Citizen science and open innovation to manage mosquito-borne diseases

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CEAB-CSIC & CREAF

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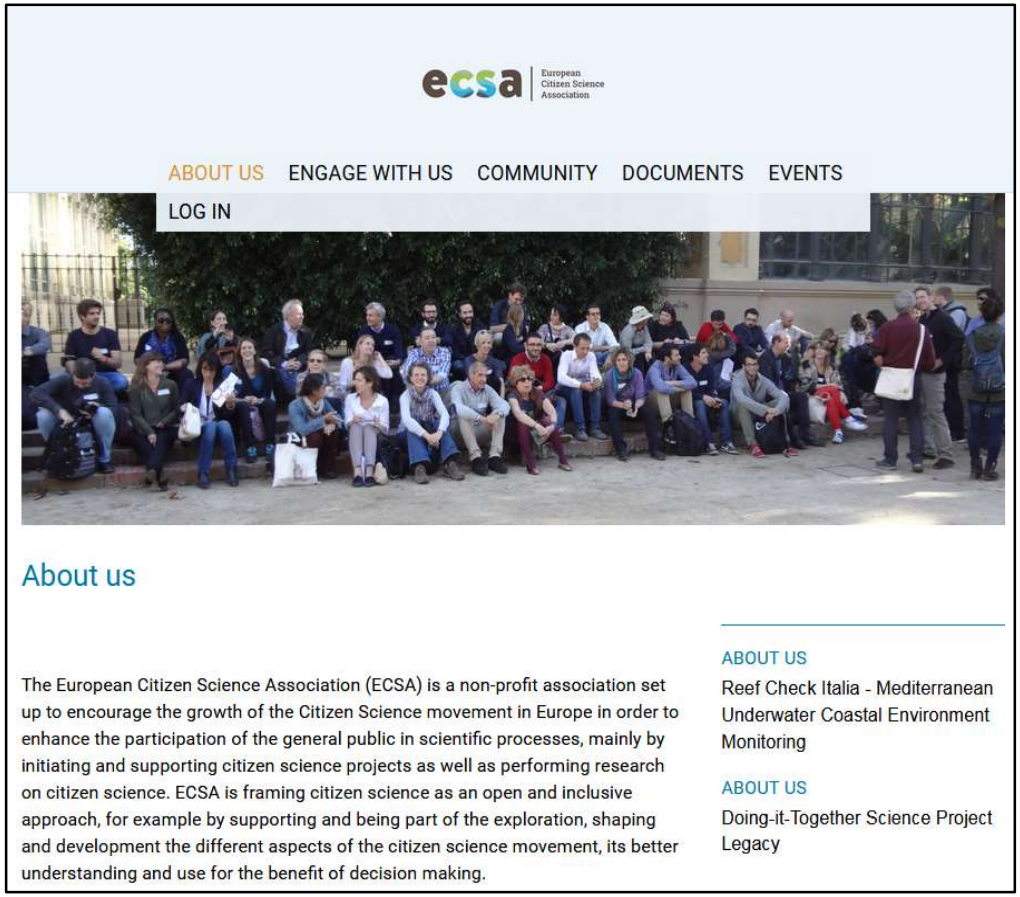
EUROPEAN
CITIZEN SCIENCE
ASSOCIATION

ECSA General Assembly 2015
28.-30. October, Barcelona, Spain

doing it together science

A collection of Citizen Science guidelines and publications

https://ecsa.citizen-science.net/



UK Environmental Observation Framework

Guide to Citizen Science

developing, implementing and evaluating citizen science to study biodiversity and the environment in the UK

Data Quality

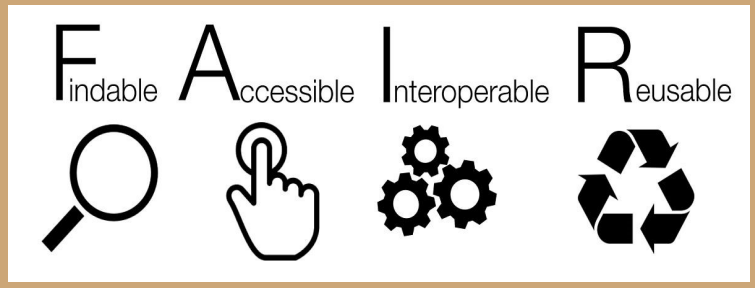
REAL-MEASURE

1. Quantity
2. Accuracy
3. Precision

UTILITY

1. Completeness
2. Free-of-bias
3. Scale-adjusted
4. Fitness-for-use
   (hypothesis driven)

UTILITY 2.0



Types of Citizen Science

types of citizen, approach, goals...

- Amateurs
- Trained
- Naive

- Contributing projects
- Collaborative projects
- Co-creative projects

- Scientists' needs
- Participants' needs

Mosquito Alert

A citizen science solution

Why adding citizen science in your surveillance?

It is the future...

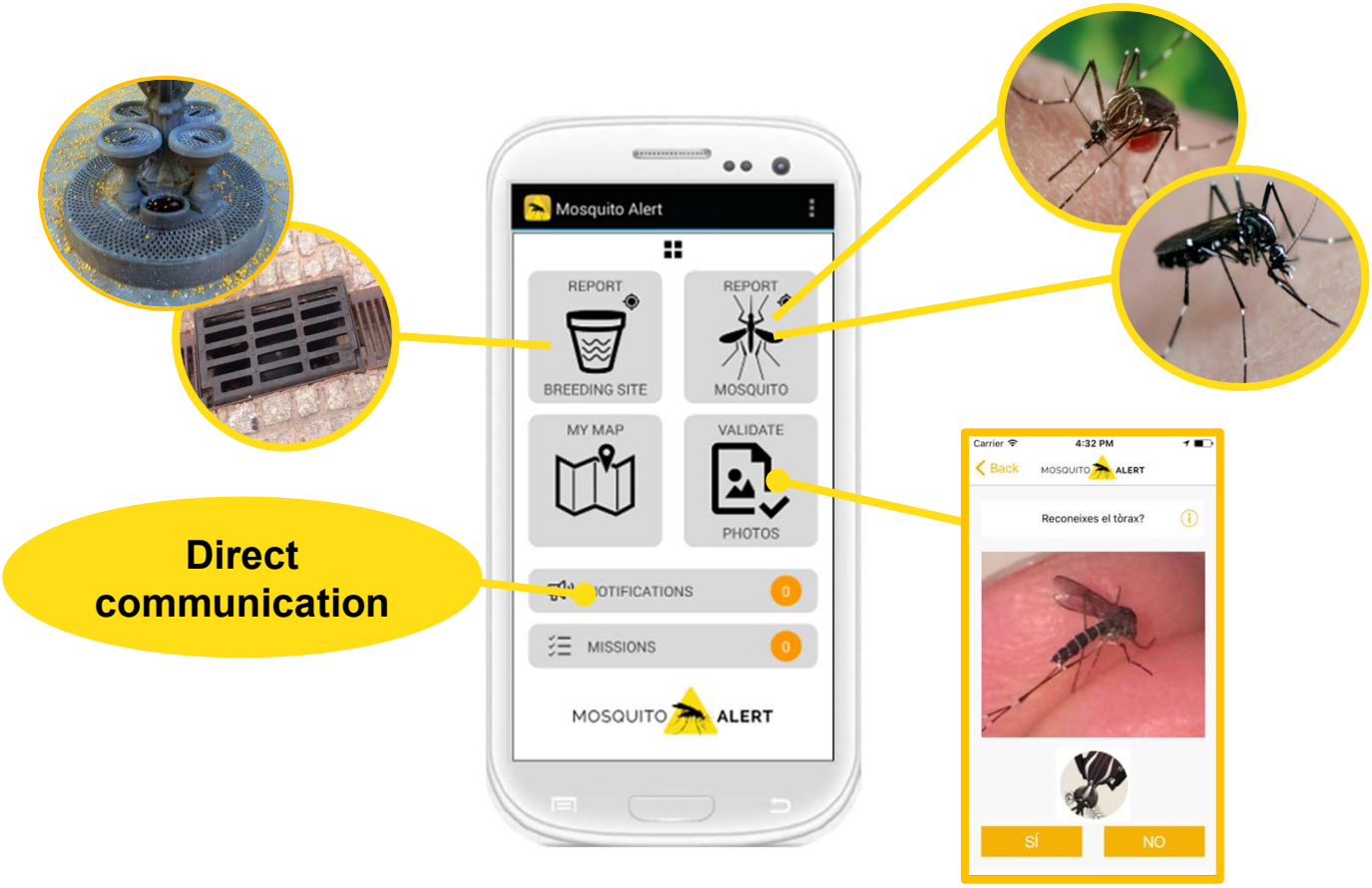
- Scalability
- Real-time
- Flexibility
- Integrative
- Big Data
- Open
- Cost-effective

Why NOT adding citizen science in your surveillance?

