

Accessible Citizen Science for the Developing World

IAU OAD Grant Report TF3E2014 - Robert Simpson for the Zooniverse

1. Summary

The Zooniverse is home to a wide variety of citizen science projects; many are about astronomy. They display chunks of data to online volunteers (often in the form of images) and ask them to annotate the data, or answer questions about it.

Zooniverse projects are mostly built to deadlines by, and for, people who use browsers on high-speed connections in Western Europe and North America. This has created a bias over the years that has led to an mostly English-speaking volunteer-base and a skew away from low-bandwidth compatibility and non-standard accessibility. Put simply: the Zooniverse has not historically paid attention to accessibility or to international participation, particularly from the developing world.

This project set out to improve that. We have successfully done so by:

- a. Improving Zooniverse in-house translation tools, and [reaching out to](#) a greater diversity of volunteer translators
- b. Adding [greater default accessibility](#) functionality to the standard Zooniverse project toolset
- c. [Creating a project](#) directly connected to Africa, and building a site with a meaningful scientific contribution to the developing world. This was done by collaborating with the PEEK Retinal Imaging project, and London's Moorfields Eye Hospital, and has provided a whole new avenue for the Zooniverse to work in for potentially the next two years.

2. Outline of Project Implementation

2.1 Translation

In writing the proposal for this project we were motivated to improve the Zooniverse's translation efforts and decided to work on it regardless. This was something that eventually came at a small overhead of time with the creation of a simple tool to manage the display and editing of multiple JSON files, each storing the website text for a large number of Zooniverse projects. IN fact we had this built before the project was even approved¹.

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<http://blog.zooniverse.org/2014/02/19/more-languages-more-science-translating-zooniverse-projects/>

Zooniverse volunteers can simply ask to be made translators and are then sent a set of instructions. We now crowdsource the translations for the crowdsourcing platform itself. As part of this we doubled the list of languages on Galaxy Zoo, which now includes Indonesian, Chinese (traditional and simplified), and Ukrainian. All translation effort comes from volunteers keen to bring the projects to their own communities.

The screenshot shows the Zooniverse Translations interface for the Galaxy Zoo project. At the top, there's a navigation bar with the Zooniverse logo and 'Zooniverse Translations'. Below that, the project title 'Galaxy Zoo' is displayed. A grid of language buttons is shown, with 'Indonesian' highlighted in green. Other languages include Catalan, Spanish, French, Hebrew, Hungarian, Dutch, Polish, Portuguese, Romanian, Russian, Ukrainian, Chinese (Simplified), Chinese (Traditional), Bosnian (Latin, Bosnia and Herzegovina), Korean, German, Swedish, Japanese, Welsh, and New Locale. Below the language grid, there's a small disclaimer: 'By submitting translations, you are agreeing to the terms of the Apache 2 software license.' The main content area is divided into two columns. The left column shows the progress status 'Progress: 100%' and a 'Todo' section with a 'Deploy' button. The right column shows the text to be translated, with the English text on the left and the Indonesian translation on the right. The Indonesian translation is a direct translation of the English text. At the bottom of the translation area, there are buttons for 'Copy English Text' and 'Save'.

The following Zooniverse projects are now all translatable at <http://translations.zooniverse.org>:

- Asteroid Zoo
- Disk Detective
- Galaxy Zoo
- Cell Slider
- Condor Watch
- Higgs Hunters
- Floating Forests
- Penguin Watch
- Planet Four
- Planet Hunters
- Plankton Portal
- Radio Galaxy Zoo
- Snapshot Serengeti
- Space Warps
- Sunspotter

- The Milky Way Project
- Worm Watch Lab

To see the translated interfaces, you can visit the project itself. All the URLs are available at <http://zooniverse.org>. Through this effort we now have 17 Zooniverse projects available in at least two of 26 languages. Several projects have been translated into 10 or more languages. More translations are added each month, and a community of Zooniverse translators exists online as a Google Group².



2.2 Accessibility

To execute the bulk of this project we hired Jim O'Donnell, a web developer who has built several Zooniverse projects (including operationwardiary.org, sciencegossip.org). Jim has always had a keen interest in accessibility and he immediately set out to make as many basic, functional additions to the core Zooniverse front-end javascript toolset as possible.

