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ecs academy

Citizen science opportunities and challenges for scientists

Muki Haklay,
UCL/Université Paris Cité/MNHN

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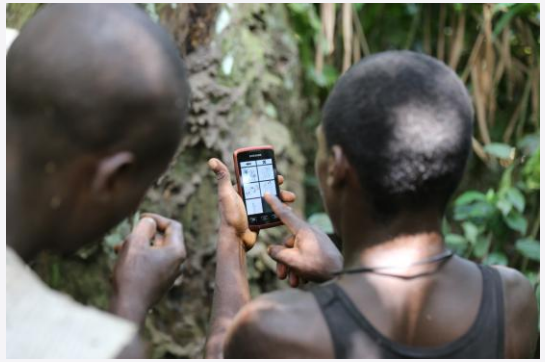
personal context

1980s	1990s	2000s	2010s
• Participatory Rural Appraisal • Participatory Learning and Action	• Public Participation GIS (PPGIS) • Participatory GIS (PGIS)	• Volunteered / Crowdsourced Geographic information • Participatory Sensing	• Citizen Science



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Overview

- Citizen Science – range of activities
- Why should researchers care?
- Summary of opportunities and challenges

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Citizen Science

Long running Citizen Science

- Ecology & biodiversity
- Meteorology
- Archaeology

Citizen Cyberscience

- Volunteer computing
- Volunteer thinking
- Passive Sensing

Community Science

- Participatory sensing
- DIY Science
- Civic Science

Haklay, Mazumdar & Wardlaw, 2018, Citizen Science for Observing and Understanding the Earth, *Earth Observation, Open Science, and Innovation*

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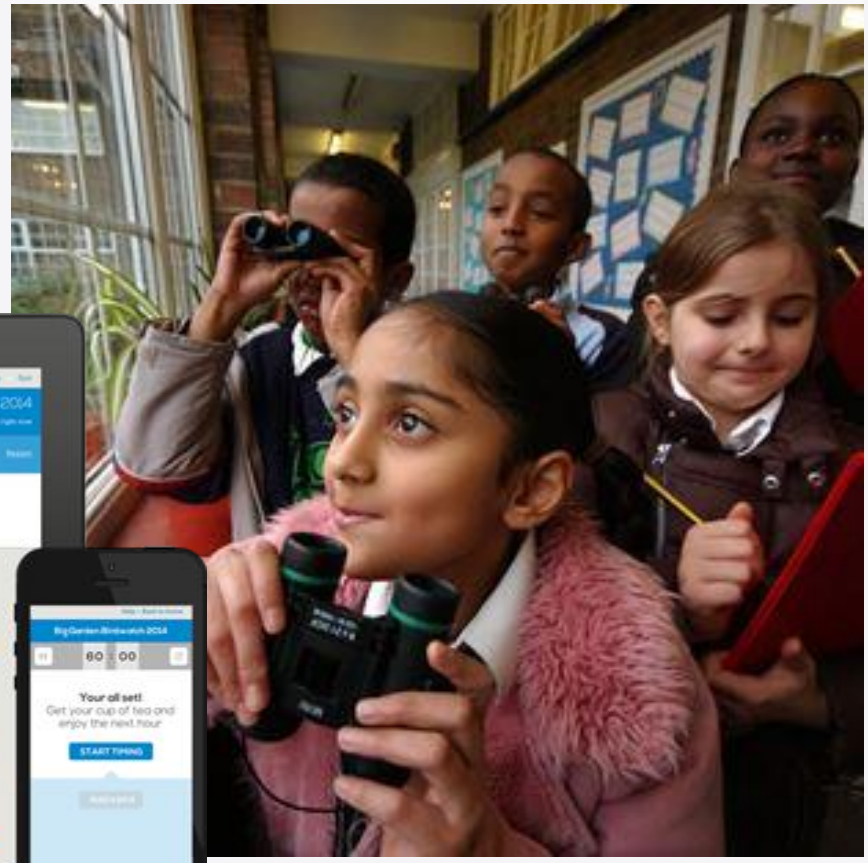
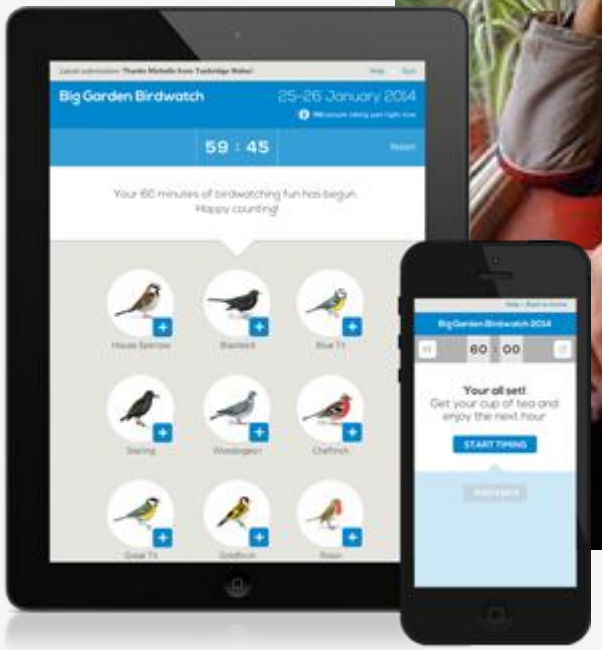
Biodiversity/Ecology/Biological recording

- Observations of plants and animals (esp. birds) are popular
- Example: Big Garden Birdwatch – 1 hour, end of January, structured reporting, education focus, over million participants in 2021

Participating in Big Garden Birdwatch (source: RSPB)





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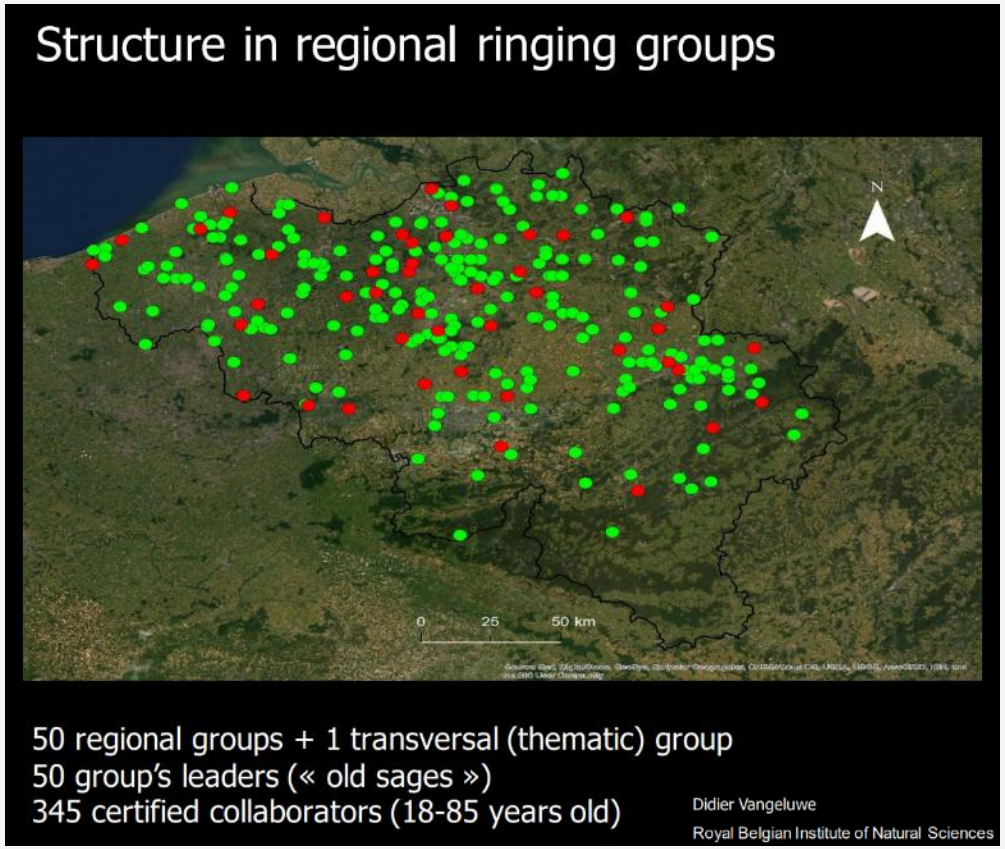
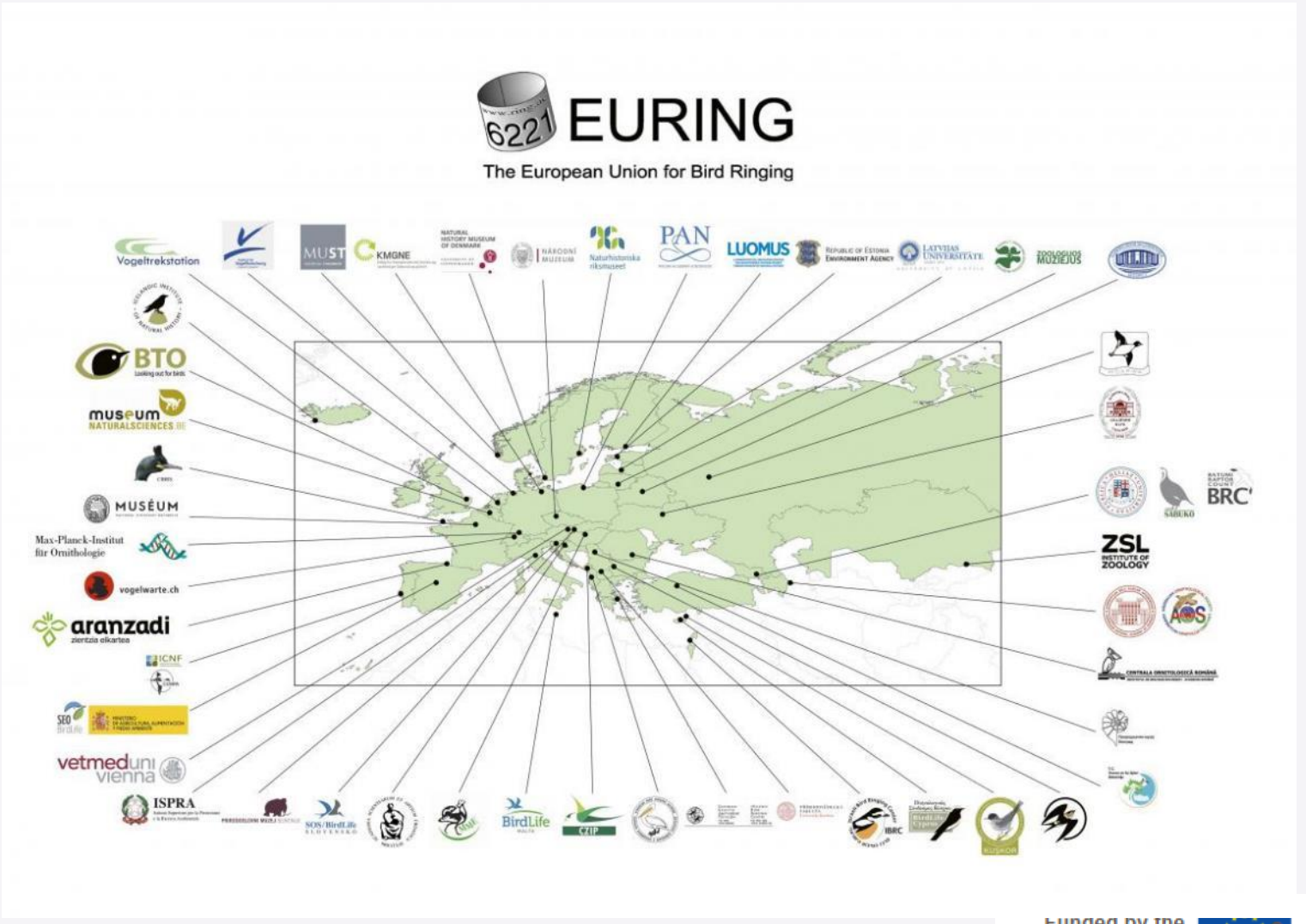
Bird Ringing – Belgium