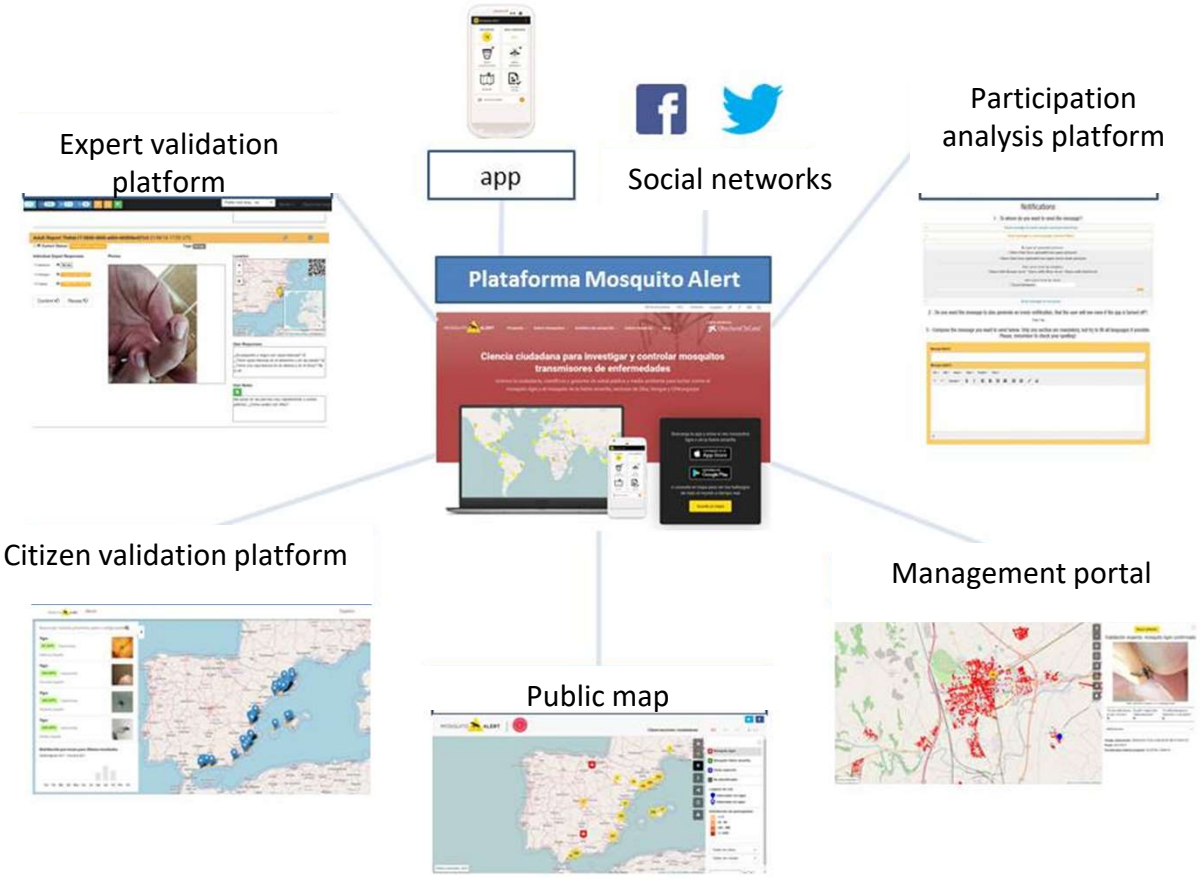
It is demanding...and open!

- Community Managing
- Requires fast-rewards
- Technologically demanding
- Multidisicplinar team
- Openess

