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Working with citizens to monitor tick-associated risk

Lessons learned from the CiTIQUE project

Jonas Durand, Irene Carravieri, Clémence Leyat, Costanza Puppo, Julien Marchand, Cyril Galley, Sandrine Capizzi, Gwenaël Vourc'h, Marie Préau, Pascale Frey-Klett, Annick Brun-Jacob





Poll questions on stereotypes about ticks

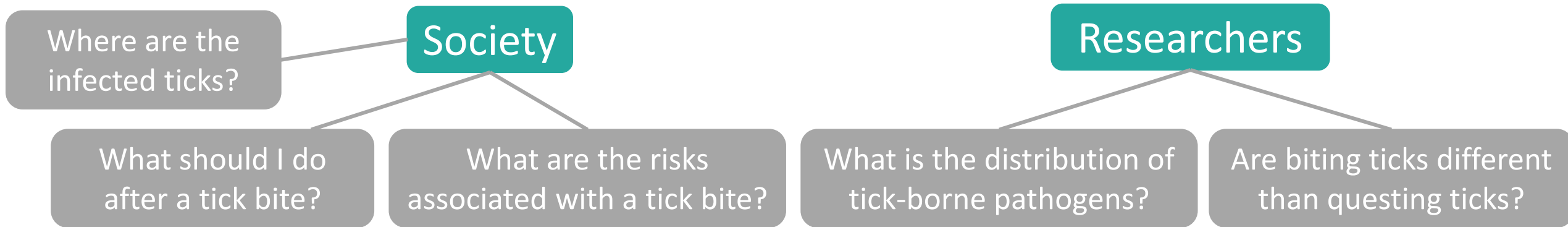
- Do ticks fall from trees to bite you?
 1. Yes
 2. No
 3. It's better than trees falling on me!
- Should you care about ticks when you're taking care of your garden?
 1. Yes
 2. No
 3. I can only dream to have a garden
- It's dangerous to let the mouthparts of the ticks in your skin after removing its body?
 1. Yes, because it can still infect you with a pathogen
 2. No, because the pathogens are localized in its body
 3. Yes, because the body will regrow from the mouth parts

Ticks and tick-borne diseases

- In Europe, ticks are the most important vector for vector-borne diseases for both human and animal health.
- Tick-borne diseases can be caused by bacteria (e.g. Lyme disease), parasites (e.g. babesiosis), viruses (e.g. tick-borne encephalitis).
- There are around 900 different species of ticks in the world, adapted to different ecosystems.



Ticks and citizen science



- Importance of Tick-borne Diseases (TBDs) for public health and society.

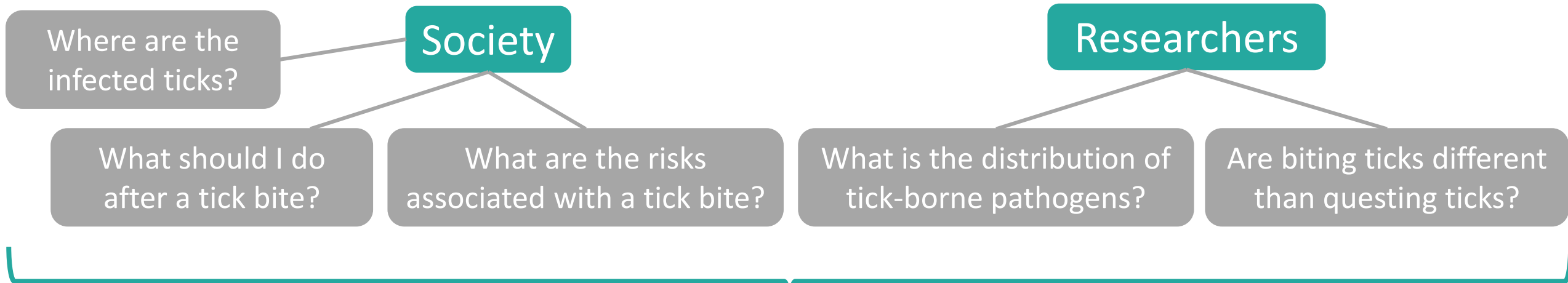


TBDs are a social problem that calls for the implication of citizens.