- Since 1927





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Meteorology

- Another area with a need for a widely distributed geographic network
- Extreme weather events & early warning - local issues
- Reliable observations through recruitment

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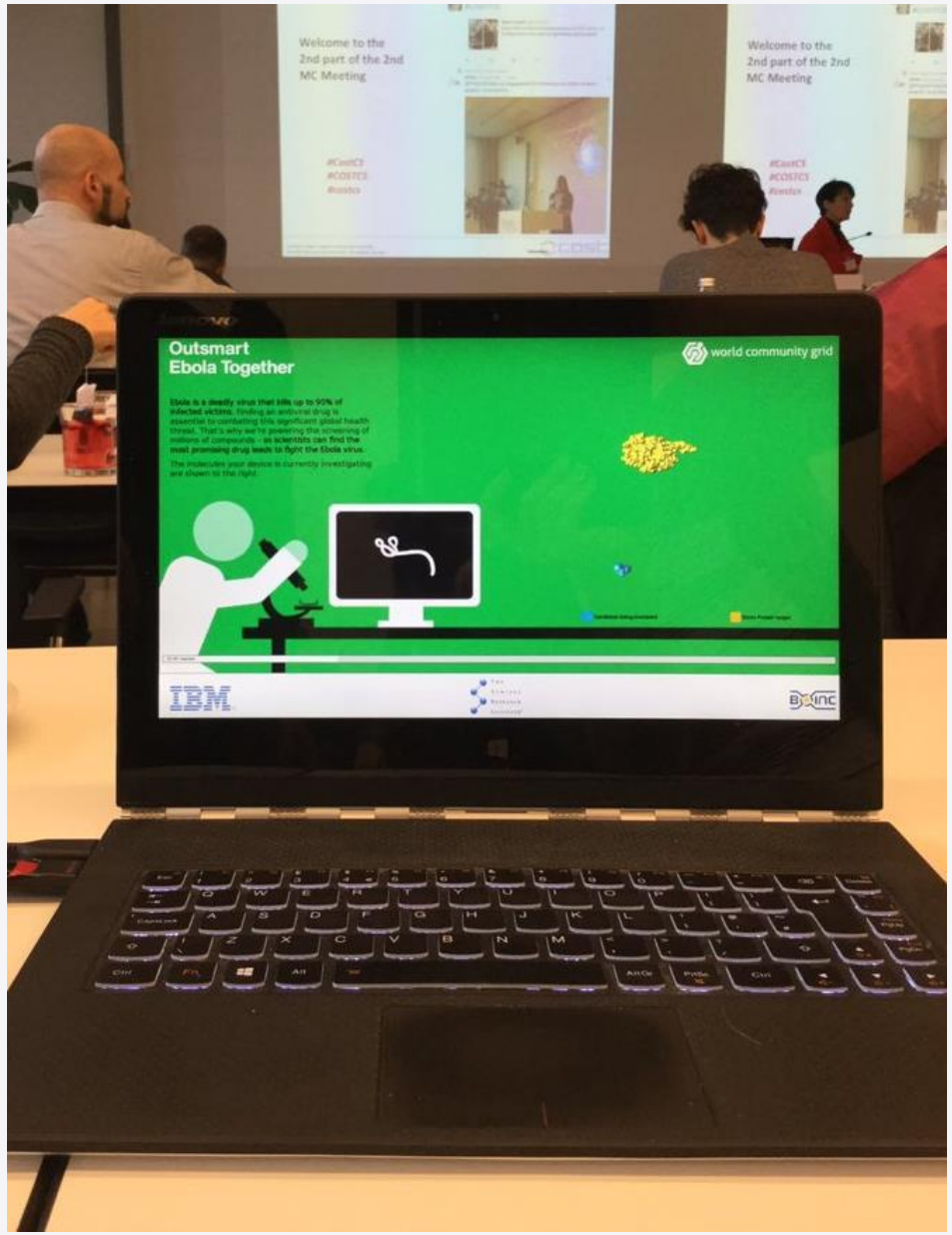
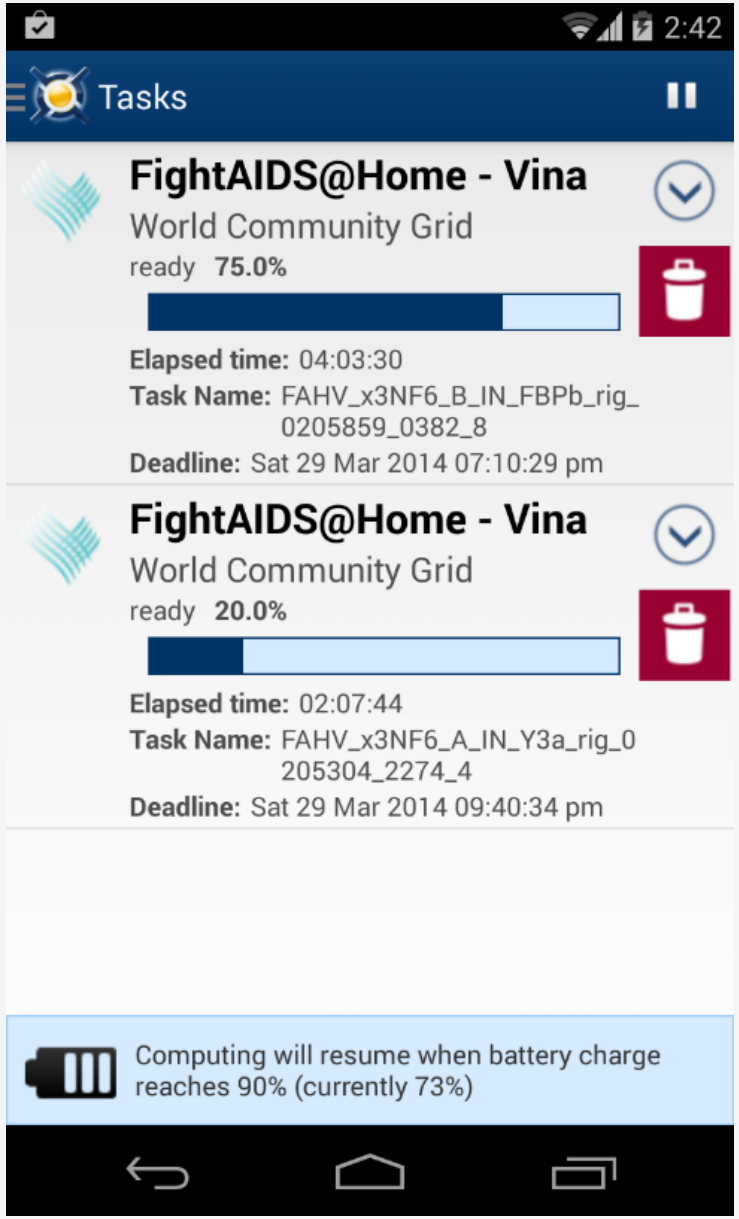
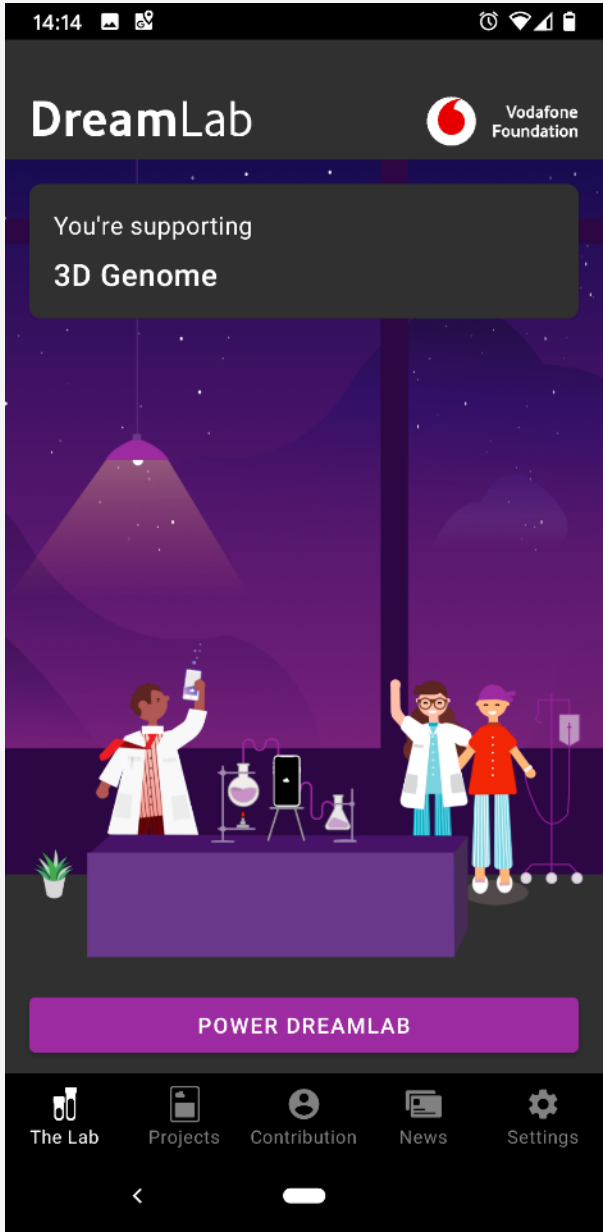
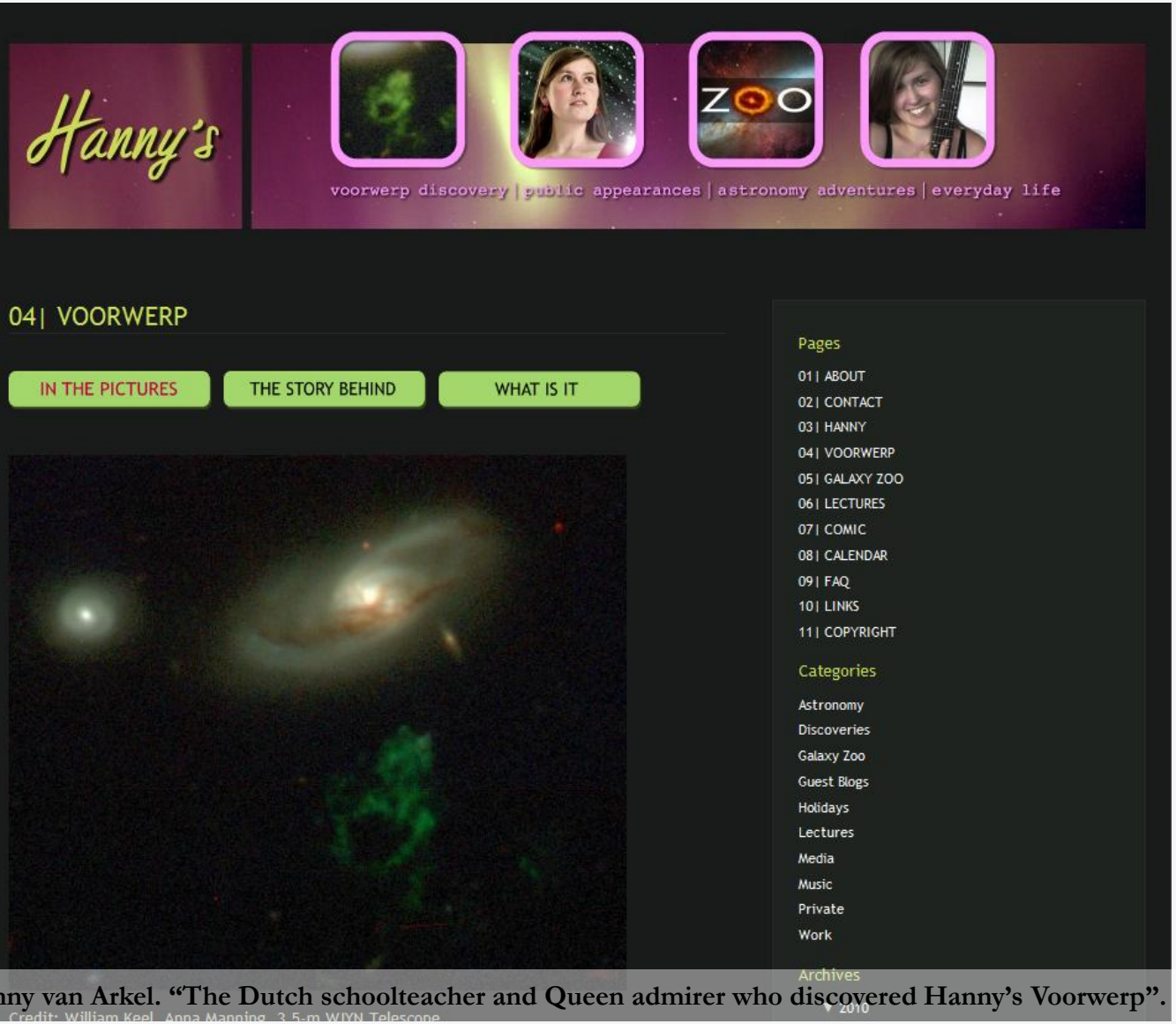
Volunteer computing







