



Award #: 1835530

CSSI Element: Building the Twenty-First Century Citizen Science Framework to Enable Scientific Discovery Across Disciplines

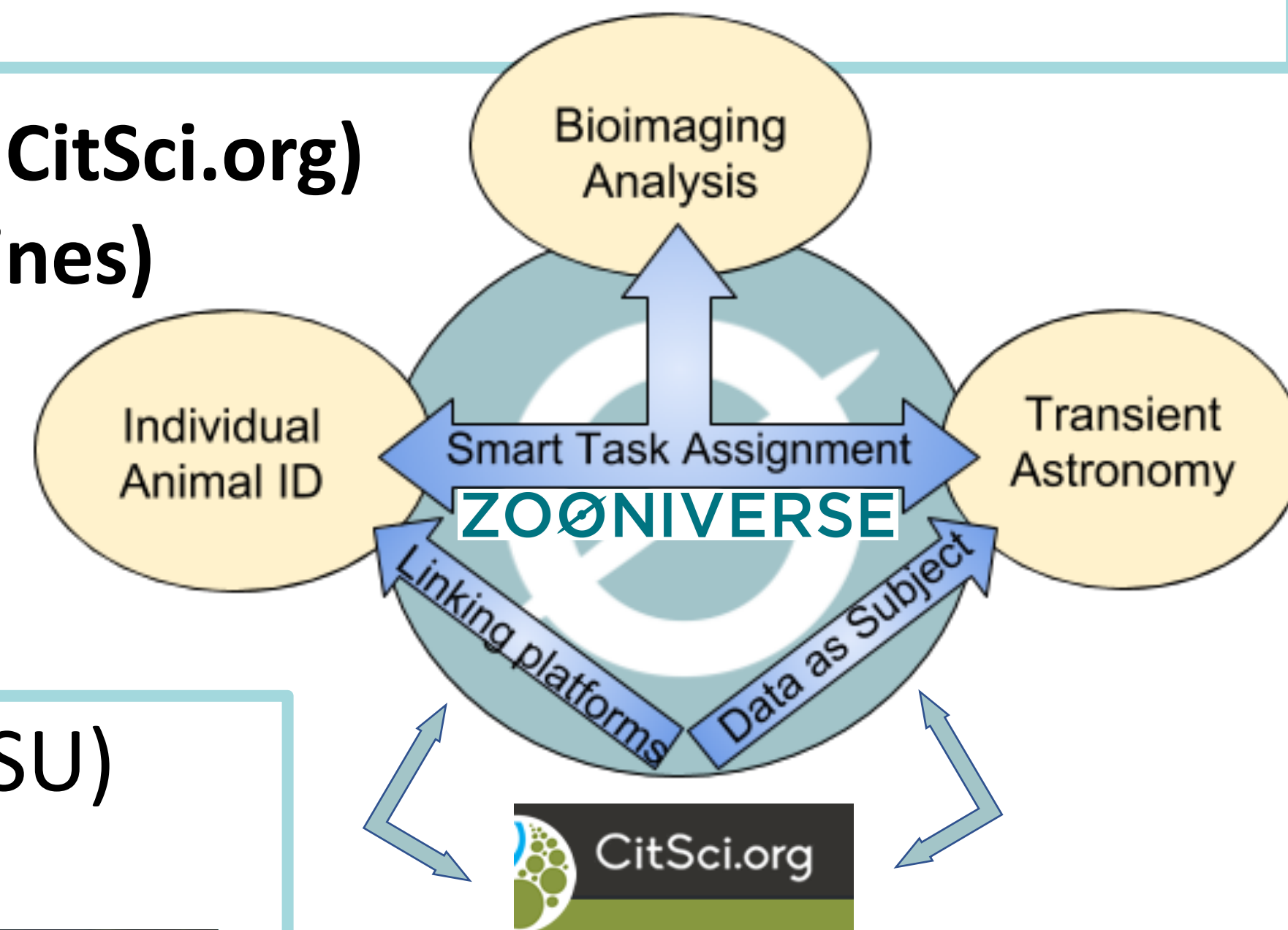
PI: Lucy Fortson, Co-PIs: Laura Trouille, Greg Newman, Sarah Benson-Amram, Subha Sivagnanam, Craig Packer, Dan Boley and Chris Lintott, with Lucy Collinson Francis Crick Institute, UK
Institutions: University of Minnesota [UMN], Adler Planetarium, University of Wyoming [UWy], Colorado State University [CSU], University of California San Diego, University of Oxford

