Location Disclosure to Social Relations: Why, When, & What People Want to Share

Sunny Consolvo, Ian Smith, Tara Matthews, Anthony LaMarca, Polly Powledge, & Jason Tabert
Intel Research Seattle
April 5th, 2005

Why social location disclosure?

- Social applications are a main driver of mobile telephony & SMS usage
- Location-Based Services (LBS) are predicted to expand business opportunities for mobile devices

Social location-based services on mobile devices are being implemented now

Before designing ...

- How do people determine when they will disclose their location?
  - Who is making the request
  - What they're doing when they receive the request
  - Why they think the requester wants to know

Designers must account for the ways in which users make disclosure decisions

Before designing ...

- What would people disclose?
  - exact address
  - City
  - Lat/Lon Coordinates
  - cross streets
  - ZIP Code
  - neighborhood name
  - generic place name
  - State
  - Country

Designers need to know what level(s) of location detail people want to disclose
Evaluating social mobile apps

- Challenging because...
  - Difficult to follow people everywhere
  - Lab studies are out of context
- We found a way to do it
- Results applicable to other location-based social mobile apps

Outline

Study design
- Who participated
- 3 study phases

Key Results

Participants, N=16

- 8 male / 8 female
- Aged 24-64, Seattle area
- Primary screening criteria:
  - Regular use of cell phone
  - Got out of house
  - Non-technical career
- 12 were employed full-time
- 14 had spouse / SO

Phase 1: In-lab exercises

- Participant background:
  - Demographics
  - Location “buddies”
  - Anticipated factors
- Consumer privacy classification
  - Westin/Harris Privacy Segmentation Index
Phase 2: Experience sampling

- 2 weeks, *in situ*
- Randomly interrupted
  - 10 questionnaires/day
  - ~2-4 minutes to complete
- Asked about:
  - Current situation
  - Hypothetical location requests

Question types:
- Context
- Hypothetical requests
- Follow-up
- Response rate: ~90%
- ~126 questionnaires per participant

Single & Standing requests

- Single:
  - Assume Ann is going to know your location right now. Would you want the system to tell her *something* or *nothing* about your location?

- Standing:
  - You have received a request: *whenever you arrive at your home* (Ashley) wants to know. Do you accept this request?

Customized for each participant

Phase 3: In-lab exercises

- Interview about experiences
- Exercise revisions from Phase 1
  - Location “buddies”
  - Anticipated factors
- Equipment return and compensation
  - From $60-250 USD (median = $225)
Outline

Study design

Key Results
- Decision factors
- Level(s) of detail
- Location “buddies”

Imagine…

- If someone wanted to know where you are right now, how would you reply?

Imagine…

- If someone wanted to know where you are right now, how would you reply?

Imagine…

- If someone wanted to know where you are right now, how would you reply?

Outline

Study design

Key Results
- Decision factors
- Level(s) of detail
- Location “buddies”

Imagine…

- If someone wanted to know where you are right now, how would you reply?

Imagine…

- If someone wanted to know where you are right now, how would you reply?

Imagine…

- If someone wanted to know where you are right now, how would you reply?

Imagine…

- If someone wanted to know where you are right now, how would you reply?

Imagine…

- If someone wanted to know where you are right now, how would you reply?

Imagine…

- If someone wanted to know where you are right now, how would you reply?

Imagine…

- If someone wanted to know where you are right now, how would you reply?

Imagine…

- If someone wanted to know where you are right now, how would you reply?
Why do they want to know?

- Are they...
  - trying to figure out if I’m available?
  - trying to find out if I’m okay?
  - ‘okayness checking’
  - just being nosey

Useful because people need to get a hold of me

Sometimes I can’t use the phone

My mother is nosy. It drives me crazy

Why do they need it? Are they just bugging me or do they have a real reason?

What would help them?

- Would exact address be useful to...
  - my mother who lives in Dallas? probably not
  - my friend who I’m trying to meet for coffee/tea? maybe

Am I willing to disclose?

Consequences of disclosing

When I go to babyGap, I don’t want my husband to know

...if I told my wife I was taking the dogs out for exercise and I really didn’t do it.

I wouldn’t want people to ask me to pick stuff up.

Would I want to talk with or be in contact with this person right now?

Am I willing to disclose?

Is the request appropriate?

When I was socializing with my friends, other people’s requests seemed rude.

Regarding my boss, all she needs to know is that I’m getting my work done, not where I am.

During work, it was okay when a co-worker or boss wanted to know where I was, but it was weird when I was at the coffee shop.

