CROWDSOURCING PUBLIC PARTICIPATION IN TRANSIT PLANNING: PRELIMINARY RESULTS FROM THE NEXT STOP DESIGN CASE

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ABSTRACT
We recognize that the collective intelligence of communities is largely untapped by traditional public participation (P2) methods, which may result in less-than-ideal transit plans that neglect the needs of diverse constituencies. Mediated approaches may ameliorate contextual factors which inhibit participation in traditional methods, and, specifically, Web-based participatory activities would cast a wider net in the community, harnessing more and more diverse input. This paper discusses a P2 model utilizing “crowdsourcing,” which is a Web-based, distributed problem solving model already in use by a number of online businesses, a model which promises to be such an alternative P2 method for public transit planning. This paper draws from a Federal Transit Administration (FTA) pilot project focused on the application of crowdsourcing to bus stop design at the neighborhood scale. We introduce the concept of crowdsourcing and then discuss the components of transit stop design. This is followed by preliminary results from Next Stop Design, our first case study in transit stop design.

INTRODUCTION
Traditionally, public participation (P2) in public transportation planning has been conducted through open houses, day-long workshops, and design charrettes intended to gather input from stakeholders to inform top-level planning decisions. The body of scholarly planning literature has come to acknowledge the various challenges associated with such methods, both in theory and in practice, particularly as such methods can fall short of gathering enough community input or a diverse range of ideas. Though the intent with traditional P2 methods is certainly to maximize community input and hear a diverse array of stakeholder voices, traditional methods are problematic for at least two reasons:

(a) Participants in traditional P2 methods can never be fully representative of the wider community. Traditional P2 methods, such as workshops, are predicated on a representative democratic model, which necessarily condenses diverse stakeholder input into the bodies and minds of a few representative citizens. Though not a bad model, representatives in P2 activities can never fully capture the numerous specific needs of diverse communities, much in the way elected government officials can never fully address all of the concerns of their constituencies. More participants in the P2 process are needed in general, and a more diverse representative sample is needed specifically to improve transit planning and operations.

(b) Contextual factors may inhibit participation and diverse input in traditional settings. Traditional P2 methods are shrouded in a number of contextual challenges which can inhibit citizen input, particularly the input of underserved communities. These challenges include: the scheduling of P2 meetings, which can conflict with the working hours of citizens, particularly if citizens must work multiple jobs; the location of P2 meetings, which may prove difficult to attend for senior citizens, people with disabilities, those without the convenience of personal transportation, and those employed in multiple jobs; and the power dynamics of face-to-face P2 meetings, where, because of vocal
special interests or the interplay of identity politics, some citizens may feel their opinions are drowned out or feel compelled to self-censor entirely.

The collective intelligence of communities is largely untapped by traditional P2 methods, which may result in less-than-ideal transit plans that neglect the needs of diverse constituencies. Mediated approaches may ameliorate contextual factors which inhibit participation in traditional methods, and, specifically, Web-based participatory activities would cast a wider net in the community, harnessing more and more diverse input. Crowdsourcing, a Web-based, distributed problem solving model already in use by a number of online businesses, promises to be such an alternative P2 method for public transit planning (1, 2). Presented in this paper are the preliminary results from Next Stop Design, a Federal Transit Administration (FTA) pilot project to apply crowdsourcing to bus stop design at the neighborhood scale in Salt Lake City, Utah.

BACKGROUND

Public Participation

Our premise is that greater diversity in P2 enhances the creative input in the stop design process for bus transit routes, which in turn improves the ability for transit authorities to meet the needs of diverse constituencies, improving access and mobility across metropolitan areas. Greater diversity, and thus more creative input, comes from more inclusive participation—i.e., participation by a broader range of affected parties—and from participation of greater numbers of persons.

At most, public participation can be seen as a logical extension of the democratic process in more local, direct, deliberative ways (3). And at the very least, involving citizens in the planning process helps ensure a plan that will be more widely accepted by its future users (4-6). As Crewe (7) found in an analysis of citizen participation in the Boston Southwest Corridor project in the 1970s and 1980s, “[t]he more designers value the input of citizens, the more appropriate their designs will be for the users concerned.” Extending this notion, Fiskaa (8) posits that “[t]he purpose of public participation is of course to obtain better plans, meaning that they are well accepted by most, and therefore easier to carry out.”