- Citizen science projects on ticks are increasing in the world.



CiTIQUE: a citizen science program



Started in 2017

To improve our knowledge of ticks and tick-borne disease ecology in order to improve prevention



CiTIQUE: How can citizens participate?

Different levels of citizen engagement

Started in 2017

Level 4

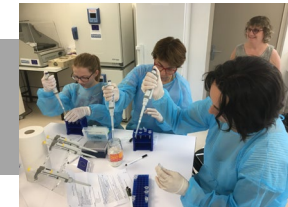
Co-construction of prevention messages with professionals



+ 100 trained professionals

Level 3

Analyzing the ticks during small internships



19 internships
197 students-researchers
77 citizen-researchers

Level 2

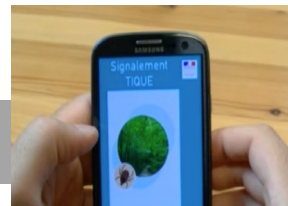
Sending biting ticks



+ 50 000 biting ticks stored in the 1st biting tick bank in France

Level 1

Reporting tick bites



- www.citique.fr
- App Signalement Tique
- Paper form



+ 61 000 animal and human tick bite reports

Level 0

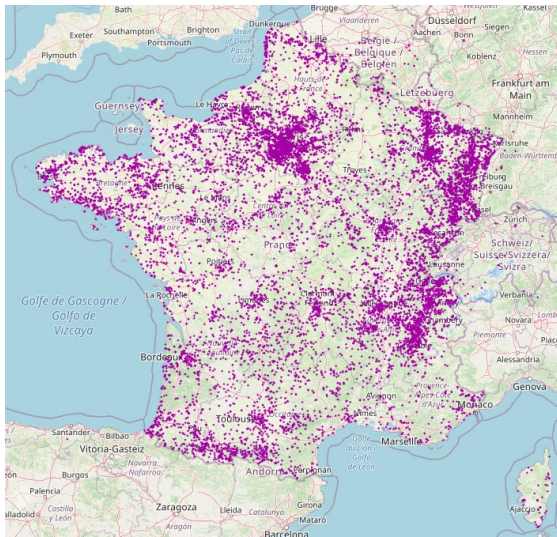
Helping with the outreach of the program
Adopting good methods to prevent tick bites



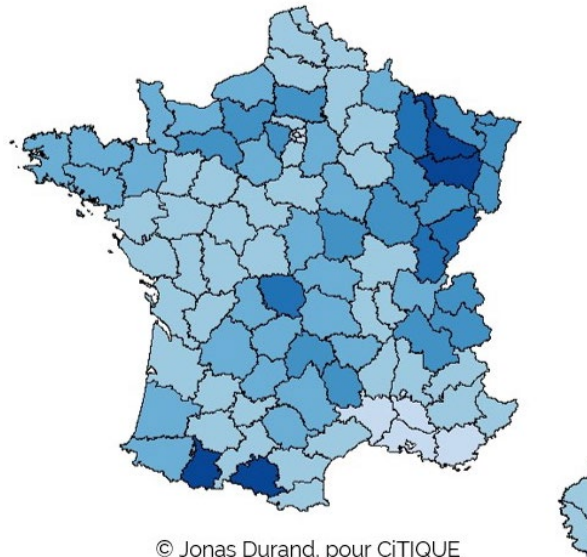
+ 100 partners (Associations, professionals, companies, collectivities...)

