BRITEC Experience: Researcher's Perspective

Dr. Christos Giannaros

24 March 2021

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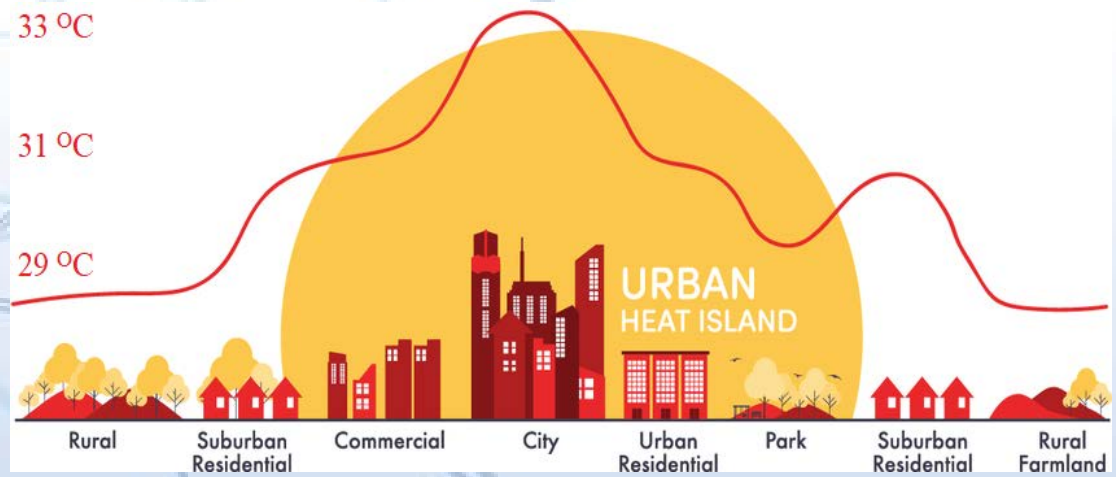
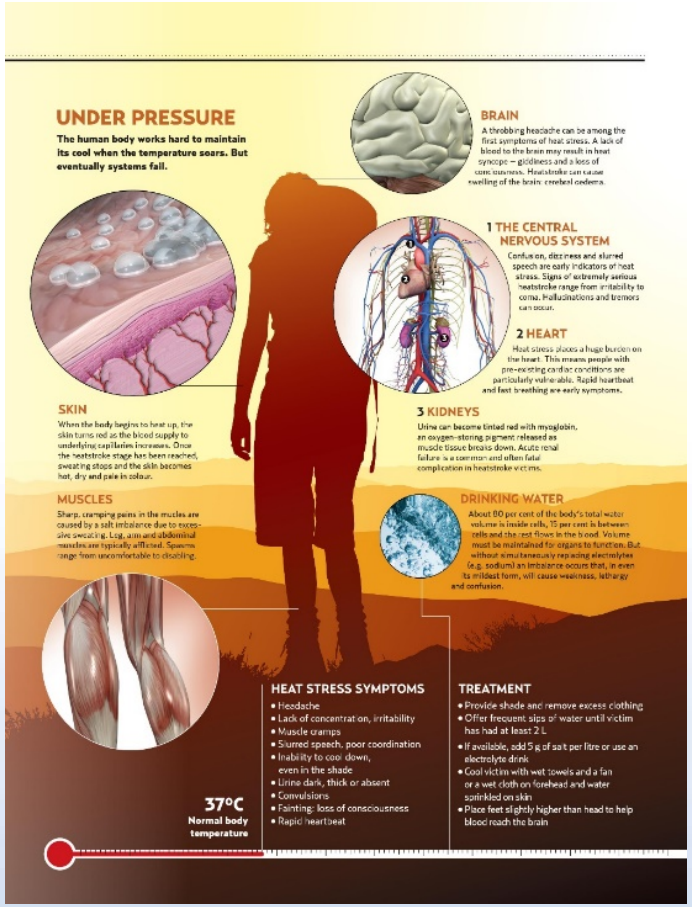
Research Problem

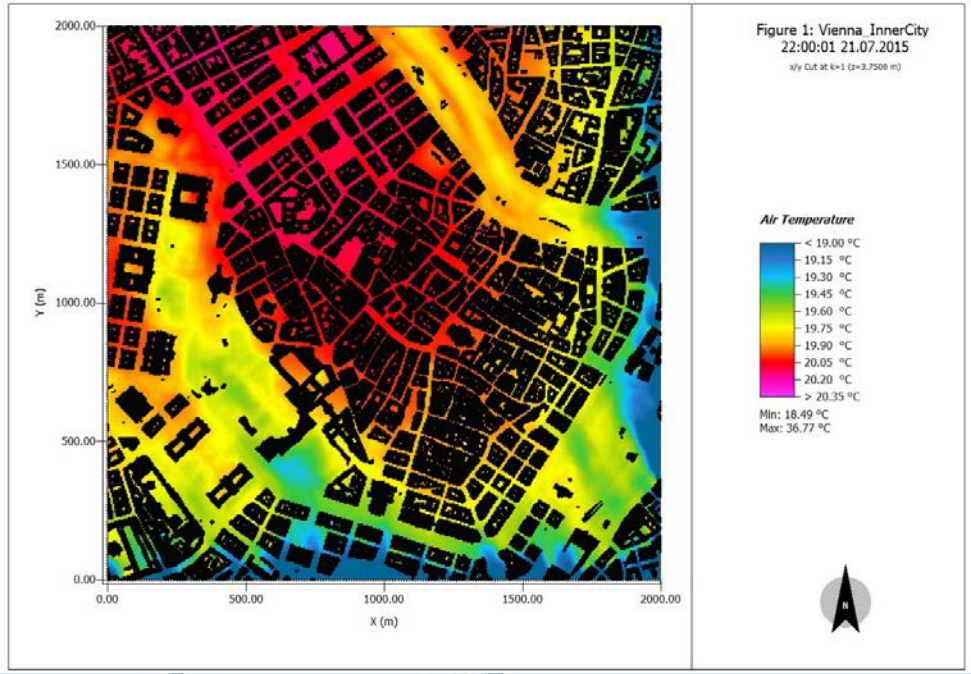
- High-temperature weather conditions
- Urban Heat Island (UHI)
- Human thermal comfort

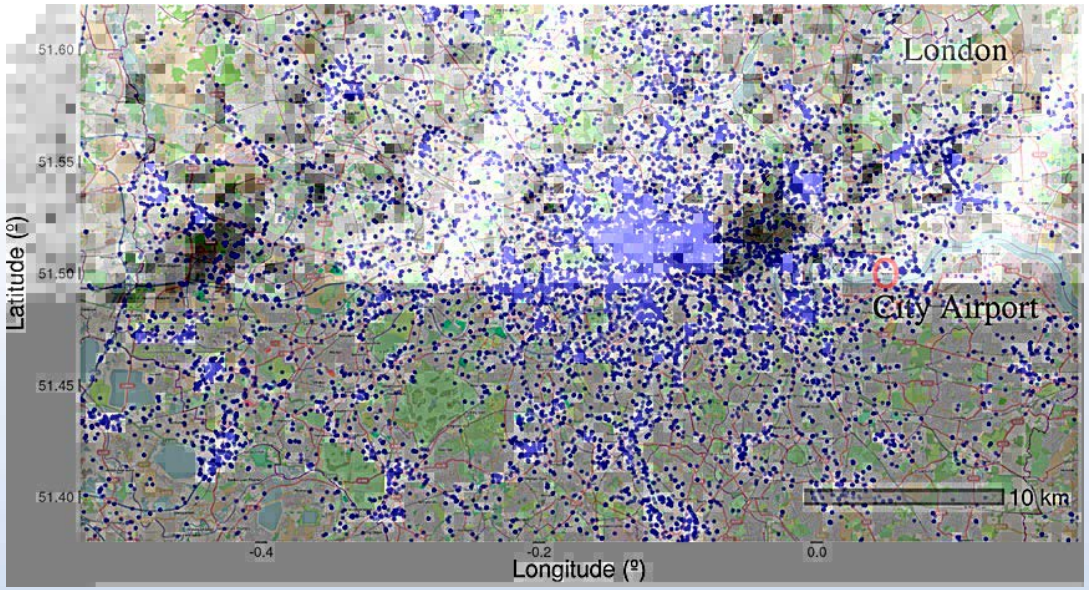




Research Problem

- **UHI: A highly localized phenomenon**
- **Citizen-science environmental monitoring**





Source: Overeem et al., 2013

Research Experiment

Human thermal comfort:

- Meteorological factors -> Measurements using a pocket weather meter
- Physiological factors -> Activity, clothing and personal information

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Research Experiment

- **Guided data processing**
- **Report on specific research questions**

BRITEC: Ανάλυση δεδομένων 1ης μέτρησης: 11 Νοεμβρίου 2019

[redacted] *1ο Γενικό Λύκειο Βριλησσίων*

1. Διαφοροποίηση δείκτη θερμικής αίσθησης σε συνάρτηση με τον τόπο και τα χαρακτηριστικά αυτού (θερμοκρασία, υγρασία, ταχύτητα αέρα, νεφοκάλυψη)

ΟΜΑΔΑ 1

Σημείο 2: η θερμική αίσθηση της ομάδας είναι μεγαλύτερη από αυτή του σημείου 1. (σχολική αίθουσα – προαύλιο σε σκιά)

Σημείο 3: η θερμική αίσθηση της ομάδας είναι μικρότερη από εκείνες των σημείων 1 και 2. (προαύλιο σε ήλιο) Σημεία 2 και 3: ίδια θερμοκρασία αέρα, ίδιο ποσοστό υγρασίας, Σημείο 3: 0,1 m/s ταχύτητα ανέμου

Σημείο 4: η θερμική αίσθηση της ομάδας είναι μικρότερη από όλα τα παραπάνω σημεία. (δρόμος σε σκιά) Σημείο 4: αυξάνεται το ποσοστό της σχετικής υγρασίας σε σχέση με τα προηγούμενα (65,2%)

Σημείο 5: η θερμική αίσθηση της ομάδας αυξάνεται σε σχέση με το σημείο 4 αλλά παραμένει μικρότερη από τα παραπάνω. (δρόμος σε ήλιο)

Σημείο 6: η θερμική αίσθηση της ομάδας είναι μικρότερη από όλα τα άλλα σημεία και

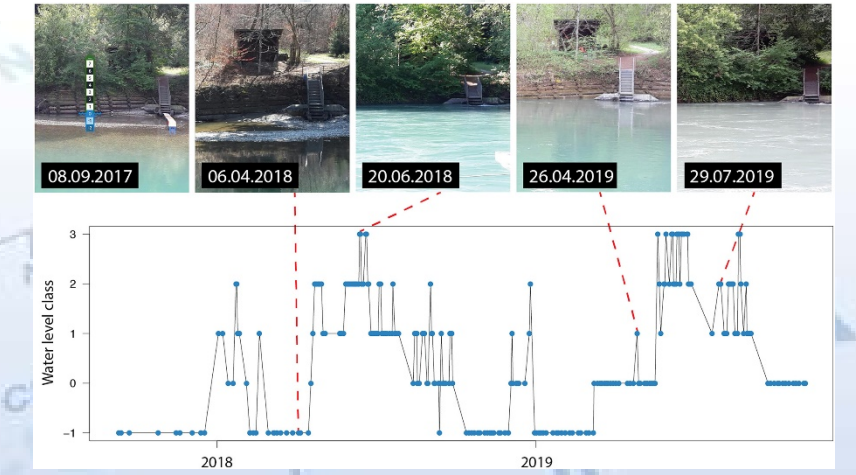
Research Opportunities

Large-scale projects: e.g., BRITEC field experiment in several schools withina city (e.g., Athens, Greece) throughout a year

