

The Privacy and Security Behaviors of Smartphone App Developers

Authors: Rebecca Balebako, Abigail Marsh, Jialiu Lin, Jason Hong, Lorrie Faith Cranor; Carnegie Mellon University

Presentation by:

Mylon Blueford & Amy Shick

Outline

- Introduction
- Related Work
- Interview Method and Results
- Survey Method and Results
- Further Discussion and Conclusion

Introduction

- Space for innovation is huge
- No training process
- No certification necessary
- Pressure to develop quickly
- Two-step research process



Related Work

- User concerns about privacy and security
- Public policy and tools

User Concerns about Privacy Policy

- Users are concerned with:
 - What permissions are requested by apps
 - Frequency of data collection
 - The recipients of the data
- Users are concerned but they are neither empowered or informed.
 - Privacy policies offer the illusion of notice.
 - Required time, reading level, and vague language pose significant barriers.

tinder



Privacy Policy

Last Updated: May 22, 2014

Tinder, Inc. (“Tinder,” “we,” and “us”) respects the privacy of its users (“you”) and has developed this Privacy Policy to demonstrate its commitment to protecting your privacy. This Privacy Policy describes the information we collect, how that information may be used, with whom it may be shared, and your choices about such uses and disclosures. We

Public Policy and Tools

- Reviewed 5 privacy guidelines for app developers.
 - 5 recommendations made by all of the guidelines
 - Someone must be appointed and responsible for privacy
 - The app should have a clear and easy to find privacy policy
 - The app should encrypt data in transmission
 - The app should encrypt data it stores
 - The app should limit data collection to what is needed
- Tools have been developed to help developers practice privacy and security behaviors.
 - Open-source databases
 - Privacy policy generators

Outline

- ~~Introduction~~
- ~~Related Work~~
- Interview Method and Results
- Survey Method and Results
- Further Discussion and Conclusion

In-depth Interview

- Semi-structured interviews with 13 smartphone app developers in August and September of 2013
- Research Goals:
 - Understand what decisions app developers make that they consider privacy and security related
 - Better understand what resources they were aware of to help them make those decisions
- Demographics

Participant ID	Company Size	Revenue Model	Service	State
P1	10-30	Advertising, Free trial, Subscription	Digital, Physical, Service, Contents	CA
P2	2-9	Advertising, Free trial, Other	Digital, Contents, Personalized information, Other	CA
P3	2-9	Free trial, Other	Digital, Service	PA
P4	2-9	Pay-per-user	Physical, Service	WA
P5	2-9	Free trial	Digital	WA
P6	100+	Subscription	Other	PA
P7	1	None	Contents	TX
P8	10-30	Subscription	Digital, Service	CA
P9	2-9	Other	Service	CA
P10	1	None	Contents	PA
P11	2-9	Advertising, None	Physical, Personalized information, Other	IL
P12	2-9	None	Personalized information	PA
P13	100+	None	Physical	MI

TABLE I. INTERVIEW PARTICIPANT MOBILE APP AND COMPANY DEMOGRAPHICS.

Service	Examples
Digital	games, MP3, Ebooks
Physical	selling books
Service	e-mail, banking, ticketing
Stock Information	stock prices
Contents	news, weather, entertainment
Personalized information	location information

Interview Results

- Emerging Themes
 - Education and Advice
 - Third party data collection tools
 - Perception of privacy policies
 - Trade-offs due to lack of resources

