



# Citizen science tools and AI

9 October 2023

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AARHUS  
UNIVERSITY

# TIME4CS

SUPPORTING SUSTAINABLE  
INSTITUTIONAL CHANGES  
TO PROMOTE CITIZEN SCIENCE IN  
SCIENCE AND TECHNOLOGY



The TIME4CS project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101006201



# Citizen science tools and AI?

nature > news feature > article  
 NEWS FEATURE | 23 October 2018  
**No PhDs needed: how citizen science is transforming research**  
 Projects that recruit the public are getting more ambitious and diverse, but the field faces some growing pains.



iNaturalist's Blog / A new Computer Vision Model (v2.6) including 1,399 new taxa  
 Summary  
 Description  
 Comments

## A new Computer Vision Model (v2.6) including 1,399 new taxa

We released a new computer vision model today. It has 78,387 taxa up from 77,276. This new model (v2.6) was trained on data exported last month on July 16th and added 1,399 new taxa.

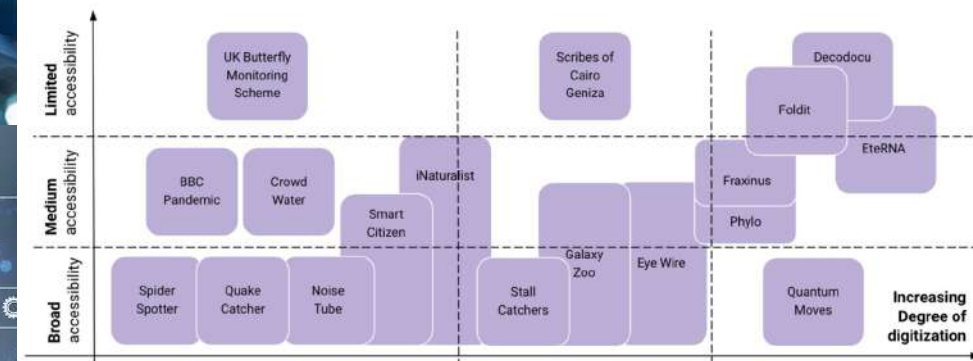
Aisling Irwin



## Scaling Galaxy Zoo with Bayesian Neural Networks

J. Rafner et al. / Human Computation (2022) 9:1

Increasing participant requirements for scientific contribution



**PHYSICAL TASK**  
Involves a concrete physical task, not in the digital world  
Intelligent sensors/robotics

**ANNOTATION TASK**  
A purely digital challenge derived from a particular physical phenomenon (eg images)  
Supervised learning

**OPTIMIZATION TASK**  
A self contained, digital model exists.  
Reinforcement learning, optimization methods



THE ZOONIVERSE WORKS  
**771,523,814**  
 CLASSIFICATIONS SO FAR BY  
 2,654,785 REGISTERED VOLUNTEERS





# TIME4CS



"SDG monitoring"