Key idea: Develop Citizen Science Cyberinfrastructure (CSCI)

For citizen science as a research framework to fulfill its promise in supporting hundreds of researchers across many disciplines in harnessing the data revolution and in enabling new science not previously possible, we are developing cyberinfrastructure for:

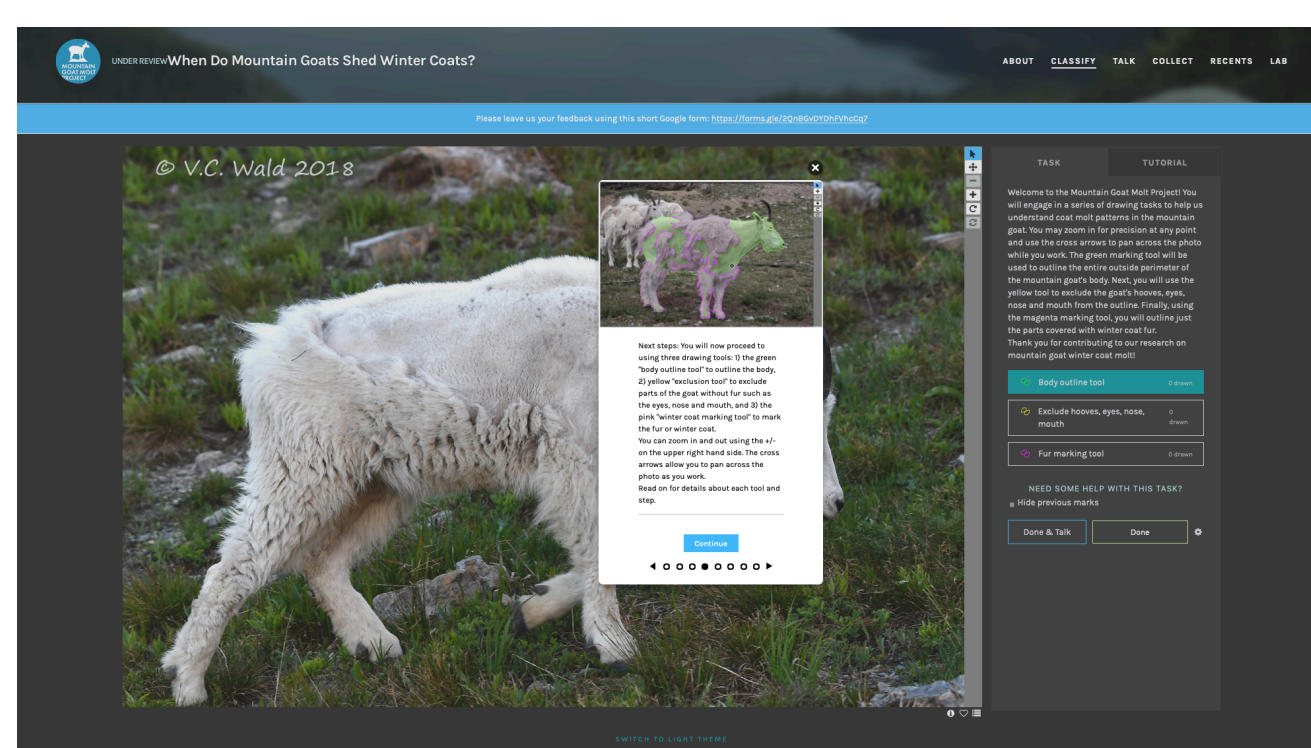
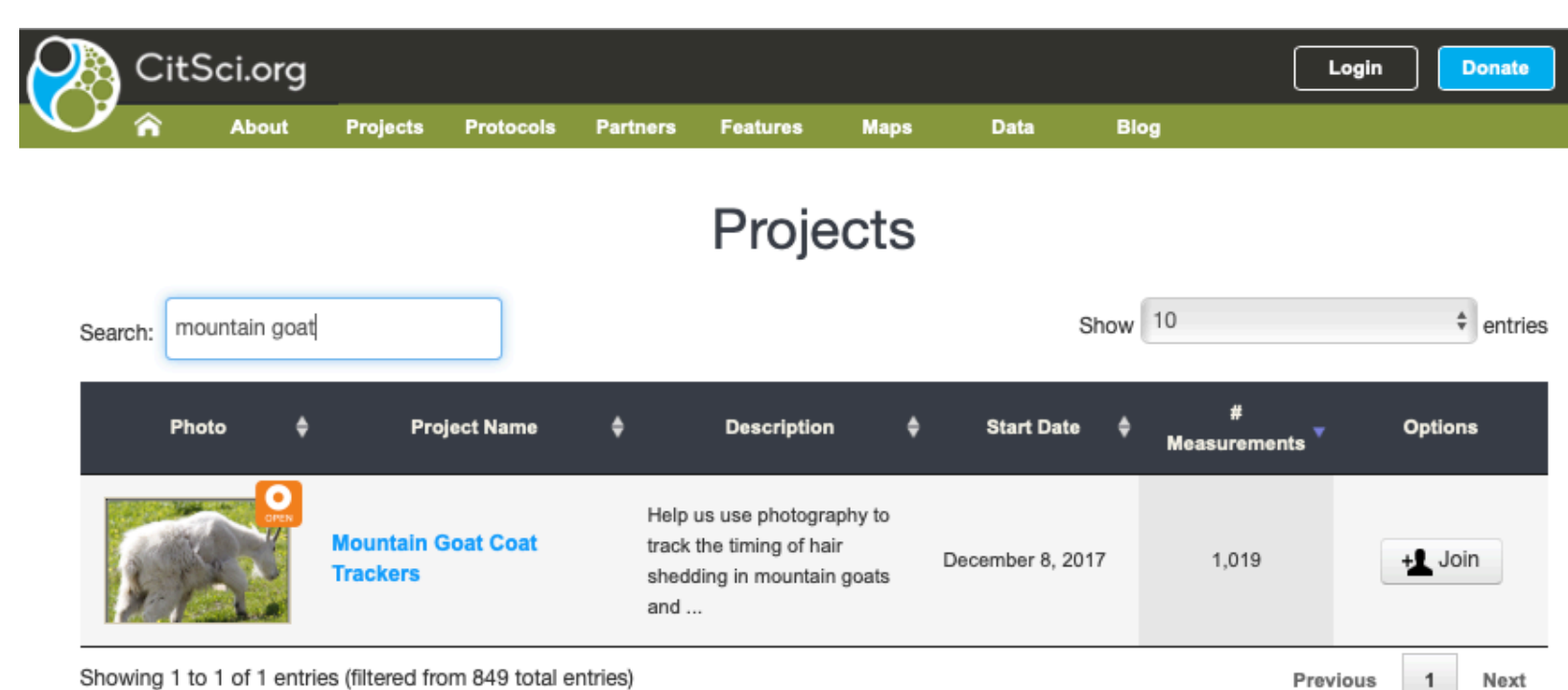
- (1) *Combining Modes of Citizen Science* (Zooniverse & CitSci.org)
- (2) *Smart Task Assignment* (combining humans+machines)
- (3) Presenting *Data as Subject* to the volunteer.

