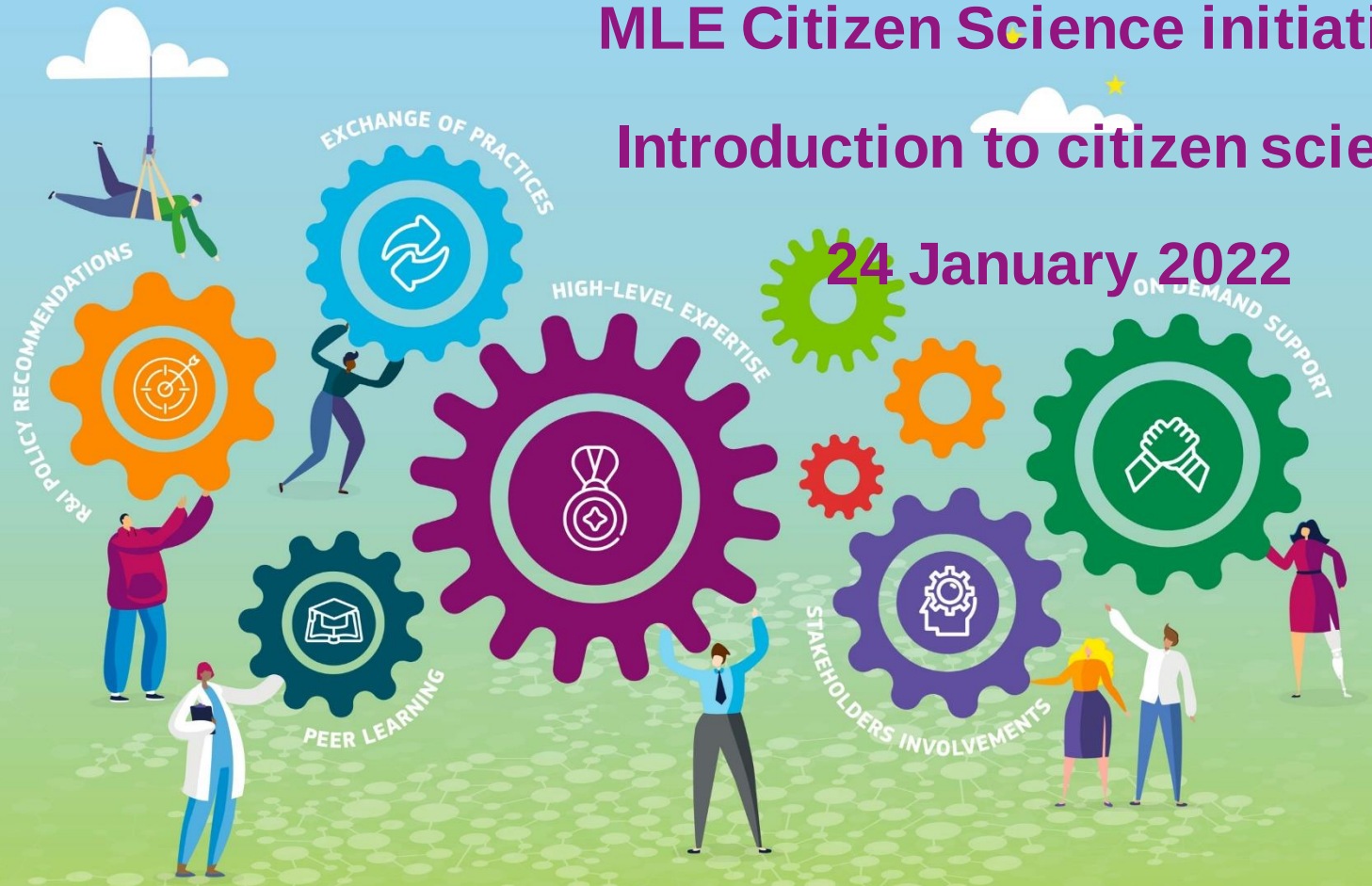
MLE Citizen Science initiatives:

Introduction to citizen science

24 January 2022



#HorizonEU

HORIZON EUROPE POLICY SUPPORT FACILITY

2021 – 2027

Research and Innovation

AGENDA

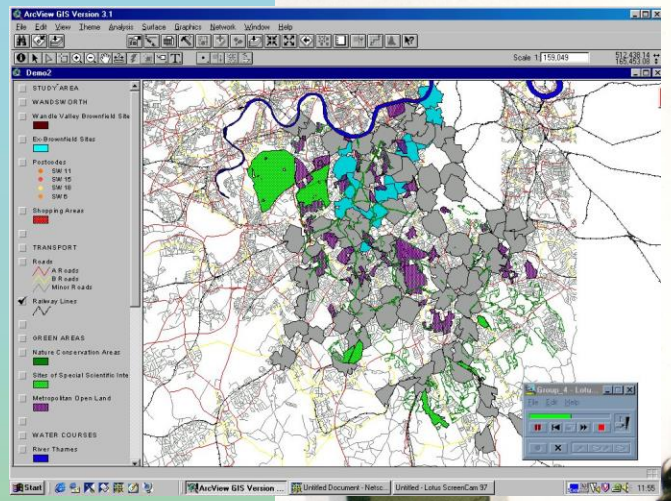
Time	Description
09.30-09.40	Welcome, a short ice breaker exercise (Marzia Mazzonetto)
09.40-10.00	Presentation: overview of citizen science - examples of projects (Muki Haklay)
10.00-10.10	Discussions, using some examples from the survey (Muki Haklay)
10.10-10.30	Presentation: : citizen science engagement with science, Eurobarometer 516; defining citizen science - ESCA principles, ESCA characteristics (Muki Haklay)
10.30-10.40	Interactive exercise: using inputs to jamboard to discuss what is and is not citizen science (Muki Haklay)
10.40-11.00	Presentation: Citizen science in policy and research UNESCO open science recommendations, Horizon 2020/Europe pillars, other funding (LIFE+ Erasmus) (Muki Haklay)
11.00-11.10	Break
11.10-11.40	Discussion on key principles and intelligence on citizen science including: (Muki Haklay) – How citizens interact and engage with citizen science – Practical examples of how Member States have successfully promoted citizen science – How citizen science is promoted through EU funding mechanisms
11.40-12.00	Presentation by Carole Paleco (NHM Brussels) and Tine Huyse (Royal Museum for Central Africa) providing hands-on-experience of citizen science in action
12.00-12.20	Using the Jamboard to delive into some of the questions, focusing on Topics 4 and 5 (Enabling environments and sustaining citizen science and Scaling up citizen science) (Margaret Gold and Antonella Radicchi)
12.20-12.25	Summary of learning and issues that were discussed, what aspects of these people want to explore next for 2nd meeting on ‘Ensuing good practices and impacts’ (Margaret Gold)
12.25-12.30	Closing (Alan Irwin)

TOPIC 1: INTRODUCTION AND OVERVIEW TO CITIZEN SCIENCE

Expert: Muki Haklay

Professor of Geographical Information Science, University College London

Co-Director of the Extreme Citizen Science group at UCL



1998

Aurigi, A., Batty, S., Bloomfield, D., Boott, R., Clark, J., Haklay, M., Harrison, C., Heppell, K., Moreley, J. and Thornton, C. (1999), *UCL Brownfield Research Network*, University College London, London, UK, 42 pp

CONVENTION ON ACCESS TO INFORMATION, PUBLIC PARTICIPATION IN DECISION-MAKING AND ACCESS TO JUSTICE IN ENVIRONMENTAL MATTERS

done at Aarhus, Denmark,
on 25 June 1998

Background

1980s

- Participatory Rural Appraisal
- Participatory Learning and Action

1990s

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

2000s

- Volunteered / Crowdsourced Geographic information
- Participatory Sensing

2010s

- Citizen Science

European Commission

Outline

- Introductory overview of citizen science, practical examples of how Member States have successfully promoted citizen science in their respective contexts
- How citizens interact and engage with science, and where citizen science fit within this picture
- The characteristics and principles of citizen science
- How citizen science is promoted through EU funding mechanisms

PART I: A BRIEF INTRODUCTION TO CITIZEN SCIENCE

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Defining 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)

Citizen Science in the Oxford English Dictionary (2014):

*"**citizen science** n. scientific work undertaken by members of the general public, often in collaboration with or under the direction of professional scientists and scientific institutions."*

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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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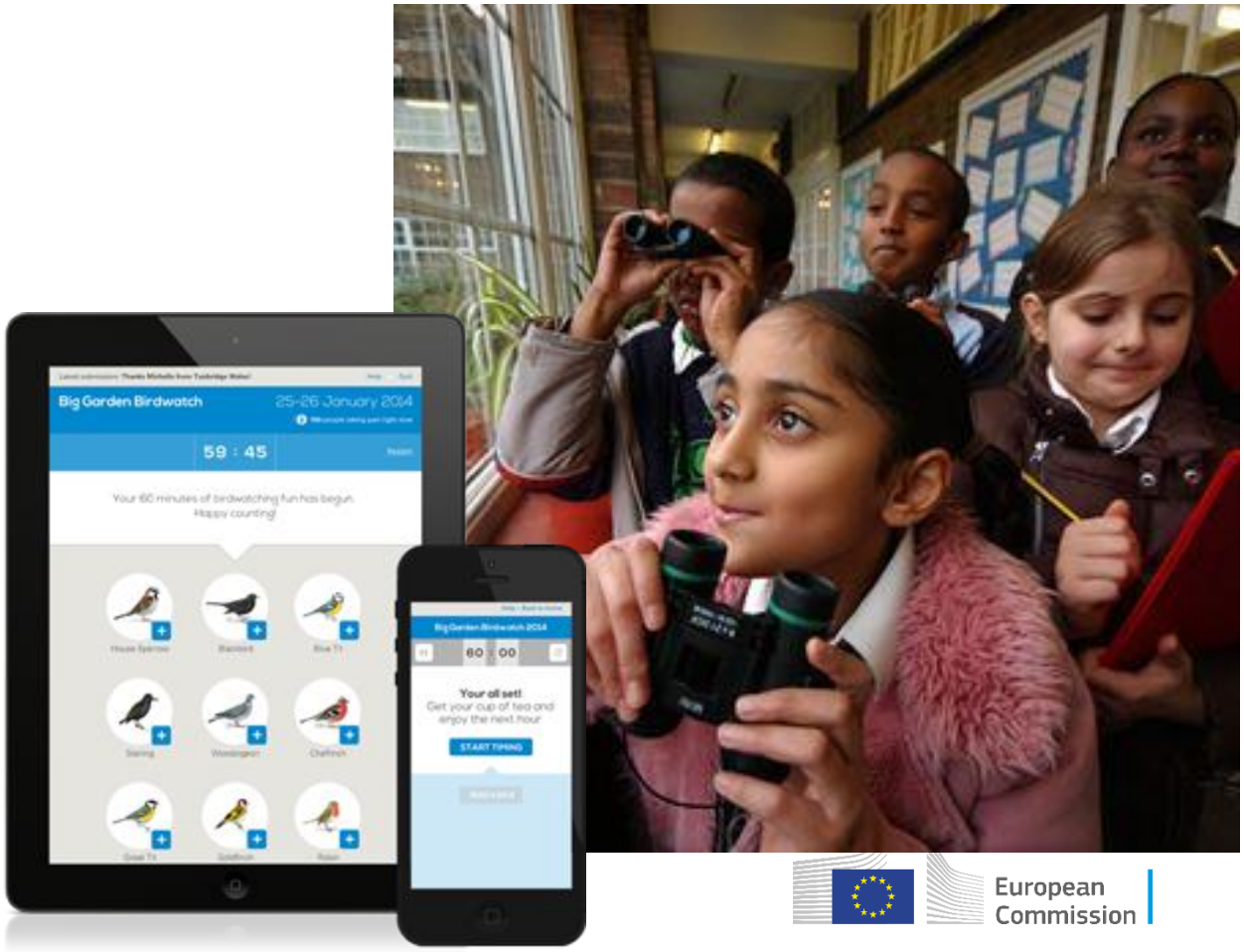
Biodiversity/Ecology/Biological recording

- Ecological observations of plants and animals (esp. birds), continue to be popular
- A review in 2012 identified 234 projects in the UK
- Big Garden Birdwatch – 1 hour, end of January, structured reporting, and over million participants in 2021

Participating in Big Garden Birdwatch (source: RSPB)



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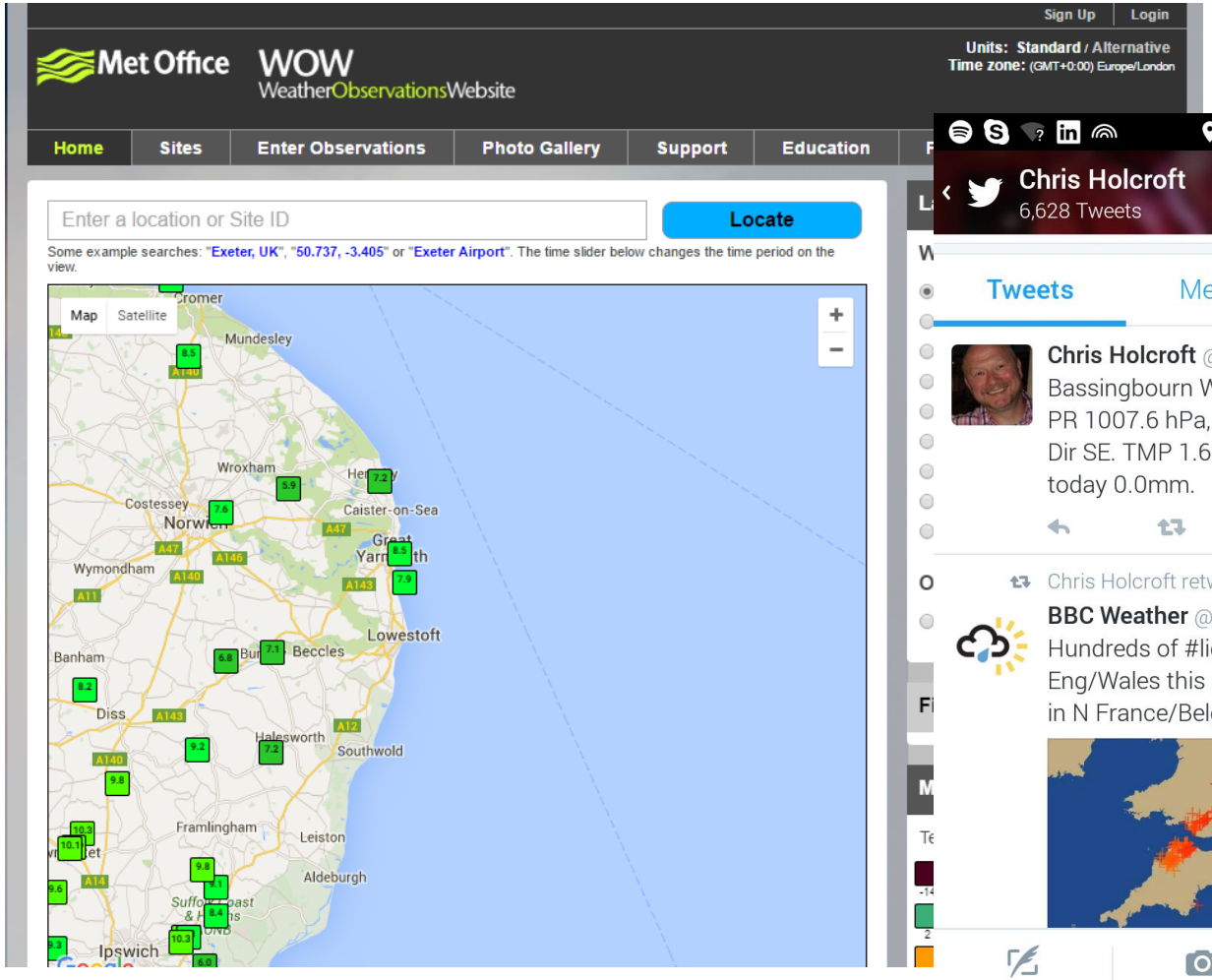
Meteorology

- Legacy of volunteer observations
- Met Office WOW received 13 million observations per month in 2017
- Volunteers also use automatic weather stations



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Meteorology

- A need to record and address extreme weather event
- Need for a widely distributed geographic network
- Reliable observations through recruitment

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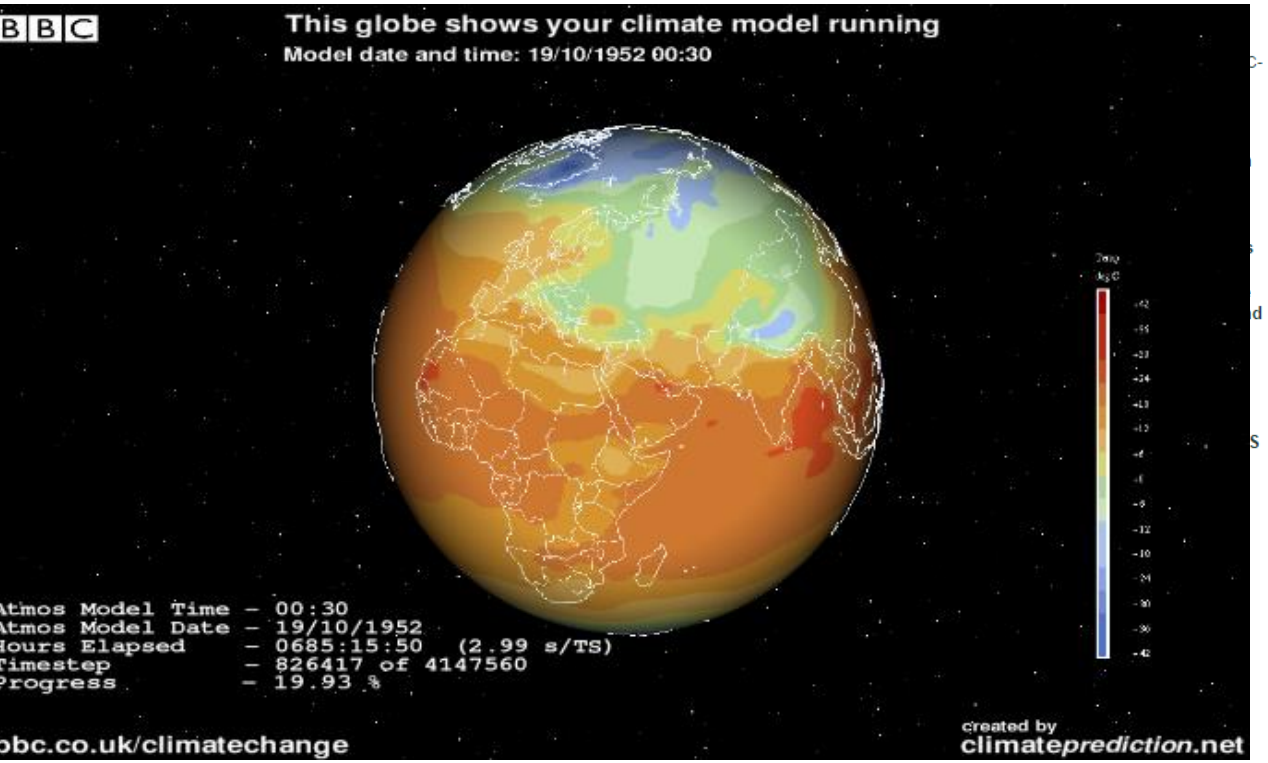
Volunteer computing



climateprediction.net

the world's largest climate modelling experiment for the 21st century

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weather@home › 2015 December Extreme weather in the UK ›

In this section:

2015 December Extreme weather in the UK

Observational Analysis

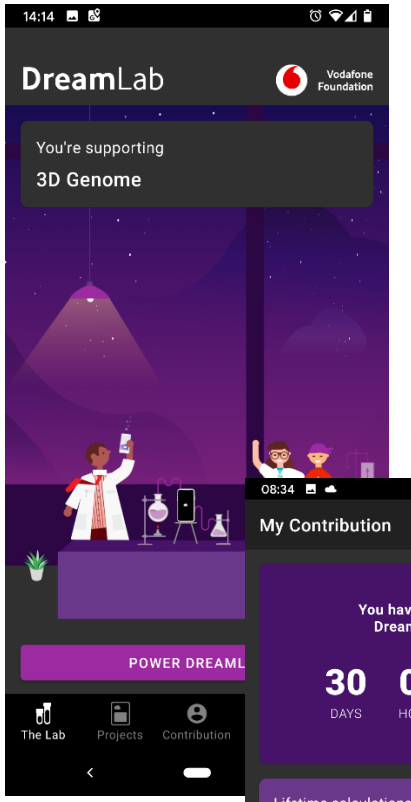
2015 December Extreme weather in the UK

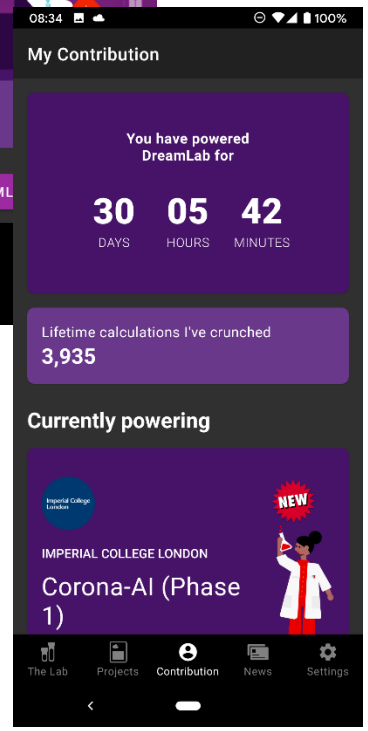
Applying three independent methodologies of extreme event attribution, we show that temperatures and precipitation in the UK in December 2015 were extremely unlikely even in a warming world with observed SST patterns, including El Niño, as an additional driver. This indicates that random weather noise played a very large role in December's weather. At the same time, the event was much less likely in the representations of a climate without human influence, showing that climate change greatly affected the odds of such a month occurring.

The observed temperature anomaly is so far outside the expected distribution that the odds are difficult to determine. We find that anthropogenic climate change approximately doubled the occurrence probability of the event for lower return times. Analysis of the historical link between the observed CET dataset and El Niño shows no discernible influence on the CET in winter. This is confirmed by a coupled model analysis that only shows a weak connection. The weather@home simulations including all ocean temperatures are warmer than the Climatology ensemble. This includes El Niño, but also the warm subtropical Atlantic Ocean, which was the source region of the mild air flowing to Britain in December 2015.

Similarly all three methods show an increase in the likelihood of high precipitation in Northern English winters due to human-induced climate change. The connection with the El Niño signal is weak in December, but the weather@home simulations reveal an increase in the likelihood of very wet Decembers due to the ocean temperatures observed in December 2015.

What happened with the weather in December 2015?





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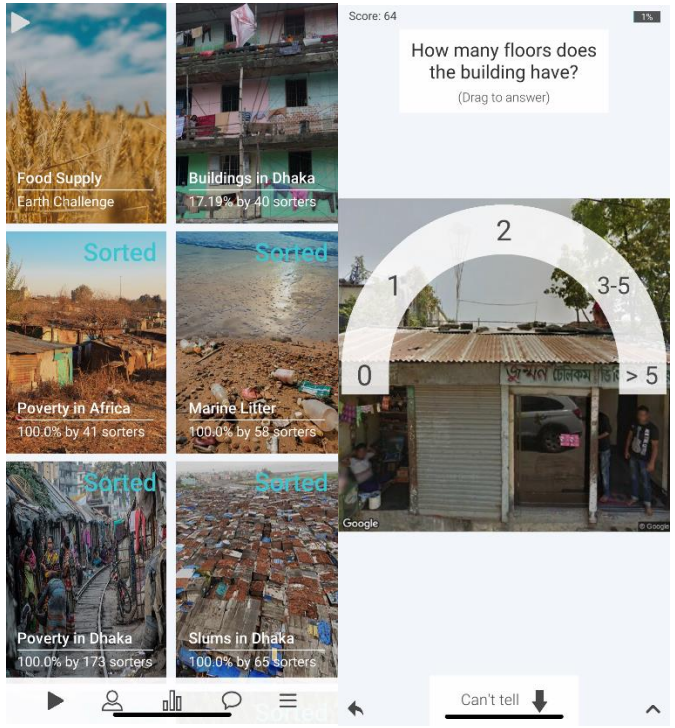
Volunteer Thinking

- Even with Machine Learning, the process of classifying and preparing dataset can be supported by crowdsourcing



Current projects

Picture Pile

What is this project about?

With Picture Pile you can contribute to solving global problems as climate chance and malnutrition by sorting piles of pictures together with other players.

How can citizens participate in research?

Sorting the pictures is very easy and works in a similar way to other Apps. A question is asked about a displayed image, for example: "Is farmland visible in the image?". Now the player can slide the picture to the right or to the left to answer the question with "yes" or "no". Alternatively, you can slide the picture down, if you are not sure. Picture Pile can be viewed in the browser, on the iPhone, iPad and Android.

What will happen to the results?

All collected data (except private information such as the players' e-mail addresses) are made freely accessible to everyone after a data check and can thus be used by scientists all over the world to answer important research questions.

What does the research contribute to?

Among other things, Picture Pile improves global landscape data sets that are used in a variety of environmental applications and sociological studies, for example for research into climate change damage, deforestation, or biodiversity. The contribution of citizen scientists is central to the validation and improvement of this landscape data.

Picture Pile

Institution: International Institute for Applied Systems Analysis (IIASA)

Project lead: Steffen Fritz

Schlossplatz 1
2361 Laxenburg

E-mail: fritz@iiasa.ac.at

Go to project website

GET IT ON Google Play

Download on the App Store

Passive Sensing

- In passive sensing, participants download a software, and sometimes connect a sensor, to allow for a wide network of observation.
- The BBC Pandemic experiment (2018) was based on people downloading an app and checking contacts through Bluetooth. Model used in early stages of Covid-19 response.