Non-Expert Knowledge

Other benefits for public participation involve the valuing of non-expert or non-mainstream knowledge brought into the creative problem solving process of planning. Participation is the act of creating new knowledge, contributing new perspectives to the planning process, and diffusing knowledge to others in the process (9). Van Herzle (10) found that inclusion of non-expert knowledge was beneficial to the planning process in general, since the perspectives of individuals outside of the professional bubble of urban planning can (re)discover creative solutions that could work in a specific local context. To enlarge the discussion to the realm of innovation research, as well, several studies (11-14) have found tremendous success when non-experts engage in scientific problem solving and product design, often with solutions superior and more cost-effective than traditional research and development programs. Corburn (15) urges that “local knowledge should never be ignored by planners seeking to improve the lives of communities experiencing the greatest risks” especially.

Contextual Participation Inhibitors

Yet, Burby (4) reminds us that “planners themselves can stifle participation by the choices they make about public involvement.” Specifically, the ways planners conduct meetings and inject
their own wit and personal facilitation style may work to either limit or enhance planning subjects’ impact on material outcomes (16). The very presence of special interest groups in the planning process, who show up to planning meetings representing the interests of some facet of the public, may intimidate the average citizen with elaborate charts, maps, empirical evidence, and expert advice, thus deterring future involvement by non-experts in the community (17). Non-verbal communicative actions and unrelated small talk by various citizens in the actual spaces of public meetings also work to “script” the power grabs that occur during the actual public participation segments of planning meetings (18). Furthermore, studies from Hou & Kinoshita (19) and Innes et al. (20) found that the degree of informality employed during the public participation process affected the ways in which citizens were able to contribute to the development of the plan and see themselves as effective actors in the solving of problems.

Simply put, with so much difficulty in executing the face-to-face P2 component of a planning project, we should begin to think beyond the bounds of what might constitute P2 methods in the first place, to think of participation that may occur in mediated ways. On the Web, the unidentified, non-expert talent is out there, accessible through the seemingly infinite scaled-up platform of the Internet, and planners can and should seek latent talent on the Web for their projects.

**Collective Intelligence**

At the time of the Web’s awakening, Lévy (21) wrote:

> It has become impossible to restrict knowledge and its movement to castes of specialists … Our living knowledge, skills, and abilities are in the process of being recognized as the primary source of all other wealth. What then will our new communication tools be used for? The most socially useful goal will no doubt be to supply ourselves with the instruments for sharing our mental abilities in the construction of collective intellect of imagination.

Since “no one knows everything, everyone knows something, [and] all knowledge resides in humanity,” we must consciously adopt the technologies and methods which harness this talent (21). Lévy is an optimist. He called this far-flung genius collective intelligence, a “form of universally distributed intelligence, constantly enhanced, coordinated in real time, and resulting in the effective mobilization of skills” (21).

**Crowd Wisdom**

An interesting thing happens, too, when enough talent becomes collected in efficient ways, even without the aid of the Web to harness all ideas: people become collectively smarter. “James Surowiecki, in his book *The Wisdom of Crowds*, examines several cases of crowd wisdom at work, where the very success of a solution is dependent on its emergence from a large body of solvers” (2). Based on several empirical investigations, Surowiecki (22) finds that “under the right circumstances, groups are remarkably intelligent, and are often smarter than the smartest people in them.” This wisdom of crowds is derived not from averaging solutions, as deliberative models of democracy and as many instances of brainstorming sessions in planning assume, but from aggregating them.

**The Medium of the Web**

The Web enables a kind of networked, creative thinking, encourages the mind to wander down winding paths to unknown mental explorations (23). What is more, the Web enables the precise
form of aggregation Surowiecki stipulates for a successful, wise crowd. Since too much collaboration and communication between problem solvers can lead to compromise or disaster (22), the key to aggregating instead of averaging ideas is to allow individuals to develop complete single ideas and put them up for review among their peers in the crowd. Easily, the crowd can sift through the bad ideas to find the good ones, a sorting that could be accomplished with a simple online voting scale.

Other aspects of the Web that make it an ideal medium for facilitating creative participation include its speed, reach, asynchrony, anonymity, interactivity, and its ability to carry every other form of mediated content. Unhinged from the constraints of time by its speed, the Web is also at the same time an asynchronous mode. That is, online bulletin board systems and similar applications enable users to post commentary and ideas to a virtual “location” at one point in time, and other users can engage those thoughts at much later points in time. Much like the leaving and taking of notes on a bulletin board in a town square, the Web can foster a sense of ongoing dialogue between members of a community without those members having to be present at the same time.

