

Developing trust and community in integrated tandem cycling for riders with disabilities

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Background and Problem Description

We have designed a Web site to aid in building a community for the Bay Area Outreach and Recreation Program's tandem cycling program. The BORP tandem cycling program is dedicated to providing tandem cycling opportunities to the visually impaired and disabled. It offers the opportunity for fun, social interaction and exercise for riders with visual impairments. However, lack of organization in the tandem biking program has caused the program to fall in popularity. Very few rides have been organized over the last few years. The program runs on an email list service, with users reporting in by phone to an organizer. One common issue is with riders who sign up for a ride and then fail to show on the day of the ride. This results in a disproportionate number of pilots to stokers. BORP is in need of a way to effectively match stokers with pilots for the purpose of organizing regular rides and provide a way to actively update the organizer with participant status.

Since our main intention was community building for the BORP tandem cycling program, and the participants' trust in each other and in the program is paramount to the growth of the community, we were most interested in framing the problem from the perspective of how trust and reputation affect community. Due to the inherent importance of trust in the activity of tandem cycling, this was a perfect opportunity to examine issues around trust and community in a computer-mediated system. This community of tandem bicycle riders, including members with disabilities, must rely on others in order to participate in cycling. Tandem cycling demands a high level of cooperation on the part of both riders. Volunteer "pilots" ride in front, steering, shifting, and braking, while participants with disabilities ride in back as "stokers", providing power and cooperating to balance the bike. Most of the stokers have a visual impairment, though a few have a physical disability that limits their ability to control a bicycle on their own. The pilot and stoker need to be able to maintain balance on the bicycle, working together to navigate traffic and avoid accidents.

We investigated this domain, identified issues that could be affecting the organization of rides and the willingness of riders to participate. Coupled with pragmatic methods for matching pilots to stokers for organized rides, we designed an online system that applies our knowledge about trust and reputation to facilitate community growth.

Needs and Usability Assessment

We conducted a ten-question online survey and five interviews in order to better understand how to make our Web site easily accessible and how to improve ride organization in the BORP tandem cycling program.

Survey

The survey had nine respondents.

- 78% were completely blind.
- Their exercise options included spin classes, riding on a trainer, cycling, walking, going to the gym, running, weights, aerobic jazz classes, and yoga.
- It was "a little bit important" to 55.6% of the respondents that rides are of a specified length. It was "fairly important" to 22.2%, and "very important" to the remaining 22.2%.
- 33.3% stated that they would like to go on an organized ride once a week. Another 33.3% would like to go once a month. 22.2% would go several times a week, and 11.1% would go once every two weeks.
- 77.8% responded that they would use a Web site to sign up for informal rides with other BORP members. The remaining 22.2% said they would not.
- When the question of how often they would ride their bike if they could ride any day of the week was posed, 44.4% said they would ride several times a week. 33.3% would ride every day, and the remaining 22.2% would ride once a week.
- When presented with the option to use a computer or phone to sign up for rides, 55.6% answered that they would use the Web site through the computer. The remaining 44.4% said they would use both.

- We wanted to gauge how likely the users would access a Web site for organizing tandem rides through somebody else's computer. 57.1% answered that they would never do this; the remaining 42.9% responded that they would do this rarely.
- We asked which accessibility tools the users use on the computer. 22.2% specified JAWS as the screen reader they use. In total, 66.7% use screen readers. 11.1% use zoom text. 22.2% use a braille display. Some users use more than one tool.
- We asked for examples of Web sites with good and bad accessibility. The recommended Web sites were:
 - <http://www.LightHouse-sf.org>
 - <http://www.craigslist.org>
 - <http://www.facebook.com>
 - <http://www.borp.org>
 - Most e-commerce sites

The Web sites deemed to be poorly accessible were:

- <http://www.co-motion.com>
- Any Web site that segregates the blind from the sighted by using a text-only feature.
- Any Web site with unlabeled graphics

Interviews

Early in the project, we interviewed the BORP tandem cycling program organizer. He described the current state of the program and gave us his view of what could be improved. He stated that organizing group rides takes higher priority over enabling informal rides between pairs of members. His suggestion for a signup system included collecting information about the participant's height, bike preference, pilot preference, experience level, and pedal choice. He suggested that the system allow for people to initiate their own rides and find pilots to join them on these rides. We explored the idea of setting up an automated phone call so that members without computer access can be notified of rides. He also delved into the privacy and safety issues of tandem cycling through BORP; he emphasized the importance that only registered BORP members who have filled out an insurance form should be allowed to sign up and show up for a ride. We also discussed issue

of keeping and updating a database of BORP's tandem bicycles. As a way to make the inevitable scenario of dealing with last-minute cancellations smoother, he proposed a way to communicate with the group, so that members can find a substitute partner at the last minute. He proposed a calendar, noting that members respond well to rides that are organized in advance. We learned from him that the BORP tandem cycling program currently has approximately 15 visually impaired participants, 4-5 of whom are active at any given time, 6 pilots, and 10-12 tandem bicycles. The stokers range from having no day vision to being completely blind, to being stroke survivors or people with balance issues.

