

Opportunities in Conflict on the Trail



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Abstract People spend time on trails for a great many reasons. Often their reasons overlap—sometimes in positive ways but occasionally in conflict. Although there have been studies of individuals and unique groups that utilize the trail, there is a need first to first understand trail users. These users span different groups that use the trail, and the communities that inhabit the region surrounding the trail. It is important to the understand the group–community interaction especially in the presence of technology. In this chapter, we methodically consider these groups and communities, and identify relationships and tensions that emerge from their interactions with each other. We argue that exploring tensions provide a space to identify design opportunities to mitigate conflicts and improve the sense of community on the trail.

1 Introduction

The trail provides an interesting context by which to consider people (who are the trail users?), technology (what do they take with them on the trail?), together with the attitudes toward the usage of said technologies and whether it is viewed negatively (Bryson 1998) or positively (Fondren 2016). We contend in this chapter, that understanding trail users and their dynamics, particularly the tensions between different hiker groups, helps with understanding how these groups interact with technology. This understanding will in turn help in directing analysis and presenting design guid-

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ance and/or opportunities for encouraging community, toward diffusing inter-group conflict.

Examples of overlap and conflict are exemplified in the goals of day hikers and long-distance hikers. Both benefit from well-maintained paths, shelters, water sources, and restroom facilities (Appalachian Trail Conservancy 2018). They also benefit from applications developed to lead them to these needed resources. But these hikers may differ in their ability to plan for when they arrive at a point (relevant in the nature of campsite reservation systems), and their need to resupply along the trail (e.g., highly portable food versus bulky luxury food).

Identifying the types of users and understanding both similar and differing goals of being on the and trails, needs while on the trail their are crucial to be able to design technology that is both useful to the trail users while also mitigating the tension that would otherwise emerge from designing for groups with discrete needs.

To achieve these goals, we involved stakeholders and researchers who work at the intersection of technology on the outdoors to be able to:

- Identify who the trail users are, their goals and needs on the trail
- Understand the tensions and conflicts emerging from the interactions of the different trail users
- Distinguish between groups (transient users) and community (permanent inhabitants) of the trail
- Identify opportunities for technology design for this space

This chapter highlights three exercises that we conducted with trail users, trail stakeholders, and researchers in the trail space over a period of 1 year, as a means to meet the goals outlined above, and to improve our understanding of trail needs. By involving stakeholder participants, we were able to identify trail users in the first exercise. The second exercise involved grouping the identified trail users according to similar goals to identify common needs and also tensions and conflicts that emerge from conflicting needs. We then selected groups from that exercise to delve deeper into their activities as part of the third exercise. These exercises provided us with an opportunity to discuss the technological impact on the individual, group, or community on the trail, which we discuss in later sections.

2 Background

The outdoor space and how people interact with it has been defined by researchers in different ways. Recent research and workshops have directly participated or indirectly contributed to the creation of this design/information space. We focus on those work in this section, introduce the “trail” information space, and discussing the trail users by introducing, together with the role that technology plays (if at all) in their trail use.

2.1 The Outdoors

Rural areas often have vast wilderness spaces for hiking and other outdoor activities that have long been touted as an enriching, and worthy of preservation and even cultivation (Hardy et al. 2019; Nash 2014). However, not everyone has the same objectives when using wilderness spaces. Reasons have ranged from going to the trail as a means of “escape” (Mills and Butler 2005), in search for individual meaning (Berg 2015), coping with war losses (Shaffer 2004), responding to life crises (Strayed 2012), or as a sense of adventure (Bryson 1998). The revealed motivations have implications on the differing goals even among people who are identified as part of the same collection of people, which undermines any sweeping assumptions that are made about the outdoor space: who uses trails, what technology they use, and their attitudes toward the usage of said technologies.

Recent workshops focusing on Human–Computer Interaction have further highlighted the importance of the outdoor space and have spanned the discussion of the rural space in broad terms (Hardy et al. 2018), to more narrowly defining the aspects of the outdoors to identify both challenges and opportunities for designing for the outdoors (Jones et al. 2018), or focusing directly on a theme applied to a section of the outdoors such as technology on the trail (McCrickard et al. 2018).