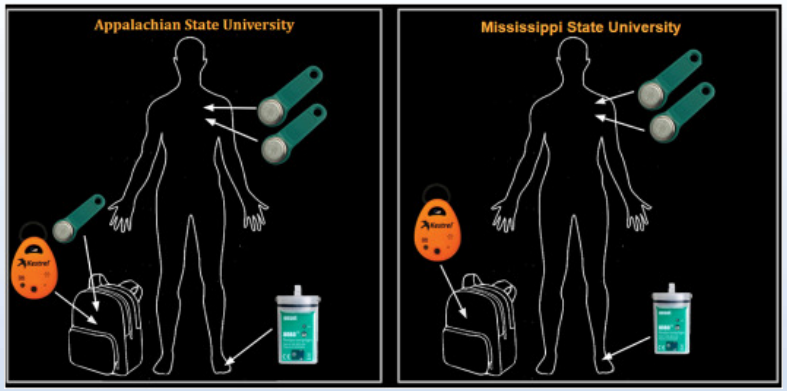
- **Assistance in data collection (students)**
- **Assistance in project's actions coordination (teachers)**
- **Acceleration of the research process**
- **Understand how people perceive our research -> Adapt communication and dissemination**

Research Opportunities

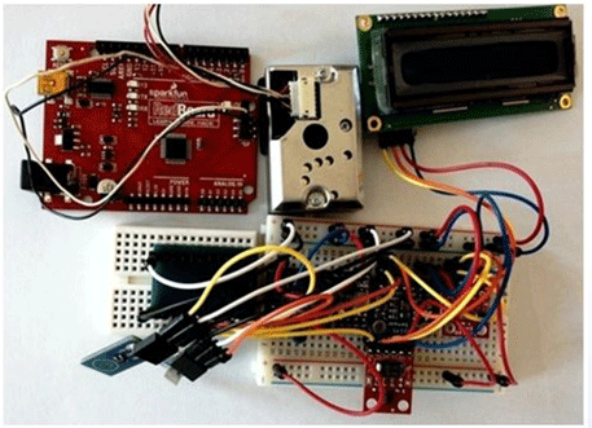
- **Extensive deployment of low-cost, citizen-science and/or crowd-sourced sensors and devices**
- **Wearable tools and smart gadgets**



Source: Strobl et al., 2019



Source: Bailey et al., 2019



Source: Pető and Király, 2019

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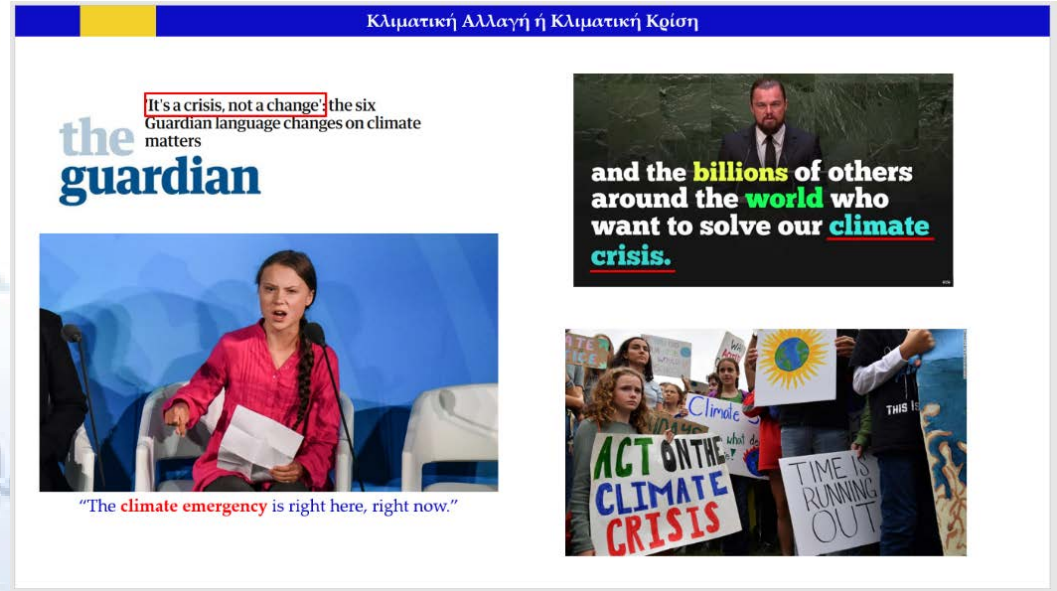
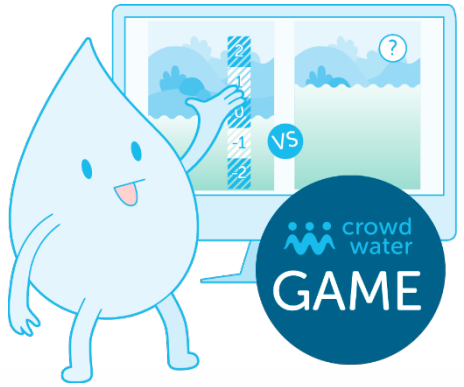
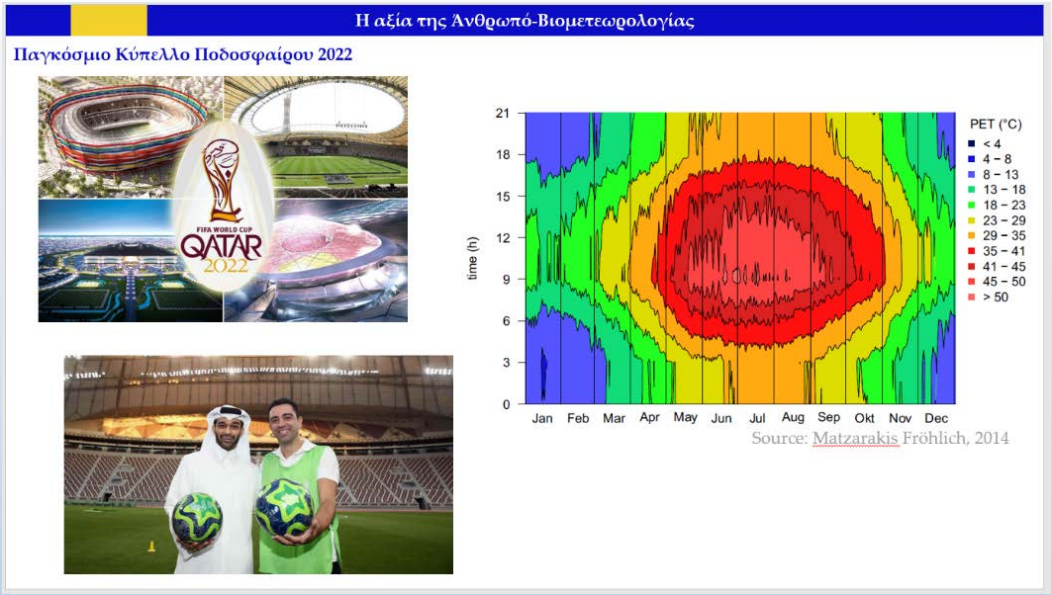
Research Challenges

- **Students' participation and motivation**







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Research Challenges

- **Adaptation and incorporation of a research project into the standard school programme (Particularity)**
- **Data quality**
- **Ethics (e.g., GDPR)**

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Summary

- Great experience 
- Significant opportunities 
- Manageable challenges 
- Go for it!

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Thank you!

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Citizen science in the classroom

Collaboration with teachers

Adrián Gollerizo Fernández (Escuela IDEO, Madrid)

24th March 2021

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Introduction: Citizen science in the classroom

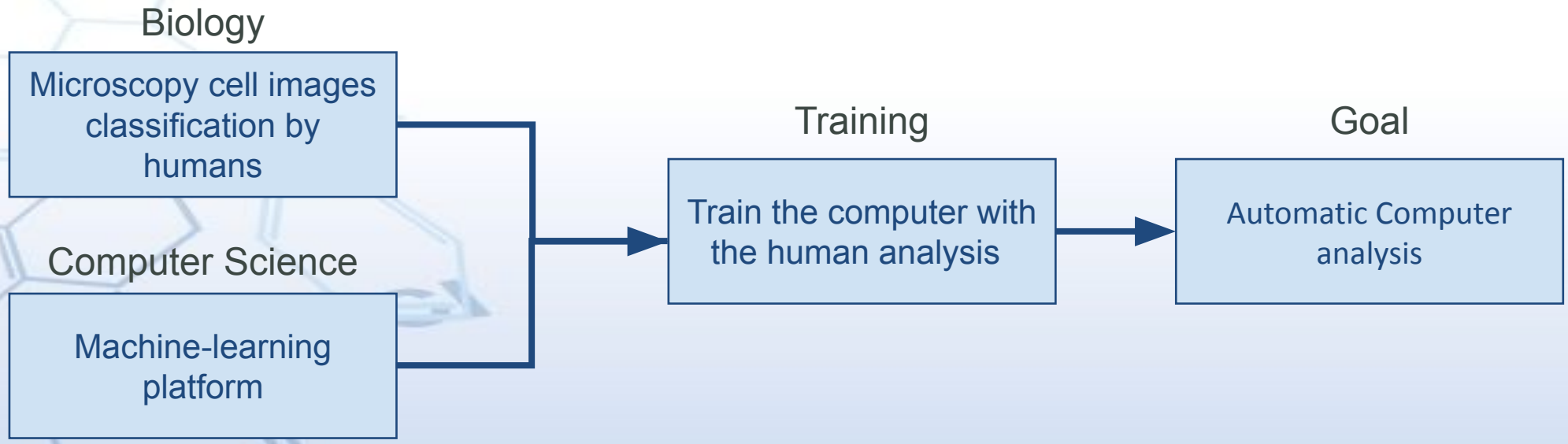
Citizen science projects in the classroom…

- Allow students to participate in advanced research, increasing academic performance.
- Introduce students into the process of science and the scientific method.
- Help develop positive attitudes towards science among students.
- Offer teachers an innovative approach to science learning and an enriching professional development opportunity.

