



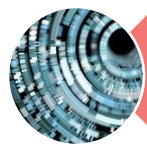
**citizen  
science lab**

**Margaret Gold**

m.j.gold@cwts.leidenuniv.nl

## Citizen science in de klas – de leerling als onderzoeker





Het CS Lab



Wat is CS?



De 10 Principes



Voorbeelden



Waarom CS?



Aan de Slag



# Science for All & All for Science



# citizen science lab

## VISION

In **2025**, Leiden University is an *innovative* pioneer of *collaborative citizen science* initiatives that *connect* science and society in *transdisciplinary* research to address urgent scientific & societal challenges together.





Het CS Lab



Wat is CS?



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Voorbeelden



Waarom CS?



Aan de Slag

Wij noemen het 'Citizen Science' wanneer mensen buiten de wetenschap mee doen als deelnemers in onderzoek, of als co-onderzoekers



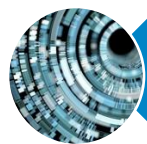
biodiversiteitsmonitoring burger wetenschap  
 gelijkwaardige samenwerki natuurhistorie  
 community driven public engagement wetenschap in de wijk  
 burgerwetenschappen participatory research  
 leren van elkaar citizen observatory citizen sensing  
 samenwerking burgermetingen co-creation participatie waarde  
 citizens science societ al engagement citizen scientists  
 fijnstof human right public engagement politieke interesse  
 draagkracht delen resultaat partnerschap participatief actieonderz  
 hulp van vrijwilligers samen openheid vertrouwen  
 inclusief onderzoek burgerwetenschap  
 water kwaliteit meting kennis co-creatie community sensoren participatief  
 burgermeetnetwerk cocreatie community science  
 participatief werken burgerparticipatie par burgeronderzoek  
 level playfield open data citizen sc zelfonderzoek community generation  
 open sciences participatief onderzoek burger als wetenschapper  
 citizenscience democratised research  
 community-based monitorin extreme citizen science  
 overheidsparticipatie nuttig participatory science  
 bewoners meetnetten

# Science for All & All for Science



Frits Ahlefeldt





Het CS Lab



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Voorbeelden



Waarom CS?



Aan de Slag

# BURGERWETENSCHAPPELIJKE PROJECTEN BETREKKEN BURGERS ACTIEF BIJ WETENSCHAPPELIJK ONDERZOEK DAT NIEUWE KENNIS OF INZICHTEN OPLEVERT

1

Burgers kunnen fungeren als: bijdragers, medewerkers of projectleiders en hebben een betekenisvolle rol in het project.

# BURGERWETENSCHAPPELIJKE PROJECTEN LEIDEN TOT EEN WETENSCHAPPELIJK OF MAATSCHAPPELIJK RESULTAAT.

2

Bijvoorbeeld het beantwoorden van een onderzoeksvraag of het informeren over maatregelen voor natuurbehoud, over beleidsbeslissingen of over het milieubeleid.

# ZOWEL BEROEPSWETENSCHAPPERS ALS BURGERWETENSCHAPPERS HEBBEN BAAT BIJ HUN DEELNAME

3

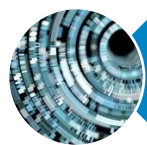
Voordelen kunnen zijn: de publicatie van onderzoeksresultaten, mogelijkheden om bij te leren, persoonlijk plezier, voordelen op sociaal vlak, voldoening dat men bijdraagt aan wetenschappelijk bewijs voor bijv. lokale, nationale en internationale kwesties en, daardoor, mogelijk het beleid kan beïnvloeden.



# Open Science

*“Kennis is een  
gemeenschappelijk goed”*





Het CS Lab



Wat is CS?



De 10 Principes



Voorbeelden

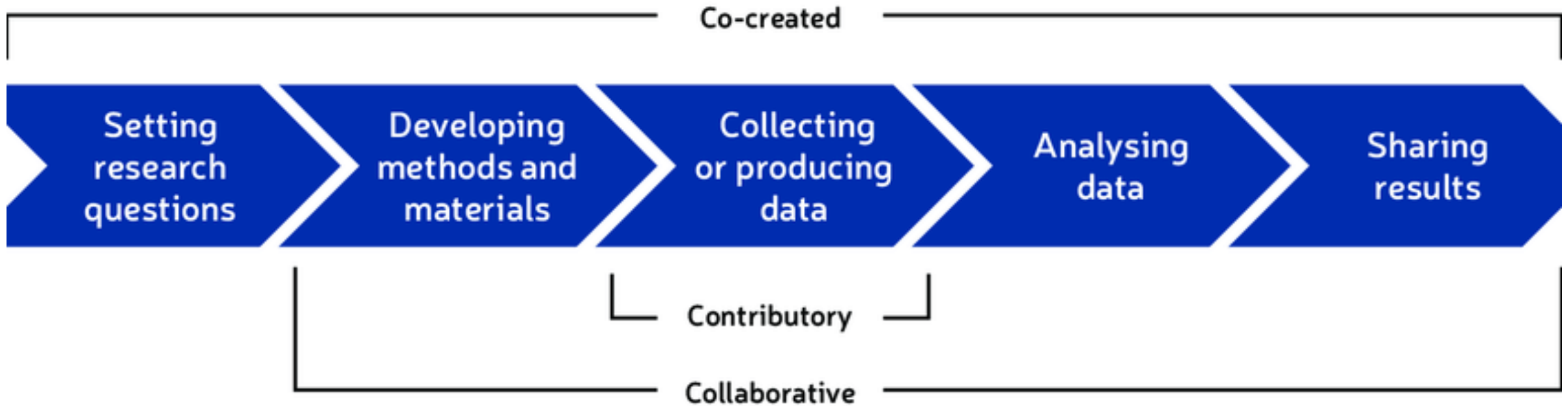


Waarom CS?



Aan de Slag

# In elke fase van wetenschappelijk onderzoek kan men mee doen





Helpen  
gegevens &  
waarnemingen  
verzamelen

Setting  
research  
questions

Developing  
methods and  
materials

Collecting  
or producing  
data

Analysing  
data

Sharing  
results

Contributory

Collaborative

**Veel handen  
maken licht werk**





# Wat ZOEMT er in je achtertuin?

Doe mee met de  
Nationale Bijentelling

Nederland  
**ZOEMT**  
In actie voor de bij 

# TELFORMLIER NATIONALE BIJENTELLING

## Wat zoemt er in je achtertuin?

Je ziet hier de bijen, hommels en zweefvliegen die je in het voorjaar in je tuin kunt zien. Lukt het jou om verschillende soorten te ontdekken? Vul per soort het aantal in dat je geteld hebt. Twijfel je? Geen nood! Ook als je alleen het aantal onbekende bijen, hommels en zweefvliegen doorgeeft, lever je al een belangrijke bijdrage. Voer na afloop jouw resultaten in op: [nederlandzoemt.nl/bijentelling](http://nederlandzoemt.nl/bijentelling)

### Bijen



Bij onbekend:



Vosje



Roodgatje



Viltvlekszandbij



Rosse metselbij



Meidoornzandbij



Grijs rimpelrug



Horingbij



### Hommels



Hommel onbekend:



Boomhommel



Akkerhommel



Steenhommel



Weidehommel



Aardhommel  
of Veldhommel



Tuinhommel



Vierkleurige  
of Boomkroekoekshommel



Grote  
of Tweekleurige-  
kroekoekshommel

### Zweefvliegen



Zweefvlieg onbekend:



Variant 1



Variant 2



Variant 3

Hommelbijvlieg



Variant 1



Variant 2



Variant 3

Grote narcisvlieg



Bijvlieg

# De grote schelpenteldag

zaterdag  
**23 maart**  
2024

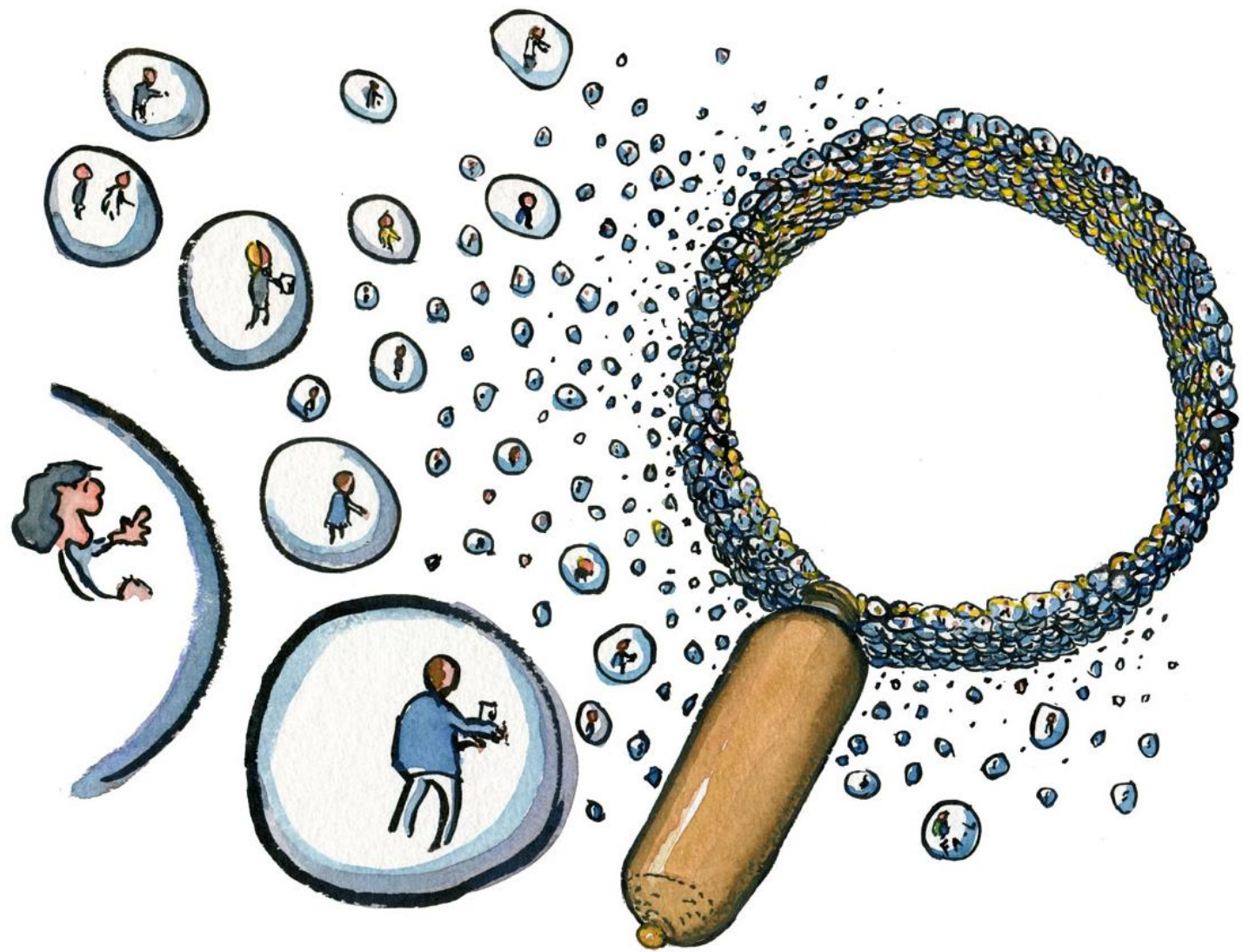
Tel en herken schelpen!  
Iedereen kan meedoen in  
elke Belgische kustgemeente!

Alle info op [www.groteschelpenteldag.be](http://www.groteschelpenteldag.be)

Hier staan - met een klein voorbehoud- de plaatsen waar je in 2024 kan tellen.

