

Leveraging Digital Histories of Use For Resource-Sharing Organizations

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ABSTRACT

An increasing number of non-profit groups and organizations are offering what Trebor Scholz has called “platform cooperativism”: networked-driven collections of shared things (e.g., books, tools) and resources (e.g., woodworking spaces, fab labs) that benefit local communities. In contrast to for-profit services in the sharing economy (e.g., Uber, AirBnB), platform co-ops attempt to promote both ecological and social sustainability, with the goal to promoting a fairer distribution of goods and labor, ultimately creating a stronger sense of community. However, simple inventory management systems do not account for the challenges that these kinds of organizations face, which include transience, anonymity, and general lack of creative interactions among community members, making it difficult to sustain their engagement. We designed and developed an interactive system aimed at supporting the capture and sharing of equipment-use experiences among members, called “Roaming Objects”. We deployed the system for two months in a tool-sharing community to explore how it might help to address the challenges faced by these organizations.

CCS CONCEPTS

• **Human-centered computing** → **Collaborative and social computing**

KEYWORDS

Sharing Economy; Collaborative Consumption; Sharing for Maximal Use; Digital Histories; Interaction Design.

1 BACKGROUND

Resource sharing organizations, such as tool libraries or community-owned workspaces, play a key role in supporting environmental sustainability efforts in two important ways: (i) by maximizing the use of artifacts (e.g., tools) and thus minimizing the consequences and effects of manufacturing new things [5] and (ii) through promoting acts of DIY repair, re-use, and renewal of things (e.g., a broken chair) and places (e.g., the home), over disposal and acquisition of new things [13]. They also play a key

role in promoting social value in the new “sharing economy”, where community members jointly own and develop services and resources.

However, prior research has illustrated and articulated several challenges that resource-sharing communities and organizations face. These include a) a large degree of anonymity often exists among ‘community members’ [1], b) the majority of the work of community members takes place off-site and is thus not visible to other community members [11], c) the moderate degree of transience among community members [1], and d) the lack of accountability for (and, at times, poor treatment of) the tools themselves [11]. These challenges have major implications for resource sharing communities, particularly in terms of their long-term sustainability.

Bellotti et al. [2] conducted a qualitative interview study and demonstrated the difference between motivations of platform providers and their users. While providers emphasize social, moral and altruistic qualities in their systems’ explanations, consumers are primarily driven by utilitarian motives whilst increasing value and convenience. HCI researchers have also emphasized the value of social ties and trust in sustaining online sharing communities [8], outlined considerable challenges that can occur in terms of creating and nurturing new instances of local communities if social ties and trust are weak [8,9], and examined technical limitations (e.g. account sharing) of existing online platforms [7]. Our work explores how the needs of multiple stakeholders (e.g., providers, volunteers and community members) in a non-profit tool sharing community can be supported through the design and study of an interactive system aimed at addressing the challenges identified by prior research.

While prior work has investigated how interactive systems can enable people to capture, archive, and share digital histories for real-world objects and events [3,6], little work has explored how these capabilities could be extended to support platform cooperativism. In addition, we want to better understand how new technological interventions can shape our relations with everyday objects (e.g. through personal creative practices) and to examine practices around physical objects in the broader social organization of objects/tools sharing – thus extending prior research that explored how digital histories of individual and shared experiences can become valuable resources for self-reflection and social connection [10,12].