Ecology

Health



Cultural heritage

Citizen science

Astronomy



Archaeology



Social science

Quantum physics



Natural resource mgmt

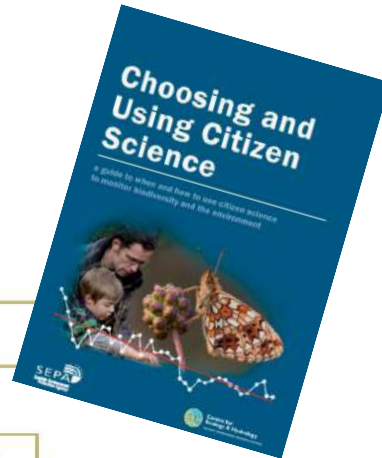
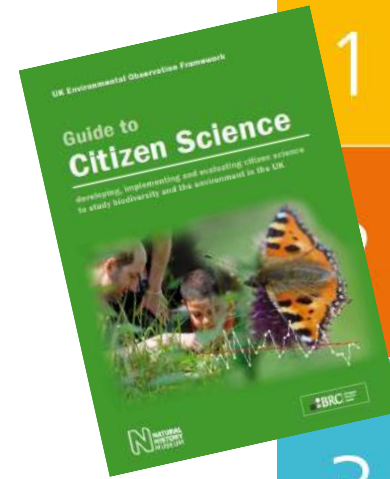
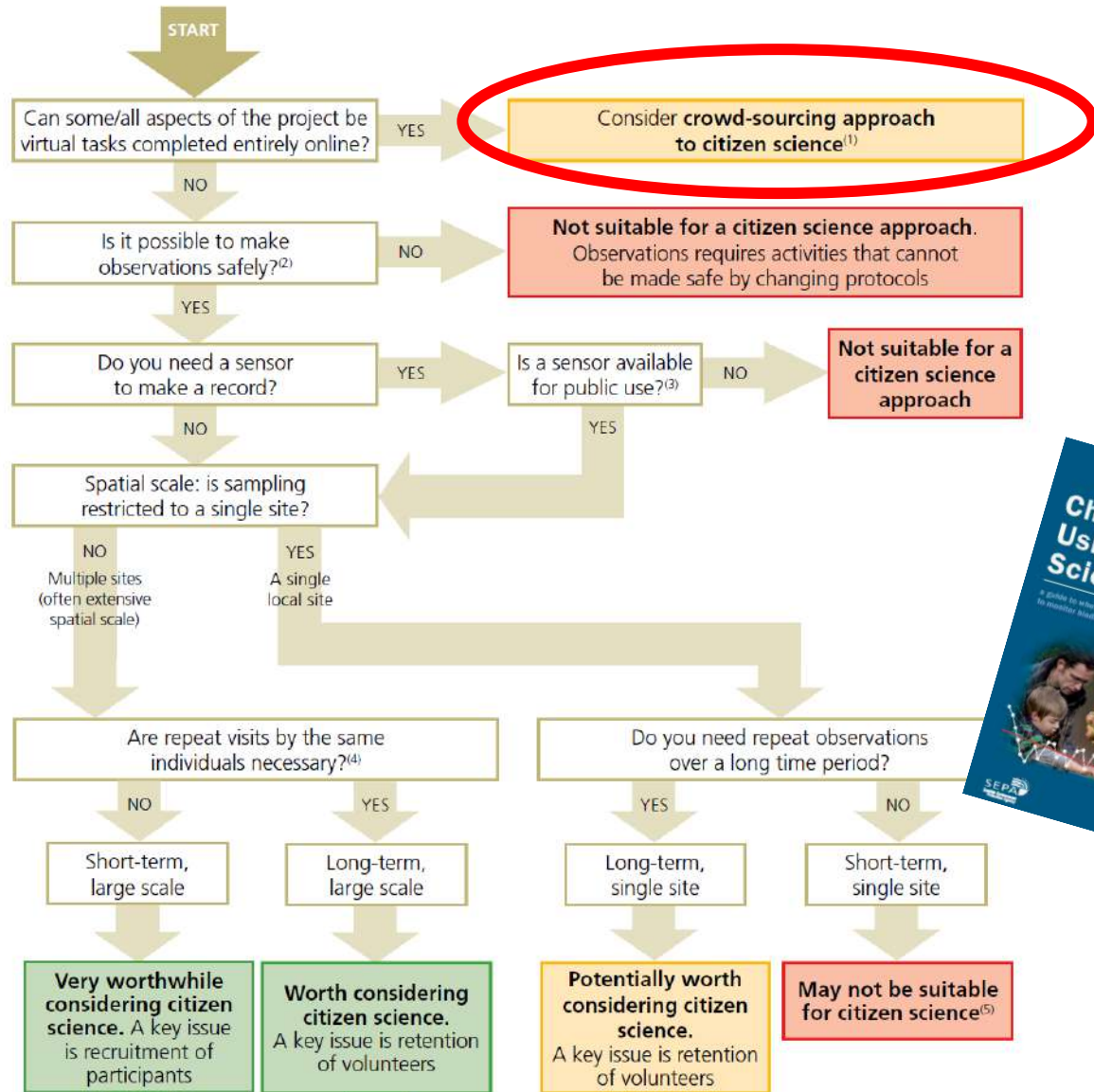
Meteorology



Welcome to CoCoRaHS! "Volunteers working together to measure precipitation across the nations."

# TIME4CS Deciding on using Citizen Science

## Part 1 of the decision framework



1	<b>Before you start</b>	
	Is citizen science the best approach?	2
	Choose a citizen science approach	4
2	Citizen science flowchart	
	6	
	<b>First steps</b>	
	Establish project team	7
3	Define project aims	8
	Identify funding and resources	9
	Identify and understand target participants	10
	<b>Development phase</b>	
3	Design the survey or scheme	12
	Consider data requirements	14
	Consider technological requirements	16
	Develop supporting materials	17
	Test and modify protocols	19
4	<b>Live phase</b>	
	Promote and publicise the project	21
4	Accept data and provide rapid feedback	22
	<b>Analysis and reporting phase</b>	
5	Plan and complete data analysis and interpretation	23
	Report results	24
	Share data and take action in response to data	25
	Evaluate to maximise lessons learned	26
	<b>Resources and links</b>	

