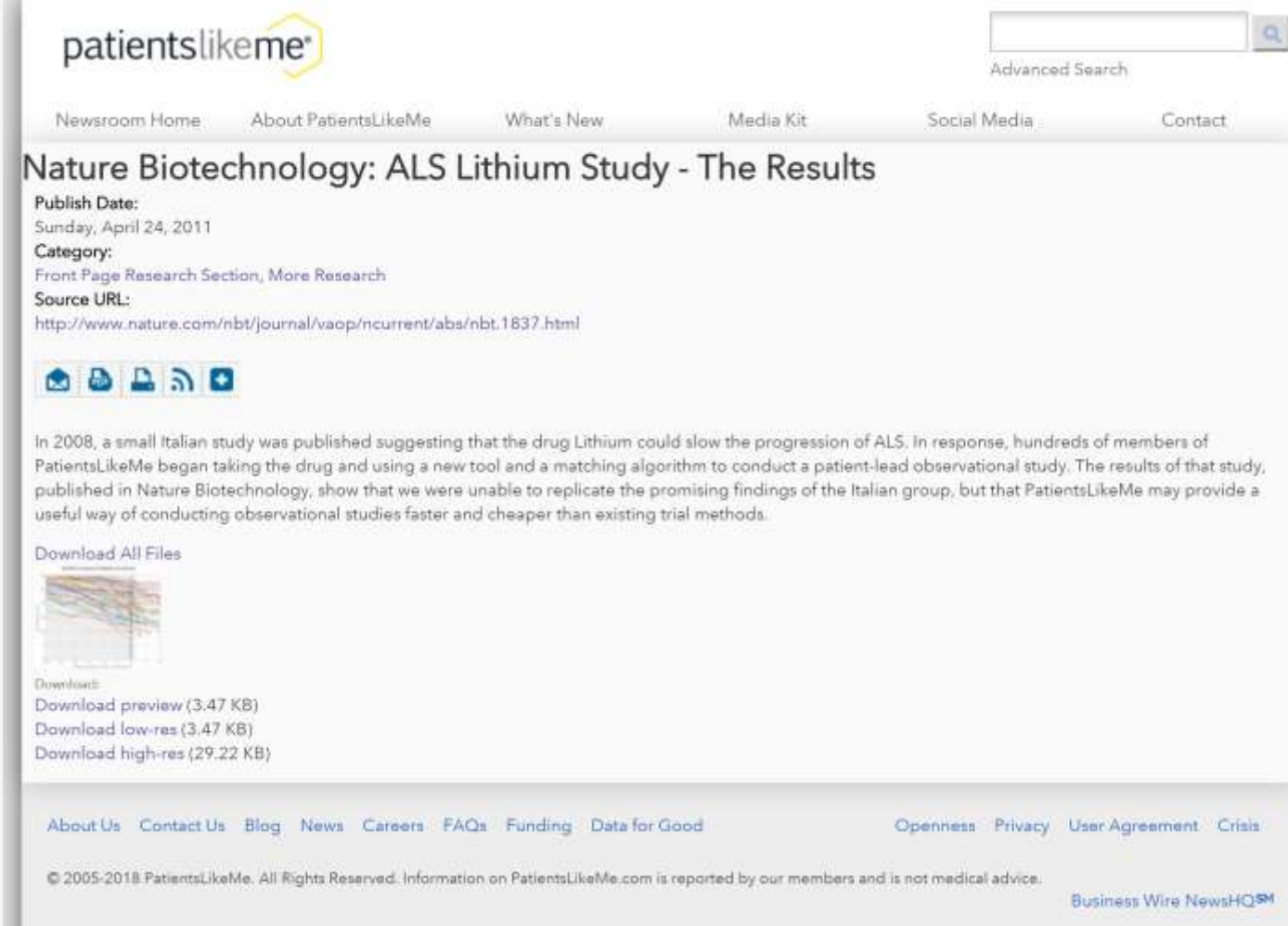
- Biomedical research focus on medicine, understanding how to develop better medicines and medical treatments
- Understanding through interventions and their impact
- Methodology: Randomised Control Trial





PatientsLikeMe Lithium Study

- Participants discussed the initiation of the study
- Participants volunteered to self experiment, with control drawn from other participants.