Galaxy Zoo & discoveries



Hanny van Arkel. "The Dutch schoolteacher and Queen admirer who discovered Hanny's Voorwerp".

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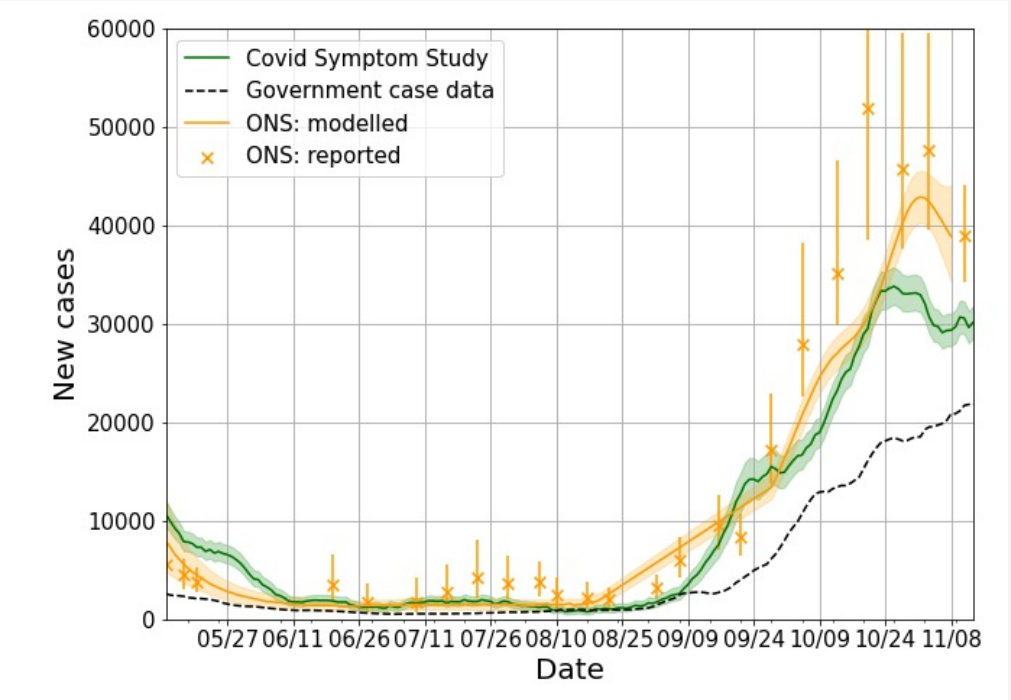
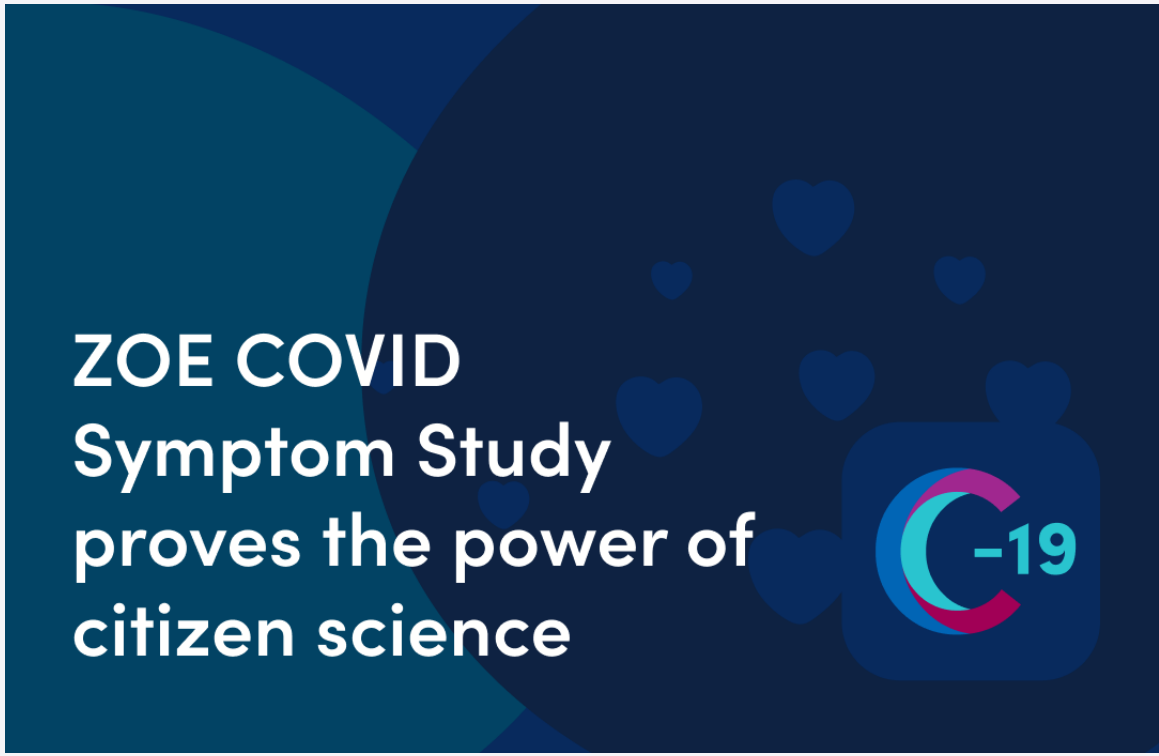
Public health

- ZOE app – used by up to 4 million people to report their symptoms





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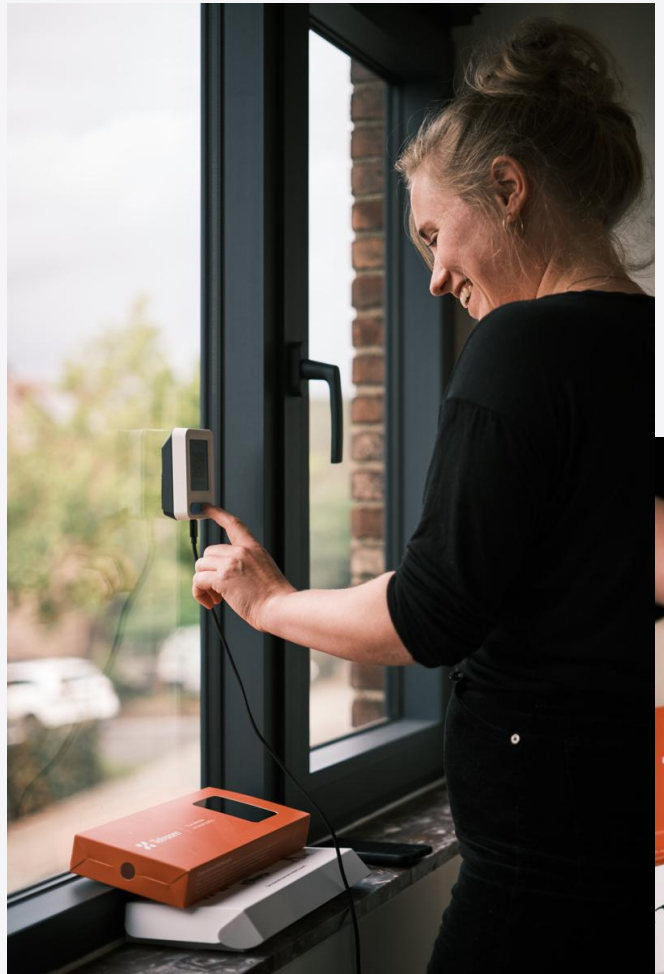
Counting traffic

- Telraam came out of the WeCount project
- Passive sensing – counting traffic and only sharing results