Pocock et al. 2014: <https://www.ceh.ac.uk/citizen-science-best-practice-guide>

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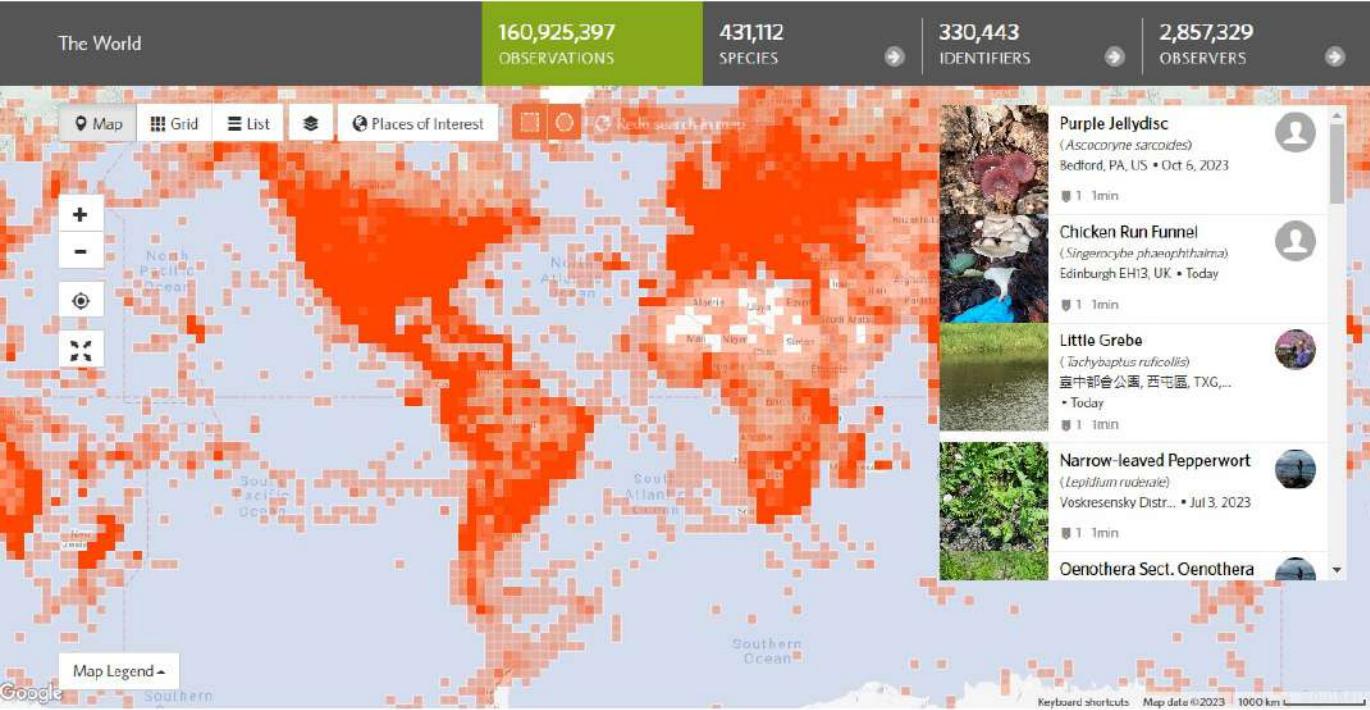




# TIME4CS iNaturalist

## Observations

Species Location Go Filters



- Computer Image Model: updated monthly
- September 2023: 78,387 taxa



Home Profile Observations Edit Observations Calendar IDs Lists

All Updates Your Content Following Real Time Discussions

daniel\_liepack added an identification to an observation by you Oct 3

Adder (*Vipera berus*)  
kragen | May 31, 2023 | 5 Research Grade  
90630 Oulu, Finland (Google, OSM)  
View Observation

daniel\_liepack added an identification Oct 3

Adder (*Vipera berus*)  
View Observation Agree Show More...

nikibifrost added an identification to an observation by you Sep 27

Wild Marjoram (*Origanum vulgare*)  
kragen | September 24, 2023 | 2 Research Grade  
8940 Randers, Denmark (Google, OSM)  
View Observation

nikibifrost added an identification Sep 27

Wild Marjoram (*Origanum vulgare*)  
View Observation Agree Show More...