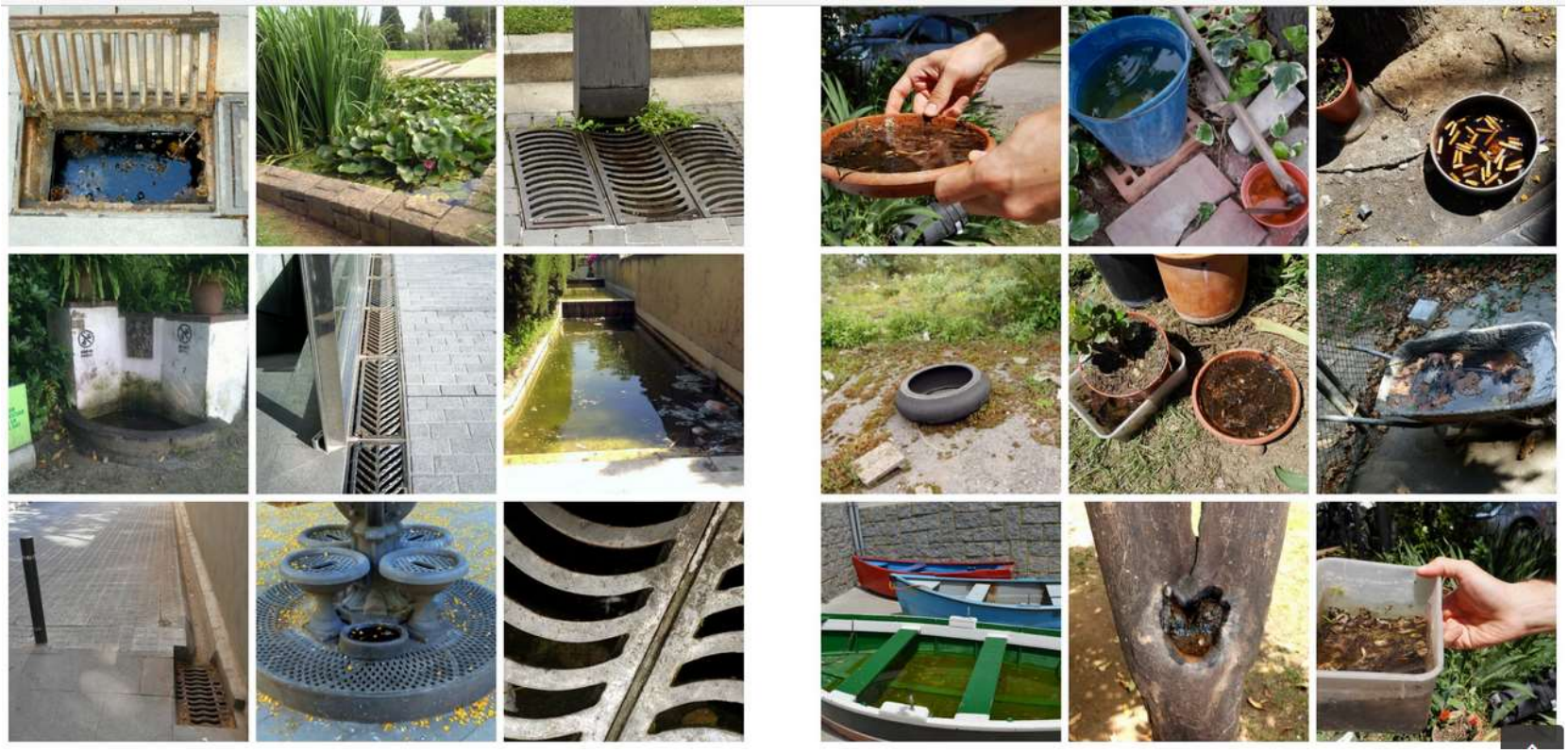
Citizen Observations: Collecting Data



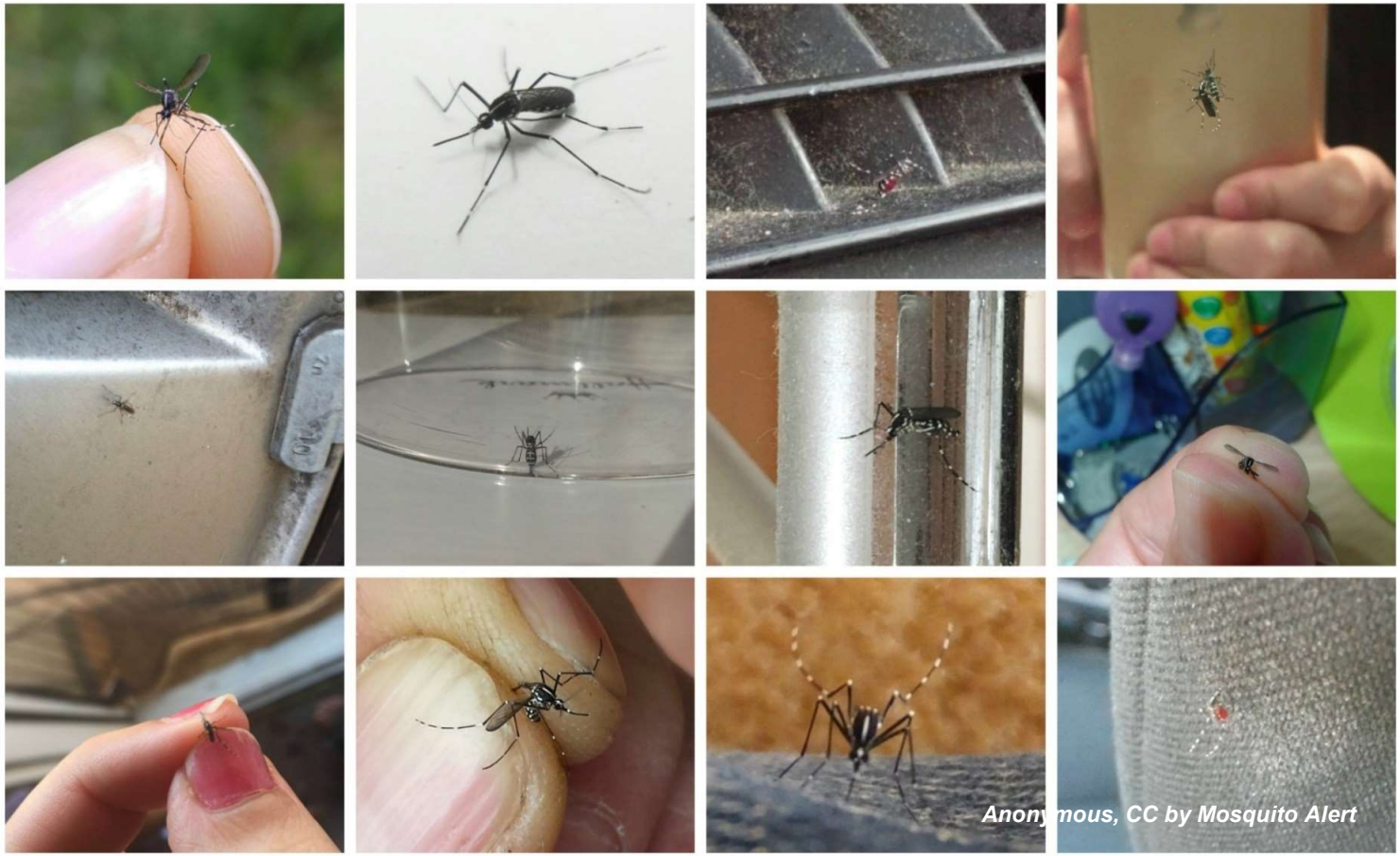
Mosquito Alert is an e-infrastructure



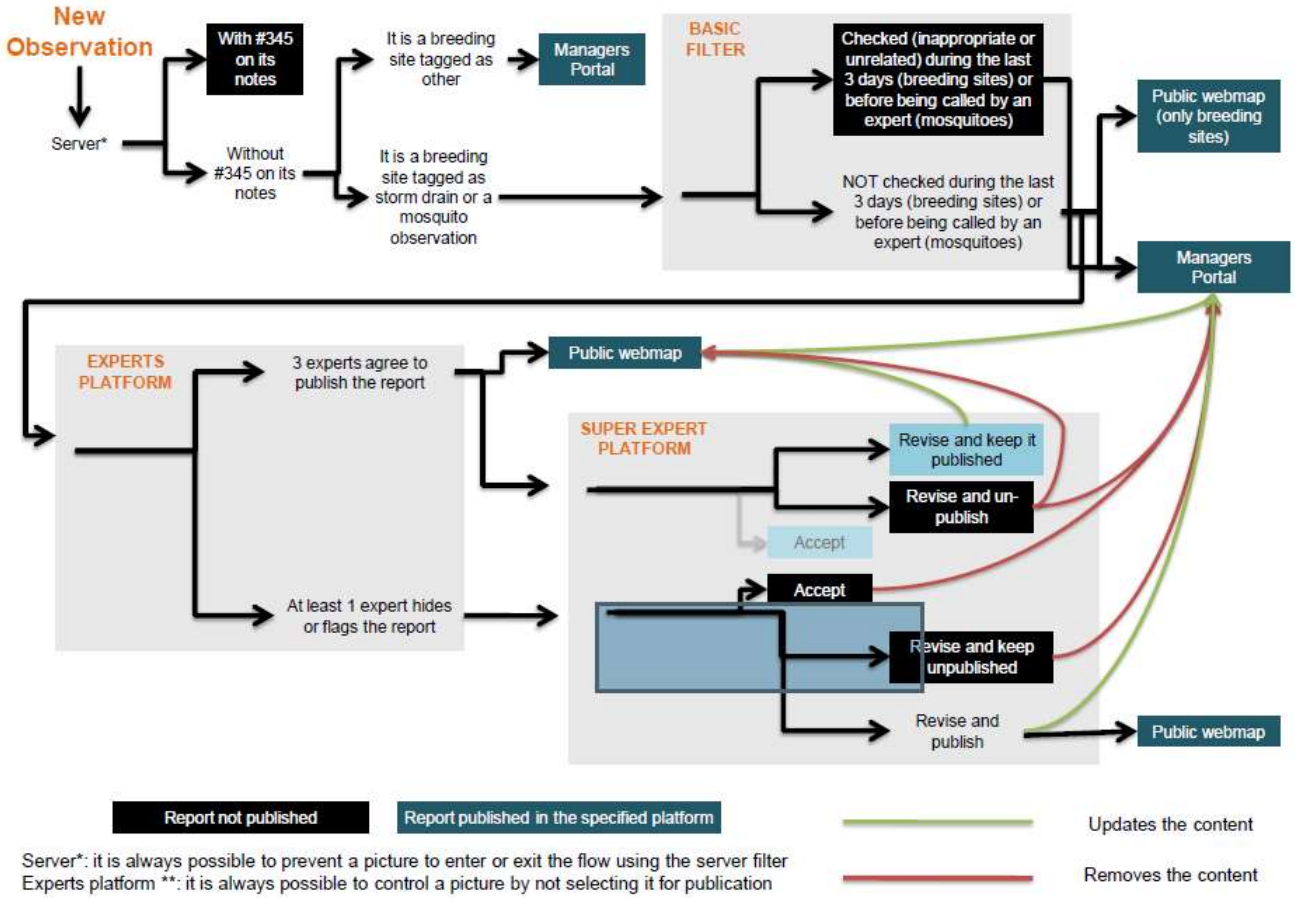
MOSQUITO ALERT



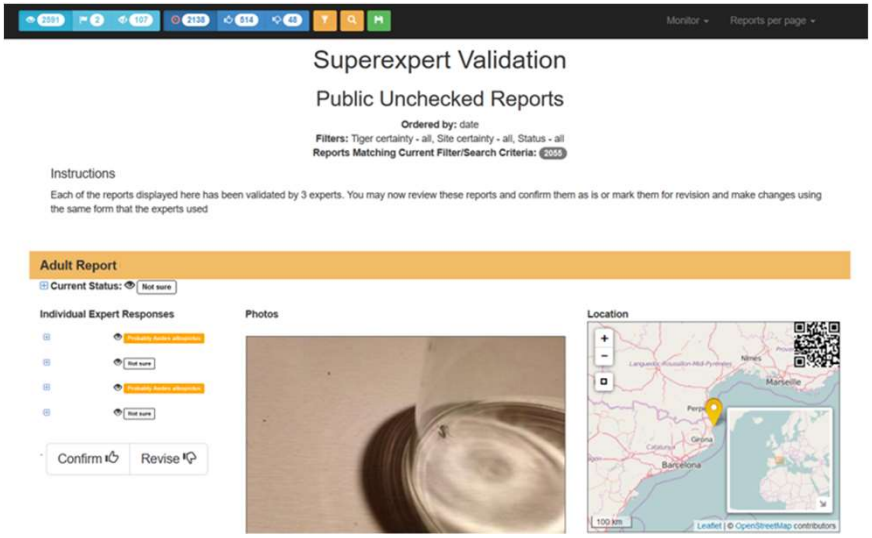
MOSQUITO ALERT



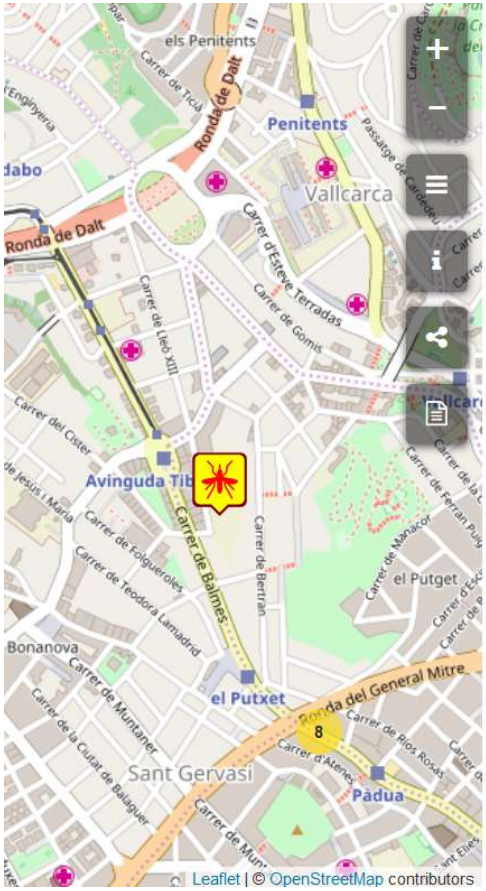
Data flow at MOSQUITO ALERT



Validating Data: DIGITAL ENTOLAB



Data Visualization and Sharing



Expert validation: possible tiger mosquito

Author: Anonymous. License: CC by Mosquito Alert

Expert note: *Nota experta: Se aprecia la raya blanca en patas y abdomen, nos faltaría la raya blanca en cabeza y tórax. Te animamos a que nos mandes una foto donde se vea ¡Gracias!*

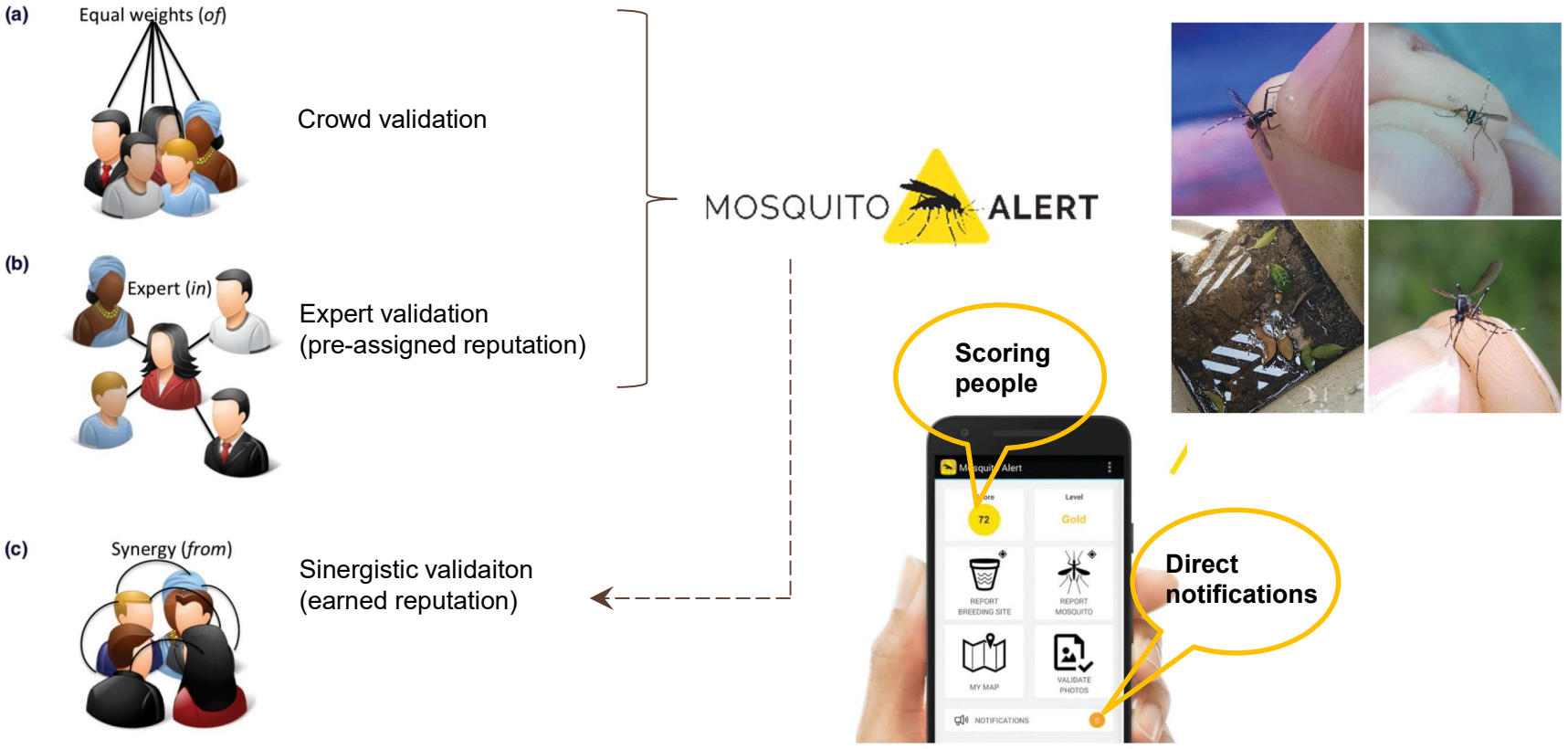
Observation ID: 9a5f5780-1039-4fac-9e30-d510210d9a08

