

Citizen science opportunities and challenges for scientists

Muki Haklay,
UCL/Université Paris Cité/MNHN

personal context



- Participatory Rural Appraisal
- Participatory Learning and Action

- Public Participation GIS (PPGIS)
- Participatory GIS (PGIS)

- Volunteered / Crowdsourced Geographic information
- Participatory Sensing

- Citizen Science



Overview

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

Citizen Science

Long running
Citizen Science

Citizen
Cyberscience

Community
Science

Ecology &
biodiversity

Meteorology

Archaeology

Volunteer
computing

Volunteer
thinking

Passive
Sensing

Participatory
sensing

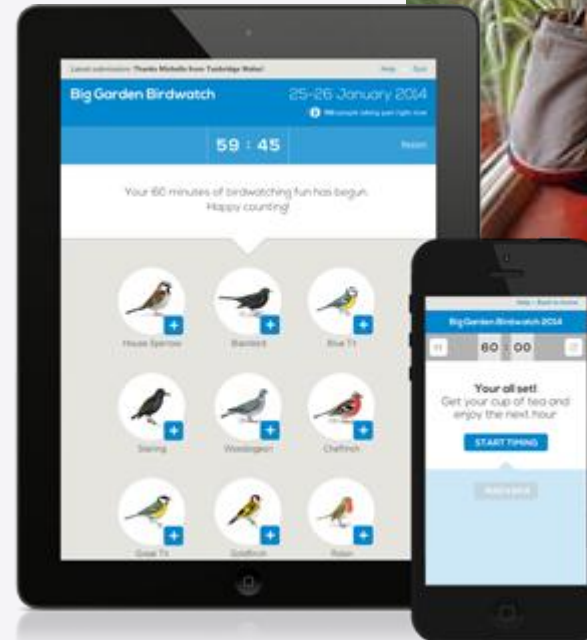
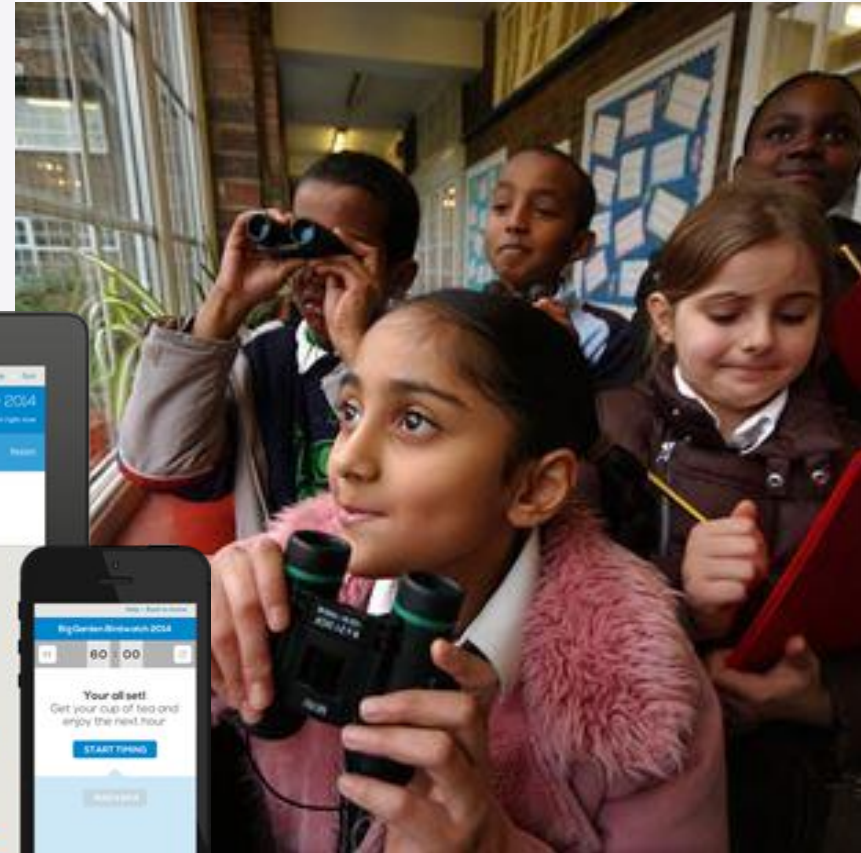
DIY Science

Civic Science

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

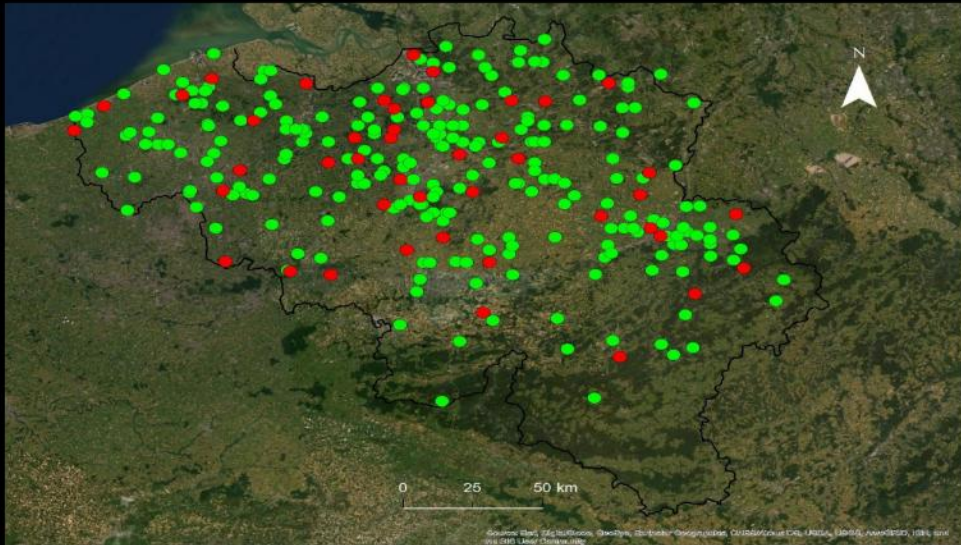
Participating in Big Garden Birdwatch (source: RSPB)