Citizen Science

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Participatory Sensing

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Richmond and Twickenham Times » News »

NEWS

New app allows smartphone users to measure aircraft noise

By Paul Teed 10:20am Thursday 28th June 2012 in News

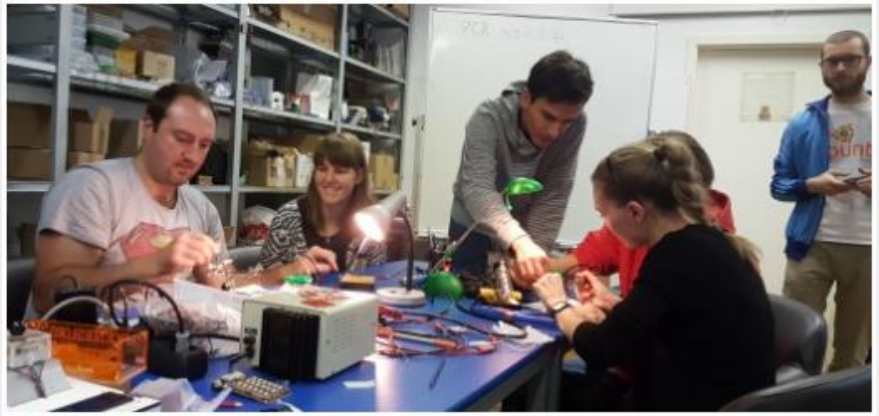
Ears to the skies: Smartphones will be able to pick up noise levels overhead

Smartphone users will be able to measure the noise of planes flying overhead thanks to new technology.

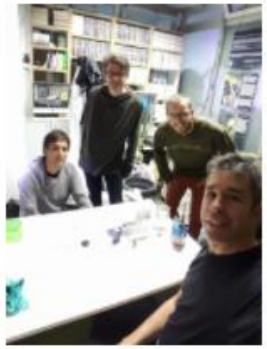
DIY Science

MyOpenPCR Workshop @ BioTehna Lab – Ljubljana (SI)

By gaudi
Wednesday November 9, 2016



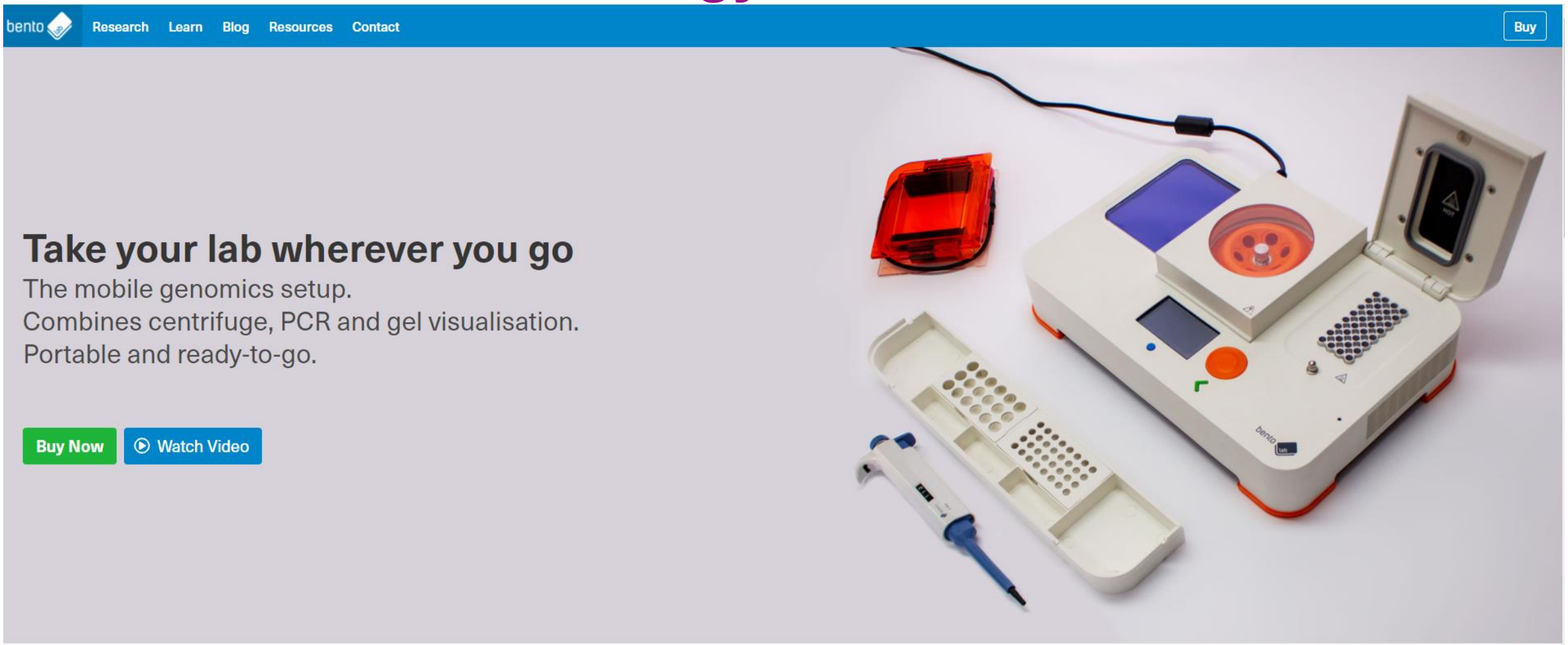
Finally back in Ljubljana Urs, Oli and Aurelio gave a workshop on how to build your own wild OpenPCR at BioTehna Lab.



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

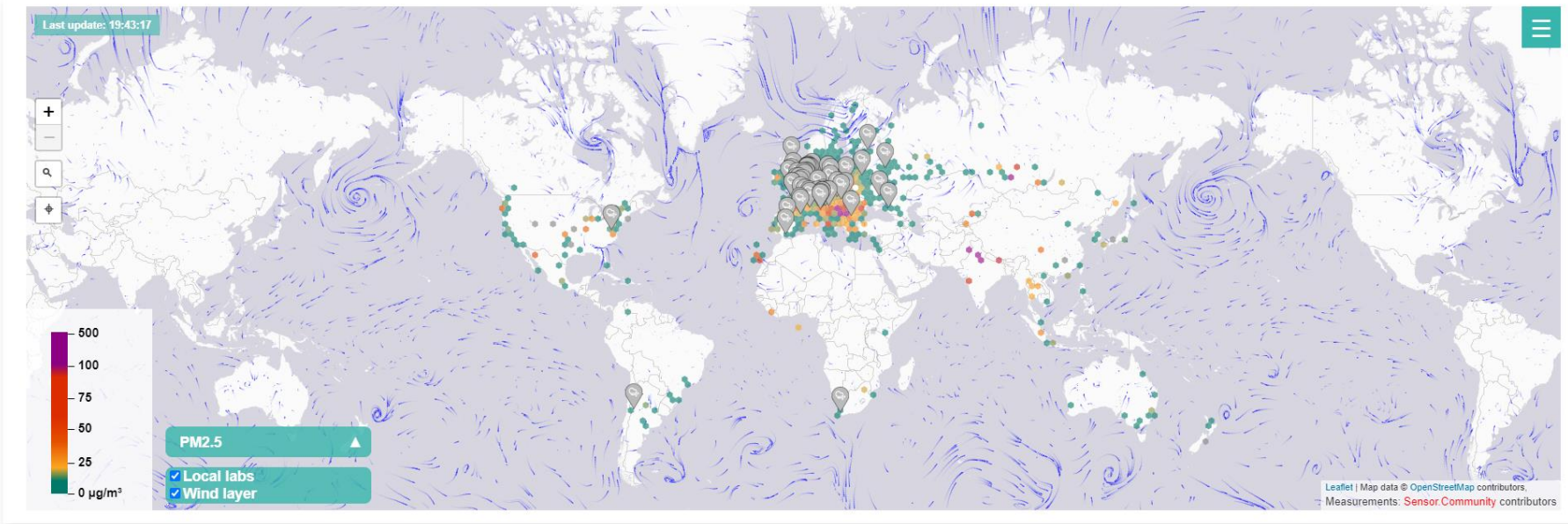
The participants, all with solid biotech background, learned about resistive heaters, thermoelectric cooling using peltier elements and thermo sensors. After 4 hours and heavy soldering actions we had 2 complete PCR machines up and running. The next days the participants kind of took over the workshop 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.

Bento lab – DIY biology tool



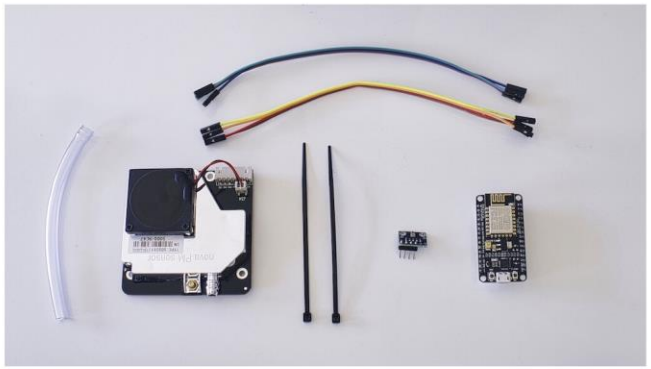
Sensor.community – DIY air sensing

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.

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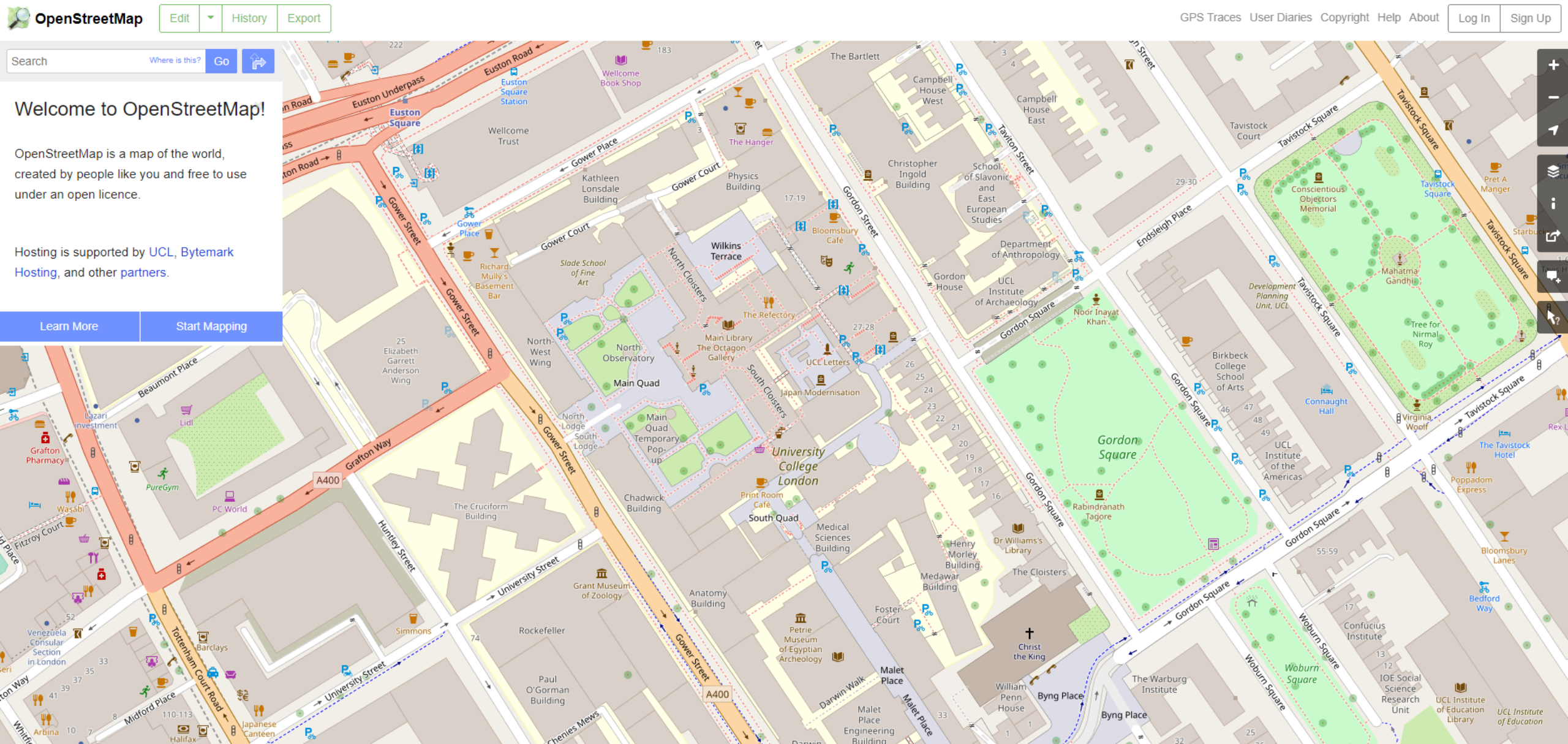
Geographical information



Humanities

Transcribe Bentham

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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.

Find out more about Transcribe Bentham in the sidebar menu on the left, or scroll down to read the latest news from the Transcribe Bentham blog.

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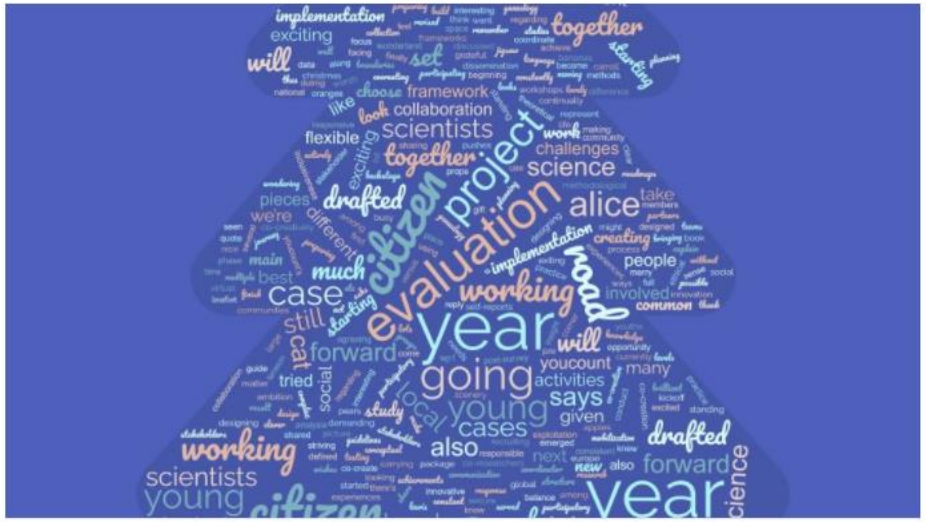

Thank you 2021!...Welcome 2022!

Thank you 2021! 2021 has been an exciting year for YouCount. In February, we met for our virtual kick-off meeting, aware that we were starting a process that involved a lot of planning, meeting and preparing for youth citizen social science. Ten months later, we are ready to begin a new phase of our project which involves actually doing youth citiz...

Citizen scientists and co-researchers on a study visit in Hungary

9 citizen scientists and co-researchers from Siklósbodony participated in a study visit at Cinege Farm at Törökbálint and Pallagvölgyi Biogarden at Kóspallag. ESSRG researchers Alexandra Czeglédi, György Pataki, Márton Oblath also accompanied the group. The fundamental purpose of the study visit was to get inspired and acquire k...

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Citizen Science project goals

- Each citizen science project is a balancing act between the scientific goals, scale and depth of engagement, benefits to different stakeholders (scientists, participants, project funders)

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The 5 Cs classification

Contractual - communities ask professional researchers to conduct a specific scientific investigation and report on the results;

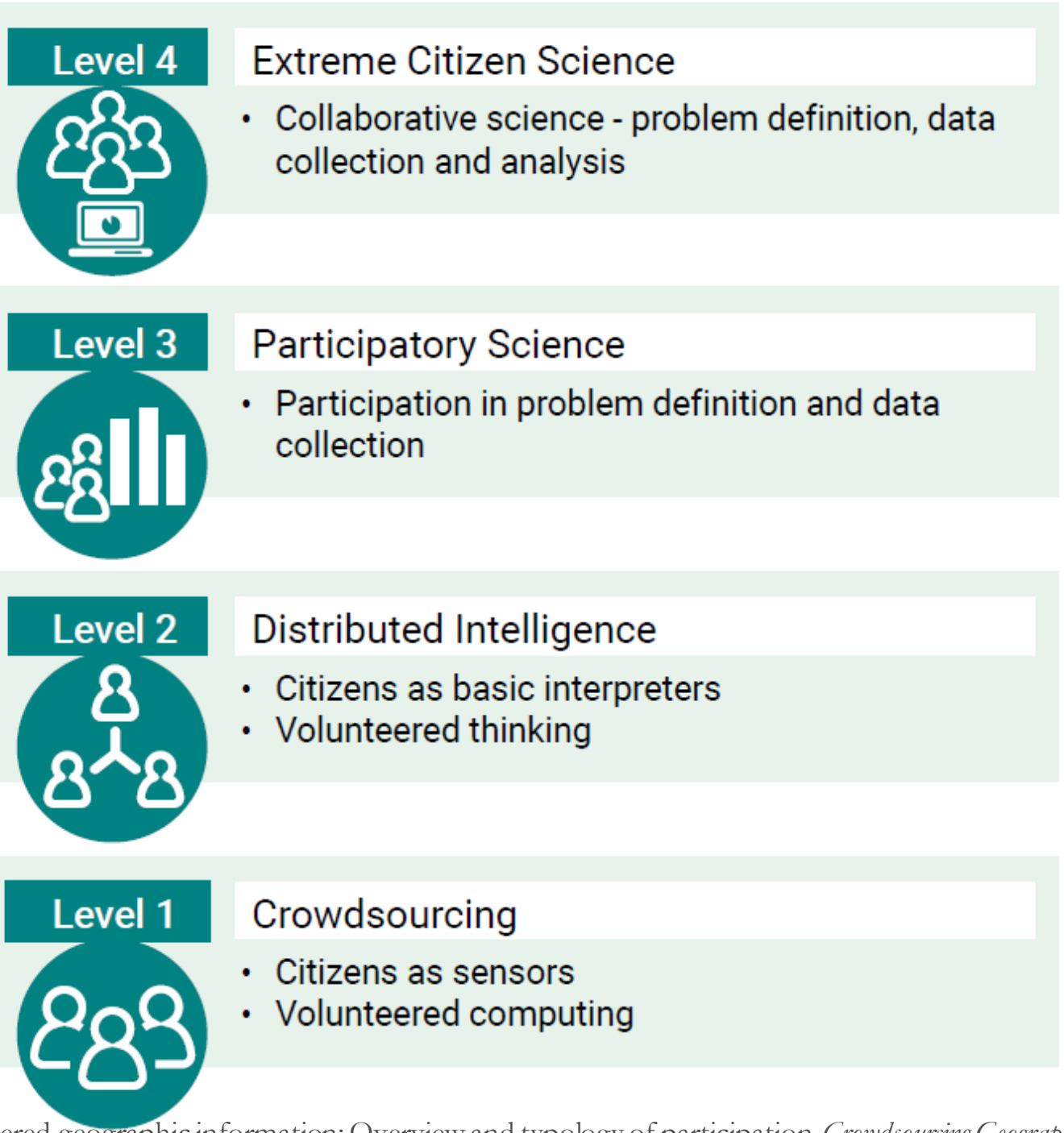
Contributory - generally designed by scientists and members of the public primarily contribute data;

Collaborative - generally designed by scientists and members of the public contribute data, refine project design, analyse data, disseminate findings;

Co-Created - designed by scientists and members of the public working together, some of the public participants are actively involved in most aspects of the research process; and

Collegial - non-credentialed individuals conduct research independently with varying degrees of expected recognition by institutionalised science.

Shirk, J. L., H. L. Ballard, C. C. Wilderman, T. Phillips, A. Wiggins, R. Jordan, E. McCallie, M. Minarchek, B. V. Lewenstein, M. E. Krasny, and R. Bonney. 2012. Public participation in scientific research: a framework for deliberate design. Ecology and Society 17(2): 29.



European Commission

Haklay. 2013. Citizen Science and volunteered geographic information: Overview and typology of participation, *Crowdsourcing Geographic Knowledge*

DISCUSSION

Types of projects: long running, citizen cyberscience, volunteer computing, volunteer thinking, passive sensing, participatory sensing, DIY science, community science

5Cs: contractual, contributory, collaborative, co-created, collegial

Goals: awareness, scientific outputs, temporal and geographical coverage, inclusiveness, scientific literacy, accessing resources, enjoyable & engaging experiences

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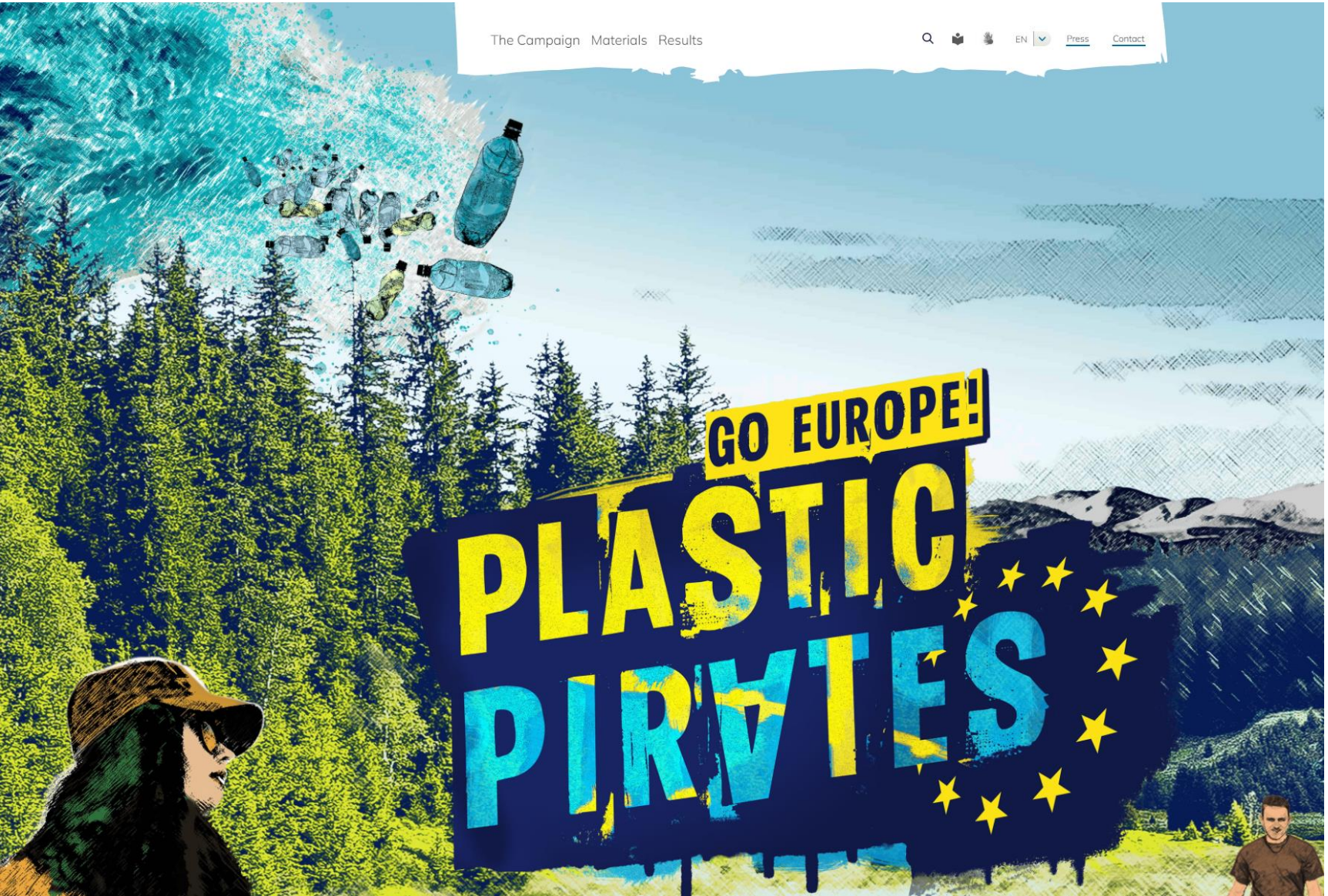
Plastic pirates – what is it for?