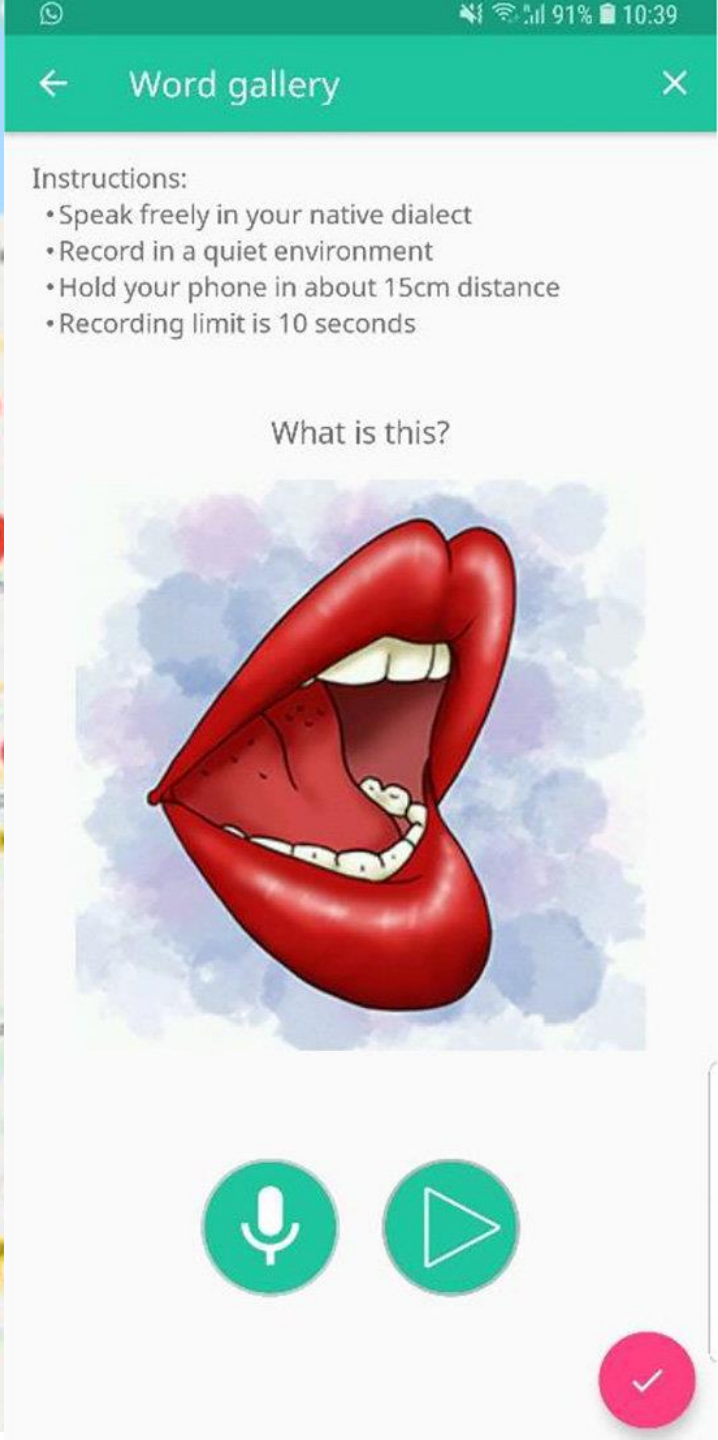
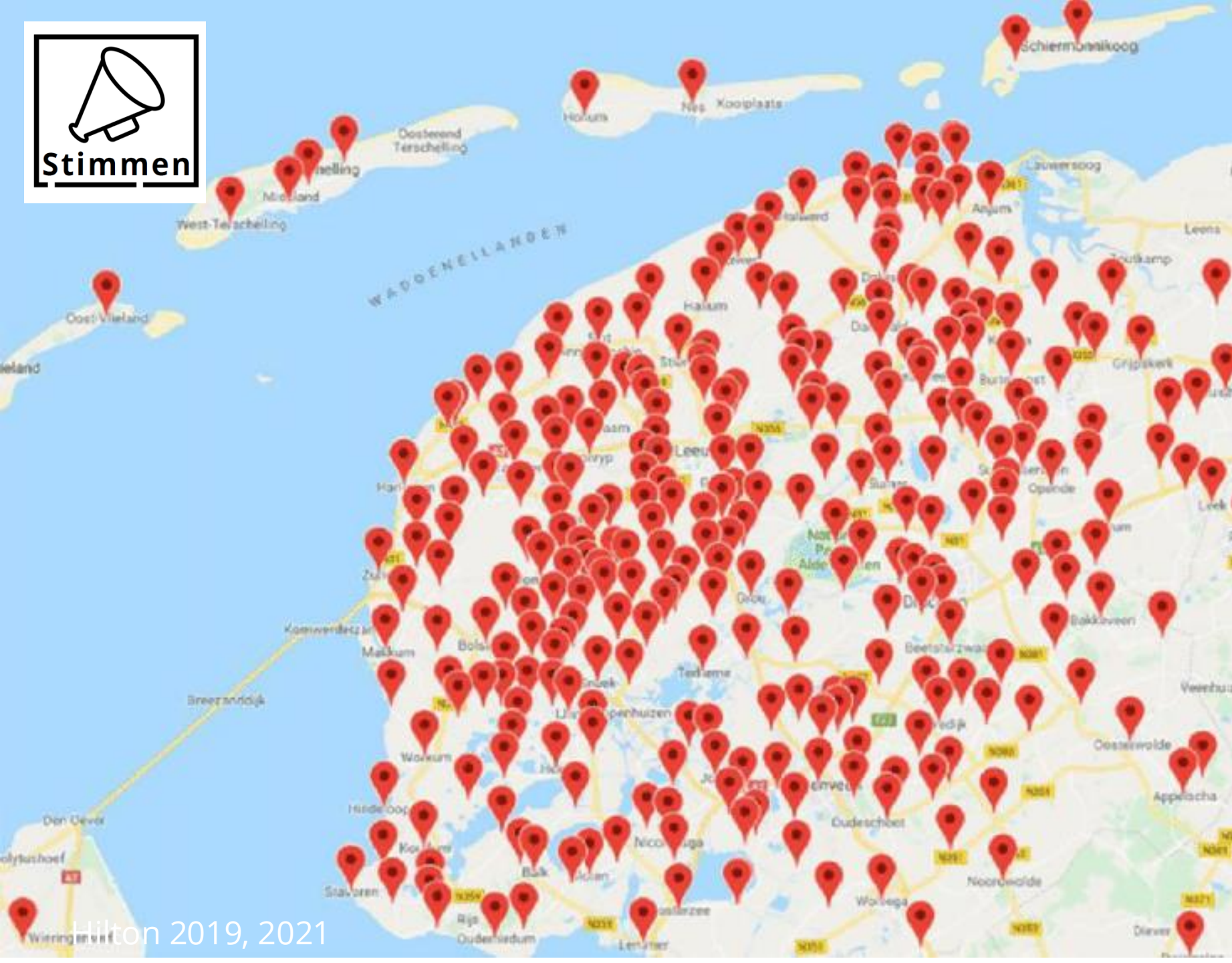
Als je op de hoogte wilt blijven van de planning, kun je je natuurlijk inschrijven voor onze [nieuwsbrief](#).