As we elaborate further in later sections, many participants in these workshops contributed to this work, either by participating directly in the affinity diagramming sessions (Kotut et al. 2018a,b) or indirectly in the creation of this design and information space (Hardy et al. 2018; Jones et al. 2018).

2.2 The Trail

Our main focus in this chapter is the trail—as part of our *Technology on the Trail* initiative (McCrickard 2017), where we consider technology use and non-use involving different activities on the trail (Druin et al. 2017). These activities broadly involve technology that support *preparation* for the trail, aid the trail *experience* and facilitate post-trail *reflection* (Stelter and McCrickard 2017).

There are different trail users and identifying their needs and technology use is an important first step (Goldenberg et al. 2008). Fields (2017) leveraged the use of cultural probes to understand the technology needs of these trail users, to provide “harmonious” technology–nature design recommendations. Kondur (2018) expounded on the technology aspect by clustering trail users based on their technology use. To add richness to the clusters identified, Kondur then crafted personas that helped to reflect some of the differences among hikers in the identified clusters, such as the fact that, while younger trail users embrace technology, they yet lack financial resources to support their preferences.

Focusing on the larger trail community and especially considering the Triple Crown trails (Appalachian Trail, Continental Divide Trail, and the Pacific Crest

Trail), Bartolome (2018) leveraged Twitter data and topic modeling in an effort to identify topics that describe the distinct communities representing the three Triple Crown trails. Bartolome's work also considered depreciative trail behaviors to further understand cultural differences between trails and the larger hiker attitudes toward trail health, together with the tensions that arise in the case of conflicting trail ethos.

Similar overlap and conflict occurring across different types of trail users sharing the same trail space have been identified: hunters, for example, apply different ethos behind their choice of weapons depending on the prey, and tension arise from the differing choices and conflicting ethos (Su and Cheon 2017). Tension can extend to preferences that preside over the choice of technology to use while on the trail (Ande et al. 2017), such as hikers who exercise preferring the use of headphones contrast to naturalists who study plant propagation on the trail.

These works show that the presence of groups with differing goals, practicing different ethos concerning trail use, and who have different reasons for using technology may be a source of tension or conflict on the trail. Our work considers the boundaries between groups and choices toward identifying opportunities for design in a manner that addresses these tensions.

2.3 Trail Users

In defining trail users, we consider the terminology of use. Which would best describe these users? And how do we differentiate between transient users such as thru-hikers, and permanent inhabitants of the trail environs such as farmers?

Differences between these terms have been long debated. Grudin's classic paper (Grudin 1994) does not explicitly define these terms, but it does refer to *groups* as a subset of an organization that tends to be small and task-focused while referring to *communities* as larger and loosely connected around ideas and themes (e.g., the CSCW community). Ospina differentiates groups as having a sense of belonging and shared purpose, while communities may share the belonging but may differ in their practices and values (Ospina 2017). We can also look to social media and "communities in cyberspace" (Wellman and Gulia 1999) for a distinction between these terms: a Facebook group is an invitation-based collection of people that share specific interests or backgrounds, while a Facebook community is open to anyone with an expressed interest in a topic. Once you are in a Facebook group, you have a great deal of power to post, comment, and invite others, while a Facebook community has a leadership structure that controls information flow.

Groups then, tend to be small, focused, and somewhat exclusive, with membership centered on some sort of common criteria such as thru-hiking or search and rescue work. Members of a group tend to have some familiarity with each other either in person or by the compatibility of goals. *Communities* on the other hand, would generally be larger and center on common beliefs, concerns, or behaviors (e.g., the Appalachian Trail Community that span across hikers of different types and distance,

trail maintenance workers, foragers, scientists, etc.), or a shared space that is defined by a physical or natural border (Hoggett 1997), such as farmers or locals.