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Participatory Sensing

Mapping for Change

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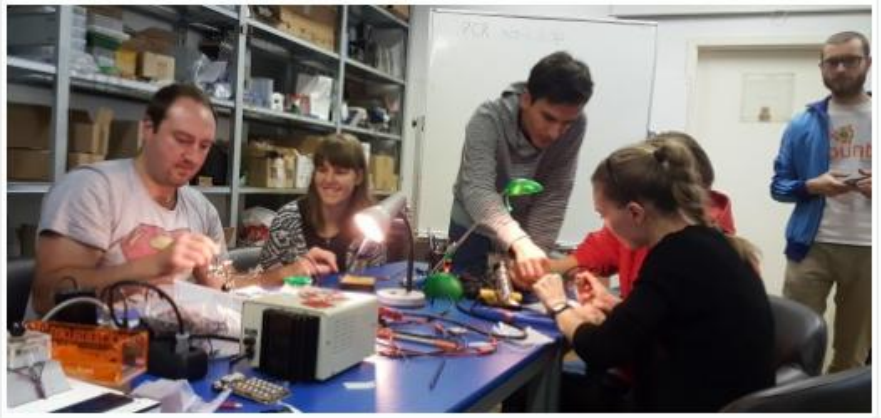
DIY Science

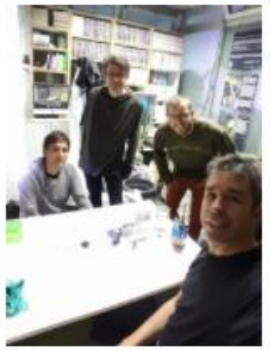
Imane Baiz, CRI Paris

MyOpenPCR Workshop @ BioTehna Lab – Ljubljana (SI)

By gaudi
Wednesday November 9, 2016



Finally back in Ljubljana Urs, Oli and Aurelio gave a workshop on how to build your own wild OpenPCR at BioTehna Lab.



http://www.hackteria.org/wordpress/projects/biotehna/biotehna/

The participants, all with solid biotech background, learned about resistive heaters, thermoelectric cooling using peltier elements and thermo sensors. After 4 hours and heavy soldering actions we had 2 complete PCR machines up and running. The next days the participants kind of took over the workshop and the mentors had to undergo strict instructions on lab practice and pipetting. The evening program with a science café was already in course when the first results of the electrophoresis gel came in. The reference machine (also DIY) and one of the newly build device showed amplification while no lines where to be seen on the tests for the second device. We assume that this is due to the not so well applied heated lid, as we saw quite some evaporation during the runs. This should be easy to fix with building a proper case.

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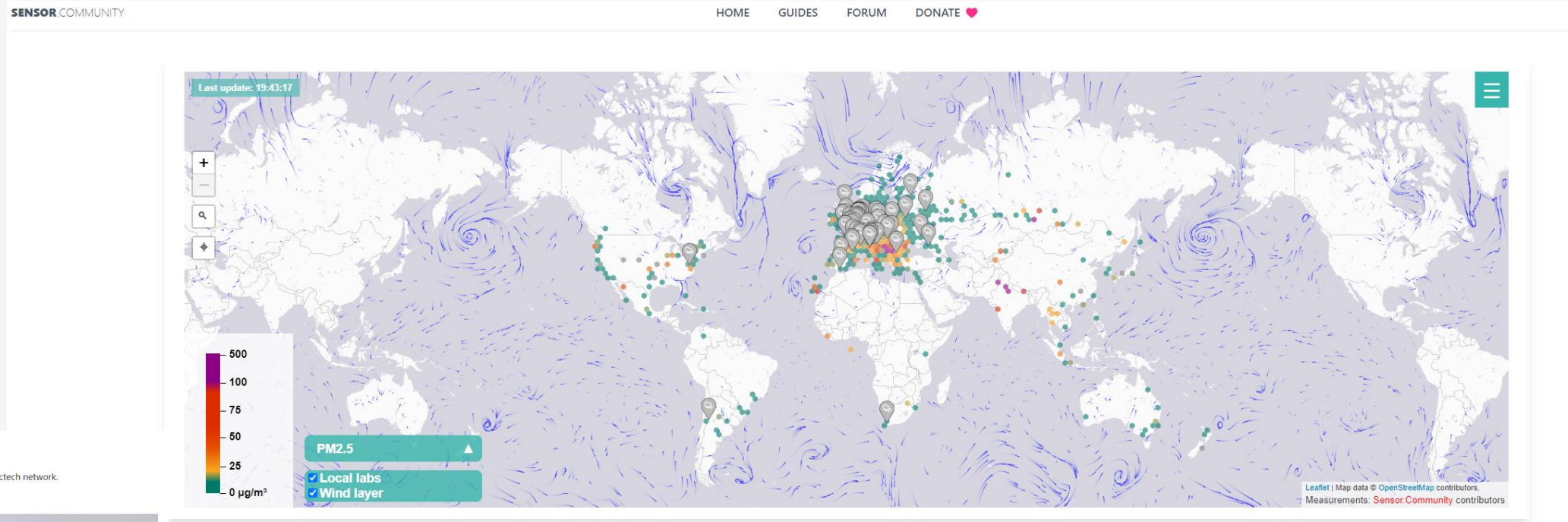
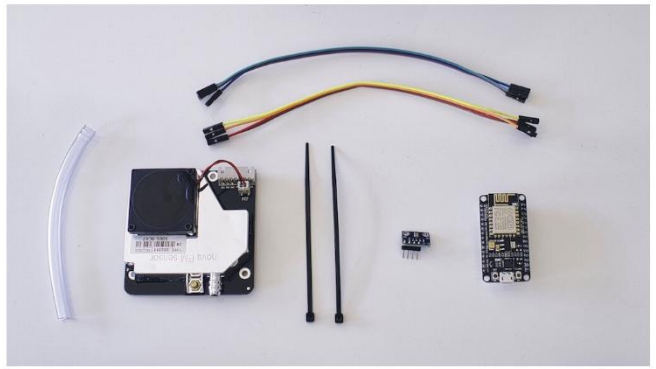
Sensor.community – DIY air sensing



Introduction

Build your DIY sensor and become part of the worldwide, opendata & civictech network.
With airRohr you can measure air pollution yourself.



Shopping list

Sensor kit

- Pre-flashed Sensor Kit

Sensor.Community is a contributors driven global sensor network that creates Open Environmental Data.

Our mission is to inspire and enrich people's lives by offering a platform for the collective curiosity in nature that is genuine, joyful and positive.

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thebmj covid-19 Research Education News & Views Campaigns Jobs

Sara Riggare

Sara Riggare is an engineer by training. She experienced her first symptoms of Parkinson's disease around 1984, at 13, but wasn't diagnosed until nearly 20 years later. In 2010 she decided to combine her patient experiences with her engineering skills to try to improve things for herself and others with chronic diseases so she started studying at a masters programme in health informatics at the Karolinska Institute in Stockholm, Sweden. Sara is currently a doctoral student at Karolinska and the topic of her research is "Personal observations as a tool for improvement in chronic disease". She is an actively engaged patient with a vast network across the chronic disease community and blogs at www.riggare.se.

SARA RIGGARE
Not patient but im-patient

My PhD thesis In English + På svenska + Contact + Graphics +

1 vs 8,765

The selfcare infographic used in this post is available

Image with English text as jpg file.

I see my neurologist twice a year, about half an hour every time. That's one hour per year in healthcare for my Parkinson's disease. During the same year I spend 8,765 hours in selfcare, applying my knowledge and experience together with what I get from my neurologist to manage a difficult condition as best I can. Only during the one hour per year (the red circle in the image to the left) am I in direct contact with neurological specialty care and its clinical practise and guidelines.

And it's also during this one hour that my condition is evaluated by my neurologist and my treatment is prescribed. But it's during the 8,765 hours of selfcare (the blue circles in the image, and yes, there are 8,765 blue circles, I am that nerdy 🙂) that the I put my treatment into action. I take 6 prescription drugs, 6 times a day, in 5 different combinations, with 6 different time intervals. Because let's face it, my doctor doesn't even know if I take my medications or not.

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Varieties of citizen science

- Lots of variety in disciplines – examples from natural sciences (astronomy, biology), social sciences, and humanities
- Technological range – sensors, apps, website, and off line activities
- Leadership – Mostly led by scientists, with some examples for community-led projects, also N=1 projects

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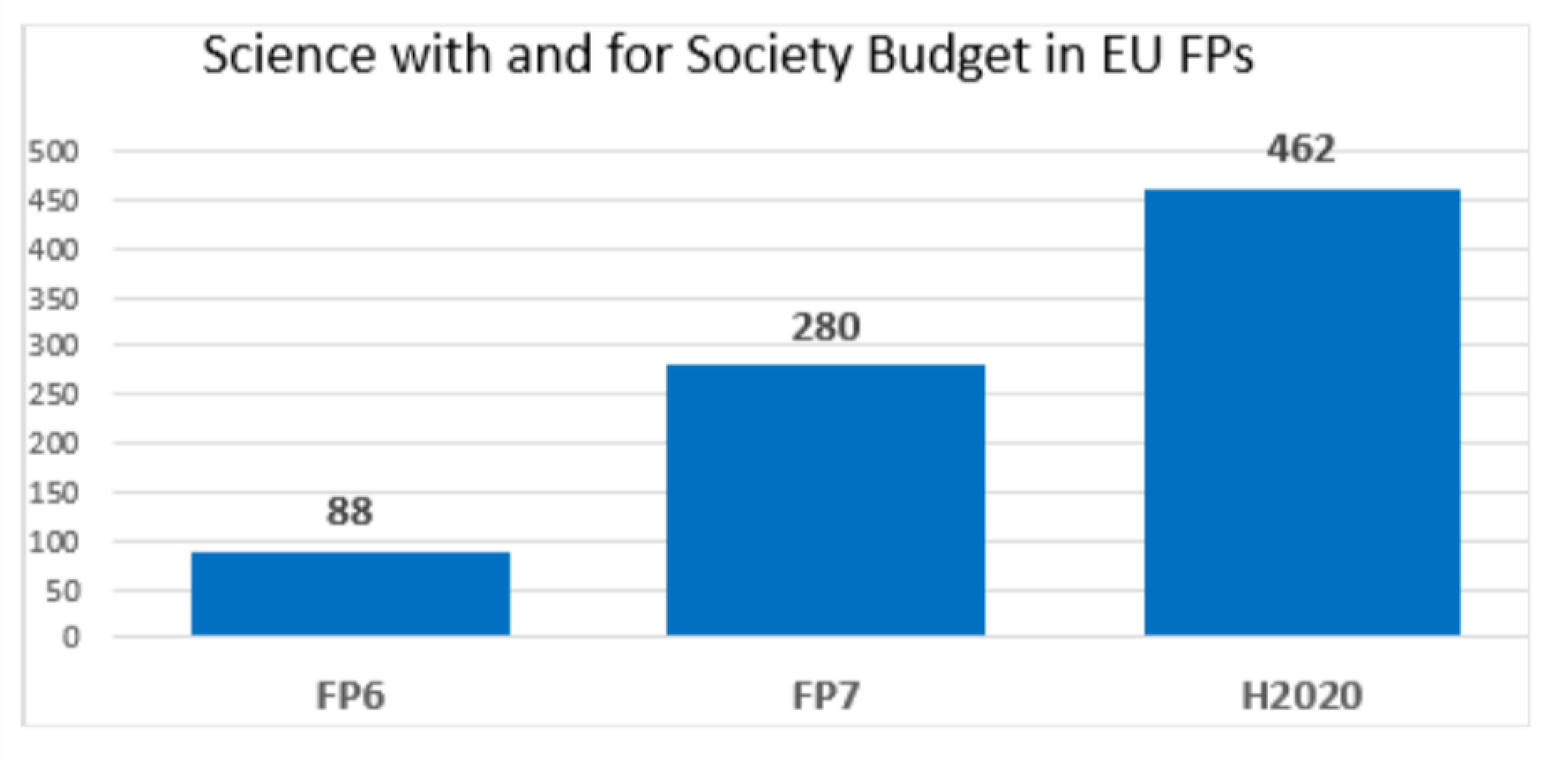
SO WHAT? WHY SHOULD I CARE?