Our next interview subject was a long-time pilot for the BORP tandem cycling program. Being experienced as he is, he offered us plenty of insight into ways to improve the state of the organization of rides. He was very clear that scheduling is critical. He believed that an online calendar system should be used to schedule rides and asserted that if rides are scheduled, both pilots and stokers would participate. His view as a pilot was that volunteering on a ride once per month is reasonable, because a ride takes up a solid day. He suggested that there be a regular monthly ride on a weekend day. From this, we deduced that rides should be organized often enough that each pilot would be able to volunteer once a month; if 2-3 pilot-stoker pairs show up for each ride, two rides per month may be feasible.

This pilot's assessment with the current system was that it is very manual; the Cycling Coordinator pairs people up. He saw the system as being unstreamlined in the sense that the beginning of each ride usually involves adjusting the seat and getting the right pedals set up for the stokers. He suggested sending individual bicycle and pedal measurement information to riders ahead of time so that this delay could be shortened. Another problem he pointed out was that the rides all required starting at the same spot due to the bicycles being at the BORP bike house. He suggested incentivizing pilots to volunteer by giving them free tandem bicycles, because they could then provide the transportation for the bicycles, freeing up the participants to go on more varied rides. Some other suggestions he gave were to provide a way for members to know the names and roles of other members, involve the stoker more by providing them with maps and cue sheets, and loaning pilots racks to transport the bicycles. Lastly, we approached him with the idea of having stokers vouch for

pilots. He responded favorably to the idea, but warned that novice pilots have a steep learning curve. In terms of matching, he listed experience, person size and bike size as being most important, in that order.

We interviewed three stokers with varying disabilities in order for stokers' interests to be adequately represented in our study. All subjects have several years of experience bicycling with the BORP tandem cycling program. Our first interview subject, B, has cerebral palsy. Our second interview subject, L, is partially blind. Our third interview subject, J, is completely blind.

We found that for everyone, scheduling and knowing the planned distance and terrain of the ride were the most important factors when deciding whether to participate in a BORP ride.

Walther, Slovacek and Tidwell (2001)[9] studied short-term and long-term use of photos in computer-mediated communication and concluded that photos enhanced social attraction between unacquainted users, though they were not effective for long-term relationships that were entirely computer mediated. We were interested to see whether user reactions to the use of alternatives to photos, such as audio avatars, would be similar. To explore media richness and its effect on trust, we tested out a simple interface with different sound clips assigned to user profiles. Unfortunately, the sound files did not work congruently with the visually impaired riders. The sound file playback conflicted with their screen readers, and when we played the sounds on our computers, the sound avatars did not make any difference to them in their assessment of the trustworthiness or approachability of the person being represented in the profile.

Faced with the choice of having a phone interface available, all three stokers preferred the phone over a computer for learning the time, location, ride length, difficulty, and cancellation status of organized rides. J suggested that this type of interface would be helpful for receiving ride reminders.

Ultimately, the interview subjects wanted the Web site to provide them with a way to pair

up for rides, see community members, exchange information regarding tips, and so forth. They were all willing to go on rides, as long as there were rides organized for them.

All three stokers agreed that they need opportunities to ride, and being outside is the best experience they get out of tandem riding. B stated that she gets both social interaction and exercise out of it. She stated that what she liked best about BORP was the fun in participating and discovering what she can do. L was appreciative that there is an organization that makes riding bicycles possible. However, both showed concern when asked how comfortable they felt riding with others. B stated that she has to get to know them, while L was more concerned with the experience, bike handling skills, and coordination of the pilots.

All three of the stokers we interviewed had different opinions on the types of information they preferred to know about potential pilots. B expressed interest in knowing how fast the pilot likes to go, how patient they are and how competitive they are. L only needed to know the potential pilot's size and experience. J wanted to know which of their friends like the potential pilot, their gender, age, politics, favorite books, and movies, as well as whether they are a good match for experience and weight. L stated that she feels most comfortable with a pilot who is strong enough to hold up the bicycle and who has no bad habits from riding single-rider bicycles.

All three stokers stated that they think the BORP program is lacking in a way to connect with other people to ride. B disliked that BORP was closed during the winter. The stokers wanted more rides, especially ones in new locations. L felt that there was a lack of understanding of the blind riders' needs, especially regarding the difficulty of getting to and from the meeting place; she voiced her opinion that the directions should include details such as hazards and landmarks, as well as when to turn left or right. B showed interest in reading the experiences of other riders, while L did not show interest.