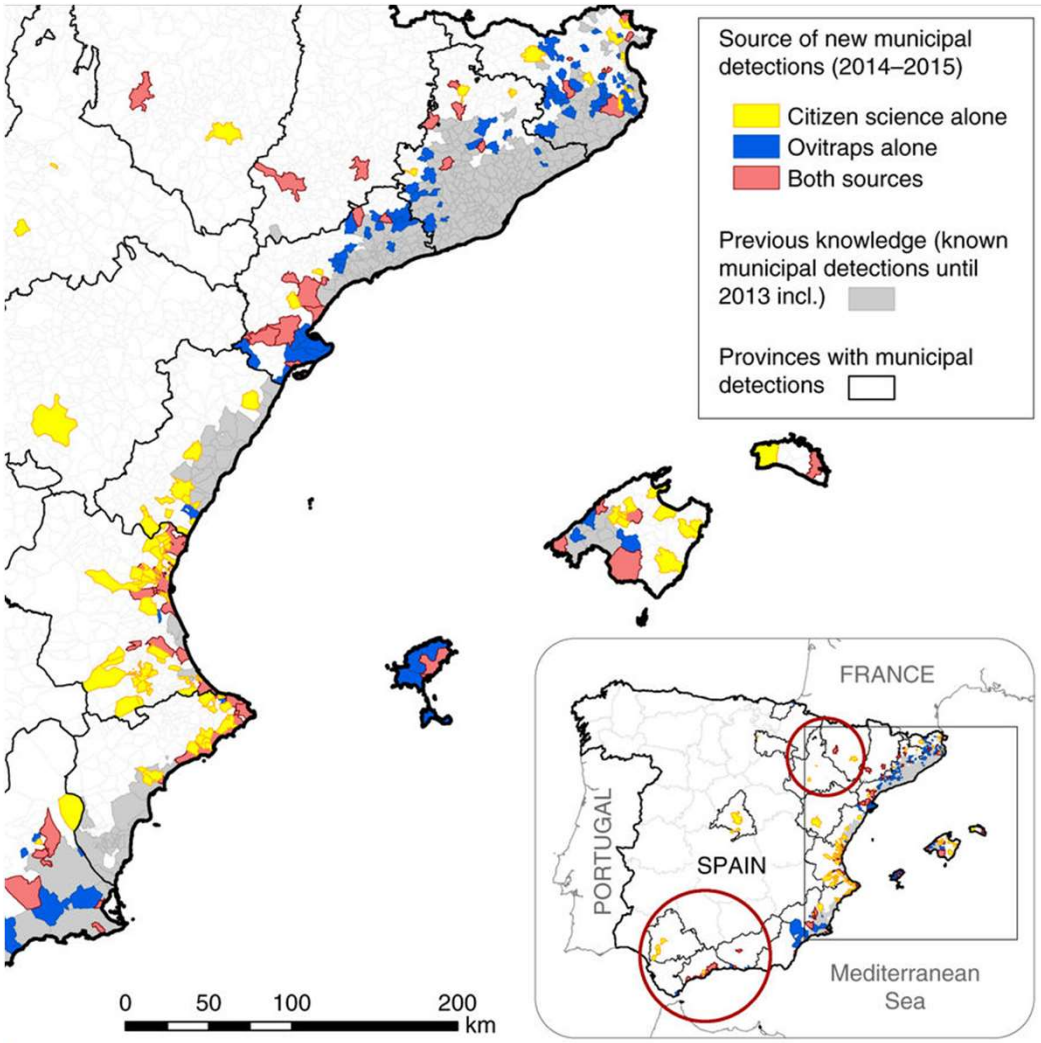
Date: 17-9-2015

Coordinates (latitude,longitude): 41.408615, 2.138596

Reputation Systems in Citizen Science

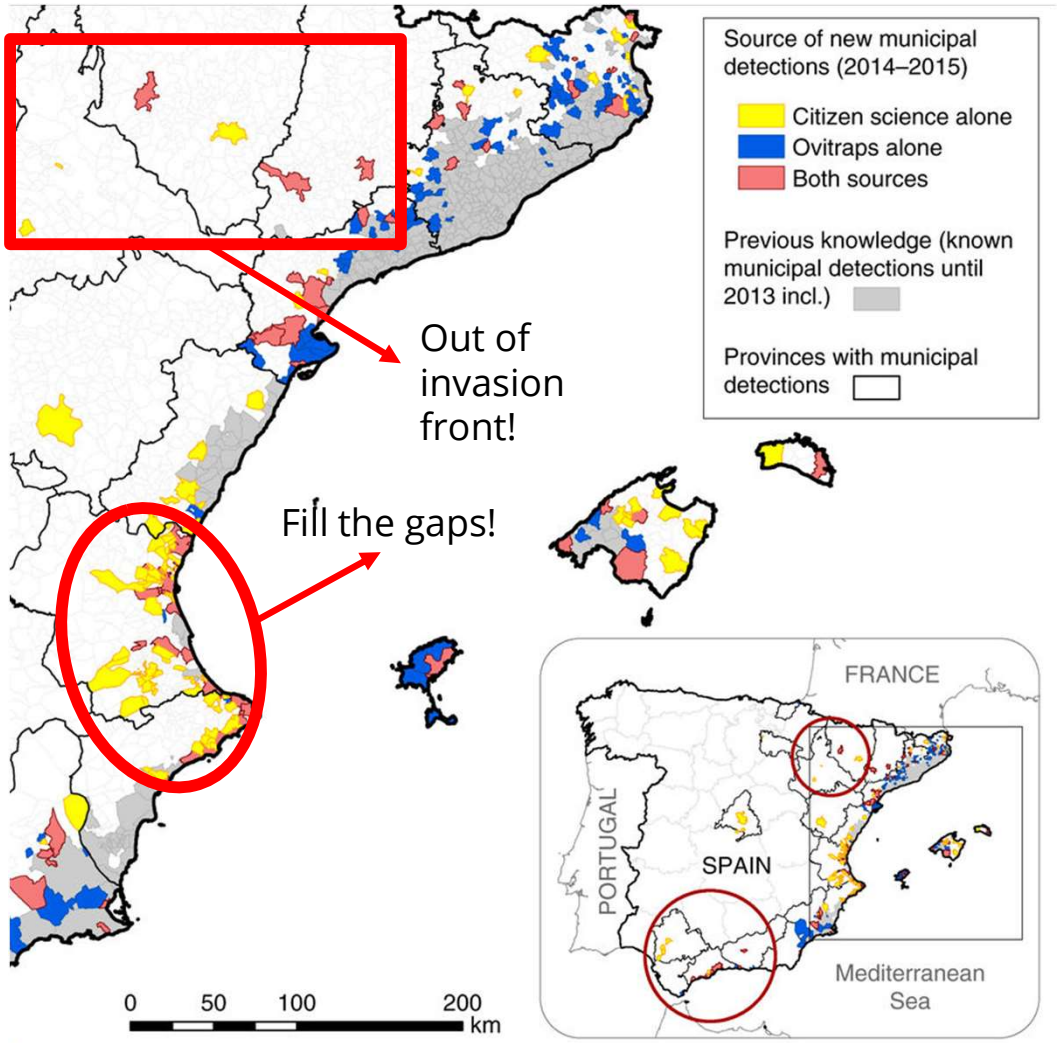
Silverstown et al. (2015) ZooKeys





Early Warning

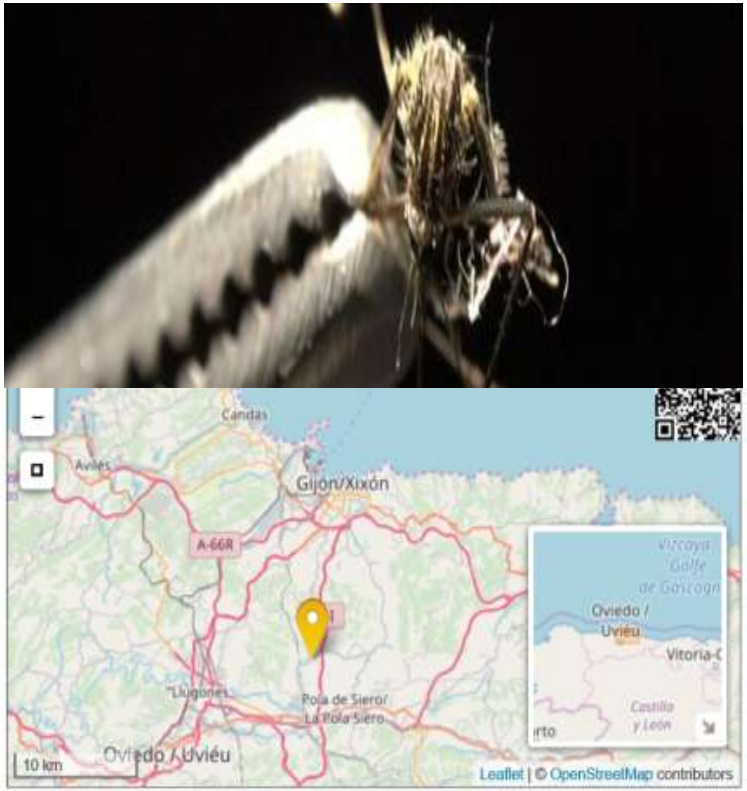
Mosquito Alert detects tiger mosquito invasion into previously clear municipalities **sooner** than traditional surveillance **and at greater** distances from the invasion front.



Early Warning

Mosquito Alert detects tiger mosquito invasion into previously clear municipalities **sooner** than traditional surveillance **and at greater** distances from the invasion front.