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PART II: CITIZENS INTERACTION WITH SCIENCE

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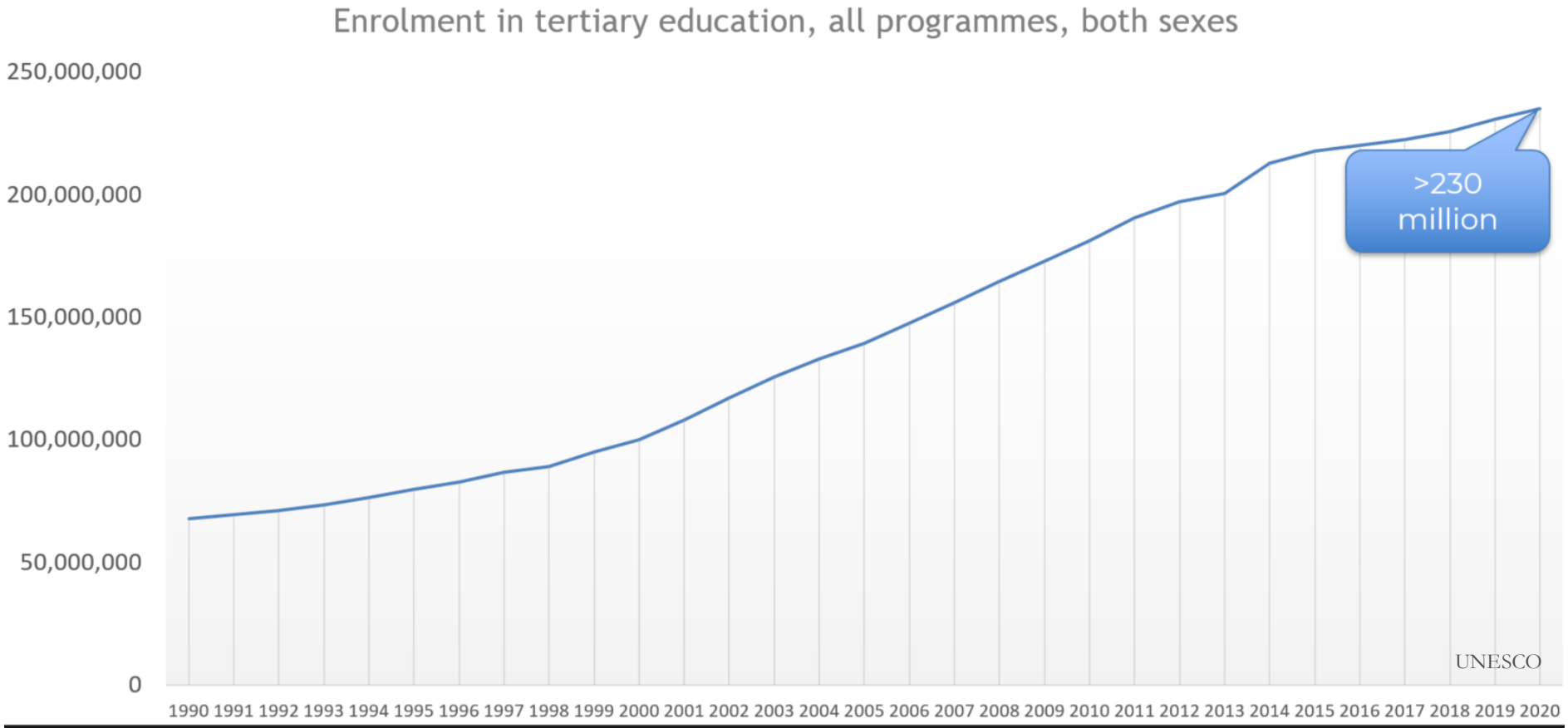
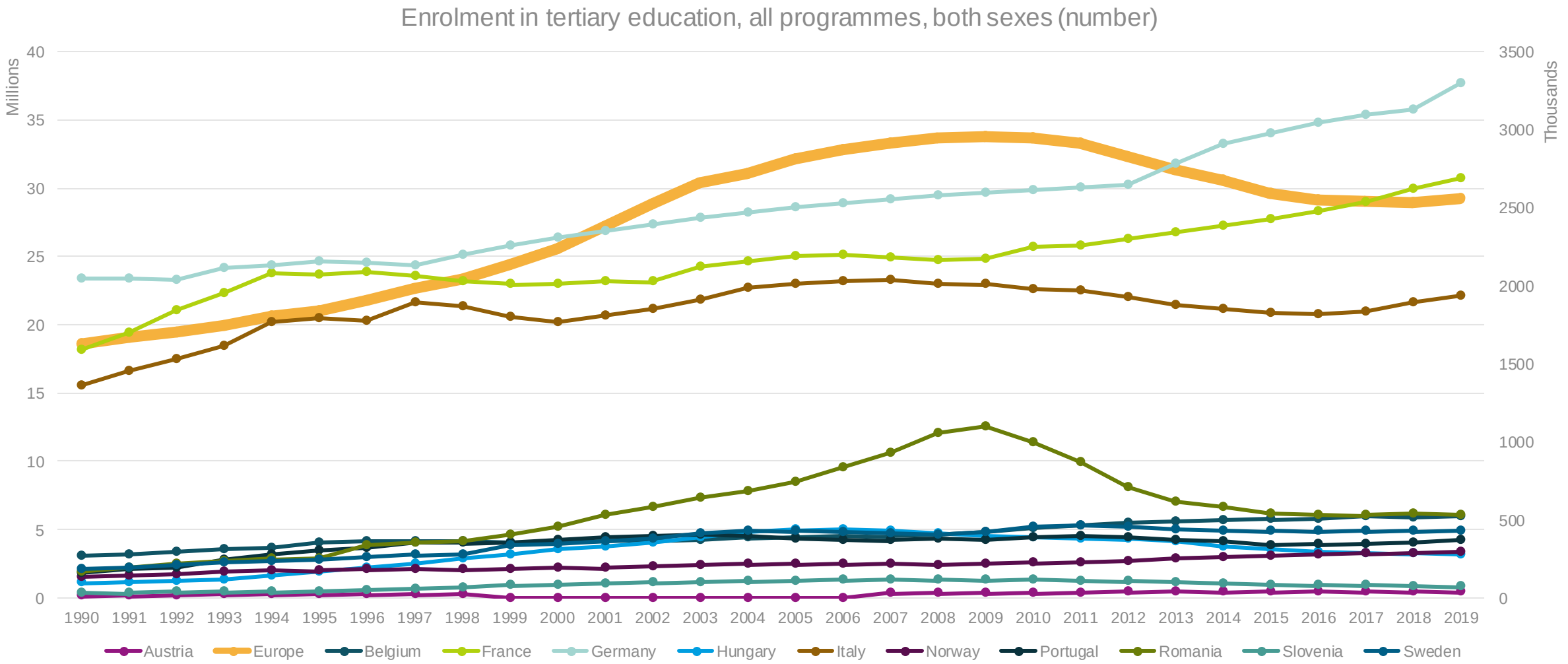
Underlying trends

- Levels of education (esp. rise in higher education)
- Technological developments (Web, mobile phones, broadband)



Continued growth in tertiary education



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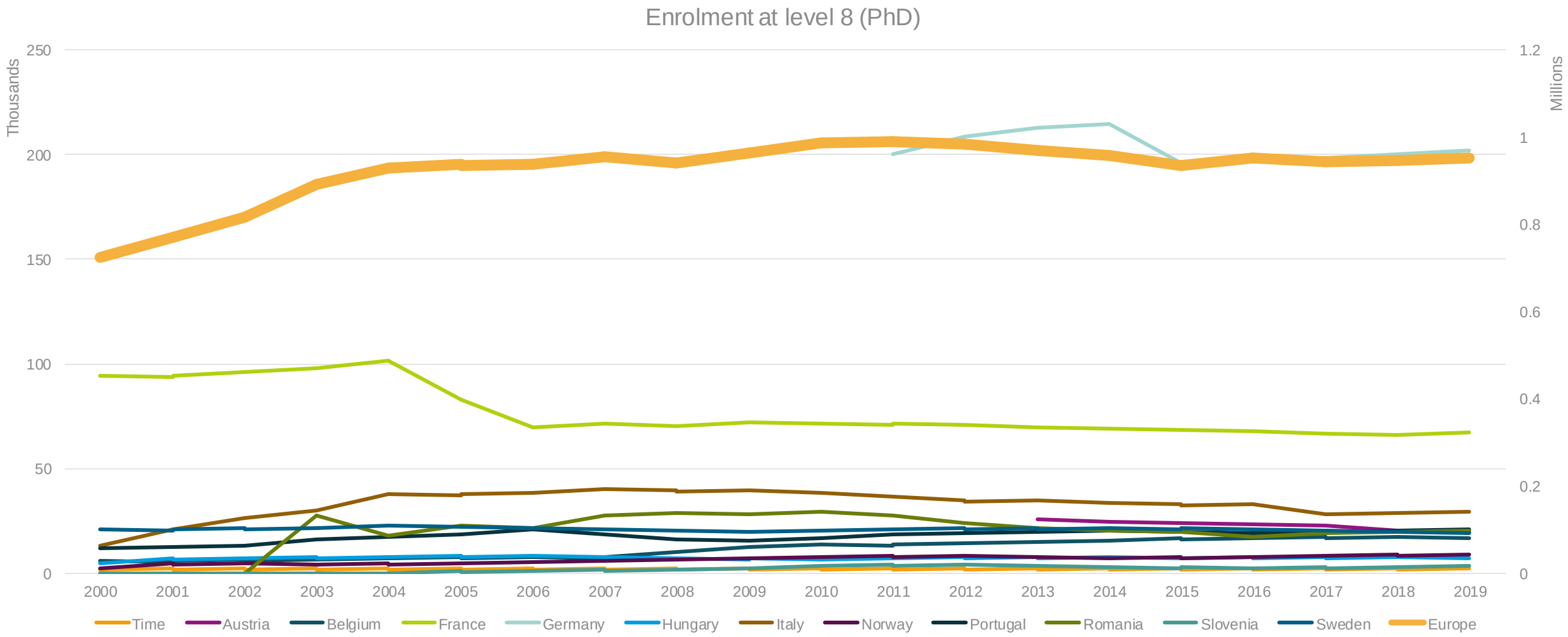
Source: UNESCO UIS

…and in people who gain PhD level education



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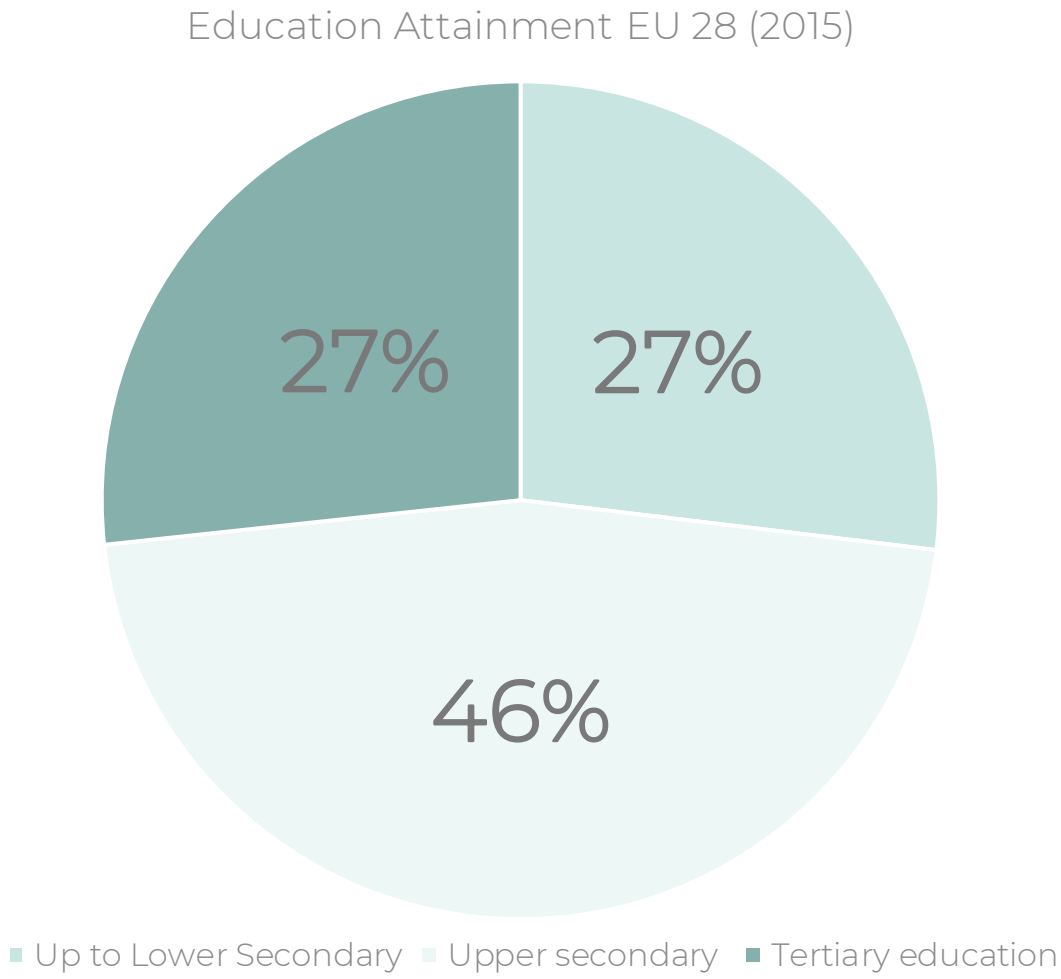
Source: UNESCO UIS

Population aged 25–34 with tertiary educational attainment (ISCED 5–8), 2020

(% of population aged 25-34)

Educational attainment

- In 2015 among the general population of EU 28, the **educational attainment** is 27% in tertiary education (university).



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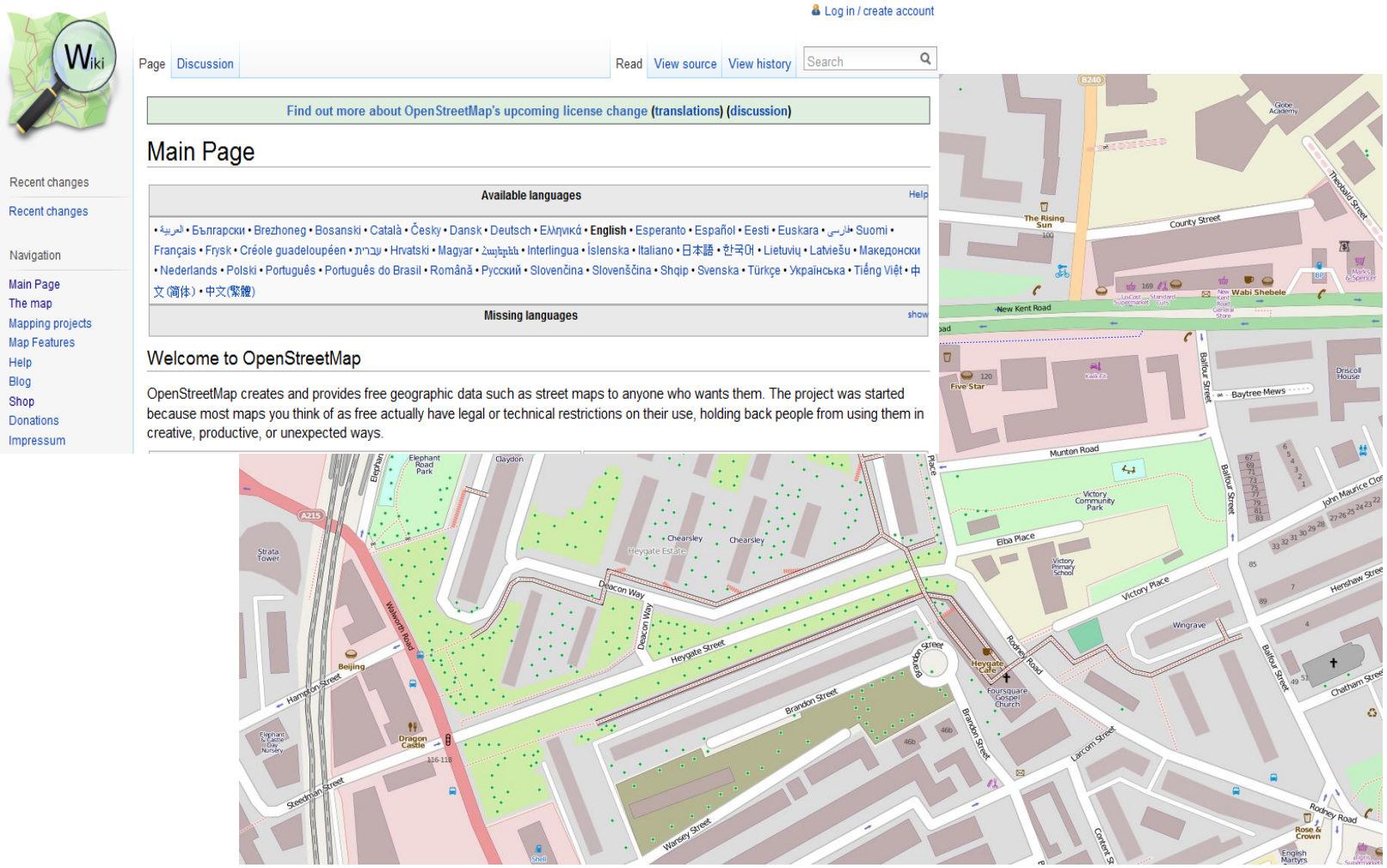
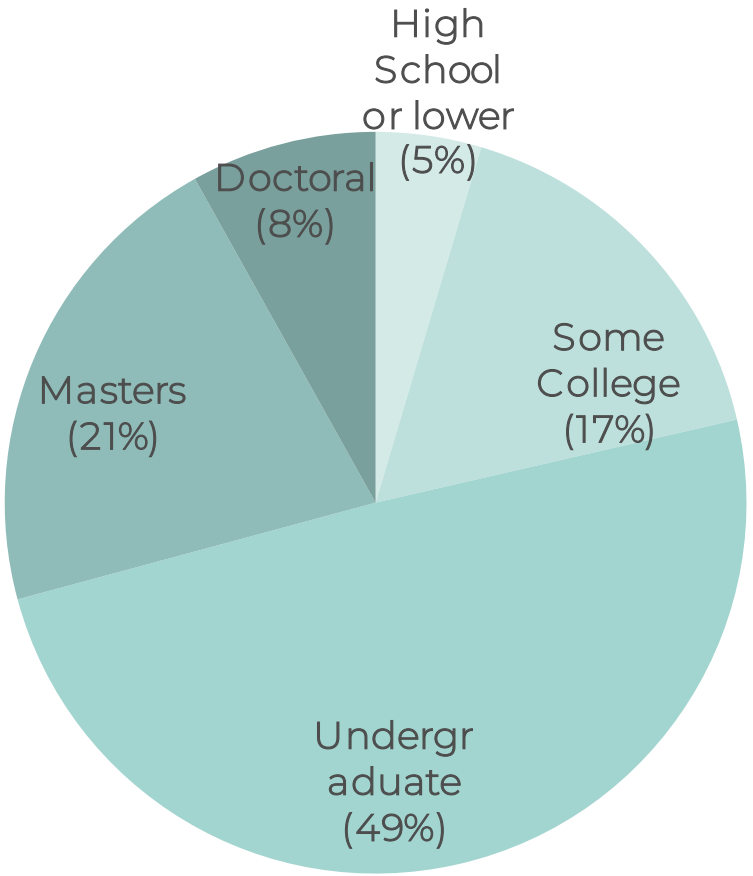
OpenStreetMap (2010)





Budhathoki, N.R. and Haythornthwaite, C., 2013. Motivation for open collaboration crowd and community models and the case of OpenStreetMap. *American Behavioral Scientist*, *57*(5), pp.548-575.

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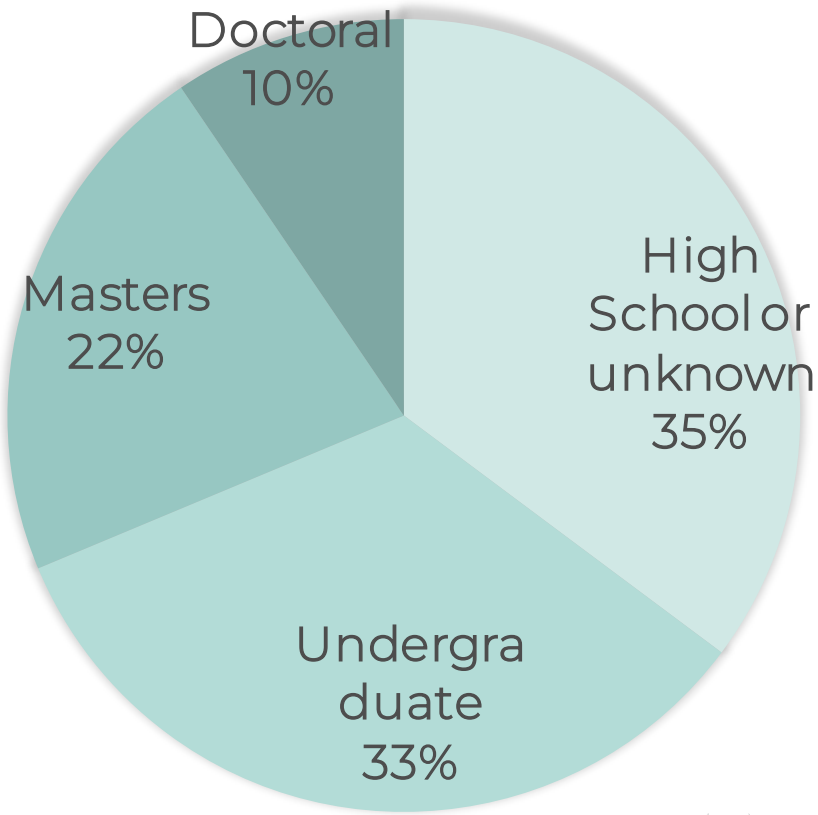
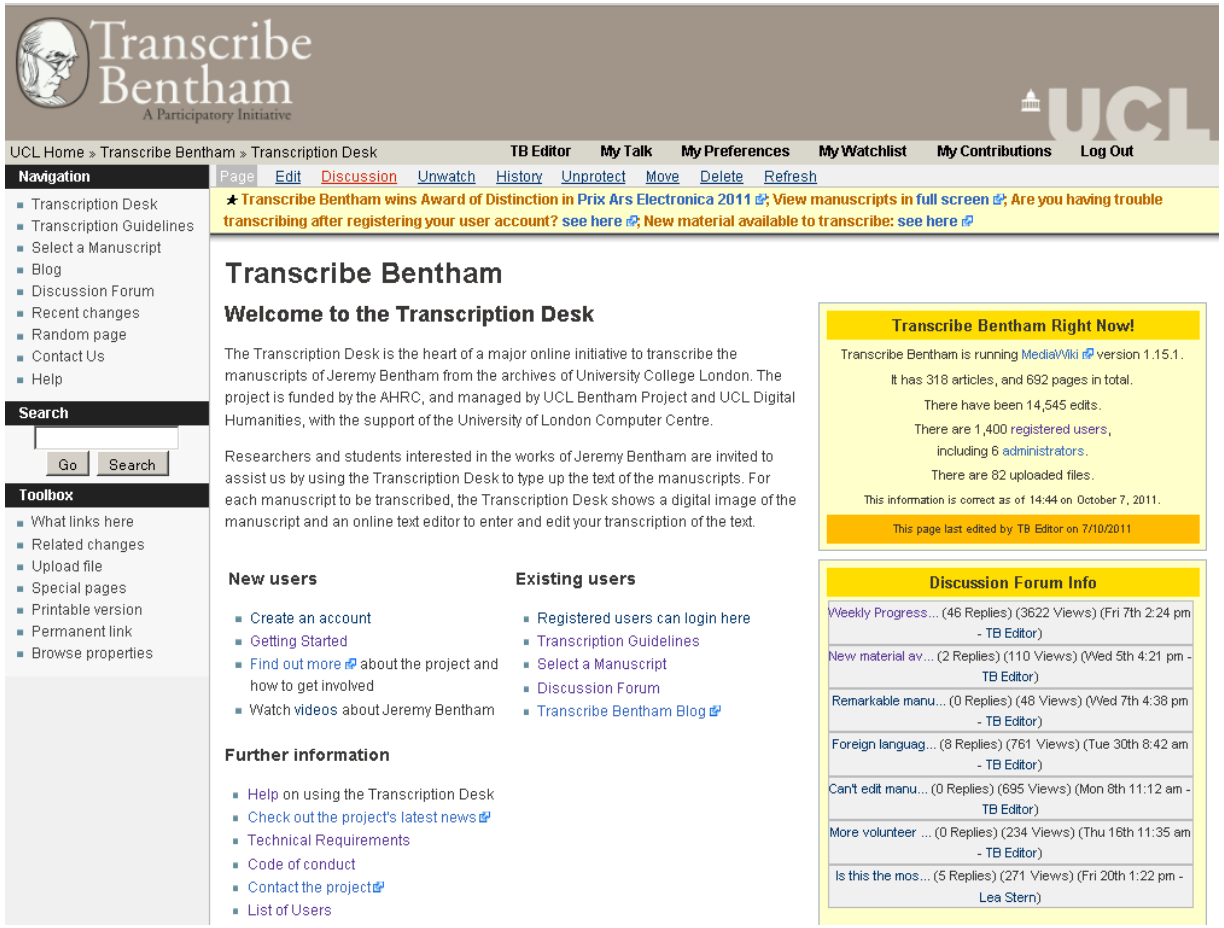
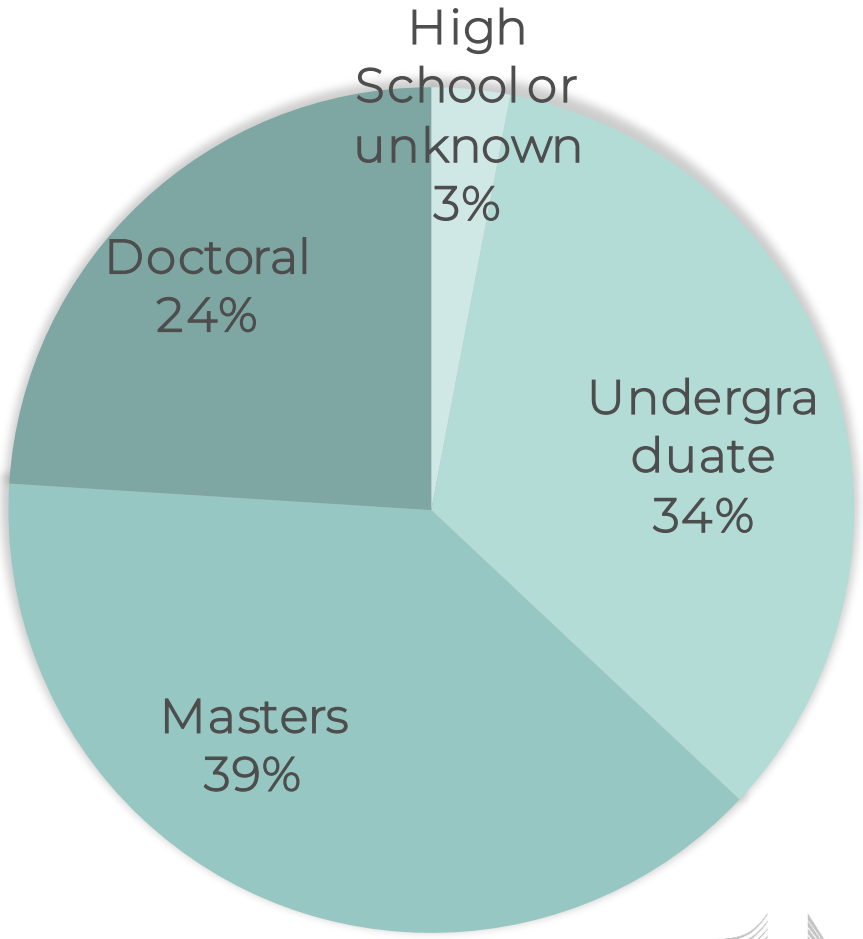
Galaxy Zoo (2013)



Raddick, M.J., Bracey, G., Gay, P.L., Lintott, C.J., Cardamone, C., Murray, P., Schawinski, K., Szalay, A.S. and Vandenberg, J., 2013. Galaxy Zoo: Motivations of citizen scientists. *arXiv preprint arXiv:1303.6886*.

