NatureNet: An Interaction Design with a Focus on Crowdsourcing for Community

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Abstract. Citizen science projects adopt a crowdsourcing model for collecting and analyzing scientific data for the purpose of improving science and encouraging non-scientists to participate in science projects. For example, the iNaturalist model relies on crowds of citizen scientists to scale both the detection and identification of species from photo vouchers. EBird, as another example, crowd sources bird observation data. Both of these projects leverage community interactions for effective data collection and validation, where the data is used to support environmental sustainability research [1]. In NatureNet, the interaction design has a focus on creating an online community around informal learning about environmental sustainability issues and on engaging the community to extend and customize the design of the technology to better support their environmental sustainability projects.

Keywords: Crowdsourced design · Citizen science · Sustainability

1 Introduction

NatureNet is a citizen science project that creates community around informal learning about environmental sustainability issues and engages the community to customize the design of the technology to better support their environmental sustainability projects. NatureNet is deployed via a multi-platform application delivered on a multi-user, touch-based tabletop display, smart phones, and a web site [7]. The NatureNet mobile app allows a park naturalist or visitor to record biodiversity data while in the park. The biodiversity data collected by individuals through the mobile app are loaded into a database and can be viewed and discussed by other visitors and naturalists on the website in addition to on the tabletop station in the park.

What distinguishes NatureNet from other biodiversity projects such as iNaturalist or eBird is its focus on community and the crowd's participation in both scientific contributions and design of the technology used by the online community.

In NatureNet, creative development of the design happens by individuals suggesting design ideas for extending or modifying the features of the interaction design or adding new features of the system, commenting and having discussions around the ideas and voting on the ideas. Based on a synthesis of crowdsourced comments and votes, strong

ideas are selected by the design team and integrated into the next version of the platform [3–5].

While a great amount of crowdsourcing literature has focused on crowdsourcing as a strategy to either collect scientific data or collect designs, what we focus on in NatureNet is forming community around the science projects as well as the design of NatureNet system. This will enable the users of online communities to iteratively re-design the community platform and projects to meet their latest needs and improve collaboration in their field of interest [2].

NatureNet is being deployed in three communities focused on environmental sustainability: NatureNet for ACES, a community of visitors to the Aspen Center for Environmental Studies in Aspen Colorado. NatureNet for AWS, a community focused on protection of Anacostia watershed in Maryland. NatureNet for Reedy Creek, a community of Reedy Creek Park visitors in Charlotte North Carolina.

In the following sections, we present the NatureNet platform design and how the design elements support different types of collaboration to serve the online community dynamics.

2 NatureNet Interaction Design

A quick look at different types of services provided in form of crowdsourcing highlights the difference between NatureNet and other citizen science projects. Vuković [6] categorized the way crowdsourcing platforms manage needs into two general groups, "Crowdsourced Function" and "Crowdsourcing Mode". Crowdsourced function represents the part of the product and/or service lifecycle that is being crowdsourced. Crowdsourced function may take one of the following forms: design, development and testing, data collection, marketing and sales and support. The second category of crowdsourcing activities is Crowdsourcing mode. Crowdsourcing mode identifies whether a decision is acceptable by potential users or not. Crowdsourced mode includes voting and evaluation provided by crowd as is commonly used in marketplace and competitions.

2.1 NatureNet and Crowdsourced Function

The crowdsourced function of data collection has been regularly used in citizen science projects. As an example, eBird utilizes volunteers to collect observations of birds. The crowdsourcing function of design engages the creativity of crowds. Members of the crowd can contribute their own design ideas, before the design team proceeds with new product development.

Crowdsourced function in form of design is way of doing business among enterprises such as Threadless.com. The crowd is responsible for contributing t-shirt designs before mass production [6]. In Threadless, the crowdsourced mode includes comments for evaluating a design and voting for a design.

NatureNet includes crowdsourced functions of design and scientific data gathering. NatureNet data gathering happens with contributions to observation activities and design happens with contributions of design ideas. Figure 1 shows the part of the web site in

which users can review projects and contributions. The community can also explore the crowd's contributions via an interactive map, as shown in Fig. 2. The map feature allows the crowd members to explore other's contributions that are located nearby. This feature is developed as environmental matters and activities in an individual's local environment would be more perceptible and motivating for them to contribute with the community.
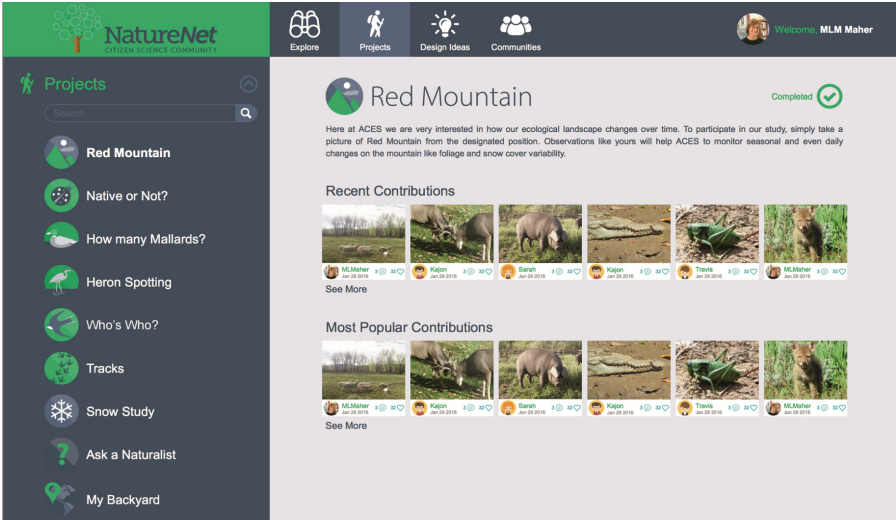

