
ERA: Encouraging Contribution at a Community Bike Project

Thalith Nasir

Indiana University
School of Informatics
Bloomington, IN 47406
atnasir@indiana.edu

Chad Camara

Indiana University
School of Informatics
Bloomington, IN 47406
ccamara@indiana.edu

Rachel Bolton

Indiana University
School of Informatics
Bloomington, IN 47406
rbolton@indiana.edu

Abstract

In this paper we propose ERA (Experience Reflective Artifact), a system that strengthens participant contributions at a community bike project. Organizations like this rely on the contributions of individual members. ERA was borne out of a human-centered and experience-focused design process that reflects the current culture of the bike project. We hope to strengthen the community that is built around the bike project, resulting in the spread of sustainable behavior.

Keywords

Community Bicycle Project, Artifact, Ensolement, Behavioral Reinforcement

Introduction

Bicycles are a zero emission mode of transportation. A 4-mile trip on a bicycle versus the same distance in an automobile can keep 15 pounds of pollutants out of the atmosphere [4]. However, 99.56% of bicycles sold in the U.S. are imported, [5] and these globally produced and oftentimes still useful bikes are thrown in local landfills, abandoned in garages, or left on bike racks.



Figure 1. Bike parts abandoned on a community bike rack.

Problem Space

The Community Bicycle Project (CBP) provides a venue where volunteers can build their own bike from donated bikes and bike parts. The CBP also sells used bikes at low prices, offers bike maintenance classes, and provides tools for fixing bikes. The community is only as strong as its members, and the CBP relies on fostering participation and individual leadership within the organization.

The problem with this type of organization is that there is no system to strengthen individual participation. Participants at the CBP can choose to participate as much or as little as they wish. While the CBP can still function without maximum participation from every member, the community is not as strong as it could be. If our design can foster more participation we can build stronger individuals as well as a stronger community. Everyone benefits when everyone participates.

Our focus in research and design was experience-centered rather than technology-centered. We explored the value of meaningful artifacts as stated in *Why We Need Things* by Mihaly Csikszentmihalyi, "...objects reflect the continuity of self through time, by providing foci of involvement in the present, mementos and souvenirs of the past, and signposts to future goals." [3]

Research

Focus Group

In order to better understand what residents considered important to the sustainability of local resources, we conducted an exploratory focus group. All participants considered transportation to be the most important area of sustainability in their town.

Further, it was agreed that community is a major factor in promoting sustainable behaviors. Participants identified the Community Bicycle Project as a model of sustainability through its reuse and recycling of bicycles.

Ethnographic Observations

We conducted our observations at the bike project and the local recycling center over a span of three months. Although we decided to focus mainly on the bike project, we felt it was valuable to compare it to another recycling organization in terms of process and motivation. Each visit lasted between two to four hours. This was an ideal method to use because many of the activities at the bike project and the recycling center take place in public space. There was no barrier to entry, and we were free to observe whenever we needed during operating hours.

Contextual Inquiry

Because of the open nature of the bike project, it was not appropriate to schedule specific times for the contextual inquiry, nor was there any way to predict how many volunteers would be present at any given time. We decided to have one team member volunteer three hours at the bike project and work alongside a new member. This worked well for us, because we were able to learn the processes and ask questions without worrying about imposing or needing to schedule time with specific individuals.

Interviews

Our first interview was conducted with a veteran member of the bike project who continues to contribute to the community. Our main goal for this interview was



Figure 2. Research at the local recycling center.



Figure 3. Building the affinity diagram from research done at the Bike Project.

to understand his motivation to continue contributing to the CBP even after he had built his bike.

Our second interview was conducted with a volunteer leader at the bike project. The purpose of this interview was to understand what motivated him to volunteer his time, as well as what activities he felt were important for fostering a strong community.

We also interviewed two employees at the local recycling center. The main goal of each interview was to understand how they do their jobs without the aid of technology. By interviewing so many different types of roles at the CBP and the recycling center, we were able to understand multiple personal viewpoints.

Our combined research gave us a substantial pool of information. We held several interpretation sessions during which we constructed an affinity diagram [Fig. 3], conducted artifact analysis from photographs taken at the CBP, and used role playing to interpret data. Our interpretation sessions yielded the following insights.