Bird Ringing – Belgium

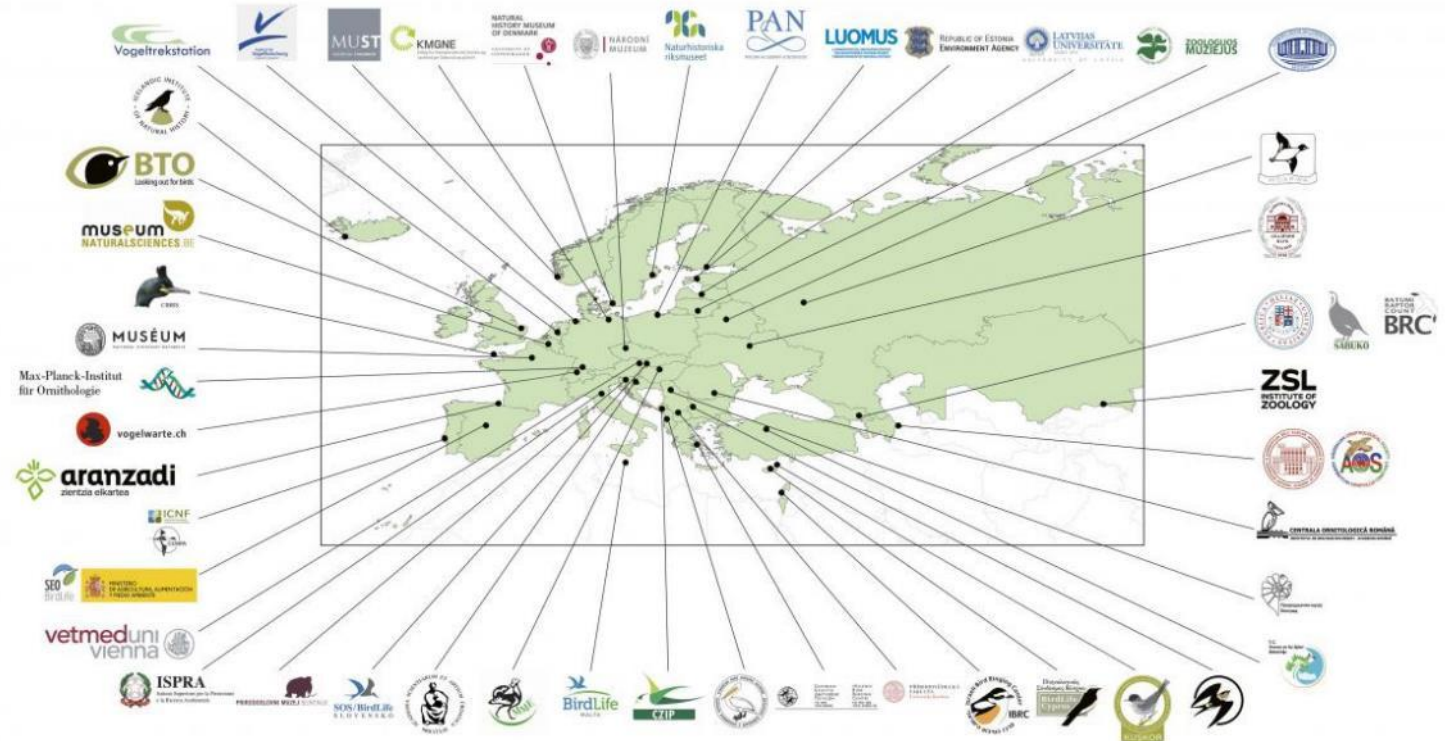
- Since 1927

Structure in regional ringing groups



50 regional groups + 1 transversal (thematic) group
50 group's leaders (« old sages »)
345 certified collaborators (18-85 years old)

Didier Vangeluwe
Royal Belgian Institute of Natural Sciences



Meteorology

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



ZAMG
Zentralanstalt für Meteorologie und Geodynamik

Home Weather Climate Environment Geophysics **Research** Products

Research / Citizen Science / TSN Austria

TSN Austria - Mainpage

Trusted Spotter Network Austria - Main Page test



TRUSTED SPOTTER NETWORK = AUSTRIA

SKYWARN AUSTRIA ESSL ÖVSV Österreichischer Versuchssenderverband ZAMG

ZAMG a Research Institute of the
Bundesministerium Bildung, Wissenschaft und Forschung

© Zentralanstalt für Meteorologie und Geodynamik
1190 Vienna, Hohe Warte 38
Phone: +43 1 36 0 26
E-Mail ●●●

The TRUSTED SPOTTER NETWORK AUSTRIA TSN, in its current state constitutes the collaboration between:

- ZAMG Central Institute for Meteorology and Geodynamics (www.zamg.ac.at), the Austrian meteorological service,
- SKYWARN AUSTRIA (www.skywarn.at) and ÖVSV (<https://www.oevsv.at/>),
- ESSL (www.essl.org), the European Severe Storms Laboratory and the European Severe Weather Database ESWD (www.eswd.eu).

Trusted Spotter – Specialists among spotters and chasers in Austria

So-called "trusted spotters" - as the name implies spotters with a special status - play an important role in impact based weather forecasting and warning activities of ZAMG. These spotters are working on a voluntary basis with the purpose of contributing reports of significant or severe weather as well as accompanied damages. Their reports satisfy high quality demands and are provided according to strict guidelines. Thus, the ZAMG offers an extensive educational and training program to enable spotters for the successful accomplishment of these specific requirements.

[Read more...](#)

Weatherwarnings



Su Mo Tu We Th

Citizen Science

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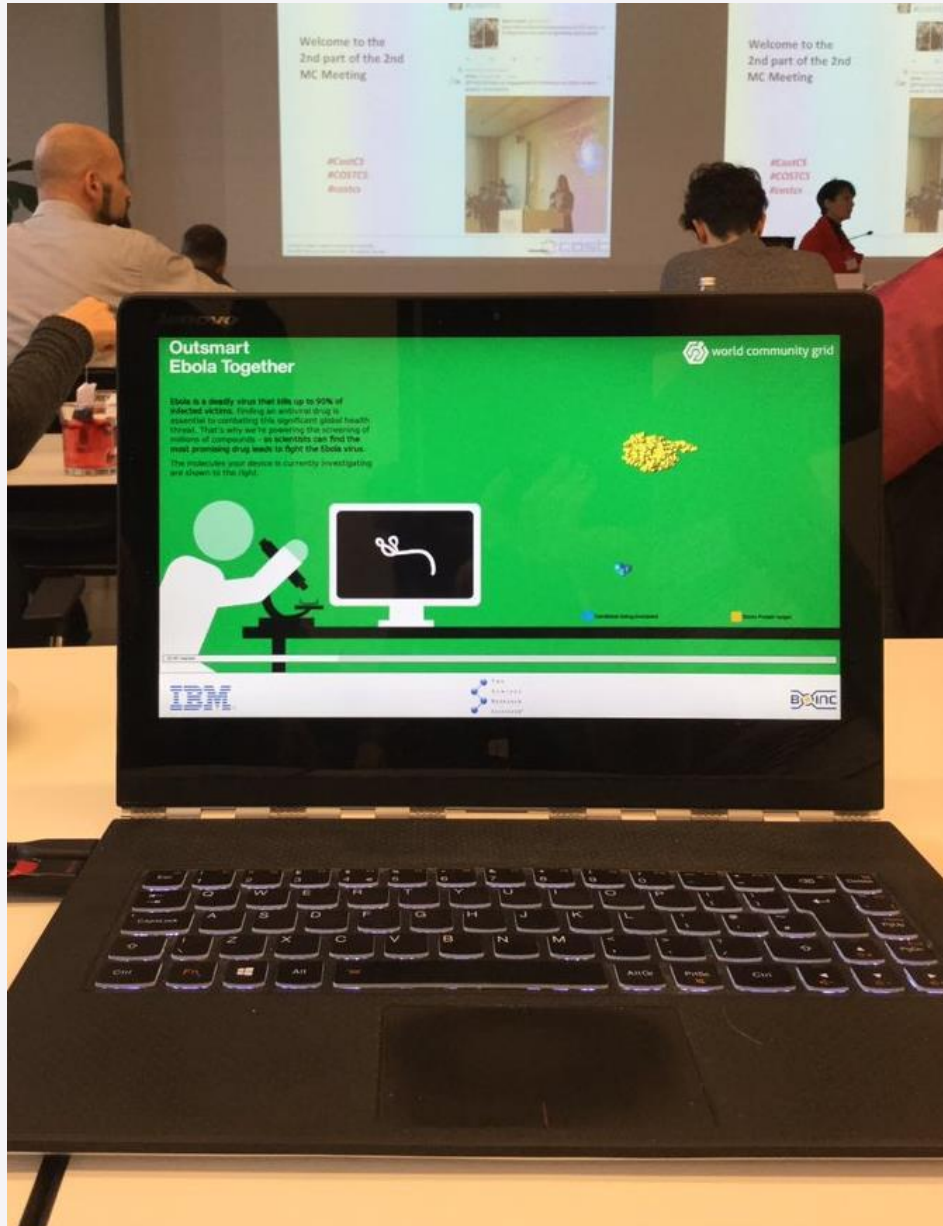
**Community
Science**



Participatory
sensing



DIY Science


Civic Science

Volunteer computing







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%)






14:14
 

 Vodafone Foundation

DreamLab

You're supporting
3D Genome



POWER DREAMLAB


 The Lab
 
 Projects
 
 Contribution
 
 News
 
 Settings



Welcome to Galaxy Zoo, where you can help astronomers explore the Universe

Galaxy Zoo: Hubble uses gorgeous imagery of hundreds of thousands of galaxies drawn from NASA's Hubble Space Telescope archive. To understand how these galaxies, and our own, formed we need your help to classify them according to their shapes — a task at which your brain is better than even the most advanced computer. If you're quick, you may even be the first person in history to see each of the galaxies you're asked to classify.

More than 250,000 people have taken part in Galaxy Zoo so far, producing a wealth of valuable data and sending telescopes on Earth and in space chasing after their discoveries. The images used in Galaxy Zoo: Hubble are more detailed and beautiful than ever, and will allow us to look deeper into the Universe than ever before. To begin exploring, click the 'How To Take Part' link above, or read [The Story So Far](#) to find out what Galaxy Zoo has achieved to date.

Thanks for your help, and happy classifying.

The Galaxy Zoo team.

Classifier Log In

[Click here to log in](#)

- Register
- Forgotten Password?