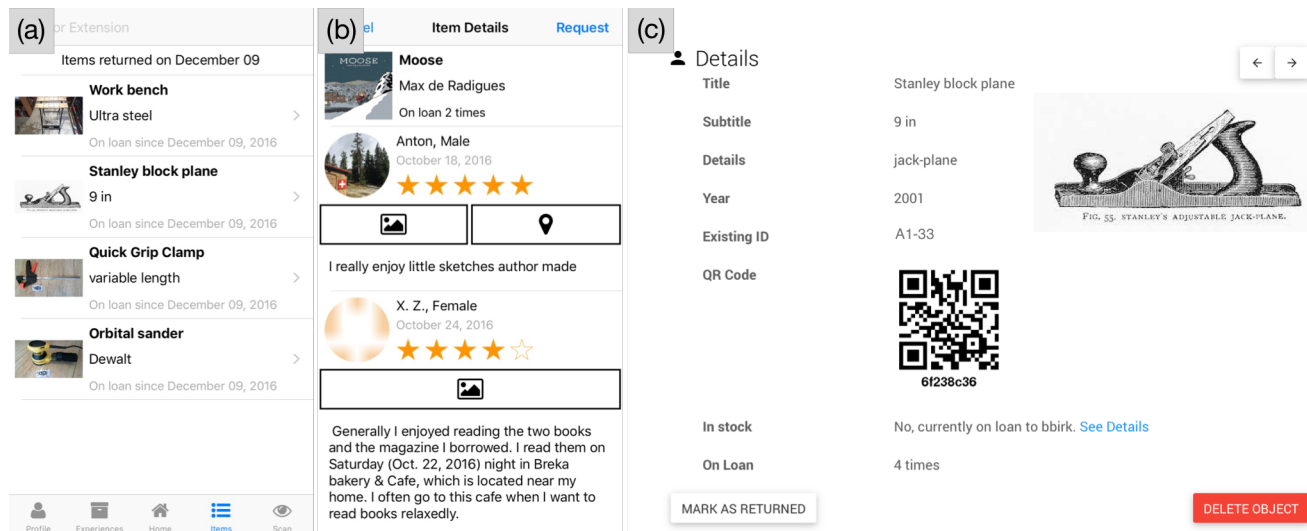


Figure 1. The user interface of the smartphone that shows (a) a list of borrowed items; (b) encoded digital history for an item; (c) the user interface of the web-based inventory management system that shows details of a tool (jack plane)

To investigate these issues, we created Roaming Objects, a software ecosystem that support the capture, retrieval, and sharing of digital experiences with tools that *roam* from one borrower to another. We deployed the Roaming Objects with 16 members of sharing co-op – the Vancouver Tool Library (VTL) – over a two-month period. Based on descriptive accounts of people’s attitudes towards, and perceptions of, digital records of shared tools, we explore how these experiences might shape people’s sharing practices at both the individual and the community level.

2 ROAMING OBJECTS ECOSYSTEM

Our ecosystem to support “experience-enabled” roaming objects is inspired by the Tale of Things platform [6] and consists of

1. A set of augmented (QR codes) physical rental objects.
2. An iPhone application to capture and share end-users’ experiences with them.
3. A web service to maintain objects’ inventory and to handle the loans.

2.1 Augmented Physical Objects

The VTL is a collective community resource that is run primarily by volunteers (around two dozen) and is coordinated by the board of directors (seven individuals elected by and among the members). The library serves over 1500 members, although not every member is actively borrowing tools. In the case of our field deployment with the VTL, we have utilized VTL’s alphanumeric inventory codes from the subset of tools (100 out of 2000+) that the VTL possesses. This code was used as a unique identification of the tool within the Roaming Objects system (see ‘Existing ID’ on Fig. 1c). We decided to only include the most frequently used tools in our study, such as sanders, power drills, and Mitre saws, which were repeated rented objects that would enable us to build

richer digital histories for each item. To facilitate the collection of histories of use, we added basic provenance details (image, maker, year of acquisition) to each item’s history.

2.2 Smartphone App

The smartphone app allows one to “connect” to a borrowed tool in order to add and retrieve digital information encoded “into” the tool (Figure 1b). In case a borrower loaned several tools within one rental, the list of borrowed tools and the return/expiration date is always available (Figure 1a). The supported types of information are textual (e.g., comments, ratings), personal media (photos, videos) taken during the rental period of the equipment, and location details (GPS path where the tool was used). System-generated information was added automatically (how many times a tool was lent, how long it was used, etc.). We incorporated a broad range of identity disclosure settings, ranging from full name with a profile picture to completely anonymous, to let the user decide on how her identity would appear once their rental experience with the tools is shared with the community. The app allows users to change this setting at any time (e.g., if they become more comfortable with disclosing their information and activities over time).

2.3 Web Service

The web service handles inventory, storage, and retrieval of all tool-related data. We use a non-relational database (MongoDB) to ensure robust deployment and scaling. A companion web application (Figure 1c) allows a rental shop administrator to maintain inventory, retrieve the current status of a tool, and notify the current user about an upcoming expiration date. Here, tool library volunteers assisted in registering each time a tool from the Roaming Objects tool subset was borrowed via our web-



Figure 2. (a) work-in-progress project; (b) finished wooden coffee table; (c) process of carving wood; (d) message for volunteers “When receiving returns don’t forget to ask how the tool worked”; (e) post-it note pointing to the broken item “Piece doesn’t turn”

application, which ran in a web browser on their centrally located desktop computer that logged tool check ins/outs.

3 EARLY FINDINGS

We are currently analyzing the results of our field deployment. An early snapshot of results is available below – we would present more detailed findings at the workshop.

