The Circles of Latitude

Adoption and Usage of Location Tracking in Online Social Networking

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Abstract—**This paper reports preliminary results of an ongoing ethnographic study of people's attitudes towards and adoption of Google Latitude, a location-tracking technology for mobile devices. In order to understand barriers to adoption, participants include both users and non-users of Latitude, and those whose usage has dropped off. The report focuses on how participants perceive Latitude to be conceptually situated within the ecology of social networking and communication technologies. Earlier work on user attitudes with regard to location tracking emphasized potential privacy concerns. In our research we also identified privacy concerns, but additionally several other more salient tensions such as adoption trends, social conformance, audience management, and information filtering.**

Keywords-Latitude; location-tracking; Facebook; Twitter; social network; mobile; adoption

I.   INTRODUCTION

Describing one's location serves to convey more than just geography. Analysis of mobile phone conversations reveals that location disclosure plays a major role in creating social or process awareness, coordinating meetings, and in signaling availability, caring, or need for help [1]. With location being so integral to communication, much research has focused on how mobile technology can facilitate location disclosure.

We are studying how people view, adopt, and use mobile location-tracking services in a naturalistic environment. Google Latitude enables a circle of friends, relatives, and acquaintances to share their real-time cell phone or laptop location on Google Maps. Because it exposes a wider audience to location-tracking than earlier technologies [2], researching its reception and use is likely to yield valuable insights into how these types of technologies could be better integrated into the everyday lives of larger segments of our population.

Although we are still conducting interviews, initial analysis already shows that participants' attitudes towards and use of Latitude were intertwined with their existing ecologies of social web technologies. This connection instantiates itself in the following ways: 1) **Technology adoption.** New social web technologies pass through similar adoption cycles, influencing with whom and how they are used. 2) **Social norms.** Real and imagined social norms shape behavior, often taking precedence over privacy concerns and leading to anxiety and reluctant usage. 3) **Audience management.** People are entrenched in a web of eclectic social ties without a way to manage it. 4)

Information filtering. People cannot adequately filter information in their social networks and are limiting their participation. 5) **Benefits.** Despite the challenges, people do find value in staying connected through the social web.

What became clear to us is that new technologies such as Latitude must be designed for and evaluated within this ecology of rapidly changing technology and social norms. Thus, this paper describes the social web ecology expressed by participants rather than concentrating solely on Latitude.

II.   PREVIOUS RESEARCH

Much location-tracking research within the location-based services literature emphasizes privacy concerns. Probing hypothetical scenarios via questionnaires, experiments, and experience sampling methods (ESM), researchers found that people's disclosure depends largely on who is requesting their location, and also on why [3][4]. However, stated privacy attitudes often differ from actual behavior [6]. Thus, a few studies looked at location-tracking usage [5]. Other systems used real-time disclosure within predetermined social groups such as a family, group of friends, or co-workers [7][8][9][10]. These studies showed that location-awareness facilitates coordinating meetings, checking on loved ones, and social connectedness.

The present research found additional and arguably more salient tensions in location tracking besides privacy. In these earlier studies, researchers gave subjects the technology for the sake of the study. Our research instead focused on a popular location-tracking technology autonomously adopted by the participants, i.e. on adoption and use in the real world.

III.   METHODS AND SAMPLE

Our report draws on semi-structured interviews with 12 individuals, conducted mostly one-on-one and face-to-face (an out-of-state participant was phone interviewed and a husband and wife pair were only available to be interviewed together). We asked open-ended questions about their experiences with Latitude, probed their feelings towards using it with various contacts, and found out how they stayed connected with others. Since little is known about who is and is not using social web technologies [11], we interviewed from the following groups: those who have heard of Latitude but not used it, those who use it, and those who stopped using it. Since Latitude was new and likely to have attracted the attention of those more technically inclined, we recruited participants through a student discussion

list in Information and Computer Science at UC Irvine, through personal contacts, and through subsequent snowball sampling.