Transcribe Bentham (2012)





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Causer, T, and Wallace, V., 2012. Building a volunteer community: results and findings from Transcribe Bentham. *Digital Humanities Quarterly*, 6

KNOWLEDGE SOCIETY

- Citizen science provides a way to capitalise on the societal investment in increasing levels of education to high levels

It also provides a way to gain access and engage the high number of people with PhDs who are outside the formal R&D system

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Eurobarometer 516 – What Europeans think of Science and Technology?

How citizens engage with science and technology

59%
watch documentaries, or read science and technology-related publications, magazines or books

55%
talk about science and technology-related issues **with family or friends**

33%
visit science and technology **museums**

19%
sign petitions or **join demonstrations** on science and technology matters

14%
attend **public meetings or debates** about science and technology

12%
actively **take part** in scientific projects

8%
contact **public authorities or political leaders** about science and technology-related issues

European Commission

Impact of science and views about science

Opinions on the role of scientists in society

68%

say that **scientists should intervene in political debate** to ensure that decisions take into account scientific evidence

51%

say that scientists **do not spend sufficient time meeting people** to explain their work

45%

say that scientists **should be held accountable for the misuse** of their discoveries

The benefits of science and technology

86%

respondents think the **overall influence of science and technology on society is positive**

57%

think that science and technology mostly **improve the lives of people** who are already better off

53%

of EU citizens think that science and technology benefit **their lives**

Views on the impacts of science and technology

Areas where science and technology can make a difference

47%
Health and medical care

40%
The fight against climate change

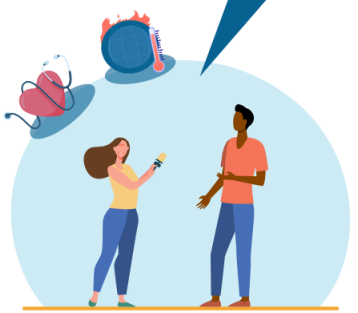
32%
Energy supply

25%
Protection of the environment

19%
Availability and quality of food

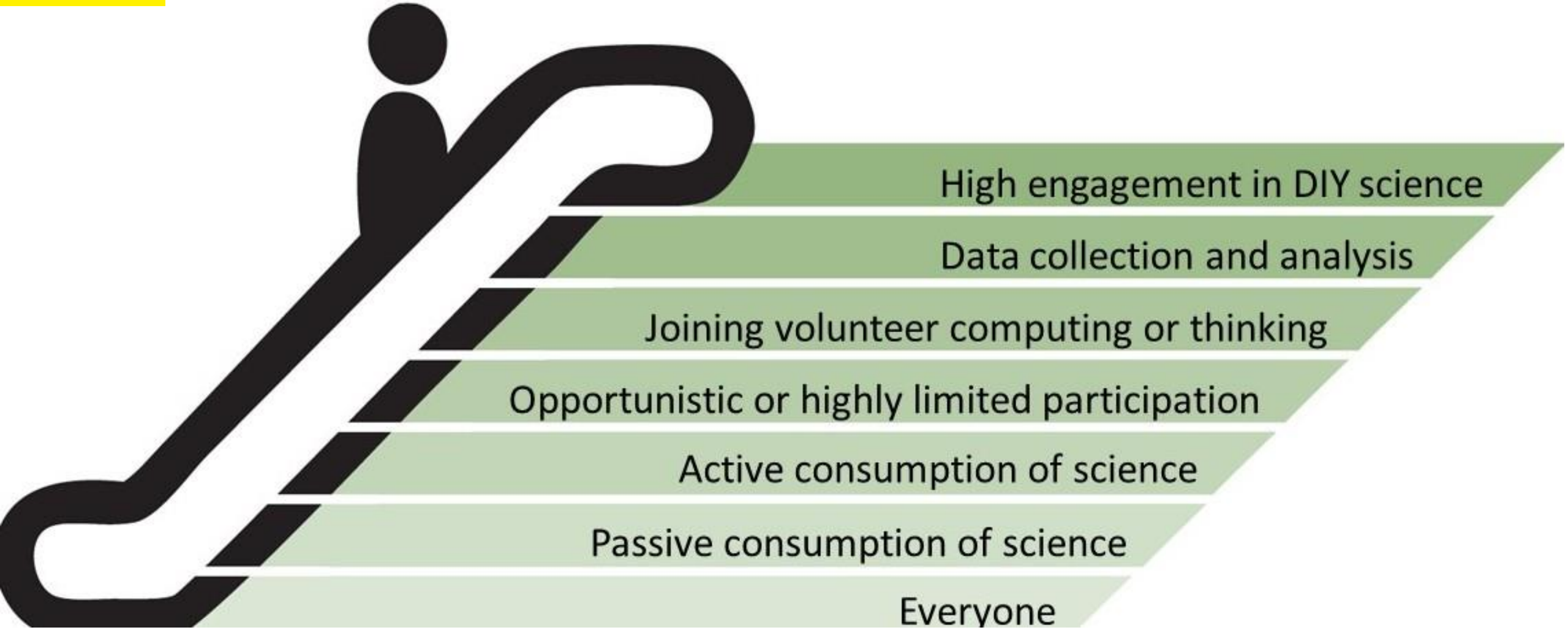
19%
Education and skills

Respondents think that **health and medical** care and the **fight against climate change** are the areas where science and technology **can make the most difference.**



European Commission

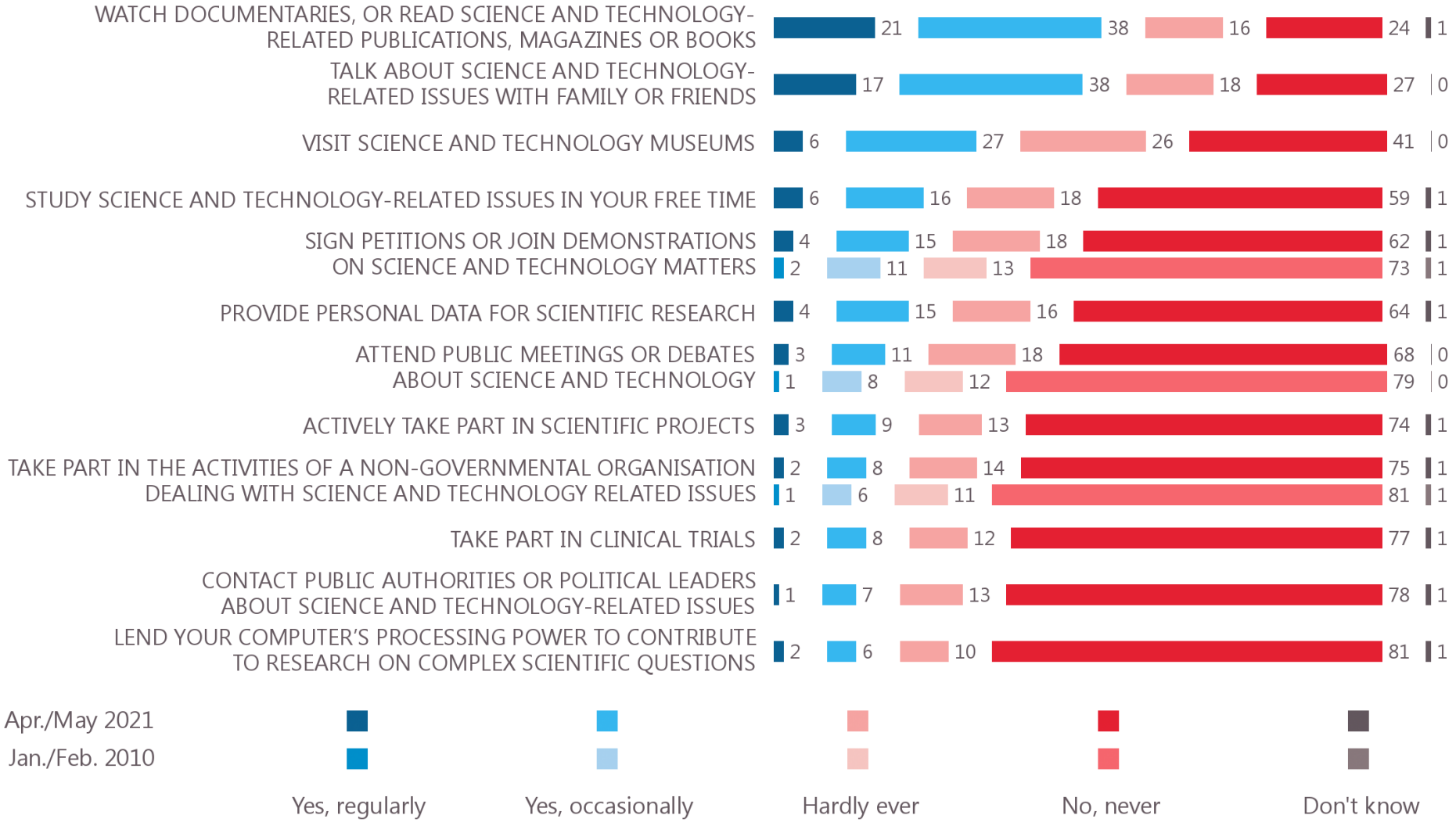
Citizen Science with public engagement



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

Impressive - and increasing - engagement

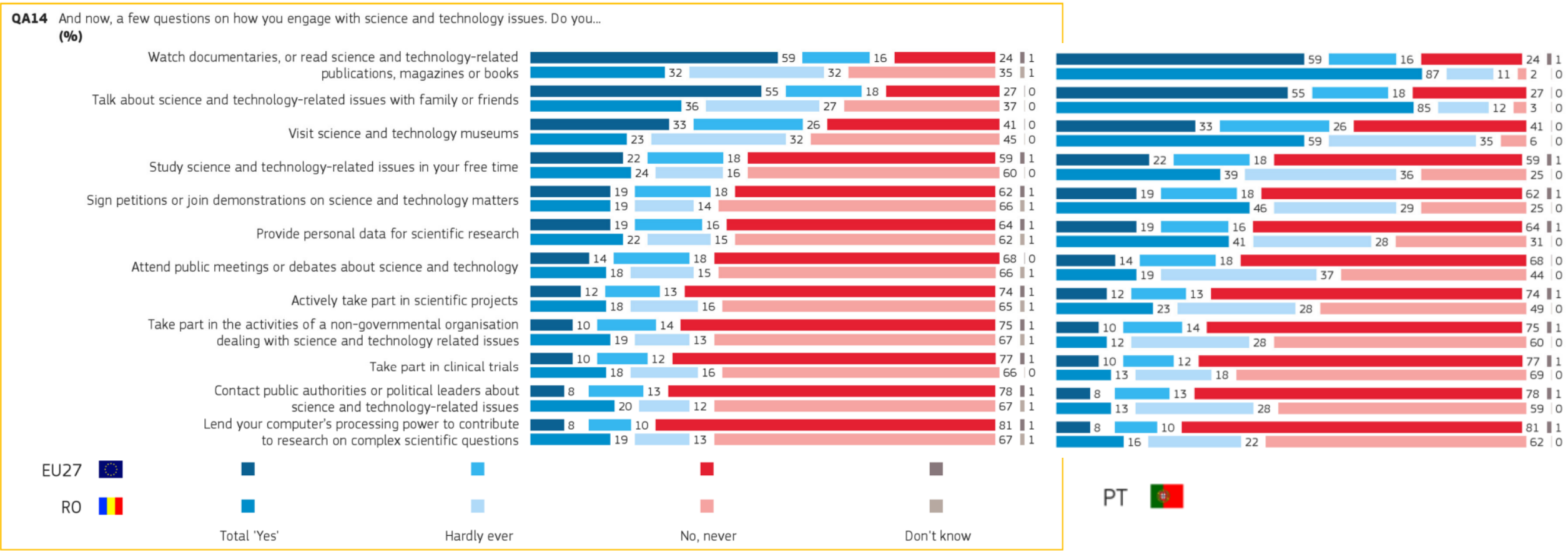
QA14 And now, a few questions on how you engage with science and technology issues. Do you
(% - EU27)



Source: Special Eurobarometer 516 – "European citizens' knowledge and attitudes towards science and technology". Fieldwork: April – May 2021, sample: EU27 data (26,827 respondents)

Country profile: Romania & Portugal

5. CITIZEN'S ENGAGEMENT IN SCIENCE AND TECHNOLOGY



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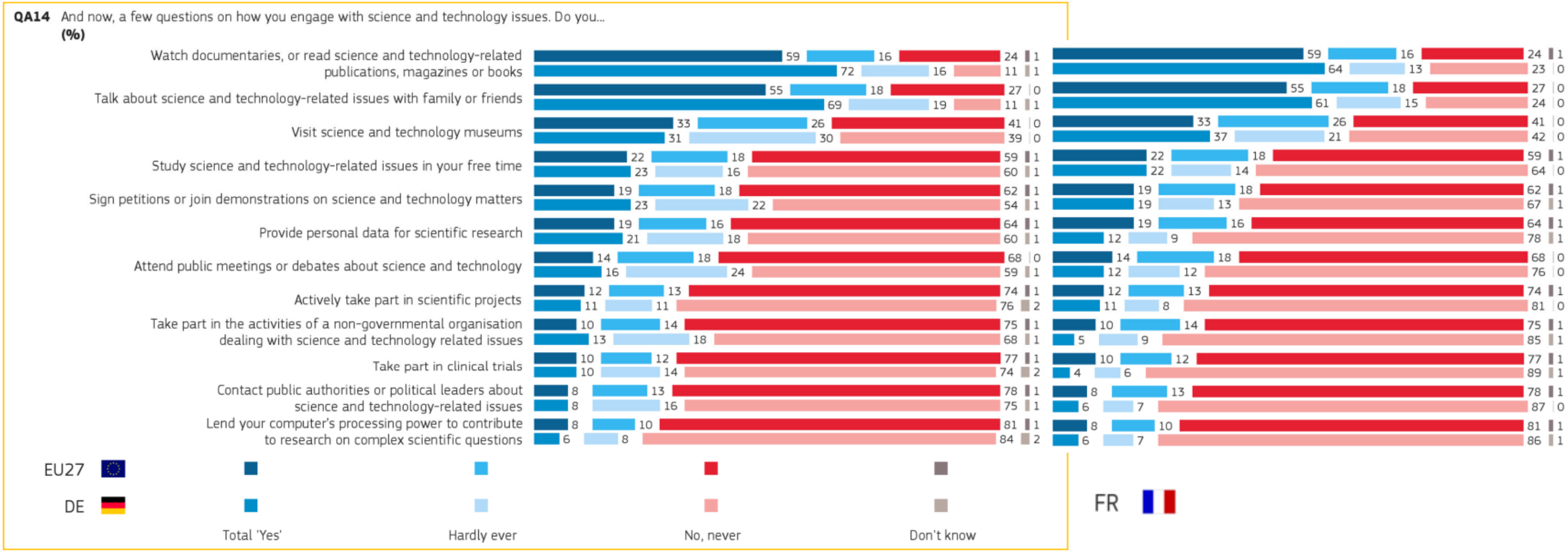
Country profile: Germany & France

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...
(%)



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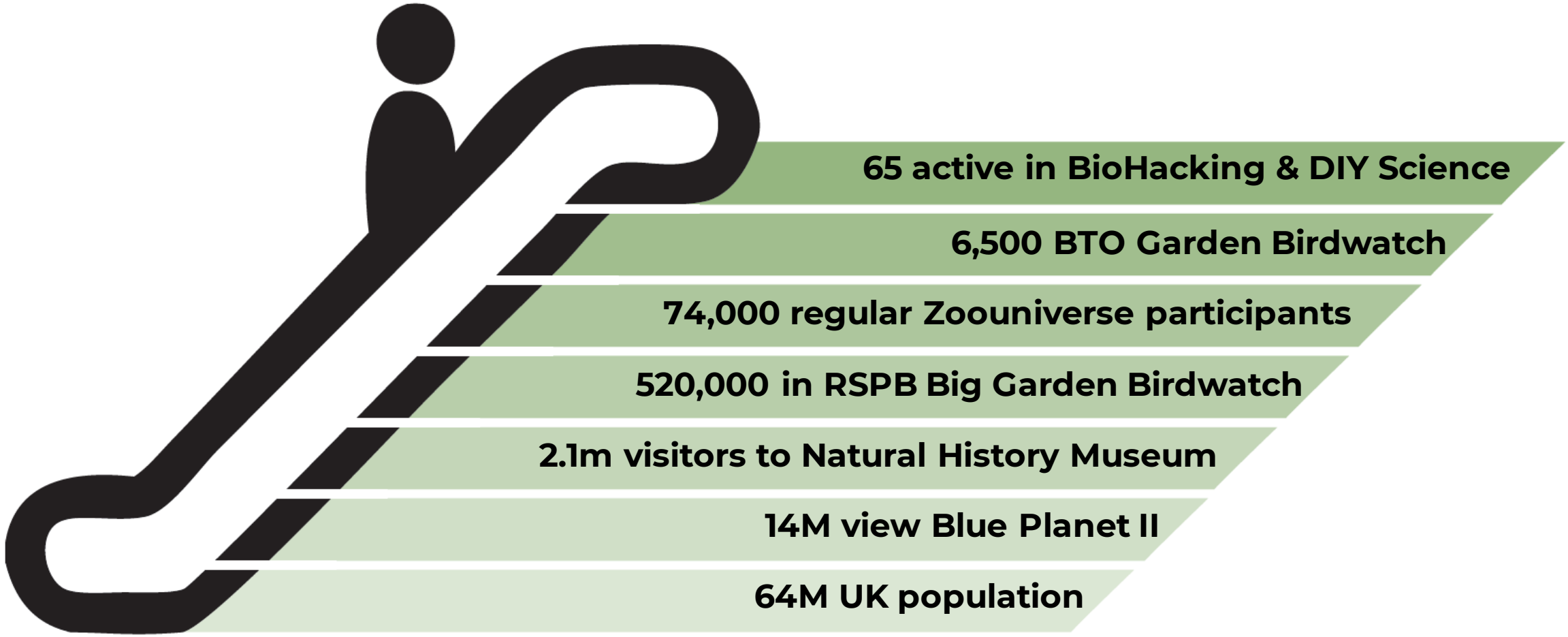
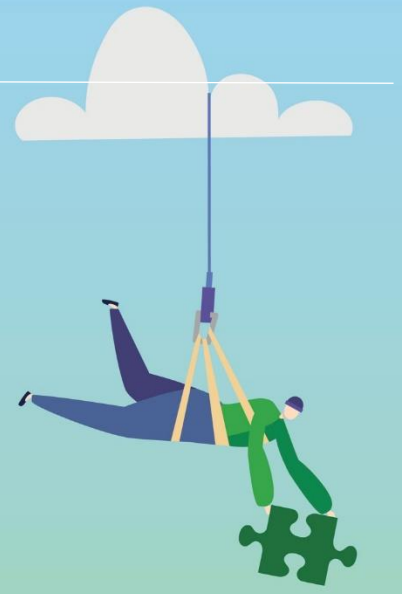
UK Engagement Escalator



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

PART I: PRINCIPLES AND CHARACTERISTICS



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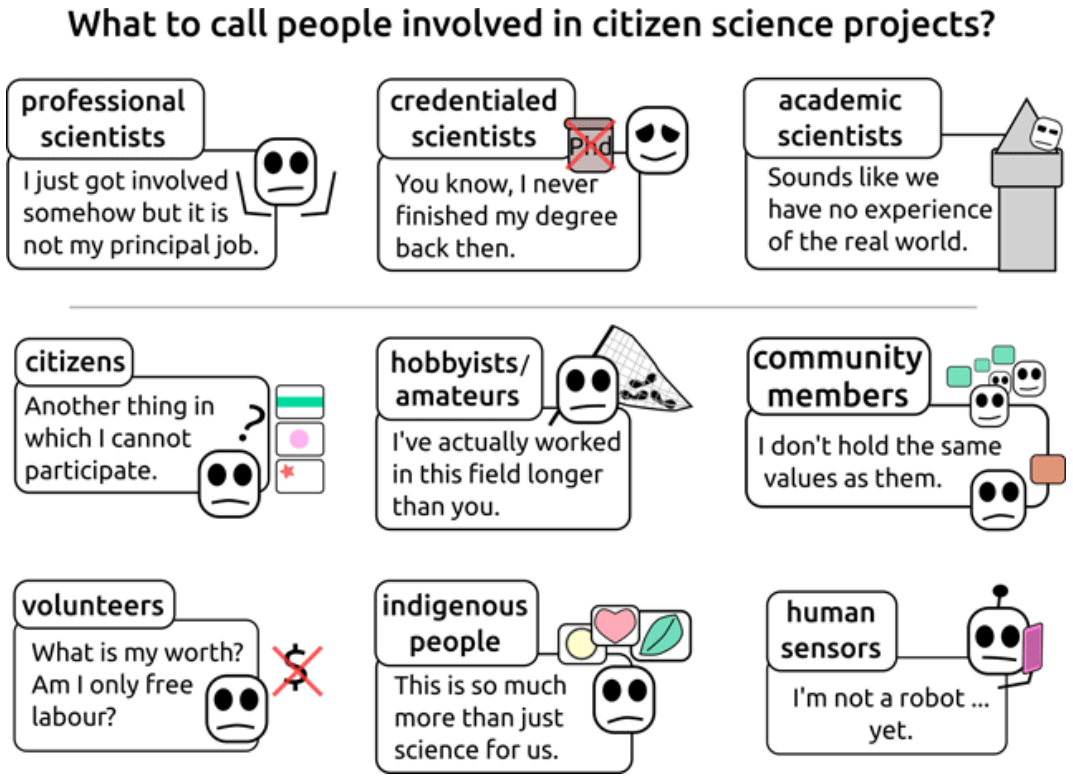
Terminology: pluralism in terms and practices

- **Need to define the practice, but support pluralism in practice and terminologies:** Public participation in scientific research, Scientific crowdsourcing, Volunteered Geographic Information (VGI), Volunteer computing, Digital Humanities, Participatory action research (PAR), Community-based participatory research (CBPR), Knowledge co-production, Lay local and traditional knowledge (LLTK) …



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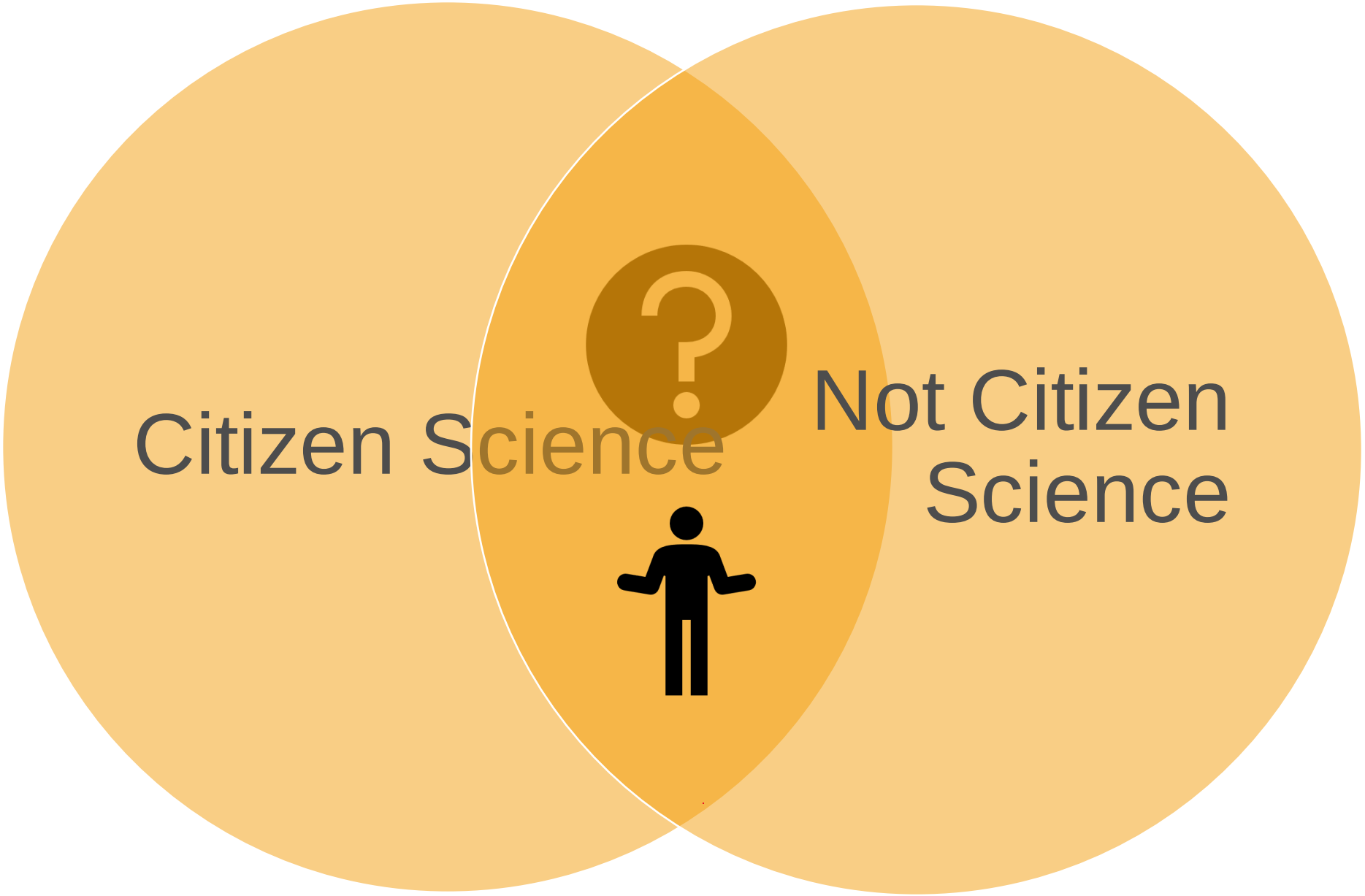
Eitzel, M.V. et al., (2017). Citizen Science Terminology Matters: Exploring Key Terms. Citizen Science: Theory and Practice. 2(1), p.1.