European Commission: Directorate-General for Research and Innovation, Warin, C., Delaney, N. and Tornasi, Z., *Citizen science and citizen engagement – Achievements in Horizon 2020 and recommendations on the way forward*, Delaney, N.(editor) and Tornasi, Z.(editor), Publications Office, 2020, https://data.europa.eu/doi/10.2777/05286

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Endorsing citizen science

Citizen Science is part of Open Science in the EU policy framing.

"citizen science can be described as the voluntary participation of non-professional scientists in research and innovation at different stages of the process and at different levels of engagement, from shaping research agendas and policies, to gathering, processing and analysing data, and assessing the outcomes of research." (Citizen Science factsheet 2020)

European Commission

Horizon Europe legal texts

- **Reg. - Recital (26):** ...the Programme should engage and involve citizens and civil society organisations in co-designing and co-creating responsible research and innovation (RRI) agendas and contents that meet citizens' and civil society's concerns, needs and expectations...
- **Reg. - Programme principle (A6a.8)**: The programme shall promote co-creation and co-design through engagement of citizens and civil society
- **SP - Operational objectives (A2.2)**: (c) promoting responsible research and innovation, taking into account the precautionary principle; (n) Improving the relationship and interaction between science and society, including the visibility of science in society and science communication, and promoting the involvement of citizens and end-users in co-design and co-creation processes
- Open Science, which includes citizen and societal engagement, will be **operationalised** throughout the programme: **award criteria** for proposal evaluation, **key impact pathways**, and within **topic texts**

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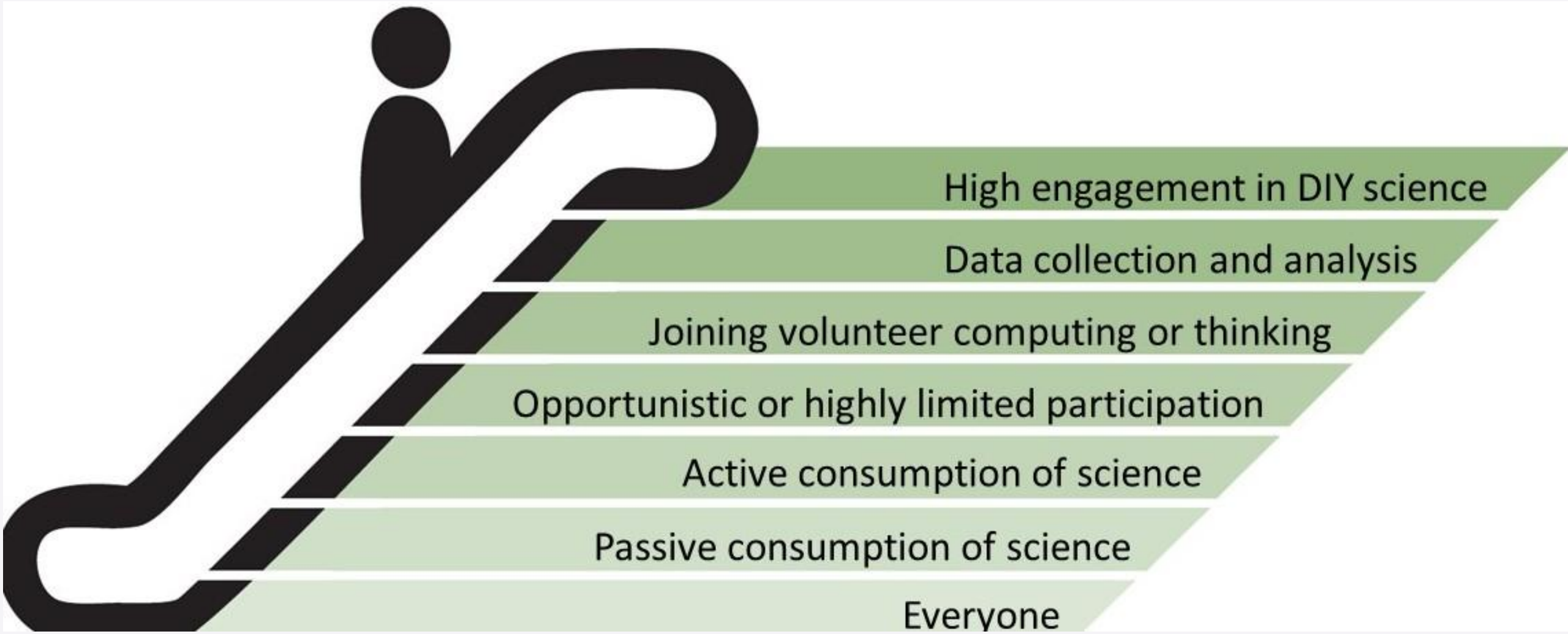
Citizen Science with public engagement



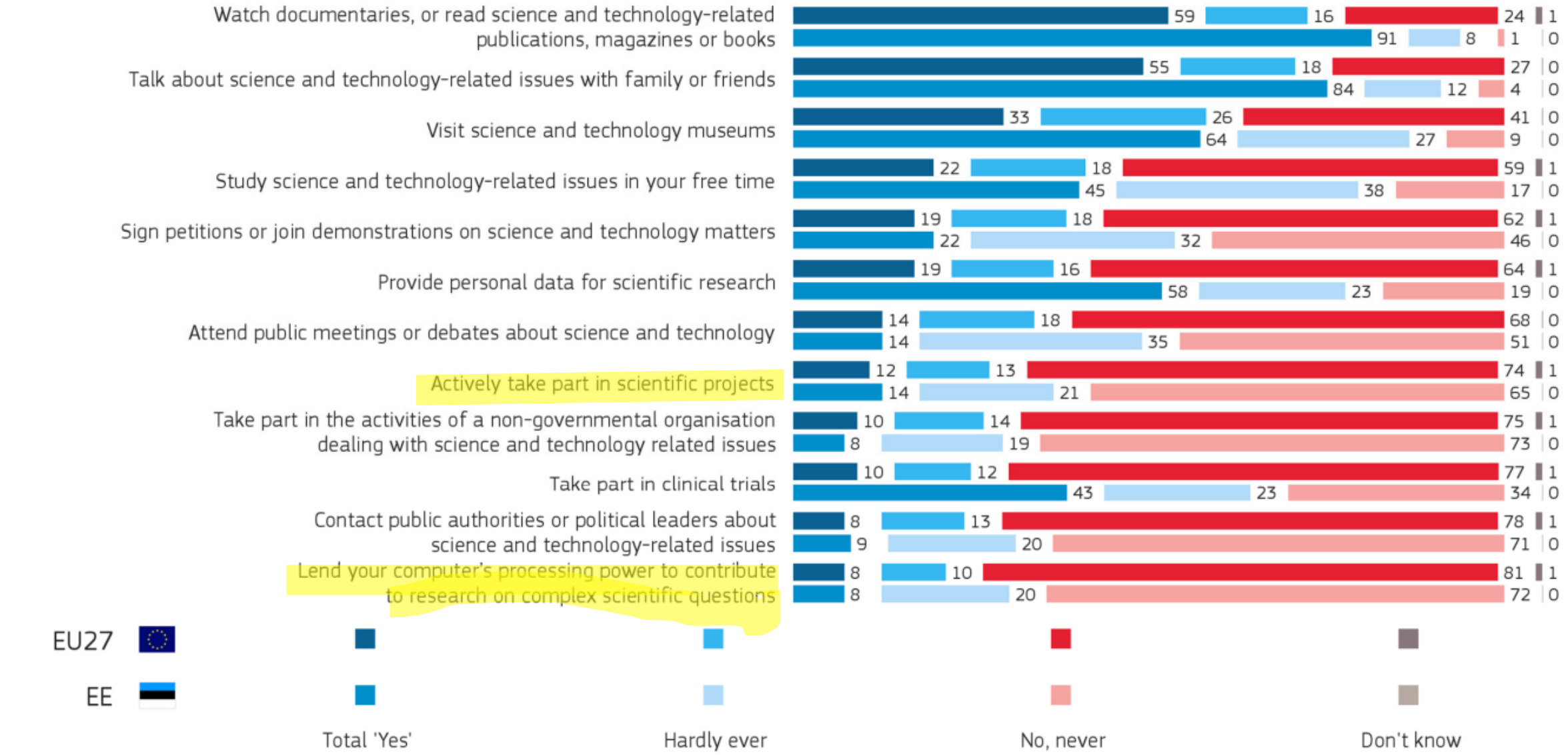
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 709443

Funded by the European Union

5. CITIZEN'S ENGAGEMENT IN SCIENCE AND TECHNOLOGY

QA14 And now, a few questions on how you engage with science and technology issues. Do you... **(%)**