Latest News

Galaxy Zoo gets highlighted by the 2010 Decadal Survey

by Kevin - 16 Aug 2010

Every decade, the US astronomy community gets its leaders together to write up a report on the state of the field and its future.

- Win a Signed Comic Book
- Galaxy Zoo gets highlighted by the 2010 Decadal Survey
- Zoo 1 data set free
- Happy birthday to us.

Hanny's



voorwerp discovery | public appearances | astronomy adventures | everyday life

04 | VOORWERP

IN THE PICTURES

THE STORY BEHIND

WHAT IS IT



Pages

- 01 | ABOUT
- 02 | CONTACT
- 03 | HANNY
- 04 | VOORWERP
- 05 | GALAXY ZOO
- 06 | LECTURES
- 07 | COMIC
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Categories

- Astronomy
- Discoveries
- Galaxy Zoo
- Guest Blogs
- Holidays
- Lectures
- Media
- Music
- Private
- Work

Archives

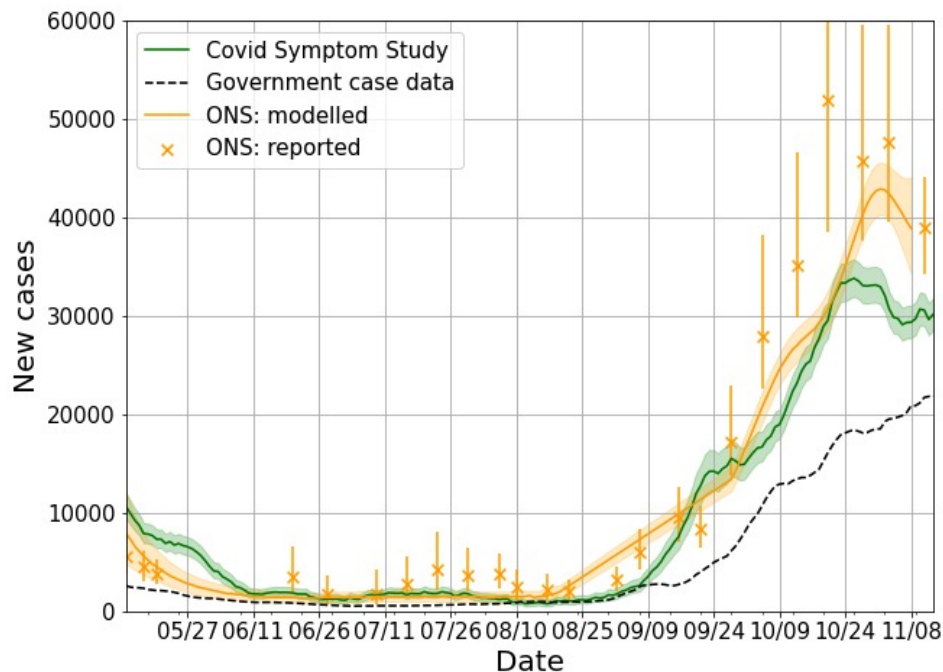
2010

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

Credit: William Keel, Anna Manning. 3.5-m WIYN Telescope

Public health

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



**ZOE COVID
Symptom Study**
proves the power of
citizen science



Counting traffic

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



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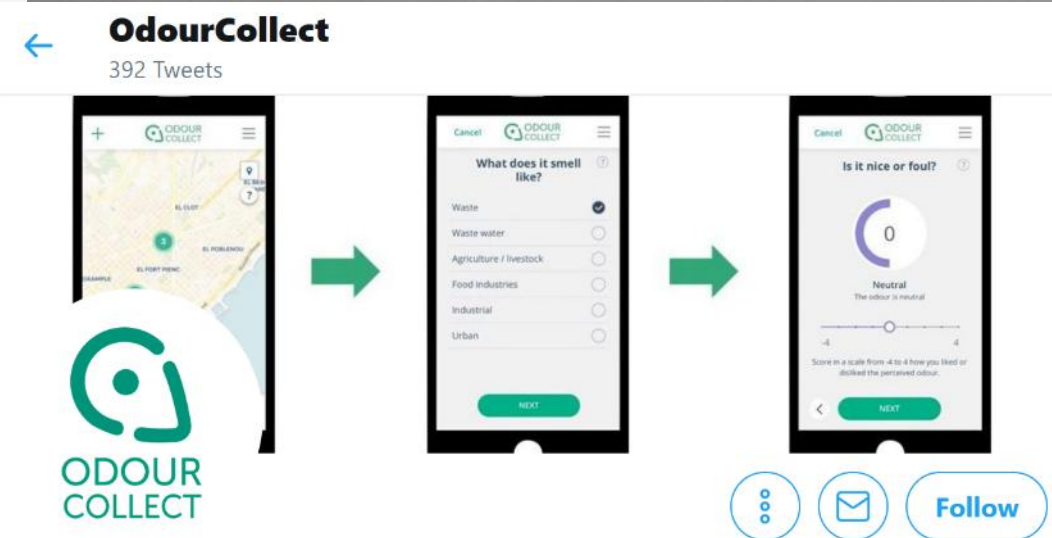
Participatory
sensing

DIY Science

Civic Science



Participatory Sensing



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

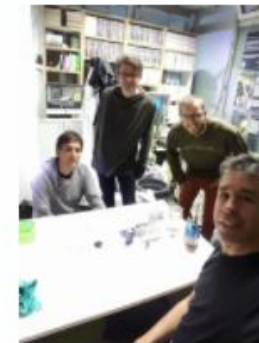
DIY Science



Imane Baiz, CRI Paris



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



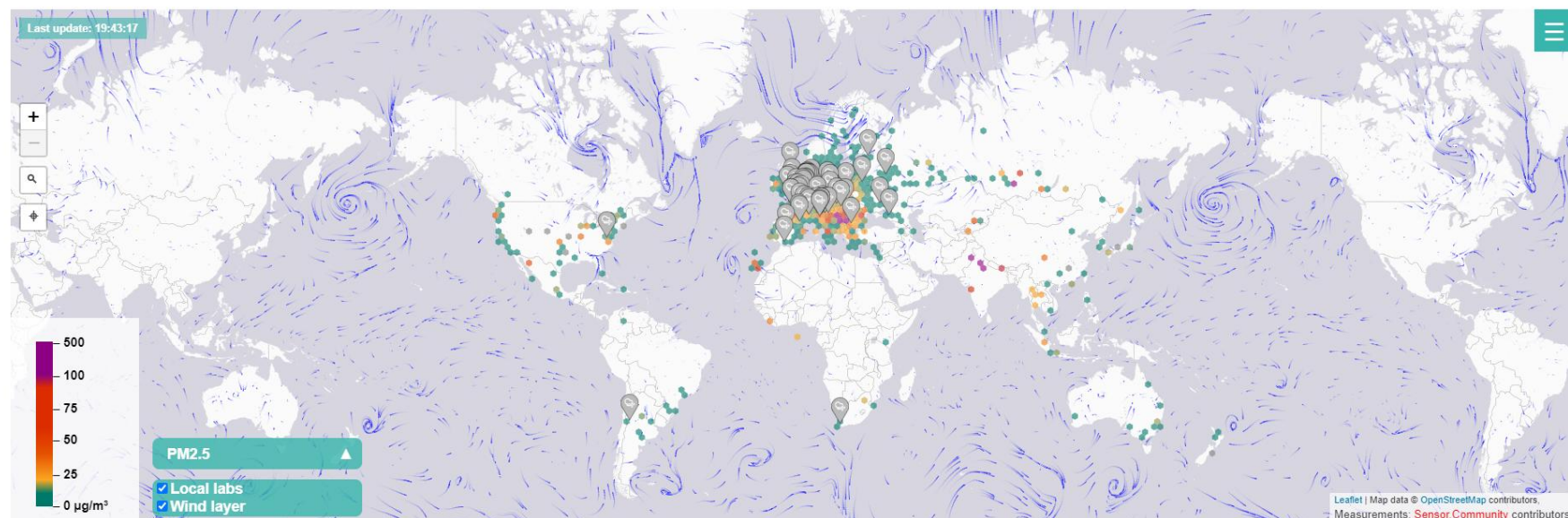
<http://www.hackteria.org/wordpress/projects/biotehna/biotehna/>

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.