# TIME4CS iNaturalist – City Nature Challenge

*In 2022: 10% of all obs. from Luxembourg!*



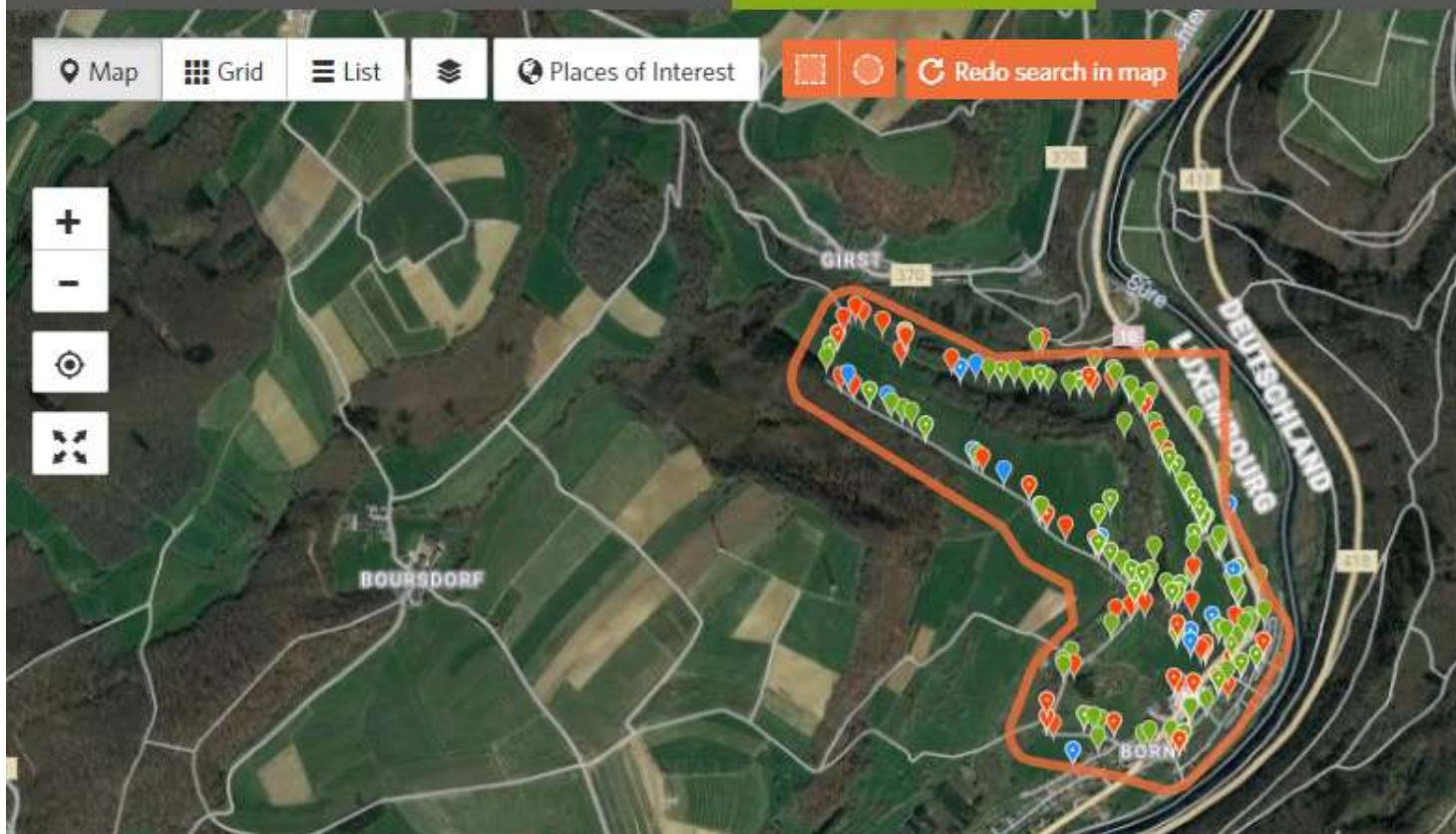
Nordic Agency for Development and Ecology



Ramborn Orchard Hiking 📍

1,123 OBSERVATIONS    300 SPECIES    211 IDENTIFIERS    108 OBSERVERS

Map    Grid    List    Places of Interest    Redo search in map



Map view showing observation pins (green, blue, red) clustered in the Ramborn Orchard area, outlined in orange. The map includes labels for 'GIRST', 'BOURSDORF', 'BORI', 'LUXEMBOURG', and 'DEUTSCHLAND'. A sidebar on the left contains zoom controls (+, -, eye, and compass icons).

