Organizing from the Middle Out: Citizen Science in the National Parks

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ABSTRACT

This poster presents initial findings from a dissertation pilot study on a citizen science project involving the public with scientists in collaborative research. The goal for the pilot study was familiarity with the contextual factors that influence citizen science project design, and in turn, observing how the design choices contribute to the project's knowledge creation and participation outcomes. The initial results highlight an unexpected form of 'middle-out' organizing that challenges assumptions about top-down and bottom-up organizing, as the location of the top and bottom are clearly a matter of perspective in inter-organizational partnerships.

1. INTRODUCTION

This poster presents initial findings from a dissertation pilot study on a citizen science project involving the public with scientists in collaborative research. Many such projects are virtual organizations, with geographically dispersed resources and members who work toward common goals via cyberinfrastructure. Related research underscores the importance of understanding how organizational, task, and technology design requirements interact to influence participation and the scientific outcomes [5, 6].

Research which relies upon data about the natural world, and indeed the universe, is often hindered or rendered impossible by the high cost of data collection and analysis. The real-world problems that fall into this category depend on massive data sets that cannot be automatically generated, data collected over long periods of time or wide geographic areas, or large-scale analyses that require human perceptual competencies. The research problems range from climate change to the search for cures to cancer. To address these issues, as well as many other questions spanning a variety of disciplines, scientists are now employing citizen science as a solution to enable scientific research that is not feasible by any other means.

Public participation in scientific research can take a variety of forms; many of these projects resemble the Community Data and Open Community Contribution models of scientific collaboratories [2]. The dominant form of citizen science projects, found in the biological and environmental sciences, focuses on monitoring ecosystems and wildlife populations; volunteers form a human sensor network for distributed data collection [3, 1]. By contrast, in projects like NASA's Clickworkers [4], volunteers provide data analysis service, applying basic human perception to computationally difficult image recognition tasks.

Ubiquitous computing now makes broad public participation in scientific work a realistic research strategy for an increasing variety of projects. The evidence is clear that under the right circumstances, citizen science can work on a massive scale and is capable of producing high quality data as well as unexpected insights and innovations [1, 7], particularly when coupled with traditional scientific studies.

2. PILOT STUDY

The goal for the pilot study was familiarity with the contextual factors that influence citizen science project design, and in turn, observing how the design choices contribute to the project's knowledge creation and participation outcomes. The grand tour research question was, "How are citizen science projects formed?", and more specifically, "What factors influence the way a citizen science project develops?" The data collected between July and October of 2009 are currently under analysis, with initial findings reported here.

2.1 Study Site

The Northeast Phenology Monitoring (NPM) project is being developed by an inter-organizational network of partners collaborating virtually. They are working to create a regionally-coordinated citizen science project for implementation in National Parks in the Northeast region of the US. The goal of the project is to generate a large-scale phenological data set to study effects of climate change on natural life cycles in plants and animals. This pilot study focuses on the organizers who are designing the project, a virtual organization comprised of representatives from several organizations at multiple physical sites.

3. METHODS

The study employed ethnographic methods, taking an exploratory approach to develop a deeper understanding of the

context of a place-based citizen science project under development by a virtual organization. Data from interviews and participant observation are inductively coded with emergent themes relating to the processes and contextual factors influencing the development of the project. Data collection for the study began with seventeen interviews conducted by phone and in person; field notes generated detailed written observation, along with 315 digital images from the field sites and over 90 documents addressing many facets of the project's development.

4. FIELD SITES

Three field sites make up the locations for this pilot study. The first is virtual, and the other locations are physical sites in which the project's work is being implemented. The organizing group does most of its work virtually; coordination and communication occurs via email and phone, with periodic conference calls to report progress and plan next steps. The field sites for the citizen science project implementation were Acadia National Park and Boston Harbor Islands National Recreation Area.

Acadia was the first National Park east of the Mississippi, and today the Maine park encompasses 47,000 acres of unique mountain, forest, and seashore habitats. The park attracts several million visitors annually, offering 125 miles of hiking trails and 45 miles of carriage roads perfect for bicycling; it is widely considered a top birding destination in North America.