The work is driven by specific science cases and implemented in a sustainable CSCI infrastructure.



Combining Modes of Citizen Science (Adler, CSU)

Connect data collection to data analysis modes.

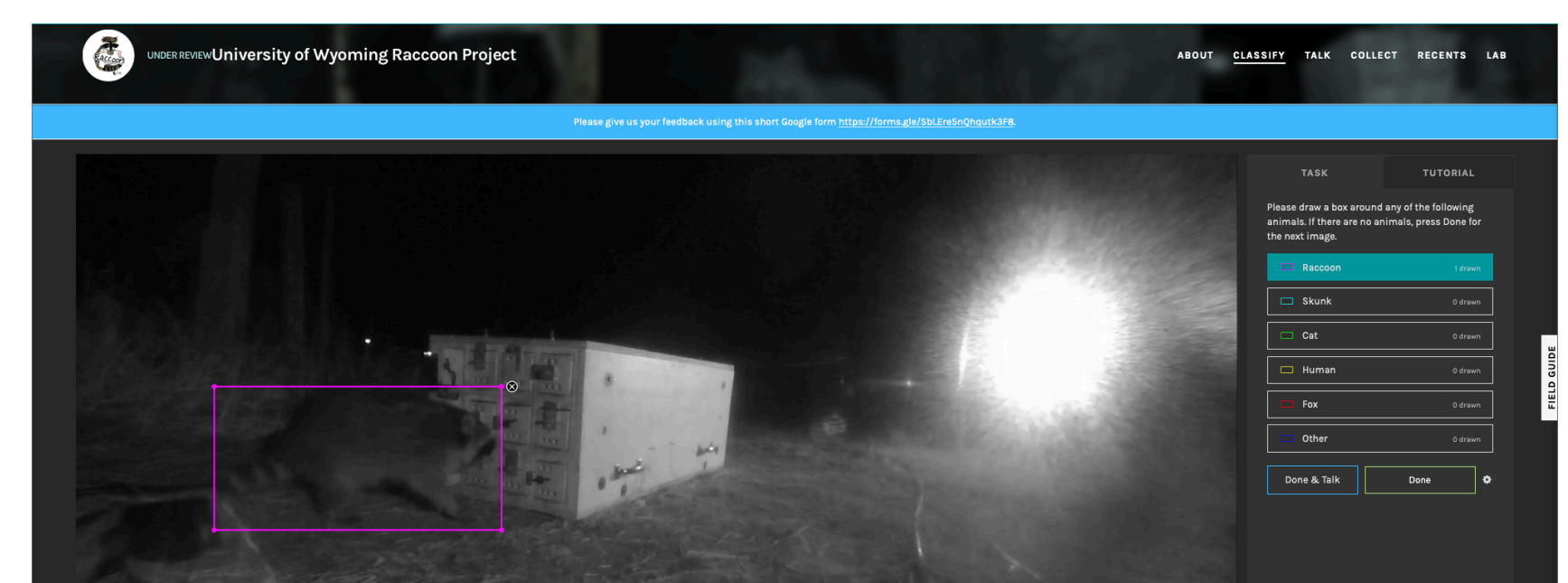


- Connect APIs: CitSci.org (data collection/photo upload) to Zooniverse.org (data processing/analysis).
- Projects launched through both platforms.

Ecology: Identifying Individual Animals (UWy, UMN)

Deploy sequence of machine algorithms alongside human annotators using smart task assignment to develop capacity for identifying individual animals in camera trap data.