Given these definitions, we identify two distinct trail users: *Groups* to refer to transient or temporal users who are either passing-through or using the trail temporarily and *Communities* to refer to trail users who inhabit the trail or surrounding areas on a permanent basis, whose identities can also be inferred from physical or natural borders. The interaction between these distinct populations further provide insights into tensions that may emerge from differing ethos in the use of the trail, or differing attitudes around the use of technology on the trail. For instance, due to their transient nature, *Groups* tend to interact frequently with other *Communities* and *Groups*, and therefore have a better understanding of the overall culture, while at the same time, are more likely to cause tension especially in cases where trail etiquette and ethos are in opposition (e.g., improper food storage by hikers, and a proportional increase in bear-human conflict).

3 Our Approach

The role of technology enhances the personal experience on the trail, such as the use of fitbits and headphones (Ande et al. 2017), citizen scientist water quality monitoring, and logistical planning of trail practicalities (e.g., campsite reservations) (Kotut et al. 2020). However, tension can exist in the roles of groups or communities in outdoor settings. Hunters, for example, agree on the ethos of “fair chase” (Su and Cheon 2017), but different types of hunters differ on how they interpret this notion depending on their attitude toward the role of weapon technology (crossbows versus bows, rifles versus bows) in hunting.

By using participants who span trail stakeholders, trail users, and trail researchers, we endeavored to first curate an exhaustive list of trail users (Sect. 4), and then (1) identifying select groups that would most benefit from technology and (2) discussing tensions and conflicts that emerge from their interaction with technology (Sect. 5). Finally, using a minimal pair of definitions distinguishing between transient trail users (*Groups*) and those who permanently inhabit the trail or areas surrounding it (*Communities*), we sought to examine how the select trail-related collections of people differed in their goals and approaches, building upon previous inquiries (Kotut et al. 2018a, b) used to identify different facets of roles and goals for technology on the trail (Sect. 6).

4 Who’s on the Trail

As an initial approach, we first wanted to identify the various users of a trail and then cluster these users into subgroups (e.g., day hikers, thru-hikers, etc.) so that later analyses could explore the goals, tensions, and commonalities among these

Fig. 1 Affinity Diagramming/Cluster Labeling Session



trail users. We describe the exercises to identify the trail users below and expound on the emerging groups and the design opportunities these groups present in this, and subsequent sections.

4.1 Identifying Trail Users

We organized an initial workshop activity and asked an estimated 25 participants that spanned trail users, trail stakeholders, and researchers on different aspects of the outdoors, to first identify types of trail users on Post-It notes, then to cluster them in subgroups of their choosing. Clustered subgroups were generated by participants who identified 132 unique types of trail users (excluding exact duplicates, while retaining singular/plural differences like scout and scouts). Participants spent a great deal of time crafting the notes, leaving little time for clustering—but at the same time, established the opportunity for the follow-up activity described here.

Our follow-up activity shifted the focus from people to their goals. We assembled a group of nine people, two professors and seven graduate students, to participate in a second affinity diagramming session (Fig. 1). The aim of this second session was first to cluster the trail users identified in the first workshop, and then to apply selective coding (Corbin and Strauss 1990) to identify axes of interest that would help to order and differentiate cluster items.

4.2 Who's on the Trail Findings

In discussing the rationale for note axis placement during the affinity diagramming session, it was clear that some of the notes did not fit the clusters they were placed in. This was made evident when participants considered all the clusters and the emergent patterns on holistic viewing. Mismatched notes were then moved around to a group

with closer affinity and at the end of this exercise, seven clusters of different sizes emerged, with a consensus that cluster overlap yet remained.

Emergent Clusters

Part of the affinity diagramming exercise was to consider cluster naming, based on the commonality of each note in a given cluster. The cluster name should best describe all the notes in each cluster. Some clusters were easy to label, while the ones identified to have overlaps were more difficult to label. Seven initial clusters emerged and were named: *Management/Maintenance (Job)*, *Passive/Active/ Thrill-Seeking Recreation*, *Socialize*, *Gatherers*, *Discovery/Research*, *Recreation*, *Exercise*, and *Discovery/Learning (Organization)*.