The interviewees consisted of 3 females and 9 males aged 23 to 40's (averaging early 30's). 5 interviewees had never used Latitude, 4 used it on a mobile device, and 3 had used it on a laptop but stopped using it. As for other social technologies, all but one interviewee used Facebook, most mentioned using instant messenger, and a third used Twitter. Relationship status wise, 5 were single, 2 living with a significant other, and 5 married with children. Their professions include graduate student (some having previously worked in industry), software developer, product marketing manager, lawyer, construction project manager, and housewife. All participants were either born in the United States or had lived here for 5+ years.

IV. RESULTS

Throughout the study, interviewees tied Google Latitude to their social webs of technologies. They most commonly cited Facebook, Twitter, instant messengers, texting, and calendars.

A. Technology Adoption

We found common adoption characteristics in how decisions were made to use technologies like Facebook, Twitter, and Latitude. Some participants used technology just because it was new while others waited for a critical mass. However, whether they continued to actively use the product depended upon whether others (close friends or critical mass) used it. "Emit", a graduate student who often bought the latest gadgets when he was in industry, recounts: "I started on twitter mostly because it was new and I wanted to try it out. Same with Facebook. And then everyone got on it, so you stay on it."

Other participants decried the rapid pace of people adopting new social web technologies and felt inclined to resist knee-jerk adoption. From our interviewee's histories of adopting technologies like Friendster, Facebook, Twitter, and Latitude, we see a pattern of slower adoption and greater resistance. Many were reticent to join Twitter and Latitude as a result of this social web onslaught. "Chris", formerly the product marketing manager of a major tech company, complained that there are so many of these technologies now, he only superficially test drives them. "I'm not going to spend the time to be a pioneer in the technology. It's a waste of time...Before I use it personally I want there to be some critical mass. I don't want to waste my time on sorting out the weaknesses of it."

Despite this resistance, many interviewees were dismayed that others were still "saying yes" to these technologies and creating a critical mass that then compels them to say yes. A graduate student "Elizabeth" fretted: "I feel like it's where we're headed. There's enough people that will just say yes to all of it – to Twitter to Latitude." However. some of the interviewees, particularly many married ones, felt that they had tempered their adoption decisions by also looking at utility.

Economics is related to why people are adopting social web technologies so rapidly and without as much thought towards utility. "Laura", a housewife and mother married to lawyer "Pete" (both with law degrees from a prestigious university), was using Latitude to broadcast location through Pete's Treo

when they went on short distance trips. Latitude wasn't working on her PDA and so her husband suggested that he could set it up on their home computer. They couldn't immediately decide how this would be useful, but she stated matter-of-factly, "How is more information a bad thing? It's free." Installing free software was very common amongst our participants, and many times the only justification needed to connect. "Terra", a graduate student, invited to Latitude "closer friends" who "just happen to be online at the time."

Because social web technologies do not gain much value until others use it, participants wanted to connect with others. Some participants initiated connections with close friends and family. Many reported mainly accepting invitations, and some even never having initiated any. No interviewee indiscriminately sent out invitations, but many were affected by that:

> "It seems like all of a sudden there were a few people following, a lot of people following, now like everyday a new person is following me...I can tell from the types of people that are following me, that...they were like 'here's my Google contacts, search, find, and I'll say yes to pretty much everybody'. Cause there are people who I TA'd two years ago and I know they don't care... it's a free-for-all."

The longer interviewees had been on a given technology, the larger and more eclectic their mix of social connections. Since Latitude was still in its technical infancy, many complained that they were waiting for bug fixes and platform support so that others could connect. Many wanted to be more selective as Latitude gains momentum, but often felt the types of pressure discussed in the next section would make that difficult.

B. Social Norms

So why are people accepting connections from such an assorted range of strong and weak relationships? Some interviewees wanted contact information of people that "I didn't [know] them well enough to have asked for their email." Others wanted to reactivate old relationships when needed. But many participants emphasized the rudeness of not accepting. Even ignoring a request would be a slight. One interviewee described it as not shaking someone's hand. Emit explained that on Twitter, where the technology allows for non-reciprocal relationships, "there's still an etiquette that a lot of people will just automatically follow anyone that follows them." However, everyone drew the line on strangers and had not accepted those connections in Facebook nor Latitude.