Class Demonstration

We also attended a class talk by C, who showed us how difficult it is to navigate a computer or phone interface. She demonstrated a Nokia phone that takes pictures of text, which a screen reader then reads aloud. The system would give verbal feedback on the angle at which the phone should be held so that the camera can take a clear shot. The exact angle was very precise, so setting up took a long time. This demonstrated how, even with impressive new technology, something as simple as reading text can be a laborious process for those with visual disabilities. Once the picture was taken, the screen reader did a commendable job with reading the text out loud.

The remainder of her presentation involved navigating a Web page and dialing a phone number. One striking observation we made was that the built-in DWIM (do-what-I-mean) mechanisms served as more of a hindrance than a help. In particular, the system remembered her password, so when she attempted to log in, the cursor appeared at the end of her password, so that she ended up entering it twice, preventing her from logging in. There was no warning or feedback telling her that the password from her previous session had been automatically filled in. We witnessed a similar experience when she dialed a phone number.

Computer Accessibility

During our user interview session with L, we had the opportunity to see her computer setup. She had a text enlarger on one screen, as well as the JAWS for Windows screen reader installed on her Windows operating system. In our surveys and interviews, as well as our research, we found that the blind and visually impaired community predominantly uses computers with the Windows operating system, as opposed to Macintosh or Linux. Furthermore, JAWS was the most popular and widely used screen reader, so we focused on designing our Web site to be compatible with JAWS. L graciously slowed down the speech output speed so that we could understand it, but it is worth noting that her regular setting was quite fast. We observed that she had memorized key combinations that activate the reading of a list of headings of different types, a list of frames, or a list of links. Thus, navigation in a screen reader such as JAWS is necessarily very linear, and very structured. The usefulness of this form of navigation is dictated by the description of the content. This is

determined by the anchor content assigned to each header, frame, or link. A nonsensical tag content would provide no clue to the visually impaired user as to what lies behind the header, frame, or link.

One pattern we noticed as we observed visually disabled users navigate computer interfaces is that these users adapt to the imperfect technology. C's favorite Web site, featuring a computer game, is very complicated, but through countless visits to that Web site, she had learned where items were laid out and which key combinations to press for certain actions. Nevertheless, even she had trouble logging in, because of the DWIM problem described above. When L showed us the Web sites she deemed to be most accessible, she also commented on the correlation between frequency of visits and ease of navigation. She estimated that about a quarter of all Web sites are not accessible at all.

System Design

Overview

Our design for the BORP tandem Web site blends social networking features with elements to enhance trust and reputation building as well as items of interest to the tandem riding community. Accessibility is of paramount concern, because many users will browse the site with the help of assistive technologies. In keeping with the goal of maintaining an integrated site, there are no pages or features built exclusively for users with or without a disability.

The central page of the site is, not surprisingly, the home page. Before logging in, the user sees a generalized version with only information available to the general public. After logging in, the user sees a much richer home page with tools for managing a personal profile, calendar, media stream, and ride feedback along with links to ride announcements. If the user is the BORP Cycling Coordinator, the customized home page will contain additional links to administrative pages for managing membership, bike listings, rider matches, and announcements.

Custom Home Page

The personalized home page offers access to all the major features of the web site. Announcements of rides and other events appear at the top. Each item is a link to an announcement page detailing that event. The brief listing on the home page includes date and time plus a one-click signup link. If you have already signed up, the signup link indicates that you have already signed up. Below the announcements is a list of recent forum posts (newsfeeds from the forum). A small ride calendar shows the current month with dots indicating events, such as rides. The dots are links to the actual announcements. Alternative text for each dot image provides date information about that event for a screen reader. The calendar also links to a calendar page with more detail about each event.

The custom home page also functions as the launching point for visiting one's profile, personal blog, and media stream, and for entering the forum. A list of past rides in which the rider participated shows the rides from most to least recent. Links from this list direct the user to the announcement for each ride, which persists afterward and becomes a hub for photos and feedback about that particular ride.

From one's custom home page, one can also contact other members in several ways. An area for invitations shows any invitations you have received from others or sent out yourself, and it gives the current status of each (e.g., "Tim accepted"). These invitations are geared toward setting up quick rides between two people rather than the more organized and official group rides. Below the invitations is a list of members you have designated as friends. An "Invite to ride" button beside each friend's name lets you send an invitation immediately to that friend. A link to the full list of members allow you to invite those not on your friends list, or add them to your friends. Clicking on the name of any friend or member takes you to that person's profile page, which provides other means for contacting the individual (depending on how that person customized their profile).