It was clear both from observing the cluster labeling exercise and the resulting discussion that the clusters with multiple labels had a lot of overlap and could be further refined. There was consensus on clusters labeled with mononyms as being satisfactorily descriptive. The remaining clusters would benefit from further fine-tuning. Out of this refinement exercise, 12 clusters emerged in total. New clusters tended to be a split of the original title and placed close to the parent cluster, the distance between clusters being arbitrary. The final clusters were labeled: *Volunteer*, *Job*, *Thrill-Seeking Recreation*, *Anti-Society Sentiment*, *Mental Health*, *Family Connection*, *Ad-Hoc Socializing*, *Formal Socializing*, *Active Recreation*, *Sight-seeing*, *Training*, and *Passive Recreation*.

The clustering exercises also made evident the order/hierarchy of hikers within a cluster: The likelihood of having single hikers, hikers with dogs or machines (e.g., bicycles, ATVs) in a specific group, easy to determine.

Axes of Interest

We then considered the relationships between clusters by contemplating possible axes placement with which the clusters would fit. We describe these axes below.

Anti-social Versus Extremely Social axis quickly emerged, as it naturally followed two general intentions: Broadly, tasks to complete in isolation on the trail versus people to meet while hiking on the trail. The “*Gatherers*” (e.g., mushroom gatherers) group was placed toward the *Anti-social* extreme on the axis, while families and dog walkers groups were placed toward the *Extremely Social* end.

Opportunists Versus Intentionalists axis also had a general consensus; one participant posited that it was because the axis was naturally goal oriented—the two labels forming the extreme end of the axes. *Sightseers*, *Time-killers* and *Picnickers* were considered **Opportunists**, while *thru-hikers*, *spelunkers* and *Birdwatchers* were considered **Intentionalists**. “**Accidental**” was a midpoint axis label that was suggested to represent spontaneous hikers—the Ad Hoc Socializing cluster that contained *Dog Walkers*, for example, fit this categorization.

Monetary Versus Altruistic axis emerged when considering monetary gains, or lack thereof. Users on the **Monetary** end of the scale were considered hikers who would

not be on the trail if there was no incentive. Those grouped under the “job” affinity: *Trail Markers*, *Forest Rangers*, etc., were considered toward the **Monetary** end, while “Volunteer” hikers: *Trail Angels*, *firemen*, and *National Park Service (NPS) Volunteers* were placed toward the **Altruistic** end.

Mental Versus Physical axis considered internal (invisible) gains, and was made up of hikers positioned explicitly under the “**Mental**” affinity that included *Solo Day-Hikers*, *Nature Lovers*, *Thinkers* and *Rehab*, compared to external (**Physical**) goals (those with identifiable/visible results), for example: *Trail Markers*, *Loggers* and *Herbalists*.

Other Axes: *Experiential versus Task Oriented* was discussed as a potential axis but was ultimately rejected based on the fact that it was too connected: an experiential goal could turn into a task-oriented goal. Other axes considered but not discussed included: *Active versus Passive*, *Random versus Non-Random*, and *Good versus Evil*.

5 Inter-Group Tensions

Given our understanding of the people on the trail from the initial exercise, together with their clusters as determined by the affinity diagramming session, we wanted to have a fine-grained understanding of the groups. To achieve this, we used the trail user groups from the first workshop session as seeds in a second workshop to identify (1) those groups that would most benefit from technology and (2) groups that revealed tensions and conflict. In this section, we highlight interesting groups that emerged from the second workshop exercise and further, how different tensions surfaced. We then discuss design opportunities proffered by the tensions we identified.

5.1 Opportunity in Conflict

We engaged ten participants who are involved in research surrounding technology and the trail, during a GROUP¹ workshop session focused on discussing Technology on the Trail (McCrickard et al. 2018). We divided the participants into two equal teams (*blue team* and *yellow team*). We then had each group consider 35 unique hiker groups from the original workshop session (Table 1). We first approached the question of what technology design opportunities could be found in these groups and goals, by considering the question of benefit: which groups benefit from technology, and which do not? Each participant in the team was given eight votes: four (indicated with green dots) used to signify groups they judged to benefit from technology, the remaining four (red dots) to signify a detriment. Figure 2 highlights a selection of the groups and the votes for/against them.

¹<https://group.acm.org>.