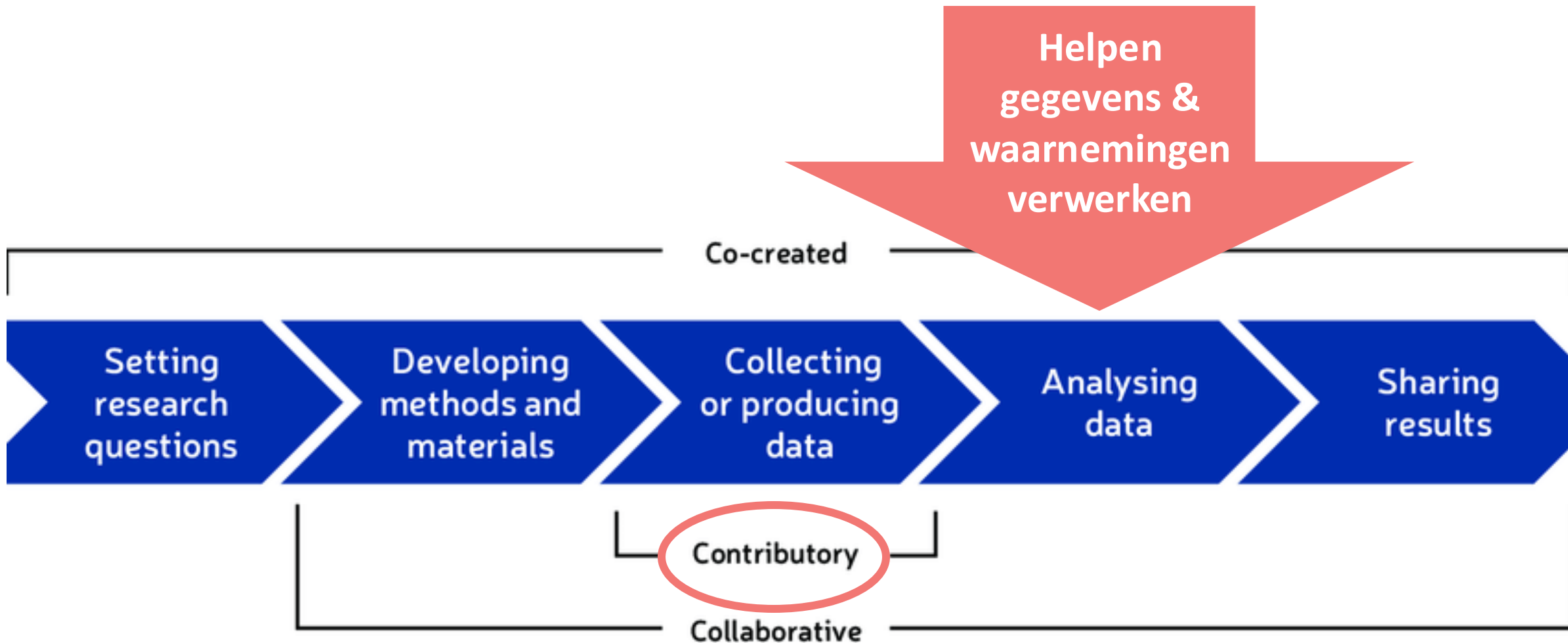
Frits Ahlefeldt



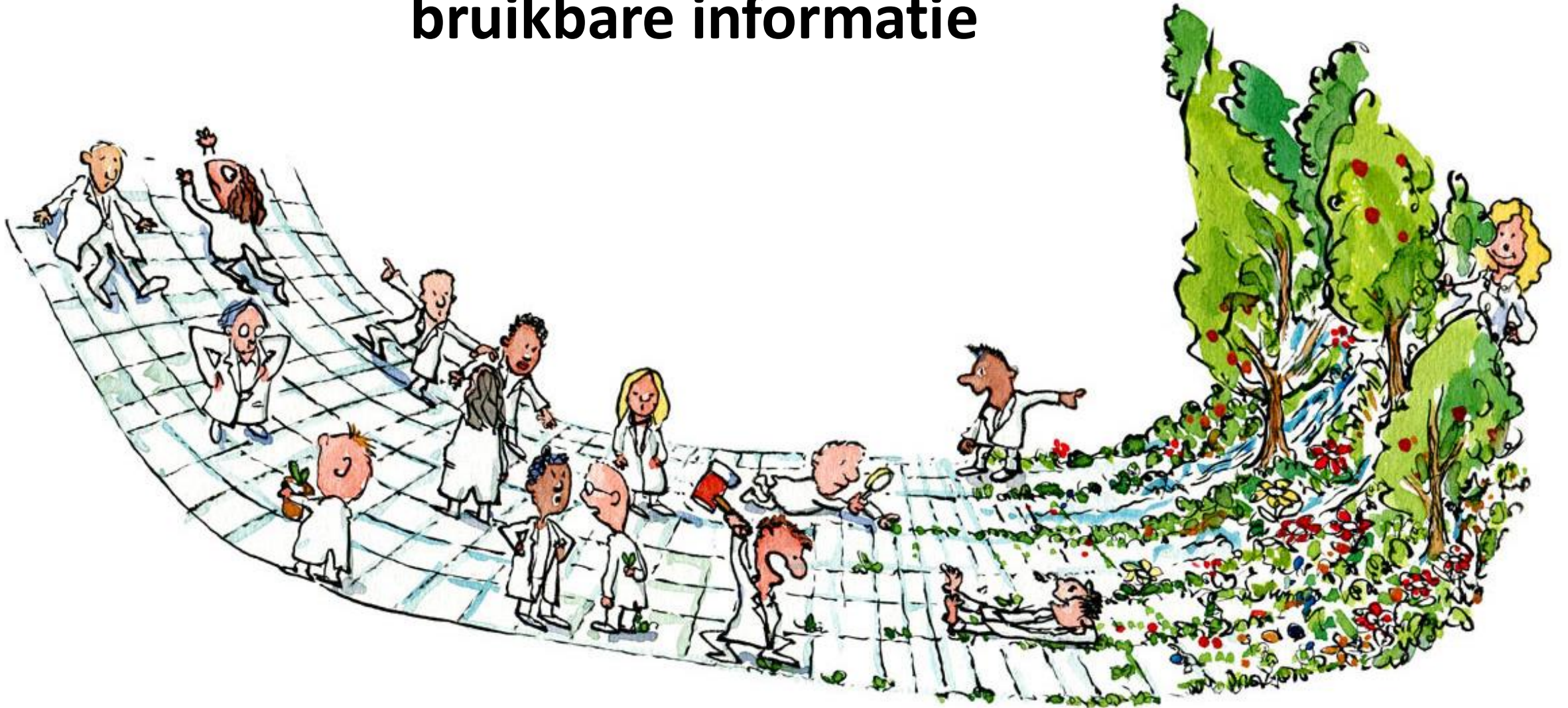


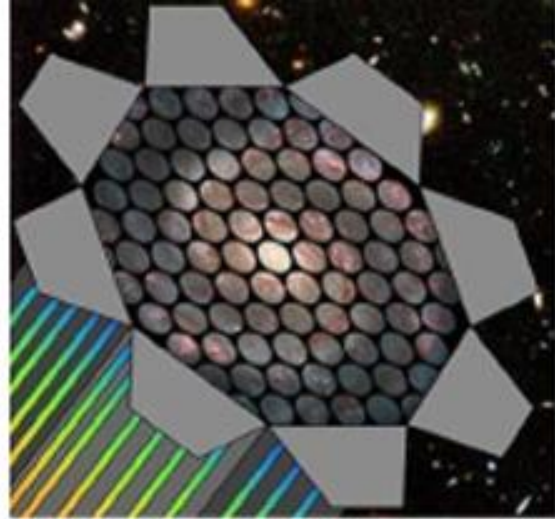
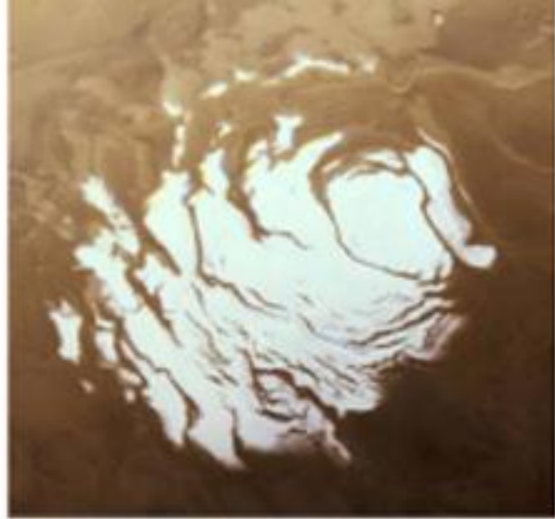




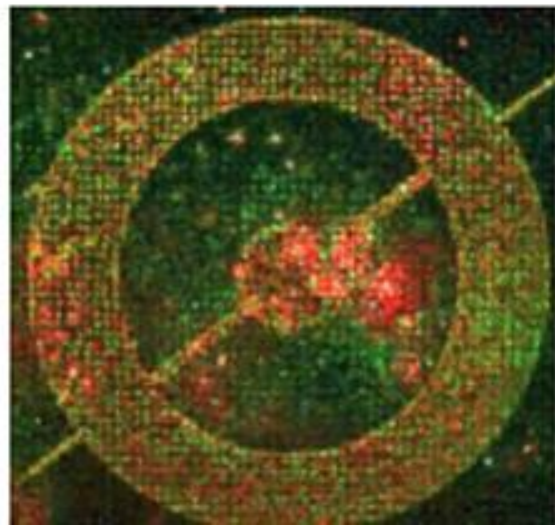


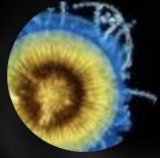
# Plaatjes verwerken naar bruikbare informatie





# ZOO NIVERSE

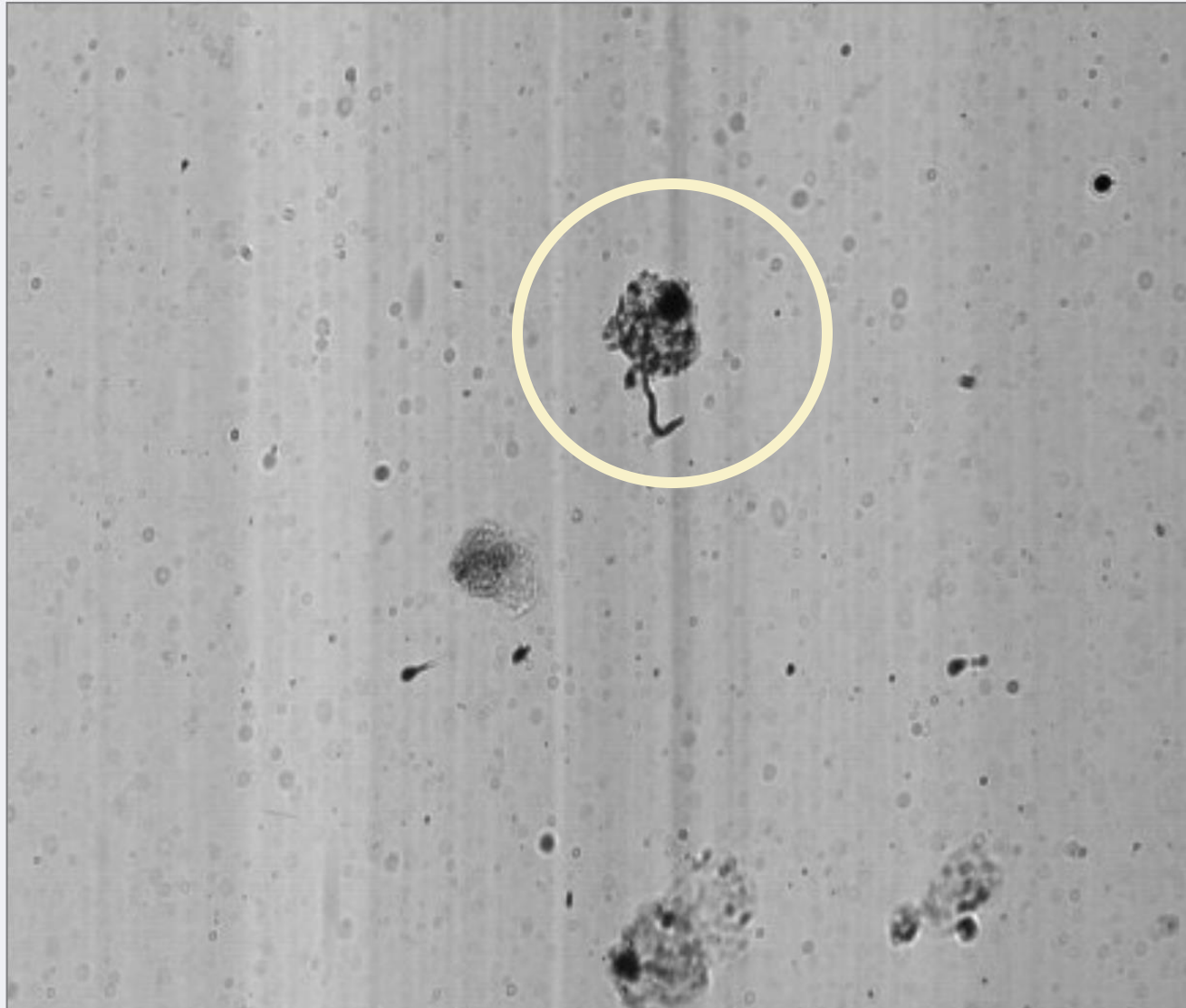




**No plankton = No life in the ocean.  
Help us better understand the  
health of our oceans through  
plankton.**

[Learn more](#)

# ZOO NIVERSE



## TASK

## TUTORIAL

Mark each plankter you see with the relevant tool and select the appropriate species in the pop-up menu.



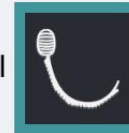
Round, no tentacles



0 drawn



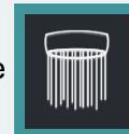
Head with tail



0 drawn



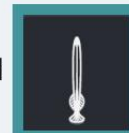
Jellyfish-like



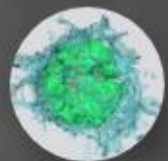
0 drawn




Ribbon/elongated



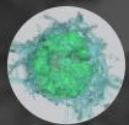
0 drawn



Etch a Cell 

**Welcome to Etch a Cell. Help us  
learn more about the structures  
that make up cells!**

[Learn more](#)



ETCH A CELL



ABOUT

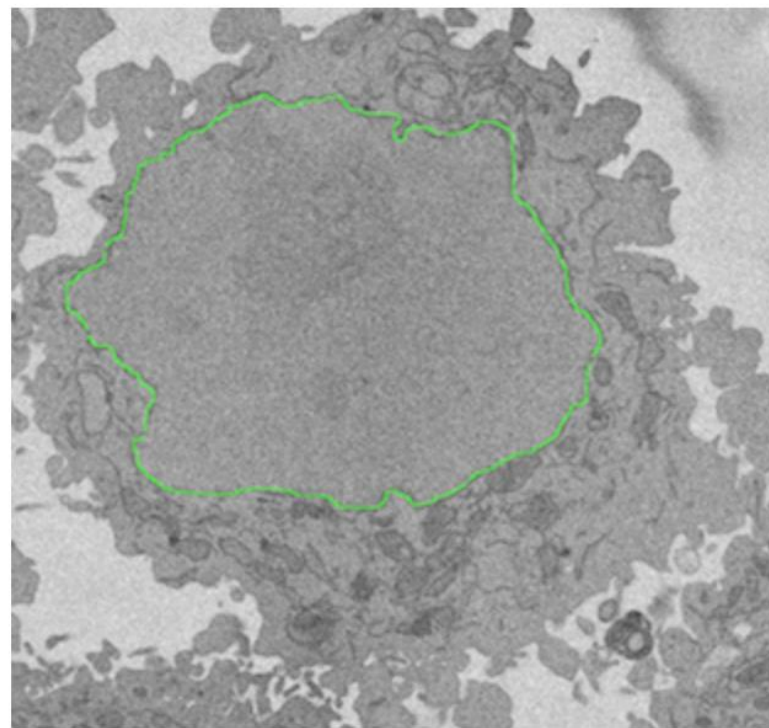
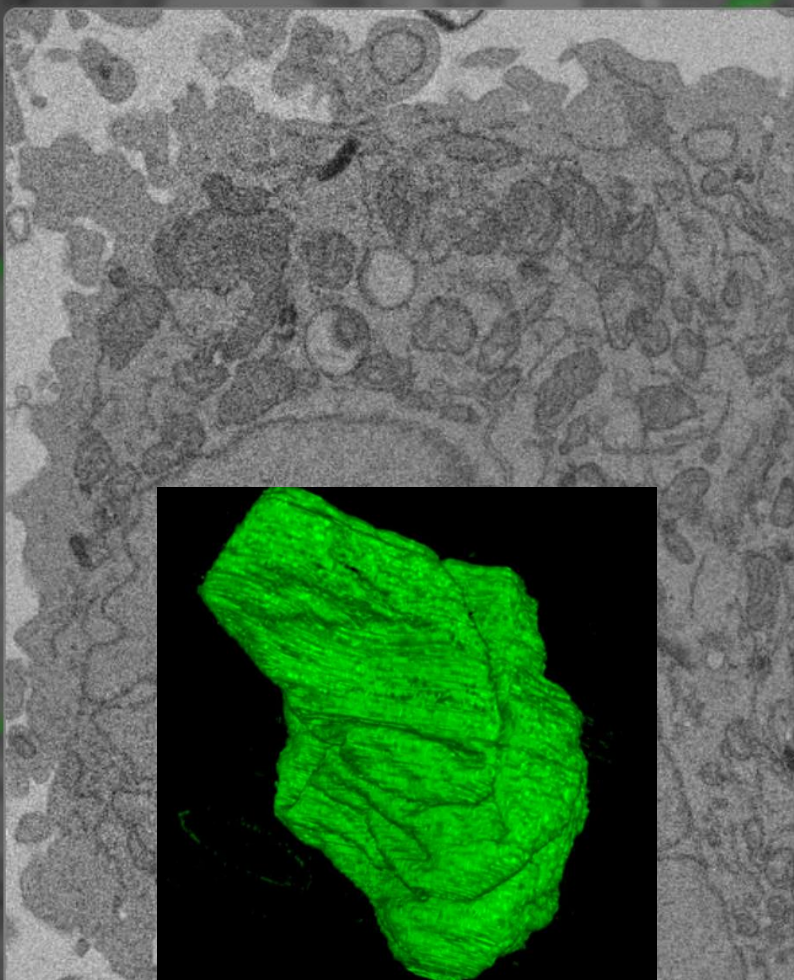
CLA



cell

cell

0 drawn



## Draw around the whole nucleus

Once you've drawn around the whole nucleus you're done - submit your classification!