While the current inventory system the VTL uses (MyTurn¹) provides comprehensive statistics about the registered rental transactions, experiential details from borrowers had so far been largely unknown to the various library stakeholders. Volunteers at the tool library attempted to gather oral feedback about tool experiences through written reminders placed on and near the check-out computer (Figure 2d), however, this offered neither a comprehensive record nor did it facilitate common awareness among all members. During our in-person observations, we also discovered that volunteers and management used post-it notes to communicate messages about tool-related issues that required attention (Figure 2e). However, those notes were easily misplaced or lost.

During the two-month field study, 16 participants submitted experiences with 49 different tools. Participants rated the tools and left detailed annotations of 19 personal projects that contributed to the digital histories of the tools. Overall, participants borrowed a diverse selection of equipment, ranging from hand tools (e.g. chisels, clamps) to power tools (e.g. Mitre saws, drills). The most reviewed tools were sanders, drills, and planes. The digital histories accrued by Roaming Objects was perceived as valuable not only by community members, but also by management and library volunteers who were interested to

know how the tools were used, what projects community members were working on, and whether the tool required maintenance. In one case, e.g., a library volunteer could provide timely tool maintenance after a prior user left a comment indicating that the edges of a jigsaw were dull.

Through collecting personal projects—which spanned from home and garden maintenance to creative gifts—the Roaming Objects system helped unveil the creative potential and practices of members. Personal projects were documented through the app as a set of pictures and textual descriptions, all of which revolved around a single project. Submissions varied from completed (Figure 2b) to incomplete projects (Figure 2a), or described the process of making (Figure 2c). Roaming Objects also provoked personal reflections around the shared tools. Participants shaped personal practices and developed relations to shared tools in a variety of ways: from spending time learning the tool, to exercising personal creativity, to representing aspects of their sense of self using the means of digital archiving (e.g., documenting and sharing the making of functional improvements to their homes, self-expression through giving form to art pieces, etc.). What is more, Roaming Objects stimulated speculation about the tools and their value on a broader community-level, based on the digital histories the tools accumulated throughout their use across community members. Our participants exhibited both altruistic and utilitarian motives when it came to interacting with other community members. These findings demonstrated the importance that such interactive systems can have in terms of enabling, supporting, and nurturing tool sharing communities.

¹ <https://myturn.com>

4 DISCUSSION AND FUTURE WORK

Local sharing associations face four key challenges: (1) the often highly transient nature of community members; (2) a large degree of anonymity; (3) a lack of awareness for other members' activities with the shared resources; (4) and low levels of accountability for these resources. We designed and deployed Roaming Objects in an attempt to address these issues, promoting re-use of tools and materials and, more generally, inspire others through a better understanding of their DIY practices.

4.1 Reflection on Design Choices

Overall, given the added value of uncovering members' tool-use experiences, the reception of our Roaming Objects system by VTL stakeholders was mostly positive, despite encountering initial challenges (e.g., registering loans twice: in MyTurn inventory and in the Roaming Objects systems). Those challenges were resolved within a pre-study training session.

VTL members regarded the platform as a valuable resource to seek ideas for future projects. For example, borrowers submitted detailed descriptions of their own personal experiences to inform and to inspire others on how to start a new project, e.g., by suggesting achievable milestones.

Collaborative economy platforms must strike a fine balance between obtaining critical mass and viably sustaining trusted relationships between community members [8]. In our deployment, some participants indicated that overly restricted profiles were not considered to be trustworthy. Clearly, a longer-term deployment would be needed to investigate this in more detail.

A key issue for our field study was that we needed to build up a repository of digital histories of use for the various tools in Roaming Objects, in order to make the system appealing to community members (a common challenge new crowdsourcing systems face [8]). Despite this time-consuming setup process, it paid-off in as our study progressed. Throughout our two-month deployment, we observed that participants increasingly used the platform to make borrowing decisions based on the previous comments about the tool. Therefore, we conclude that the Roaming Objects could improve the overall accountability of the tools and facilitated their timely maintenance and repair, while also catalyzing more valued relations with shared tools on individual and social levels.

4.2 Follow-up Deployment

As the next step, we plan to conduct a follow-up study to explore practices around sharing personal everyday artifacts. For example, in Switzerland the online service "pumpipumpe.ch" provides a set of stickers for one's mailbox to let neighbors see what things they can borrow from this household. However, the service does not specify how the sharing of those items can be arranged. We plan to deploy Roaming Objects within the Pumpipumpe community to understand whether such an interactive system can support their existing sharing practices. The main differences to the VTL study

are: (a) the community does not have a formal platform except the search interface and the map²; (b) we expect different relation and the level of attachment to the personal objects than communal tools from the VTL. Additionally, exploring the creation and management of pop-up inventories in a community context without any centralized organization will significantly increase the potential deployment areas of the Roaming Objects system.

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² http://www.pumpipumpe.ch/map/page_v2/