Level 1 & 2: results from 2020

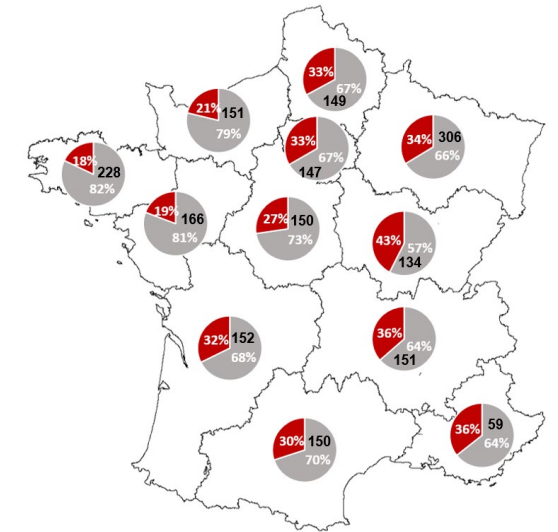
18 306 human and 5 300 animal tick bite reports in 2020



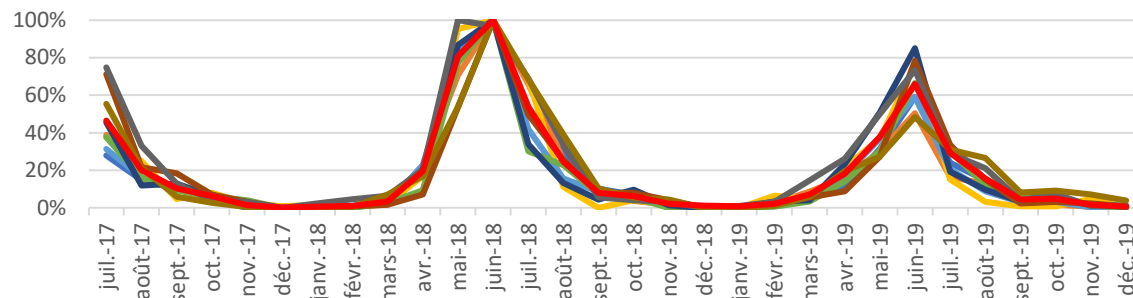
Location of tick bite reports



© Jonas Durand, pour CITIQUE
Number of human tick bites per 100 000 inhabitants



Percentage of ticks infected by a pathogen



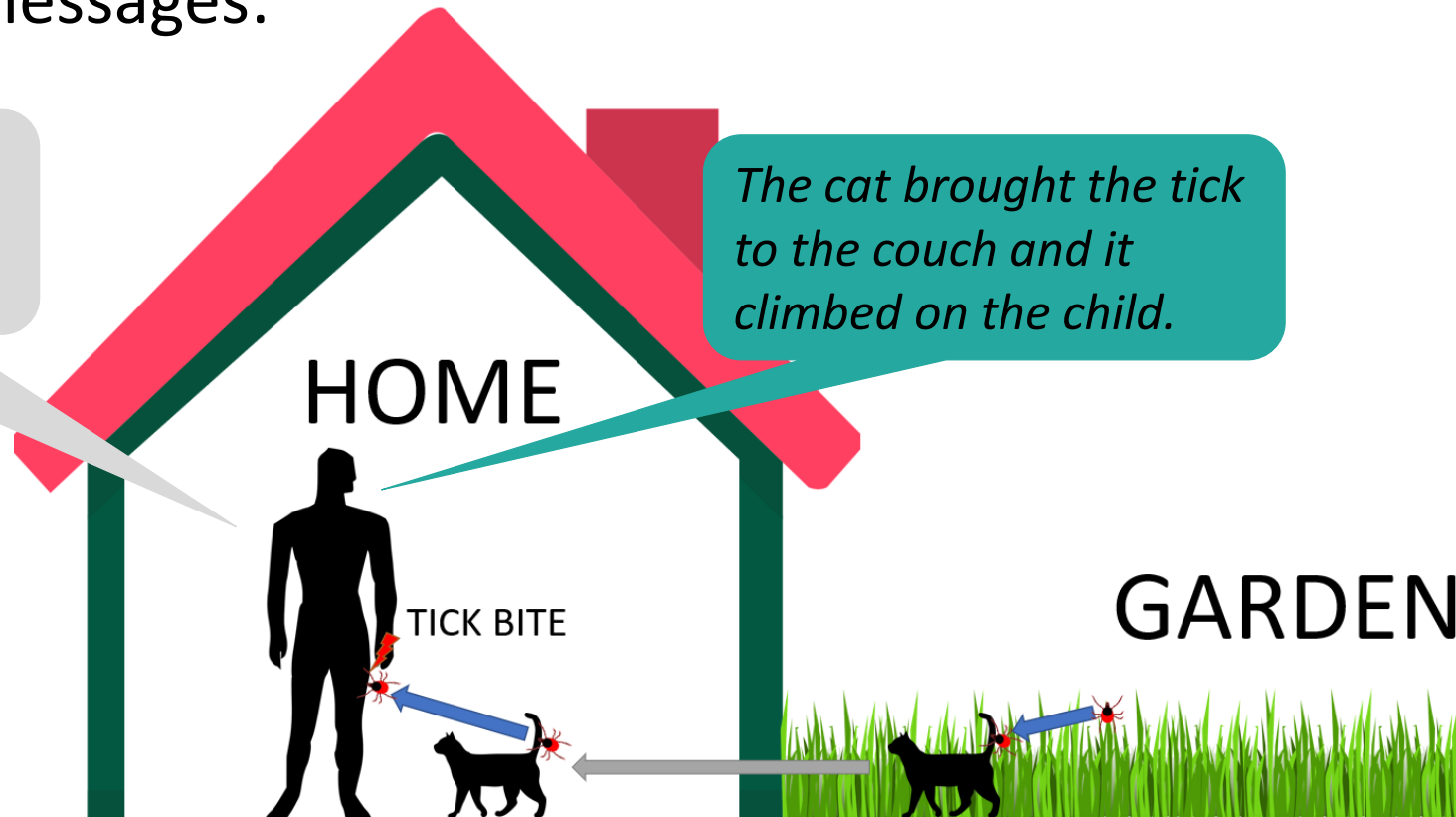
Dynamics of tick bite reports

Level 1 & 2: Importance of citizens' contribution

- More than 2000 emails in two years, and 1-2 phone calls per day during peak tick activity.
- Examples of messages:

Tick probably brought back by my cat who then slept against me.

The cat brought the tick to the couch and it climbed on the child.



Level 3: Tous Chercheurs internships

- Tous Chercheurs = Everyone's a researcher
- Tutored by scientists
- Example of a 2-days program:

First Day

Discovery and discussion of the scientific method,
ticks and tick-borne pathogens ecology
Co-construction of a research question, hypothesis

1st experiment: morphological identification of
ticks

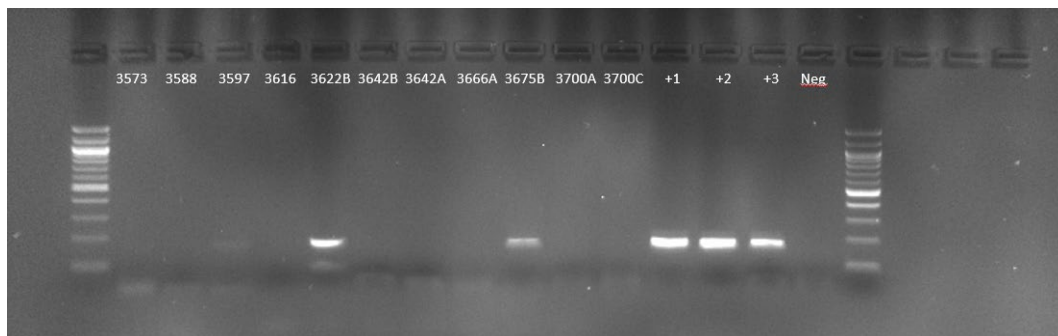
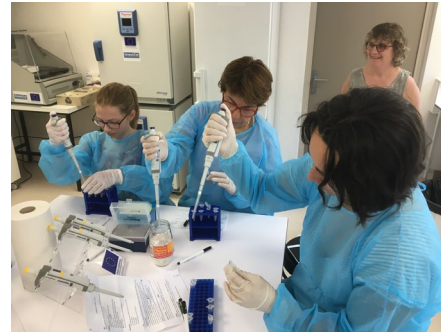
Second Day