Sensor.community – DIY air sensing

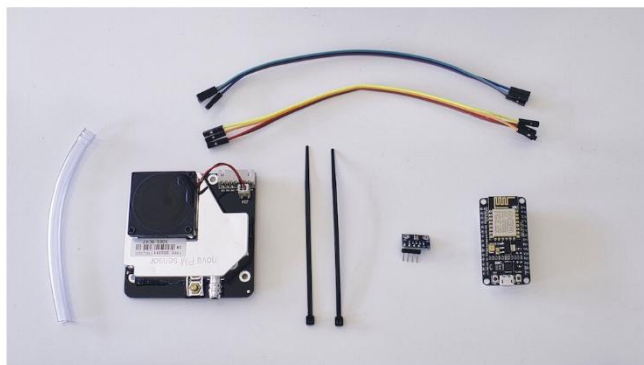
SENSOR COMMUNITY

HOME GUIDES FORUM DONATE ❤️



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.

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

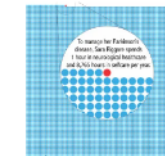


Image with English
text as jpg file.

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.

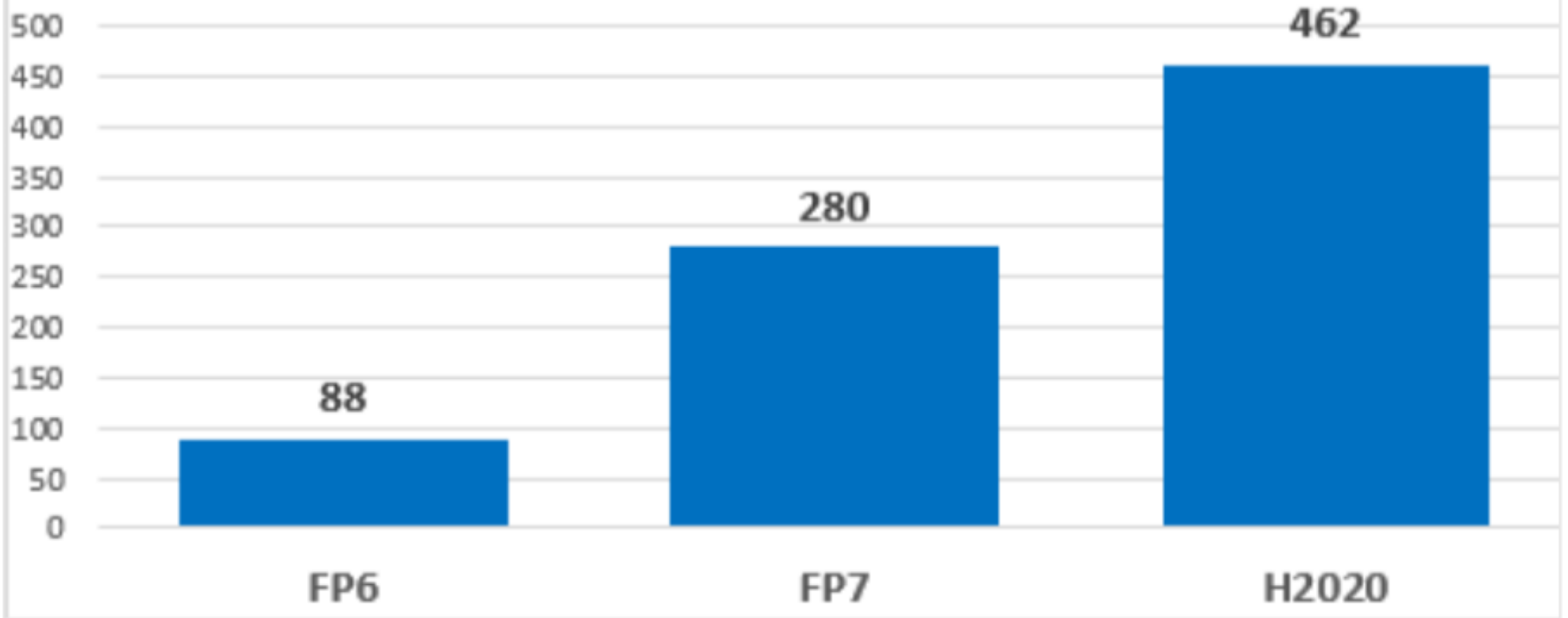
Varieties of citizen science

- 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

SO WHAT? WHY SHOULD I CARE?



Science with and for Society Budget in EU FPs

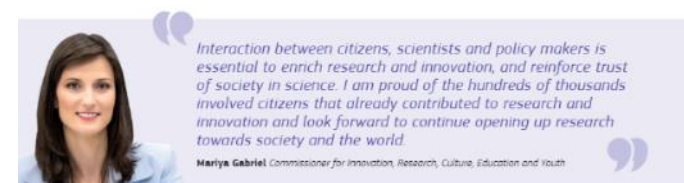


“

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)



WHAT IS CITIZEN SCIENCE AND WHY IS IT IMPORTANT?

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.

Active engagement with citizens and society has the potential to **improve research and its outcomes and reinforce societal trust in science**. It can increase

- **relevance and effectiveness** by ensuring that R&I aligns with needs, expectations and values of society
- **creativity and quality** by enlarging the collective capabilities, the scope of research and the quantity and quality of data
- **transparency, science literacy and confidence of the public in research**

CITIZEN SCIENCE AS PART OF EU POLICY

Citizen engagement is at the core of the Von der Leyen Commission's **New Push for European Democracy** and more participatory decision-making, and an **integral part of the EU's Open Science policy priority** and the **European Research Area**.

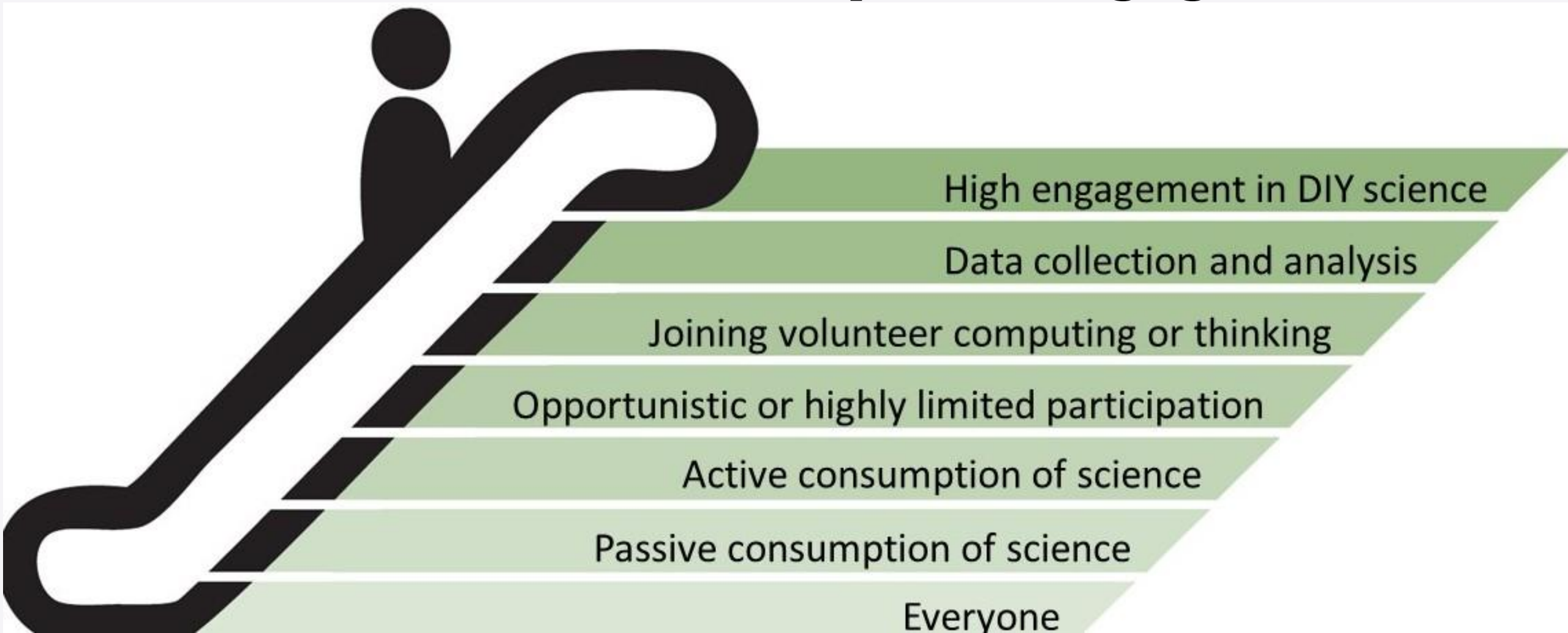


”