European Citizen Science Association

1. Citizen science projects actively involve citizens in scientific endeavour that generates new knowledge or understanding.
2. Citizen science projects have a genuine science outcome.
3. Both the professional scientists and the citizen scientists benefit from taking part.
4. Citizen scientists may, if they wish, participate in multiple stages of the scientific process.
5. Citizen scientists receive feedback from the project.
6. Citizen science is considered a research approach like any other, with limitations and biases that should be considered and controlled for.
7. Citizen science project data and meta-data are made publicly available and where possible, results are published in an open access format.
8. Citizen scientists are acknowledged in project results and publications.
9. Citizen science programmes are evaluated for their scientific output, data quality, participant experience and wider societal or policy impact.
10. The leaders of citizen science projects take into consideration legal and ethical issues surrounding copyright, intellectual property, data sharing agreements, confidentiality, attribution, and the environmental impact of any activities.

The need for “definition building blocks”

- Different actors need their own definition that is fit for *their* purpose:
  - **Citizen science platforms:** which projects to include or exclude?
  - **Funding bodies:** when a project says that it is “citizen science”, how do we know that it is?
  - **Scientists**: when creating a new project, how can we ensure that it is indeed citizen science?
  - **Participants**: if something is called citizen science, can I be confident that it is?


Citizen Science
Not Citizen Science

The Characteristics document

Purpose: the aim is not to describe everything that is citizen science but identify the areas that require attention and guidance.

Development: survey of people with knowledge of citizen science, to see what the citizen science and science communication views are

The resulting document is broken into: core concepts, disciplinary aspects, leadership and participation, financial aspects, and data and knowledge.

European Citizen Science Association

Version 1, April 2020

ECSA's characteristics of citizen science

Introduction

Citizen science is a common name for a wide range of activities and practices. It is possible to understand it by considering the characteristics of those activities and practices, which are described in this document. These are found in different scientific disciplines – from the natural sciences to the social sciences and the humanities – and within each discipline, the interpretation of citizen science can be slightly different. Yet despite these differences, citizen science is an emerging area of research and practice, with evolving standards on which different stakeholders are developing methodologies, theories and techniques. It is, therefore, useful to establish some level of shared understanding, across disciplines and practices, as to what to expect from an activity or a project that is set out to be a citizen science one.

The ECSA Characteristics of Citizen Science

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May 27, 2020 (v1) Video/Audio Open Access

View

Webinar on the Characteristics of Citizen Science

Haklay, Muki; Hecker, Susanne; Warin, Colombe; Weisspflug, Maike; Gold, Margaret;

What is Citizen Science? What is not? Learn more about the characteristics of citizen science and why it is important to define them. On May 27th, 2020, ECSA and EU-Citizen.Science co-hosted a webinar about the recently published 'Characteristics of citizen science&rs

Uploaded on May 27, 2020

April 1, 2020 (v1) Other Open Access

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ECSA's Characteristics of Citizen Science

Haklay, Muki; Motion, Alice; Balázs, Bálint; Kieslinger, Barbara; Greshake Tzovaras, Bastian; Nold, Christian; Dörler, Daniel; Fraisl, Dilek; Riemenschneider, Dorte; Heigl, Florian; Brounéus, Frederik; Hager, Gerid; Heuer, Katja; Wagenknecht, Katherin; Vohland, Katrin; Shanley, Lea; Deveaux, Lionel; Ceccaroni, Luigi; Weißpflug, Maike; Gold, Margaret; Mazzonetto, Marzia; Mačiulienė, Monika; Woods, Sasha; Luna, Soledad; Hecker, Susanne; Schaefer, Teresa; Woods, Tim; Wehn, Uta;

This document attempts to represent a wide range of opinions in an inclusive way, to allow for different types of projects and programmes, where context-specific criteria can be set.The characteristics outlined below are based on views expressed by researchers, practitioners, public officials and th

Uploaded on April 20, 2020

New upload

Community

ecsa European Citizen Science Association

The ECSA Characteristics of Citizen Science

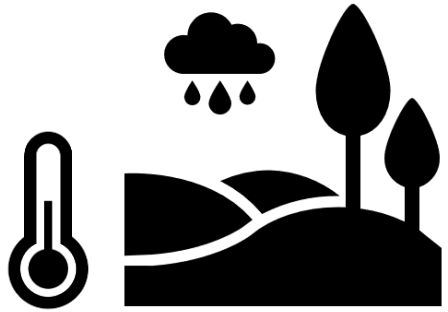
The characteristics of citizen science defined in the documents in this repository are based on views expressed by researchers, practitioners, public officials and the wider public. They attempt to represent a wide range of opinions in an inclusive way, to allow for different types of projects and programmes, where context-specific criteria can be set. The explanation notes provide more discussion about how these characteristics were created and what they mean in practice.

Curated by:
MargaretGold

Curation policy:
Not specified

Would you call this citizen science?

Erik is a teacher in Uppsala, Sweden. For the past 15 years, he has been running a weather station that is part of the Weather Underground's Personal Weather Station Network with over 250,000 participants who share their observation data, just like Erik. In return for the data sharing, the company is providing tech support, data management services and customised, free-of-charge access to forecasts. The company uses the data to produce a global weather forecast as a commercial service.



European Commission

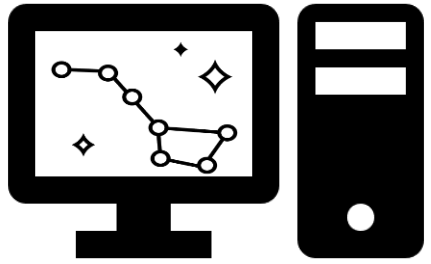
Would you call this citizen science?

Jane is a long-time supporter of the charity British Trust of Ornithology (BTO) work, as she cares about birds. She is an active supporter of the Garden Birdwatch programme (GBW), and happy to give it £17 a year. However, she does not have time to carry out the birdwatching survey. She is reading with interest the reports from the BTO GBW and finds the information motivating to continue her support of the project.

European Commission

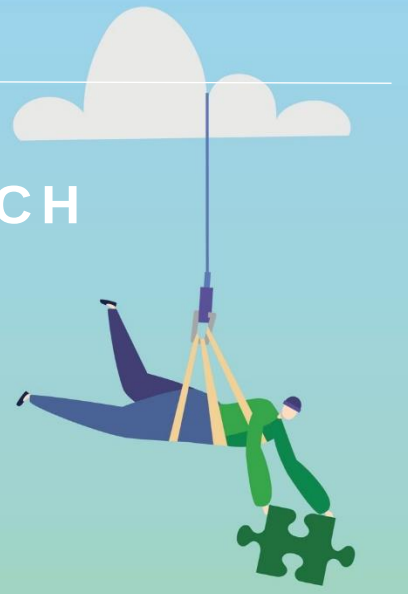
Would you call this citizen science?

Femke is a teaching assistant in Eindhoven, the Netherlands. She has heard about a website where you can help astronomers by classifying images of galaxies. She did not expect to get hooked on the experience, but after a few classifications, she finds that looking at these images is fascinating and in doing so, she has learnt new things about the universe and the composition of galaxies. She is dedicating significant time every evening to classify galaxies on the website. The results of her analysis will be used by the scientists who developed the platform to publish important scientific papers.



European Commission

PART IV: CITIZEN SCIENCE IN POLICY AND RESEARCH



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Aarhus Convention – Recommendation on EIT

3. Each Party shall ensure that environmental information progressively becomes available in electronic databases which are easily accessible to the public through public telecommunications networks. Information accessible in this form should include:

(a) Reports on the state of the environment, as referred to in paragraph 4 below;

(b) Texts of legislation on or relating to the environment;

(c) As appropriate, policies, plans and programmes on or relating to the environment, and environmental agreements; and

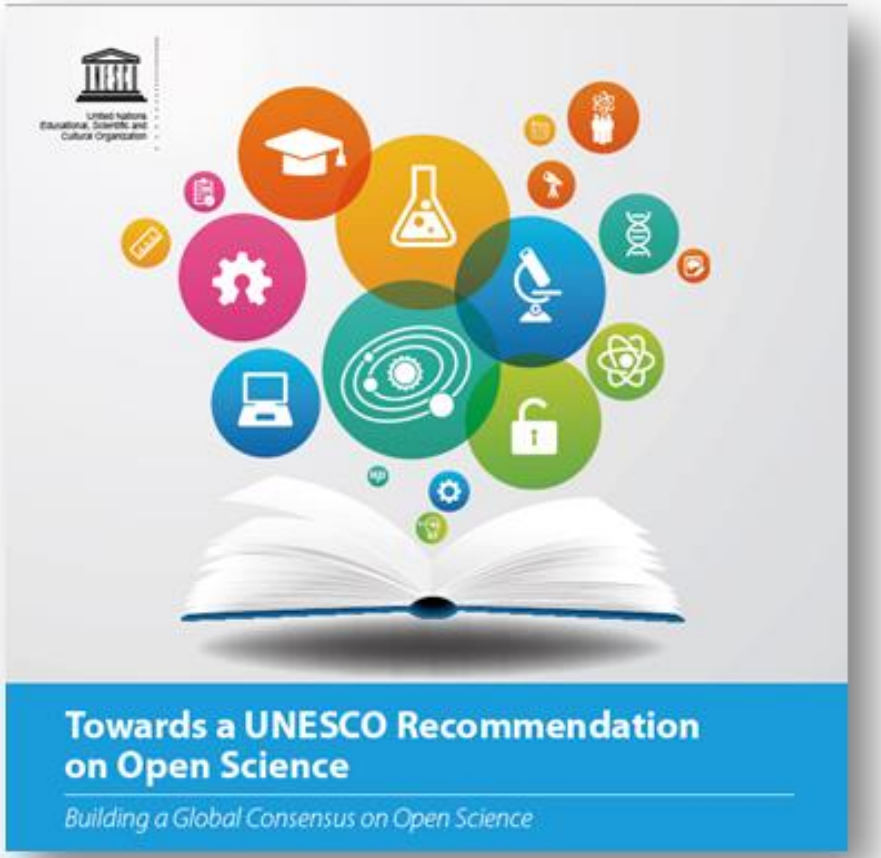
(d) Other information, to the extent that the availability of such information in this form would facilitate the application of national law implementing this Convention,

provided that such information is already available in electronic form.

- The recommendations on Electronic Information Tools originally adopted in 2005, and updated in 2021 to include citizen science

UNESCO Recommendation on Open Science

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



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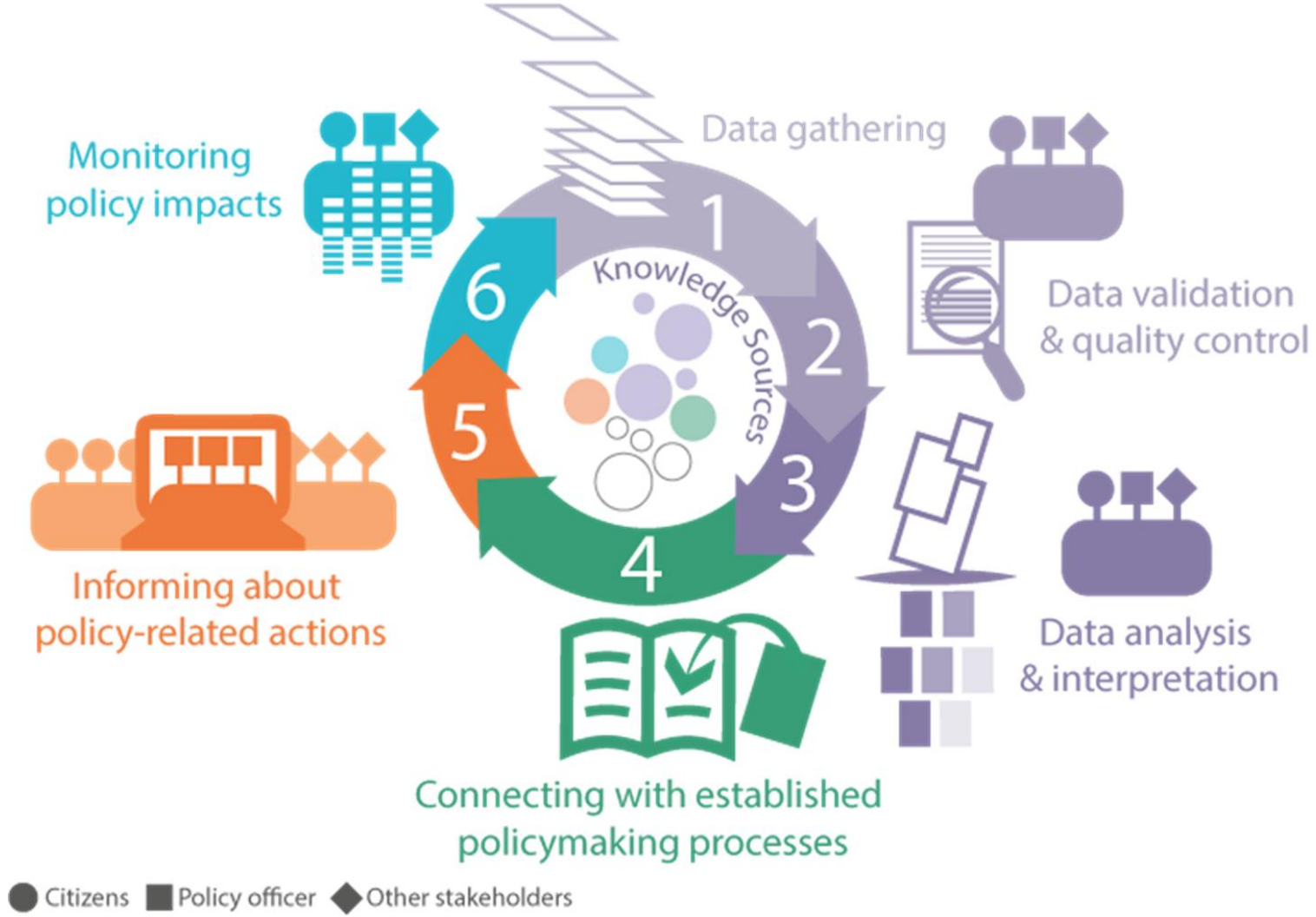
Citizen science for policy



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**

Key features for citizen and societal engagement in Horizon Europe

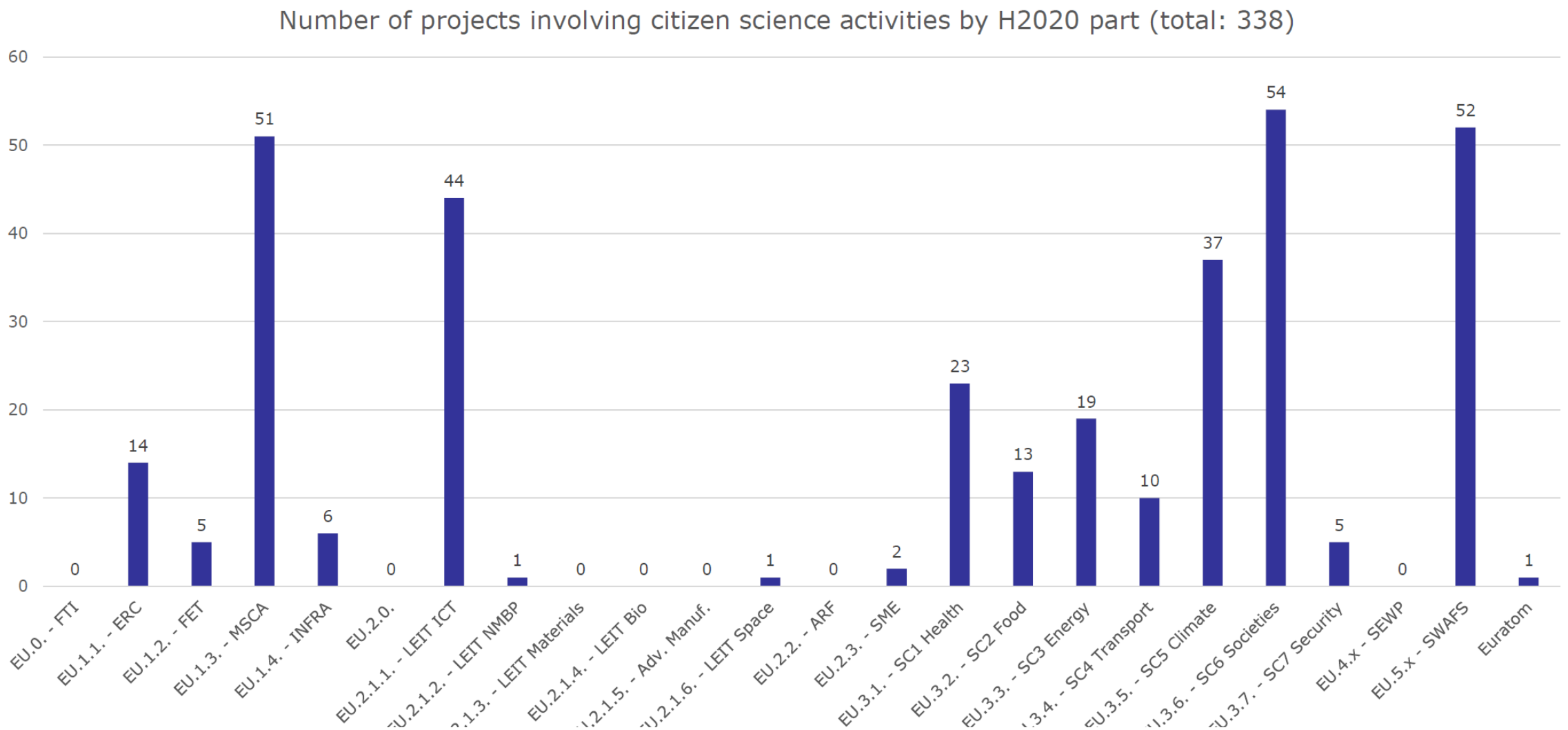
Open science is the *modus operandi* of the entire programme

Societal engagement considered part of the excellence criterion under methodology during **proposal evaluation**

Co-design and co-creation, and engagement of citizens and civil society organisations, are **mainstreamed** across the programme

One of the nine **pathways to impact** (KIP6) starts with citizens and end-users co-creating knowledge and innovations, with the goal of developing solutions and knowledge that are taken up by society

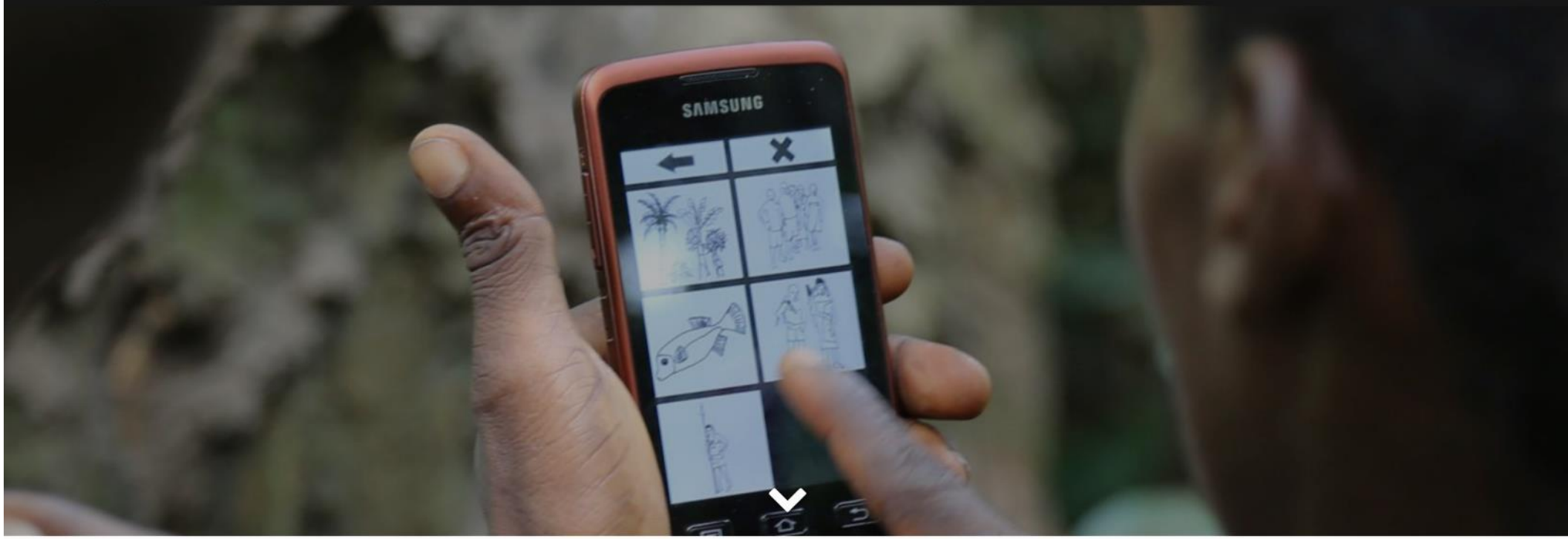
Citizen Science Activities in Horizon 2020



Source: Michael Arntoft DG R&I Open Science

Sapelli

Examples Tutorials XML FAQ News About

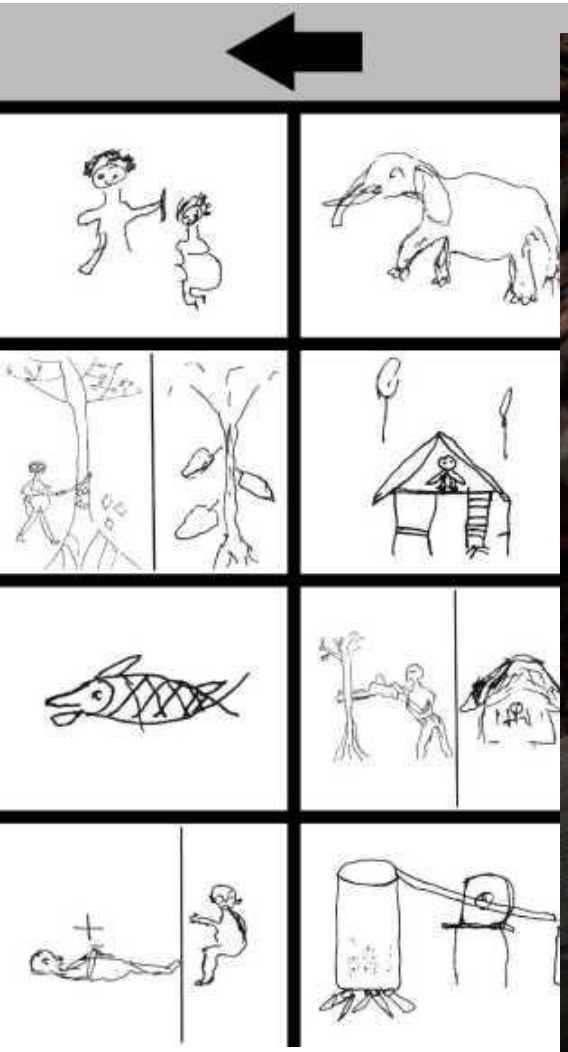


Sapelli is an open-source project that facilitates data collection across language or literacy barriers through highly configurable icon-driven user interfaces. We encourage people to download the app from the Google Play store, or from our GitHub repository and deploy it for their own purposes.

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.

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)



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Other programmes

Erasmus + through cooperation programmes

European Universities Initiative

LIFE programmes

Building a better LIFE with citizen science

Photo: Volha Kaskevich

26 September 2018 Online technology has led to a boom in citizen science. Can LIFE direct that voluntary interest in recording the world around us in ways that better support the implementation of nature policy? That was one of the topics under discussion at a LIFE platform meeting on **volunteering for nature conservation**, which took place in Tartu last week. The meeting was hosted by **LIFE Mires of Estonia**.

Bird-watchers and other amateur naturalists have long been a source of useful data for conservation organisations. But, as Dani Villero Pi from the European Bird Census Council explains, "the emergence of online bird recording portals and mobile applications has exponentially increased the amount of information collected in the last decade."

The Flemish nature NGO Natuurpunt, a beneficiary of numerous LIFE projects, has over 30 million species observations in its database, **waarnemingen.be**. "We have more and more volunteers submitting data – way more than when the database started in 2008," says Kristijn Swinnen from the Natuurpunt Study department. These observations by ordinary citizens are already having an impact on policymaking – and current LIFE projects. "For instance, we have more than 100 000 reports of roadkill in the last 10 years. So you can start focusing on certain locations, see if certain species are more vulnerable. If there's an important highway you can see the number of kills over the last 10 years – that's already being used by the government for planning," says Mr Swinnen. It is also being used by a LIFE project in the **Sonian Forest** to analyse the impact of a new ecoduct near Brussels that will connect habitats and allow key species to safely bypass roads.

Structuring the data

Yearly crane migration patterns
Image rights: Euro Bird Portal

One of the challenges with citizen science has been how to structure and integrate the huge amount of information generated. Dani Villero Pi is involved in a LIFE Preparatory project called **EuroBirdPortal** which is combining data from a dozen existing online bird portals into a common data repository that will display reliable Europe-wide patterns of bird distribution in near real time. "This should have strong insights for EU conservation policies," he says. It will also be a best practice example for compiling and displaying citizen science information on a European level.

"You need a solid network of fieldworkers to collect large volumes of high-quality information. It is important that people feel that any contribution is useful," believes Dr Villero.