To exit full screen, press and hold esc

Language English ▾



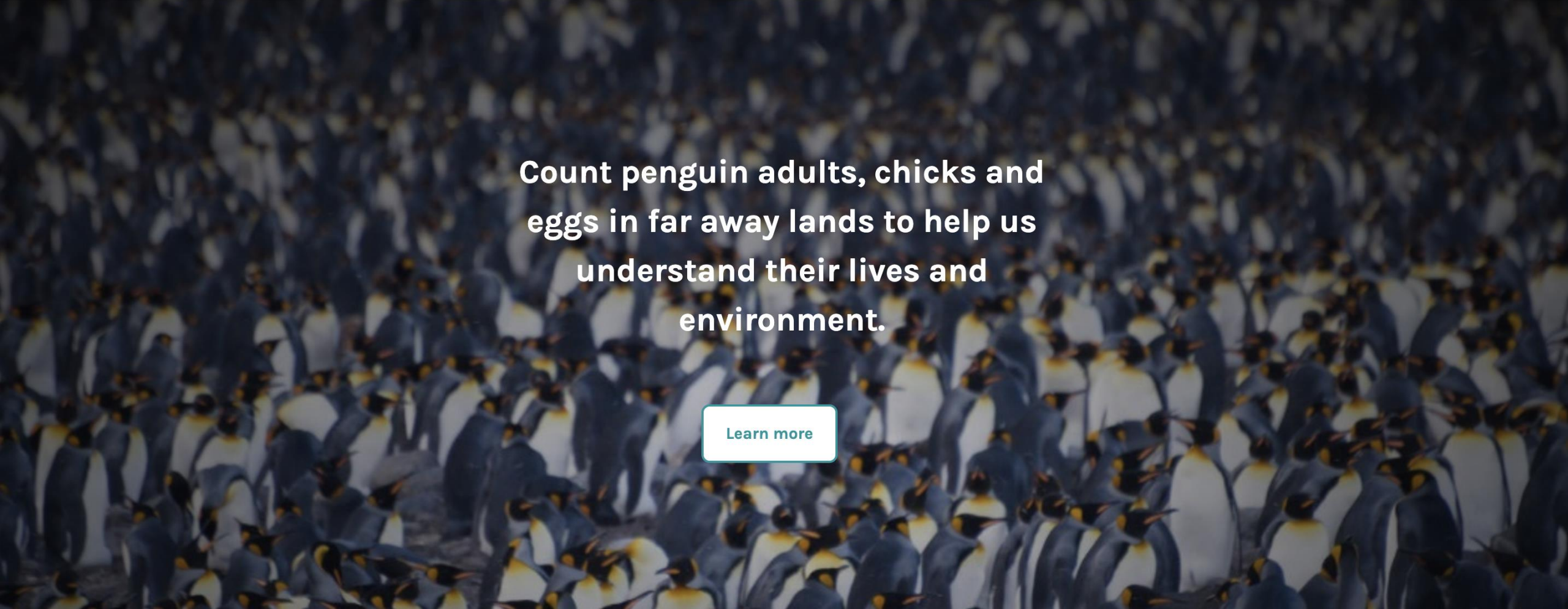
**Penguin Watch** ✔

[ABOUT](#) [CLASSIFY](#) [TALK](#) [COLLECT](#)

**BREAKING:** Zooniverse now has a **certificate generation tool** which works for all Zooniverse projects including Penguin Watch and Seabird Watch. Visit our [Education page](#) to learn how to generate your certificate.

**Count penguin adults, chicks and eggs in far away lands to help us understand their lives and environment.**

[Learn more](#)





BREAKING: Zooniverse now has a certificate generation tool which works for

bird Watch. Visit our [Education page](#) to learn how to generate your

FINISHED! -11-14 11:00:00 AM T



Individually mark rockhopper penguin adults, chicks and eggs in the foreground of the image by clicking at the centre of each one's visible area.

Click and drag the marks to recentre them as needed.

Remove any accidental marks using the black-and-white cross.

You can '*Hide previous marks*' if required - for example if your markings are hiding unmarked penguins. But be careful not to click on the same penguin more than once!

More help on how to identify adults and chicks can be found in the *Field Guide* (see tab on the right of your screen).

Continue



You should sign in!

FIELD GUIDE

TASK

TUTORIAL

Penguins spend a lot of time laying on their pebble nests and only rarely stand up and let us see what is in there. If you can see into a nest, let us know what is in it. It is equally important to know if it is empty or it has any egg(s) or even chicks.

If you can't see into any nest, please tick the appropriate box below before clicking "Done".

- Empty nest 0 drawn
- Egg in nest 0 drawn
- Chick in nest 0 drawn

NEED SOME HELP WITH THIS TASK?

- The image is too dark or blurry.
- There are no penguins on nests
- I can't see clearly into any of the penguins' nests

Onderzoek  
vraag komt uit  
de  
samenleving

Co-created

Setting  
research  
questions

Developing  
methods and  
materials

Collecting  
or producing  
data

Analysing  
data

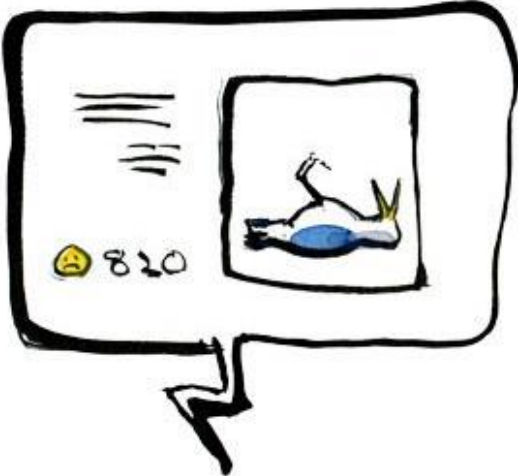
Sharing  
results

Contributory

Collaborative

Co-Creatie = burgers & wetenschappers werken SAMEN

# Zorg & nieuwsgierigheid



# 444



Universiteit  
Leiden



**citizen  
science lab**



**Leiden**



# Plastic soep in de Leidse grachten, in kaart gebracht met een app





# plastic spotter

Hoeveel plastic spot jij in de gracht?  
**Download de app!**



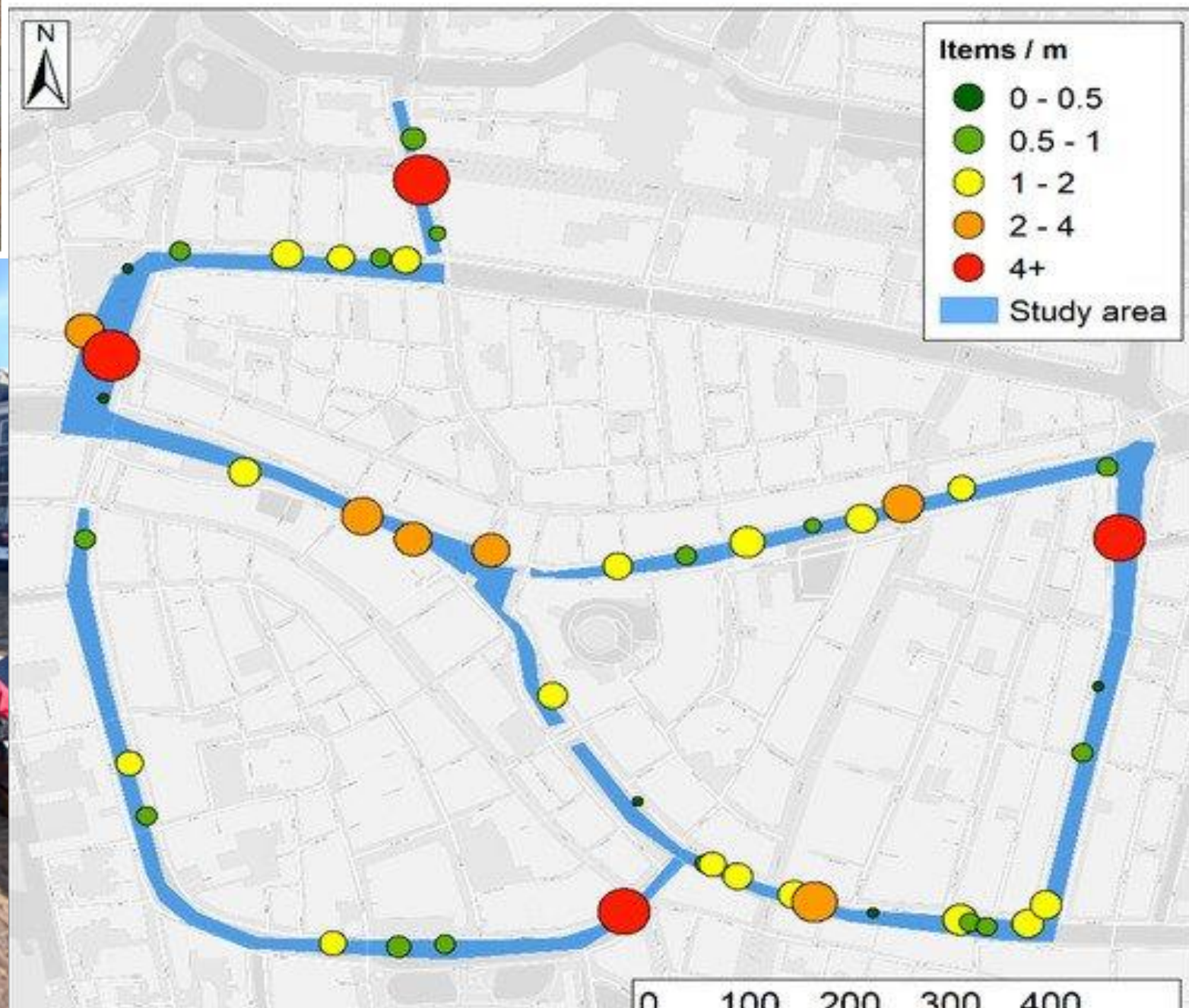


**DE GRACHTWACHT**





## Plastic counts in Leiden







[HOME](#)[Over ons](#)[Hoe werkt het?](#)[Educatie](#)[Metingen](#)[Contact](#)

# NestWacht

Citizen Science met slimme vogelhuisjes

## Over Nestwacht

NestWacht doet met slimme vogelhuisjes onderzoek naar de invloed van de stad op de ontwikkeling van jonge vogeltjes.



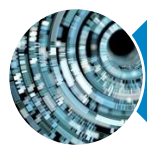
[Lees meer...](#)

## Educatie

NestWacht nodigt je uit om mee te doen. Dit onderzoek is niet alleen leerzaam voor ons, maar ook voor jou!



[Lees meer...](#)



Het CS Lab



Wat is CS?