Aggregating the single ideas of individuals in the crowd by putting them in competition with one another does not mean the disappearance of qualitative input. Planning decisions are not about the will of the simple majority. They are about the ways in which communities provide qualitative commentary on how they want to see their future built environment. In an online context, individuals make qualitative input available primarily through online bulletin board systems and other modes of asynchronous communication. Ideally, individuals in the wise crowd incorporate discussion and exchange as they develop potentially a series of individual solutions to contribute to a commons. It is then the aggregate of these individual ideas which results in crowd wisdom. The process is not unlike peer review. This is also different from the deliberative democratic model, which favors compromise and debate to produce collective, averaged solutions.

Furthermore, the Web is an anonymous medium. Users are able to develop their own online identities largely on their own terms, or they can choose to remain anonymous entirely. In a chat room or bulletin board system, for example, people can develop whole new personas or design entirely differently-bodied avatars to represent themselves and their interests. In line with much of the scholarly literature on nonverbal communication, Campbell & Marshall’s (18) discovery that people’s body language, positioning in the space of a room, and small talk work to “script” the ensuing power dynamics of a planning meeting is relevant here. In an online environment, people are free to contribute to online discussions and the vetting of ideas without the burden of nonverbal politics. That is to say nothing of the very real power inequities at play with embodied forms of difference (e.g., race, gender, (dis)ability), inequities buttressed many times over by empirical research in communication, sociology, health, psychology, and other disciplines. The medium of the Web can work to liberate people from the constraints of identity politics and performative posturing by endowing users with the possibility for anonymity in participatory functions (24).

Finally, the Web is an interactive technology and a site of convergence, where all other forms of media can be utilized. Rather than the simple transmission mode of information native to “older” forms of media (e.g., television, radio, newspaper) and much policy, the Web encourages ongoing co-creation of new ideas. Content on the Web is generated through a mix of bottom-up (content from the people) and top-down (content from policymakers, businesses, and media organizations) processes, as opposed to solely a top-down model. It would seem that public participation programs folded into transit planning processes try to achieve this meeting in
the middle of ideas from the “bottom” and from the “top.” Web users are particularly savvy at broadcasting their own ideas, uncovering buried information, and remixing previous ideas and content into new, innovative forms. Web users are problem solvers, are creative. We must turn to the Web to transform the public participation process, to change our archaic perspective on how citizens actually participate in democracies today (25).

**Crowdsourcing**

Jeff Howe (26) coined the term *crowdsourcing* in an issue of *Wired* magazine. The term “describes a new Web-based business model that harnesses the creative solutions of a distributed network of individuals through what amounts to an open call for proposals” (2). In crowdsourcing, an organization broadcasts a problem to an online community, individuals in the community submit solutions, and others in the community vote on the best solutions. Individuals with winning ideas are rewarded, and the organization takes ownership of the solution. Notable examples of crowdsourcing include t-shirt design company Threadless.com, scientific research and development clearinghouse InnoCentive.com, crowdsourced gold mining contest The Golcorp Challenge, and user-generated advertising contests like Doritos’ Crash the Super Bowl.

An efficient and profitable business model, Brabham (2) has argued that crowdsourcing can be applied to government and non-profit problem solving. Specifically, Brabham (1) proposes crowdsourcing for P2 in urban planning contexts, and small-scale projects are ideal for testing the model initially. Small-scale planning challenges, however, ought to be sufficiently complex to attract and retain public involvement. Designing a bus stop fits these requirements for a pilot study. Bus stops are familiar for most people, and riders have first-hand experience with bus stops that is useful for a user-centered design perspective. At the same time, though, bus stop designs incorporate several climate and other contextual factors, making for a sufficiently complex design challenge.

**Bus Stops**

Bus riders, just like other customers of a transit system, typically have tight time schedules to which they must adhere. Work, school and other planned events demand for prompt and timely service. Extreme weather, in Utah common in the summer as well as the winter, can make waiting for the bus a dreadful experience. It is important not only that the bus is on time, but that adequate, attractive, safe, and comfortable shelter is provided to the customer waiting in the heat or the snow. Waiting for a bus is rarely time spent in civilized or stimulating conditions. While necessary in any transit system, bus travel is often regarded as the cheapest and most marginalized form of transport, and structures and interchanges associated with it tend to be designed with an emphasis on economy rather than imagination.