A classroom experience: Cellspotting project

Cellspotting. *Let's fight cancer together!*

Machine learning to classify microscopy images of cancer cells



A classroom experience: Cellspotting project

Cellspotting. *Let's fight cancer together!*

Main goals:

- To observe cell images obtained by fluorescence microscopy
- To sketch and legend the main components of the cell.
- To understand the apoptosis and necrosis processes and to identify the morphological characteristics of the two types of cellular death.
- To approach students to the techniques used in apoptosis-inducing drug delivery research in tumour cells

A classroom experience: Cellspotting project

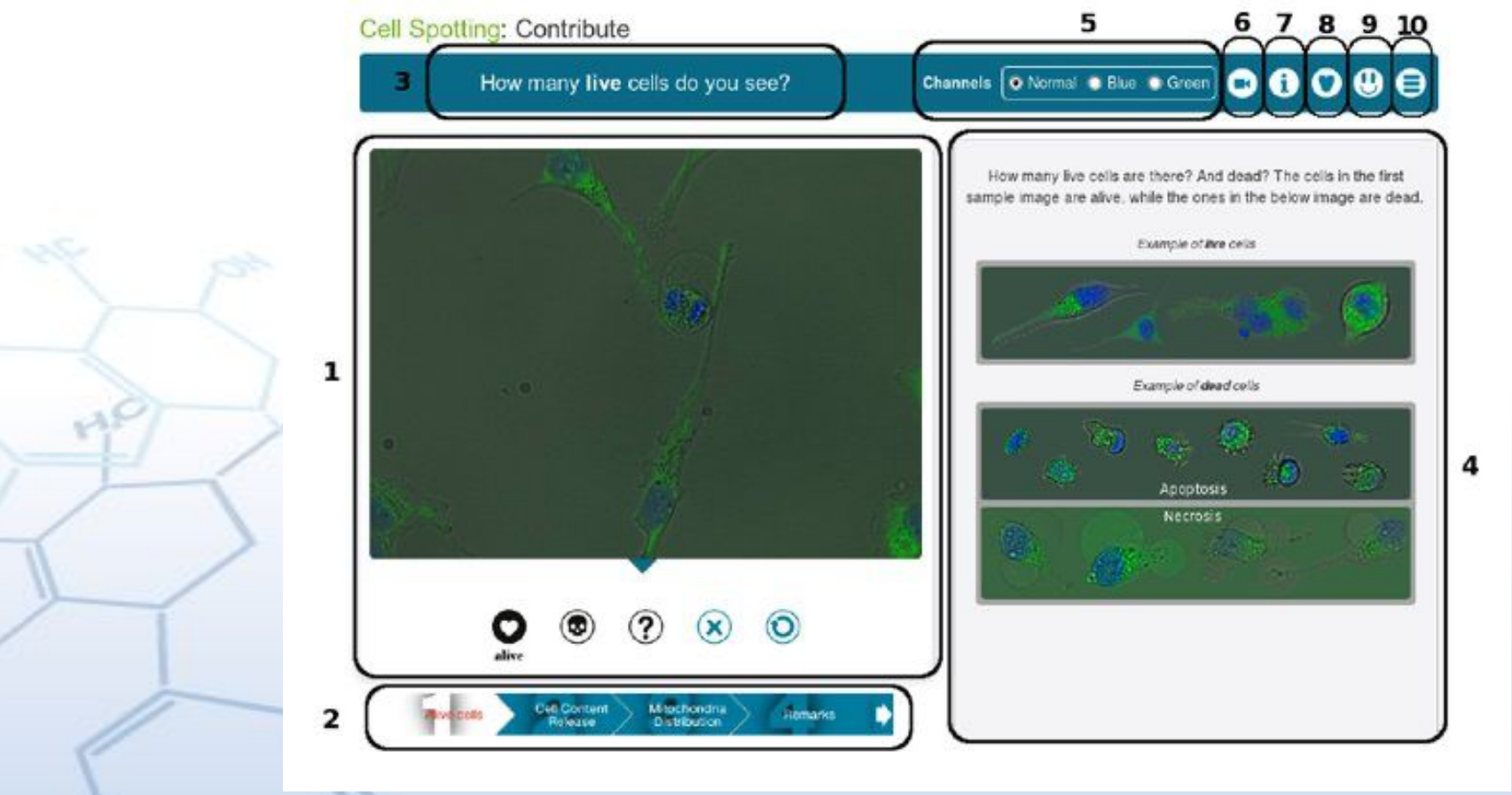
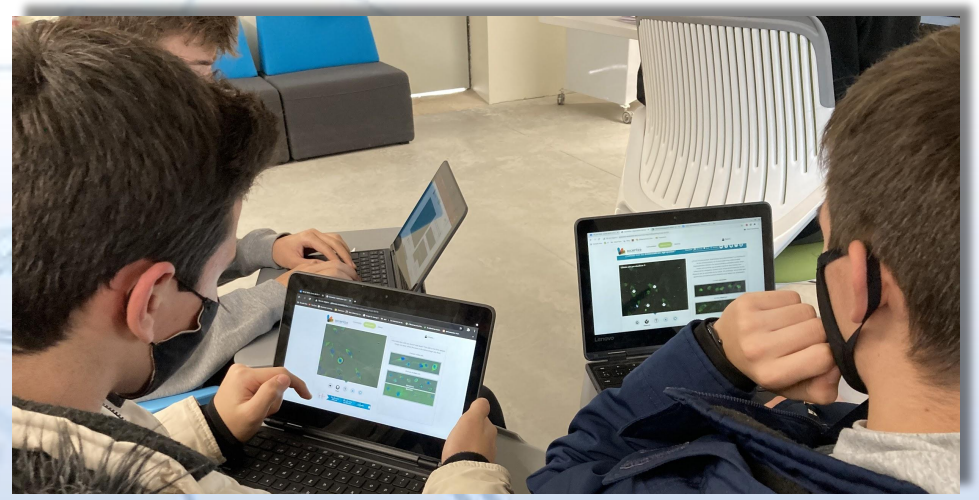


Image source: Socientize

A classroom experience: Cellspotting project

The project was implemented in Biology and ICT classes:

- Secondary Education: 3º ESO & 4º ESO
- Bachillerato: 1º & 2º Bachillerato



A classroom experience: Cellspotting project

Before starting…

- Previous lessons. The Cell (Biology) & Introduction to programming languages and machine learning (ICT)
- Lecture by the researcher (1)

Implementation of the project

- Cell analysis using Cellspotting:
  - Identify alive cells
  - Cell content release
  - Mitochondria distribution
  - Other remarks

After the implementation

- Lecture by the researcher (2)
- Evaluation

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Lessons learned

Some of the lessons learned from this experience are:

- **Communication** between the researcher and the teacher is essential.
- **Communication** between the researcher and the students is very valuable.
- There should exist a **common goal**, shared by the teacher and the researcher.
- An effort should be made to link the **educational value** behind the project with the school's educational project and the national educational curriculum.
- The researcher and the teacher should work together in the design of the **evaluation of the project**, from an educational point of view.
- The **sense of community** is very important for the students.

Thank you!

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Citizen Science & Education: what about data?

Dr. Mieke Sterken

24/03/2021

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Citizen Science facilitator
(40%)

KU LEUVEN

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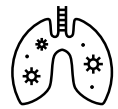
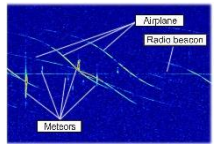
BRINGING RESEARCH
INTO THE CLASSROOM



MOMSTER



https://momster.aeronomie.be/

Radio Meteor Zoo on Zooniverse.org

Citizen Science facilitator
(40%)

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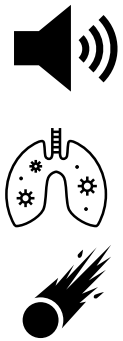
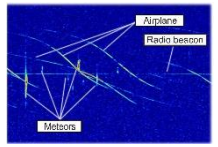
BRITEC

BRINGING RESEARCH
INTO THE CLASSROOM



MONSTER



Citizen Science advisor
(60%)

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Citizen Science
Vlaanderen

- Data Management
- Privacy & Ethics

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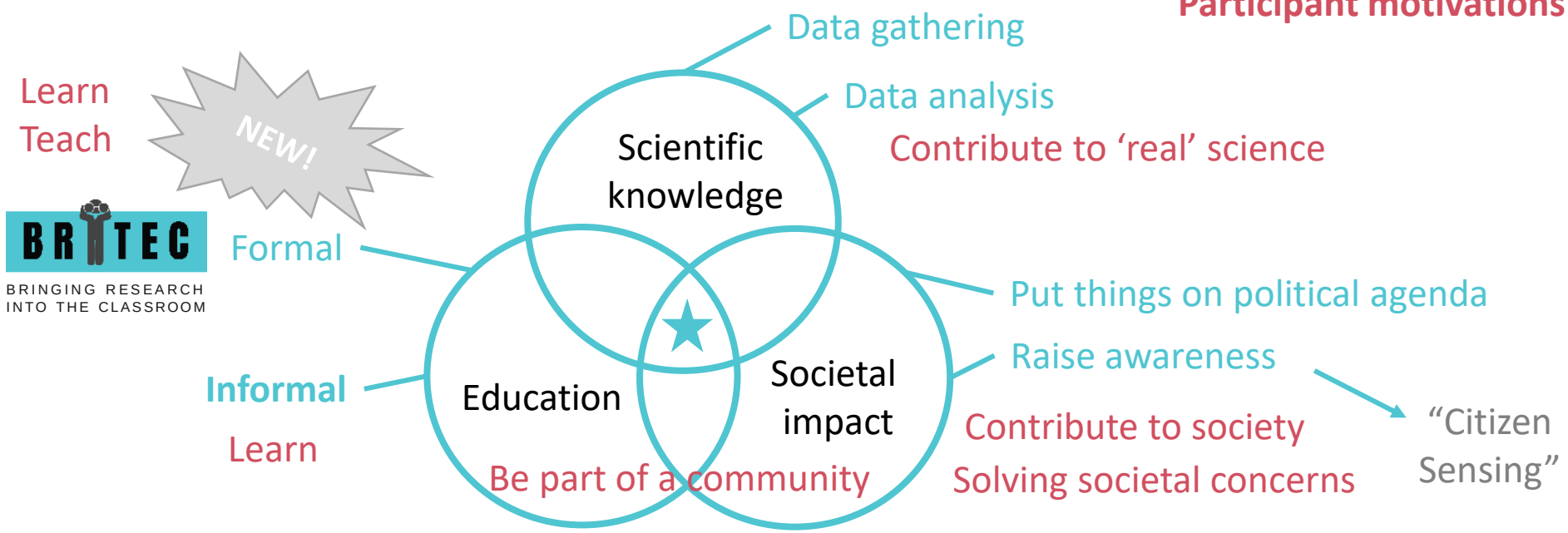
Citizen Science
Vlaanderen

Project goals

Participant motivations

Citizen Science:

a choice



SCivil Citizen Science Vlaanderen

Erasmus+

BRITEC

KU LEUVEN

SCivil Citizen Science Vlaanderen

Project goals

Participant motivations

Citizen Science:

a choice

- deliberate
- free

- motivations!

Learn
Teach

NEW!