Also impolite was limiting access to personal information. "Derin", a graduate student, explained of Facebook, "They understand that it's a limited profile because they don't see anything in your account and you have a lot of friends, it's obvious that it's not your real account." He felt disclosing city-level location would also be unacceptable. In fact, Derin ignored Facebook requests, considering that as the lesser of two evils. He resigned to doing so for Latitude as well.

Many interviewees also bemoaned how weak ties made social advances online. "Lee", a graduate student and software developer, articulated his frustration at even a simple gesture:

> "I mean it's funny, I actually get annoyed by [happy birthday posts] because people...write you a quick note,

and then now I feel like…I have to respond [and] I have to make every single one unique because I don't want to just paste one thing for everyone and make it look like a thoughtless person. I just feel like it introduces this load of work which is totally unnecessary and just has no real end."

Feeling obligated to engage in interaction commonly came up.

An exception to all of this was "Dan", a software developer and father of teenagers and younger children. Recognizing that he was in the minority, Dan has resisted instant messengers for the same reason he's resisted Latitude: "Somebody can always look and see whether I'm online or not… IM expects you to respond immediately if they know you're online." Dan didn't want others making these inferences and thus preferred email.

C. Audience Management

This mix of strong and weak social web ties greatly shaped how participants used technologies. Both Facebook and Twitter were considered public spaces where people engaged in semi-private interactions. Participants reacted by minimizing their participation. "Sam", a graduate student, would only engage in Facebook to write happy-birthday posts. Elizabeth wished she could "unfriend" people and return to a small group of friends. Emit untagged pictures of himself posted by friends, so that others wouldn't see the pictures in their newsfeeds. Lee maintained "minimum level disclosure" on his Facebook profile and deleted posts not appropriate for everyone on his list. He also limited his posts to others' walls in order to slow down friends' posting to his. Lee even stopped using status in instant messenger because it invited unintended friends to interrupt him. This inability to direct messages to certain audiences, or for audiences to filter out what is intended for them, has led to frustration and lower utilization of features.

Some interviewees had a wait-and-see approach. Derin planned to accept connections from friends, and then figure out how to use Latitude only after seeing under what circumstances people show up. Lee hadn't unfriended anyone yet but has it as a contingency plan if a new contact writes much on his wall.

With the exception of female interviewees, most participants were generally unconcerned about others knowing their location beyond work supervisors and a handful of rare events such as being caught in a lie or being someplace with bad associations. Dan pointed out that he would not be concerned other than that if someone has his location, it would be a safety concern that they can infer his wife and daughter's address. Nonetheless, most male participants were still reticent to expose their location data to the public without good reason.

However even the least concerned participants didn't always want others to just show up. "Noah", a construction project manager who was fine with making his location public, didn't want his friends coming to see him at work. Elizabeth recounted a situation where she posted a work meeting on her calendar and her significant other "Bobby", on a break from work, waited outside her meeting so as not to disturb her: "Had I known Bobby was going to be here it would have been fine…but I was so visibly surprised…that it signaled to my colleague that Bobby had stalked me and found me there." Elizabeth felt that she could probably negotiate Latitude usage with Bobby, but couldn't do so with friends, acquaintances, or supervisors. "Eric", a computer programmer, was similarly concerned: "That would be a really hard decision. I'd probably just add them just based on the fact that they're my manager."

D. Information Filtering

Interviewees compared sharing location to sharing status in Facebook or IM, or Twittering messages about mundane activities. As Chris put it, "I'm not telling you I'm making dinner for the family, but I am telling you that I am in XYZ location. So it's effectively just another type of status update." Resoundingly, participants who opposed or had abandoned Latitude reported being bombarded with too much useless information about what others are doing (both automatic and manually entered status). This manifest itself as information (1) about people they did not care about (2) that was useless even from people they did care about, and (3) that unintentionally invited people to engage. We elaborate on each of these here.

Elizabeth bemoaned how Facebook "feels cluttered to me with people I don't care about…if I update my status it's showing up on pages of people that I don't actually want them to see that…" Emit explained that after moving he no longer was interested in detailed status of friends from home.