De 10 Principes



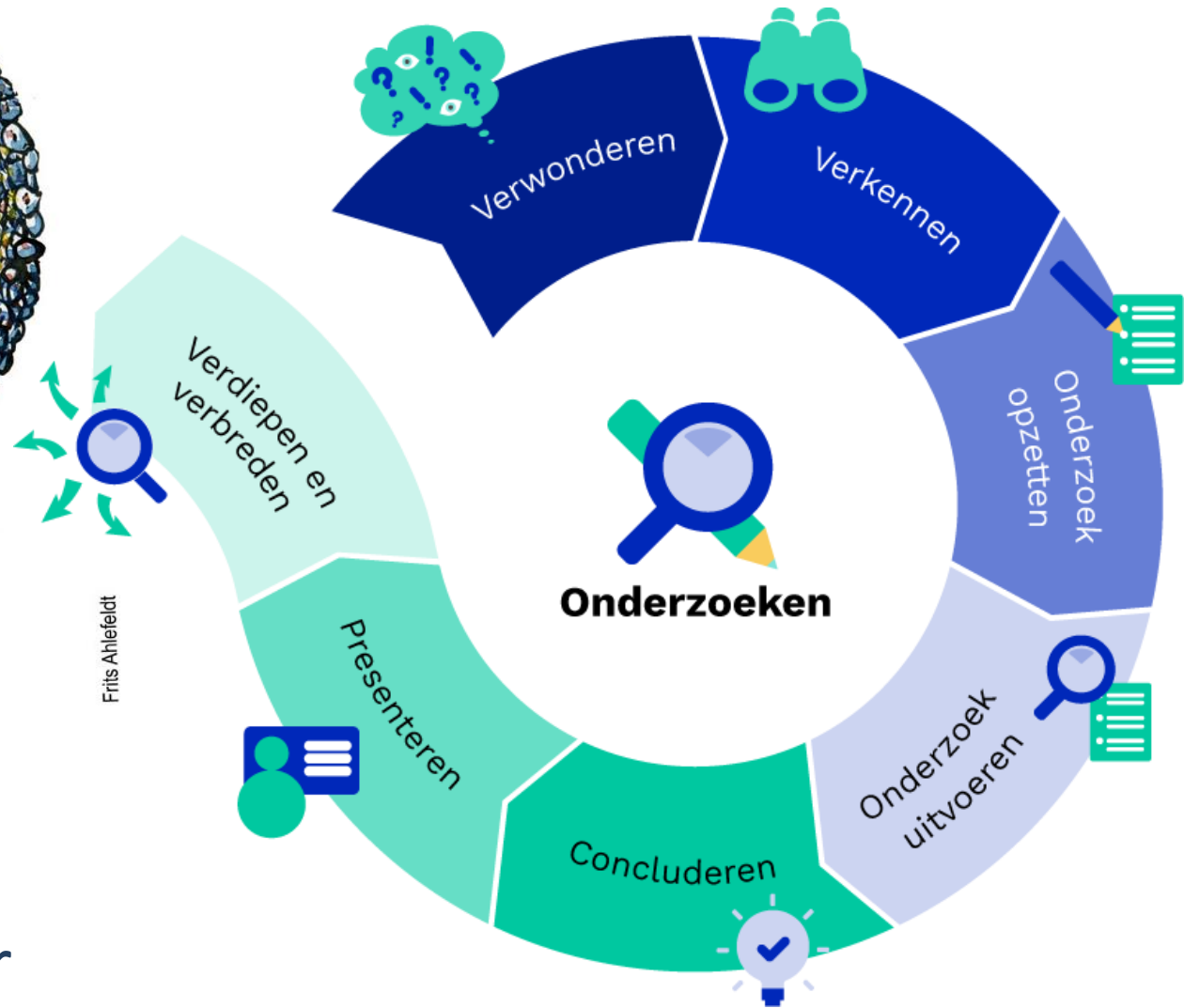
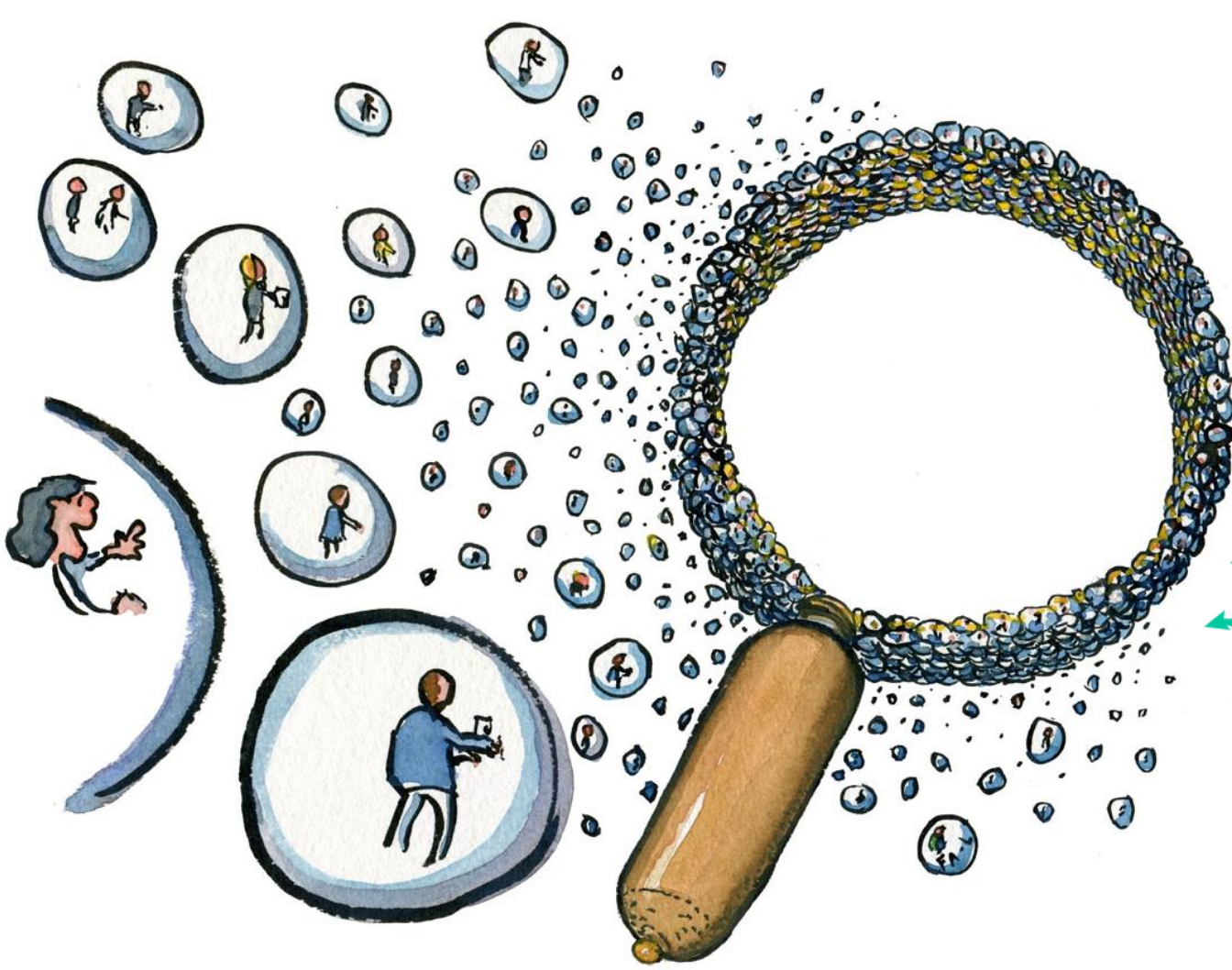
Voorbeelden



Waarom CS?



Aan de Slag



De leerling als onderzoeker  
met een echte bijdrage aan de wetenschap





**Waardevolle data**

Frits Ahlefeldt





A smartphone is shown displaying four nature challenge cards. The top card features a grasshopper and a bee on a yellow flower, with the text 'Vliegen en bijen' and 'Zomerzoemers'. The second card shows a beetle on a purple flower, with 'Kevers' and 'Meikeverchallenge'. The third card displays mushrooms, with 'Paddenstoelen en schimmels' and 'Digitale paddenstoelenpluk'. The bottom card shows a small bird. To the left of the phone is a spider, and at the bottom right is a mouse.

## ObsIdentify daagt je uit

Kies jouw challenge. Zo maken jouw waarnemingen, samen met die van anderen, deel uit van onderzoek naar deze soorten.

## Citizen science in cijfers

### Natuurplatform Waarneming.nl

 **230.000**  
accounts

 **13 miljoen**  
waarnemingen 2021

### TOP 3


soortgroepen van  
Waarneming.nl

 **Vogels**

 **Planten**

 **Nachtvlinders  
en micro's**

### Soortenorganisaties

 **16.500**  
tellers 2021

 **641.500**  
vrijwilligersuren 2021

Soortenorganisaties:

**Anemoon**

**BLWG**

**EIS**

**FLORON**


**NMV**

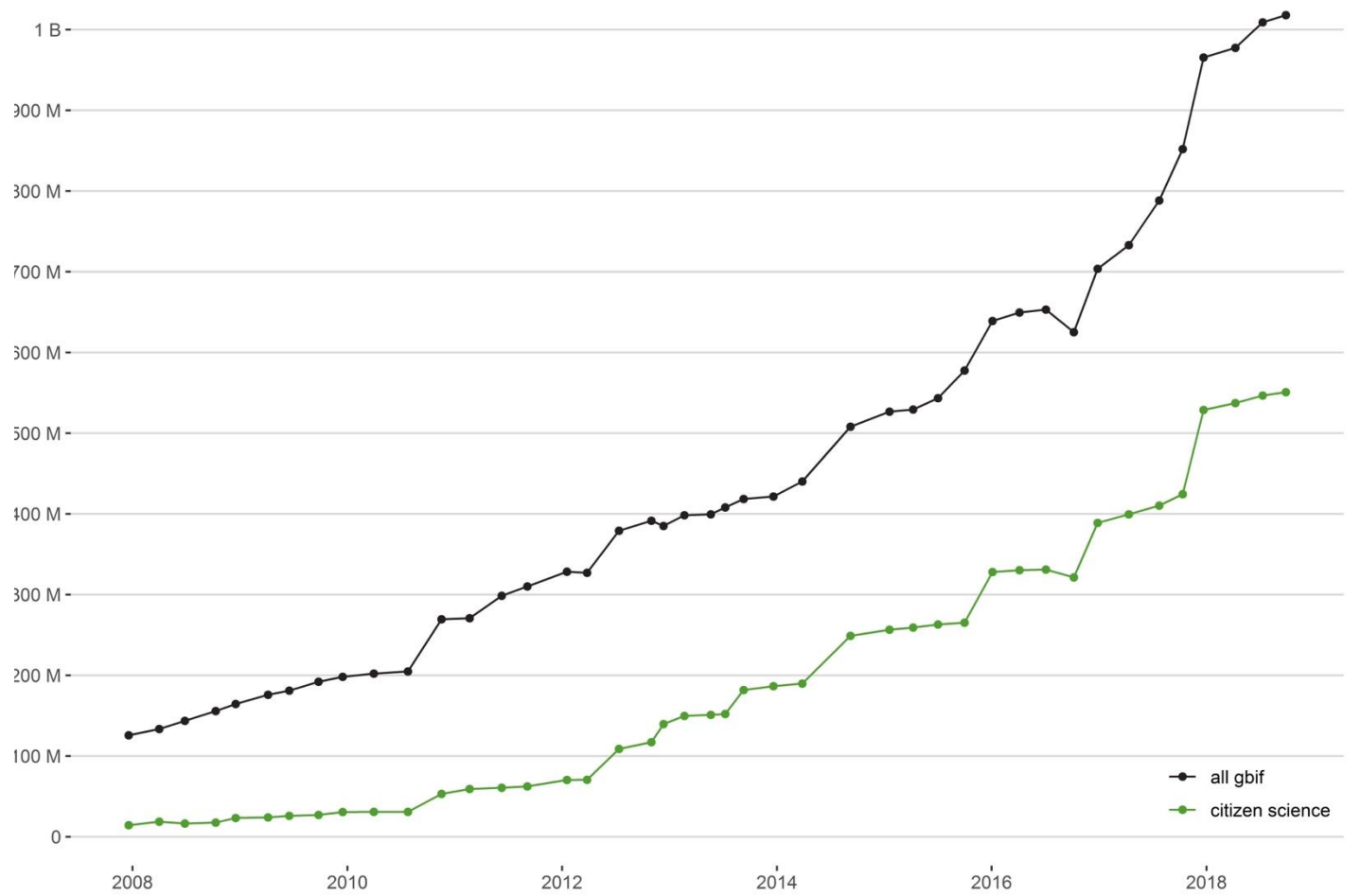
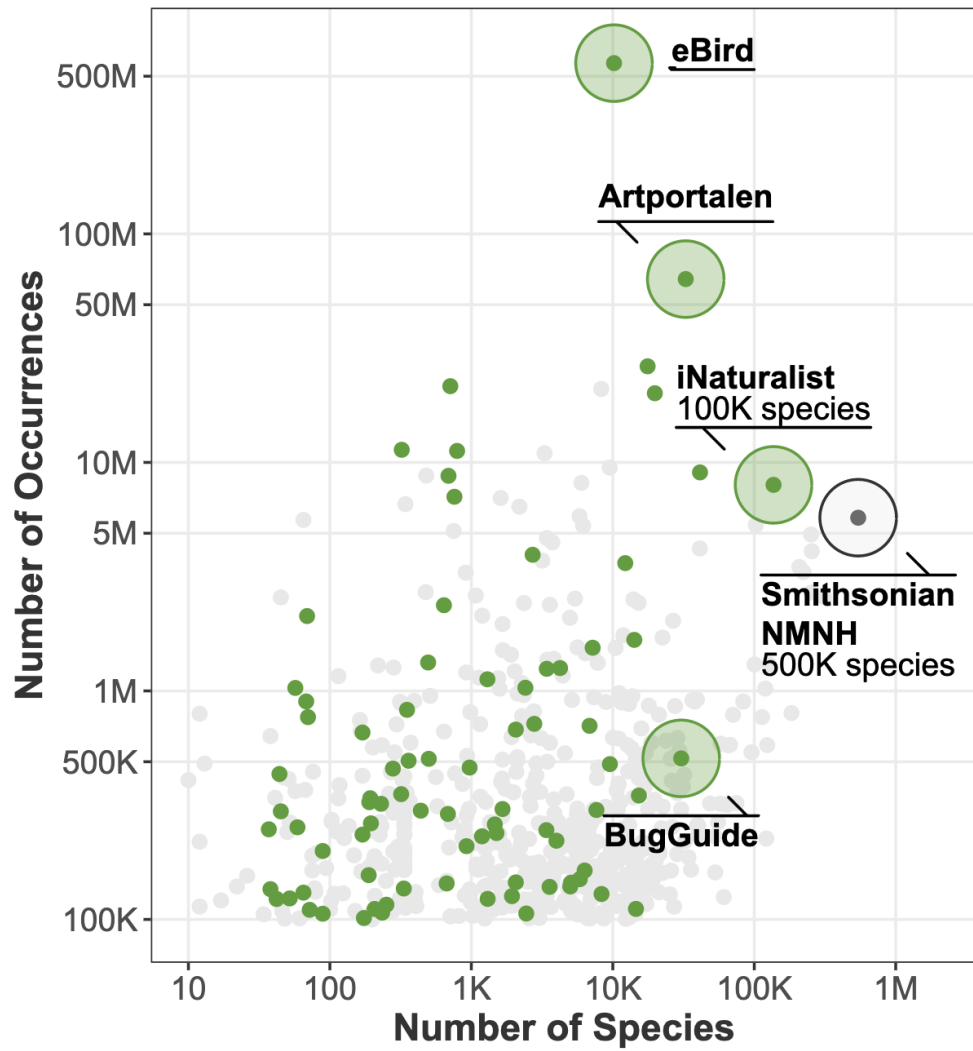
**RAVON**