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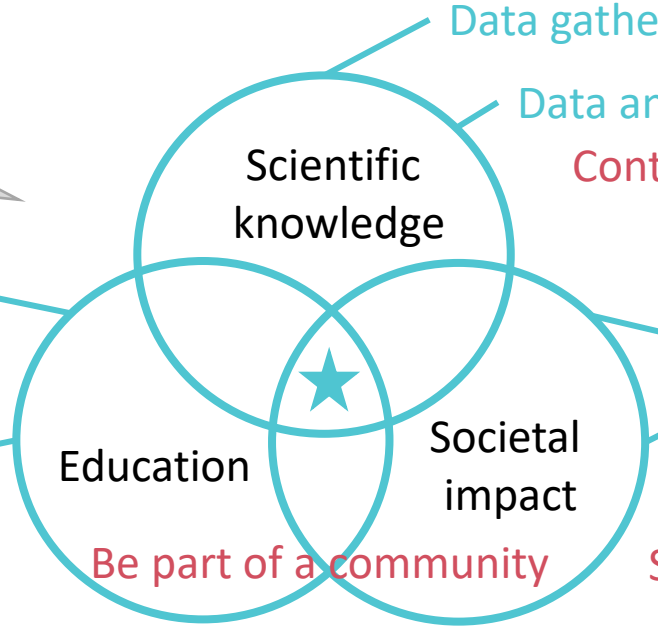
BRINGING RESEARCH INTO THE CLASSROOM

Formal

Informal
Learn



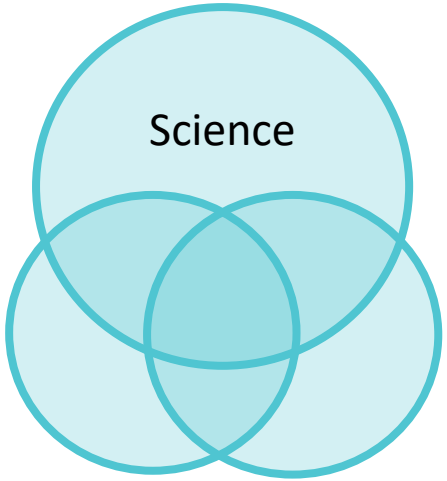
Data gathering
Data analysis
Contribute to 'real' science

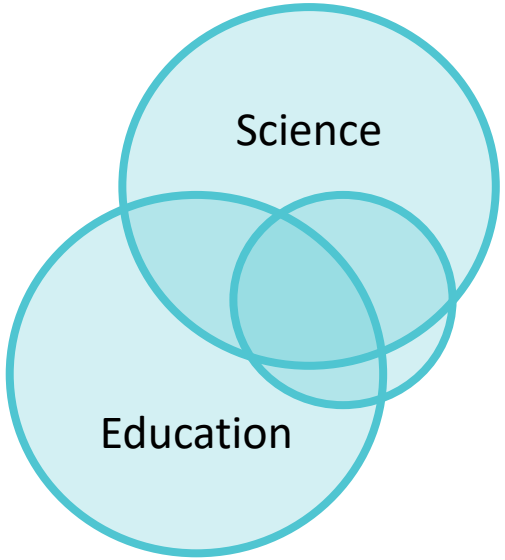
Put things on political agenda
Raise awareness

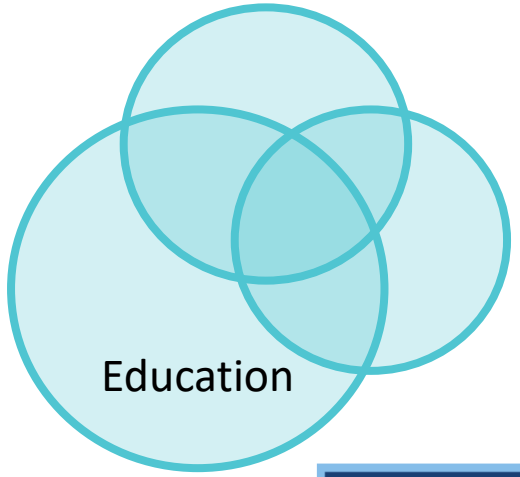
Contribute to society
Solving societal concerns

Be part of a community

"Citizen Sensing"







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Citizen Science:

a choice

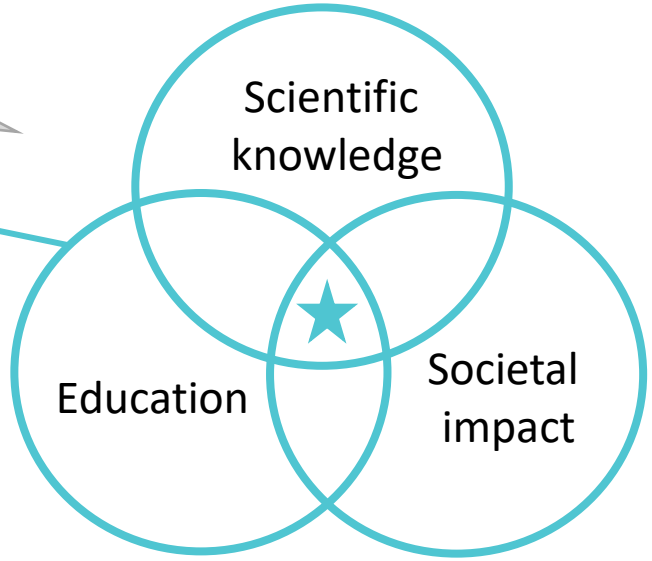
- deliberate
- free

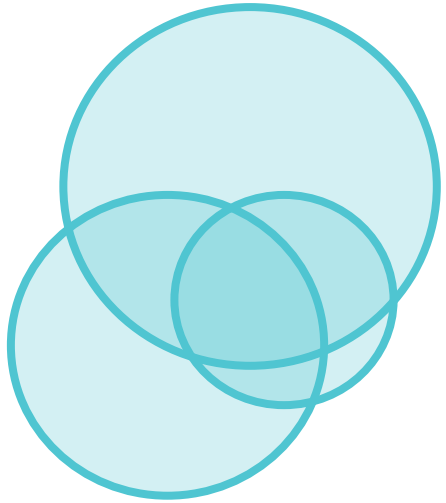
- motivations!

NEW!

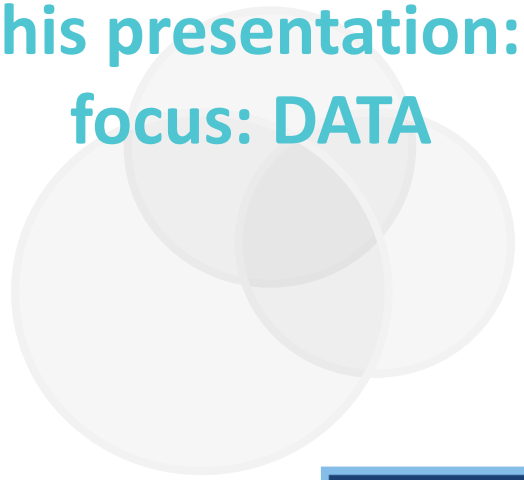
BRITEC
BRINGING RESEARCH INTO THE CLASSROOM

Formal





This presentation: focus: DATA



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Pitfalls & Fears

"Can we TRUST the data they retrieved?"

They don't register observations (accurately) — Motivation, Mindset

They have different interpretations — Obs – Interpr.

They make mistakes,

e.g., they don't register certain species — Knowledge

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Solutions

"Can we TRUST the data they retrieved?"

They don't register observations (accurately) — Motivation, Mindset

They have different interpretations — Obs – Interpr.

They make mistakes,

e.g., they don't register certain species — Knowledge

Numbers: duplications

Numbers: large sample sizes

Protocol: peer-review

Protocol: education on the topic

Erasmus+ BRITEC KU LEUVEN SCivil Citizen Science Vlaanderen

Solutions

Numbers: duplications

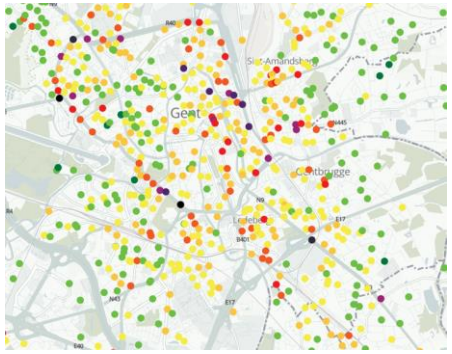
Curieuzeneuzen

(air quality)

20,000 participants

https://2016.curieuzeneuzen.be/en/

©CurieuzeNeuzen – De Standaard



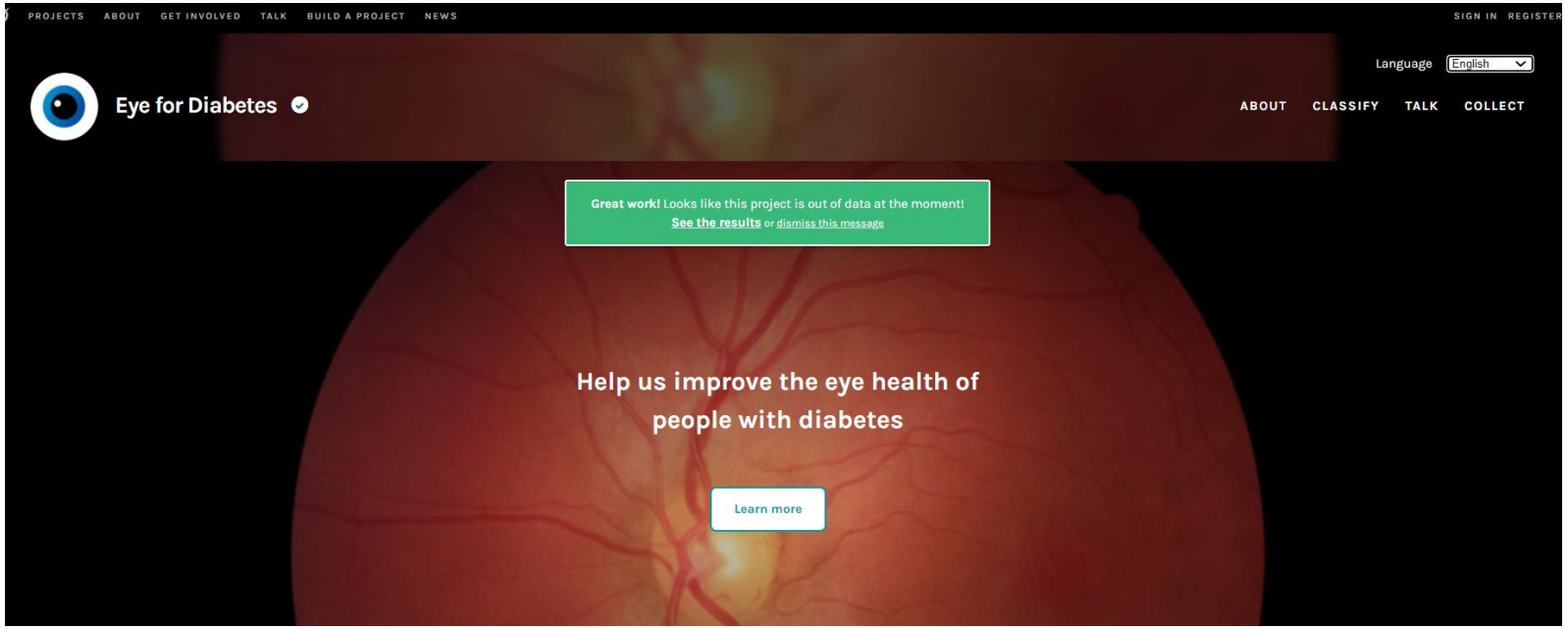
NO2 – mei 2018 (ppmv)
©CurieuzeNeuzen/DeStandaard