Japonicus Mosquito in Northen Spain (Asturias) 4-07-2018



We would be very interested if you could give us more details about this mosquito, especially if you have kept it, or you can get more specimens to send by postal mail.

Rural Habitats, cattle-related breeding sites

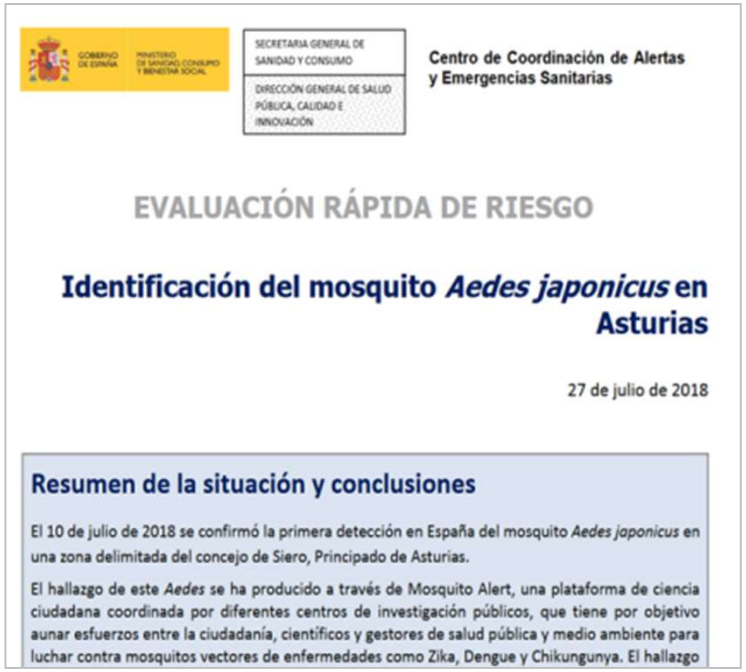
Aedes japonicus

Aedes albopictus

Aedes aegypti

Consequences

- A (national) rapid risk assessment
- An updated official European map (ECDC)
- Media attention and more pictures received
- Eritja et al 2019. Parasites & Vectors



GOBIERNO DE ESPAÑA · MINISTERIO DE SANIDAD, CONSUMO Y BIENESTAR SOCIAL

SECRETARÍA GENERAL DE SANIDAD Y CONSUMO

DIRECCIÓN GENERAL DE SALUD PÚBLICA, CALIDAD E INNOVACIÓN

Centro de Coordinación de Alertas y Emergencias Sanitarias

EVALUACIÓN RÁPIDA DE RIESGO

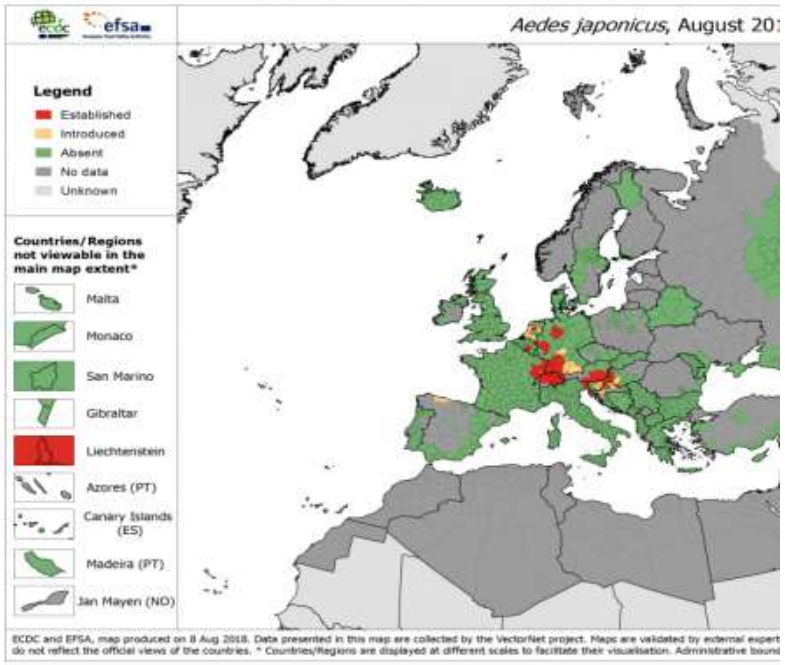
Identificación del mosquito *Aedes japonicus* en Asturias

27 de julio de 2018

Resumen de la situación y conclusiones

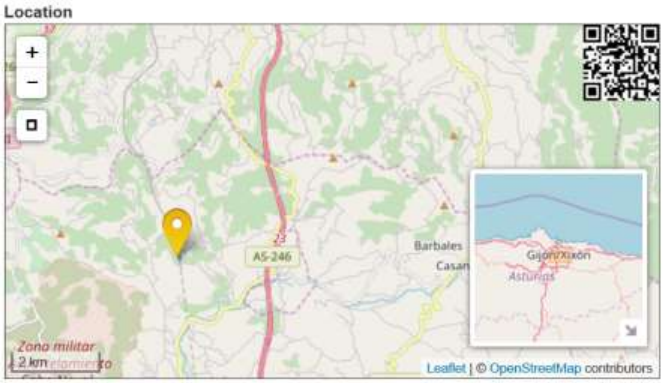
El 10 de julio de 2018 se confirmó la primera detección en España del mosquito *Aedes japonicus* en una zona delimitada del concejo de Siero, Principado de Asturias.

El hallazgo de este *Aedes* se ha producido a través de Mosquito Alert, una plataforma de ciencia ciudadana coordinada por diferentes centros de investigación públicos, que tiene por objetivo aunar esfuerzos entre la ciudadanía, científicos y gestores de salud pública y medio ambiente para luchar contra mosquitos vectores de enfermedades como Zika, Dengue y Chikungunya. El hallazgo

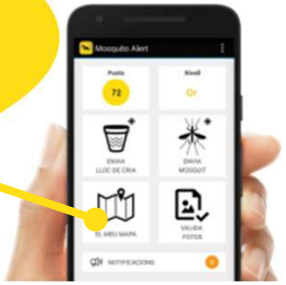


Consequences

The media attention brings new evidence from participant citizens.



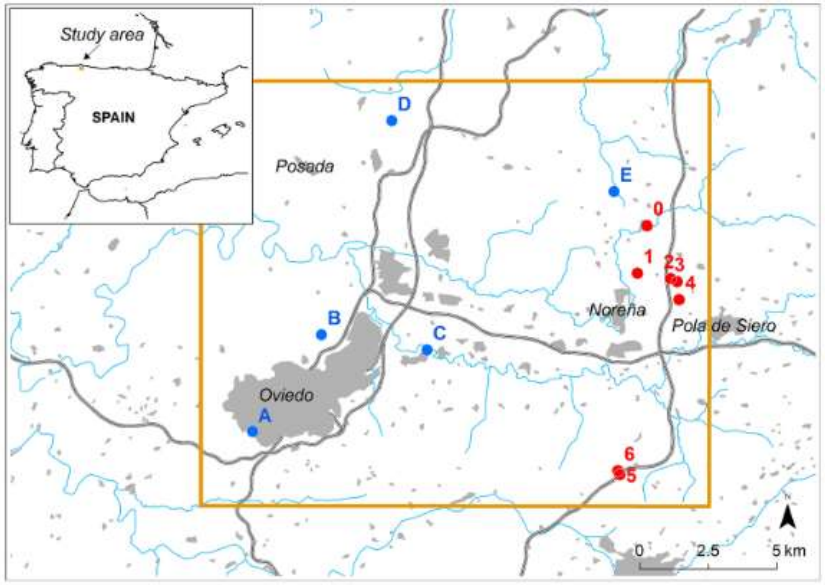
I've been observing this mosquito since 3 years ago, near the location where the japonicus has been detected.



RESEARCH Open Access

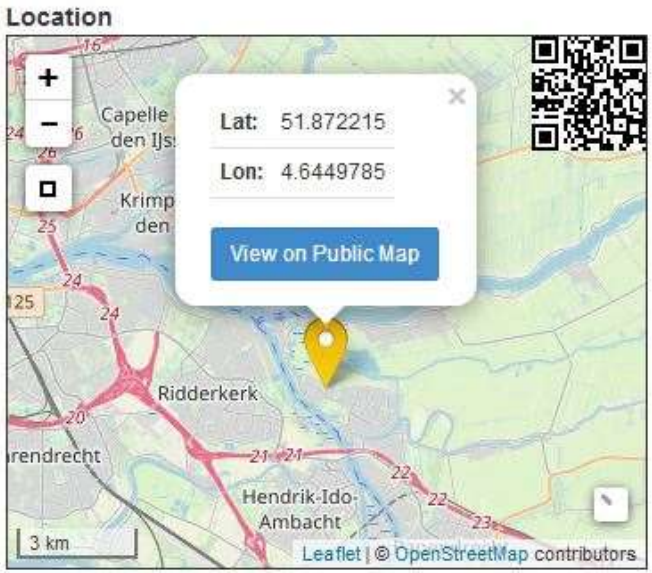
First detection of *Aedes japonicus* in Spain: an unexpected finding triggered by citizen science

Roger Eritja[1*], Ignacio Ruiz-Arrondo[2], Sarah Delacour-Estrella[3], Francis Schaffner[4,5], Jorge Álvarez-Chachero[6], Mikel Bengoa[7], María-Ángeles Puig[8], Rosario Melero-Alcíbar[9], Aitana Oltra[8] and Frederic Bartumeus[1,8,10]



Eritja *et al. Parasites & Vectors* (2019) 12:53
https://doi.org/10.1186/s13071-019-3317-y

Tiger Mosquito in Rotterdam 4-09-2019



Adolfo Ibáñez-Justicia
Sr. Researcher Vectors

.....