User Profile

Each user who has registered in the system and been approved by the administrator has a detailed profile page that other members can view. Users have control over which

components of their profile are viewable by other members, which are viewable only by friends, and which can only be seen by the member and the Cycling Coordinator. In this way, users can choose how much medical information they wish to share, and limit access to contact information if they so desire. The profile can contain fun facts about the member, such as what kinds of rides, movies, or books they like, but requires some information to be used in matching riders and bikes. Height and weight ranges, leg length, tandem riding experience, type and severity of disability, preferred pedal type, and favored riding partners will all be used in the matching algorithm. If the user owns a tandem bike, information about the bike (seat height range, handlebar range, pedal type, maintenance condition) is also captured when the user creates their profile, and this information is used in the matching algorithm.

A user's profile also displays vouchers given to them by riding partners. A voucher is a signed "thumbs up" vote for someone, suggesting the person has proven to be trustworthy. Both pilots and stokers can vouch for their riding partners. When someone has vouched for you, the voucher appears in your profile as an icon with a brief textual endorsement and the name of the person who vouched for you. To submit a voucher, a user viewing your profile simply clicks the "Vouch for ..." button. The user can then enter their optional textual endorsement and save the voucher.

Another endorsement, for pilots only, can be granted by the Cycling Coordinator. This is a certification, indicated by a special icon in the member profile, that the pilot has passed BORP's tandem pilot training.

Ride Announcements

The Cycling Coordinator can post announcements of group rides, which will appear on the calendar. The detail page for each ride gives basic date, time, start location, and route information, including distance, difficulty, and regrouping locations. A contact is given for the ride (usually the Cycling Coordinator), along with a telephone number in case of emergency. A one-click signup button appears at the top of any ride announcement the user has not yet signed up for. A list of other riders who have signed up for the ride is also

shown on the announcement page.

Detailed information about the planned route is available from the announcement page. A route map and "cue sheet" (with instructions like "turn left on San Pablo Dam Road") are available in PDF and plain text. Audio guides can also be downloaded. (Imagine a tandem ride version of a sightseeing audio tour.) A ride profile chart for each ride shows elevation over time. A long description provided in html allows screen readers to convey a description of the chart to visually impaired users.

After a ride has occurred, riders can post photos, videos, or other media such as sound files to share with the group. They can also post feedback about the ride. This feedback is essentially a blog post about the ride, tied to that specific ride announcement. Thus, if a user enters feedback from the ride announcement it automatically becomes part of their blog. Similarly, photos, videos, and sound files posted about the ride are added to the user's media stream.

Media Sharing

Users each have a personal media stream, analogous to a Flickr photo stream, to which they can add photos, videos, or sound files for others to experience. For visual media, the user will be prompted to include a textual description, which will be included as an html long description for the item.

Telephone Interface

Our system includes a telephone-based component for announcing rides. When the Cycling Coordinator adds an announcement for a new ride, the system also sends the basic information about the ride (as RSS) to a phone messaging system (such as Jott Feeds) that makes an RSS feed available to callers who request it by name. Users will need to enable this in their feed reading account (through Jott or its equivalent). The Cycling Coordinator can also send ride reminders to users through the phone messaging system.

Forum

BORP tandem cyclists currently use Yahoo! Groups as a forum for sharing questions, ideas, tips, and camaraderie. We feel that a forum integrated with the rest of the BORP tandem Web site would be better used, since users would not have to move between independent systems. Thus, our design includes a forum area where all users can post messages. We envision a simple threaded forum like the Yahoo! one so that users can easily switch.

Matching

One week before a ride's scheduled start, the system will calculate optimized rider and bike matches. The algorithm takes into account profile information provided by each rider and detailed information about each bike that is available for riding. Fields used are each rider's height and weight, leg length, tandem riding experience, type and severity of disability, preferred pedal type, favored riding partners, bike ownership, bike availability, bike storage location, bike seat height range, handlebar range, pedal type, and maintenance condition.

The system will send the match results to the Cycling Coordinator for review via email. The Cycling Coordinator will then need to log in and verify that the match is okay. With that go-ahead, the system will send an email notice to each participant who signed up. The notice will list all people who have signed up for the ride, their pairings, and the bikes on which they are expected to ride. Pilots will also receive physical measurements (stoker leg length, height, and preferred pedal type) with which they can set up the bike in advance.

Administration and Access Control

The BORP Cycling Coordinator will act as the site administrator. This person approves membership requests (primarily contingent upon completion of insurance forms), adds new bikes to the listings, and posts announcements through an access-controlled administrative area. The administrative user can see all profile information for all members, since this information can be important in verifying the safety of ride matches. The administrator also

has his or her own member profile and has the same privileges as any regular member to post media and ride feedback. The Cycling Coordinator can also grant pilots a certification to indicate that they have completed the BORP tandem pilot training and been approved by at least one experienced stoker.

