

## Research question

Which factors influence the motivation of CS participants?

## Methodology

Investigating the motivating factors in citizen science communities through surveys

### Survey design

- define the research question
- define investigated factors
- formulate questions
- set-up the questionnaire
- test the survey with some user

### Collect & Process survey responses

- monitor answer collection
- export data
- process data

### Interpret & Share survey results

- draw insights from result analysis
- anonymizing data if needed
- select suitable open licenses
- openly publish research results (e.g. as research objects)

### Survey administration

- identify list of respondents
- send survey
- re-solicit responses, if necessary



## Data gathering instrument

Coney – the CONversational SURVEY toolkit

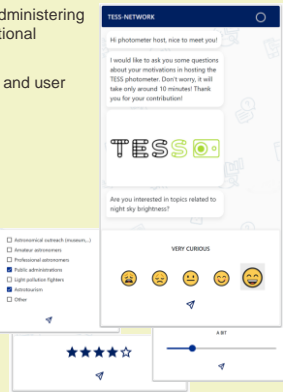


Try a demo

Coney is a toolkit for designing, administering and analyzing results of conversational surveys, developed by Cefriel.

Coney enhances user experience and user engagement thanks to:

- a chat interaction pattern
- interactive "storytelling" (colloquial and multimedia content)
- conversation flow with multiple branches according to the respondents' answers
- multiple closed question visualizations
- qualitative (a textual label displayed to the respondent) and quantitative values (numerical coding for results analysis) associated to answers



<https://github.com/cefriel/coney>

## What is TESS network about?

TESS network initiative aims to collect sky brightness measurements through sensors to fight light pollution

Telescope Encoder and Sky Sensor (TESS-W) photometer is a compact and inexpensive device developed under STARS4ALL project by the Universidad Complutense de Madrid

As of today, 200+ TESS photometer hosted by 120 people in Asia, Africa, North and South America, Europe and Australia (sensors displayed on this map <https://tess.dashboards.stars4all.eu/>)

Citizen Scientists mainly involved in data collection task.

No monetary rewards for participants.



TESS

<https://tess.stars4all.eu/>

STARS4ALL

<https://www.stars4all.eu/>

## Survey design

Selection of investigated factors

- Reference methodology inspired by the Schwartz Theory of Basic Values<sup>(1)</sup>
- 10 motivating factors related to intrinsic motivation that may influence CS global motivation (*self-direction, stimulation, hedonism, achievement, power, conformity, benevolence, universalism, routine and belongingness*)

Questions formulation

- 2 closed questions for each motivating factor (answers values from 1 to 5)
- 1 closed question for global motivation (answers values from 1 to 5)
- 1 open question for free text motivation
- 10 questions for demographics and data usage

Total: 32 questions

(1) Schwartz, S. H. (2012). An Overview of the Schwartz Theory of Basic Values

## Survey administration

Link of the survey sent by email to 120 people hosting photometers. One reminder after a week from the initial sending.

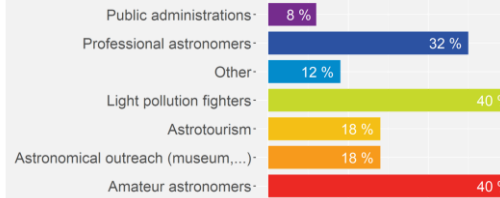
83/120 volunteers answered the survey (69%)<sup>(2)</sup>

(2) very successfully wrt average market response rate of 30% <https://surveyanyplace.com/average-survey-response-rate/>

## The TESS Network community

### Demographic

85% are male, 70% of volunteers are older than 45 years old



Which of the following categories identifies you the most?

### Motivating factors

Correlation between the global motivation and motivating factors.

Very strong *intrinsic motivations*: TESS participants are pushed by their own personal interests and curiosity, without influence from external pressures, rewards and perspectives. Intrinsic motivation is associated with the specific research topic and with the altruism and volunteer effort of participants

Factor	Mean Answers	Correlation with global motivation	Questions
Self-direction	4,43	0.491***	want to learn interested in topics
Benevolence	4,42	0.62***	good thing to do contribute and help the scientific research
Universalism	4,33	0.672**	making data more accessible possibility to raise public awareness
Hedonism	4,17	0.588***	making you feel good about yourself how passionate are you
Stimulation	4,14	0.423***	possibility to do something new to challenge yourself
Achievement	4,13	0.424***	perform better than others do something meaningful
Belongingness	3,75	0.456***	meeting people with similar interests feeling part of something worthwhile
Routine	3,08	0.272*	task already done before frequency of participation
Power	2,83	0.156	gain recognition and status expect something in return
Conformity	2,35	0.075	know other people obliged to participate

p-value \*\*\* < 0.001, \*\* < 0.01, \* < 0.05

## Collect & Process survey results

### Data usage

75% interested in downloading, exploring or using data collected from all the sensors installed, but only 30% has evidence about data usage by researchers.

Learning about the project discoveries has in itself been framed as a reward. Increasing the sharing of the results can be an added value for the community.

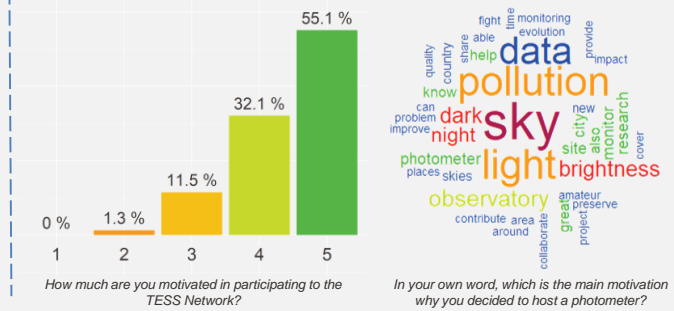


What are you using (or planning to use) the data provided by your photometer for?

Do you have evidence that data collected from the network has been used by researchers?

### Global motivation

Citizen Scientists very motivated, with an average value is 4.39 on a scale of 5. Their main drivers are to collect new data for research and to fight light pollution.



How much are you motivated in participating to the TESS Network?

In your own word, which is the main motivation why you decided to host a photometer?

## Interpret & Share survey results

The survey structure, the collected answers and the analysis of correlation are openly available in RDF and CSV formats on Zenodo [https://zenodo.org/record/3739058#\\_XxxK1udS9PY](https://zenodo.org/record/3739058#_XxxK1udS9PY).

Reproducibility and Open Science. This survey can be reused to study motivation in other CS communities. Contact us to have support on this!