Duplication: 2 sampling units per participant

Solutions

Numbers: duplications

replications: 10x
(pre-study: 25x)



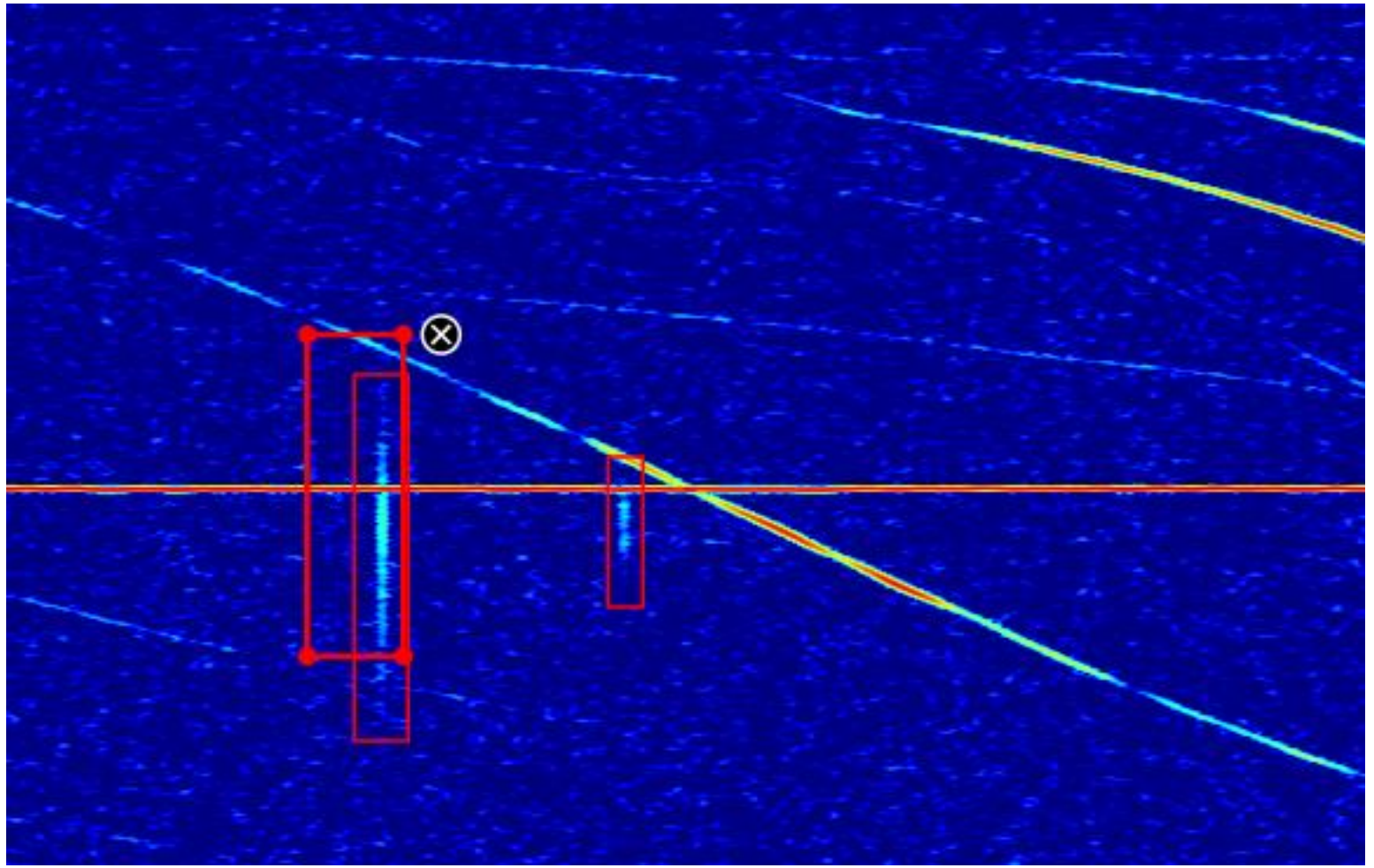
https://www.zooniverse.org/projects/oogvoordiabetes/eye-for-diabetes?language=nl

Eye for Diabetes

(Zooniverse)

Solutions

Numbers: duplications



Radio Meteor Zoo

(Zooniverse)

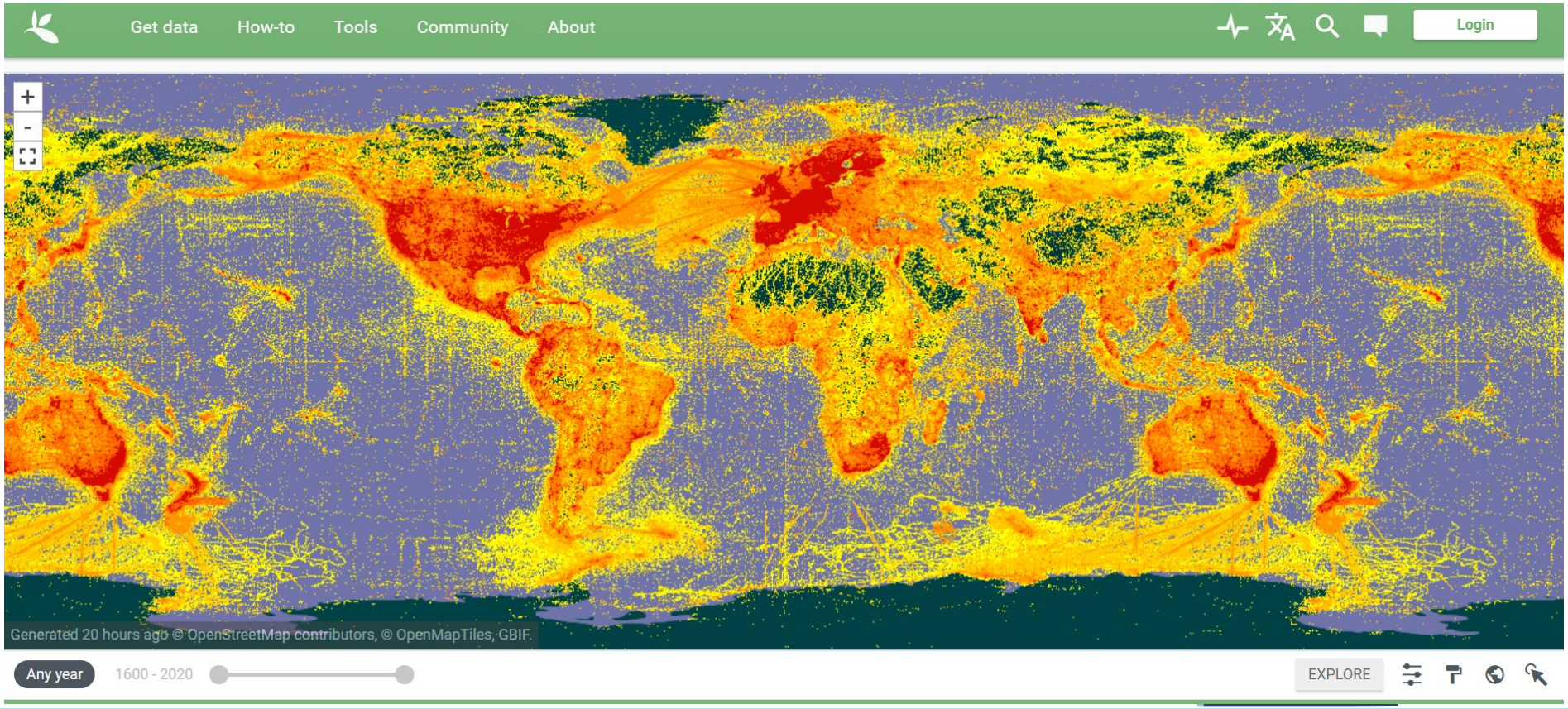
https://www.zooniverse.org/projects/zooniverse/radio-meteor-zoo/classify

Solutions

Numbers: large sample size

GBIF

Okt 2020: **1,6 billion observations** >5000 peer-reviewed papers



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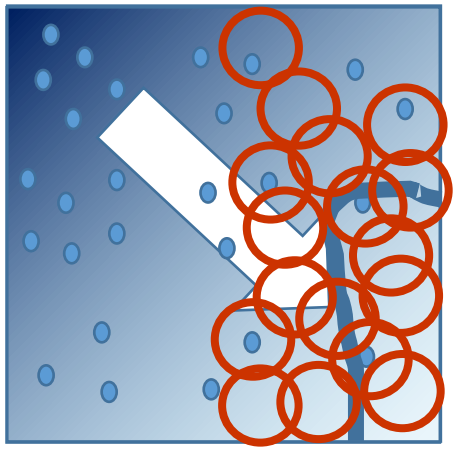
Solutions

Bain 2016
Bird et al. 2014
Hill 2012
Isaac et al. 2014
Pocock et al. 2019
van Strien et al. 2013

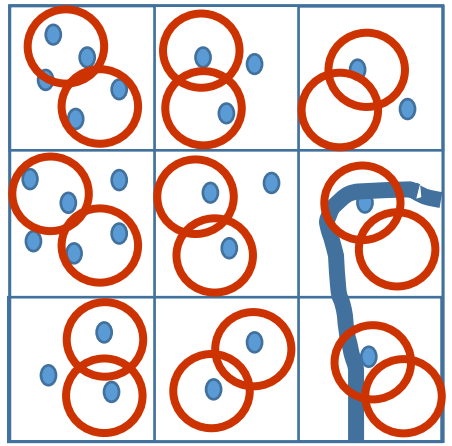
Large sample sizes
allow you to do
post-systematization
of your data

Opportunistic data vs. **Systematic data**

e.g., Biodiversity research, invasive species, climate change



6 per km2
No trend?



19 per km2
+ trend!

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Solutions

Bain 2016
Bird et al. 2014
Hill 2012
Isaac et al. 2014
Pocock et al. 2019
van Strien et al. 2013

Large sample sizes
allow you to do
post-systematization
of your data

Biological Conservation 173 (2014) 144–154

Contents lists available at ScienceDirect

Biological Conservation

journal homepage: www.elsevier.com/locate/biocon

ELSEVIER

CrossMark

Statistical solutions for error and bias in global citizen science datasets

Tomas J. Bird [a,b,*], Amanda E. Bates [b], Jonathan S. Lefcheck [c], Nicole A. Hill [b], Russell J. Thomson [b], Graham J. Edgar [b], Rick D. Stuart-Smith [b], Simon Wotherspoon [b], Martin Krkosek [d], Jemina F. Stuart-Smith [b], Gretta T. Pecl [b], Neville Barrett [b], Stewart Frusher [b]

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[b] Institute for Marine and Antarctic Studies, University of Tasmania, Hobart, Tasmania 7001, Australia
[c] Virginia Institute of Marine Science, College of William & Mary, PO Box 1346, Gloucester Point, VA 23062-1346, USA
[d] Department of Ecology and Evolutionary Biology, Ramsay Wright Zoological Laboratories, University of Toronto, 25 Harbord St., Toronto, ON M5S 3G5, Canada

ARTICLE INFO

Article history:
Received 5 February 2013

ABSTRACT

Networks of citizen scientists (CS) have the potential to observe biodiversity and species distributions at global scales. Yet the adoption of such datasets in conservation science may be hindered by a perception

Opportunistic

19 per km2
+ trend!