Insights

- Core Contributions

Contributions made by individuals are vital to building a strong biking community. We identified six core contributions as being essential to long-lasting social value and long-term participation:

1) Bike building, 2) Shop maintenance, 3) Receiving assistance, 4) Assisting others, 5) Bike maintenance, and 6) Socializing.

The interviews showed that involvement within the community was directly linked to full-participation in

CBP activities. Fully-engaged participants were also more likely to use biking as a primary form of transportation.

- Self-Directed

The CBP is largely self-directed. After new members are given a basic introduction to the organization and its physical layout, they must direct their own progress and contributions.

- Limited technology needs

Computers are not used at the CBP. Instead, personal interactions and hand-made signs convey necessary information. The volunteer leader suggested that the project runs smoothly as is and he could not justify the need for the addition of technology.

- Transient participants

Participation dramatically drops off upon completion of building a bike. This is attributed to two things. First, the majority of patrons are students whose time spent in town is predetermined by their education goals. Second, building a bike is a short-term individual endeavor.

Concept Generation

Design Approach

Our goal for this design was to create a system that encourages participants to be fully involved in the six core contributions at the CBP. We identified four constraints specific to designing for the CBP. It is a non-profit organization with a low tech, self-directed ethos that operates in a garage with limited physical



Figure 4. Initial design concept: testing sequences of flashing colors.

space. Thus our design needed to be as inexpensive, low-tech, self-directed, and spatially unobtrusive as possible.

We used rapid sketching, scenarios, and role-playing exercises to develop design sketches from our research. An affinity analysis of our sketches identified common themes that led to core aspects of our final concept: *storytelling*, *reflection*, and *ensoulment* [6].

As described by Nelson & Stolterman, ensoulment is an appreciation for the essential quality of a product and its role in one's life [6]. Over time participants develop a rich story of the CBP that is ensouled in the bike that they build. We wanted our design to be an ensouled artifact that provides an opportunity for reflection. This artifact needed to be something that could be incorporated into daily life and easily be referred to throughout the day.

Initial Design Concept

Our initial concept was a small portable artifact that could flash six colors. Each color would represent one of the six core contributions. At the press of a button, a light would flash a sequence depicting the participant's CBP core contributions (over what period of time?). We chose colors in order that each distinct experience might be recognizable with little cognitive effort. If all the colors are shown during playback, this represents well-rounded contributions. Fewer colors means the participant has not contributed everything they could have.

Experience Evaluation

Our prototype consisted of two videos of color sequences shown on a laptop designed to test the validity of the color sequence concept [Fig. 4]. One video was a short sequence consisting of only two colors. The other was a long sequence including all of the colors in varying frequencies. In order to encourage test participants to focus on the video, all but a small part of the screen was obscured.

Five participants were recruited for the experience evaluation. The evaluation sought to answer four questions: 1) Do people relate the colors to the six contributions? 2) Do people value seeing the entire story of their time at the CBP? 3) Do people recognize patterns and missing colors? 4) Are people motivated to add missing colors?

Upon conclusion of the evaluation, participants were asked open-ended questions about the experience. We also used Microsoft's product reaction cards [1] to gauge the different values participants related to the design.

Experience Evaluation Results

The experience evaluations validated some of our assumptions while also revealing problems with our approach:

- Participants could easily match the colors to experiences, but they needed a color key to do so.
- Storytelling was seen as valuable, but the entire story seen in one sequence was overwhelming.
- The experience was found to be valuable, but also novel in the sense that it might be seen as gimmicky.



Figure 5. Experience log box.

Design Solution

Issues from experience testing were addressed in our second iteration. In order to deliver on the core of our design, participants only needed to know what experiences were available and if any were missing. In the redesign we decided to elaborate on the initial concept and create a two-part system: an experience log box [Fig. 5] located at the CBP, and a portable experience reflective artifact, or ERA [Fig. 6].

Experience Log Box

The log box will be a simple display device mounted near the exit door of the CBP. While spatially unobtrusive, it will be noticeable as the only technology on the wall amongst the hand-made signs.

The log box will be used to log daily activity and then transfer that data to the ERA. The interface will consist of six colored buttons labeled with the six core contributions. We anticipate low technology needs: the circuitry to capture and transfer the input from the six buttons, a casing, and a USB slot.