Factors to be incorporated into a bus stop design process should include the needs of the riders, the types and amounts of transit serving the stop, surrounding pedestrian and vehicular systems, space availability, desired activities and amenities, materials, maintenance, accessibility for the mobility-limited, weather protection, and aesthetics (8, 9).

An inherent problem exists when bus stops are poorly designed or under-equipped. Since the bus stop is for many the first and only point of contact with transit, the amenities presented to both the rider as well as the motorist passing by create an image of the level of service presented and project directly the individual community’s level of commitment. While these points are important to the message transit agencies want to send to potential riders, more important is the fact that poorly designed bus stop waiting areas may place hardships on some users, such as the elderly and people with disabilities, and may dissuade choice transit users from riding the bus
often due to unnecessary inconvenience and a perceived high level of crime around bus stops. In her extensive study, Lusk (27), for example, found a strong connection between bus stop design and perceptions of crime, having implications for ridership and the eventual success of a transit system.

The goal of bus stop design is to provide basic functional access and amenities at the transit end of the pedestrian trip in order to attract choice riders and to meet the needs of elderly and disabled users. Regardless of ownership or business unit service bus stops serve as advertising for all of a transit agency’s service and help generate or hurt ridership and revenue through their appearance.

In a unique analysis of bus stops, Ewing (10) reports on the use of a “visual preference survey” to identify important stop features. Survey participants—transit riders, non-riders, and planners—were shown 50 pairs of bus stop photographs and asked to select at which of the two they would prefer to wait and to rate each stop on a 5-point scale. For the first 25 pairs, respondents were asked to give the reasons for their selections. The results were assessed using multiple regression techniques that incorporated 25 design-related variables. All three respondent groups rated the presence of ads at stops negatively, and the presence of shelters and trees positively. Combined scores show the most important features are a shelter, a bench, trees at the stop, a curb, trees along the sidewalk leading to the stop, and the setback of the stop from the street edge.

The range of amenities addressed in bus stop design guidelines is wide. Across the literature, the common topics include bicycle parking, public telephones, trash cans, and seats (3). New technologies, however, are greatly expanding the range of amenities available. New options include solar-powered lighting, air conditioning, heating, and ATMs (16), and touch screens that provide real-time service information, allow for Web browsing, and facilitate message posting by patrons (17).

TECHNICAL APPROACH

We believe that “[t]he bus stop is the first point of contact between the passenger and the bus service. The spacing, location, design, and operation of bus stops significantly influence transit system performance and customer satisfaction” (28). This is one reason why we initially focus on the bus stop instead of the route for the purposes of this research. To execute a crowdsourcing experiment for P2 in transit planning, our approach includes a series of activities:

(a) **Build a crowdsourcing project Web site with interactive components.**

- A Web site would be built to convey the problem or challenge to a visitor to the site. This challenge would set a series of expectations for viable solutions to the problem. On this site would be a place for visitors to create a free login on the site. This login procedure would capture demographic and other pertinent data from visitors.
- Once users design transit stop scenarios that meet the requirements of the challenge, they may “submit” their final designs to a community “gallery” on the site. Users can then view the designs of their peers in the gallery, make comments on specific designs in a discussion board, and register simple votes (e.g., on a 1-5 star scale) in favor of others’ designs.
(b) **Assess effectiveness of crowdsourced design outcomes.** A technical evaluation of designs produced through the crowdsourcing process will be undertaken by planning professionals for feasibility and alignment with project goals. These crowdsourced design alternatives will be evaluated for how they compare to designs produced solely through traditional P2 methods that run parallel to the crowdsourcing experiment.

“Next Stop Design” was coined as a catchy and marketable name for this pilot project. A Web designer was contracted to build a Web site, located at the URL www.NextStopDesign.com. The site was built with Ruby on Rails, an open source application suited for rapid, agile development. The chosen interactive elements, styles, and navigational structure give the site a contemporary “Web 2.0” look and feel that invites user participation on the site (see Figure 2). Once registered on the site, users were able to submit their own bus stop designs and rate the designs of their peers (see Figures 3-4).