Table 1 35 unique groups were curated from previously identified hiker roles and used to determine technological benefits for each. Contentious and/or interesting groups are in bold, and we further discuss them below (¹Mental/Physical, ²Search and Rescue)

Activists	Guide-Book Authors	Park Rangers	S & R ² Workers
Bikers/Activists	Herbalists	Plant Foragers	Section Hikers
Bird Watchers	Historians	Prof/Army Training	Solo Hikers
Boy/Girl Scouts	Hunters	Pet Owners	Sponsored Hikers
Day Hikers	Locals	Picnickers	Tourists
Exercisers	Loggers	Property Owners	Thru-Hikers
Families	Maintenance Workers	Recreational	Trail Angels
Farmers	M/P¹ Rehab	Retirees	
Fishermen	Horse-Back Riders	Scientists	



Fig. 2 Selection of trail users from the workshop session: *Tourists*, *Mental/Physical Rehab*, *Families* and *Solo Hikers*. These groups of hikers were considered contentious either because of the vote discrepancy between the two groups of participants (Comparing votes between the *Yellow* team versus *Blue* team) or based on explicit identification of a group being contention based on workshop participants discussion

5.2 Technology Opportunity Results

Figure 2 provides a glimpse of how each team voted across the hiker groups for the most contentious user groups. Two groups particularly stood out from this exercise based on the vote discrepancy across teams: *Mental and Physical Rehab*, received four red votes from the *yellow* team, signifying detriment from technology, and received no votes from the *blue* team. We also labeled *Solo Hikers* group as contentious for it received three green votes from the *blue* team with no votes from the *yellow* team.

After the clustering and voting exercise, the two participant teams were tasked with selecting a group of hikers considered to be interesting or contentious based on voting decisions. All participants would then discuss these groups to identify and understand inter-group tensions and possible design opportunities. Hiker groups were considered based on various subjective factors: how they were organized in clusters, how the participant teams voted for them, and how groups were selected by each team for further discussion. The selected groups were connected with interesting characteristics and underlying issues that led to the choices. We describe these connections below.

5.2.1 (Un)Clear Hiking Goals

Clarity, or lack thereof of group goals while on the trail was important. The *Families* group was selected by both teams as interesting not only in how to design for them, but also in how the group sparked debate on the difference between interacting with technology in contrast to with people on the trail, especially when the hiking goal is not clear. This discussion was also true of *Tourists* group, which received the most votes across the two teams and further prompted a debate on the definition of ‘tourist.’ For these groups, often there are conflicting goals within the families or tourists, and often the goals are more ephemeral and not tied to reaching a destination, collecting artifacts, or completing a task.

5.2.2 (Im)Practicality

When discussing the usefulness and practicality of technology on the trail, *Search & Rescue* group was voted for the group most likely to benefit—notably because of direct association of the service with technology. This conclusion was also realized with the *Scientists* group, tied with *Search & Rescue* in the number of votes received. All of these groups tend to have clearly defined goals that they wish to accomplish on the trail.

5.2.3 Assisting Versus Inhibiting

An unanticipated though interesting discussion emerged when considering the *Physical/Mental Rehab* group: the *yellow* team made a distinction between the *mental* and the *physical* elements of the hiking group, thus initiating a question regarding the efficacy of current technology, and possible technological innovations and applications to be used for purposes of mental rehab on the trail. Further, a debate was sparked on whether the technology would benefit or inhibit the experience of this group on the trail. Technology can be tied to mental stresses, suggesting that it should be avoided on trails. The exercise and the discussions revealed common use patterns that present opportunities for design, and also common themes that reveal tensions between and within groups.

5.2.4 Presence Versus Distraction

The teams were in agreement in attributing the most explicit source of tension/conflict between hikers groups to technology that distracts from the moment: Email, social media, notifications, etc. They were considered to negatively impact *Tourists*, for example, in contrast with those that undermine the trail experience of a hiker-group altogether like *Mental/Physical Rehab*. The *yellow* team was specific in differentiat-

ing between *Mental* and *Physical* aspects of rehab shown in Fig. 1) and vociferous in their opposition to technology because of the negative effects on mental well-being.