Access control rules define three levels of access: administrator, member, and public. Areas of the site can be public, restricted to members only, restricted to a member's friends only, or private (restricted to the owning member and the administrator). The site will be hosted on an SSL-enabled server so that personal data is encrypted during transfer.

Non-Member Pages

A small group of pages are accessible to users who are not members of the BORP tandem group. The purpose of these pages is to advertise the group and its services so that new members have the option of joining. We envision an "About Us" page describing the group, a descriptive section about the tandem bikes available (including photos and technical specifications that would be of interest to the typical cycling enthusiast who is likely to volunteer as a pilot), and testimonials from riders who have agreed to have their words quoted on the public side of the site.

Discussion

Trust

Trust is an inherently relevant concern in the act of tandem bicycling. Mounting and dismounting from the bicycle, as well as getting to the destination safely, requires that the pilot and stoker possess superb balance and coordination skills. 78% of our survey respondents have visual disabilities, which accurately reflects the demographics of stokers within the BORP tandem program; stokers also have non-visual disabilities, including cerebral palsy and paralysis on one side. A stoker who is paralyzed on one side of their body will have different needs for assistance in mounting the tandem bicycle than a stoker who is completely blind but has free movement on both sides of their body. Thus, each disability

presents unique challenges in mounting and riding a tandem bicycle. Both pilots and stokers are taking a risk each time they mount a tandem bicycle to go on a ride with a partner.

Of particular interest, our project connects people online for the purposes of developing a potentially longer-term partnership offline. Currently the BORP tandem program members are notified of whom they are riding with when they arrive on the day of the organized ride. Online, members communicate through the Yahoo! Groups forum. Through our Web site, we intend to extend and broaden the online interaction in such a way that a sense of community and trust is built over time online, constructing a stronger foundation for lasting relationships and cycling partnerships offline. We believe the organization of regular rides will gain traction with a strong and cohesive community in place.

The act of trusting is defined as "to have or place confidence in; depend on" (CMC Fall 08, 09/23/08, slide 4)[2]. We infer how trustworthy someone is based on our perceptions of what their future behavior might be. Studies on trust have identified trust building as being contingent on the existence of some type of risk taking or uncertainty. In fact, Paine Schofield and Joinson assert that "trust is critical when there is a degree of uncertainty" [8]. There is no concept of trust without the possibility of betrayal. In our quest to enhance trust between stokers and pilots, we explored these themes and used them to inform our design.

To begin with, we note that trust is "theoretically linked to perceived competence and [the] motivations of a given partner to act in our best interests" (CMC Fall 08, 09/23/08, slide 8)[2]. Paine Schofield and Joinson frame this analysis of trust with Bhattacharjee's three dimensions of trust: ability, integrity, and benevolence [8]. Our assessment of competence involves whether the subject will act in a manner in which we believe is appropriate.

Motivation involves whether the subject will act in our best interests. Presumably a positive perception of competence and motivations fosters trust. To expound on the subject of motivation, motivation can also be analyzed in an inverted fashion. For example, if you ask your neighbor to take care of your pet while you are away, you can surmise with high probability of being right that your neighbor will not steal from you when you are gone. They have less motivation to steal from you than somebody else who you do not know will be in your house. In the context of BORP tandem bicycling, experience with tandem

bicycling, especially with visually impaired stokers, correlates with competence. Pilots are volunteers who give their time for a variety of individual reasons. Enjoyment of bicycling, interest in helping people with disabilities pursue sports, and the desire for social interaction are just a few potential motivations. In general, stokers are likely to believe the pilots are volunteering with the stokers well-being and needs in mind. The competence of pilots is more likely to traverse a wide spectrum. Pilots currently attend a half-day training session, but certification could instill more confidence in their competence on the part of the stokers. We will return to this idea soon.

We considered the trust theory for visually impaired users recently suggested by Han (2007)[6], who states that the main elements of trust for this group are integrity, benevolence, and predictability. Han minimizes the role of competence in establishing trust, but we feel that competence is more important in the context of tandem biking than in Han's study, which assesses trust of online travel agencies.

Trustworthiness is signaled in two ways: symbols and symptoms. A symbol in the context of signaling trustworthiness is an indicator of "trust-warranting properties in a person" (CMC Fall 08, 09/23/08, slide 9)[2]. For example, we tend to trust that people in uniform will protect us and have our interests in mind. A symptom is a "by-product of actions" that we associate with trust. An example of a symptom that does not signal trustworthiness is the impression we are left with when conversing with someone who averts their eyes. In order to facilitate trust building in the BORP tandem cycling program, we believe that certifying the pilots after providing them with adequate training in tandem bicycling with visually disabled BORP members, and granting them with an emblem of certification on their online profile page, can profoundly affect the confidence stokers have in the pilots. This is one of the suggestions we intend to make to the BORP tandem cycling organizers.