European Commission

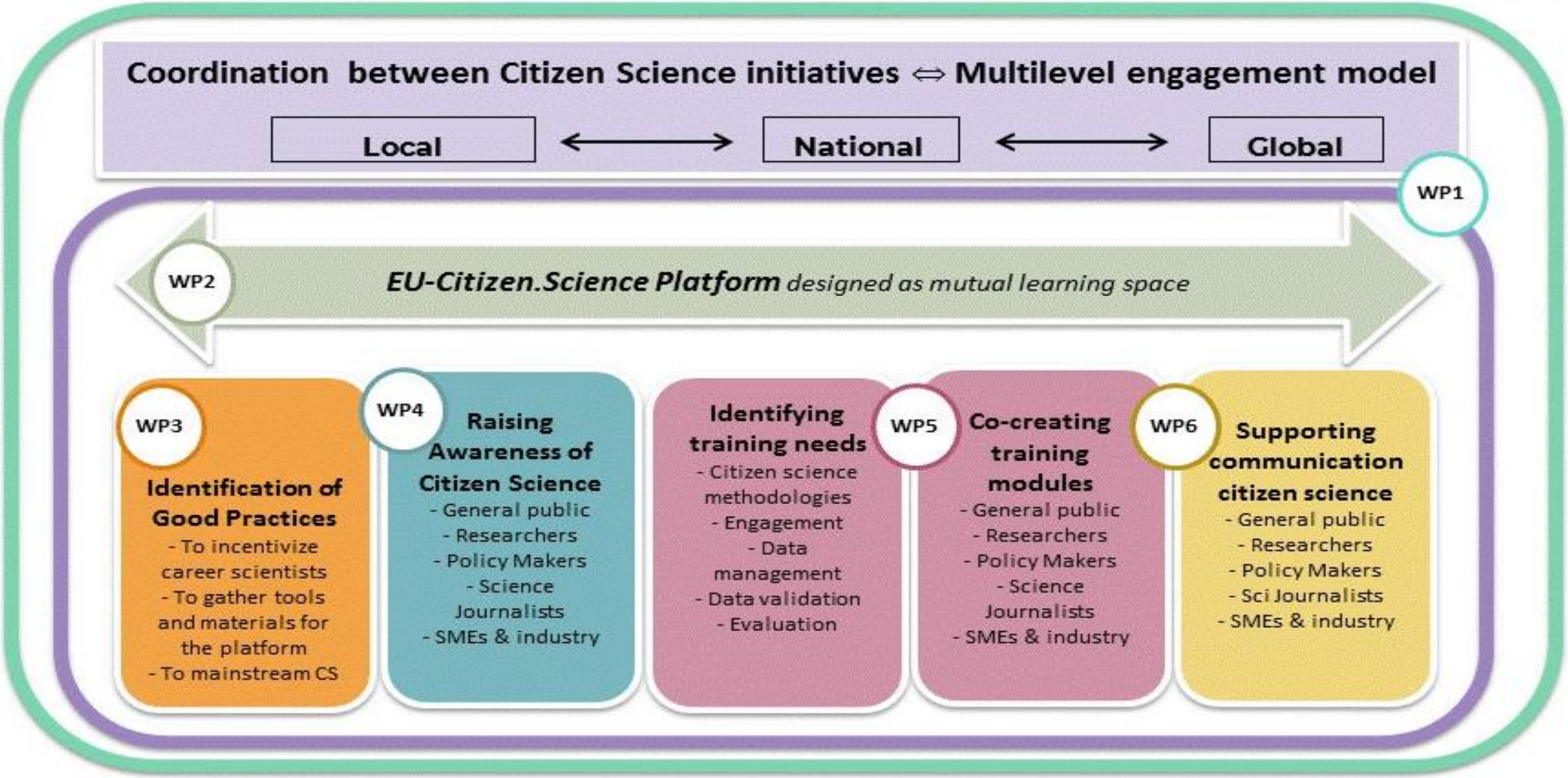
FURTHER INFORMATION

European Commission

EU-Citizen.Science

Support to Citizen Science at European Level

1. **Consolidation: Identification, Coordination & Support of ongoing initiatives**
2. **Integration & Implementation: Dynamic co-design of tools and guidelines**
3. **Capacity building, governance & social innovation: Creation of new business models and promotion of evidence-based policies to address societal challenges**



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824580


GEOGRAPHIC
CITIZEN SCIENCE
DESIGN
No one left behind
Edited by Artemis Skarlatidou and Muki Haklay
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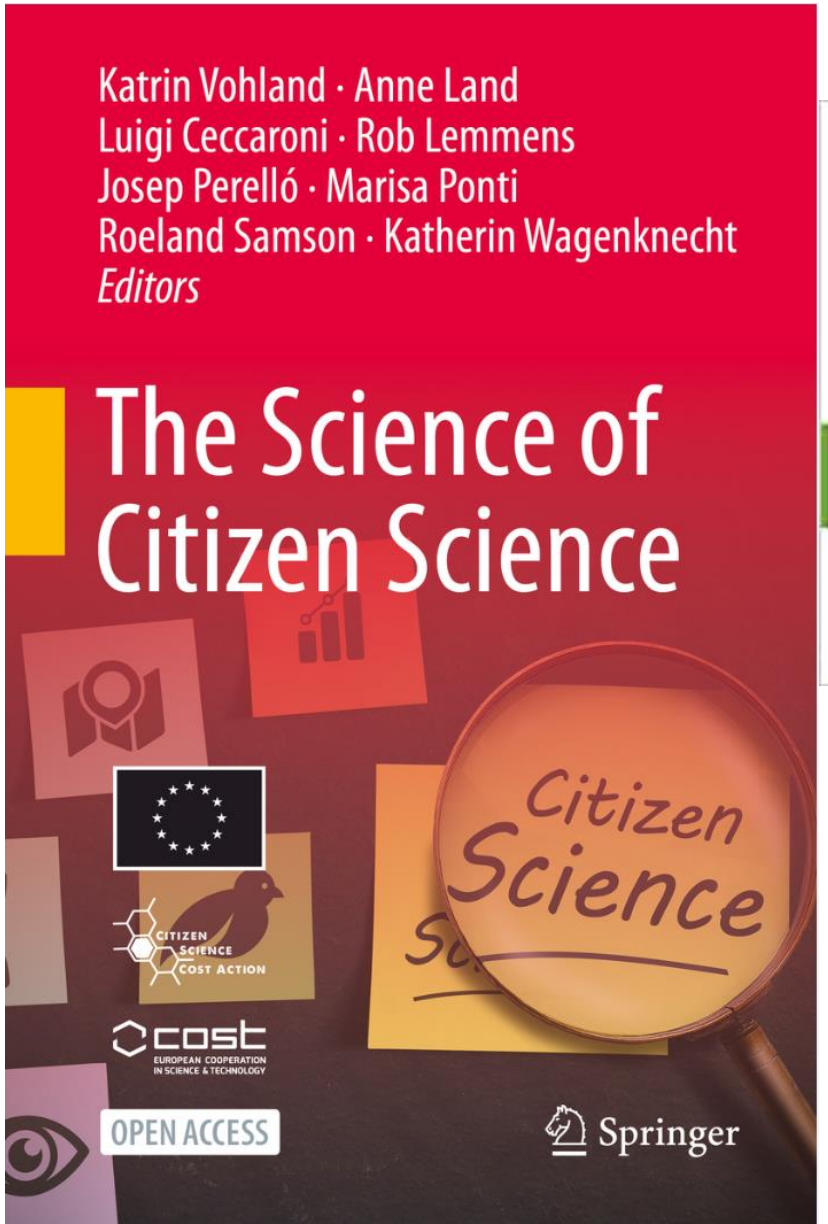
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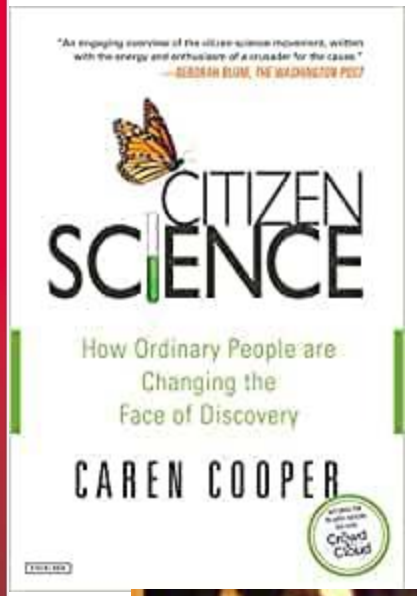
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How Ordinary People are
Changing the
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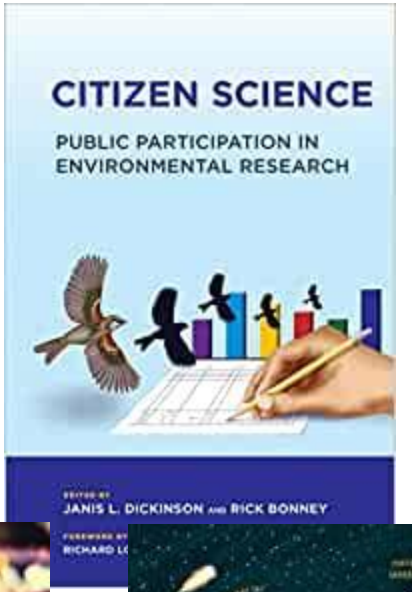
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PUBLIC PARTICIPATION IN
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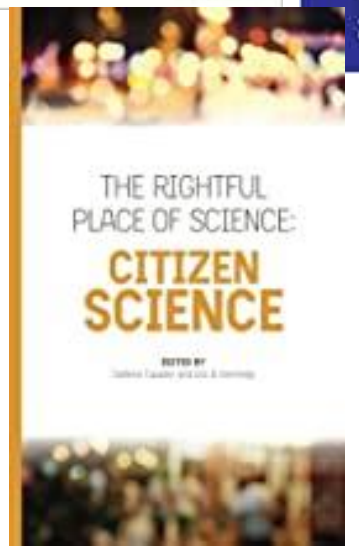
JANIS L. DICKINSON AND RICK BONNEY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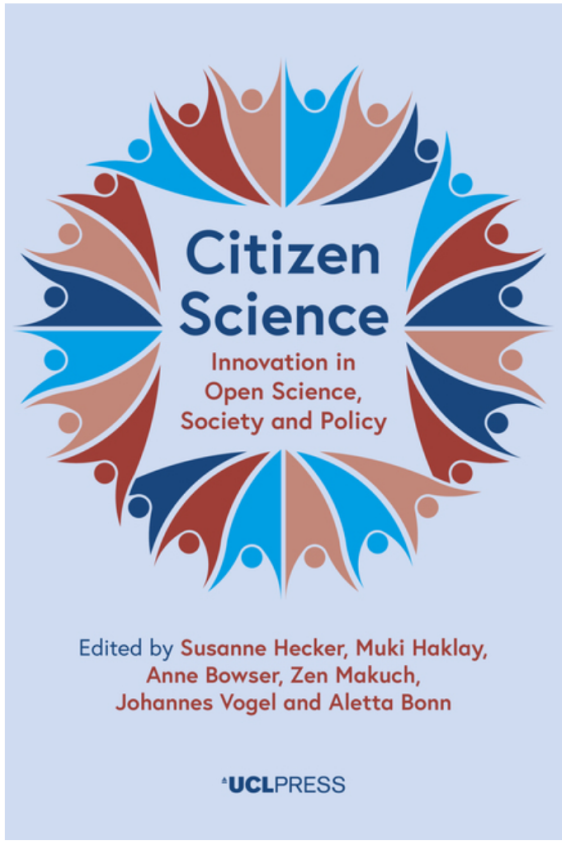

Return to results

Edited by Susanne Hecker, Muki Haklay, Anne Bowser, Zen Makuch, Johannes Vogel and Aletta Bonn | October 2018

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#HorizonEU

HORIZON EUROPE POLICY SUPPORT FACILITY

2021 – 2027

Carole Paleco
Royal Belgian Institute of Natural Sciences

Tine Huyse
Royal Museum for Central Africa

Research and Innovation

Different types of CS activities at the RBINS

1. CS within the “hardcore research” activities

2. CS as “educational” activities

3. Types of funding

4. Current needs

museum NATURALSCIENCES.BE

European Commission

CS within the “hardcore research” activities

- The nature of the activities of the «Citizen Scientists» (CSts) is really varied. With their help, the RBINS complements the lack of expertise in some research fields. They also valorize the scientific collections by studying them, as a result improving collection management of the collections and their accessibility.
- A CS part of the Strategic objectives of the RBINS 2015: creation of a CS Working Group in 2016
    - Inventory : The RBINS has an extensive and well established collaboration with volunteers in all its directorates (Taxonomy & Phylogeny, Public Services, Natural Environment, Scientific Heritage Service, Earth and History of Life), more specifically in the following domains: entomology, malacology, geology and palaeontology, and manages the Belgian Bird Ringing Service.

European Commission

CITIZEN SCIENCES (CS) AT THE RBINS :
RECENT AND RECURRENT COLLABORATIONS

The Royal Belgian Institute of Natural Sciences (RBINS) has an extensive and well established collaboration with volunteers in almost all its directorates (Taxonomy & Phylogeny, Public Services, Natural Environment, Scientific Heritage Service, Earth and History of Life).
The nature of the activities of the «Citizen Scientists» (CSts) is really varied. With their help, the RBINS complements the lack of expertise in some research fields. They also valorize the scientific collections by studying them, as a result improving collection management and accessibility of the collections.
This poster shows some of the most recent projects where the CSts are active and how important their role is to the RBINS.

MALACOLOGY - INVERTEBRATES

Contribution to Taxonomy: Neotropical landsnails, especially the re-evaluation of the Orthalicoidea

CSts contribute to the research of landsnails, and collection management (types, biohistory, Dautzenberg collection).

Fraud and Fakes with specimen shells, shell related objects and artefacts

Study and analysis of shells and shell related objects fraud and fakes in nat. hist. museums, private collections and ethnographic collections worldwide, improving and valorising conservation and management of collections.

Contribution to taxonomy & population distribution

Identification of European marine Mollusca (Gastropoda, Opisthobranchia, Nudibranchia) from NE Atlantic & Mediterranean Sea with occasional support in identifications for stakeholders.

Slak-in-Du (Slakken Inventarisatie in de Duinen) project

CSts make an inventory of the terrestrial and freshwater molluscs from the Belgian coastal region with attention for vulnerable and Red List species and exotic/invasive species.

Contribution to SPEEDY (2014-2017) by a collaborative project funded by the IAP program of Belspo

CSts and researchers sample landsnails/slugs for DNA research and morphometrics to study the responses of populations and communities to urbanisation.

"Overarching project" improving our knowledge and expertise of species : invertebrates

CSts and professionals describe new species of invertebrates (Mollusca, Crustacea, Hydrozoa, Porifera, Echinodermata, Bryozoa, ...), study collections, data, archives, etc.

ENTOMOLOGY

Contributions to Taxonomy

CSts study and describe specimens of insects and spiders (specific groups: Families, genera, ...) from the collections at home (loan) and are valorising un-identified specimens/collections.

Contributions to Collection Management

CSts are involved in sorting, mounting and labelling specimens of insects and spiders, re-organising collections and making them available for study.

Contributions to field sampling and international scientific missions/ expeditions

CSts are involved in sampling specimens in Belgium or foreign countries. Citizens and professionals with an interest in «nature; insects, spiders, mites, centipedes,...»

Contributions to digitisation of type specimens (pictures) by crowd sourcing

CSts make high resolution stacked pictures from type specimens and put them on «Virtualcollections» (RBINS database) using an on-line crowd sourcing tool. After validation, the pictures are put online.

Contribution to entomological databases and websites by crowd sourcing

CSts compile Excel lists of observations (Coleoptera). Screened and validated data are added to a database, and can be used by both researchers and CSts for their own projects, publications etc.

Education & sensitization on insects for a broad audience

CSts help organizing educational activities on insects for a broad audience. One of the top activities is the "Week of the insects" organised by RBINS and 6 Belgian entomological associations. During this week, all over Belgium CSts are informed on the magic world of insects.

GEOLOGY & PALAEONTOLOGY

Contribution to palaeontology and geology

CSts are: collecting fossil specimens, studying them and analysing the results; studying specimens from the RBINS palaeontology collection, either on their own or in collaboration with RBINS scientists.

Collecting geological data and samples from temporary outcrops

CSts provide information about temporary outcrops such as excavations for new buildings or roadcuts, make a description of the outcrop to be included in the GeoDoc database, and supply useful samples for the collection.

Contribution to fossil preparation

CSts participate in the preparation and restoration of fossil vertebrate remains, both recently collected specimens as well as specimens from the RBINS collection. Part of the prepared/restored specimens are studied at RBINS or by the CSts at home (loan).

Enlargement of the RBINS reference collection of dry fish skeletons

CSts collect and deliver sharks/ rays or carcasses of rare fishes, that are prepared for their skeletons at RBINS and deposited in the collections. They serve for comparative purposes to identify fish remains from archaeological or palaeontological sites.

BELGIAN BIRD RINGING CENTER

DoDirds (Belgian Ringing Scheme)

DoDirds (about 350 ringers) aims to organize the collection of quality data through a network of certified volunteer ringers; make the data available to scientists, CSts, policy makers,...; participate in training students; and develop research programs focused on the conservation of Nature.

https://odnature.naturalsciences.be/bebirds/en/index

PUBLIC AWARENESS

Doing it Together Science (DITOs) : 2016 – 2019

European projects supporting RBINS CSts activities like the DITOS project focusing on Citizenship and Environmental Sustainability.

XperiBIRD.be

XperiBIRD.be is an educational project that aims to distribute nest boxes equipped with a camera and a nano computer to schools and educational partners around Belgium. School kids enter their observations on the website http://www.xperibird.be/ .

For any questions, please write us at
citizenscience@naturalsciences.be

The pictures are used by kind permission of the RBINS and its collaborators.

Design by Alizée Dardart, RBINS
© RBINS

Louis De Pauw award & Palaeontologica Belgica award 2021

Koen Stein and Olivier Lambert, geologists/paleontologists by training, received a Palaeontologica Belgica Award.

Mark Bosselaers, a citizen scientist collaborator also describes fossil cetaceans, especially the fossils that have been excavated around Antwerp since the 19th century (often by volunteers).

Mark Bosselaers and Marcel Vervoenen – M. Vervoenen built up a valuable collection of fossilised sea beds, published about it and donated it to science - are the first two to receive the De Pauw award.

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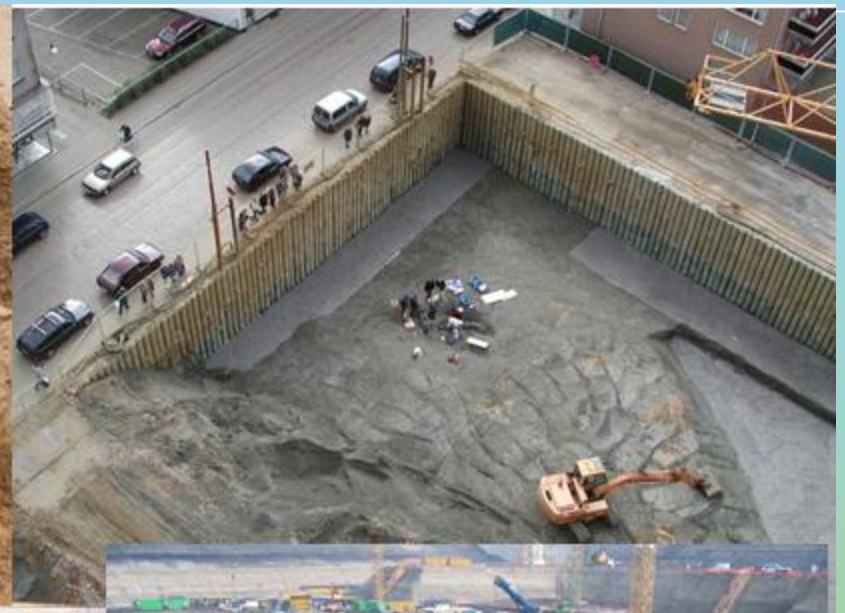
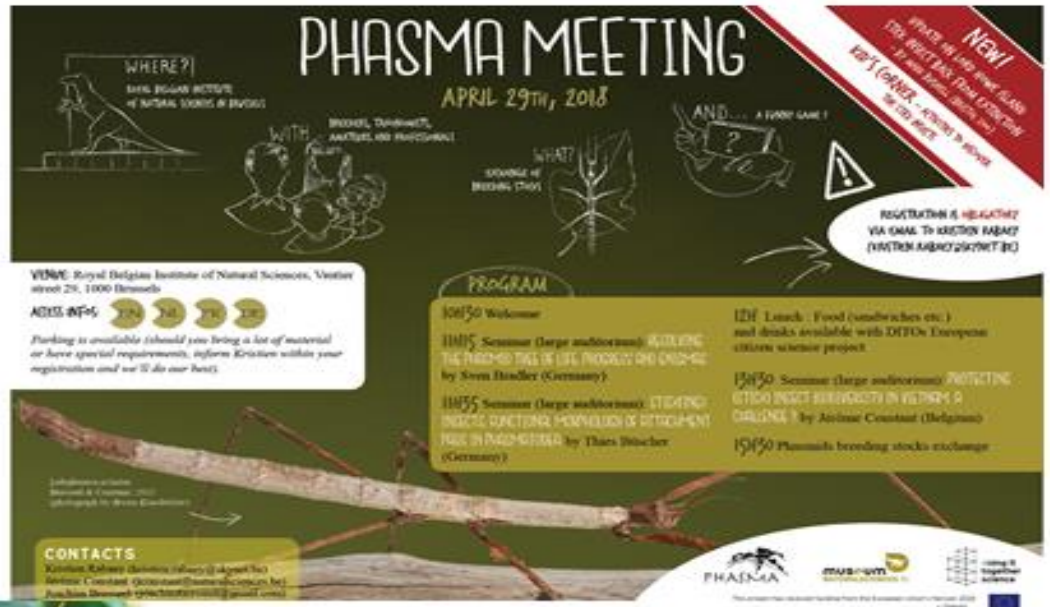
European Commission

FIELD WORK



European Commission

CS within research activities



REPORT - PHASMA MEETING @ RBINS 29 04 2018

Number of surveys filled: 35

Language
NL 15/35 (42,8%)
FR 8/35 (22,9%)
EN 12/35 (34,3%)

Age
Min 7,5
Max 73
Mean 31,5
Median 32

Gender
F 8/35 (22,9%)
M 27/35 (77,1%)
Other 0/35 (0%)

Country of origin of the participants
Belgium 20/35 (57,1%)
The Netherlands 5/35 (14,3%)
Germany 5/35 (14,3%)
Italy 2/35 (5,7%)
United Kingdom 2/35 (5,7%)
Switzerland 1/35 (2,9%)

Did you attend the Phasma Meeting before?
Yes 26/35 (74,3%)
No 8/35 (22,9%)
Didn't reply 1 :35 (2,8%)

2. CS & more "educational" activities

Bioblitzes June 02, 2018 & 2019

MAIN STATISTICS ABOUT THE PARTICIPANTS

The number of participants was limited to 20 for the afternoon and the evening sessions respectively.

22 persons attended the afternoon session focused on diurnal insects and freshwater inverterbrates. Among them, 5 persons stayed for the evening session, and 13 other joined only for the evening session, focused on nocturnal insects.

One third of all participants were children, and the average age was 34.

43% of all participants were female.

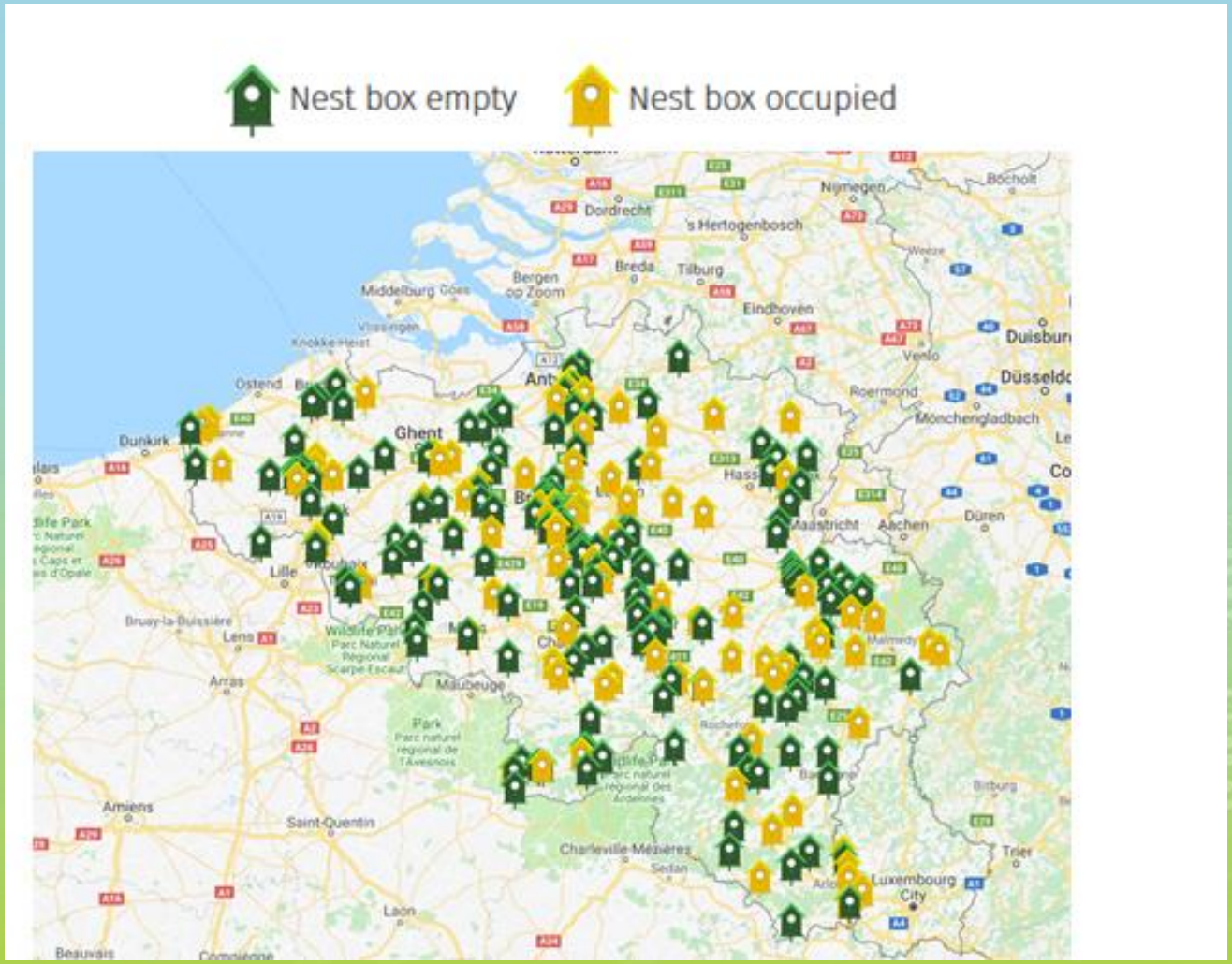
XperiBIRD.be (Support from Google)
STEM & Biodiversity

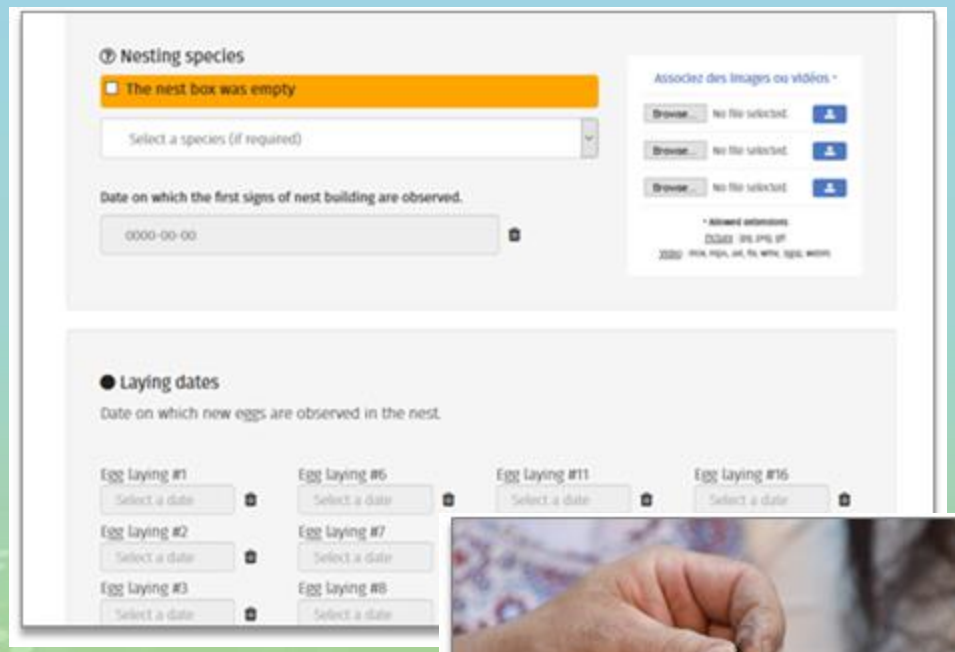
Linked to the Bird Ringing Service
=> Scientific report
http://xperibird.be/en/database#report

SUMMARY OF 2017-2018
Two springs of observation, 148 broods belonging to 6 species of cavernicolous passerines monitored day-to-day,
1331 eggs counted, 1052 chicks hatched of which 790 successfully took flight, are a fine set of results!