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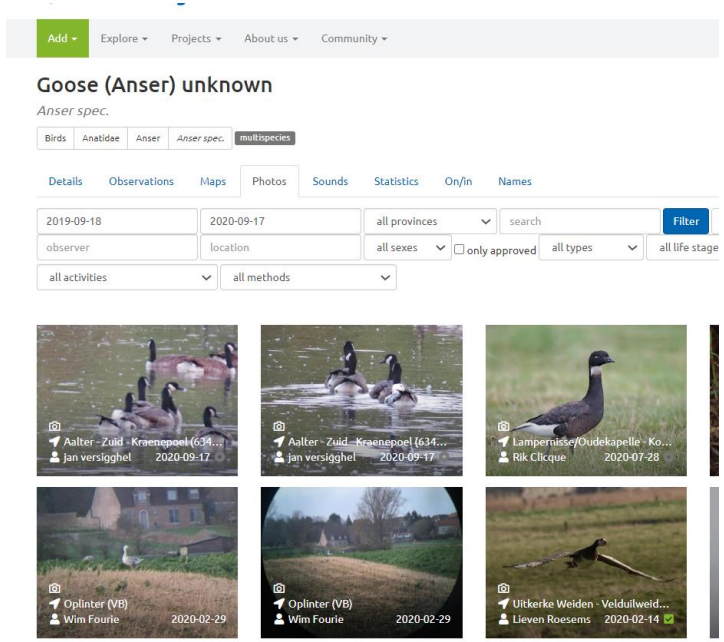
Solutions

Protocol: peer-review

- By scientists
- By highly experienced amateurs



natuurpunt

Waarnemingen.be

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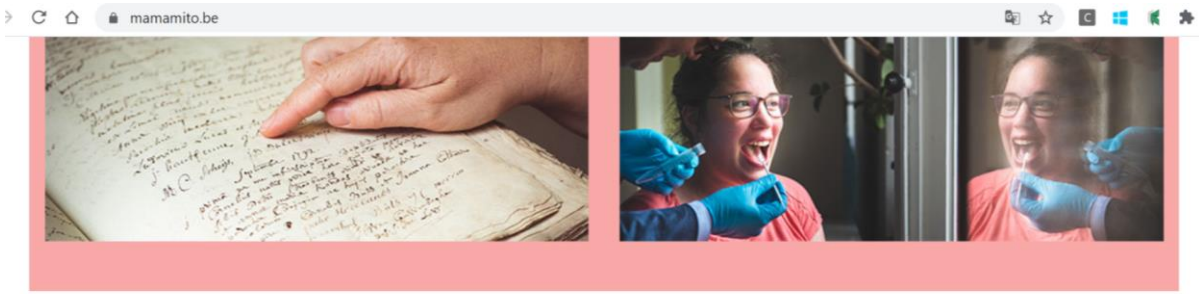
Solutions

Protocol: education

MAMAMITO



Partnership for education:
a.o. Familiekunde Vlaanderen

Zo werkt het

Registreer	Duik	Wij helpen	Check	Print	Vind	Help
jezelf en maak je eigen beveiligd profiel aan	stap per stap je moederlijke lijn in	jou je stamboom uit te breiden	je stamboom via ons team	je moederlijke stamboom af	je verre maternale verwanten	de wetenschap door je Mito-DNA te laten testen

https://mamamito.be/

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Advantages of working with schools

"Can we TRUST the data they retrieved?"

They don't register observations (accurately) — Motivation, Mindset

They have different interpretations — Obs – Interpr.

They make mistakes,

e.g., they don't register certain species — Knowledge

Numbers: duplications

Numbers: large sample sizes

Protocol: peer-review

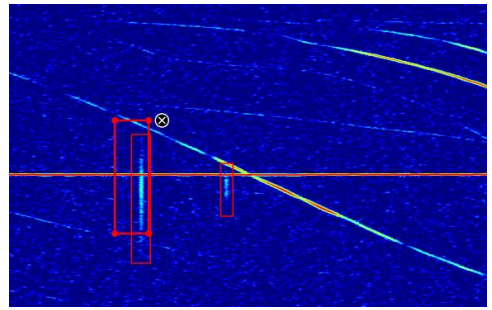
Protocol: education on the topic

Advantages of working with schools

"Can we TRUST the data they retrieved?"

Numbers: duplications

Numbers: large sample sizes



Power of the numbers: 20-30 students per class

e.g. RMZ: ran out of data on Zooniverse last semester!

+ big EXTRA advantage: Time Series!

e.g. Fietsbarometer: streets covered because the students go to school anyway!

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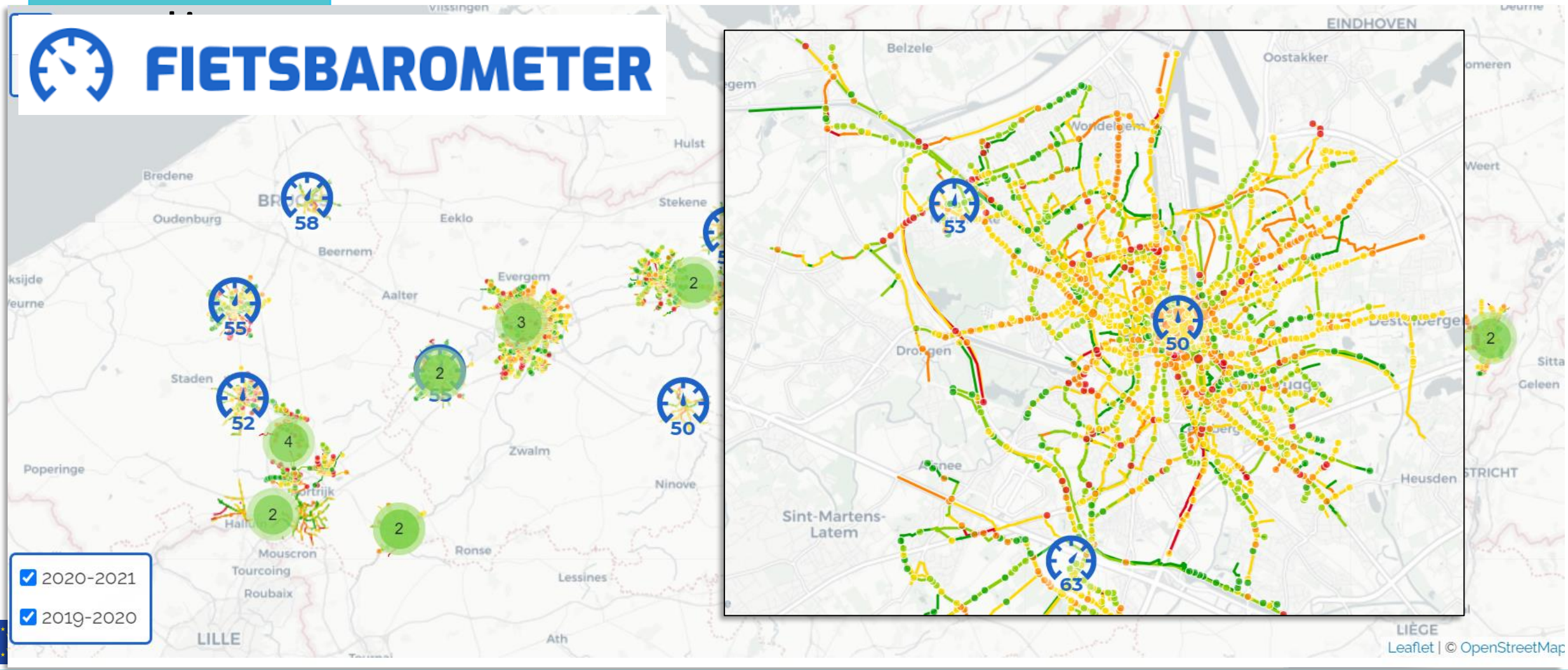
Advantages of

"Can we TRUST the data they retrieved?"



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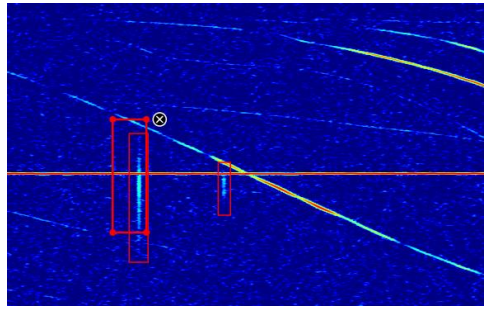


Teachers as reviewers / dataguards

Teacher: Wim Van Buggenhout,
GTI Londerzeel

Advantages of working with schools

Gemeentelijk Technisch Ins
Daalkouter 30 1840 LONDE
www.gtil.be

The magnificent wo
meteors

(Credits: https://www.ibizavandaag.nl/ibiza-nieuws/voor-in-je-agenda-meteorenreg

Acknowledgements to Engineer Stijn Calders, Space Physics
division @ BIRA-IASB, Belgium & the Erasmus+ BRITEC-proj

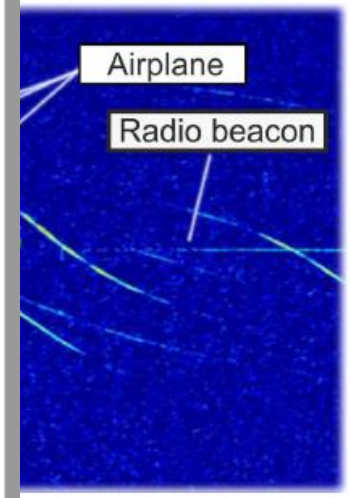
BRITEC

*Educational pack developed by Wim Van Buggenhout (GTIL school L
collaboration with Ir. Stijn Calders (BIRA-IASB, Belgium), facilitated b
Prof. Katrien Kolenberg (KULeuven university, Belgium) in the frame
project BRITEC ('Bringing Research Into the Classroom'). Translate*

3.3.1 Day 1: Monday, Oct 19th, 2020

9

that this course contains a
going to search for meteors on a
ch a spectrogram. Go to the
jects/zooniverse/radio-meteor-
red rectangular boxes around



-axis representing in these
sed?

2

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Advantages of working with schools

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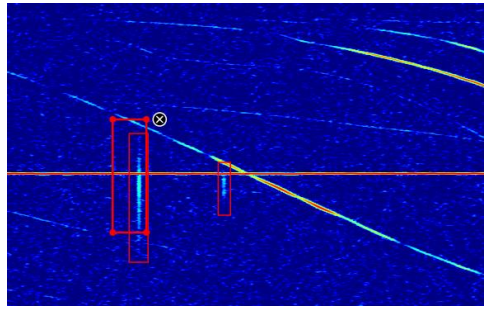

Teachers as reviewers / dataguards

Teachers as educators/ambassadors:
provide thorough training on the protocol

AND the motivation!