**Egyptian Goose**  
(*Alopochen aegyptiaca*)  
Natur-and Geopark... • Apr 30, 2023  
Research Grade    2    5mo

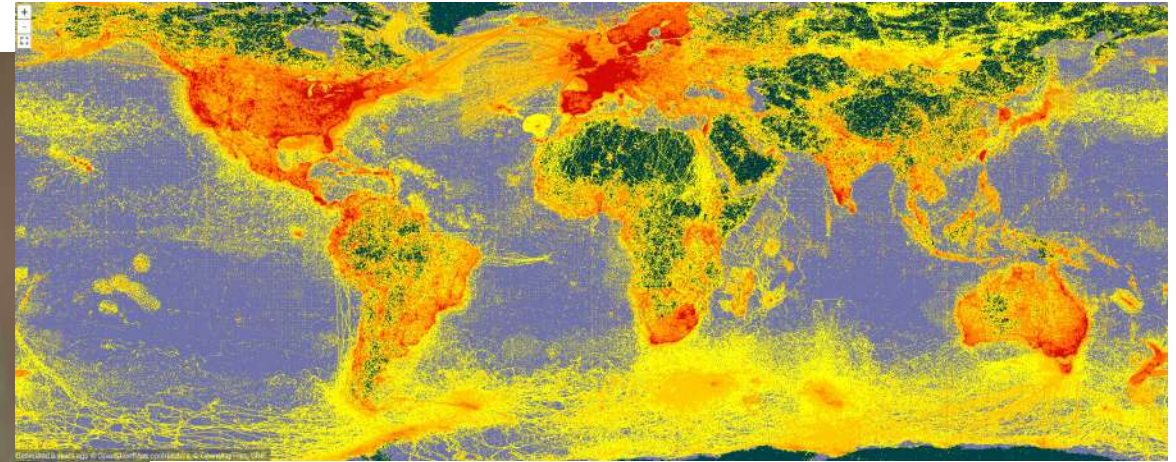
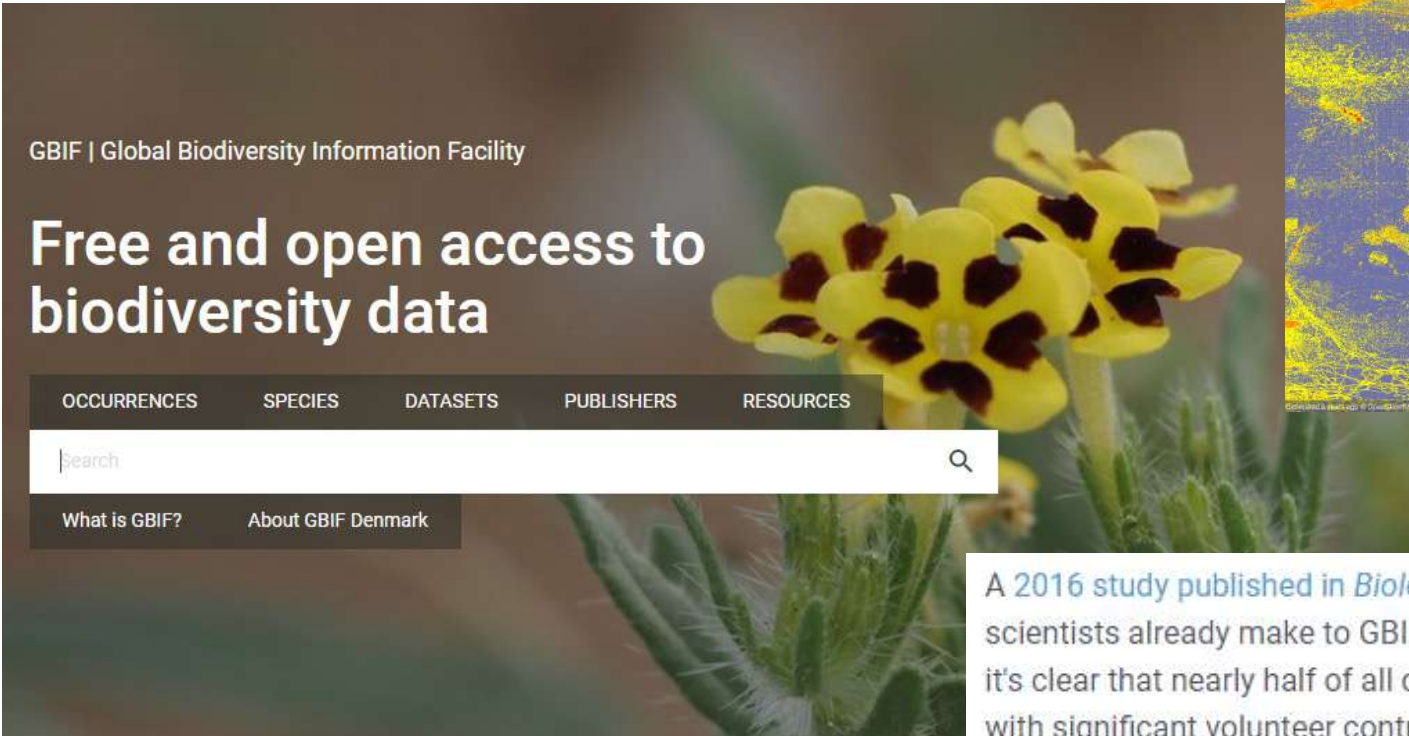
**European Firebug**  
(*Pyrrhocoris apterus*)  
Natur-and Geopark... • Apr 30, 2023  
Research Grade    3    2    5mo