These were focused on maximising the potential for people to participate in Zooniverse projects when using non-touchscreen interfaces (e.g. using very small mobile phone screens, and WAP interfaces), less-known mobile browsers, and accessibility tools such as screen readers.

² <https://groups.google.com/forum/#!forum/zooniverse-translations>

A full list of changes to the core Zooniverse front-end library (called 'Readymade') can be found in Appendix A.

This set of core changes was exactly the kind of time and effort we do not have capacity for in our usual grants and projects. Being able to spend some time getting into these issues, and implementing them in the core libraries should prove to have long-term benefits as future projects will include such changes far more easily, and by default.

2.3 The 'Retinas' Project and PEEK

In seeking out a new Zooniverse project to focus the efforts of this grant we initially looked for something astronomical in nature. It was hard though to find anything with an astronomical science case, or research goal, that was uniquely connected to the developing world, and to science that would have the most impact there too. Astronomy is, by its nature, quite global.

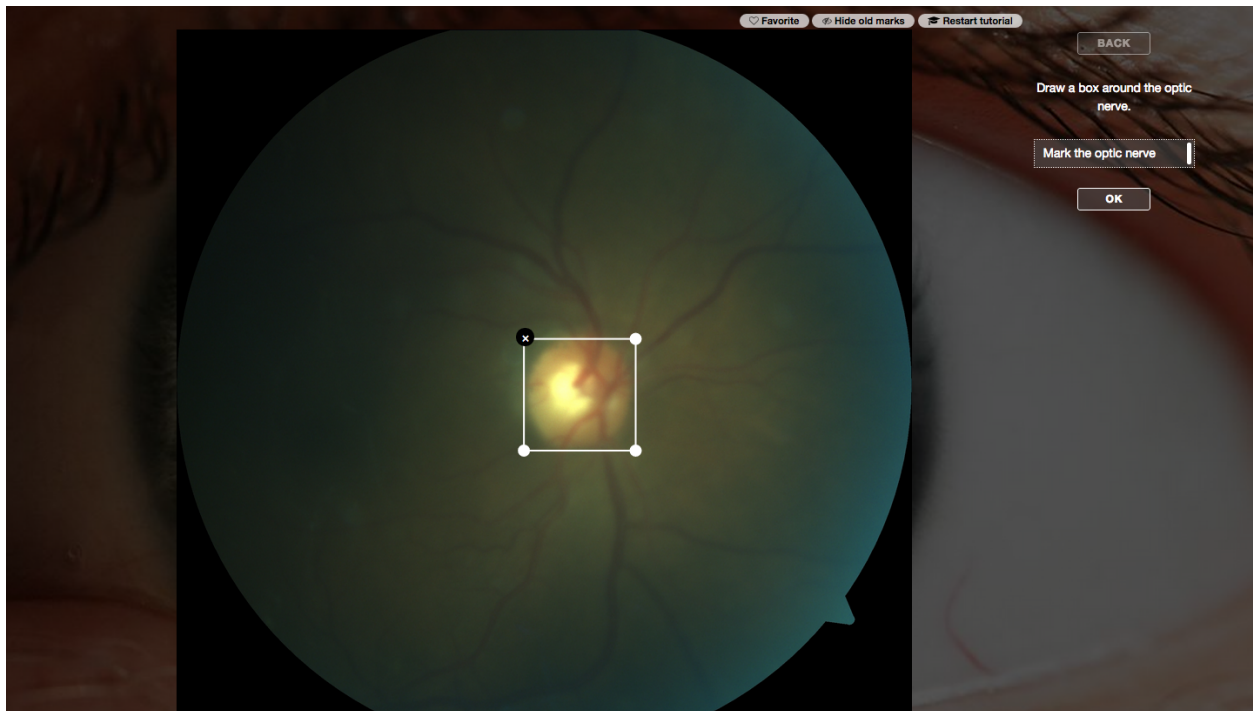
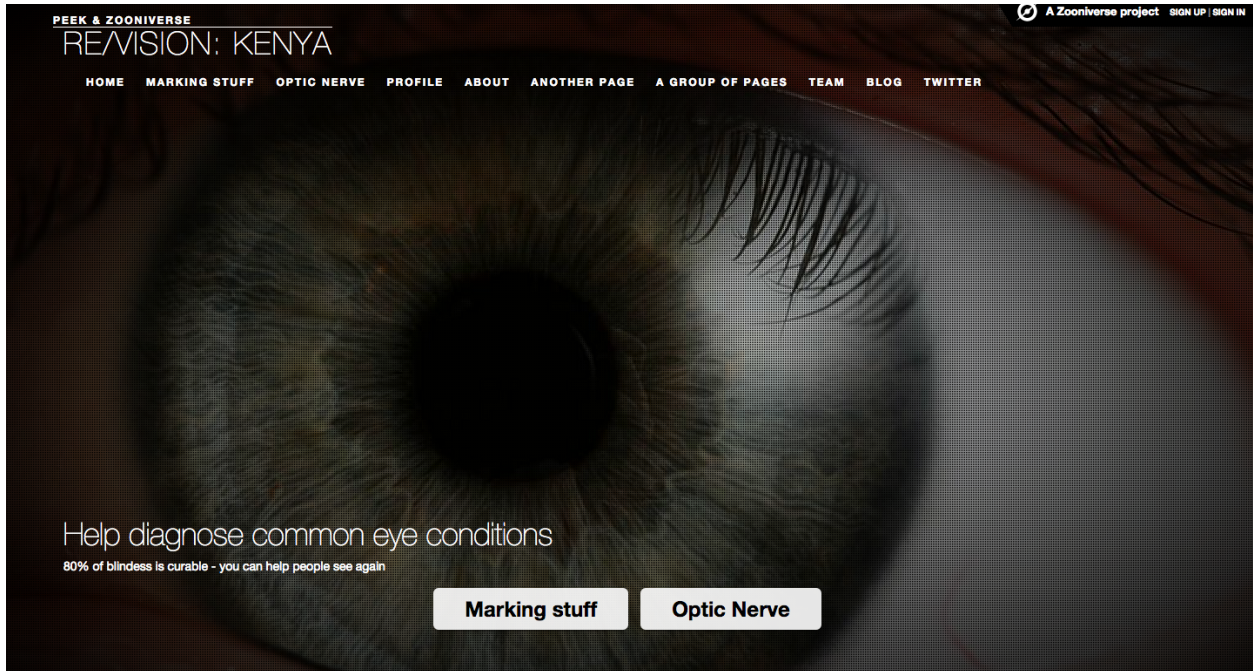
We were fortunate to find a perfect collaborator in Andrew Bastawrous, an Eye Surgeon based in Kenya, working on a project called PEEK (Portable Eye Examination Kit)³. His goal is to improve the lives of thousands of people in Kenya and neighbouring countries, by turning an Android phone into a high-quality eye examination centre for taking retinal images of people with easily curable eye conditions, who currently live with impaired sight or blindness.