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**

Citizen Science with public engagement

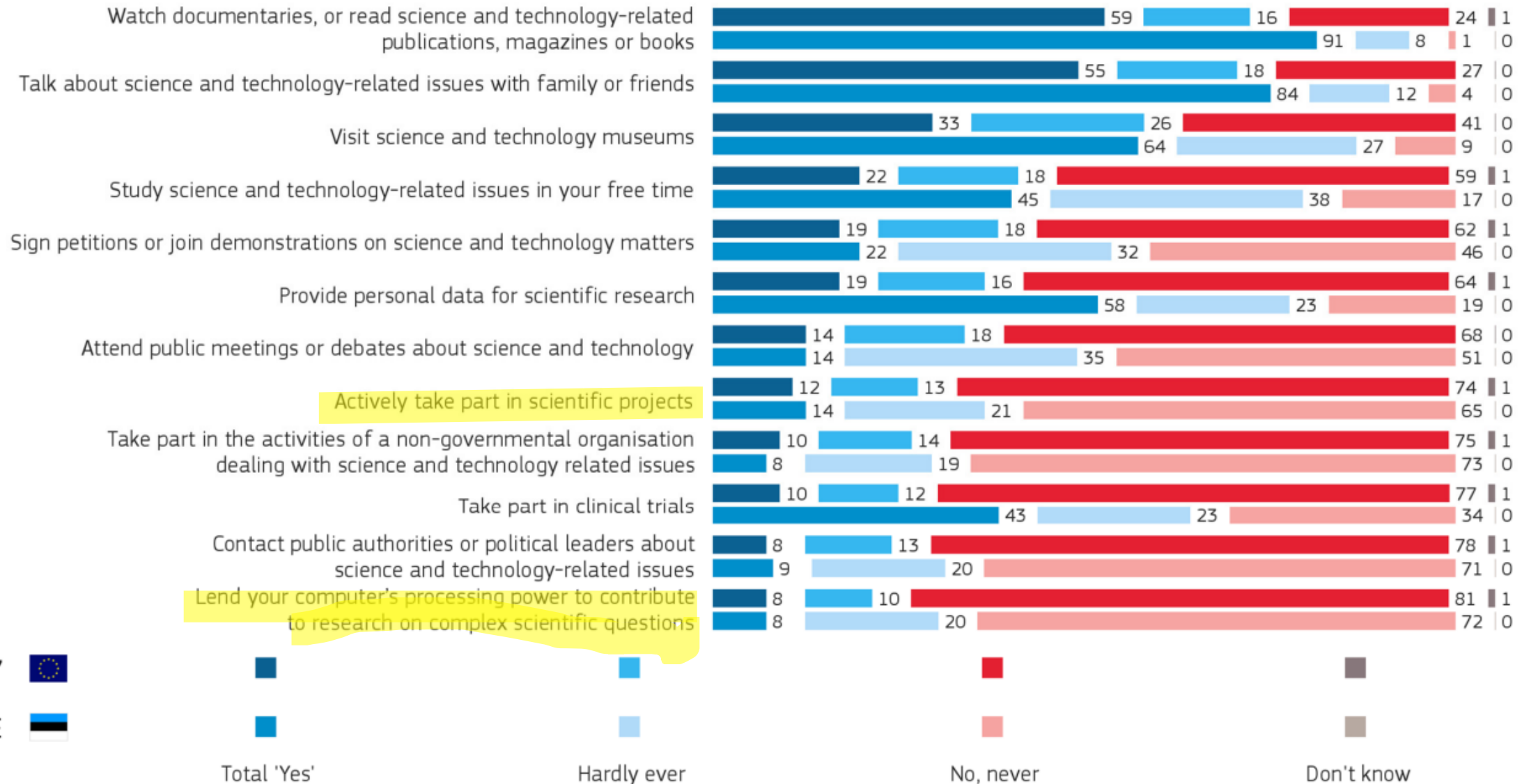




5. CITIZEN'S ENGAGEMENT IN SCIENCE AND TECHNOLOGY

Eurobarometer 516

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

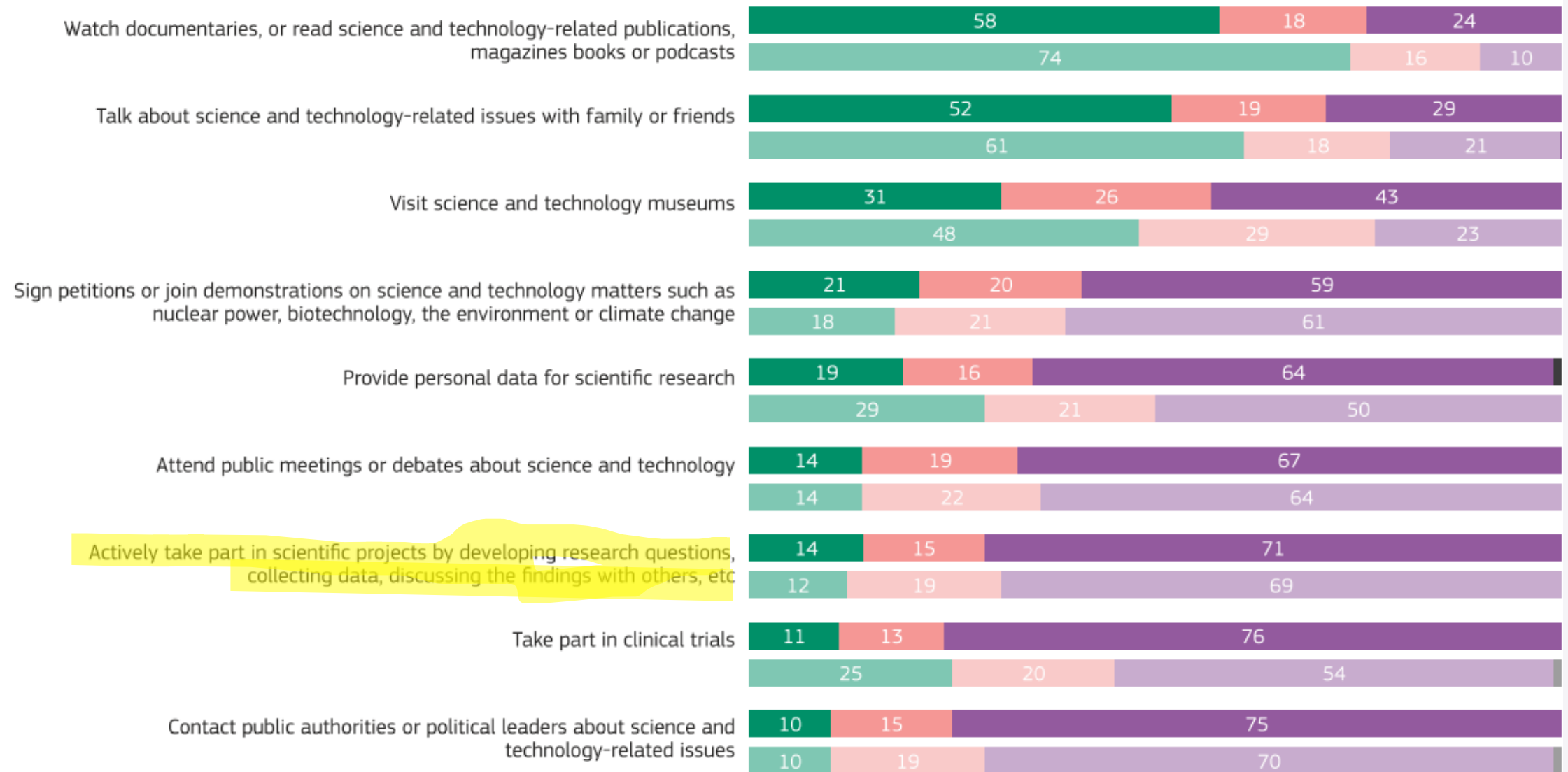




1. CITIZEN'S ENGAGEMENT IN SCIENCE AND TECHNOLOGY

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

Eurobarometer 557



EU27 ● Total 'Yes' ● No, hardly ever ● No, never ● Don't know

EE ● Total 'Yes' ● No, hardly ever ● No, never ● Don't know

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



Citizen Science initiatives
Policy and Practice

#HorizonEU

PSF CHALLENGE - MUTUAL LEARNING EXERCISE (MLE)

An increasing number of citizen science projects and initiatives are being implemented across Europe. 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. The following topics of interest have been identified for the MLE:

- Topic 1: Introduction and overview on citizen science
- Topic 2: Ensuring good practices and impacts
- Topic 3: Maximising the relevance and excellence of citizen science
- Topic 4: Enabling environments and sustaining citizen science
- Topic 5: Scaling up citizen science

Visit the website for more information: <https://ec.europa.eu/research-and-innovation/en/statistics/policy-support-facility>

Participating countries: Austria, Belgium, France, Germany, Hungary, Italy, Norway, Portugal, Romania, Slovenia and Sweden.