Another interesting consideration in the determination of trust is whether the interaction is repeated. Trust building takes time, so it is necessary to have multiple interactions with a fixed partner[3]. The BORP tandem cycling model provides an optimal model for building trust. It falls in the quadrant of fixed, iterated interactions, meaning that given the small network there is the opportunity to go on multiple bicycle rides with the same partner. To

add to that, our Web site is designed to create opportunities for further interactions through encouraging social networking and the formation of informal bicycle rides. Though it is true that certain demographics do not find any use for social networking, other demographics will gravitate towards it and take advantage of it to extend their social interactions. By providing the capability to share ride reports, exchange tips, and showcase multimedia content, we hope to build trust by giving BORP tandem cycling members more opportunities to interact with each other. Furthermore, the more they interact with each other before meeting for the first time, the more they will trust each other. As Cheshire and Cook assert, having the ability to communicate before playing a social dilemma game results in a strong effect on how each partner trusts the other[3].

We also considered the CMC trust paradox. This states that when certainty is built into the system, it is "in direct opposition to building interpersonal trust" (CMC Fall 08, 09/23/08, slide 16)[2]. Without the possibility of risk, trust has no role in such a system. While we do not take this to mean that building a high amount of uncertainty into our Web site design will foster a high level of trust among members, it does give us pause to consider just how much information and safeguarding we want to include in it. Also, the program itself sets up the perfect rubber purchasing scenario (rice and rubber market): members don't know until they meet and ride together whether the other person is a good partner - there is uncertainty - but once they find someone they ride well with, they are more likely to vouch for and loyally request that person as a partner in the future.

This brings us to the the idea of vouching for stokers and pilots. As mentioned earlier, we designed the Web site to allow stokers and pilots to vouch for each other. We realized that members filling either role might want to express their experience with their partners filling the other role. CMC studies have shown positive reputation systems to be most effective, so we designed our voucher-based reputation system to allow only positive feedback. As Cheshire and Cook explain, negative reputation systems motivate those with negative reputations to "shed" those reputations and create new identities, whereas individuals "become invested in" their positive reputations [3]. This type of feedback fosters good feelings between partners, leading to increased trust and cooperation between the voucher and the vouchee, as well as by other members towards the person being vouched for [10].

As a method for giving stokers some control, our design involves making maps - possibly braille, given braille printers - and audio "cue sheets" available to them. The rationale behind this is that equipping stokers with these tools will assist in making them feel more in control. This leads to increased confidence and therefore increased trust by the pilots towards the stokers.

Media switching is another method by which interpersonal trust is increased [8](p. 21). This movement in Internet relationships from open public online spaces to personal email or online messaging to the telephone to face-to-face meetings signifies trust. Participating in the BORP tandem cycling program naturally follows this progression, and the Web site and phone interface will contribute new forms of communicating through media, thereby building trust.

Trust is paramount to a successful pilot-stoker relationship, and to the success of a program like the BORP tandem cycling program. We have considered several methods for building trust through changes to the BORP tandem cycling program and in the design of the Web site, employing concepts such as symbols, symptoms, reputation, control, and confidence.

Community

Community is another important concern. The members who participate in BORP all share common traits. Many are visually impaired, while all enjoy biking. The BORP participants are a community tied in the real world. However, our matching Web site will tie them together in the virtual world. This poses unique problems in both trust and how they define themselves. Barak and Suler [1] state that users of online communities feel as though they are entering another world when using the internet: "When they power up their computers, launch a program, write e-mails, or browse a Web site, people often feel - consciously or subconsciously - that they are entering a "place" that is filled with a wide range of meanings and purposes"(p. 3). To ensure that BORP members feel comfortable with using an online networking system, we want to make sure the transition to the virtual space is seamless. To smoothly establish an online community, we consulted class readings on the

meaning of community. We looked at Haythornthwaite's [7] paper Social Networks and Online Community and Cohen's [4] The Symbolic Construction of Community. These papers helped guide our understanding of community in relation to online social networking Web sites, such as Facebook and Myspace. It helped us answer questions such as: What makes Facebook and Myspace a community if it has no physical boundaries? We argued that yes, these are identifiable as communities because the online system can act as an extension of existing physical boundaries, such as the East Bay, or University of California at Berkeley. These boundaries create both a community based on physical location and a community of people with similar thoughts and beliefs. Cohen [4] illustrates the point by following Wittgenstein's lexicon use of the word Community: "the members of a group of people (a) have something in common with each other, which (b) distinguishes them in a significant way from the members of other putative groups" (p. 12). Creating an online Web site for organizing rides and matching potential riders can create a sense of community because the riders all enjoy biking, and many have a visual impairment, distinguishing them from others. Of course, do these boundaries matter? Cohen [4] questions this: "By definition, the boundary marks the beginning and end of a community. But why is such marking necessary?" (p. 12). In terms of physical location, it makes sense to have boundaries for communities. A tandem rider from New York might not join BORP because the barrier of distance is too great for them.