The screenshot shows the PatientsLikeMe website interface. At the top, there is a search bar and navigation links for Newsroom Home, About PatientsLikeMe, What's New, Media Kit, Social Media, and Contact. The main content area features a news article titled "Nature Biotechnology: ALS Lithium Study - The Results". The article includes a publish date of Sunday, April 24, 2011, and a category of "Front Page Research Section, More Research". The source URL is provided as <http://www.nature.com/nbt/journal/vaop/ncurrent/abs/nbt.1837.html>. Below the article title, there are social media sharing icons for Facebook, Twitter, LinkedIn, RSS, and Email. The article text begins with "In 2008, a small Italian study was published suggesting that the drug Lithium could slow the progression of ALS. In response, hundreds of members of PatientsLikeMe began taking the drug and using a new tool and a matching algorithm to conduct a patient-lead observational study. The results of that study, published in Nature Biotechnology, show that we were unable to replicate the promising findings of the Italian group, but that PatientsLikeMe may provide a useful way of conducting observational studies faster and cheaper than existing trial methods." Below the text, there is a "Download All Files" section with a thumbnail image of a graph. The download options are: "Download preview (3.47 KB)", "Download low-res (3.47 KB)", and "Download high-res (29.22 KB)". At the bottom of the page, there is a footer with navigation links for About Us, Contact Us, Blog, News, Careers, FAQs, Funding, Data for Good, Openness, Privacy, User Agreement, and Crisis. The footer also contains a copyright notice: "© 2005-2018 PatientsLikeMe. All Rights Reserved. Information on PatientsLikeMe.com is reported by our members and is not medical advice." and a logo for Business Wire NewsHQ.



Crowdsourcing RCT results

- Biomedicine developed statistical techniques to merge results from multiple studies (meta-analysis)
- Cochrane Crowd is a system for the classification of journal abstracts to assist systematic reviews and meta-analysis

A screenshot of the Cochrane Crowd website. The header includes the Cochrane Crowd logo, the tagline 'Trusted evidence. Informed decisions. Better health.', and buttons for 'Login' and 'Sign up'. Below the header is a purple banner with the text 'You can make a difference!' and a sub-headline: 'Become a Cochrane citizen scientist. Anyone can join our collaborative volunteer effort to help categorise and summarise healthcare evidence so that we can make better healthcare decisions.' A 'Give it a try' button is centered in the banner. At the bottom of the page, there are three columns labeled 'Contributors', 'Countries', and 'Classifications'.

Cochrane Crowd Trusted evidence. Informed decisions. Better health. Login Sign up Follow @cochrane_crowd

You can make a difference!

Become a Cochrane citizen scientist. Anyone can join our collaborative volunteer effort to help categorise and summarise healthcare evidence so that we can make better healthcare decisions.