**Bees**  
(Epifamily Anthophila)  
Natur-and Geopark... • Apr 30, 2023  
1    5mo

**Oxeye Daisy**  
(*Leucanthemum vulgare*)  
Born Rosport-Mompa...  
• Apr 30, 2023  
1    5mo



# TIME4CS Crowdsourcing of research: Biodiversity monitoring



A 2016 study published in *Biological Conservation* registers the massive contributions that citizen scientists already make to GBIF-mediated data. Despite some limitations of the dataset-level analysis, it's clear that nearly half of all occurrence records shared through the GBIF network come from datasets with significant volunteer contributions.

GBIF—the Global Biodiversity Information Facility—is an international network and data infrastructure funded by the world's governments and aimed at providing anyone, anywhere, open access to data about all types of life on Earth.

The analysis also highlights the fact that biodiversity data from citizen scientists, like biodiversity data generally, are distributed unevenly across geography and taxa. Identifying data gaps and biases could help guide citizen programmes to focus on poorly sampled regions, like Africa, Asia and Latin America, and underrepresented organisms, like insects and fungi.



# TIME4CS Zooniverse.org



THE ZOOIVERSE WORKS

# 771,523,814

CLASSIFICATIONS SO FAR BY  
2,654,785 REGISTERED VOLUNTEERS

Navigation bar with icons for: ALL DISCIPLINES, ARTS, BIOLOGY, CLIMATE, HISTORY, LANGUAGE, LITERATURE, MEDICINE, NAT.

Most Recently Launched x - Showing 1-20 of 97 projects found. Name: x -

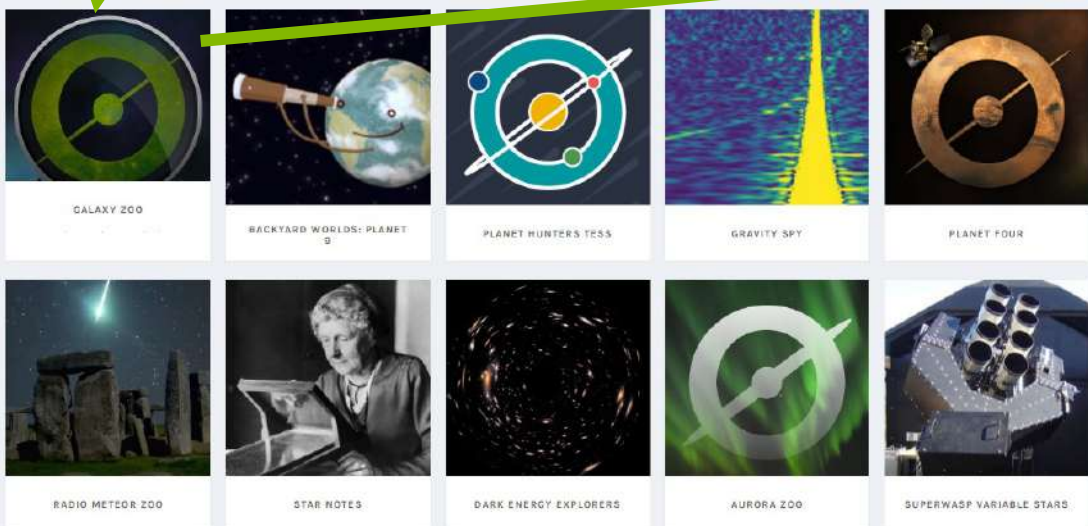
1 2 3 4 5

NOTES FROM NATURE - CAPTURE THE COLLECTIONS	SIREN PROJECT	NEST QUEST GO: GRACKLES	KILONOVA SEEKERS	BACKYARD WORLDS: COOL NEIGHBORS
TAG TREES	SHADOWS ON STONE: IDENTIFYING SING SING'S INCARCERATED	SUPERLUMINOUS SUPERNOVAE	REDSHIFT WRANGLER	THE DAILY MINOR PLANET