Our Web site is unique because it is designed to wrap around an existing community in the physical world. Its primary function is to aid in the pairing process of the pilot and stoker, but because it offers the services of a social network, it enables a virtual reflection of the physical community. It can be an extension of this physical world because it represents intangible connections in an electronic format. It can also represent a public face to the intangible communal ties. Cohen [4] states that: "the boundary represents the mask presented by the community to the outside world; it is the community's public face"(p. 74). By logging onto the Web site, users can view the ties (of the shared experiences) that tie the BORP community together.

The social interaction from the pairing of riders within the program will help build community ties within BORP. Participants who enjoy riding together will form strong ties,

build common experiences together and ultimately maintain the sense of community. Repeated pairings help maintain ties within the community, while one time pairings will enable new ties to be created. In this way, the pairing system can help grow community ties by matching riders with someone they have not ridden with before. This creates possibility for new ties to be formed. Repeated matching helps to strengthen those ties. The Web site can reflect this too; participants who found their pairing and ride to be enjoyable may "friend" each other on the Web site.

We carefully considered the use of photographs in the site. As Donath (2001) states [5], "An online environment populated with 'people' with faces may seem more sociable, friendly, intriguing than a textual or purely abstract space." Attempts to use substitutes for photographic representations of faces have not been successful. Our own experimentation with substituting audio avatars did not work, although was mainly due to conflicts with screen readers. We therefore chose to use what has become a standard for social networking sites, a photo of the user.

One element for building community on our Web site is a blog to share experiences. In designing our Web site, we decided that having a blog forum that users could post ride reviews and other helpful tips on would be essential to building a strong sense of community. One of our interviewees in particular stated that she loved BORP because of their willingness to use their mechanical skills with bikes to find solutions to riding problems. We concluded that providing a way to then log this solution online would help the community overcome common problems, building ties between people with shared experiences. Additionally, the forums would allow participants to write reviews for rides they have taken. Each ride is different depending on the participant. Factors that contribute to this include (but not necessarily limited to): athletic ability, preference on ride length and 'drive' (how aggressively they want to ride). Both pilots and stokers could share their impression of the rides after they have been completed, and get information for new rides. Haythornthwaite [7] discusses how community can emerge when participants share experiences: "Community emerges where the cumulative impact of interactions among individuals adds value above the level of pairwise interactions. Interaction such as exchange of information and advice, social support, mutual help and provision and receipt of services

can have the cumulative impact of creating trust among network members, shared history and language and known expectations about behaviors that support the community in its common goals"(p. 121). The BORP community can be reflected online by allowing users to exchange tips and support. The participants can also build trust through the same network and connection through the shared experiences, while building towards the common goal of having enjoyable tandem rides.

In order to maintain a shared connection between viewers who are visually impaired and those who are not, we designed the site to avoid discriminating between the two. All information available to viewers who are not visually impaired will be available in the same location to those who are impaired. We are designing it this way in order to prevent building a boundary between those with vision and those without. We want to be sure that the Web site does not create any sort of distinction in that sense. It would go against our goals in building the community.

Although our original intent for the Web site was to serve the local BORP tandem cycling community, if it is successful, we are considering making it open to any community which serves the needs of the visually impaired in relation to tandem cycling. This will have an effect on the sense of community for the participants. It will create a hierarchy of communities. For example, BORP becomes a community within a community of Bay Area programs serving visually impaired tandem riders, within the national community of programs.

Conclusion

Though our semester of work on this project has not allowed time to build a working version of the system, we have been able to complete the preliminary design, informed by current research in community and trust relationships in the context of online systems. The result is a design that enables positive reputation tracking via multiple modes, enables signaling of community membership, and simplifies the complex task of organizing a large group ride. It also empowers members to share information, plan informal rides with each other, and contribute to the site itself.

Our work thus far has drawn great interest from the tandem community, who are eager to see the system realized. We plan to continue working on it in order to implement it as a system for BORP. If that smaller system is successful, we hope to build a broader based system in which BORP is one of many potential ride-organizing groups. One of our interview subjects is particularly keen to see a worldwide system employed and has offered assistance in obtaining financing for such an endeavor. One group member (AG) is also planning to study user interface design for accessibility next semester as an independent study, so this should make it possible to make rapid progress toward a complete system.