A Citizen Science project

museum NATURALSCIENCES.BE





http://xperibird.be/en/home

XperiLAB – (Support from Solvay)

The Science Truck touring all over Belgian schools

XperiLAB @ Tour & Taxis (Brussels) 28-29/04/2018

Did you know the XperiLAB already? Yes 5/26 (19,2%) No 20/26 (76,9%), Didn't reply 1/26 (3,8%)

Would you like the XperiLAB to come at your school or town?

Yes 22/26 (84,6%) No 2/26 (7,7%)

Didn't reply 2/26 (7,7%)

Which experiment did you prefer in the XperiLAB?

Toothpaste 14

Daphnia 10

Hydrodynamics 8

Structure 6

Windmill 5

Insulation 4

Colors 4

Fibers 4

Solar energy 3

Have you conducted similar scientific experiments at school?

Yes 12/26 (46,15%)

No 12/26 (46,15%)

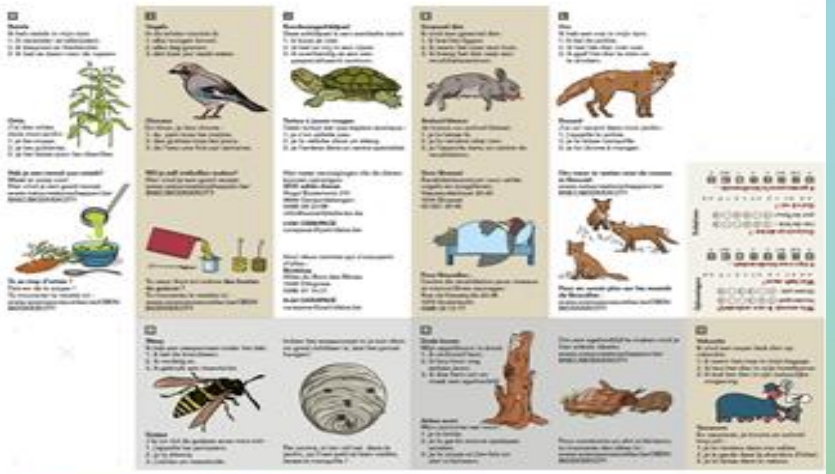
Didn't reply 2/26 (7,7%)

BIODIVERS'IDEA

UITNODIGING - INVITATION

Biodivers'idea workshop

January 31, 2018



doing it together science

museum

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

Science cafés

- 7 cafés organised & surveyed
- between 15 Dec 2017 and 20 Apr 2018
- 5 - 20 participants
- 42W / 18M
- Mostly over 60 yo

European Commission

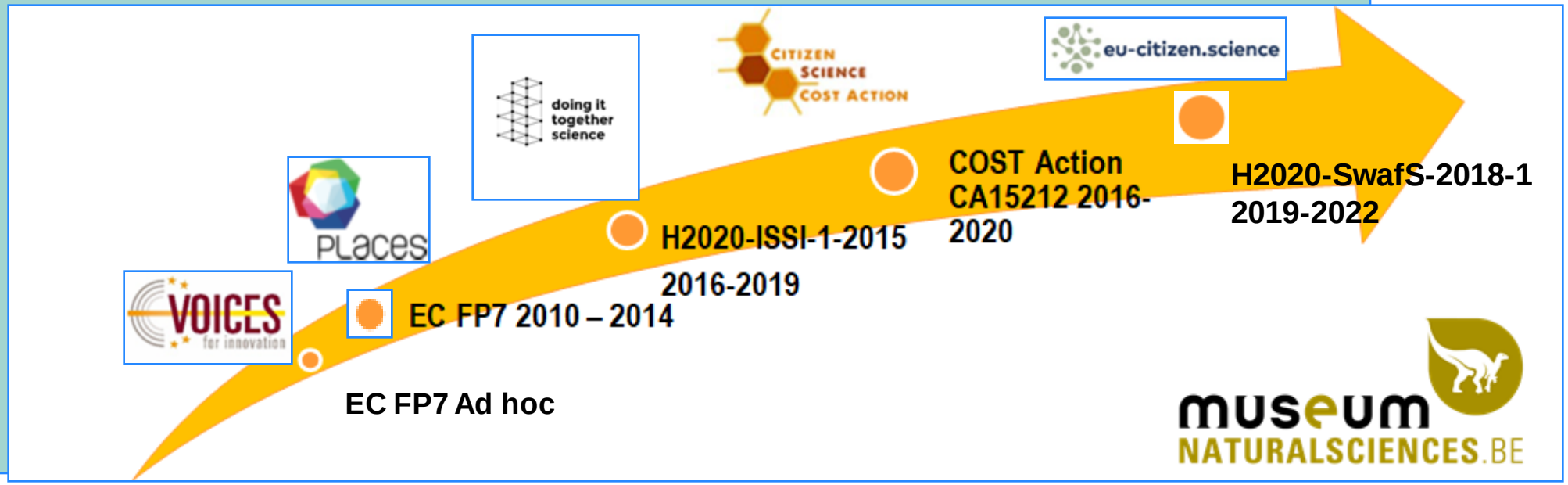
3. Types of Funding

- Private companies (Google, Solvay)
- No research programme at Federal level for SFI for research activities involving citizen scientists – CS is an additional activity on current research funding
- EU Programmes SwafS have enabled the development of educational activities. Recent H2020 programmes CS in research activities
- RBINS benefitted from several SwafS opportunities
- Networking :

  Member of

  ECSA &

  ECSITE



4. Current Needs

- Specific public funding in Belgium needed to support CS activities in research – To trainers/scientists providing expertise on monitoring and data validation through CS collaborations
  - Funding scheme in Flanders, not in Wallonia, Brussels, Federal
- Support for CS networking
- EC Example : HE first research calls linking NHM collections, taxonomy and biodiversity hotspot involving/encouraging CS activities
  - ex. HORIZON-CL6-2022-BIODIV-01-02: Building taxonomic research capacity near biodiversity hotspots and for protected areas by networking natural history museums and other taxonomic facilities

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Thank you!

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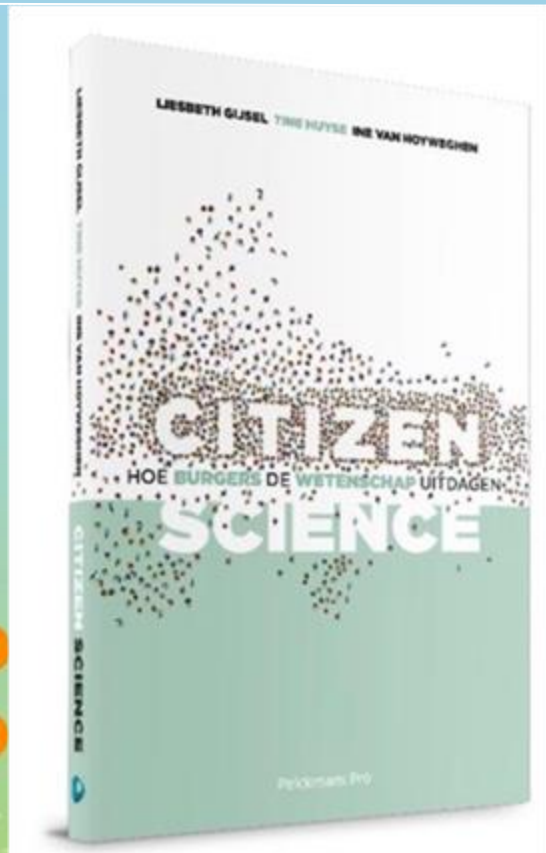
CS within the “hardcore research” activities

Royal Museum for Central Africa

European Commission

personal background

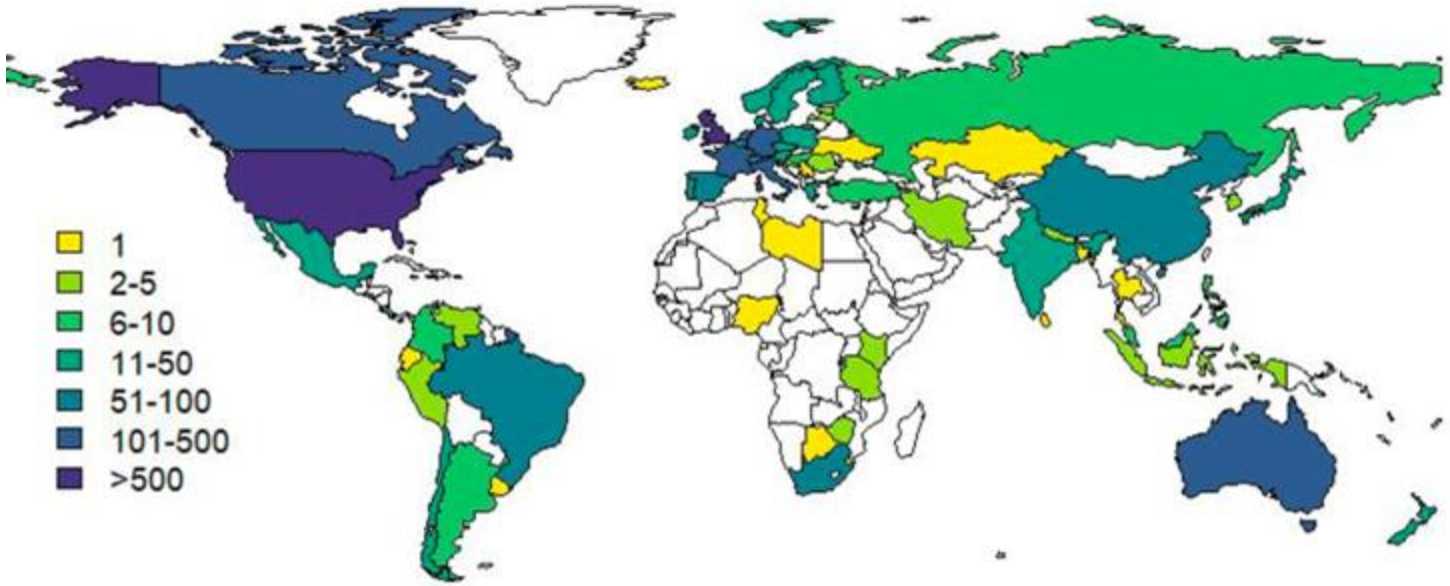


https://jongeacademie.be/wp-content/uploads/2016/04/JA_CitizenScience-EN.pdf

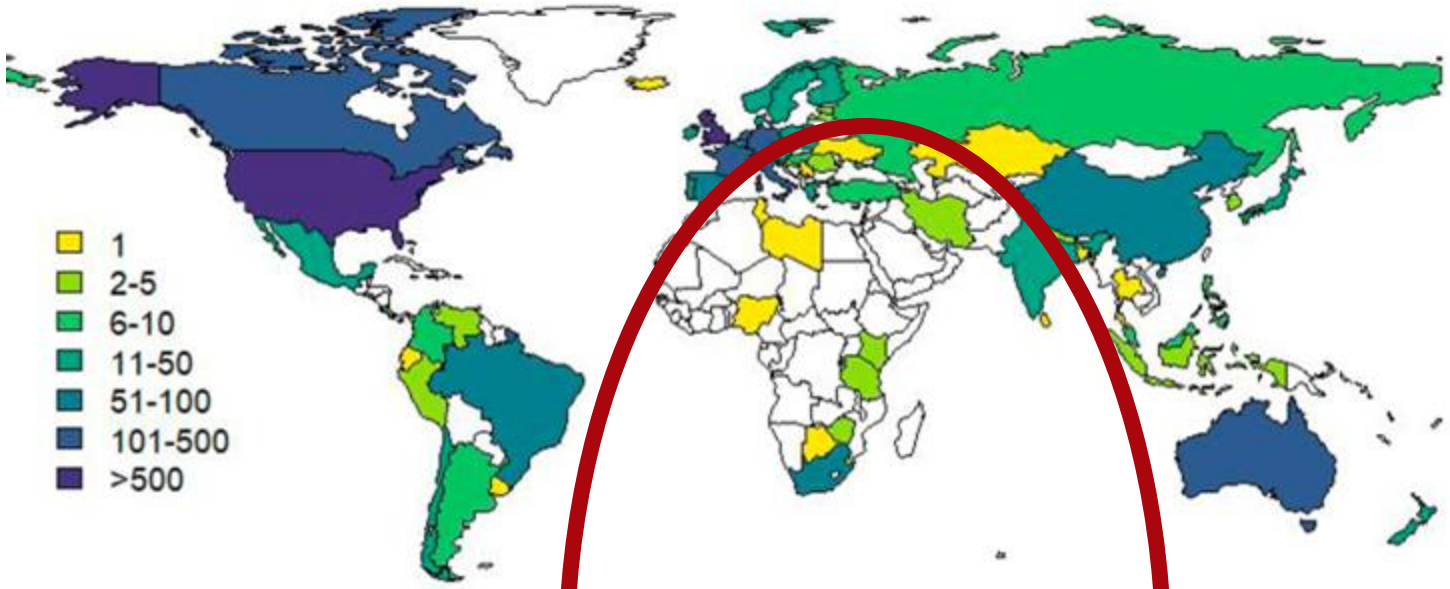
European Commission

Number of Citizen Science publications per country based on 1st author affiliation

Jacobs et al. in prep

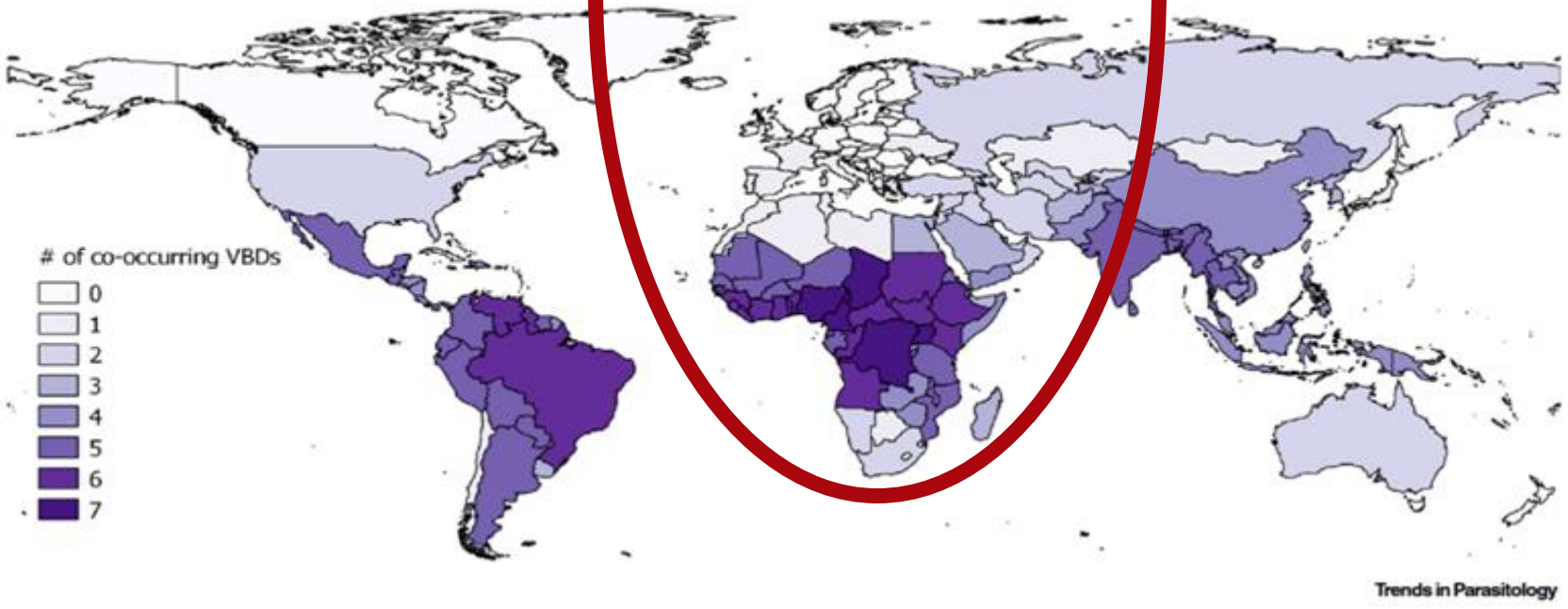


Number of Citizen Science publications per country based on 1st author affiliation



Jacobs et al. in prep

Combined Global Distribution of Nine Major Vector-Borne Diseases (VBDs).



Ashepet et al (2021). Wicked solution for wicked problems: citizen science for vector-borne disease control in Africa. Trends in Parasitology, 37(2), 93-96.

AFRICA museum

SNAIL-BORNE DISEASES

Schistosomiasis/bilharzia

- Affects >200 million people worldwide
- Symptoms: liver and bladder fibrosis, infertility
- Good treatment but no vaccine → **Re-infection**

SNAIL-BORNE DISEASES

Prevention:

- Access to safe water
- Improved sanitation
- Behavior change
- Snail control

CITIZEN SCIENCE

ATRAP PROJECT

ACTION TOWARDS REDUCING AQUATIC SNAIL-BORNE PARASITIC DISEASES

Monitor snail distribution

- Infection risk maps
- Targeted snail control

ATRAP PROJECT

ACTION TOWARDS REDUCING AQUATIC SNAIL-BORNE PARASITIC DISEASES

Monitor snail distribution

- Infection risk maps
- Targeted snail control

Community outreach

- awareness raising
- Behavior change

B

1) citizen scientists as snail collectors

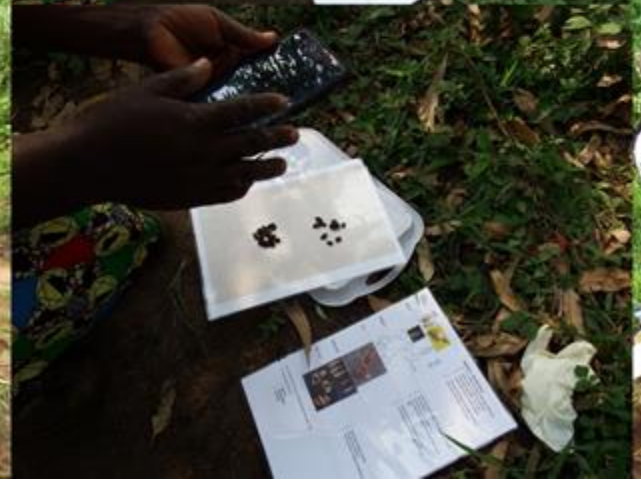
Brees et al., 2021. The Potential of Citizen-Driven Monitoring of Freshwater Snails in Schistosomiasis Research. Citizen Science: Theory and Practice, 6(1): 18, pp. 1–13

weekly snail collection sorting & counting water chemistry



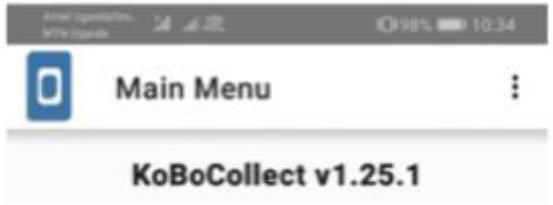







weekly snail collection sorting & counting water chemistry

KOBO toolbox

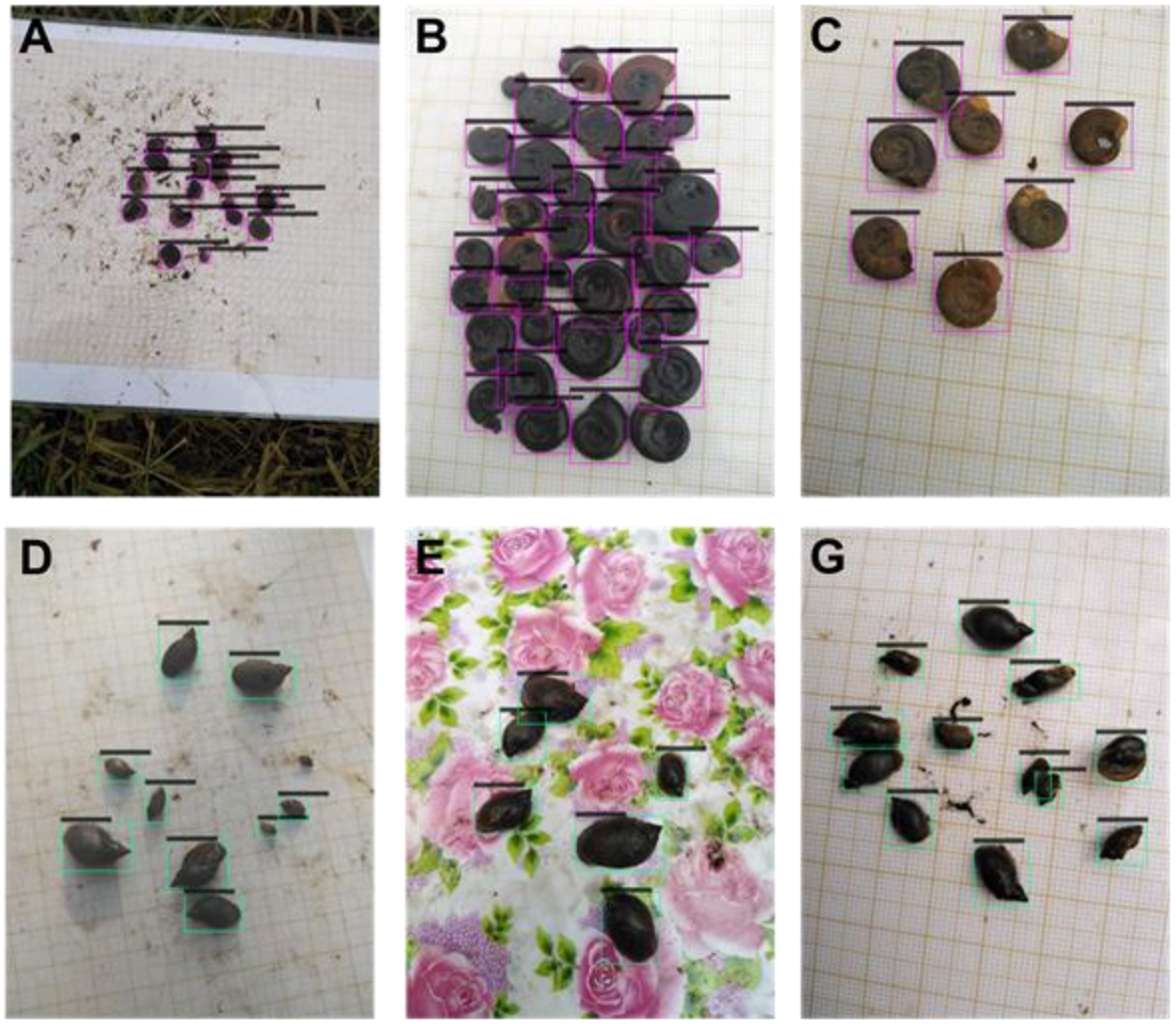


Central server

remote semi-automated data validation

Personalized feedback to CS

The potential of deep learning object detection in citizen-driven snail host monitoring



Object detection:
YOLOv4 (darknet framework)