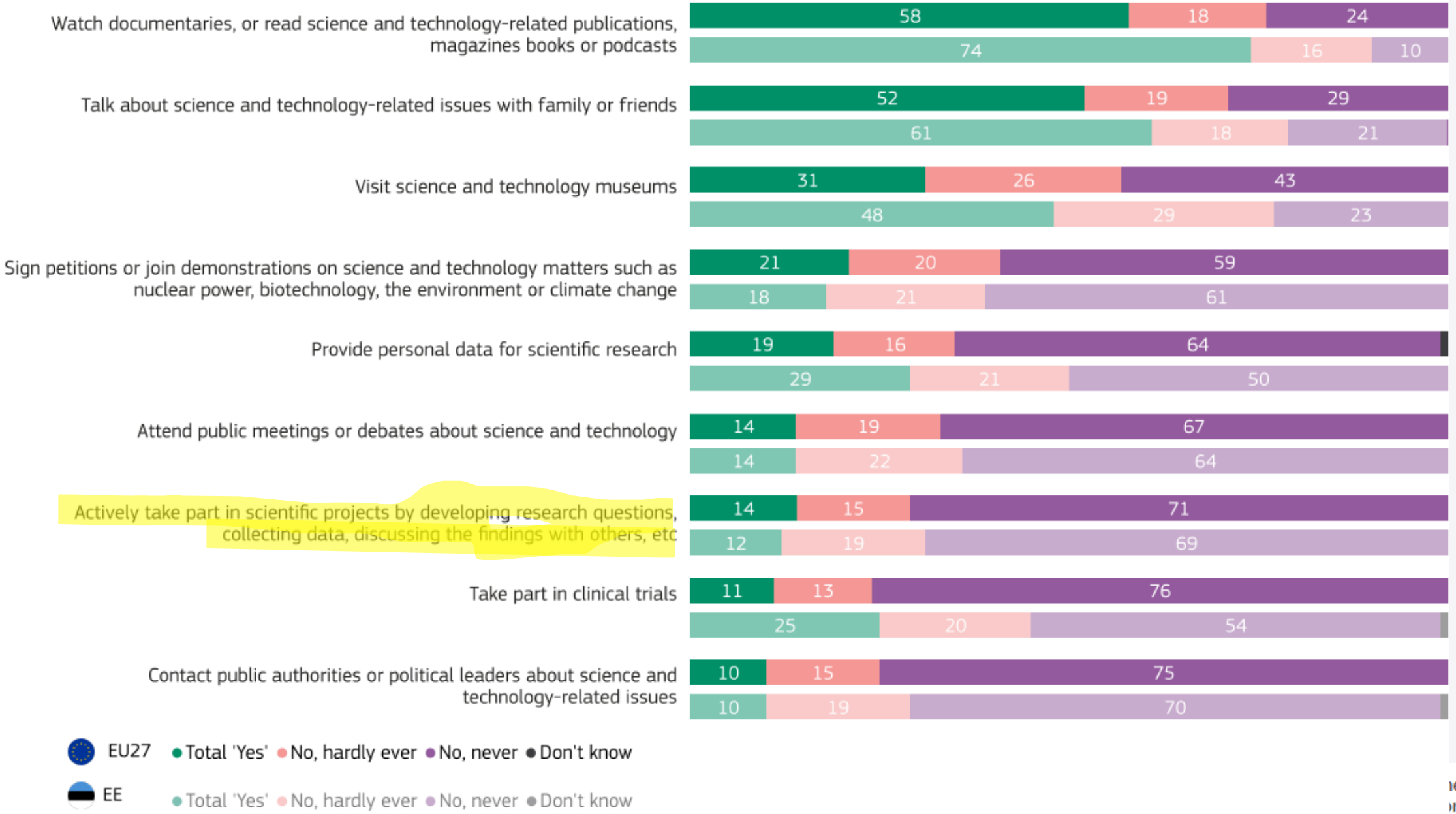
Eurobarometer 516



1. CITIZEN'S ENGAGEMENT IN SCIENCE AND TECHNOLOGY

Eurobarometer 557

QA12. And now, a few questions on how you engage with science and technology issues. Do you (%)



Mutual Learning Exercise on Citizen Science Initiatives- Policy and Practice

An increasing number of citizen science projects and initiatives are being implemented across Europe – mostly taking place at local or national levels, but some also being co-ordinated internationally. This rapidly emerging mode of research and innovation shows substantial potential in terms of achieving greater societal impact and increasing trust in science, by leveraging collective societal capabilities, by enlarging the scope of the R&I, and by increasing relevance, responsiveness and transparency. However, national or regional policies to support and mainstream them, if they exist, are in many countries at an early stage of development. Europe would benefit from greater attention to promoting citizen science within Member States and regions, and from greater cooperation and shared approaches across the European Research Area as a whole.

The MLE thus aims to facilitate an exchange of information, experiences and lessons learned, as well as to identify good practices, policies and programmes in relation to the various approaches at local, regional and national levels, towards supporting and scaling up citizen science. In addition, the objective is to identify citizen science campaigns that have high potential to be implemented in a collaborative way across the European Research Area.

01 DEC	28 FEB
2021	2023

PSF Geo coverage	Norway, Austria, Belgium, France, Germany, Hungary, Italy, Portugal, Romania, Slovenia, Sweden
PSF Exercise type	Challenge/ MLEs

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MANAGING RESEARCH TOOLS

1. Manage research data

Produce and analyse research data originating from qualitative and quantitative research methods. Store and maintain the data in research databases. Support the re-use of research data and be familiar with data management principles, including FAIR (Findable, Accessible, Interoperable, and Reusable) principles. Make data as open as possible, and as closed as necessary.

FOUNDATIONAL	INTERMEDIATE	ADVANCED	EXPERT
• Identifies sources of information, and assesses if data is trustworthy, valid, reliable and pertinent. • Knows how to store and organise data in an accessible way digitally. • Uses, transforms, and analyses non-sensitive research data transparently and in accordance with legal and privacy requirements.	• Organises data sets to be find-able, accessible, interoperable, and reusable (FAIR), and to be easily stored and retrieved in a structured environment. • Trains and empowers other team members to work with data in a structured, transparent, and accessible way.	• Applies data analysis tools, understands legal and ethical issues linked to the use of data, and integrates data management plans. • Transforms, organises, and analyses data in a research context, and applies metrics to evaluate the success of data initiatives. • Promotes FAIR principles within own academic community.	• Creates relevant data sets from different sources, and develops effective methods making data more comprehensible for research. • Proposes new processes and practices in managing data, information and digital content in a structured digital environment. • Is known as influential advocate of FAIR principles.

2. Promote citizen science

Engage citizens in scientific and research activities and promote their contribution in terms of knowledge, time or resources invested.

• Understands that citizens are knowledge-holders with the ability to contribute to the research process in some areas of research. • Knows the pros and cons of engaging or not engaging with citizens in research endeavours.	• Is inclusive and transparent in the research process and understands how best to engage with citizens in each specific context.	• Engages all categories of citizens in the research process and integrates them at specific stages of the research cycle.	• Is recognised for engaging with citizens in an inclusive, transparent and effective manner. • Develops novel, reliable, and trustworthy protocols in own research area to include citizens in the research process.

THE EUROPEAN COMPETENCE FRAMEWORK FOR RESEARCHERS

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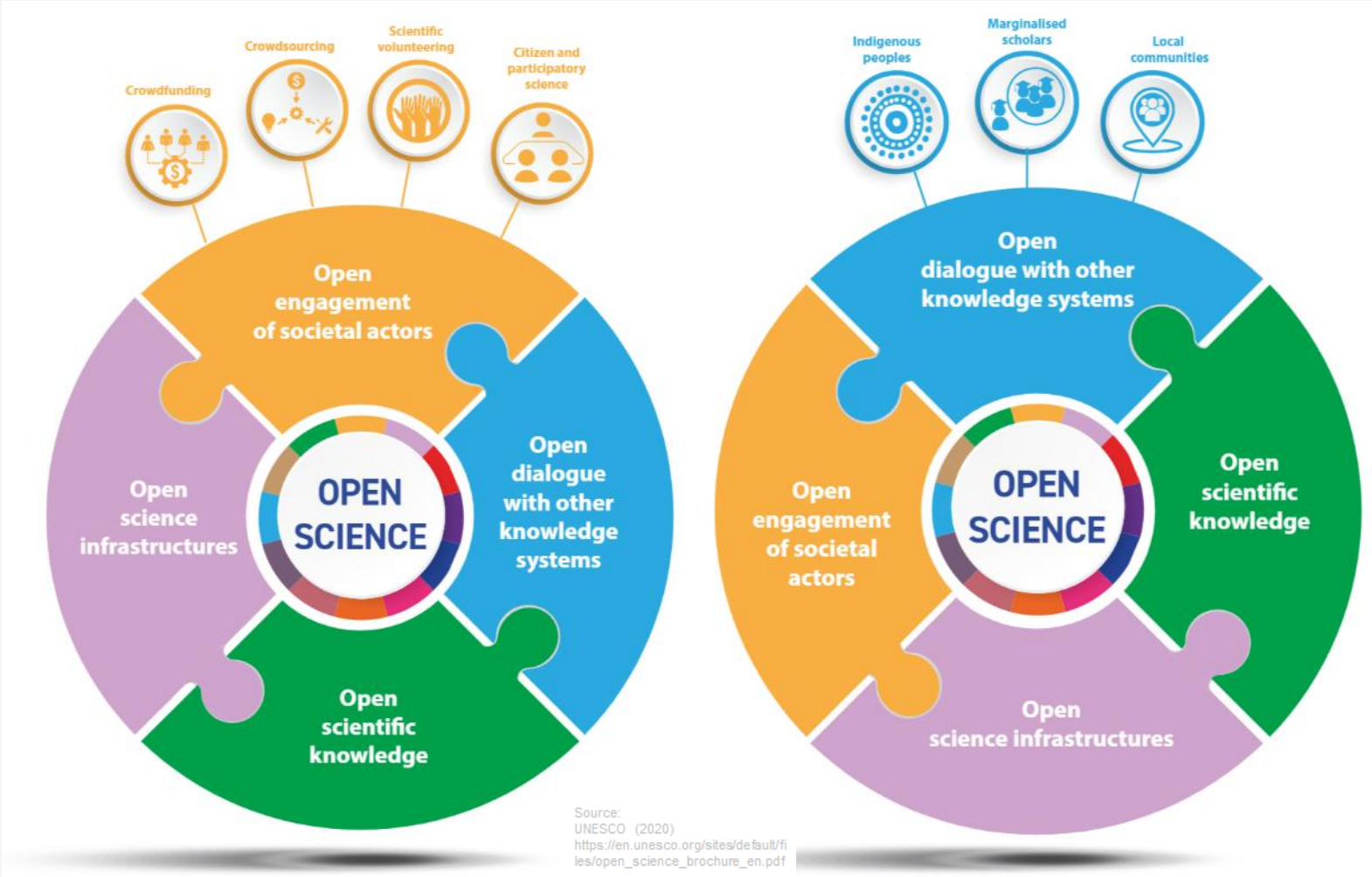
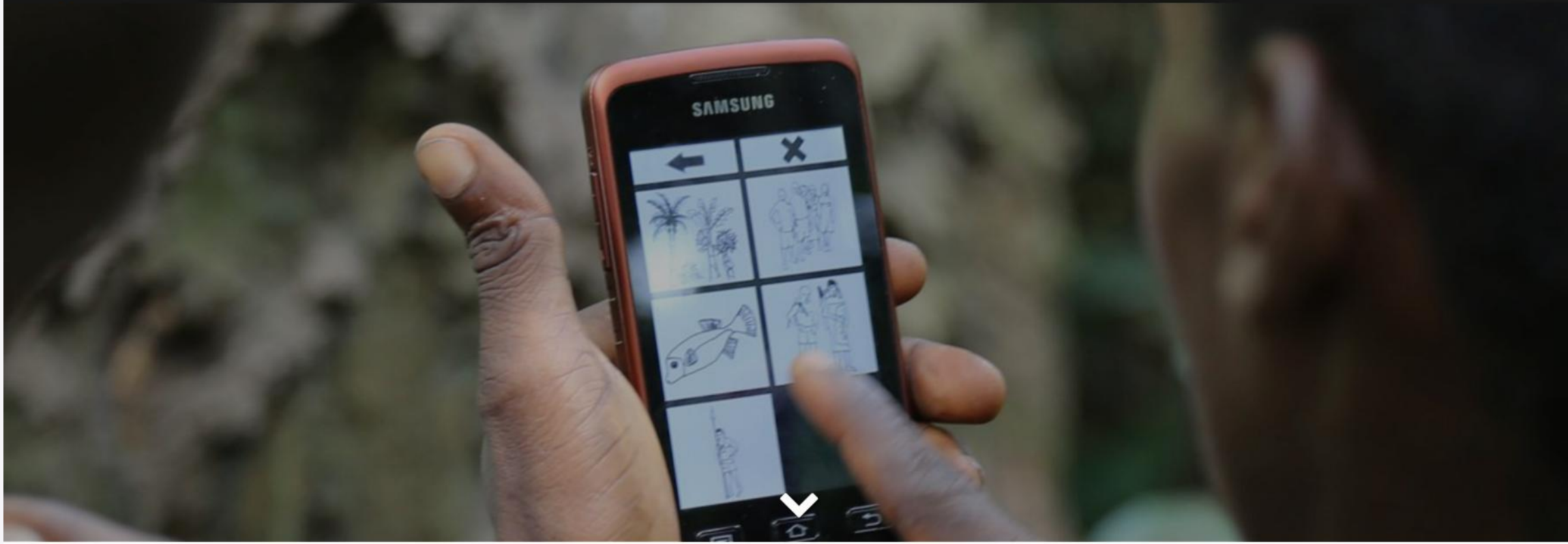
UNESCO Recommendation on Open Science