2nd experiment: PCR on tick DNA to look for
Borrelia infection

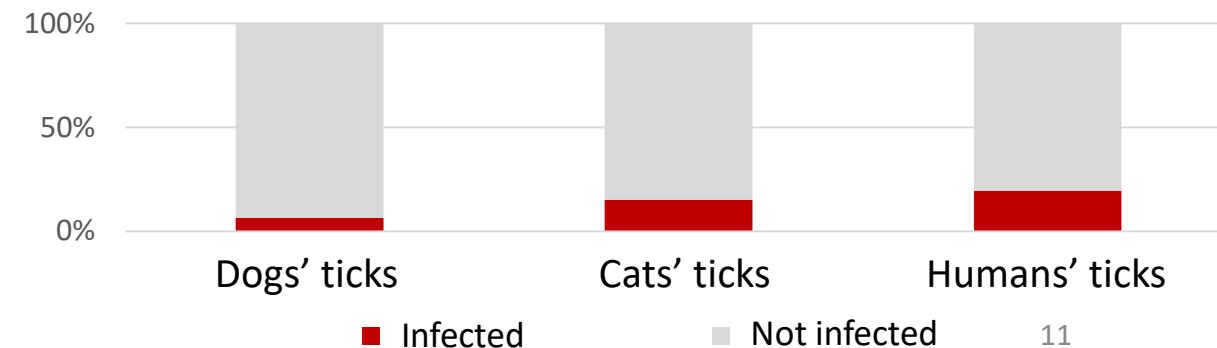
Analysis and discussion of the results

Level 3: Tous Chercheurs internships

- Started in 2019
- Are pet-biting ticks representing a risk for human health?
- 19 internships (people from 11 to 73 yo)
- 502 analyzed ticks



Percentage of *Borrelia burgdorferi* sensu lato infected ticks

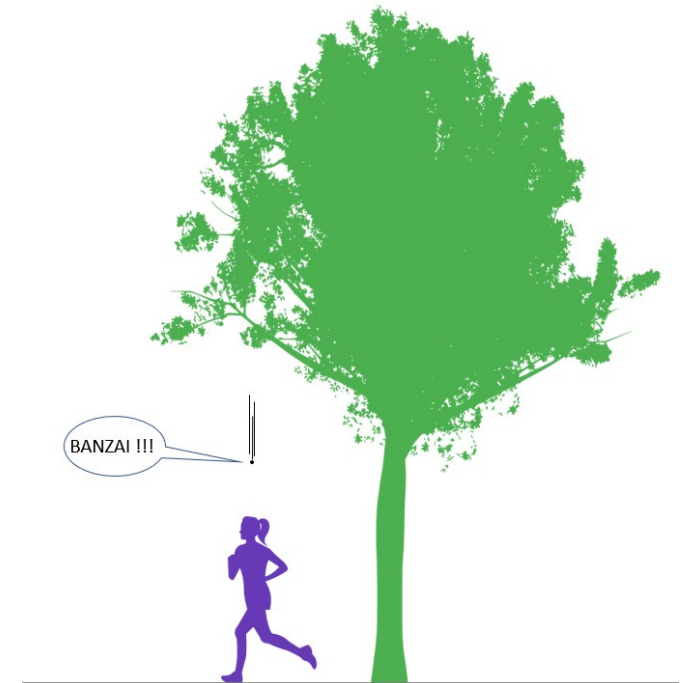


Level 3: Impact of Tous Chercheurs internships

- Humanities and social science study by Leyat C., Puppo C. and Préau M. (2021)
- **Impact on prevention:** citizens more aware of the risks, more confident to prevent tick bites and to share their knowledge with others.
- **Impact on science representation:** renewal of confidence in scientists, new (or confirmed) attraction for science.
- **Impact on stereotypes:** 3 main stereotypes have been the most cited.