![Figure 2, 3, & 4 about here]

**Dissemination Strategy**
A sophisticated marketing and public information campaign is necessary in the beginning of a crowdsourcing project to drive users to the Web site to participate. The campaign was designed to incorporate traditional public relations tactics (e.g., press releases to mainstream news media) coupled with alternative tactics (e.g., social networking, viral marketing) in order to disseminate news of the project to the wider public. Once final designs are selected in the crowdsourcing interface, the public will be notified through both traditional and alternative public relations tactics, with an emphasis in this phase on spokesperson promotion for the product from elected leaders and high-level public officials in the community. Because crowdsourcing is unique in that it truly results in solutions produced by and for the community, dissemination of results would also be boosted by word-of-mouth buzz from users of the project, both online and off.

**RESULTS**

**Site Traffic**
Next Stop Design officially launched June 5, 2009, with the competition due to close in September 2009. A Google Analytics script was appended to each of the pages on the Web site, allowing the team to track visitors to the site, page views, referral sites, and geographic locations of visitors. The IP addresses from all members of the project team were excluded from the Google Analytics tracking, so that the team’s own visits to the site did not skew the traffic results. As of July 24, 2009, seven weeks into the 16 week project, Google Analytics recorded 57,100 page views in 6,892 visits to the site from 4,654 unique visitors. This averages to a little more than 140 visits per day.

In this time frame, 4,390 visits (63.70%) were from referring sites, 2,116 visits (30.70%) were from direct traffic to the site, and 386 visits (5.60%) arrived at the site from searches performed on search engines. Direct traffic means that visitors to the site arrived by typing the URL directly into a browser, but these direct visits can also include visits from people who clicked on a URL from inside a non-Web-based e-mail program (e.g., Microsoft Outlook) or other non-Web-based source. Referring traffic sources are other Web sites from which visitors came directly to get to Next Stop Design. This almost always means that some other site included a link to Next Stop Design, which a visitor clicked on to get to Next Stop Design. The top referring sites for Next Stop Design are architecture Web sites that listed Next Stop Design in...
their competitions listings. Top referring sites among the 4,390 referral visits are: sketchupdate.blogspot.com, the official blog for Google’s free 3D rendering program SketchUp (904 visits, 20.59%); deathbyarchitecture.com (652 visits, 14.85%); and bustler.net (575 visits, 13.10%). Referrals from social networking site Facebook, largely the result of promotional efforts by the Next Stop Design team’s public relations manager, accounted for 232 visits (5.28%). Fully 292 of the 386 visitors (75.65%) from search engines arrived by searching exactly “next stop design,” “nextstopdesign.com,” “next stop design competition,” or other syntactic variations of the specific project name. This means that people who found the project site from a search engine were mostly specifically looking for the project.

Geographically, the 6,892 visits to the site came from 99 countries and territories (Google Analytics tracks certain territories and dependencies separately from the countries they legally belong to, including, for example, Puerto Rico, Taiwan, Hong Kong, the Faroe Islands, the Cayman Islands, and Guam). The most visits originated from the United States (3,965 visits, 57.53%); the United Kingdom (409 visits, 5.93%); Germany (356 visits, 5.17%); Canada (188 visits, 2.73%); Australia (151 visits, 2.19%); Italy (121 visits, 1.76%); France (115 visits, 1.67%); India (111 visits, 1.61%); Ireland (110 visits, 1.60%); and Serbia (101 visits, 1.47%). Visits from the United States came from all 50 states and the District of Columbia. The most U.S. visits originated from Utah (712 visits, 17.96%); California (548 visits, 13.82%); New York (497 visits, 12.53%); Illinois (174 visits, 4.39%); and Texas (158 visits, 3.98%).

Registrations and Submissions
Between June 5 and July 24, 2009, there were 338 registrations on the site. Free registration is required to view comments, make comments, vote on designs, submit designs, or submit ideas on the site. Of the 338 registered users, 210 (62.13%) reside in the United States, 17 (5.03%) in the United Kingdom, 12 (3.55%) each in Germany and Austria, 8 (2.37%) each in India and Australia, 7 (2.07%) each in Ireland and Canada, and 57 (16.86%) total among 43 other countries. From these registered users, 47 bus stop designs had been submitted from June 5 to July 24, 2009. Designs submitted very early in the contest were largely hand-drawn sketches, but recent submissions are almost entirely 3D architectural renderings of a professional caliber (see Figure 5).