Source:
UNESCO (2020)
https://en.unesco.org/sites/default/files/open_science_brochure_en.pdf

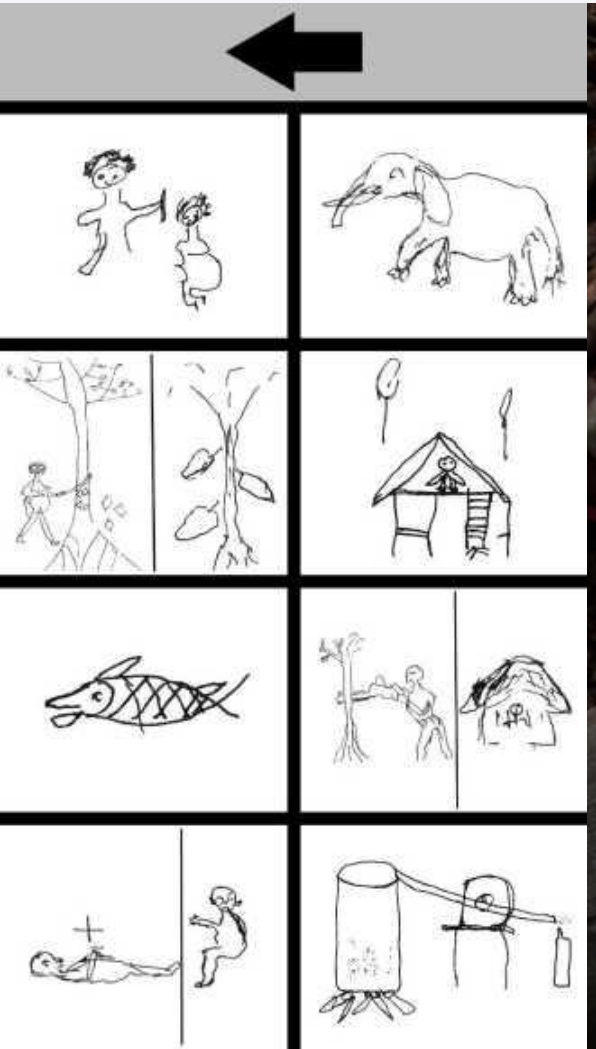


Sapelli is an open-source project that facilitates data collection across language or literacy barriers through highly configurable icon-driven user interfaces. We encourage people to download the app from the Google Play store, or from our GitHub repository and deploy it for their own purposes.

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.

This website should help to get started with creating bespoke data collection apps that meet individual requirements.

Gbiné, Cameroon



Largest study on vaginal microbiome in the world!

Over

6000

women participated in Isala

We found

10 types

based on the most important bacteria

80%

has mainly lactic acid bacteria

2000

Already more than 2000 cultured vaginal bacteria, and still counting

High-tech analysis of nearly

4500

swabs, and still counting

Determination of factors influencing the vaginal microbiome

Let's go international with sisterhood projects

LAURA

Inspired by isala.be

MARIE

Inspired by isala.be

Base for novel diagnostics and therapeutics

Awarded for clear science communication

Isala is making history
by mapping the vaginal microbiome of healthy women
for the very first time.

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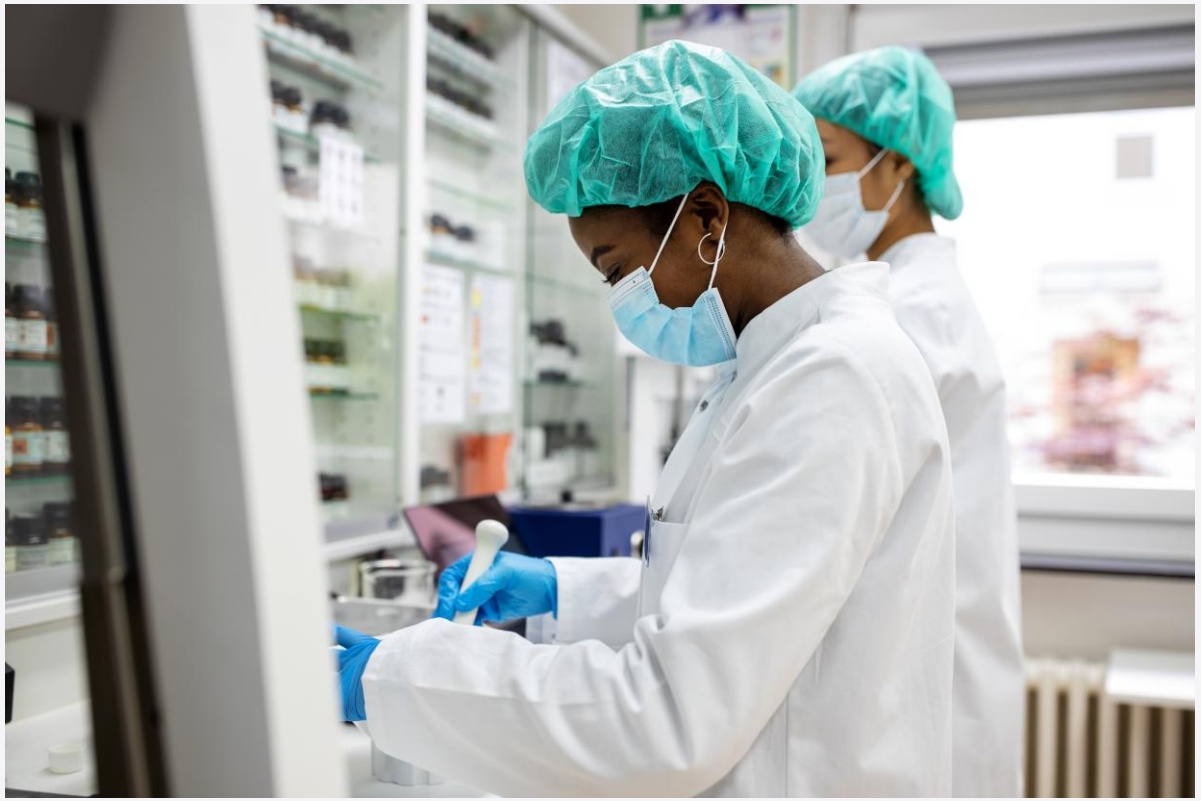
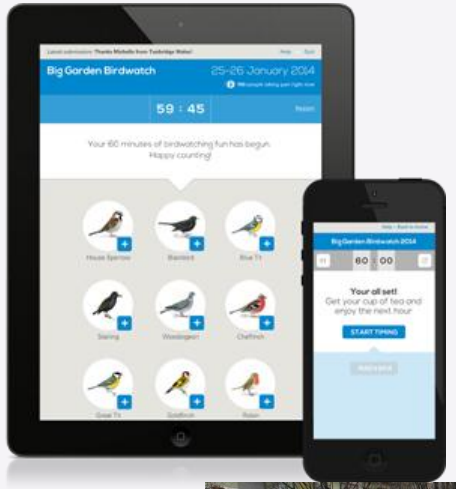
- Scarcity



- Abundance



Participating in Big Garden Birdwatch (source: RSPB)

(c) Andrea Antonello

Funded by the European Union

- **Scarcity**
  - Investment in training
  - Maximising output from each action
  - Top-down, standarised procedures to ensure ‘once & good’ – optimisation
  - Standard equipment and software
- **Abundance**
  - Assumption of variable skills and training
  - Ensuring microtasks are enjoyable and rewarding
  - Multiplicity of procedures and interactions to ensure engagement
  - Multiplicity of equipment with limited information about characteristics