MARSH EXPLORER	PEOPLE'S CONTEST DIGITAL ARCHIVE	NOTES FROM NATURE - BIG BEE BONANZA!	CLOUDSPOTTING ON MARS	GET TO KNOW MEDIEVAL LONDONERS
JOVIAN VORTEX HUNTER	PICTURING MICHIGAN'S PAST	NOTES FROM NATURE - DIGITIZING BIOLOGICAL COLLECTIONS IN CANADA	SCIENCE SCRIBBLER: KEY2CAT	CORRESPONDING WITH QUAKERS



# TIME4CS Zooniverse.org

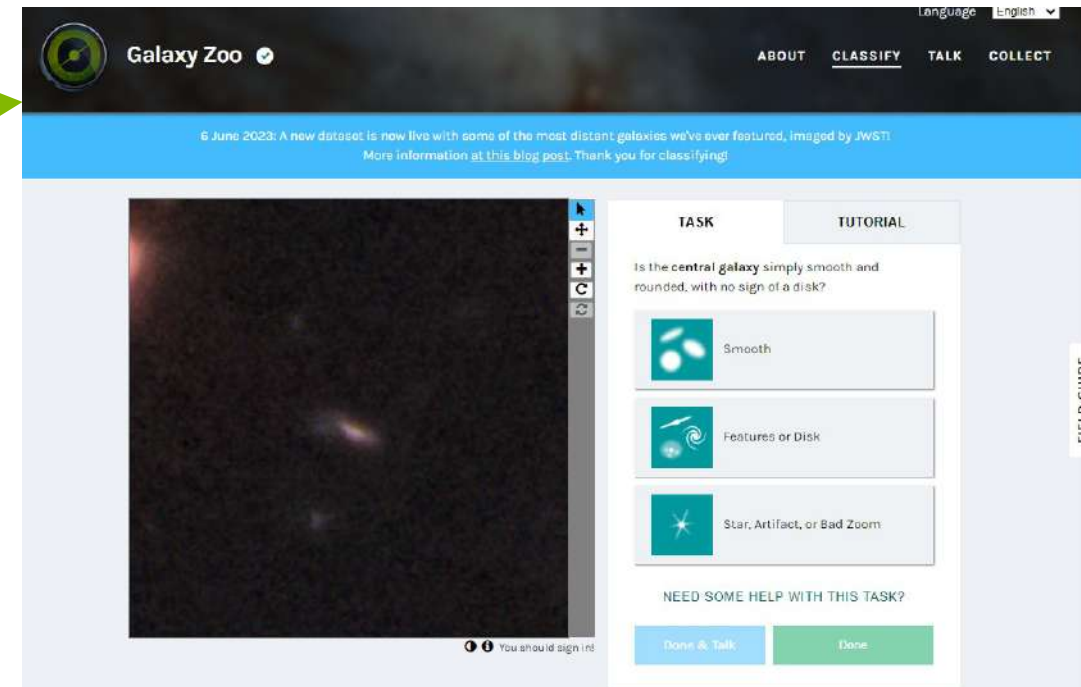


AI identify challenging galaxies ->

Volunteers identify galaxies ->

AI trained on classifications

## GALAXY ZOO STATISTICS



# TIME4CS Zooniverse.org

The screenshot shows the Zooniverse.org homepage with a navigation bar at the top containing icons for DATE, HISTORY, LANGUAGE, LITERATURE, MEDICINE, NATURE, PHYSICS, SOCIAL SCIENCE, and SPACE. Below the navigation bar, there are search filters for 'Most Active' and 'Showing 1-20 of 27 projects found.' A grid of project cards is displayed, including 'CATALINA SKY SURVEY', 'PLANET HUNTERS TEGS', 'COOL NEIGHBORS', 'KILONOVA SEEKERS', 'GRAVITY SPY', 'ACTIVE ASTEROIDS', 'STAR NOTES', 'GALAXY ZOO', 'DARK ENERGY EXPLORERS', and 'AURORA ZOO'. A green arrow points from the 'GRAVITY SPY' card to the detailed project page on the right.