**Sovon**

**De Vlinderstichting**

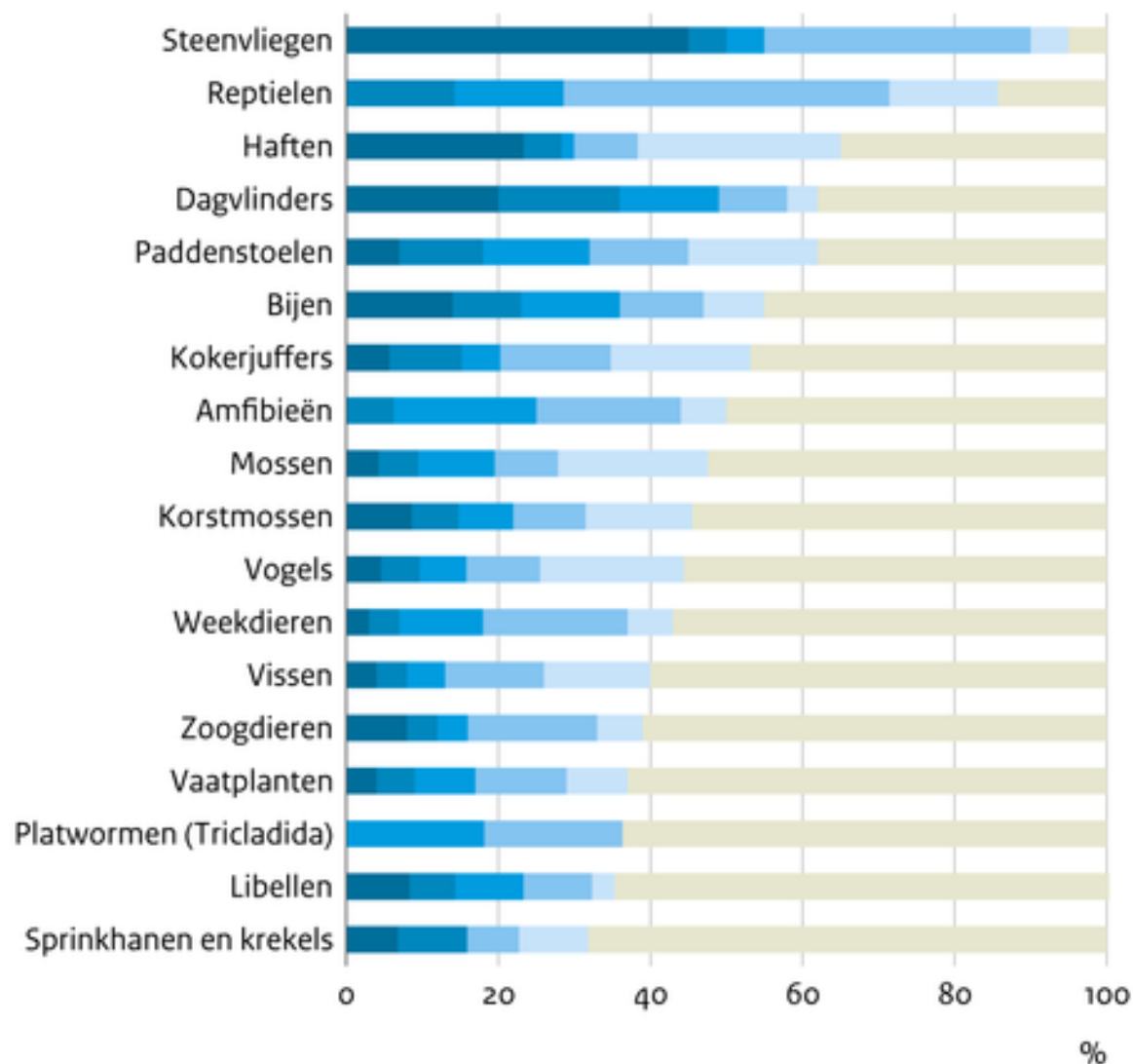
**Zoogdiervereniging**

 **39.500**  
telinspanning trektellen voor  
migrerende vogels in 2021 in uren



The rise of citizen science on the GBIF network

## Aandeel bedreigde soorten per soortgroep, 2019

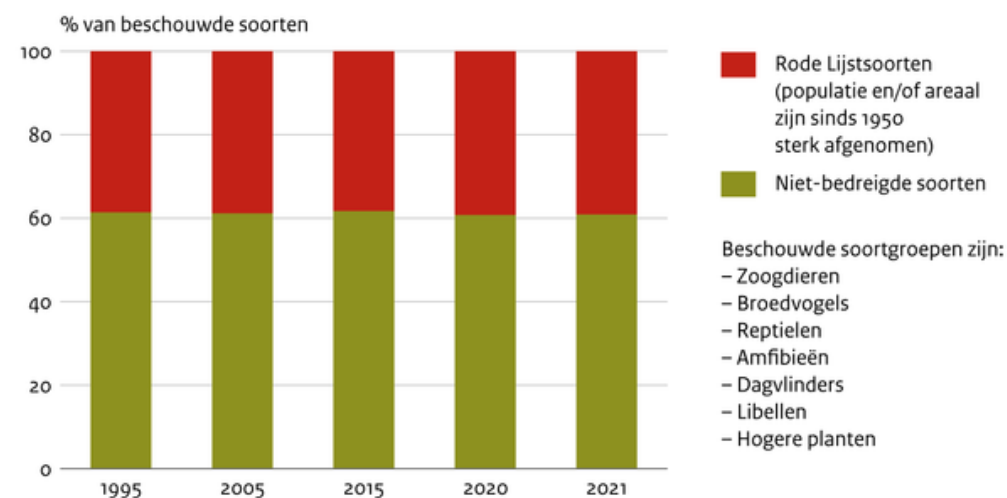


Bron: Soortenorganisaties; WUR



Rijksoverheid

### Rode Lijstsoorten en niet-bedreigde soorten



Bron: NEM (Soortenorganisaties, CBS)

CBS/mrt19  
[www.clo.nl/nl105216](http://www.clo.nl/nl105216)

CBS/jun22  
[www.clo.nl/nl152115](http://www.clo.nl/nl152115)

# SUSTAINABLE DEVELOPMENT GOALS



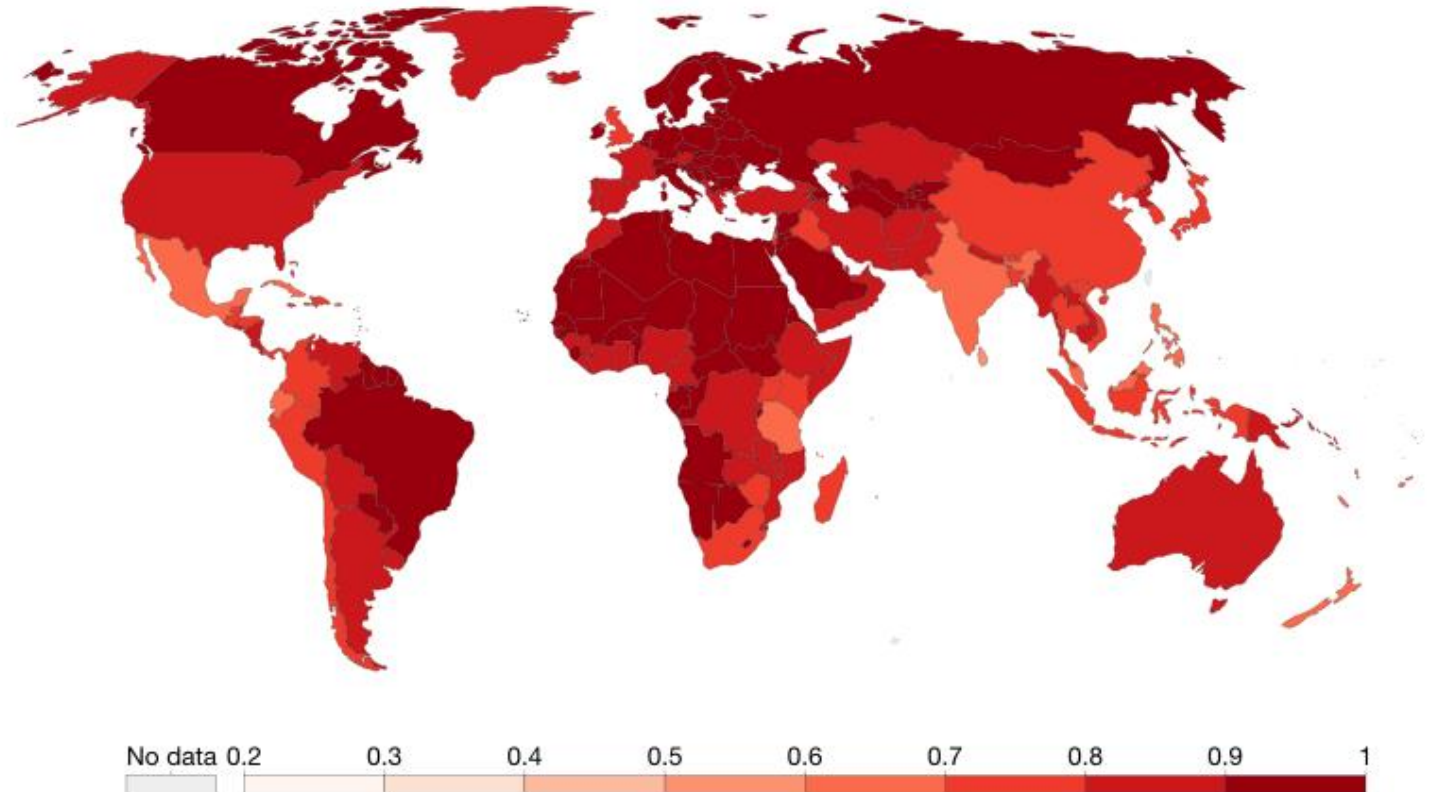
**'Red List Index'** - indicatoren die het risico van uitsterven in de loop der tijd van vogels, zoogdieren, amfibieën en koralen weergeven.



### Red List Index, 2019

The Red List Index (RLI) defines the conservation status of major species groups, and measures trends in the proportion of species expected to remain extant in the near future without additional conservation action. An RLI value of 1.0 equates to all species being categorised as 'Least Concern', and hence that none are expected to go extinct in the near future. A value of 0 indicates that all species have gone extinct.

Our World in Data



Source: UN Statistics Division

CC BY

# Student + School + Bibliotheek

... partners voor de wetenschap in de Stad ...



Frits Ahlefeldt

# Leiden Biodiversity Network



Frits Ahlefeldt





# Lokaal acteren voor een betere milieu



# De Kracht van Samen Onderzoeken

We zijn sterker als we onze kennis, inzichten, talenten en ervaring bundelen



Frits Ahlefeldt



## 10 benefits of citizen science

**Citizen science offers many opportunities, for researchers as well as for citizens. A top 10 list of benefits.**

1. Achieving more participation in research
2. Facilitating research on a bigger scale by adding additional people
3. Tapping into new sources of information, knowledge and perspectives. *“At RIVM, we conduct research on behalf of citizens. That is why it is important to get citizens involved in research. Not least to find out what the key issues are in society.”*  
Mart Stein, RIVM
4. Increasing citizen engagement in scientific research and building stronger connections between citizens and scientists. *“RIVM should embrace citizen science even more. It is the best way to be at the very heart of society.”* Liesbeth Claassen, RIVM



### 3. Aanboren van nieuwe informatiebronnen, kennis en perspectieven

## 10 benefits of citizen science

Citizen science offers many opportunities, for researchers as well as for citizens. A top 10 list of benefits.