My parents never know my schedule, and this way, they could easily find out where I am if they can’t get a hold of me.
Participants’ responses to co-workers & managers

- At work
  - Co-workers: 80% (217 responses)
  - Managers: 69% (87 responses)
- At home:
  - Co-workers: 47% (362 responses)
  - Managers: 24% (117 responses)
- At stores & restaurants:
  - Co-workers: 35% (43 responses)
  - Managers: 21% (14 responses)

Am I willing to disclose?

- Wanted to disclose *nothing* to 23% of requests:
  - I am busy (50%)
  - Request denied (37%)
  - System busy (12%)
  - Lie (1%)

Various levels of denial are useful

Disclosing something

- Willing to disclose location to 77% of the 3,798 requests

- What they disclosed...

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Disclosure Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>77%</td>
<td>Exact address, Generic place name, X streets</td>
</tr>
<tr>
<td>19%</td>
<td>City, Neighborhood, ZIP Code</td>
</tr>
<tr>
<td>5%</td>
<td>State, Country</td>
</tr>
</tbody>
</table>

Various levels of disclosure are also useful

Blurring location

- Being *purposely vague* when disclosing
- Often proposed as a way to protect privacy

- However, it was used for *clarity, not privacy*
- Once they chose to disclose, they disclosed the *most useful* level of detail
Location “buddies”

- Pre-ESM phase:
  - Buddy list size: 17 (range 3 – 36)
  - 5 participants included managers
- Post-ESM phase:
  - 15 participants liked single request app
  - Buddy list size: 11 (range 6 – 23)
  - 4 kept manager on list
  - Most included spouse/SO & best friend

Consumer privacy classification

- Not a good predictor of location disclosures to social relations
- Perhaps not surprising, as...
  - the privacy segmentation index is about consumer privacy attitudes
  - Our study was about disclosing location to members of one’s social network

Conclusions

- Social mobile applications for disclosing location are useful
- Our results show that people...
  - disclose what they think will be useful or don’t disclose location
  - want various options for disclosing location and denying requests
  - will probably use this sort of app with a small number of trusted social relations

A big thanks to…

- James Landay
- Jennifer Rode
- Scott Mainwaring
- Ken Anderson
- Christine Riley
- David McDonald
- Jennifer Mankoff
- Jason Hong
- Paul Dourish
- Barry Brown
- Batya Friedman
- Peter Kahn
- Tanzeem Choudhury
- Gregory Abowd
- and others…
Questions / Comments

- Contact us at:
  - sunny.consolvo@intel.com
  - tmattew@cs.berkeley.edu
- Download the free experience sampling software at:
  - http://seattleweb.intel-research.net/projects/esm/iESP.html

Incentive structure

<table>
<thead>
<tr>
<th>Level of participation</th>
<th>Incentive (in USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 65%</td>
<td>$60</td>
</tr>
<tr>
<td>65-79%</td>
<td>$85</td>
</tr>
<tr>
<td>80-94%</td>
<td>$175</td>
</tr>
<tr>
<td>95-97%</td>
<td>$225</td>
</tr>
<tr>
<td>98-100%</td>
<td>$250</td>
</tr>
</tbody>
</table>

Responses to spouse/SO, family & friends

- At work:
  - Spouse/SO: 91% (244 responses)
  - Family: 85% (375 responses)
  - Friends: 89% (236 responses)
- At home:
  - Spouse/SO: 92% (266 responses)
  - Family: 82% (622 responses)
  - Friends: 86% (responses)
Westin/Harris Privacy Segmentation Index

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Somewhat Agree</th>
<th>Somewhat Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
</table>

S1: Consumers have lost all control over how personal information is collected and used by companies

S2: Most businesses handle the personal information they collect about consumers in a proper and confidential way

S3: Existing laws and organizational practices provide a reasonable level of protection for consumer privacy today

**Scoring your responses**

(1) point for strongly/somewhat agreeing to S1

(1) point for strongly/somewhat disagreeing to S2

(1) point for strongly/somewhat disagreeing to S3

Privacy classifications

**Fundamentalists** (3 points)
- have “very high privacy concern” and are “passionate about what they [see] as business threats to their consumer privacy, and [favor] active government regulation of business and information practices”

**Pragmatists** (1-2 points)
- “ask what benefits they get as consumers in sharing their personal information to balance against risks to their privacy interests, and they usually favor a mixture of government and private solutions.”

**Unconcerned individuals** (0 points)
- have “little to no concern about consumer privacy issues.”

Before designing...

- **With whom** would they use a location sharing application?
  - spouse / SO
  - friends
  - other family
  - manager
  - co-workers

- Can people manually manage requests in LBS?