Netherlands Food and Consumer Product Safety Authority (NVWA)
National Reference Centre (NRC)
Centre for Monitoring of Vectors (CMV)

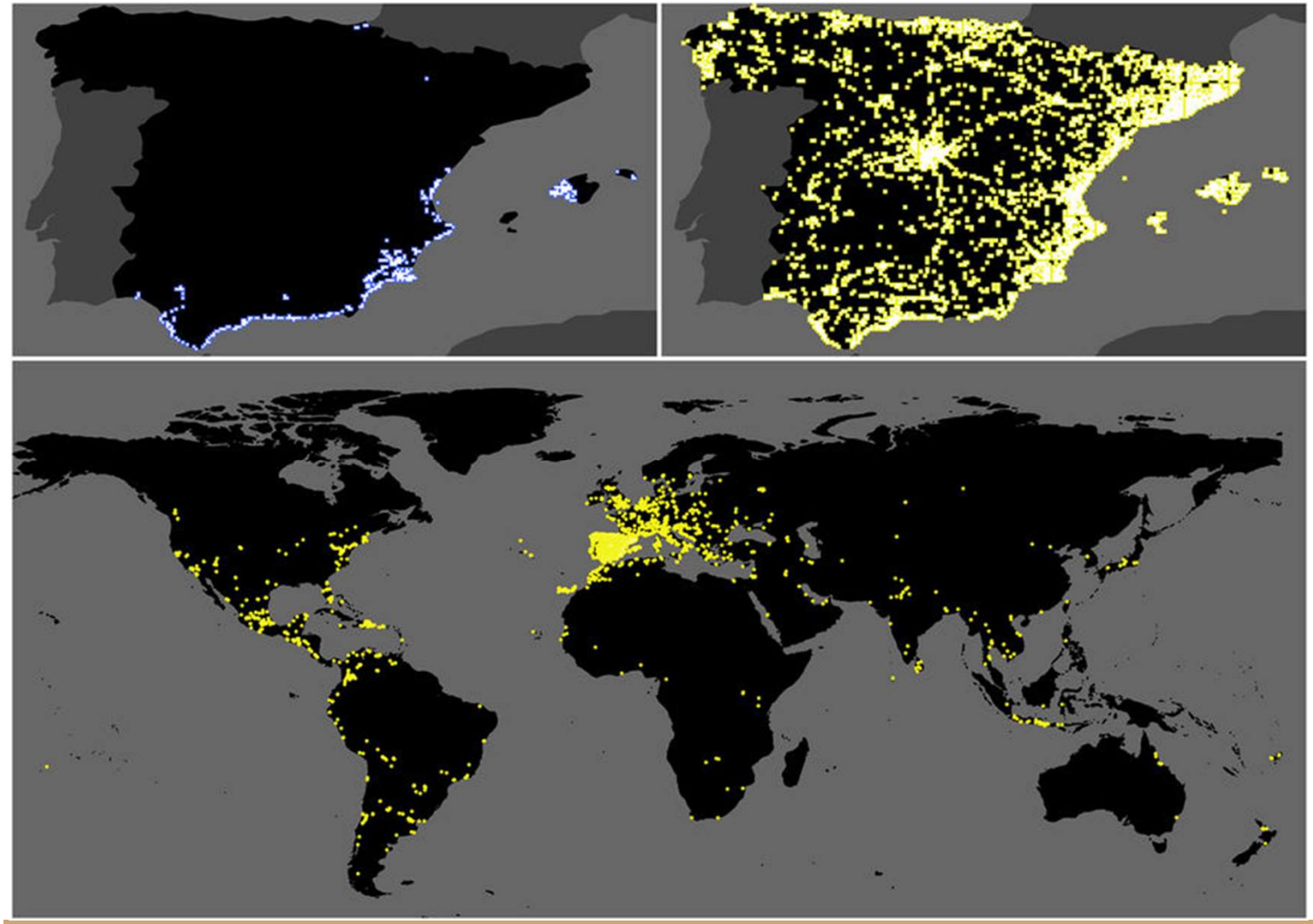
Sampling Bias Problem

Does absence of reports indicate absence of mosquitoes or of citizen scientists?

Does abundance of reports indicate abundance of mosquitoes or of citizen scientists?

Modelling Sampling Biases

- Participation patterns
- Background tracking
- Reporting dynamics



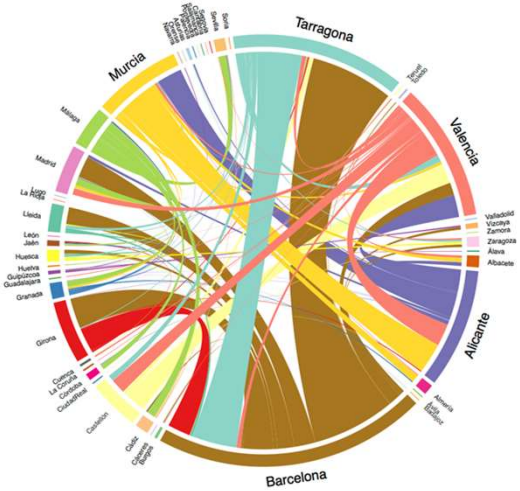
Scalable Sampling Effort

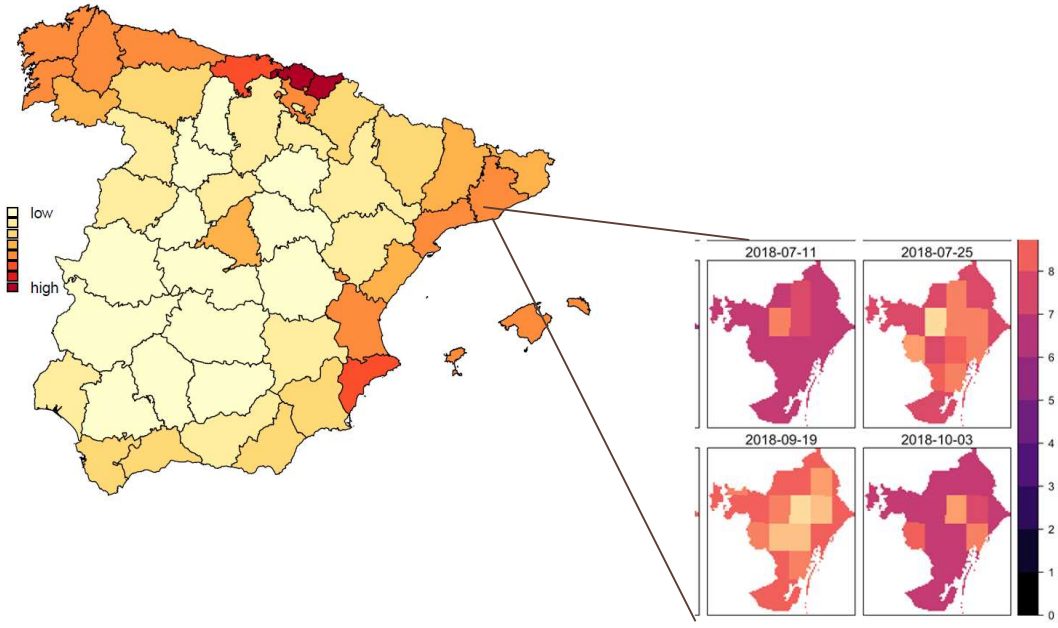
Ovitraps (left) vs. Mosquito Alert participants (right) in Spain during 2014-15.

Over 60,000 participants worldwide to date.

Vector Modelling

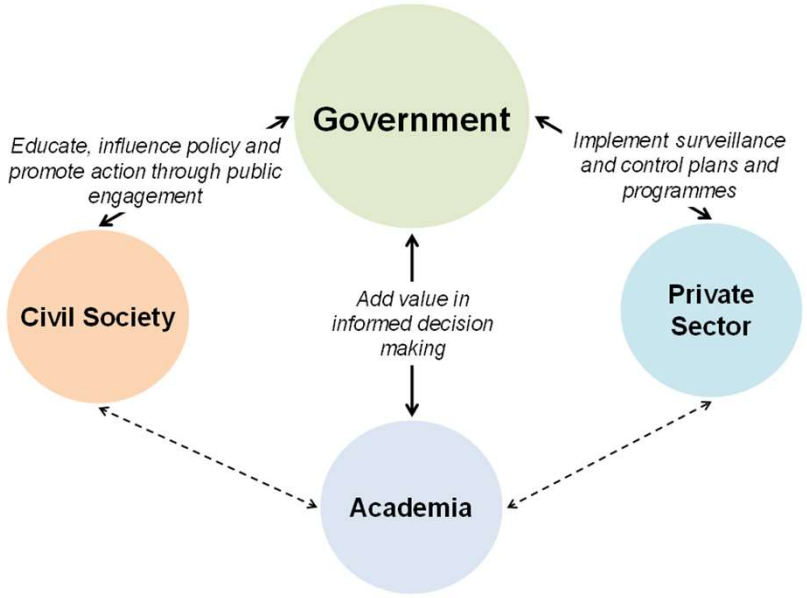
(mosquito abundance, fluxes encounter rates, biting patterns?)