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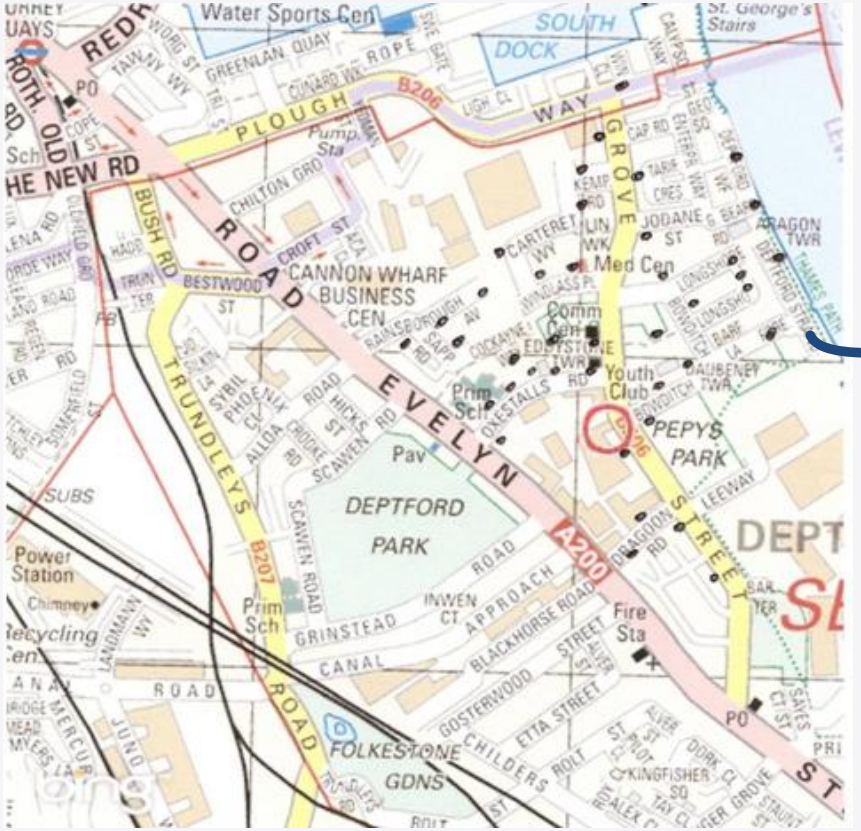
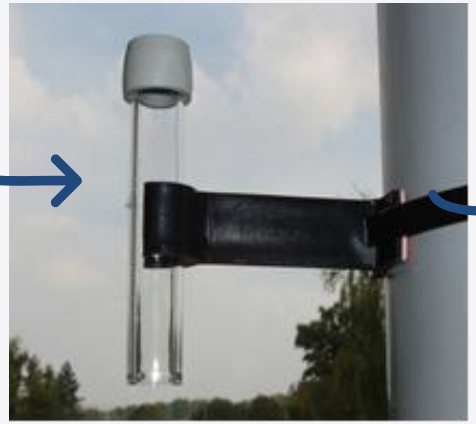
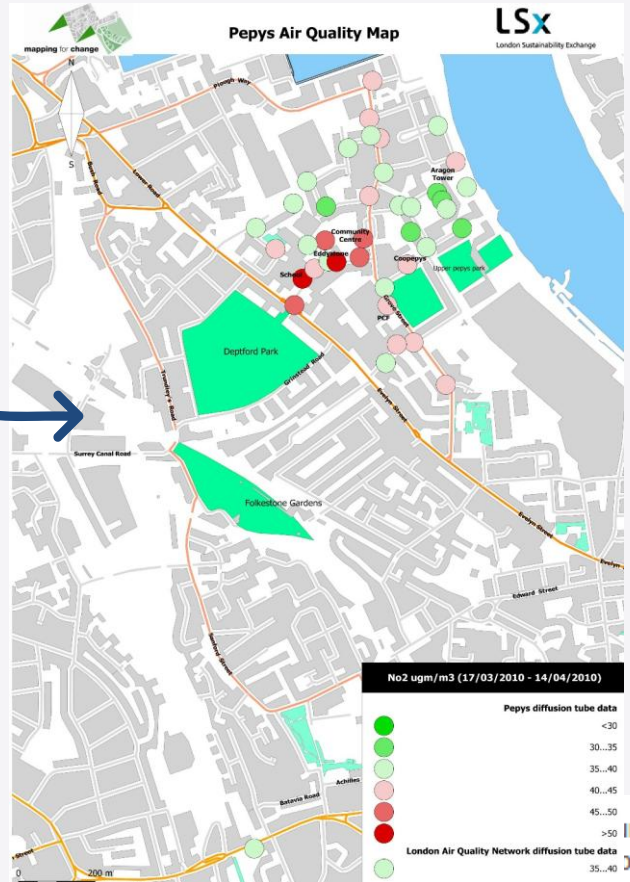
Status anxiety plays an important role in institutional resistance







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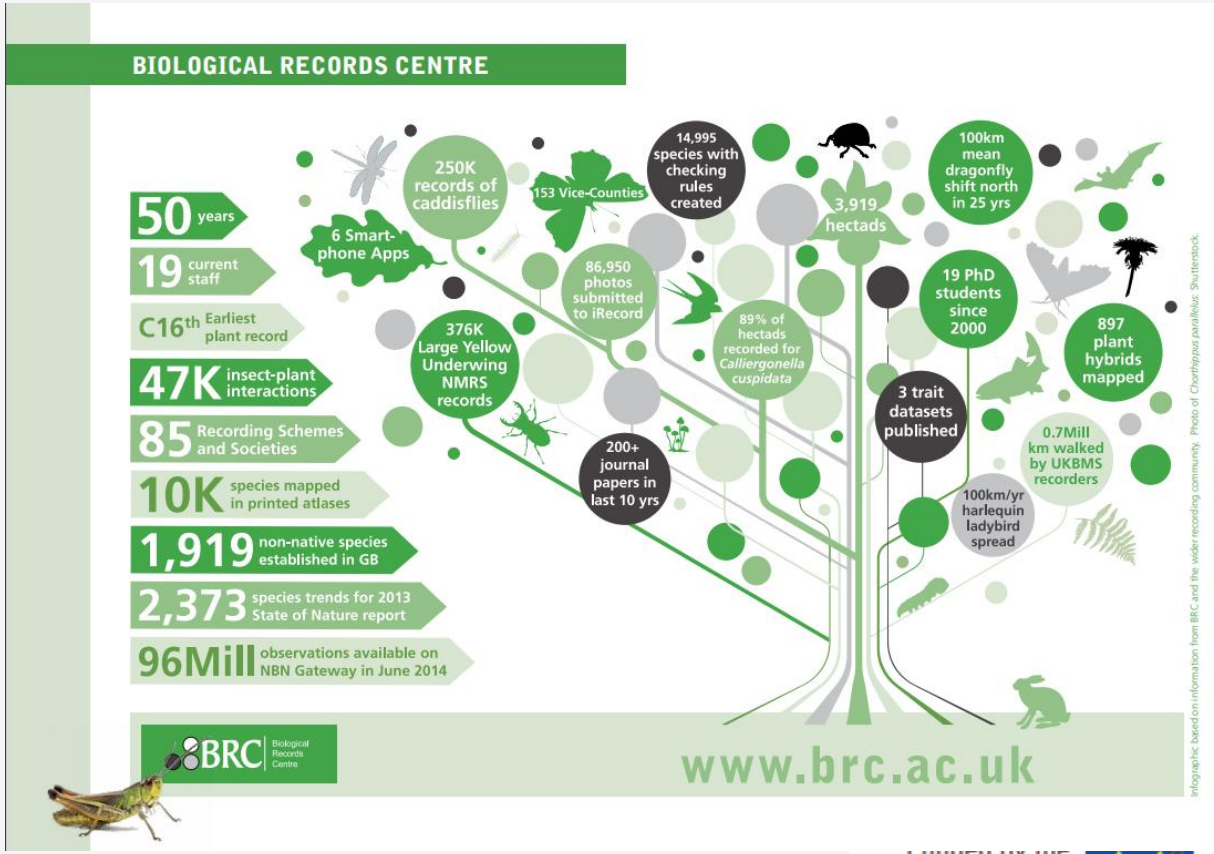
“expert in the loop” assist the acceptance

- When scientists/experts act as intermediaries between citizen science projects and decision making/policy processes, it is more likely that the results will be used



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Personal reflection

- Top-cited paper came about because of sensitivity to opportunities and emerging trends
- Participatory practices remain at the margin, and require attention on integration with mainstream funding
- Developing community of practice and contacts was vital for continuing the development of the research

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MORE RESOURCES

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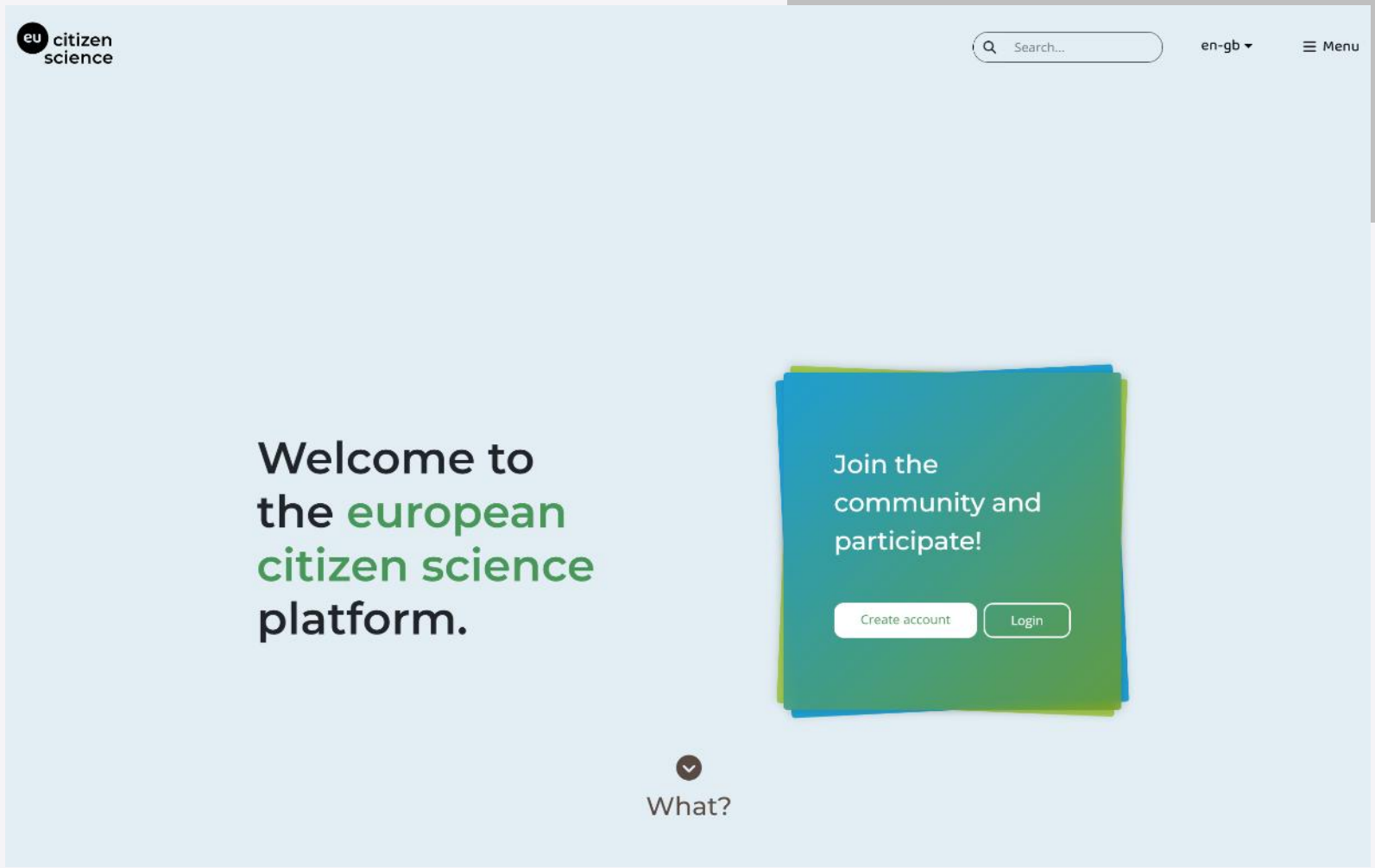
The platform to **share, initiate and learn citizen science** in Europe

https://citizenscience.eu



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PATTERN.

Empowering Open and Responsible Research and Innovation

OUR CONSORTIUM

APRE Agenzia per la Promozione della Ricerca Europea

AARHUS UNIVERSITY

LOBA®

SCIENCE CONNECT YOUR PARTNER IN SCIENCE

ZSI

SISSA

LEARNING PLANET INSTITUTE

OpenAIRE

Open AIRE
affiliated entities

EARMA EUROPEAN ASSOCIATION OF RESEARCH MANAGERS AND ADMINISTRATORS

UniSR Università Vita-Salute San Raffaele

Data Archiving and Networked Services DANS

RB

Universidade do Minho

SciLink

UNIVERSITY OF HELSINKI

Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

UNIVERSITY of DEBRECEN

İZMİR INSTITUTE OF TECHNOLOGY

HEALLINK

Funded by the European Union