Interviewees also complained of useless information for people they did care about. We watched Sam comb through Facebook status messages and facetiously commenting, "Oh, you went home, good. Oh, Texas, great! I don't really care about that." Directing his attention to his long list of invitations, "All sorts of silliness, requests for application, little green patch, I don't know what that is!" He had even stopped reading his Facebook mail. Noah was annoyed to see friends on chat who "change the status over and over again. Like Manny's the other day was different…songs like every second." Chris summed it up: "People abuse Twitter and Facebook…I want to know how friends are, but I don't want to know that they're at the movies with their son, right? It's like, status update doesn't mean I want to know exactly what you're doing at all times of every day…Latitude's got the same problem."

Many interviewees were sensitive to what they themselves conveyed. Sam limited sharing his location to a small group of techie friends who would think it was interesting because he didn't want to be "egotistical". Elizabeth described her use of Twitter as fraught with unintended connotations:

"When I broadcast, I'm like, eh, I just sent out that broadcast to a lot more people than it's intended for. I'll kind of do it as this moment of feeling very public I guess, and then I'll immediately be like, "uh, what a stupid thing to Twitter. 'I'm making beef stew, I'm really excited about making beef stew.' Wait a minute, there are people who I don't give a sh*t about who know I'm eating beef stew and who will think that I think it's meaning[ful], that they should care that I'm making beef stew. So i'll be like, eh, and I won't Twitter for a really long time."

Similarly, many participants did not use Facebook status so that it would not be broadcasted to their friends.

E. Benefits from Latitude

Despite technical problems with Latitude, interviewees found benefits. Some used Latitude to coordinate or anticipate another's arrival. Laura explained that Pete's mother signed up so she could keep the kids honest and see if they were really stuck in traffic. On the flip side, Pete and other interviewees used Latitude as a way to avoid having to make or receive intrusive phone calls reporting their location. Other uses included meeting up in a big venue or serendipitously seeing that a friend had flown into town. Derin further anticipated using Latitude for social planning. He could avoid calling buddies who were out of town, at home, with a girlfriend, or hanging out with others he didn't like. When making social plans, he could also avoid calling lots of people like a "loser".

Many participants hoped that Latitude would be an opportunity to enhance their social connections and go beyond utility and coordination. None of these interviewees were able to realize their visions because of technical issues with Latitude, but we report their motivations to understand why people are installing. Sam wanted to share his location with his sisters and their families as a way to connect and bring to their attention activities that he wouldn't explicitly communicate. Because they are familiar with his daily patterns, his sisters could pick out anomalies like, "Oh Sam is working late again". Sam would also be able to see if they had gone to the zoo and ask them about that. Derin and Elizabeth both wanted to maximize opportunities for being together with their respective significant others. As Derin put it, "In a close relationship, you plan what you're going to do based on what the other person is doing. So if I'm at home she might come home instead of staying out window shopping." He expressed frustration if one of them is unavailable to coordinate this through a phone call because of a meeting, class, or even being in the shower. Terra wanted to be able to see her friends' pictures on the map as another way to feel connected to them. Many of the interviewees also expressed a desire for family to see them, just to know they were okay, that they were alive and moving.

V. CONCLUSION AND FUTURE RESEARCH

This study was an initial exploration into attitudes towards and use of location-tracking technology in a naturalistic environment. Because of the social web ecology in which location-tracking is embedded, we believe designers must go beyond privacy concerns and focus on technology adoption, audience management, information filtering and social norms, which all greatly influence the usefulness and acceptability of location-tracking technology. We recommend that researchers concentrate future work on supporting the following areas:

- *Weak Ties.* Social web technologies should make it easy to maintain weak tie relationships online. Indiscriminate status broadcast and ability to post may not be appropriate defaults. Also, it should be possible to designate weak ties with fewer associated privileges without offending others.

- *Mixed Audiences.* People need ways to manage different audiences in the same network (e.g. family, groups of friends, work), and different interactions with each audience.

- *Information Filters.* People need ways to filter the abundant information they receive. This may go beyond filtering by audience, drawing on geographical distance or frequency of interaction.

Future research will also need to draw on a larger and more diverse sample. As Latitude continues in the adoption cycle, we will need to study participants who use it more extensively. Also, the participants of this study were largely technically inclined, well educated, and living in the Southern Californian suburbs. Finally, we need to explore differences between genders, and between married and non-married participants.

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