Summary of Promotional Efforts
To announce the project and drive traffic to the site, a mix of traditional, social media, and word-of-mouth public relations tactics were undertaken. Traditional tactics included sending press releases and news tip e-mails to print and broadcast news organizations. Though even a radio station in Washington, D.C., picked up news about the project, Utah media outlets have conspicuously ignored several waves of news releases. Social media tactics included sending press releases to prominent blogs and Web sites, as well as using social media applications like Facebook and Twitter. Profiles for the project were set up on Facebook and Twitter, and the public relations manager for the project worked to add friends on Facebook and gain followers on Twitter. In the latter case, proactively following many Twitter users at first helped convince those people to follow the project. The public relations manager then regularly announced news of the project and any new posted designs through Facebook and Twitter. As of July 24, 2009, 190 people followed Next Stop Design on Twitter, and 111 were friends of the project on...
Facebook. These efforts have paid off, as several Facebook posts and Tweets have been further reposted or re-Tweeted by others, thus amplifying promotion of the site.

An effort to target architecture and urban planning Web sites and blogs was made with press releases and e-mails. These venues were identified as having great potential to reach individuals likely to submit bus stop designs and otherwise participate on the site. As a result, sites such as the Google SketchUp blog, Transit Wire, Planetizen, the Human Transit blog, and Making Places (the Project for Public Spaces blog) picked up stories about Next Stop Design. These efforts then led to coverage by public policy blogs, including the Personal Democracy Forum blog and the official blog of the White House. Finally, Next Stop Design was listed on several architecture competition listing sites, including bustler.net, competitions.de, and deathbyarchitecture.com. All of these Web mentions resulted in immediate considerable increases in traffic to the site, according to Google Analytics data.

SUMMARY
Halfway through this pilot project, it is clear that using crowdsourcing for P2 in transit planning is effective in a number of ways. An online bus stop design contest enables citizen participation in a deeper way than a town hall meeting might. The volume of participation, indicated by both site traffic data and the number of design submissions, is higher than would be typical of a transit planning project using traditional P2 methods. Hundreds of people have registered at Next Stop Design in order to submit a design or vet the submissions of their peers.

Diversity of participation, at least geographically, is greater than would typically exist in a traditional P2 process, as well. On the one hand, this international involvement is likely to bring new ideas into the mix that might not otherwise have emerged in a traditional, local P2 process. On the other hand, though, the involvement by people outside of the U.S.—and outside of Utah especially—introduces an interesting global-local tension. How appropriate is it for an architect in Germany or India or New York to design a bus stop for riders in Salt Lake City, Utah? How does the value of local knowledge and the general purpose of P2 processes to involve everyday users of the built environment in the design of their community square with the international reach of the Internet and the open creative process of crowdsourcing? These tensions deserve further exploration.

The bus stop designs that have been submitted to the Next Stop Design site are impressive, imaginative, and incorporate many modern technological amenities. However, the dominance of professional-quality 3D renderings in recent submissions on the Next Stop Design site may indicate that truly amateur designers have lately been deterred from the process. Those without access to 3D rendering programs or the skill to use them may feel intimidated by the level of quality and the flashy veneer of professional-looking architectural drawings and may decide against submitting their napkin sketches altogether. Preliminary findings in this pilot project suggest that once a threshold in the quality of designs is crossed, those unable to rise to that level may not see value in their own participation. This is consistent with Hibbard and Lurie’s (17) findings in traditional P2 methods. Upcoming interviews with participants on the site aim to interrogate these perceptions and the potential apprehensions to submit designs.

Finally, we have learned in this pilot project that building a vibrant online community can be difficult. No amount of traditional and guerilla public relations and marketing tactics can guarantee visitors to a Web site. And once people start visiting a site, retaining their interest is a challenge in itself. A brand new online community may seem like a ghost town to a new visitor, an immature, lifeless space unworthy of his or her attention. But an overly active community generating professional-quality ideas may seem like a clique too powerful for an outsider to
penetrate. The public relations manager for this pilot project has invested a lot of her energy in building the community to a critical mass that now sustains itself and drives consistent traffic to the site. This indicates that perhaps the most important piece of infrastructure for a crowdsourcing application in transit planning is a vibrant and engaged online community.

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