Open Innovation

at regional and country-level



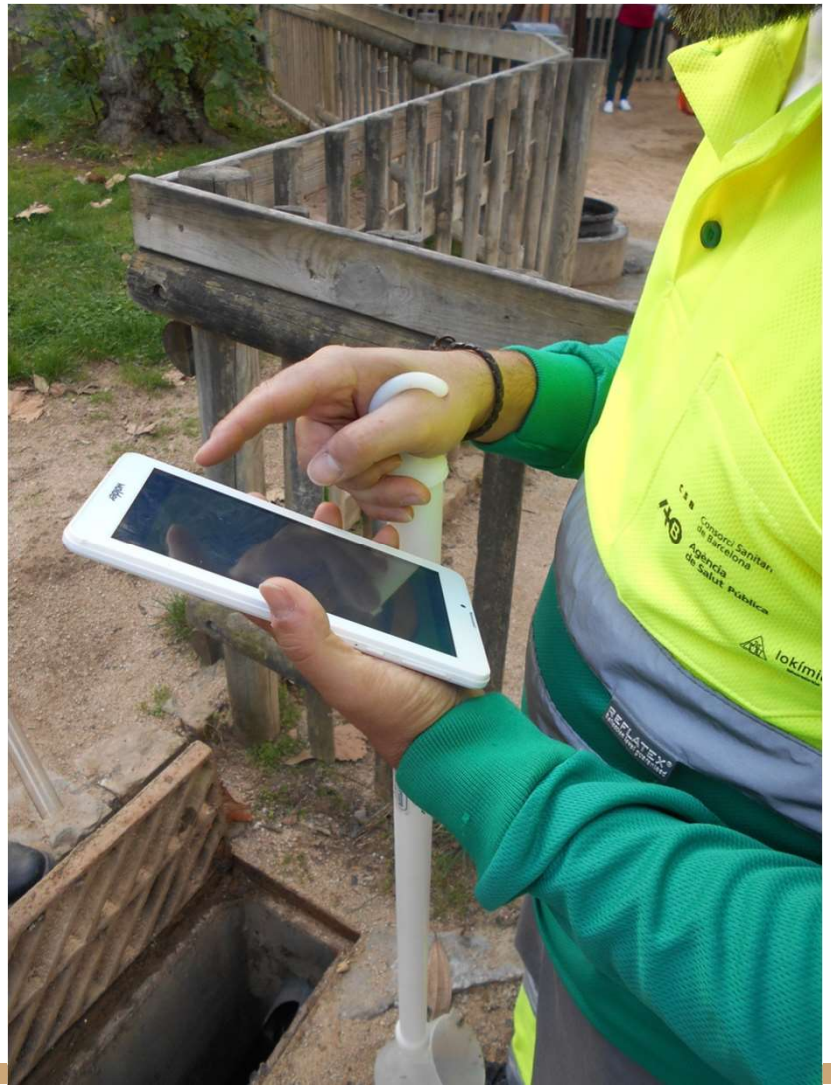
GOBIERNO DE ESPAÑA
MINISTERIO DE SANIDAD, CONSUMO Y BIENESTAR SOCIAL

Generalitat de Catalunya
Departament de Salut

COPATE
SCM
ISGlobal
PROSICS
Institut Català de la Salut
Programa de salut internacional
IGTP
MOSQUITO ALERT
IDIAP Jordi Gol
IDI BELL
IDIBGi
Institut d'Investigació Biomèdica de Girona Dr. Josep Trueta
lokímica laboratorios
anecpla
asociación nacional de empresas de sanidad ambiental

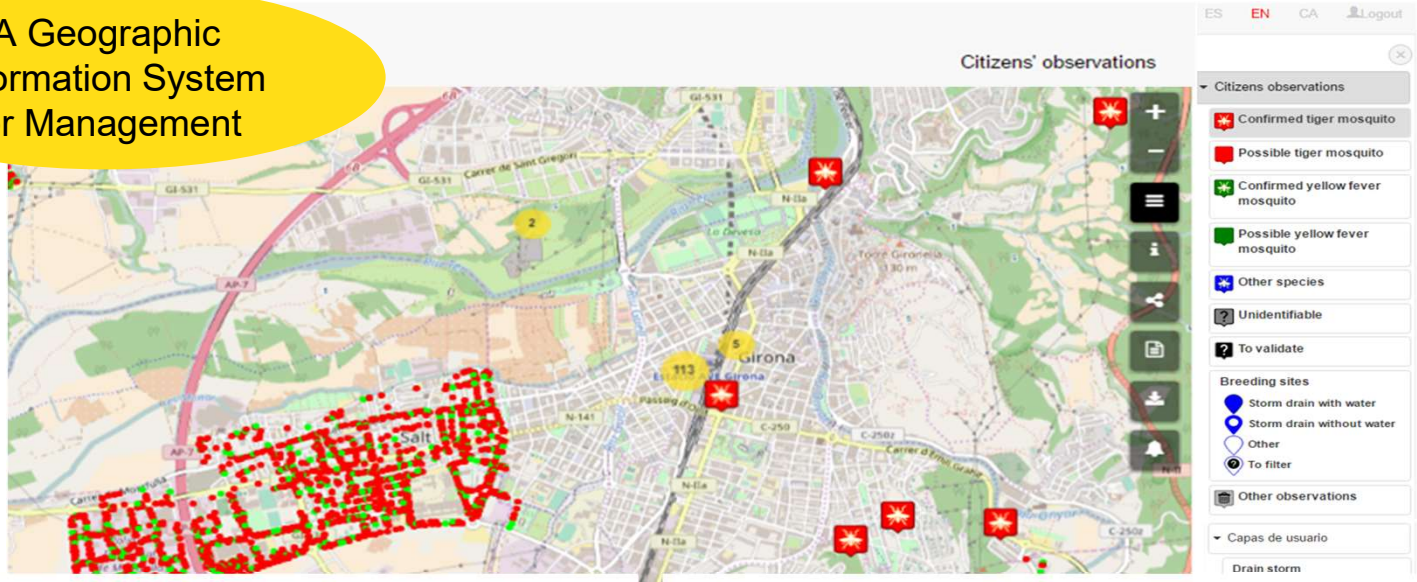
A citizen-driven platform for the Integrated Control of Arbovirosis

1. (Stakeholder) Management Portal
2. Smartphone Notification System
3. Vector Modelling



MANAGEMENT: Stakeholder Portal

A Geographic Information System for Management



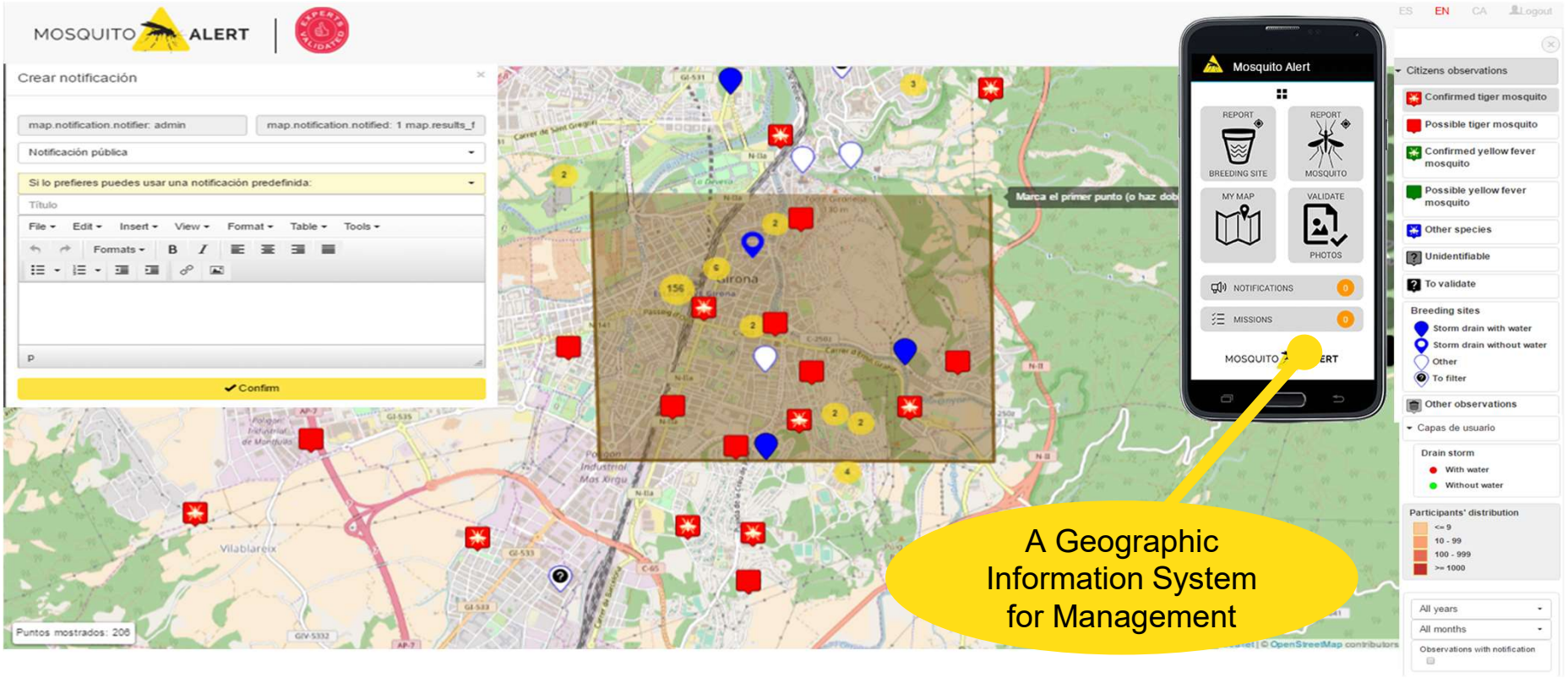
Epidemiological DATA

- Infected Cases for epidemiological control

Vector Surv. & Control DATA

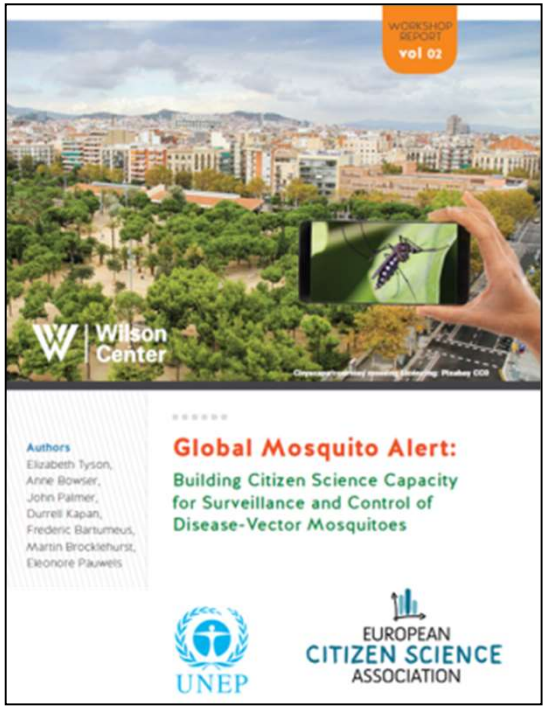
- Mosquito surveillance
- Breeding site activity
- Vector risk models

Smartphone Notification System



Current Initiatives or what is it next?

Global



European

National/Regional

Working Groups

ECSA's thematic working groups undertake the major part of our activities throughout the year. They focus on research, exchange of experience and capacity building and are open to our members and supporters. Membership of working groups requires a time commitment to attend meetings and undertake tasks. To join a working group please contact the relevant Chair.