Level 3: Impact of Tous Chercheurs internships

- Impact on stereotypes: Results from the polls
- Ticks do not fall from the trees to bite you
- Ticks can be found in private gardens
- If you left the tick mouth parts in your skin when you remove it, it's not dangerous as pathogens are contained in its body.





How to make it work?

CiTIQUE: a small team



Julien Marchand
Cyril Galley
and Irene Carravieri



Annick Brun-Jacob
and Sandrine Capizzi
Enseignants-chercheurs



Tom Beyear

Jonas DURAND

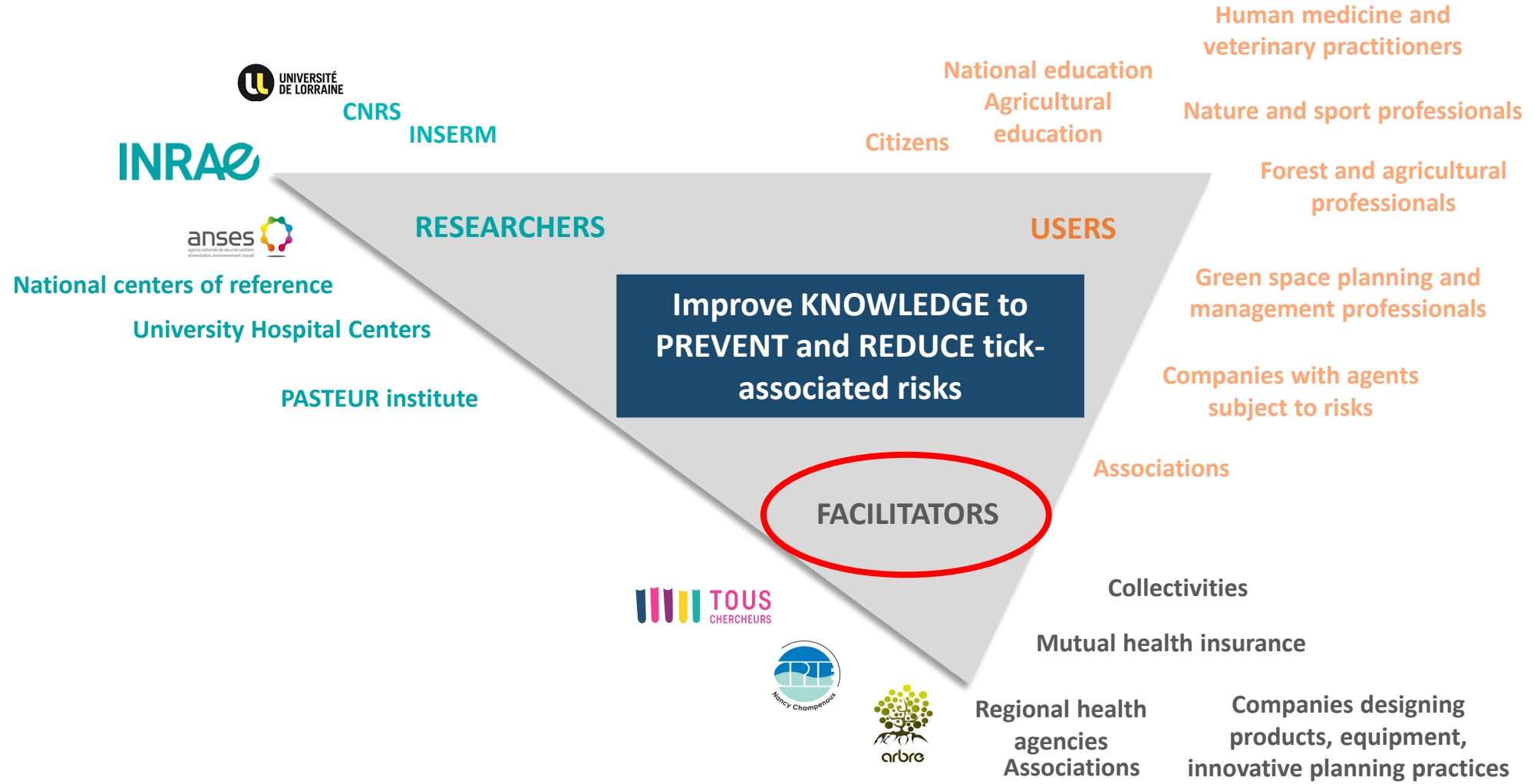


Gwenaël Vourc'h
INRAE



Pascale Frey-Klett
INRAE

CiTIQUE: a multi-actors program focused on research





Facilitators with different roles

- Linking researchers and users
- Fostering and maintaining engagement in the program
- Program's ambassadors
- Science communication
- Establishment of structures for participatory research (physical or virtual structures)

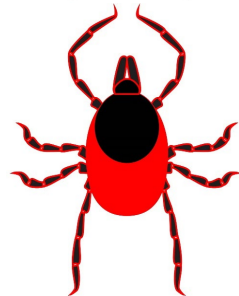
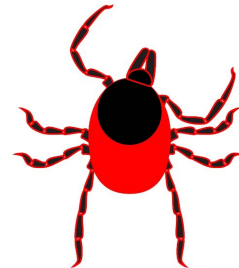
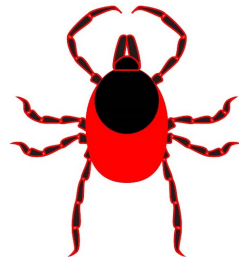