Fig. 1. NatureNet projects and associated contributions

The website and mobile app design include a specific section called "design ideas", shown in Fig. 3, where community members can suggest new design features, changes in the technical platform, new projects, or even suggest new ways to use NatureNet. One of the main considerations in design of NatureNet platform is having this design idea section easily accessible all over the platform. This allows users to see design as one of the main contributions from the community and not a side activity. In addition, the platform facilitates description of design ideas for non-designer crowd members by allowing them to upload pictures to describe their ideas, and providing them examples of design ideas created by NatureNet design team and/or other visitors.
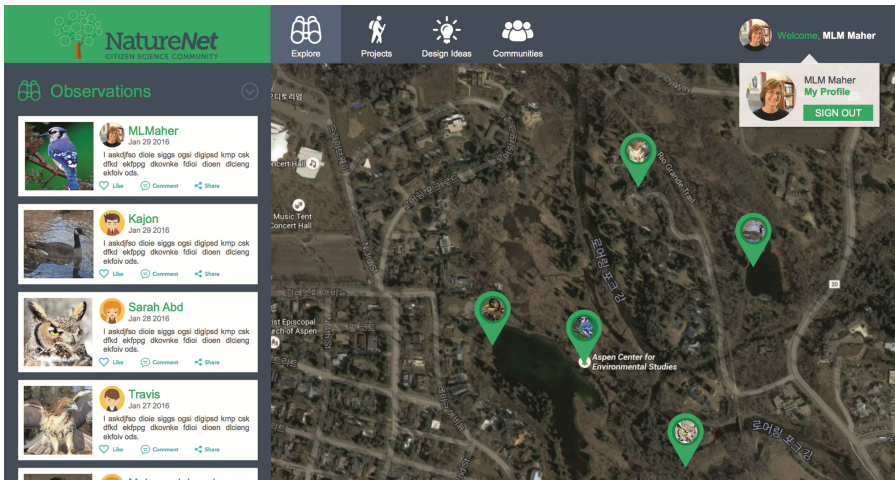
Fig. 2. NatureNet interactive map feature for location base exploration of observations
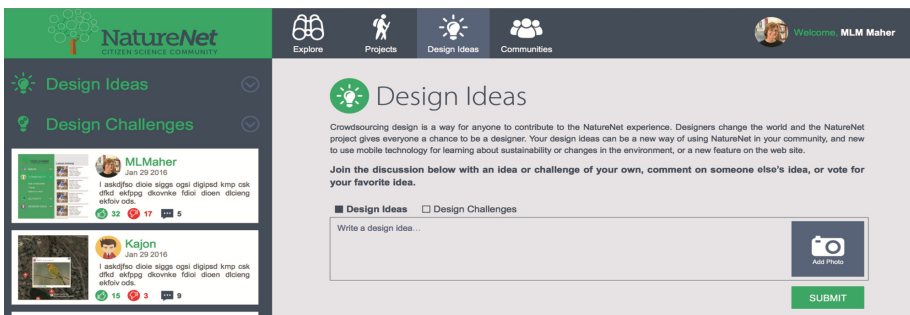

Fig. 3. Design ideas section on NatureNet website

2.2   NatureNet and Crowdsourced Mode

In NatureNet, crowdsourced mode is developed to facilitate community formation and cohesion by encouraging the community members to collaborate around their own projects and design ideas. The crowd can influence which design ideas are to be implemented for their own use. The design idea section of the website and mobile application allow users to comment, like, or dislike ideas submitted by other members of the community. The voting process helps the community members to feel they can be involved in community decision making even if it is through very small contributions such as liking a design idea (Fig. 4).

Fig. 4. Voting and commenting functionalities available to discuss community design ideas on NatureNet platform.

In addition to feedback on the submitted ideas, NatureNet users have the option to like or comment on the observations submitted by others. These likes and comments are sources for NatureNet naturalists to know which activities were more interesting for the community, and what is crowd's understanding of different environmental topics. Based on this, they can decide what new activities could be of benefit, and what sort of information should be provided to the visitors of the Nature preserve or online community.

Finally, project and design submissions with highest number of contributions are displayed in different places on NatureNet website. This works as a motivation for community members for more collaboration around the activities as it gives them the feeling their contributions are important and would be seen by other members of the community.

3   Discussion

NatureNet is a citizen science project which encourages the crowd not only to participate in environmental data collection and validation, but also in developing community around learning about environmental sustainability and contributing to the design of the interaction for community awareness [8].

The benefits to the crowdsourcing model defined by the NatureNet project as a citizen science project are:

- Create a community of people around environmental sustainability activities.
- The community becomes a stakeholder of the system by playing a role in the design and development, thereby engaging them to contribute more towards its success.
- The community feels at home for having a say in designing the system for their activities.
- The system design is dynamic and open for the community to change as new needs or interests arise.
- The overlap among the designers and community members reduces the gap between the user and designer mental models.

Naturalist at Reedy Creek Park Charlotte, and Naturalists at Anacostia watershed in Maryland, who provided insight and expertise that greatly assisted the design of NatureNet and this research.

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