5.2.5 Experiential Versus Practical

Based on the discussion post-clustering, tension emerges between groups where the line between experiential and practical gains is blurred. *Families* is one group where the debate was whether the benefit the family gains from spending time chronicling the trail experience detracted from the experience of spending time with each other. The debate on *Guide-Book Authors* considered the redundancy of Guide-books with the popularity of online guides, against a preference for technology agnostic alternatives for some users on the trail.

5.2.6 Professional Versus Amateur

The user expertise level mattered in the discussions about whether they would benefit from technology or not. This was reflected in the votes for groups that would benefit from technology: *Search and Rescue Workers*, *Scientists*, and *Hunters*-as there was a perceived distinction on the expertise of these users and in how technology assisted in acquitting their work.

5.2.7 Limitation: Known Versus the Unknown

We acknowledge that the cause of tension between understood groups and those not well known. Our affinity diagramming sessions reflect the areas that are well known by the participants, particularly topics of interest to multiple people. This phenomenon was especially evident in the contrast between groups that got all green votes compared to those groups that did not receive any votes (e.g., *Solo Hikers*), or groups that received one vote from a knowledgeable participant that did not inspire others to vote for it (e.g., *Hunters*). We also note the explicit cases where the teams self-identify groups of hikers of which they do not fully grasp the breadth of what is involved in the technology: The *Farmers* group fell under this latter case.

6 Groups versus Communities on the Trail

After successfully identifying the technology space for design, there was a need to distinguish transient vs permanent trail users. Permanent users, unlike transient users, inhabit the trail and the area around it year-round and are affected by the choice of technology and habits of the transient users. We distinguished these users into *Groups* to describe the loose coupling of transient trail users, and *Communities*

to refer to the users who live permanently on, or close to the trail. We found this differentiation to be important in helping to determine the impact of interactions and the effect of technology on the individual or a collective, either as a transient user or a permanent inhabitant of the trail.

From the users identified in the exercises we've described earlier in the chapter, and inspired by existing research that focus on these individual trail users (Schuring 2019), we considered the case of three types of users in an effort to delve deeper in understanding (1) their trail use, (2) their technology needs and/or technology used on the trail, and (3) interactions with other trail users, and the tensions and/or conflicts that emerge from these interactions.

6.1 Case 1: Thru-Hikers

Hiking as an activity can be done for recreation, wellness and fitness, competition, experiencing nature, and more. Hikers in the United States also tend to avoid urban areas and seek to embrace the wilderness (Bryson 1998). The thru-hiker has the goal of completing a chosen trail in its entirety within one hiking season (Fondren 2016; Shaffer 2004; Strayed 2012). An attempt of the 2,190 mile Appalachian Trail (AT), for example, would take several months to complete in one hiking season (Fondren 2016).

The community tends to be important to thru-hikers, given the numerous Facebook pages, blogs, planned meet-ups, and other social media and activities that are customarily used before, during, and after the hike (Kotut et al. 2020). Additionally, many hikers embrace the notion of a group with fellow hikers—often seeking to camp together, share meal planning, and splitting the weight of tents and cookware (Bryson 1998). In addition to this, thru-hikers are also known to remain connected with other groups (e.g., families, co-workers) and find ways to maintain those social bonds even while undertaking the hike.

Despite the commonality of the overarching “thru-hike” goal, conflict arises between groups on issues of preferences such as taste in (or absence of) music, communication styles, etc.

6.2 Case 2: Exercisers

Examples of trail users considered as exercisers include day hikers, bikers, joggers, and horseback riders. This classification emerged through consideration of shared goals associated with exercises and training: losing weight, muscle building, endurance training, general fitness, or simply as a means of deriving personal fulfillment and pleasure. These on common bities may be derived from the environment/place that such individuals choose to use—that is, the choice of outdoors as a means of engaging in exercise activity over indoor alternatives. This suggests that

exercisers seek to fulfill specific wants, needs, and goals that may be either interconnected or independent of the activity and exercise-related goals. Perceptions of enhanced enjoyment, fulfillment, motivation, sense of peace, solitude, and/or richer stimulus, may all be reasons why such individuals opt to use the outdoors because users have inter-related, competing, and sometimes conflicting priorities in terms of want and need fulfillment.