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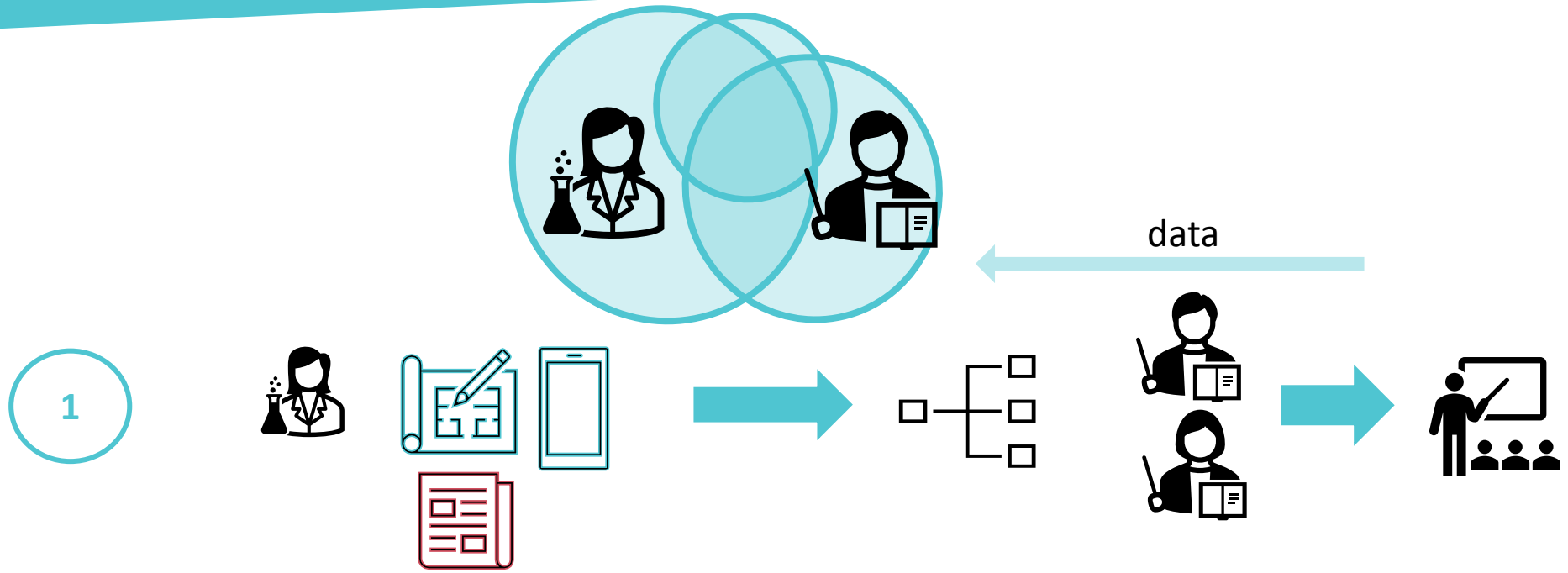
Ways of engaging



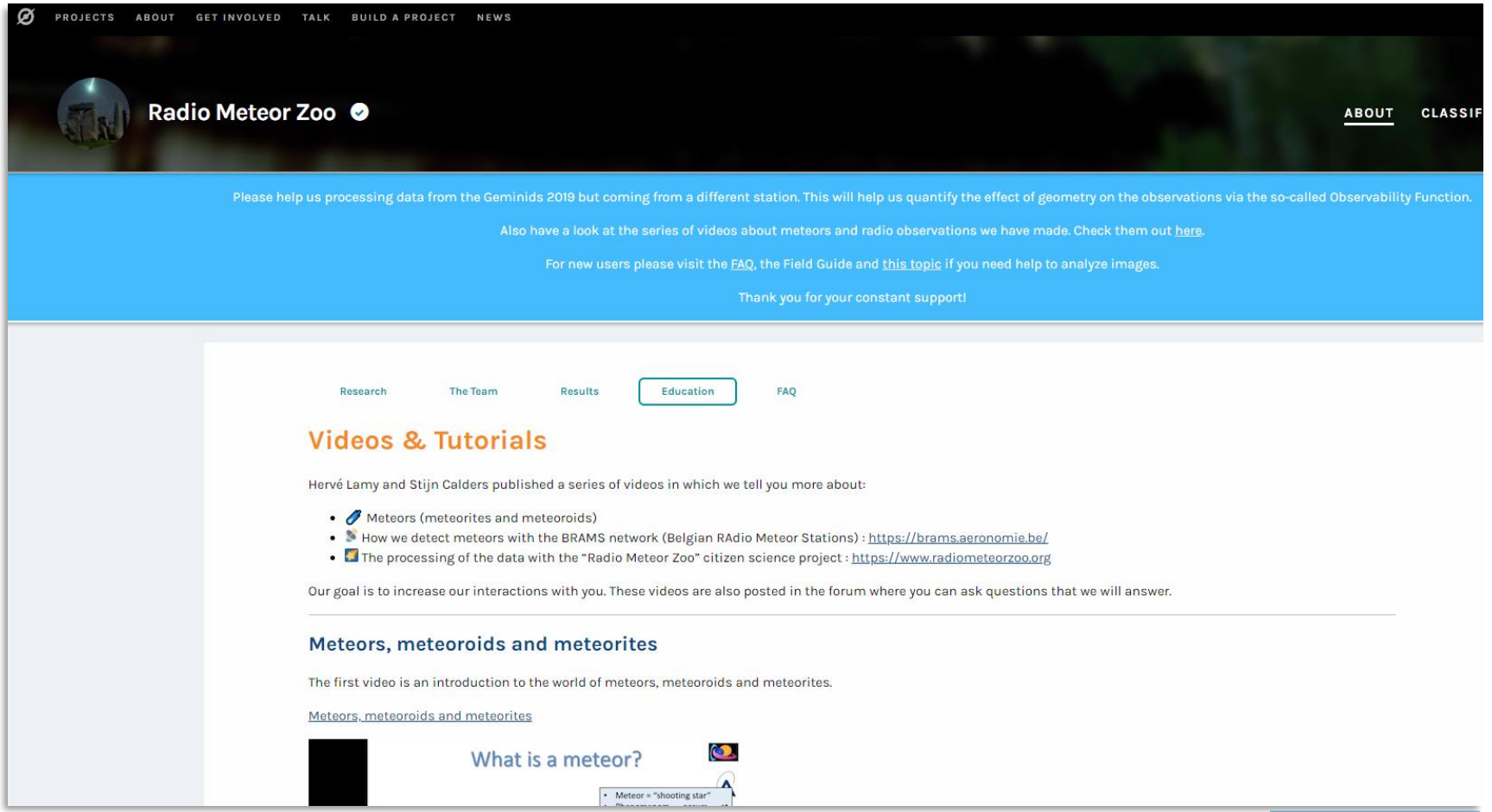
Harlin et al. 2018

Ways of engaging

1

Radio Meteor Zoo

=> Zooniverse



Harlin et al. 2018

Ways of engaging

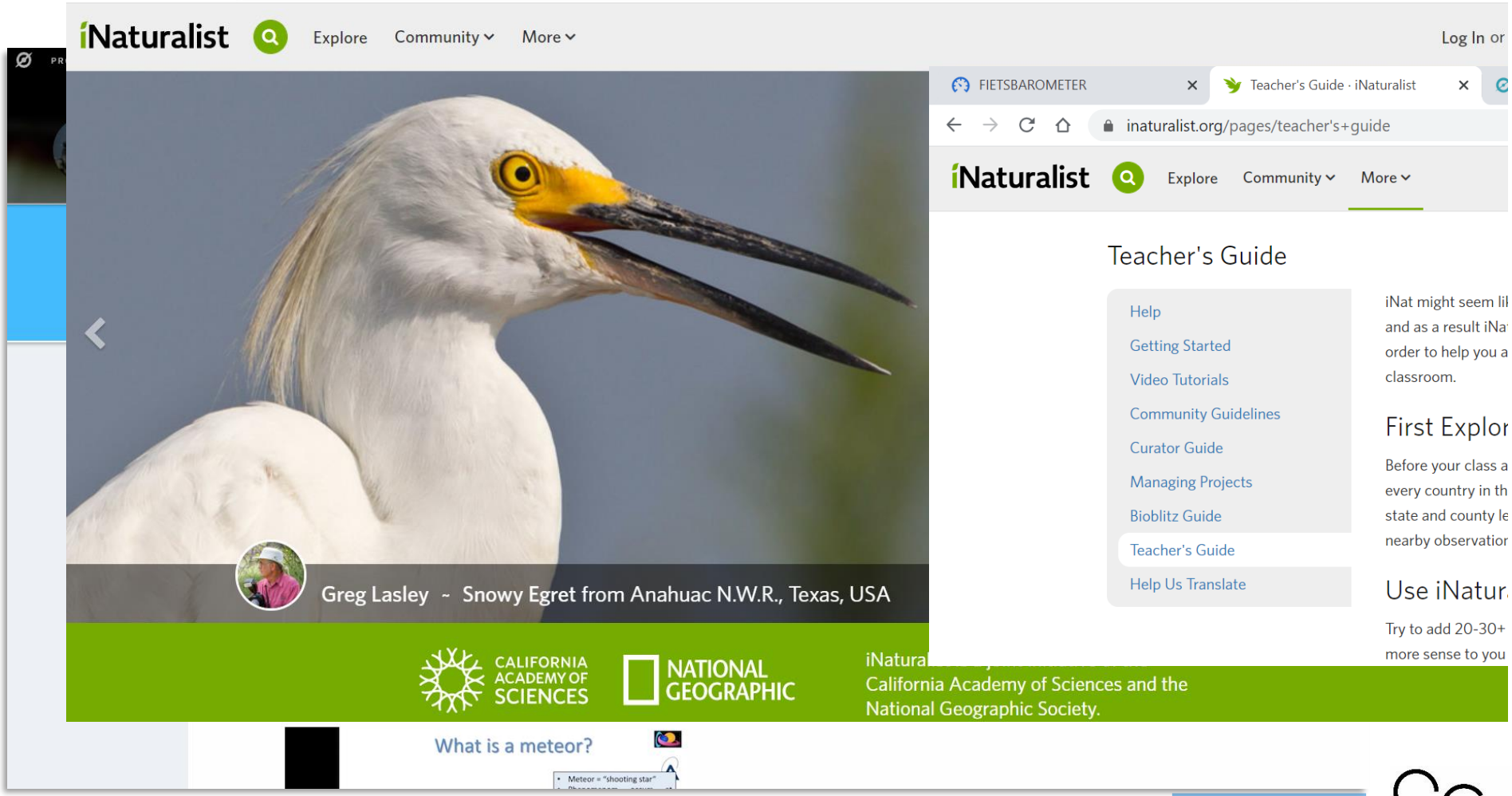
1

Radio Meteor Zoo

=> Zooniverse

iNaturalist

=> Own platform



Harlin et al. 2018

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SCivil Citizen Science Vlaanderen