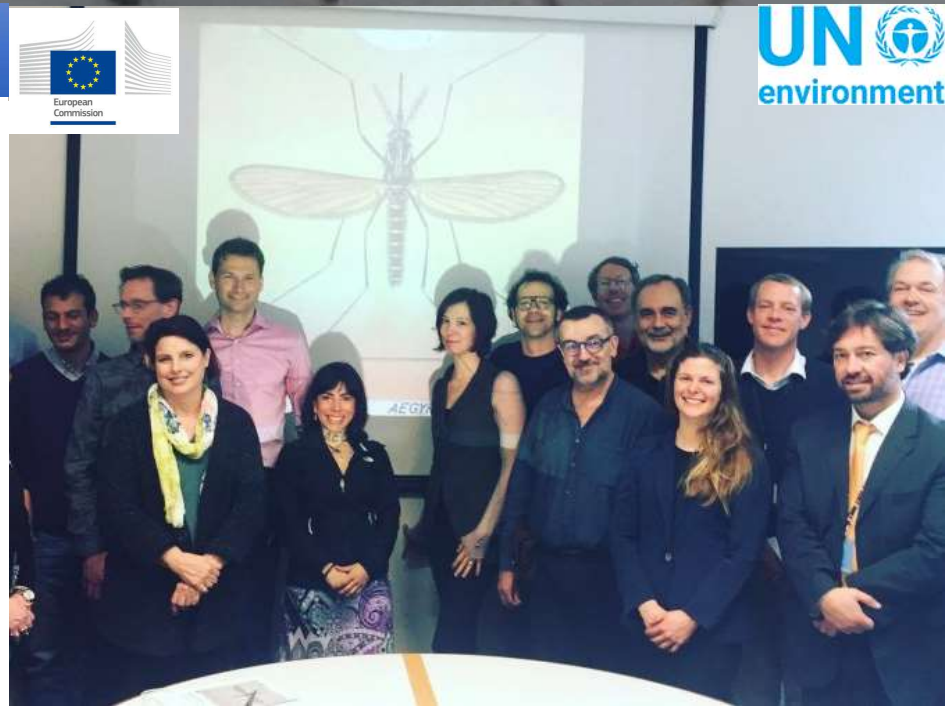
At the ECSA 2018 General Assembly, the following Working Groups were renewed and establised (*list still incomplete*):

- Sharing Best Practice and Building Capacity
- Projects, Data, Tools, and Technology
- Policy, Strategy, Governance and Partnerships
- Learning and Education in Citizen Science
- Citizen Science and Open Science
- BioBlitzes
- Global Mosquito Alert
- Air Quality
- Empowerment, Inclusiveness, Equity
- Citizen Science Networks

In addition to the working groups, ECSA also conducts general communication and capacity building activities and engages in research and coordination projects. Read more below.

MEP BRIEFING ON CITIZEN SCIENCE

SUPPORT FOR EU ENVIRONMENTAL AND RESEARCH POLICIES



The Global Mosquito Alert Consortium Vision

The Global Mosquito Alert Consortium is a new citizen science initiative that aims to leverage networks of scientists and volunteers for the global surveillance and control of mosquito species known to carry the following diseases: Zika, yellow fever, chikungunya, dengue, malaria, and the West Nile Virus.

The Global Mosquito Alert will be an open, common set of protocols and toolkit that is augmented with modular components created to meet both global and local research and management needs.

UN environment

EUROPEAN CITIZEN SCIENCE ASSOCIATION

AIM

cost
EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

Woodrow Wilson International Center for Scholars

Aedes Invasive Mosquitoes: Linking Citizen Science to Epidemiological Models

COST ACTION CA17108

WORKSHOP. Blanes 25-27. March 2019.

	GLOBE Observer	mosquitoWEB	muggenradar.nl	ZanzaMapp.it	MOSQUITO ALERT	Mückenatlas Jede Mücke zählt!
Images	Yes	No (sample)	No	No	Yes	No (sample)
Taxonomic identification	Yes	Yes	No	No	Yes	Yes
Biting	No	Yes	No	Yes	No	No
Nuisance info	No	No	Yes	Yes	No	No
Image encounters	No	No	No	No	No	No
Breeding site Larvae	Yes	Yes	No	No	Yes	No
Protection / Measures	No	No	Yes	Yes	No	No
Human Mobility	No	No	No	No	Yes	No

Mosquito nuisance / bite

When

Where

Mosquito observation, how many

Mosquito identification

Measures

Water Source?

(a) Lake, Swamp (ditch, wetland, lake, etc...)
(b) Water near a stream (estuary, puddle by a stream)
(c) Artificial container (cement, metal, plastic tank, etc...)
(d) Garbage or similar (Can, bottle)
(e) Natural container (Plant shell, animall shell, hole in tree, etc...)

Take picture and send

Is there any visible larva?

Yes
No
Not sure

Would you like to perform a sampling and count larvae?

Number of larvae observed?
Number of pupae observed?
See mosquito eggs?

Do you see mosquitoes around?

Yes
No

Continue with the identification of larvae

Taxonomic instruction to identifies groups or species

What nuisance have you experienced?

I have not experienced any inconvenience
I was bitten
I suffered from buzzing
The night rest was disturbed
Different

Breeding site. Water Source

Take picture and send

When did you experience the inconvenience?

At night
In the morning
In the evening

When did you observed?

During last hour
Last night
In the morning
In the evening

Mosquito bites me!

Future version

Where did you experience mosquito nuisance?

Bedroom
Living room
Kitchen
Cellar
Garden
Outdoor, etc...

Where was you?

Outdoors
Indoors

When?

Where?

How many mosquitoes have you seen or heard?

1
2 – 5
6 – 10
11 – 20
21 – 50
More than 50

Did you experience mosquito nuisance? How many you observed?

1 - 3
3 - 30
More than 30

Did you observe mosquito?

What measures do you take to limit mosquito nuisance

No measures
Mosquito net bed
Mosquito net windows
Mosquito repellent skin
Mosquito plugs, etc...

Measures did you take

Indicate day and hour you did a disinfection
Product you used

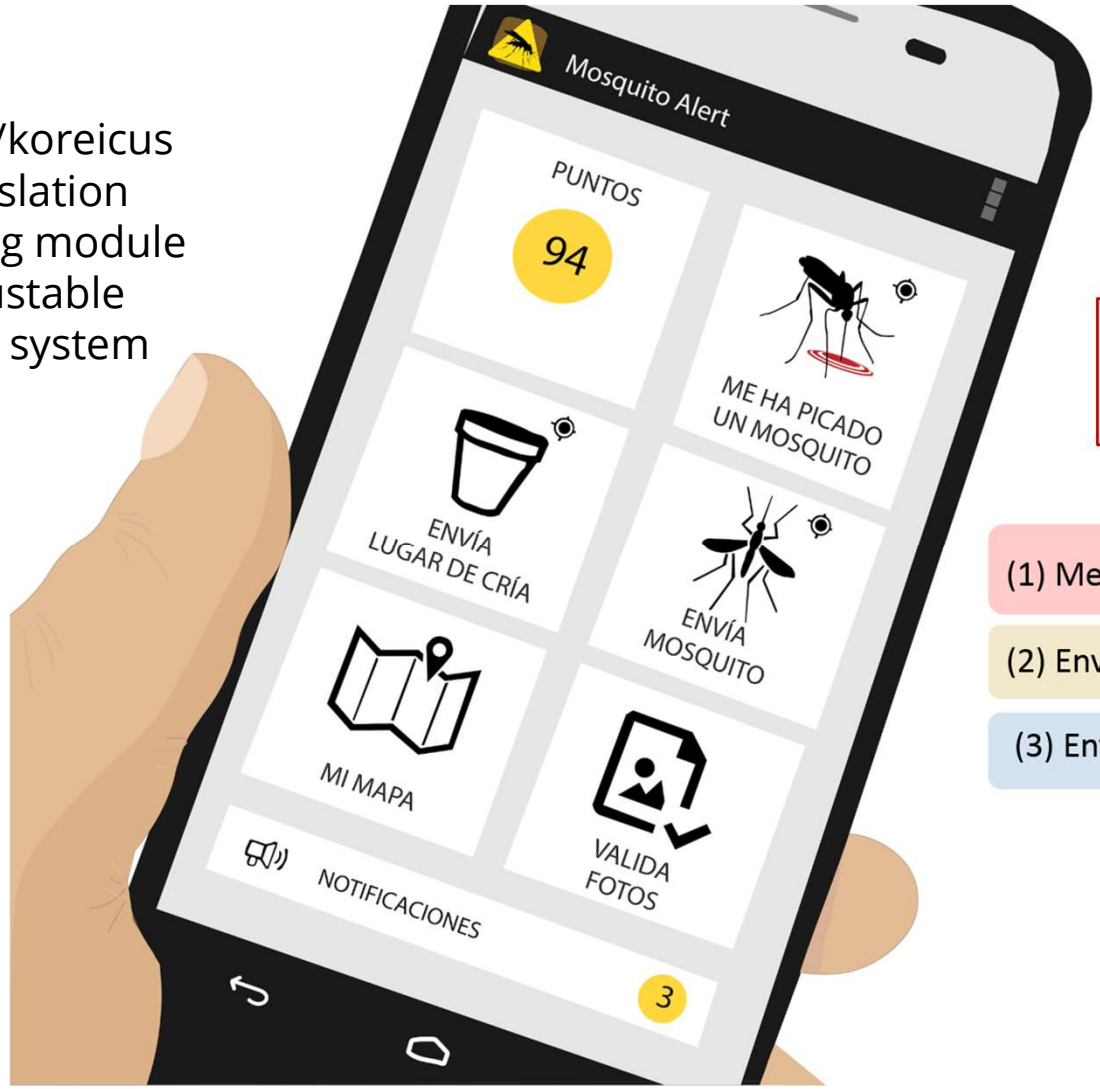
Identification of species

Take picture and send

Validation

FUTURE STEPS

- Add japonicus/koreicus
- Language translation
- Adding a bitting module
- Front-end adjustable
- Core back-end system



3 MÓDULOS DE ENTRADA PARA ENVIAR INFORMES

(1) Me ha picado un mosquito

(2) Envía mosquito

(3) Envía lugar de cría

Thanks!


AIM
Aedes Invasive Mosquitoes
cost
EUROPEAN COOPERATION
IN SCIENCE & TECHNOLOGY
MOSQUITO ALERT
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