Give it a try

Contributors Countries Classifications



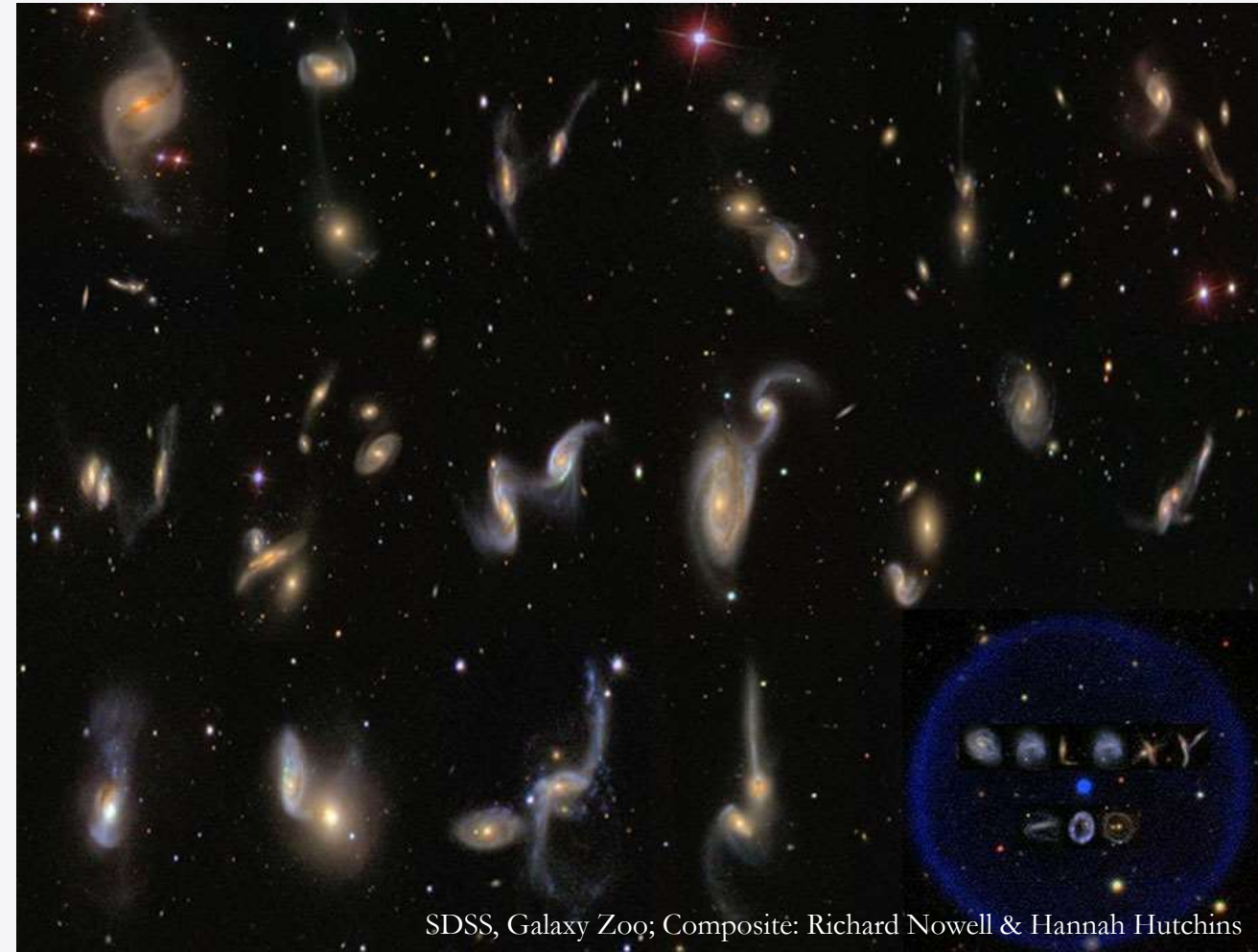
Astrophysics: classifying galaxies

- Part of Astronomy, which is related to physics, chemistry and mathematics. Aims to explain the patterns and development of the universe
- Strongly deductive – based on theoretical astrophysics theories, using the “natural experiment” of the observed universe
- Observations and statistical techniques are used to assess the validity and robustness of theories



Citizen Science in Astrophysics

- Need to assemble large data sets of classifications
- The classifications can only partially automated, and need human assistant
- Use of cognition and crowdsourcing





Summary

- Citizen science has historical precedents, but new types of activities and participants. This is the result of societal and technical trends.
- Citizen science includes a wide range of activities, and is gaining recognition among the public and within the area of research
- Growing interest within policy makers and implementers
- Citizen science adapts to the disciplinary context.