1. Achieving more participation in research
2. Facilitating research on a bigger scale by adding additional people
3. Tapping into new sources of information, knowledge and perspectives. *“At RIVM, we conduct research on behalf of citizens. That is why it is important to get citizens involved in research. Not least to find out what the key issues are in society.”* Mart Stolk, RIVM
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each other. *Annemarie Piscaer, citizen scientist in Rotterdam*

7. Ensuring that citizens understand scientific research even better

8. Ensuring that scientists and knowledge institutes understand current issues in society even better. *“Citizen science helps scientists become better citizens.” Lea den Broeder, RIVM*

9. Focusing subjects and entitled to do in 's-Graven

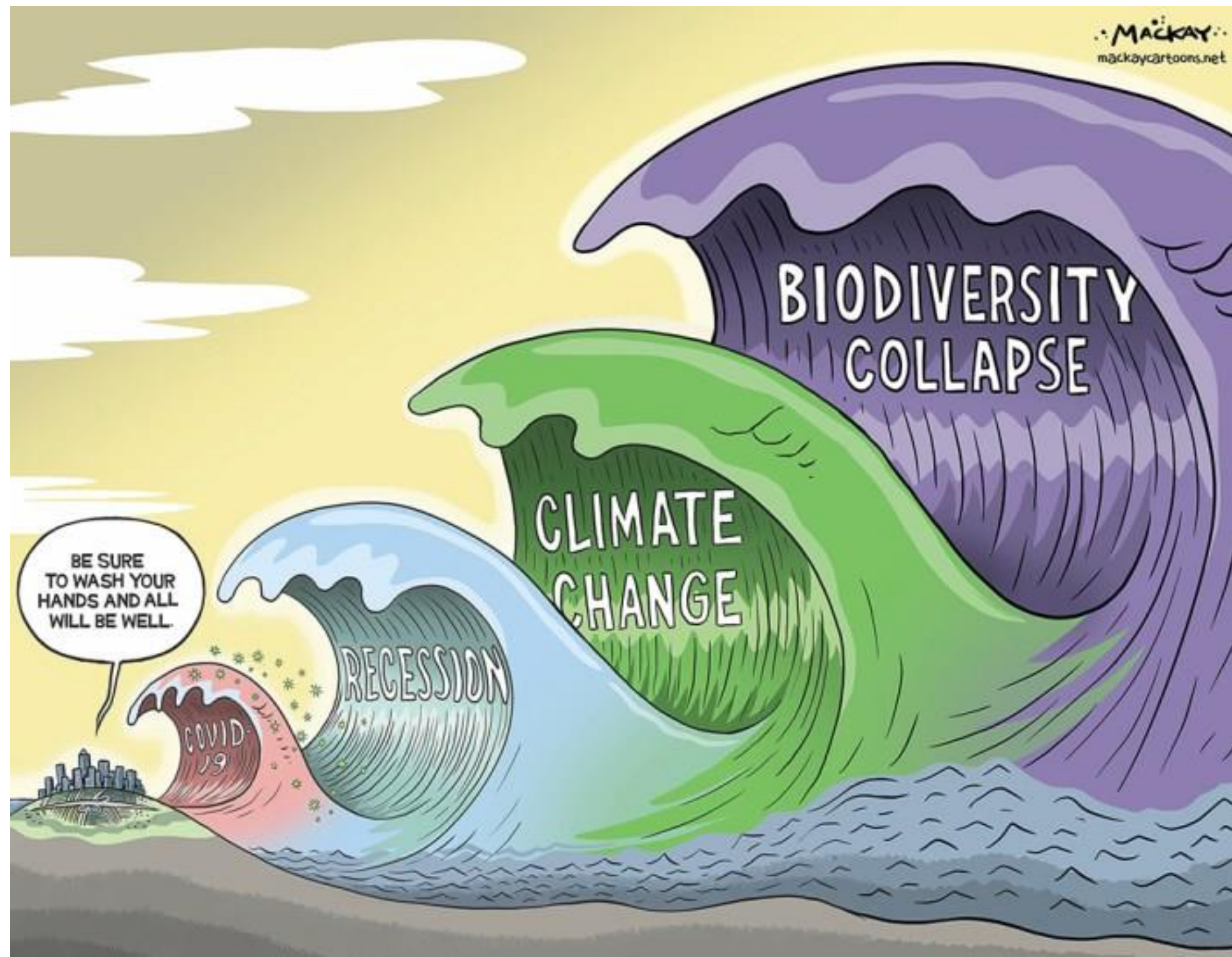
## 9. Onderzoek op relevantere onderwerpen en prioriteiten van burgers

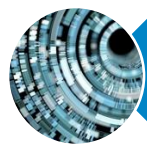
10. Improving increasing the understanding

*you see it may seem highly complex. But it is a construction that has been built up slowly over time. It has taken months.” Teus Hagen, citizen scientist in Grubbenvorst.*



All  
Hands  
On  
Deck!





Het CS Lab



Wat is CS?



De 10 Principes



Voorbeelden



Waarom CS?



Aan de Slag



- Les materialen
- Hulpbronnen
- Platformen,
- etc



[https://  
kidlab.nl/](https://kidlab.nl/)

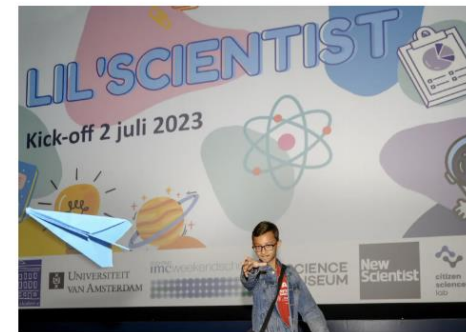
# Lil'Scientist *voor docenten*



LIL'SCIENTISTS AAN HET WOORD



LIL'SCIENTISTS IN NEMO



LIL'SCIENTIST KICK OFF



## WETENSCHAPS- KNOOPPUNTEN

Wetenschapsknooppunten

+ Alle Scholen Verzamelen

**Lesmateriaal voor scholen**

+ Wetenschapsknooppunten

Over de knooppunten

Contact



# LESMATERIAAL VOOR SCHOLEN

EEN VERZAMELING VAN HET **ONLINE AANBOD** VAN ALLE  
WETENSCHAPSKNOOPPUNTEN VAN NEDERLAND.

Op deze pagina kunt u de KNAW toolkit downloaden en al het online aanbod van de wetenschapsknooppunten vinden.

### KNAW Toolkit

Download de KNAW Toolkit.



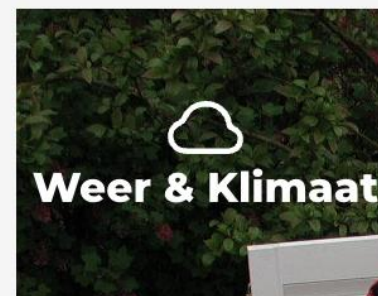
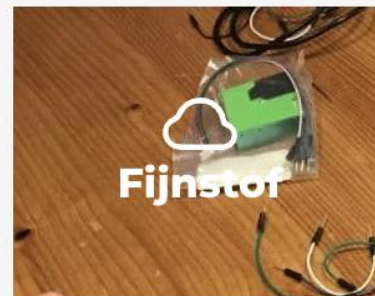
**Taal**  
**Detectives**

Een speurtocht naar de talen om je heen



[VAK: ALLES ▾](#)[NIVEAU: ALLES ▾](#)[TAAL: ALLES ▾](#)

## GLOBE Onderzoeksprojecten





# Help mee met citizen science

De 'burgerwetenschap' rukt op. Maar bij het NIOO weten we al veel langer de hulp van burgerwetenschappers op waarde te schatten. Ons oudste 'Citizen Science'-project gaat terug tot begin vorige eeuw. Wat voorbeelden...

- Al meer dan 100 jaar ringen vele (honderden) getrainde vrijwilligers Nederlandse wilde vogels.

De lichtgewicht vogelring is eigenlijk een mini paspoort en levert

PROJECT • 2019-PRESENT

# Vang de Watermonsters: Citizen Science

'Vang de Watermonsters' is een Citizen Science project dat de waterkwaliteit in kleine wateren in Nederland in kaart brengt. Door het inzetten van burgers voor metingen van de waterkwaliteit krijgen we een beeld van de waterkwaliteit in kleine wateren in Nederland. Kleine wateren zoals plassen, vennen, sloten en vijvers zitten niet in het standaard meetnet van de Waterschappen. Dit project is opgezet om die blinde vlek te kunnen vullen. Uit voorgaande jaren is gebleken dat de waterkwaliteit voor het

## Details

AFDELING

AKWA (Aquatic  
Knowledge Centre  
Wageningen)  
Aquatic Ecology

FINANCIERING

Stichting Natuur  
en Milieu

## Experts



**Sven Teurlincx**

Project Manager | Researcher , AKWA (Aquatic Knowledge Centre Wageningen) | Aquatic Ecology

[Informatie aanvragen](#)



# CS-NL

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# CS-NL

Citizen Science Nederland

- **500+ members**
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- **zenodo.org/communities/cs-nl/**
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- **tinyurl.com/CSNL-LINKEDIN**



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# EU-Citizen.Science

## What can you find here?

**336**

### Projects

That are engaging the public in research via citizen science activities.

**242**

### Resources

Useful for planning and running citizen science projects.

**75**

### Training Resources

About the practice of citizen science.

**328**

### Organisations

Involved in citizen science projects and research.

**29**

### Platforms

To get an overview of further developments in citizen science.

**5167**

### Users

You can connect with.





## EU-Citizen.Science moodle courses:

- [Designing for learning through citizen science](#)
- [Citizen Science in the Classroom: A toolkit](#)
- [Citizen Science in Schools: schools as agents of community well-being through science and research](#)

**Citizen Science Toolkit** – [Teaching Science Through Citizen Science](#)

**TeachStarter (TES)** - [8 Citizen Science Projects and Ideas to Engage Your Primary Students](#)

**NOAA** - [Citizen Science for Educators](#)

**Scientix Observatory Report, April 2019** - [Bringing research into the classroom.](#)

[Enhancing youth learning through Community & Citizen Science - A guide for practitioners \(PDF 31.2MB\)](#) Robinson et al. (2021)

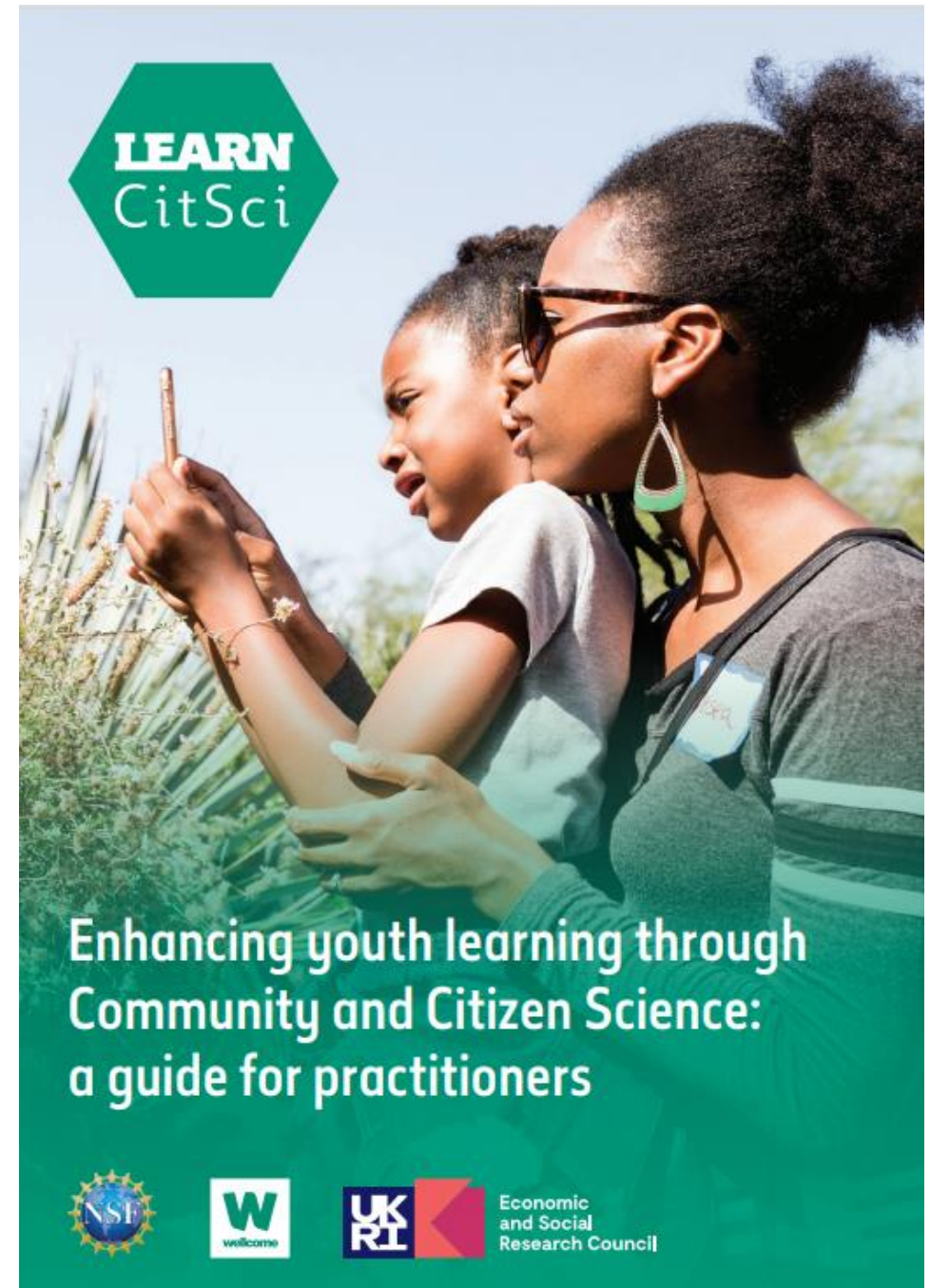
[Youth-focused citizen science: Examining the role of environmental science learning and agency for conservation.](#) Ballard et al. (2017)