Chair
Alan Irwin

Rapporteur
Margaret Gold (Rapporteur and Expert on Topic 4)

Independent Experts
Muki Haklay (Expert on Topic 1)
Rosa Arias (Expert on Topic 2)
Marzia Mazzonetto (Expert on Topic 3)
Antonella Radicchi (Expert on Topic 5)
Ingeborg Meijer (Support Rapporteur and Support Expert on Topic 4)

DG R&I Policy Officers
Annamaria Zonne (Policy Support Facility)
Annamaria.ZONNO@ec.europa.eu
Gabriella Leo (Open Science)
Gabriella.LEO@ec.europa.eu

Scheduled meetings

- January 2022: Topic 1 meeting
- March 2022: Topic 2 meeting
- June and September 2022: Topic 4 meeting
- October 2022: Topic 3 meeting
- November 2022: Topic 5 meeting
- December 2022: Final Meeting
- Early 2023: Dissemination event

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Research and
Innovation

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
<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Organises data sets to be findable, 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. 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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

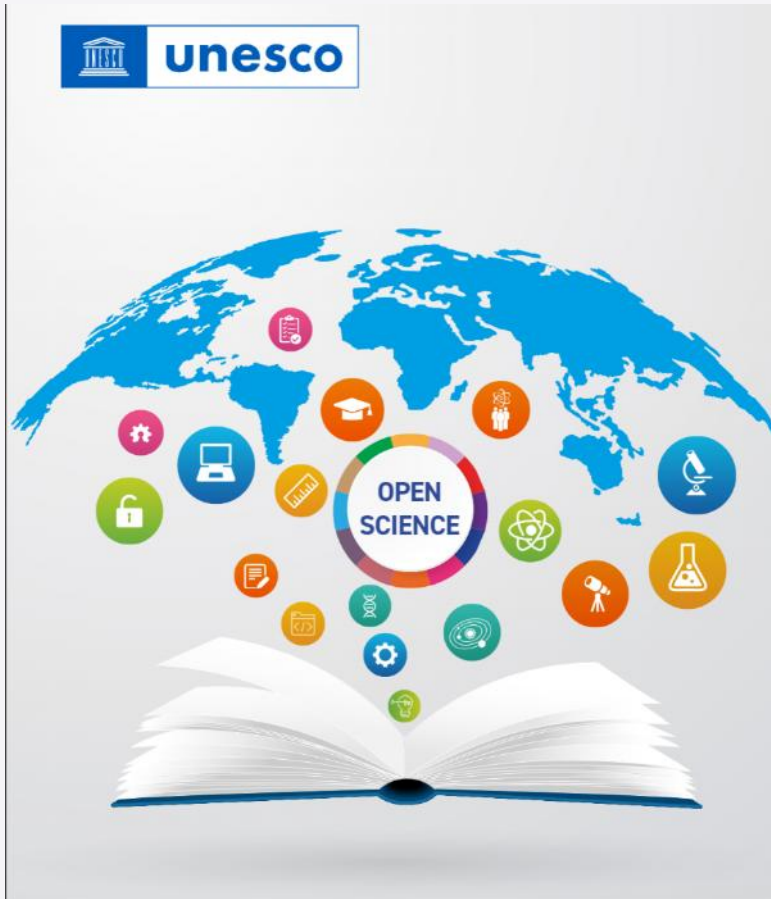
Engage citizens in scientific and research activities and promote their contribution in terms of knowledge, time or resources invested.

<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Is inclusive and transparent in the research process and understands how best to engage with citizens in each specific context. 	<ul style="list-style-type: none"> Engages all categories of citizens in the research process and integrates them at specific stages of the research cycle. 	<ul style="list-style-type: none"> 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.
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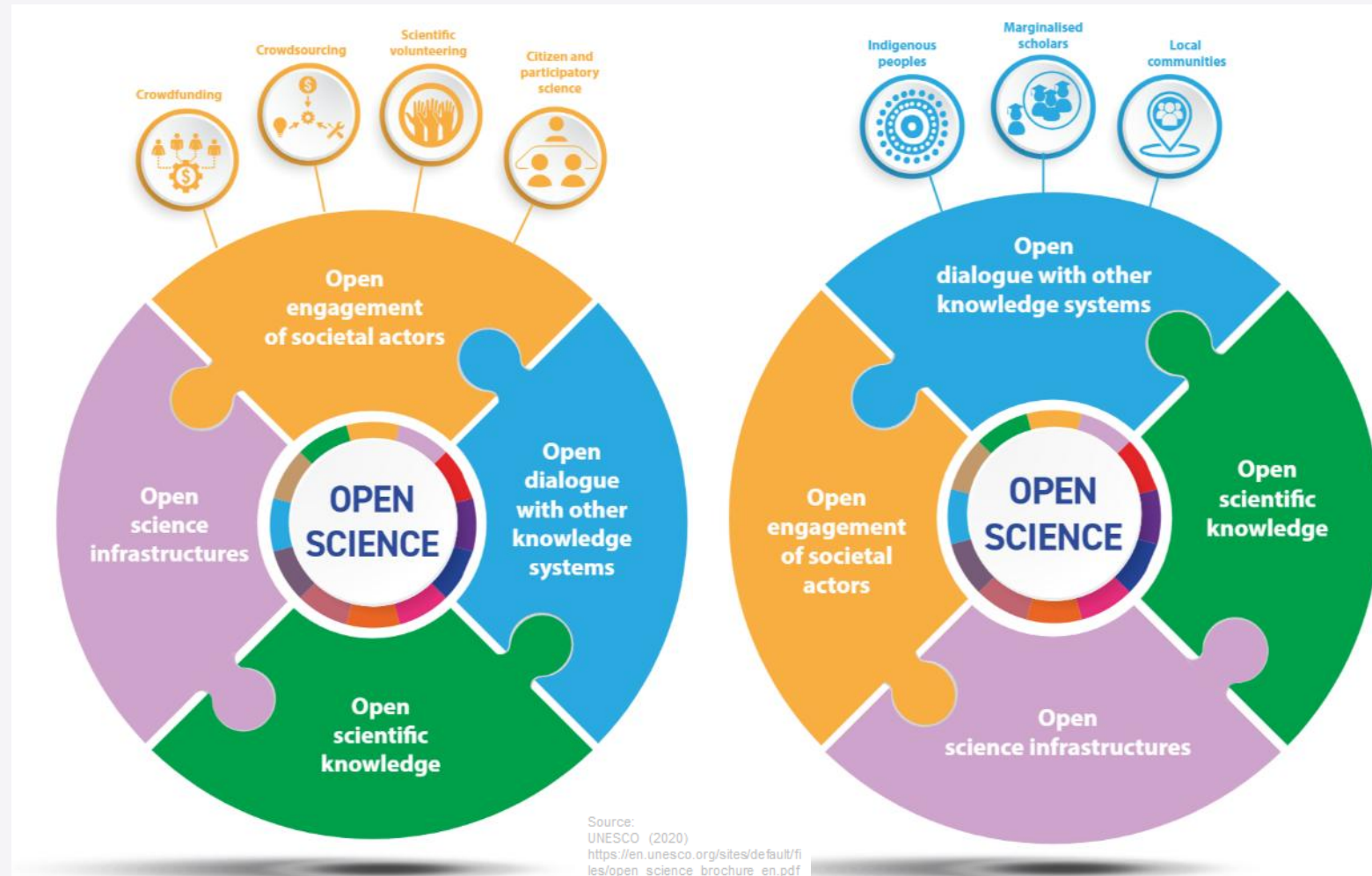
THE EUROPEAN COMPETENCE FRAMEWORK FOR RESEARCHERS