As such, a number of perspectives may emerge. For a given exercise, one may argue that these individuals may be viewed to be a group or a community depending on their level of involvement, interaction, and commitment. A great many devices and exercise programs leverage group behaviors, either cooperatively or competitively. From the community perspective, some shared norms, behavior, or culture related to preserving individual community member's "sense" of the outdoor medium emerge and influence the actions of the members. This may include an increased awareness of, and respect for, the outdoor exercise experience of a fellow member of the community of outdoor exercisers. A member of such a community may be more aware of the effect of intrusive stimuli; for example, noise pollution from a jogger listening to music without the aid of headphones. As such, they are likely to engage in their activity in a manner that preserves the sense of place.

6.3 Case 3: Activists

Activists as trail-users emerged from the original exercise when considering people who care about the trail, in combination with short-term goals (e.g., proper trash disposal) and long-term strategies (e.g., sustainability as evidenced by activists protesting pipeline construction impacting the trail (Appalachian Trail Conservancy 2018)). In reviewing our prior clustering activity, participants considered the trail-user placement on a social scale based on willingness to socialize, where *anti-social* and *extremely social* emerged as opposing extremes on the axis. Trail users tending toward the *extremely social* end of the scale were labeled as "people to meet while hiking on the trail" (Kotut et al. 2018a), and the activists' nature of promoting/protesting actions on the trail and the inevitability of encounters with other trail users lend them toward this group categorization.

However, the goals of activists can differ. Does the need of those who call for the preservation of the integrity of the trail usurp those who lobby for economic benefits from a pipeline? This possibility of sharply opposing goals seems to preclude the categorization of activists as a community. Diverging goals aside, however, what we find to be common concerns across different activist groups are issues of reach—given what definition emerged during the activity and considering examples from the trail (Appalachian Trail Conservancy 2018), and that is mobilization.

7 Discussion

Before designing for the trail, we argue that we need to understand the users and the tensions they experience. From our findings resulting from the three workshop sessions we describe above, we posit that differences within fairly well-defined professions, hobbies, and activities can highlight conflicts.

Our pursuit of approaches for designing for the trail necessitates understanding the tension between trail users and how they interact with technology. Based on the discussions, we underscore the importance of distinguishing between experiencing the trail and assisting on the trail. Planning with this consideration in mind allows us to design to assist and augment the enterprise, without detracting from the experience.

Future exercises should consider explicit tensions that may follow the common themes we have discussed in this paper that would additionally serve to inform further design opportunities. We argue that the tensions that were identified should lead to focus groups with key stakeholders, rich persona identification that highlights a depth of features, and scenarios of use that provide narrative descriptions of technology on the trail.

8 Recommendations and Conclusion

The insights gained from the three exercises and the respective discussions provide a launching point in considering future directions:

- Having an understanding of the dynamics of hikers within a group and the relationship between different groups can reveal the gaps that present the design opportunities for encouraging community and defusing intra- and inter-group conflict.
- Opportunities emerge for reaching out to specific groups or individuals within a group to aid our understanding of both the dynamics and the context of these hikers.
- When considering design opportunities in general, we have different levels of abstraction to explore: Designing for a group, for intra-group hierarchy, for group size and for different combinations of axes.
- Future work might also consider which affordances available from current technologies (e.g., GPS tracking, biometric sensing) are relevant to specific groups and which are not.
- Other work sessions could serve to showcase these insights and offer an opportunity to incorporate feedback.

In conclusion, we highlight four takeaways from the insights we gained from the three exercises: (1) The population of people who use the trail in various grouping and with differing goals provide a rich source for both design consideration and design feedback. (2) There is an immense space to consider and design technology to be used either on the trail or in the general outdoors, and while (3) technology

is already being (re)used in the trail by different users in pursuit of different goals, examining its use/non-use would lead to a deeper understanding of trail needs by different users, and finally, (4) there are ample opportunities to understand and design for technology–human interaction in a manner that accounts for inter-group tensions or that mitigates group–community conflict.

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