Ways of engaging

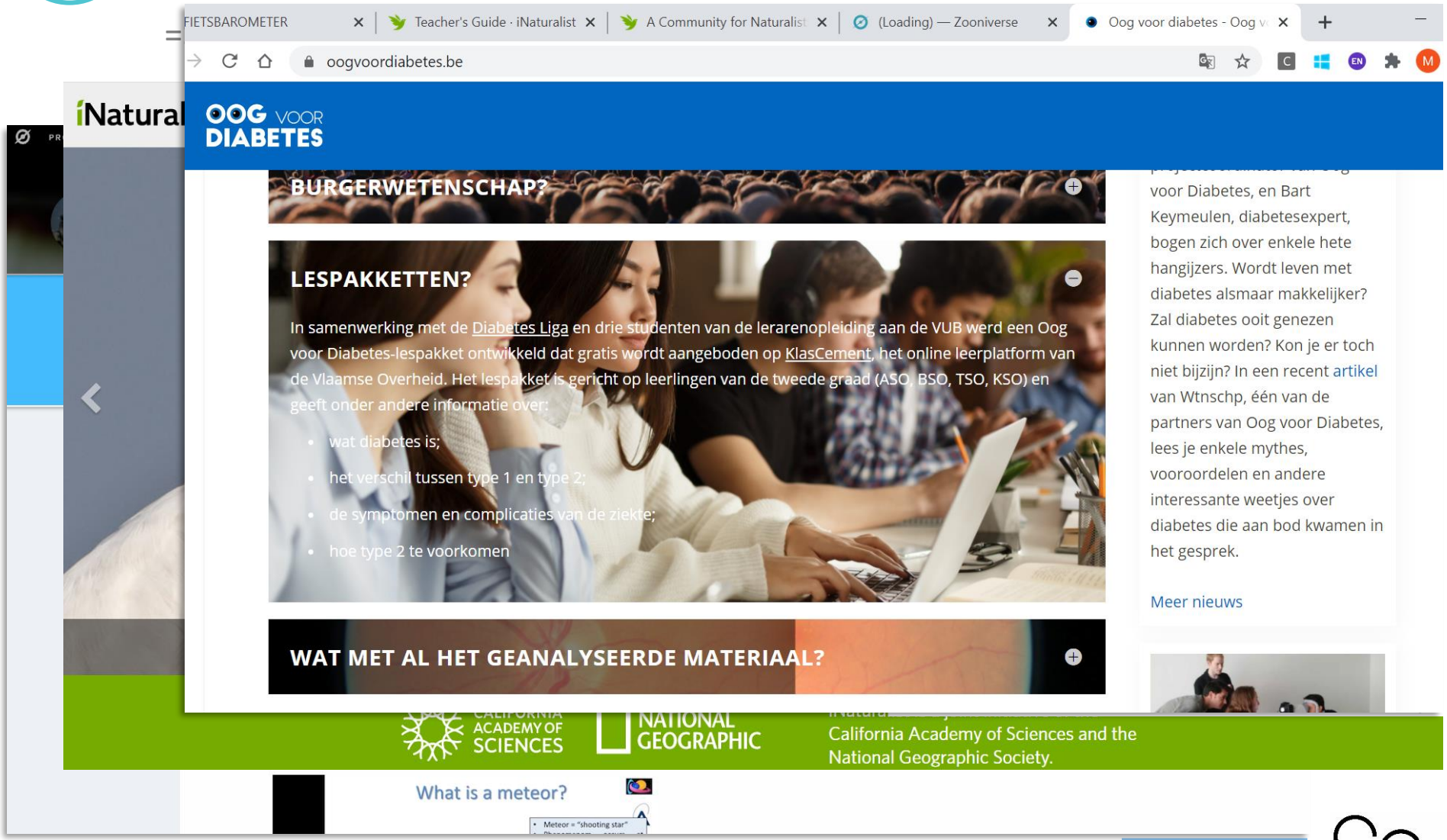
1

Radio Meteor Zoo

iNaturalist

'Oog voor Diabetes'

=> Teachers platform



Harlin et al. 2018

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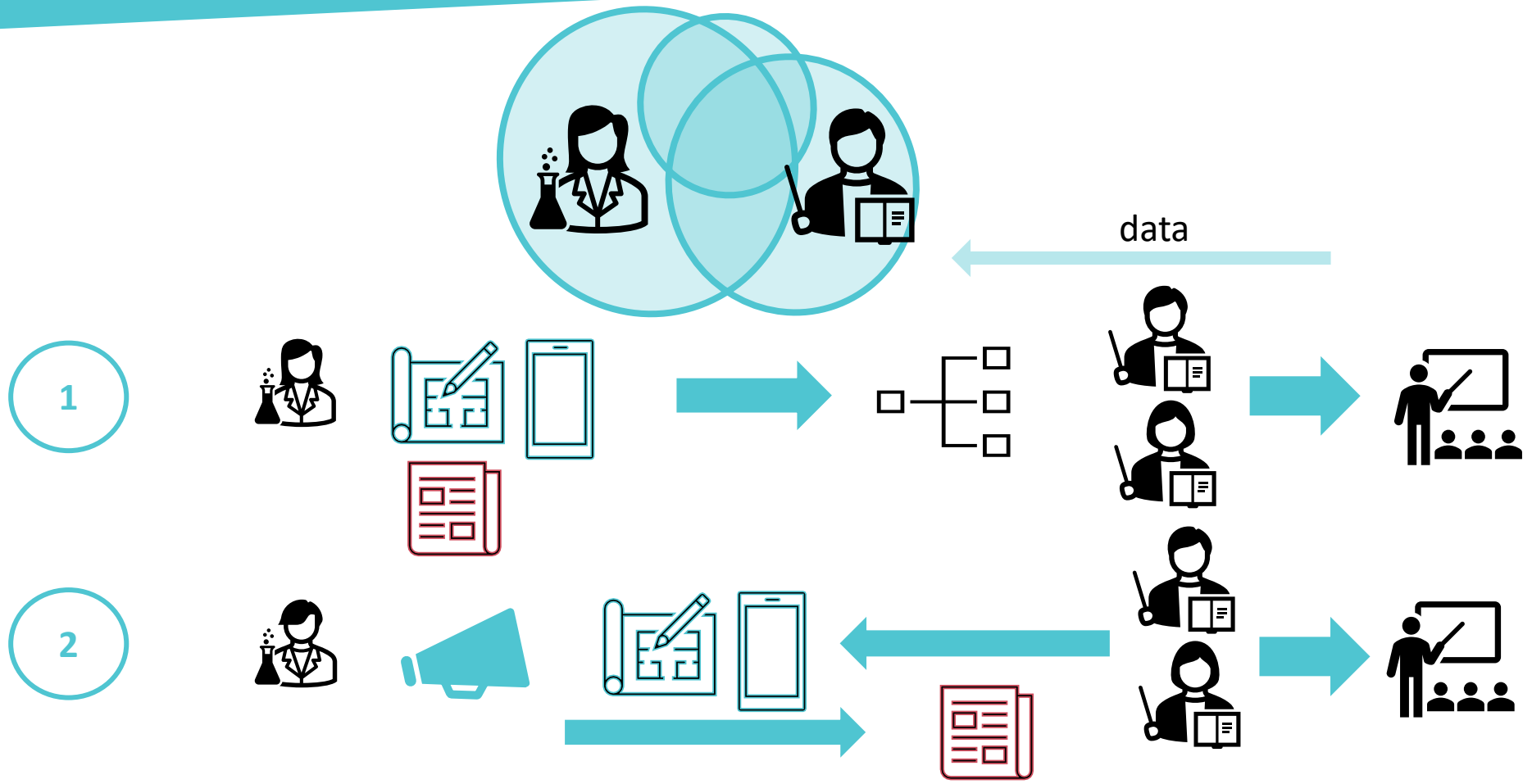
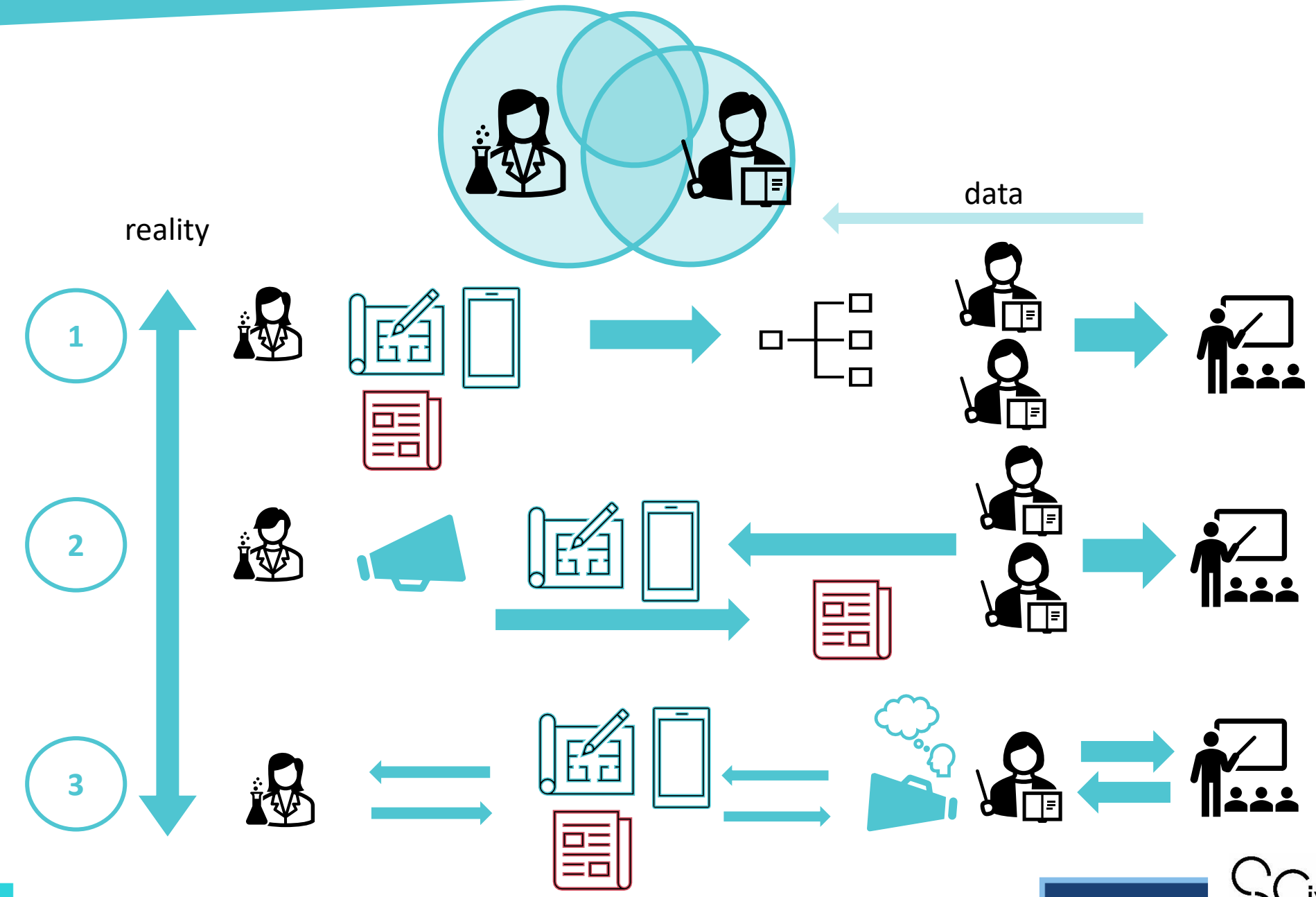
Ways of engaging



Harlin et al. 2018

Ways of engaging



Harlin et al. 2018

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Thank you!

Questions?

Mieke@scivil.be

SCIENTIX
The community for science education in Europe

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