Boston Harbor Islands is a group of thirty-four islands in the Boston harbor, and was designated a National Recreation Area in 1996. The islands are owned and managed by a combination of private, public, state, and federal entities, operating together as the Boston Harbor Islands Partnership, and are home to several historic buildings, including a Civil War-era military fort and one of the nation's oldest lighthouses.

5. INITIAL FINDINGS

The project has no formal structure, and the common perception among members that this is not a 'top-down' project derives from the fact that there is no single dominant source of funding. Most organizational partners have little more invested than staff time, and as a result of low direct financial investment, the individual participants have greater autonomy to get the project's work done.

While the NPM is not a top-down project, neither is it 'bottom-up' in the usual sense of originating with the people who serve as volunteers. Instead, it seems to be an example of 'middle-out' organizing, in which the driving force in establishing the project partnership comes from the organizers who are positioned in between the funders and the volunteers, as shown in Figure 1.

The lack of centralized funding creates conditions that permit organizers to contribute as they are best able while maintaining a focused scientific goal, which may be less likely to occur in bottom-up scenarios. Although the organizers who are employed by federal agencies view their effort as ground-up, they overlook volunteers as potential instigators, which is why I propose that this project demonstrates middle-out organizing:

> "The lack of funding from the top, that isn't going to come, so they're [regional managers] going to have to be the creators, they're going to have to be their own little generators to get it up and running. And it'll become institutionalized because a number of people will just make it happen, and that's how, in a sense, it's a ground-up instead of top-down sort of a thing."

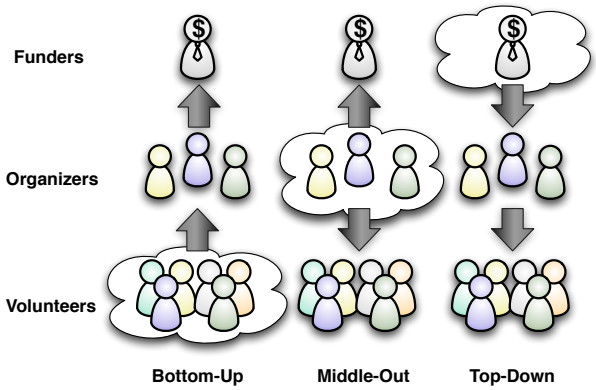

Figure 1: The organizational location of the project's originators shape its organizing processes.

This project emerged in a fiscal environment that imposed severe limitations, but the group members have found that pulling together just enough funding from a variety of sources has permitted a different approach than they would otherwise expect. As the de facto project leader observed:

> "So what you have here is a project that's being done loosely among a bunch of different organizations. Typically in a project like this, you'd have a primary source of funding kind of providing structure to it all. But we don't have that here at all. So it's just kind of everybody participating as they can, and as they have time, and as they will."

Of course, the lack of funding is never considered a good thing. It provides some advantages to the organizers in terms of their autonomy, which comes at the steep cost of personal commitment. According to a park staff member,

> "Mostly it's the individual biologist at that park who's willing to say, my forty hours a week is here, but I'm going to spend my extra eight hours a week, and this is going to be my baby because I feel something strong, and that's how it goes...So there's no national coordinator, there's no anything. But there again, I think we can be our own independent people and do our own thing."

Engaging in a middle-out partnership like the NPM project is a matter of balance, but the organizers are enthusiastic and committed despite many constraints. They see this

project as fulfilling a key organizational goal with respect to managing natural resources, and also addressing a particularly pressing environmental issue by generating the data needed for the National Park Service to make scientifically-based managerial decisions in response to climate change.

6. CONCLUSIONS

The initial analysis of the NPM project touches on challenges and advantages of organizing a citizen science project partnership from the middle outward. The NPM project has emerged from a small group of committed individuals across a variety of organizational locations scattered somewhere in between the top and bottom. These findings challenge our assumptions about top-down and bottom-up organizing, as the location of the top and bottom are clearly a matter of perspective in inter-organizational partnerships.

7. ACKNOWLEDGMENTS

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