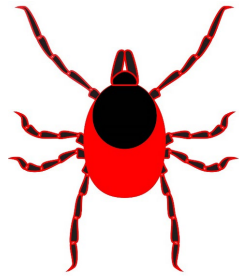


Take-home messages

- Interaction with citizens is important: they do not have to only be data providers.
- Proposing different level of engagement for citizens.
- It is possible to make scientist-grade research with citizens in an open lab.
- You cannot do everything alone! Facilitators are important.

Acknowledgements

- All the citizens participating in CiTIQUE
- EWDA Network Meeting organizers
- Our financers:



Thank you for your attention!

Bonus : diapos non utilisées

What is a classical citizen science program

Scientists ask a question



Citizens help as data gatherer



Scientists analyze the data



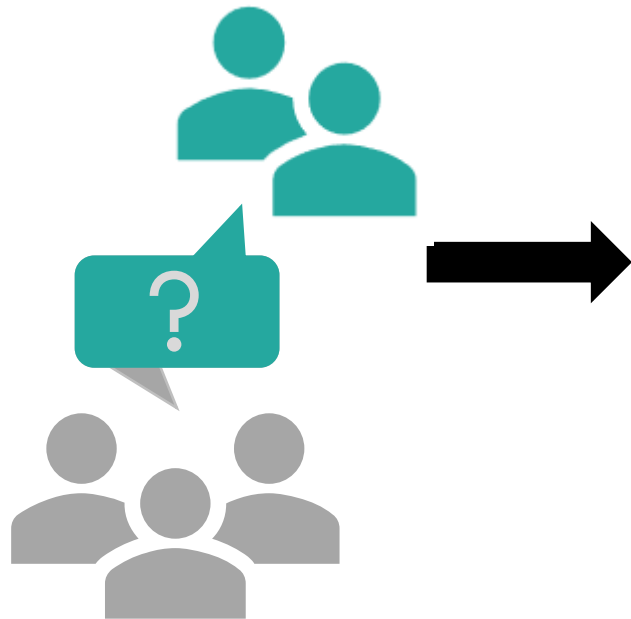
Scientists find the answer



Contributory citizen science

CiTIQUE: a citizen science program with a participatory approach

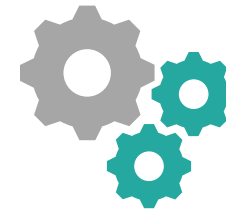
Scientists and citizen
co-construct a question



Citizens help as
data gatherer



Scientists and citizens
analyze the data



Scientists and citizens
find the answer



Participatory citizen science