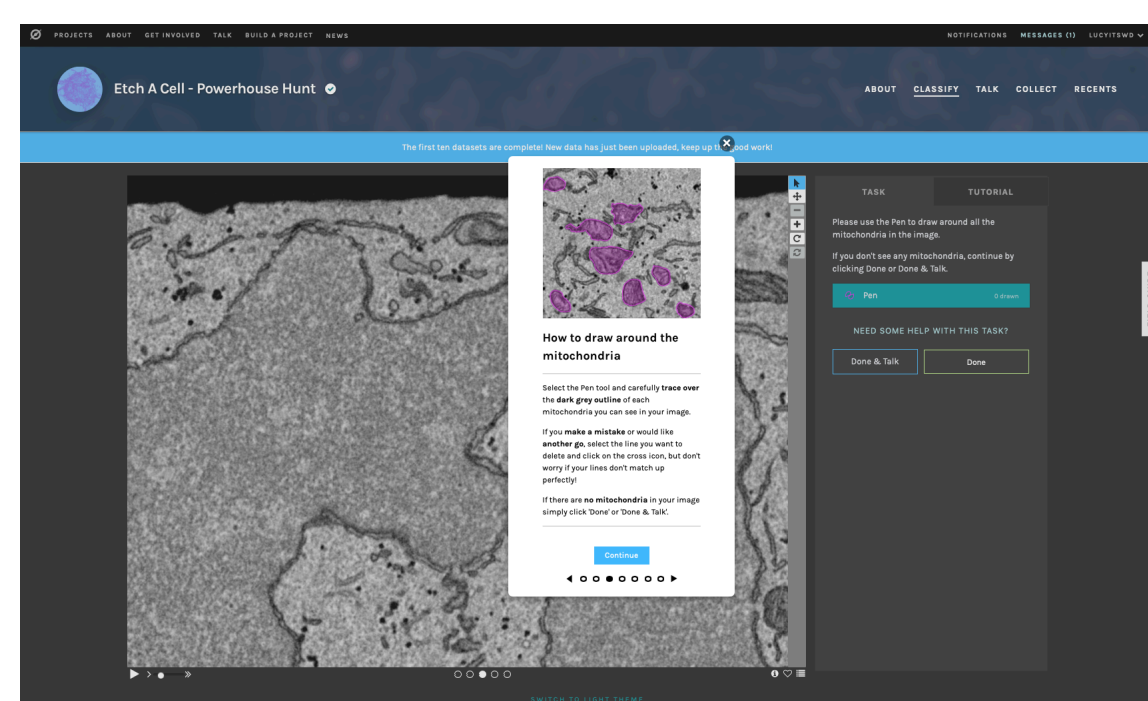
- Train object detector with human annotated bounding boxes on PIT-tagged raccoons then train a Siamese network to identify individual raccoons with PIT giving ground truth
- Investigate ability for transferring algorithm to different species



Biomaging Analysis: a 3D Morphology of Cell Organelles

(Francis Crick Institute, Oxford, UMN)

Explore accelerated segmentation of multiple organelle types through application of simple algorithms that take advantage of position information of a given slice in the 3D stack.



- Algorithm developed to aggregate multiple drawings
- Now use as training data for machine
- Ask humans to correct

Astronomy: Characterizing Lightcurves (Oxford, Adler, UMN)

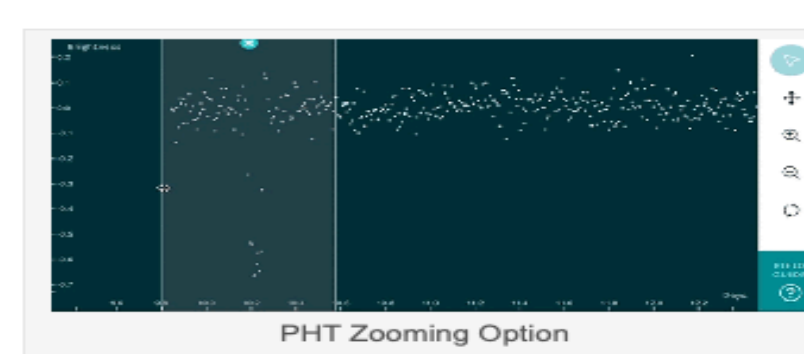
Zooniverse now supports Data as a Subject (not just static images) and interactive plots in the classify interface. PlanetHunters.org volunteers mark an interactive plot and Zooniverse records the actual data points, rather than x,y points on an image.

Planet Hunters TESS gets a Makeover

We are very excited to announce a new Planet Hunters TESS interface! Whilst the idea and the aim of the project has remained the same, we have added some additional features that will hopefully improve your overall planet hunting experience.

One of these new features is the option to zoom in on the lightcurve, giving you the opportunity to explore different parts of the data in more detail. This close up view will give you a better insight into the shape and depth of a potential transit-event and may be able to reveal more about the nature of a dip.

<https://blog.planethunters.org/2019/06/04/planet-hunters-tesse-gets-a-makeover/>



- Extend Data as Subject for flexible application to other projects
- Combine machine learning and citizen science for light curve characterization

Sustainability (SGCI, UMN, Adler)

- Direct support of research teams using the Zooniverse platform and CSCI tools
- Two workshops in 2020 (ecology, astronomy)
- Improved documentation, guidelines, and tutorials for CSCI tools
- Survey on research team CSCI tool use to understand obstacles and inform future tool development.