PEEK has been gathering funding and momentum, but they find a bottleneck that is hard to get around: it is far easier to find volunteer field workers able to deliver eye examinations with PEEK, than to find qualified ophthalmologists able to diagnose and inspect the high volume of retina images PEEK creates. Essentially: gathering the data is cheaper, but analysing it is not.

This is an imbalance that Zooniverse is ideally placed to help with, by asking volunteers to inspect retinal images instead, and reducing the need for professional time and intervention in the process.

We worked with PEEK, and colleagues at Moorfields Eye Hospital, to create a demonstration website for a retinal imaging project, which can be seen at <http://demo.zooniverse.org/retina/> and in screenshots below.

³ <http://www.peekvision.org/>



This project is not directly connected to astronomy, but is built on the foundations of the Zooniverse's astronomical projects. It is a clear example of the technology and tools of astronomy (in this case Galaxy Zoo, The Milky Way Project, and others) being used to benefit other areas of life.

This demonstration project has successfully shown that a programme of citizen-powered retina diagnosis is possible and has huge potential in assisting in eye-related healthcare in Kenya, Tanzania, Mali, Botswana, and more.

The collaboration have now taken on funding the further develop this concept and expand it. In that respect this grant has yielded far more than we planned, in a fantastic way. We hope to build on the foundations laid down by this grant and to be actively helping the PEEK project to cure blindness by early 2016.

3. Deviations from Original Project Implementation

It took much longer to find a suitable partner and project than expected. While we were waiting, we focussed on accessibility and translation and that has produced a solid foundation of future work, ensuring better compatibility of the Zooniverse with more people, on more devices. Translation efforts have resulted in increased participation in new parts of the world for many projects, in astronomy and in other fields.