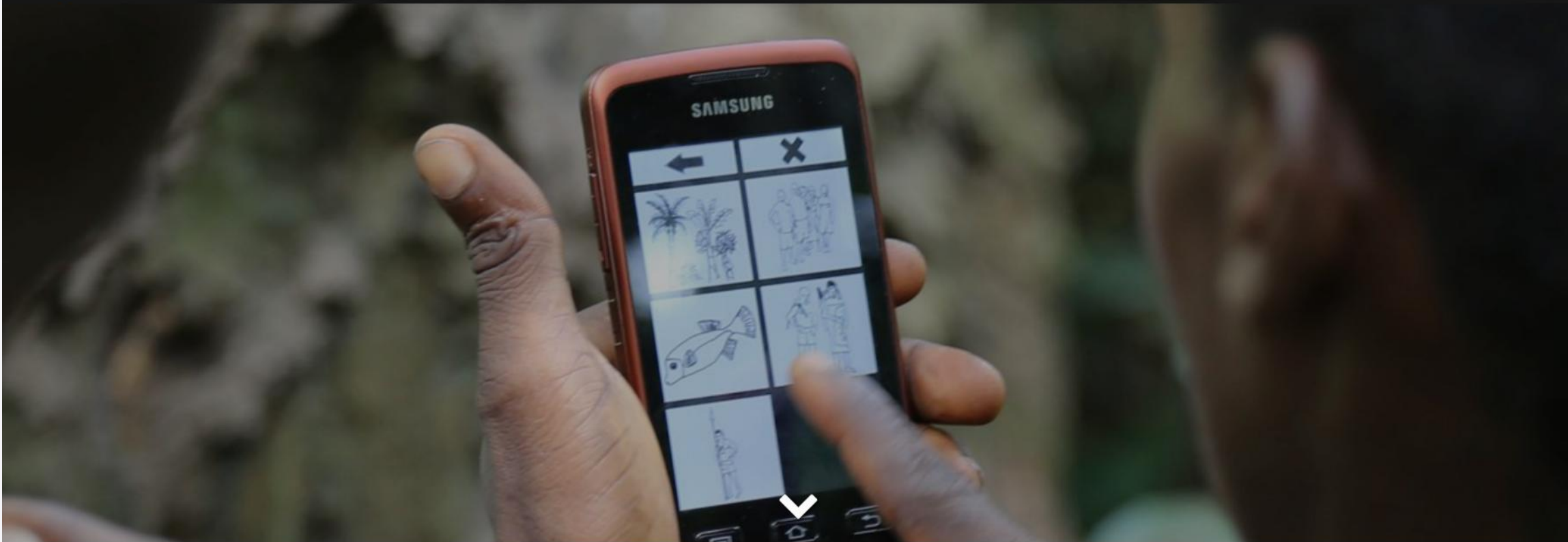


UNESCO Recommendation on Open Science



**UNESCO Recommendation
on Open Science**





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



women participated in Isala

We found



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



Inspired by isala.be



Inspired by isala.be

Base for novel diagnostics and therapeutics



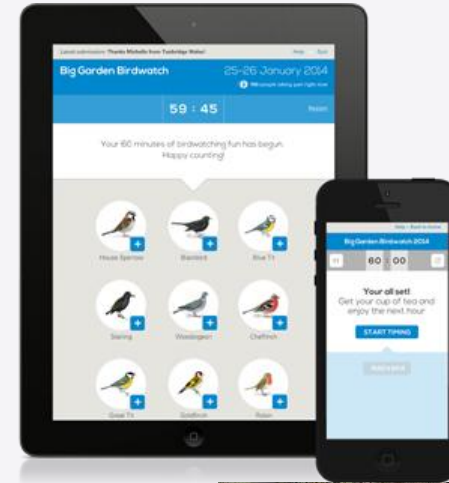
Awarded for clear science communication

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

- Scarcity



- Abundance



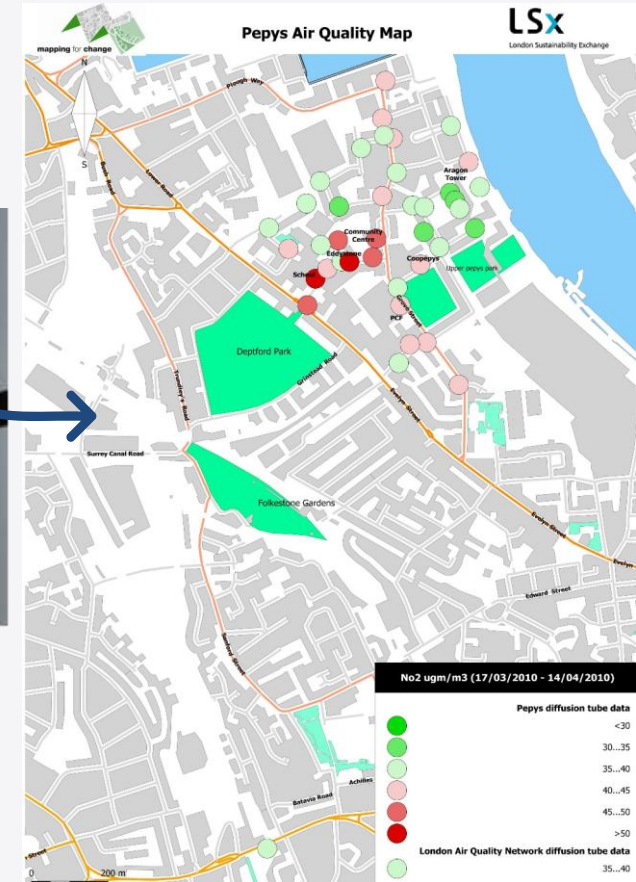
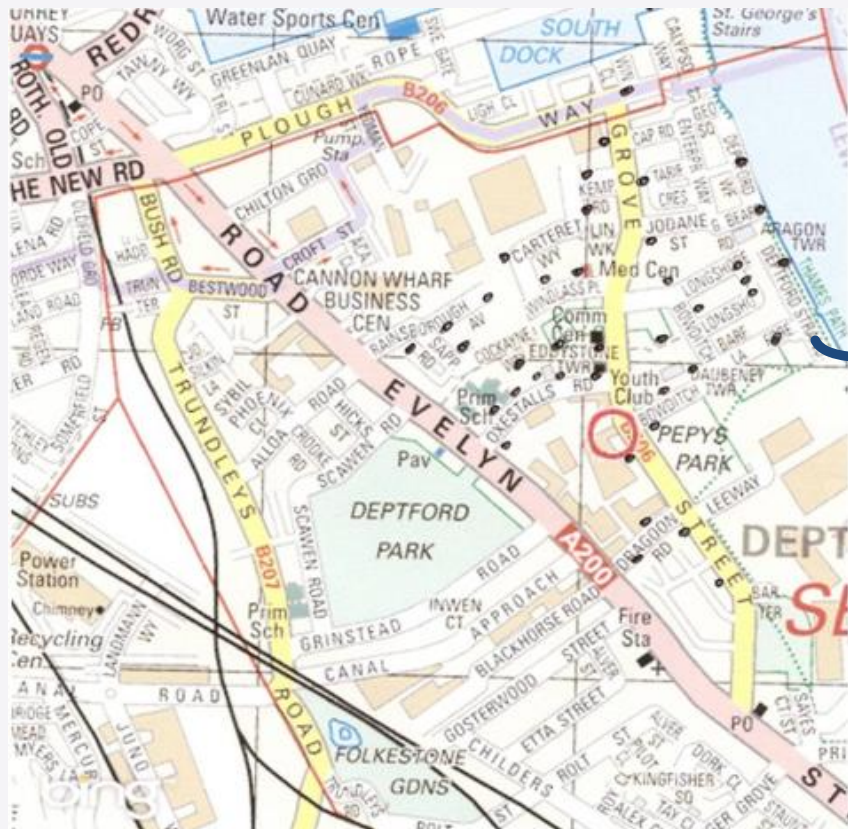
- **Scarcity**