Exploring the participation of young citizen scientists in scientific research: The case of iNaturalist ([Link](#)) ([Summary](#))

Step by step towards citizen science – Deconstructing youth participation in BioBlitzes. Journal of Science Communication ([Link](#)) ([Summary](#))

How do young community and citizen science volunteers support scientific research on biodiversity?: The case of iNaturalist. ([Summary](#))

LEARN CitSci [Podcast Series on Soundcloud](#)



## SciStarter for Educators

One of the most important aspects of the SciStarter mission is to make it simple, accessible, and fun for people of all ages to jump in and get involved in real world science. A burgeoning initiative by [SciStarter](#) is to serve as a resource for learners and educators in both formal and informal learning environments.

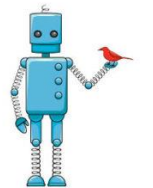
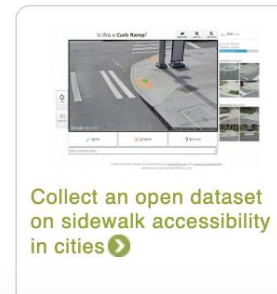
The National Academies of Sciences, Engineering, and Medicine Committee “**Designing Citizen Science to Support Science Learning**” [recommend citizen science](#) as an effective way to support science learning and found that citizen science in education may also be an effective strategy to engage underrepresented populations in the process of science.

*Citizen science is public involvement in authentic scientific research.*



When we engage in hands-on, authentic real world science, we make observations, begin to formulate questions, experiment, and ultimately construct deeper understanding about the natural world. Citizen science is an excellent way to address the Science Practices of the Next Generation Science Standards (NGSS), depicted, below:

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations



## What works in youth-focused Community and Citizen Science?



### Youth Key Practices

The following practices were associated with youth acting on the world in personally meaningful ways, using the expertise and roles acquired through their YCCS experiences.



Youth take ownership of data quality ([read more](#))



Youth share findings with outside audience ([read more](#))



Youth engage in complex social ecological systems ([read more](#))

### Educator Key Practices

We have also identified key practices for educators, which can deepen learning in the context of YCCS.



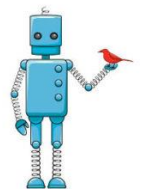
Educators position youth as people who do science



Educators attend to the unexpected



Educators frame the work globally and locally



scistarter.com



Join the Citizen and Community Science Library Network to become a community hub for citizen science.

You'll receive ongoing professional development, adaptable resources, programming and event tips, and technical support—and it's all free!



Program Overview

About the Program

**Introduce your Library to Citizen Science!**

Citizen science kits are available at **participating libraries** across the country.

Find out if kits are available at a library near you! [Search for a participating library.](#)

## Project Kits



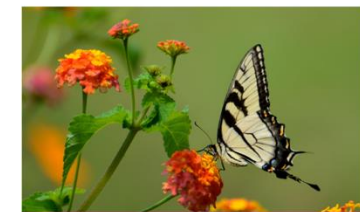
### EXPLORING BIODIVERSITY

Document and identify plants and animals around you.



### MEASURING LIGHT IN THE NIGHT

Help gather light pollution data.



### OBSERVING POLLINATORS

Identify and count pollinators as they visit flowering plants.



# Wat zijn JOUW voorbeelden?



# Project-based Learning

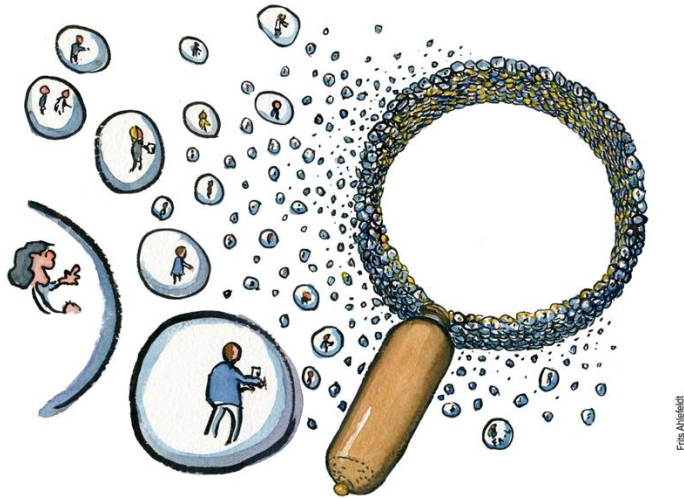
	Challenge	Potential solution
<b>The driving question</b>	Find ways to help students realize the value of driving questions.	Anchoring experiences provide students with common experiences that help them relate to the new ideas explored in the project.
<b>Situated inquiry</b>	Students find it difficult to engage in the inquiry process, particularly if they have had no previous experiences.	The teacher first models the investigation and asks students to provide suggestions.
<b>Collaborations</b>	Students do not naturally collaborate with other students in the classroom.	Teachers need to help students develop collaboration skills, including turn-talking, listening and respect for others' opinions.
<b>Using technology tools to support learning</b>	Integrate learning technologies into curriculum materials.	Teachers should have experience, skills and comfort levels in teaching science to use learning technology.
<b>Creation of artifacts</b>	Students learn more effectively when they develop artefacts: external representations of their constructed knowledge.	To be effective, artefacts need to address the driving question, show the students' emerging understanding, and support students in developing understanding associated with the project's learning goals.



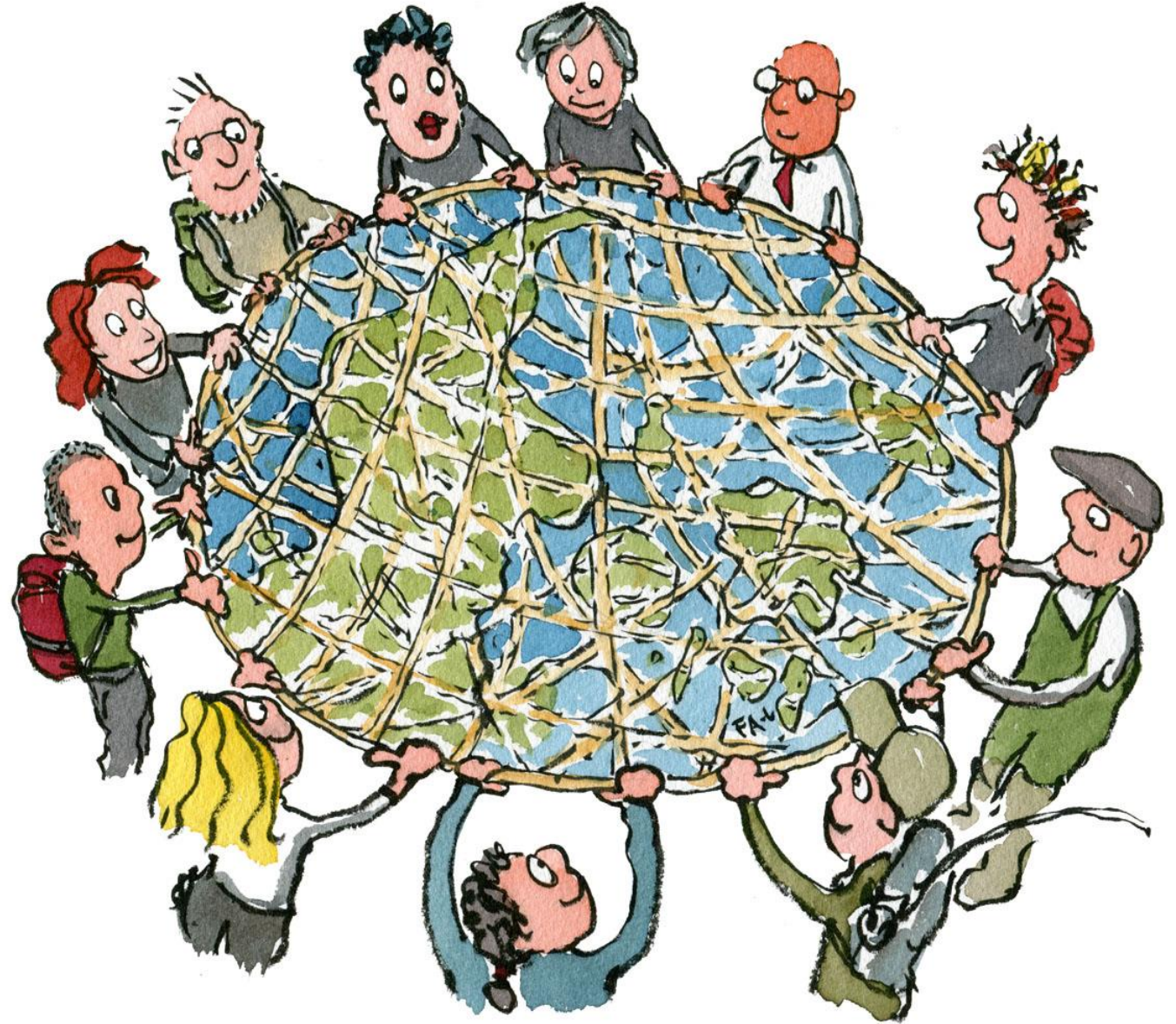
# Citizen Science for Project-based Learning

#	CITIZEN SCIENCE STEPS Adapted from Citizen Sensing: A Toolkit	FEATURES OF PROJECT-BASED LEARNING Adapted from Krajcik 2005	CROSS-CUTTING PRINCIPLES	Module section
1	Scoping activities to help map issues of interest and the work that has been done before	A driving question is set that students explore. As a result, they learn and apply important ideas in the discipline.	Empowerment Co-creation	Let's take action
2	The planning stage is directly focused on preparing the community for data collection	Students, teachers and community members engage in collaborative activities to find solutions to the driving question.	Empowerment Co-creation	
3	Sensing to gather information about the issue	Students are scaffolded with learning technologies that help them to participate in activities that are normally beyond their ability.	Co-creation	
4	Consideration of the community's awareness and understanding of the data they have collected	Inquiry process to answer the question. A continuous refinement process based on feedback from peers and experts with the teacher's guidance elicits higher quality work.	Change-making Empowerment	
5	If more activities are planned in the future, it is important to reflect on what worked well	Use and reflect on the information given by students to adjust the content and process for the next project implementation.	Change-making Empowerment	Project sustainability
6	The legacy refers to the impact of the work, and how far reaching it will be	Students create a set of shared assets that address the driving question.	Openness	

# Laten wij samen een lesplan maken



Frits Ahlefeldt



Frits Ahlefeldt

## APPROACHES TO CITIZEN SCIENCE

	CONTRIBUTORY	COLLABORATIVE	CO-CREATED
Define a Question/Issue			✓
Gather Information			✓
Develop Explanations		✓	✓
Design Data Collection Methods		✓	✓
Collect Samples	✓	✓	✓
Analyze Samples	✓	✓	✓
Analyze Data		✓	✓
Interpret Data/Conclude			✓
Disseminate Conclusions			✓
Discuss Results/Inquire Further			✓

FIGURE 1: Three different approaches to citizen-science research, characterized by the degree of participant involvement in carrying out scientific investigations (Bonney et al. 2009).

## APPROACHES TO CITIZEN SCIENCE


















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# citizen science lab

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