ERA

Our initial concept left the artifact's appearance ambiguous. After experience evaluation, however, we decided on a USB flash drive with six different colored lights laid out in a line across the drive. Changing to a USB drive addressed the risk of novelty by providing more possible avenues of usage. Changing to six different colored lights in a line eliminated the need for a key to match colors to contributions and at the same time made it easier to recognize missing colors. This

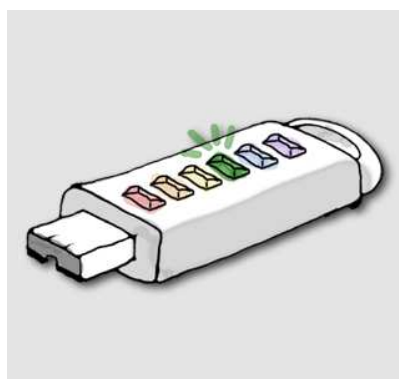


Figure 6. Experience Reflective Artifact reminding participant of experiences by flashing colored lights.

reinforced the second aspect of our core: to let the participant know if they were missing something.

Pressing a button will display a light sequence that corresponds to the participant's last twelve contributions to the CBP. Initial testing suggested any more than this runs the risk of the sequence losing its meaning. Any less would potentially represent only one visit, which would not adequately reflect recent habits.

System

The system works by providing participants with three valuable non-linear interactions: *Logging*, *Reflecting*, and *Reminding*. New participants at the CBP will be introduced to the system on their first day. The ERA system will be explained as a way to enable participants to get the most out of their time at the CBP.

The initial step is *logging* daily activity. Upon leaving the CBP, participants will take their ERA and plug it into the experience log box. "What did you do today?" will be displayed on the interface. Participants will then select from the screen the core contributions they made to the CBP that day. This information is transferred to the ERA. Logging should only take a few seconds, but provides a valuable opportunity to *reflect* on individual contributions. Later on when the participant is away from the CBP, the ERA will *remind* them of their time there. It will also become an embodiment of their contributions.

Conclusion

Our ERA system promotes reflection about contributions to the CBP. By creating a system that fosters stronger individual contributions, the community becomes stronger as well. A strong community at the bicycle project has value at both the local and global level.

Locally, more people adopt bike riding as a viable form of transportation due to the tools, skills and support system that the CBP provides. This decreases emissions into the local air, decreases traffic congestion, promotes a healthier lifestyle, and is more economical.

The global impact is both environmental and behavioral. Building bikes from local resources helps reduce the number of bikes that get manufactured globally. This decreases the emissions and energy consumption caused by global shipping. The sustainable behaviors and values learned at the Community Bicycle Project get transferred to other communities when the transient participants move out of town.

Future Work

In this early stage of the design, we still need to be concerned with many things. In terms of adoption of the design, we want to research multiple uses for the artifact that fit into the participants' normal routines. For example we need to know how viable the artifact could be as a USB storage device, a keychain, or as a safety device used while cycling. In terms of

scalability, we want to research how other community organizations might benefit from this system.

Acknowledgements

We would like to thank Dr. Shaowen Bardzell, Heekyoung Jung, Dr. Marty Siegel, Bob Molnar, C.J. Page, Matthew Snyder, and our fellow HCI/d students at Indiana University for their individual comments and guidance on this project. We also thank everyone who participated in our research and evaluations. Finally, we would especially like to thank everyone at the Bloomington Community Bicycle Project and the Bloomington Community Recycling Center for all of their efforts towards a more sustainable future.

References

- [1] Benedek, J. and Miner, T. *Measuring Desirability*, Proceedings of Usability Professionals Association 2002, Orlando, July 8-12.
- [2] Carroll, J. *Scenario-Based Design: Envisioning Work and Technology in System Development*. Wiley, New York, 1995.
- [3] Csikszentmihalyi, Mihaly. *Why We Need Things*, in S. Lubar and W.D. Kingery, ed., *History From Things: Essays on Material Culture*, Smithsonian Press, Washington, 1995, pp. 20-29.
- [4] Environmental/Energy Benefits. http://www.bicyclinginfo.org/why/benefits_environmental.cfm. Accessed on 12/18/08.
- [5] National Bicycle Dealers Association. Industry Overview 2007. <http://nbda.com/page.cfm?pageID=34>. Accessed on 12/12/08.
- [6] Nelson, H.G., and Stolterman, E. *Design Way: Intentional Change in an Unpredictable World*. Educational Technology Publications, Englewood Cliffs, 2003.