- Investment in training
- Maximising output from each action
- Top-down, standardised procedures to ensure ‘once & good’ – optimisation
- Standard equipment and software

- **Abundance**

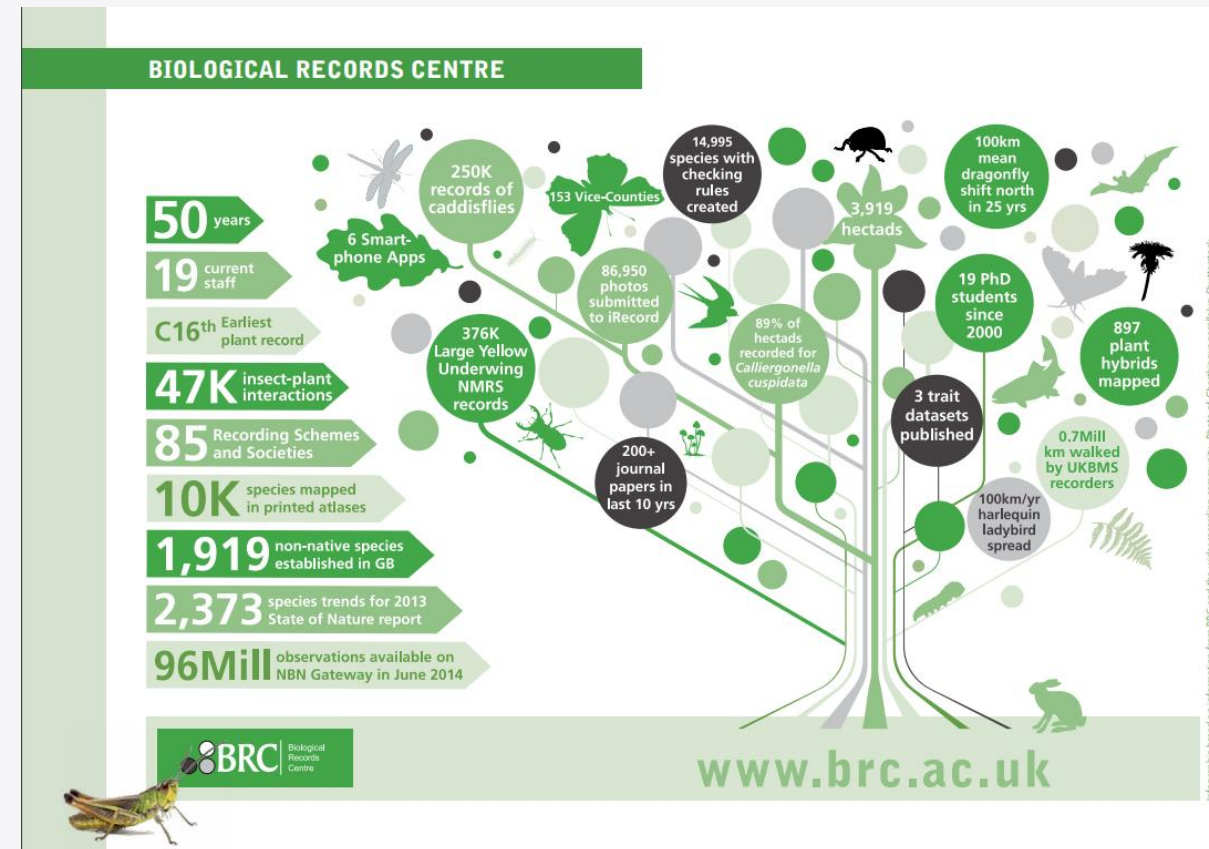
- Assumption of variable skills and training
- Ensuring microtasks are enjoyable and rewarding
- Multiplicity of procedures and interactions to ensure engagement
- Multiplicity of equipment with limited information about characteristics

Status anxiety plays an important role in institutional resistance



“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



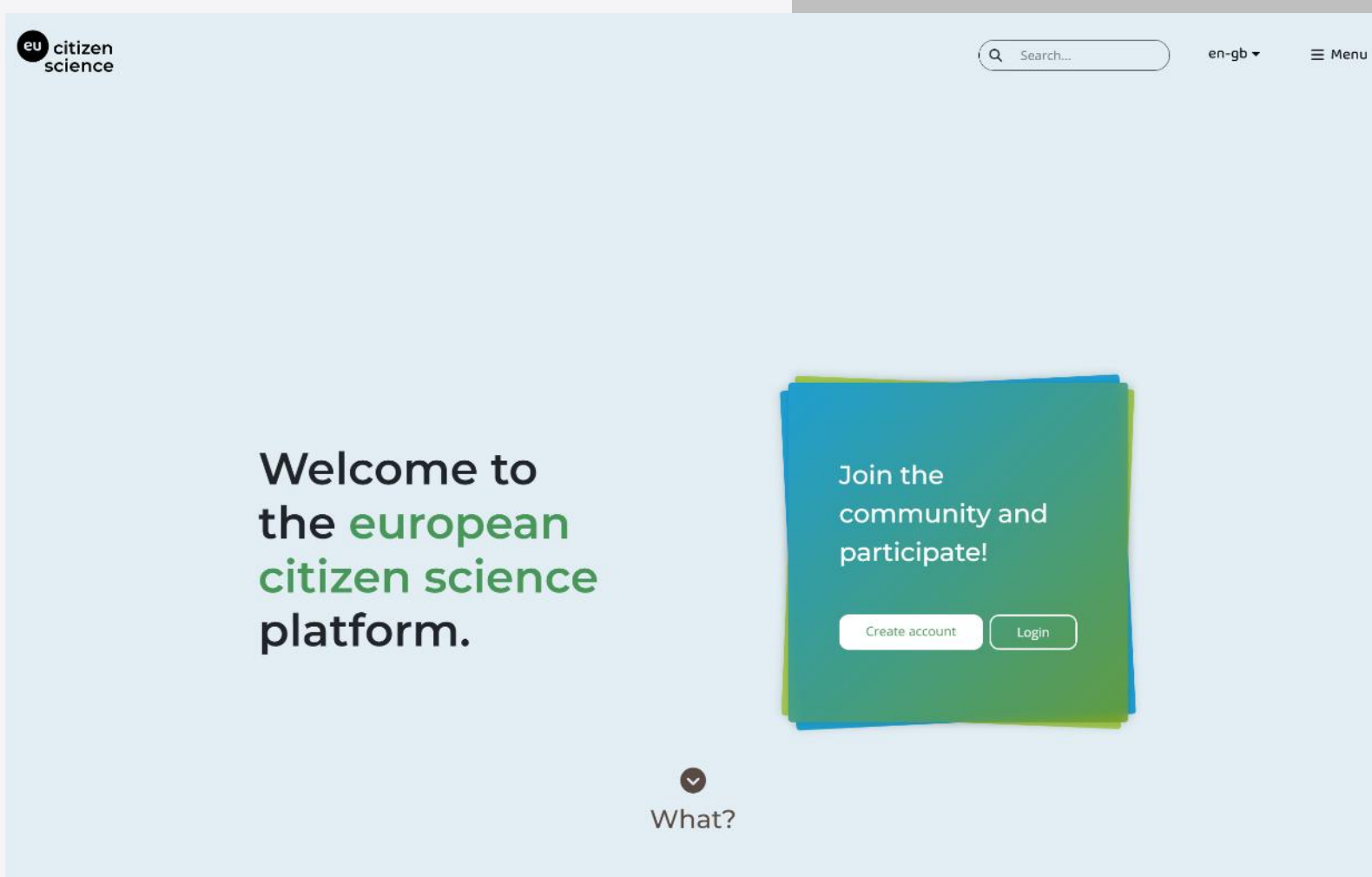
Personal reflection

- 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

MORE RESOURCES

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

<https://citizenscience.eu>



Empowering Open and Responsible Research and Innovation

OUR CONSORTIUM



UNIVERSITY OF HELSINKI

Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of DublinUNIVERSITY of
DEBRECENİZMİR
INSTITUTE OF
TECHNOLOGY
Turkey's Technology Base