AI used to train volunteers

54% -> 90% accuracy

Increased volunteer retention

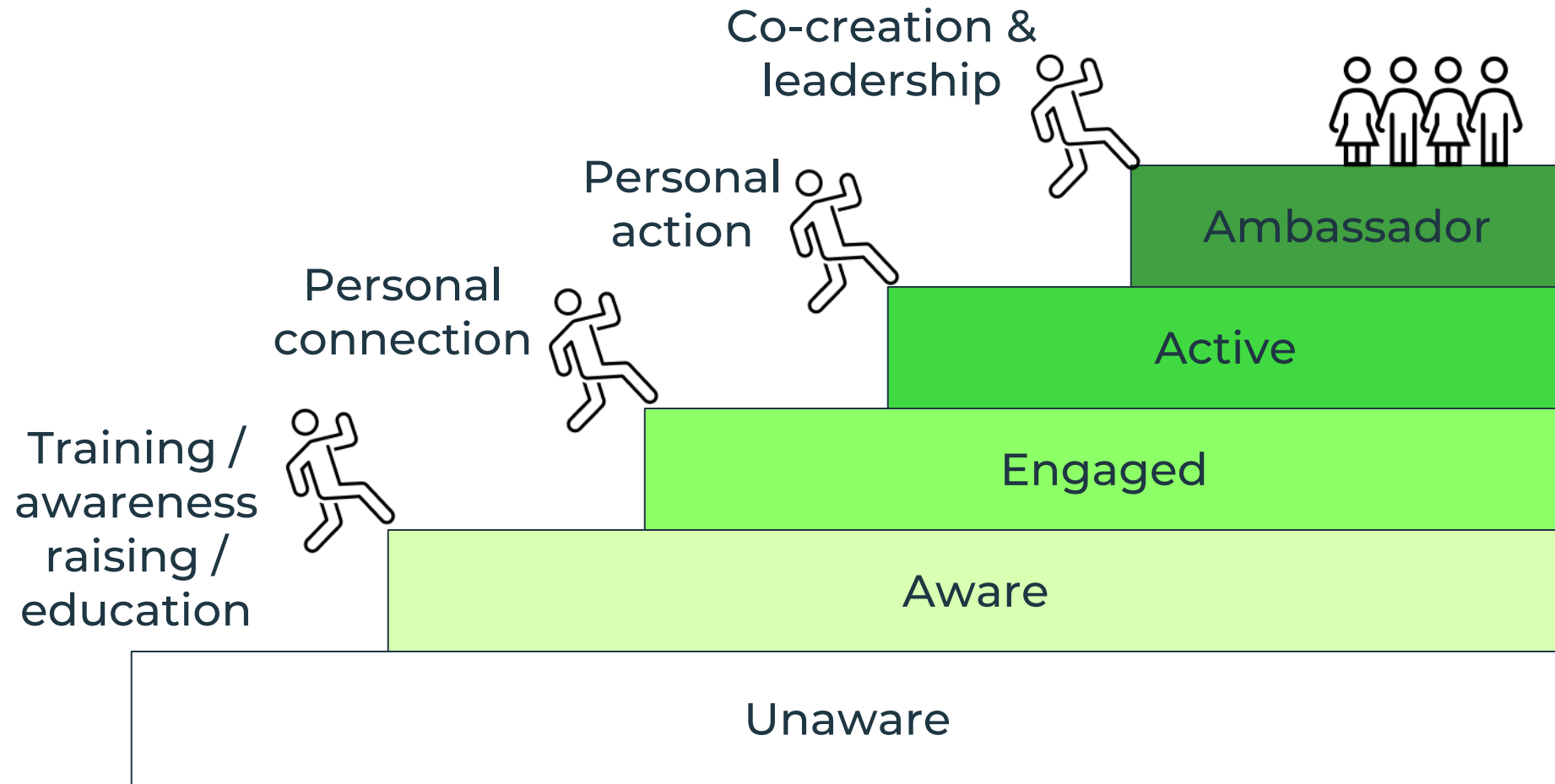
The screenshot shows the Gravity Spy project page on Zooniverse.org. The page features a header with the project name 'Gravity Spy' and a checkmark. Below the header, there is a 'By the numbers' section with the following statistics:

32,980	7,675,120
Volunteers	Classifications
1,592,276	347
Subjects	Completed subjects

Below the statistics, there is a large image of the LIGO gravitational wave detector. On the right side of the page, there is a 'GRAVITY SPY' section with the text: 'Help LIGO scientists make gravitational-wave discoveries by identifying how to improve our detectors'. Below this, there is a 'GET STARTED!' section with the text: 'You can do real research by clicking to get started here!'. At the bottom, there is a list of 'UNLOCKED' and 'LOCKED' levels, including 'Neutron Star Mountain (Level 1)', 'Galactic Supernova (Level 2)', 'Binary Neutron Star Merger (Level 3)', 'Neutron Star-Black Hole Merger (Level 4)', 'Binary Black Hole Merger (Level 5)', and 'Millionary Gravitational Waves (Level 6)'.



# TIME4CS Ladder of Participation





 [www.time4cs.eu](http://www.time4cs.eu)

 [time4cs@apre.it](mailto:time4cs@apre.it)

#TIME4CS



# Thank you for your attention !

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*Any questions?*

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