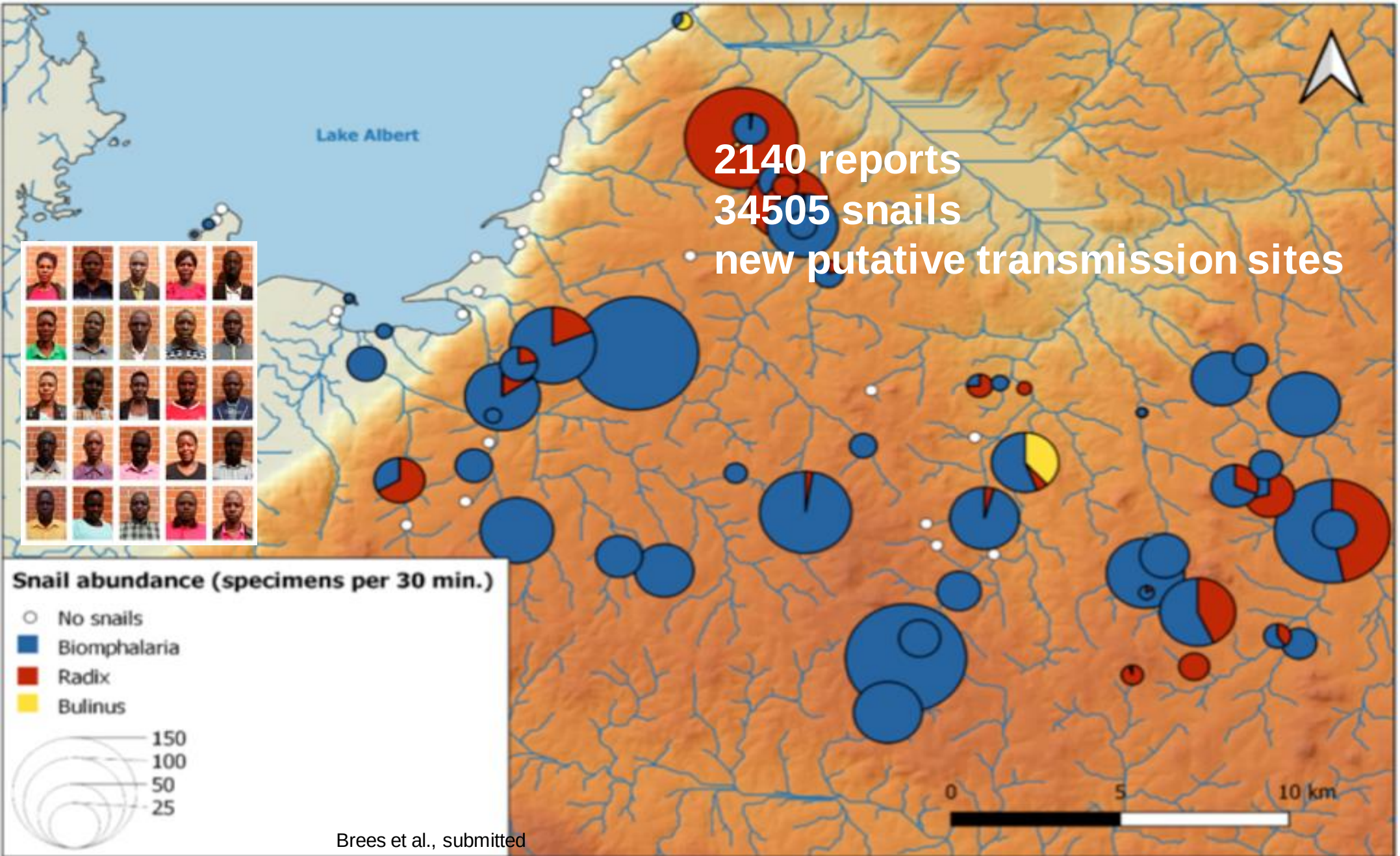
Web API
Validate field image collected by citizen scientists

Mobile app?
Replace the sorting procedure performed by citizen scientists

- Real-time detection operated by citizens
- Guiding citizens' snail identification

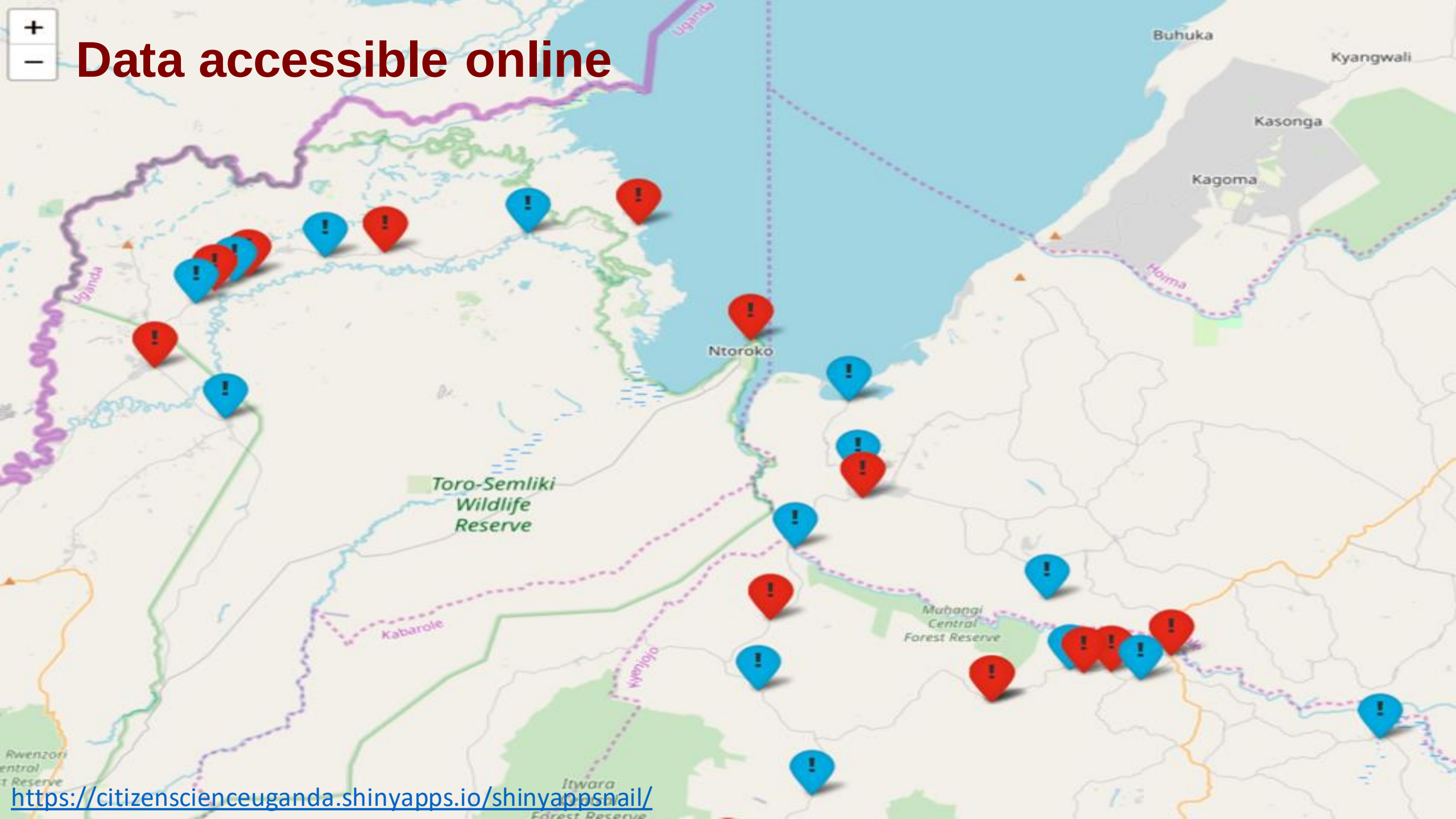
AP_{50} for Bio : 97.93%
AP_{50} for Lym: 98.98%

Some results



Brees et al., submitted

Data accessible online



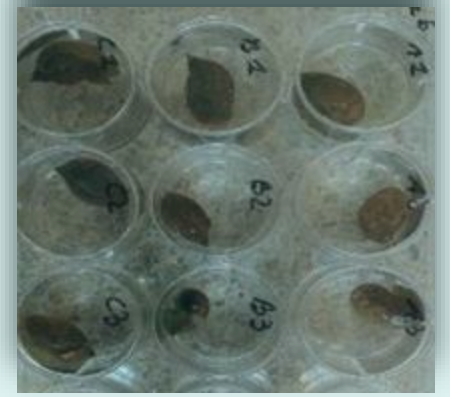
https://citizenscienceuganda.shinyapps.io/shinyappsnail/

Citizen versus ‘expert’ data

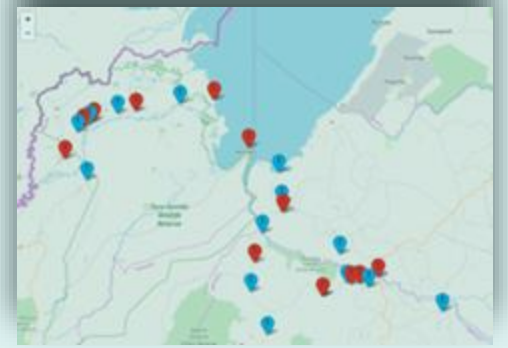



snail sampling

biotic & abiotic factors



number of infected snails



- snail distribution & infection risk maps
- spatiotemporal modelling & forecasting

B

2) citizen scientists as communicators




Socio-anthropological studies







FGDs, interviews & lived experiences
to assess
knowledge, attitudes &
practices of schistosomiasis

⇩

contextualized educational tools

Co-creation of communication tools

with citizen scientists and communities to debunk myths & induce behavioural change

CS & community-led awareness campaigns

Encounter citizen scientists & policy makers

Citizen Science Uganda

HOME CONSORTIUM PROJECTS DATA NEWS AND UPDATES RESEARCHERS CONTACT

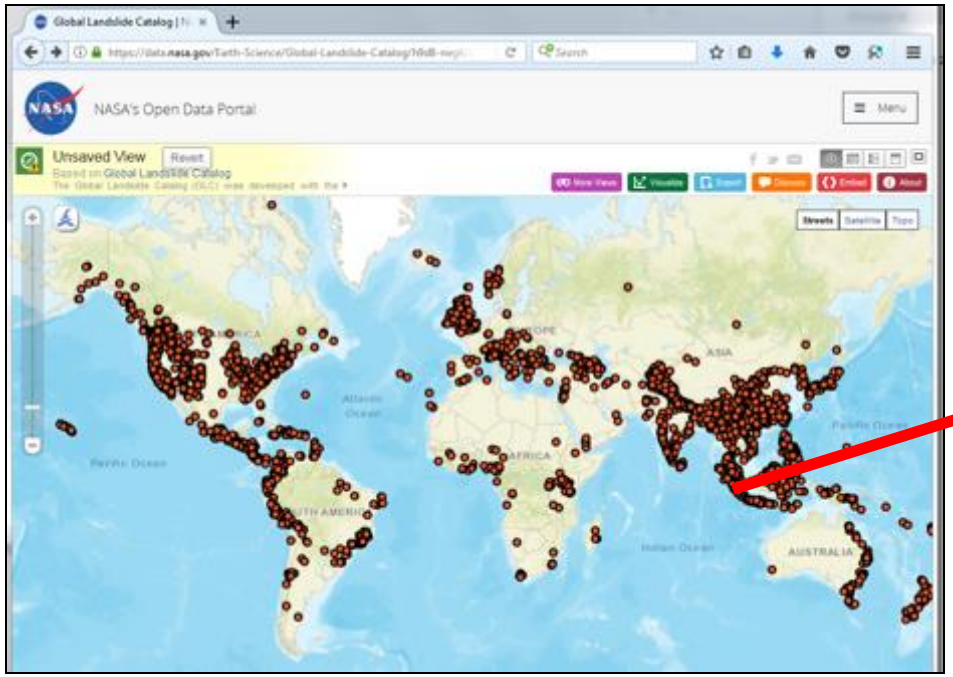
https://www.citizenscienceuganda.info/

This website was built to highlight the joint activities related to citizen science, as foreseen in the ATRAP, HARISSA and D-SIRE projects.

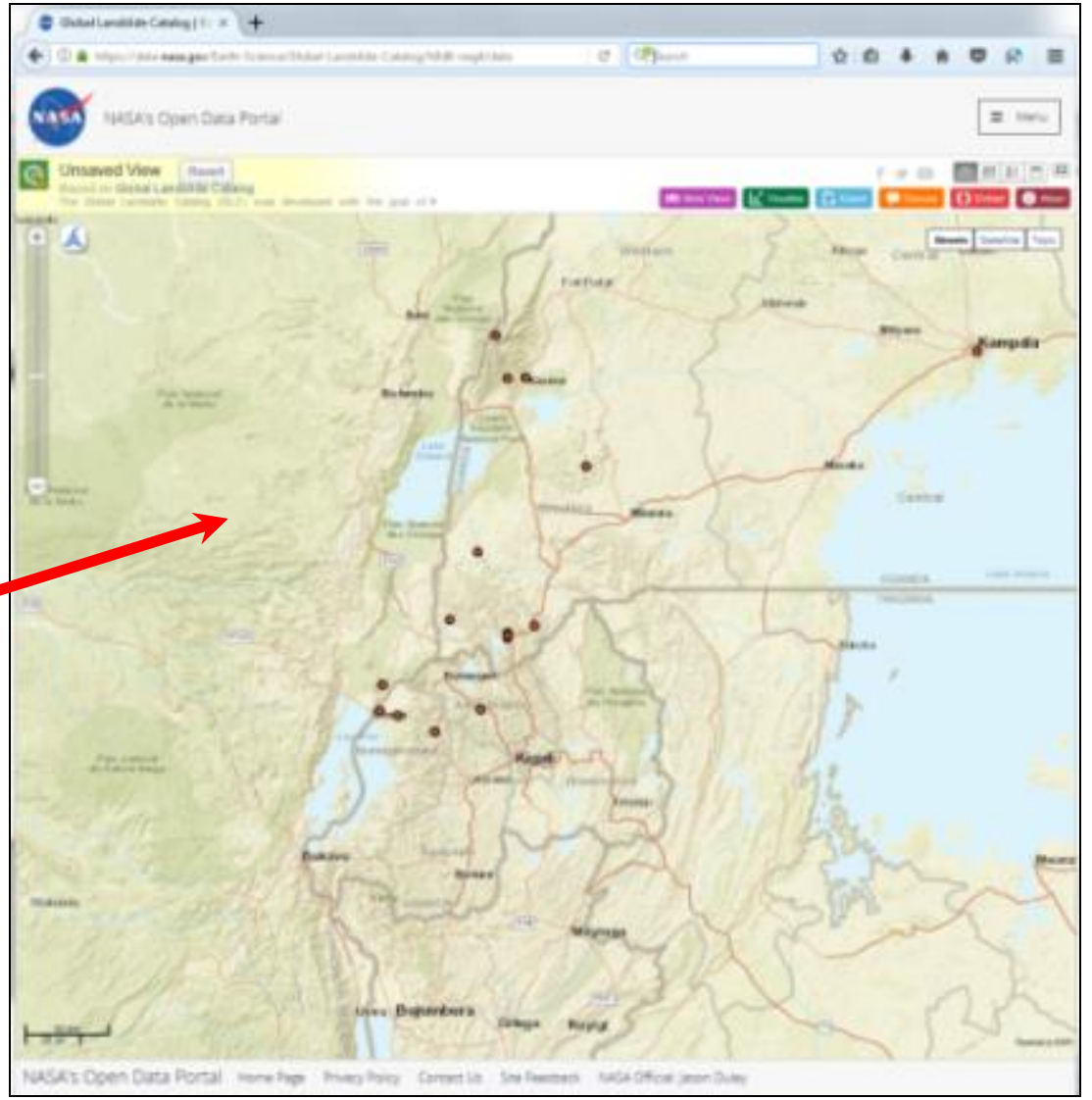
ATRAP D-SIRE HARISSA SWAMP

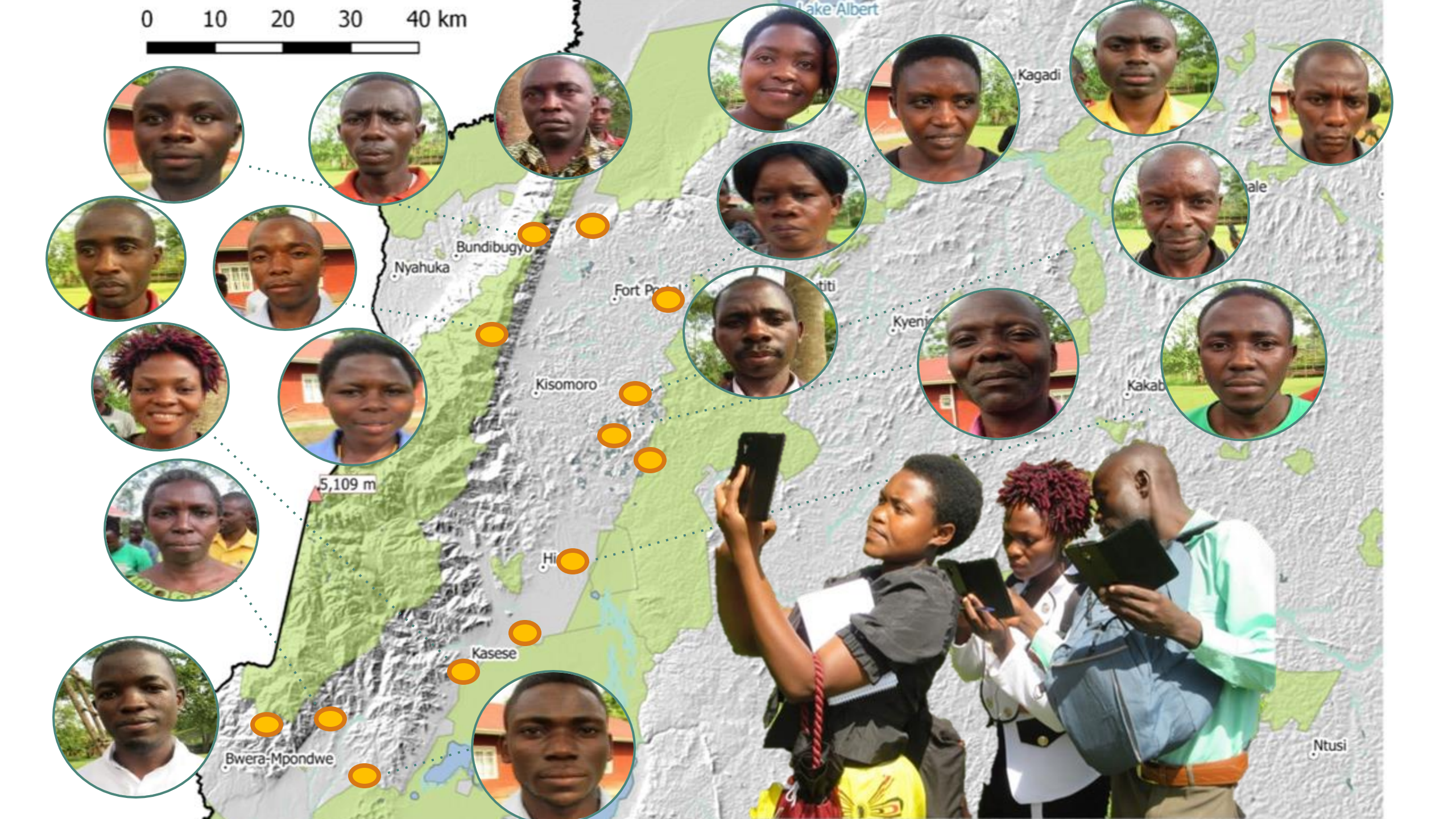
HARISSA PROJECT

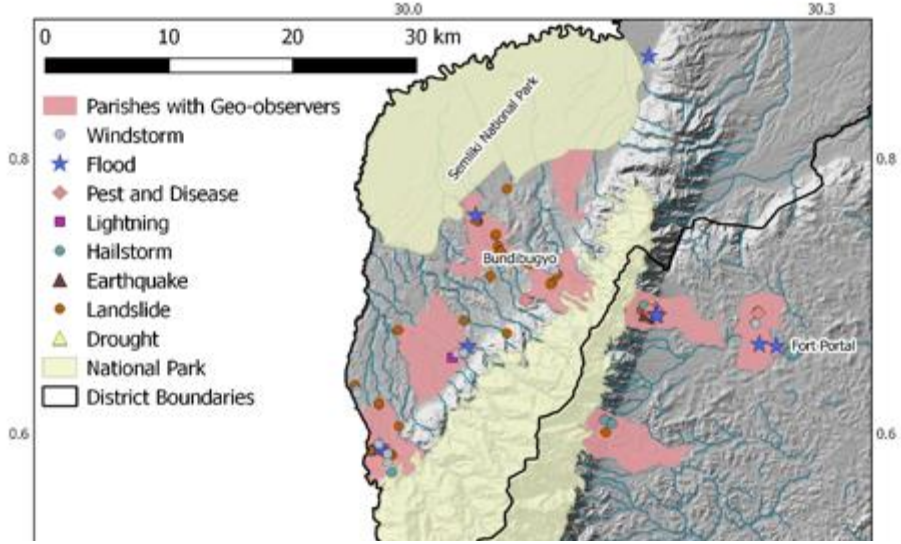
Landslides: what was known?



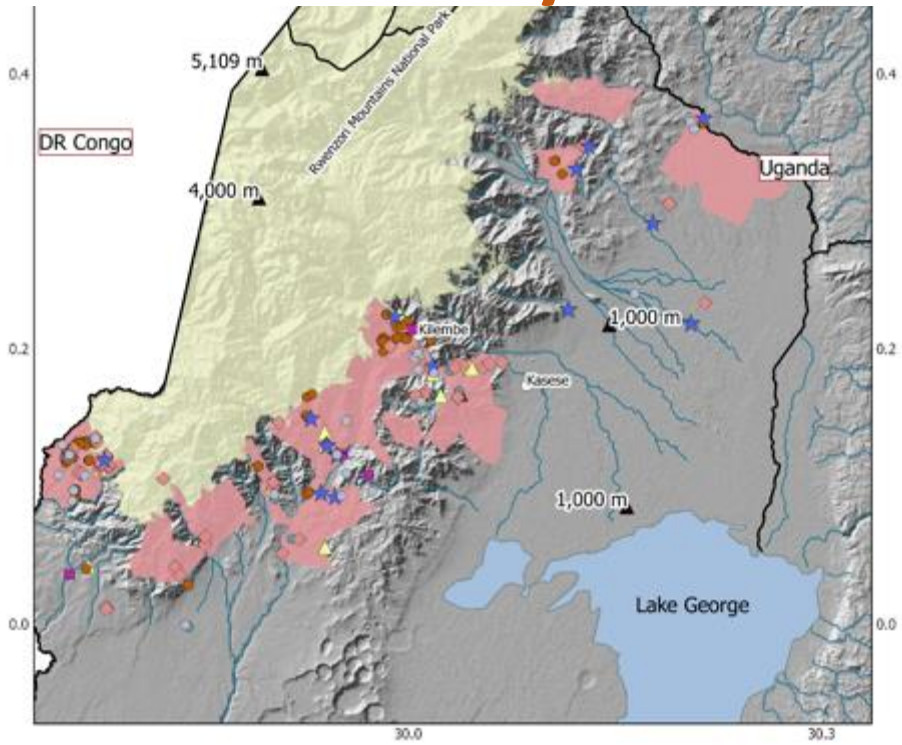
NASA- Global Landslide Catalog




0 10 20 30 40 km
Lake Albert
Kagadi
Bundibugyo
Nyahuka
Fort Portal
Kisomoro
Kyenjo
Kakab
5,109 m
Kasese
Bwera-Mpondwe
Ntusi



>350 events in 2 years



CONCLUSIONS

- CS has the potential to address monitoring issues in VBDs, natural hazards, wildlife & conservation management, as it can increase monitoring capacity and increase public engagement (unprecedented datasets in terms of spatiotemporal resolution)
- Kobo toolbox + AI facilitate upscaling, and working in remote areas
- citizen scientists are trusted by community and act as bridge between scientists and communities (2-way exchange of preventive measures & community needs)
- CS-led awareness campaigns facilitate shared problem-solving and expected to produce long-lived results (let communities own their problem)
- stakeholders from local NGOs and authorities show interest in the CS concept
- identifying intrinsic and extrinsic motivations of citizen scientists as participant motivation is key to success (PhD project Mercy Ashepet)

European Commission

CONCLUSIONS

- Successful CS projects require a lot of time and investment, it is not a quick or cheap fix
- Key points:
  - continued communication & engagement
  - partnerships with local NGOs and authorities increase sustainability
  - make CS culturally relevant in developing countries, solutions to societal problems
    (Pocock et al., 2019)

European Commission

QUESTIONS?

European Commission

Mbarara University of Science and Technology, Uganda

Université de Kinshasa, INRB, DR Congo

Supported by the development Cooperation program of the Royal Museum for Central Africa with support of the Directorate-general Development Cooperation and Humanitarian Aid

Dr. Tolo, Prof. Kagoro, Dr. Nyakato, Dr. Albrecht, prof Lapika, prof Mitachi, Dr. Madinga, Dr. Jacobs, prof Pype, prof Polman, prof Poels, Dr. Masquillier, prof Vranken, prof Van Rompaey, Dr. Dewitte, Dr. Kervyn, Dr. Michillier + all students & citizen scientists

Trees and forests

Long-lost Congo notebooks may shed light on how trees react to climate change

Decaying notebooks discovered in an abandoned research station contain a treasure trove of tree growth data dating from 1930s

The abandoned research station along the Congo river in Yangambi, DRC, where the cache of notebooks was discovered. Photograph: Axel Fassio/Cifor

http://junglerhythms.org/
http://cobecore.org/jungleweather/

CITIZEN SCIENCE

Zooniverse: Jungle Rhythms

Help researchers better understandyearly flowering, seed dispersal, leaf shedding and recurring life cycle events of trees in the Congo's tropical rainforest

Thank you!

RTD-PSF@ec.europa.eu