Division of Labor

Introduction - Carol Chen

Needs Assessment - Sean Carey and Carol Chen

Design - Annette Greiner

Discussion on Trust - Carol Chen

Discussion on Community - Sean Carey

Conclusion - Annette Greiner

Works Cited

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BORP Tandem Cycling

Carol's Home

Welcome, Carol! [Log out](#)

Announcements

- [Tiburon Ride](#) May 13, 4:00 pm [Sign up!](#)
- [Joaquin Miller Ride](#) May 13, 4:00 pm [I'm There!](#)
- [Barbecue at the Bikehouse](#) May 14, 12:00 pm

Recent Forum Posts

- [New seat is really comfortable!](#)
- [Tiburon ride was really long!](#)
- [Barbecue at the bikehouse pictures](#)
- [Watch kitty do back flips](#)

Invitations

- [From Martin](#), 4/10/2008 (You accepted)
- [From Todd](#), 4/20/2008 (You have not replied)
- [To Joe](#), 3/31/2008 (Joe accepted)
- [To Tim](#), 3/30/2008 (Tim declined)

Friends

- [Annette](#) pilot [Invite to Ride](#)
- [Brian](#) pilot [Invite to Ride](#)
- [Carly](#) stoker [Invite to Ride](#)
- [Full Member List...](#)

My Profile

[Forum](#)

[My Blog](#)

[My Media Stream](#)

[About BORP Tandem Cycling](#)

BORP Ride Calendar

Recent Rides

- [Bayfront trail](#) 4/12/2008
- [Bayfront trail](#) 3/10/2008
- [Richmond Marina](#) 2/20/2008
- [Tiburon Ride](#) 2/2/2008
- [Bayfront trail](#) 1/15/2008
- [More ...](#)

BORP Calendar

December

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
30	1	2	3	4	5	6
7 Inspiration Point Ride - 8 mi, 11 AM	8	9	10	11	12	13
14	15	16	17	18	19	20 3 Bears Ride - 30 mi, 8:45 AM
21	22	23 Bay View Trail Ride - 10 mi, 3 PM	24	25	26	27
28	29	30	31	1	2	3

BORP Tandem Cycling

Carol's Profile

Welcome, Bobby! [Log out](#)

Vital Statistics

Prefers to ride as a **pilot**

Height: 5' 6"

Weight: 130-160 lbs.

Leg Length: 29 in.

Tandem Experience: 3 years

Disability: temporarily able bodied

Bike: Santana Sovereign, [details](#)



BORP Certified Pilot

Bobby's Home

My Profile

Forum

My Blog

My Media Stream

About BORP Tandem Cycling

More about Carol

I enjoy reading science fiction and fantasy books. I also like most movies with Sean Penn.

I have a new kitty!

Contact Information

Phone: 510-222-1414

Email: ccorley@yahoo.com

Mobile: 510-222-1412

Recent Rides

[Bayfront trail](#) 4/12/2008

[Bayfront trail](#) 3/10/2008

[Richmond Marina](#) 2/20/2008

[Tiburon Ride](#) 2/2/2008

[Bayfront trail](#) 1/15/2008

[More ...](#)

Members who vouched for Carol

- ★ [Annette](#) Her enthusiasm is infectious!
- ★ [Brian](#) Had a great ride with Carol
- ★ [Carly](#) Good at calling out points of interest

[Vouch for Carol](#)

BORP Tandem Cycling

Welcome, Bobby! [Log out](#)

Ride Detail

Richmond Marina, May 13, 2008

Distance: 15 miles

Difficulty: 2 ?

Start: BORP Bikehouse at 4:00 pm

Contact: Greg Milano (510) 622-2223

[Sign up!](#)

Bobby's Home

My Profile

Forum

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My Media Stream

About BORP Tandem Cycling

Who Signed Up

[Laura](#) - stoker

[Martin](#) - Pilot

[Pete](#) - Pilot

Feedback about this Ride

No feedback yet

[Give Feedback](#)

Route Information

[Route Map](#)

[Cue Sheet](#)

[Audio Guide](#)

Ride Profile



Regroup Locations

corner of 7th and Bartlett, Richmond

Photos

None
yet

Videos

None
yet

Sound Files

No sound files yet

Sign up to join BORP Tandem

Name

Pilot or Stoker

Pilot Stoker

Weight (Kept Private)

Height (Kept Private)

Inseam

Bike preference

Max preferred ride length

Any preferred matching

Own your own bike?

Special requests?