The PEEK connection has been amazing, and has huge potential. The big downside has been that ethics approval is required to use the retinal data, and that has limited our dataset, preventing a full, public project launch happening until Autumn 2015. The same delay though has meant that we have found funding the increase the scope of the idea, and to overall have a real impact on more lives.

4. Evaluation and Suggestions for Improvement

The Zooniverse is still unable to escape its inherent structural biases, being an English-speaking collaboration in the Western world. It would greatly improve the effectiveness of the work undertaken as part of this grant if the translation tools were communicated beyond the Zooniverse's usual channels. We have seen that when translated into languages such as Russian, Hebrew, and Farsi, there is a great potential uptake and there scope for reaching new people.

If the OAD is interested in further supporting the Zooniverse in this regard, then a short, structured programme of communication about translation would be very beneficial.

4.1 Summary of implementation of the Monitoring and Evaluation Framework

One area where it is relatively easy to see if the work is having an effect is translation. Google Analytics reports where a user's web session comes from, and what language their browser is set to use.

On Galaxy Zoo, English (en-us) has steadily held at 65-70% of website sessions since 2012. In 2014 that changed to be 60-65% of all website traffic, with greater fluctuation overall. In

early 2015 there are signs that the number is dropping further, with English only accounting for 51% of session in the week Jan 11-17th 2015.

On other astronomy projects the story is better. Up to early 2014 the Milky Way Project saw English-language user sin 65% of sessions. In April 2014 that had dropped to 55% and in January 2015 it was 40%. In the first two months of 2015, Dutch has reached 8% of all MWP sessions, with Russian, German, Spanish, Polish, and French all consistently exceeding 1% of weekly sessions.

Asteroid Zoo began as an English only project and had English session rates of 60% at launch. Volunteers added Polish, Russian, and Spanish translations in the first few weeks and English sessions dropped to 50% and have stayed there since. A similar story is seen on Disk Detective, which launched with English session rates at 64%, but this has dropped to 45-50% since volunteers have added several different languages - 14 in total.

The effect of the PEEK 'Retinas' prototype site is harder to measure. It did not launch to the public as intended, but it will do at a later date, and in a larger way. The best way to measure its impact will be to see if it reconnects with people in the region, and if it causes them to consider online citizen science as a tool for their own work or community. That project is being built on the Zooniverse's new 'Panoptes' infrastructure, which will benefit from the work done in this grant. Panoptes will allow anyone to create and run their own Zooniverse-style citizen science project. If the Retinas project has the intended effect, we would hope to see a project or two originating in Kenya and the other PEEK areas .

5. Financial Report

A full grant report will be provided by Oxford University's research services division.

Appendix A: List of Accessibility Improvements to Zooniverse Readymade

This is found in code written first at <https://github.com/zooniverse/Retina> by Jim O'Donnel (username eatourgreens).

- TabSet and TabControl classes add ARIA roles (tab and tabpanel) and states (aria-selected, aria-labelledby and aria-hidden) to tabbed interfaces. Used by main nav, field guide and tutorial steps.
- Field guide implements ARIA tabbed nav, adds alt text for images. Selected panel can be switched by tabbing through the tab buttons.
- Tutorial implements ARIA tabbed nav for step controls, adds alt text for images. Modal box traps focus until dismissed, then returns to previously active element.
- Main nav implements ARIA tabbed nav to indicate current active page to assistive tech. Tabs and panels are linked using element ids, following Marco Zehe's advice on implementing accessible tabs.
- Focus cycles through decision tree elements when moving from one step to another. CSS bug fixed which hid radio buttons from the browser tab order.
- Details boxes for marking surface points trap focus until dismissed.
- Landmark roles for main sections of page (navigation, contentinfo, main, see Using WAI-ARIA landmarks)
- Main nav as an unordered list, so that screen readers announce eg. "List, role navigation, five items."
- Tabbed interfaces support left/right keys for changing the active tab, after reading Léonie Watson's guide to screen-reader interactions.

Appendix B: Contacts at Zooniverse

Robert Simpson is leaving Zooniverse and his last day will be March 6th 2015. Responsibility for this grant will pass to Prof. Chris Lintott (cjl@astro.ox.ac.uk) as indicated in the original grant documentation.

If the OAD does want to publicise and spread the word about Zooniverse translations, or any other part of this grant then it may also be useful to talk to the Zooniverse Community Manager Grant Miller (grant@zooniverse.org).