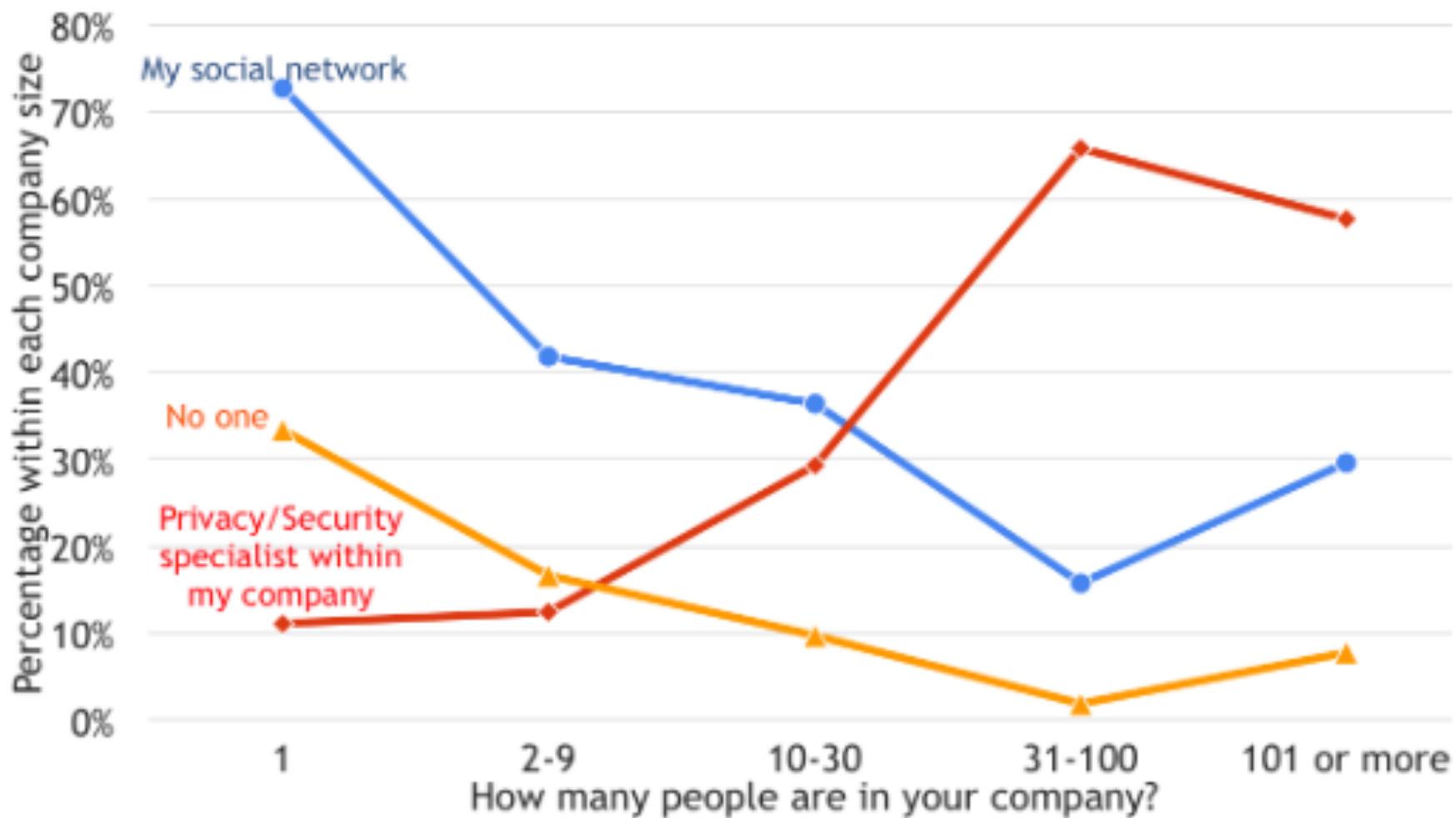
Education and Advice

- Lack of formal training
 - Corporate training or certification
 - Exceptions - eCommerce
- Lack of knowledge about new guidelines
 - Government suggestions
 - Exceptions – Heath Information
- Resources
 - Online research
 - Consulting friends
 - Legal or specialist advice

StackExchange 

 **Hacker News**

 **treehouse™**



Security Tools vs. Privacy Tools

●●○○ Verizon 8:37 PM 🔒 9% 🔋



Log In with Facebook

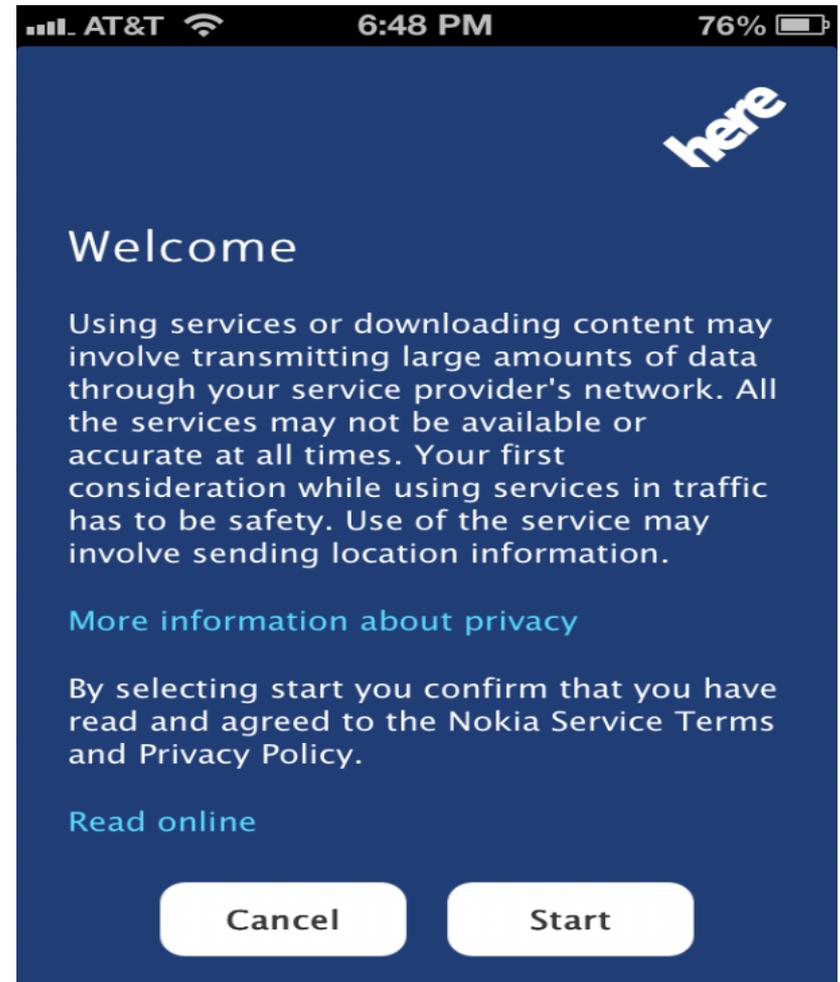
We take your privacy seriously

- We don't post anything to Facebook
- Other users will never know if you've liked them unless they like you back
- Other users cannot contact you unless you've already been matched
- Your location is not shown to other users

- Third-party tools
 - Additional privacy concerns
 - Analytics
- Security Tools
 - Encryption built into database
 - SSL code built into platform
 - Authentication methods – Facebook
- Privacy Tools
 - Little knowledge

Perceptions about Privacy Policies

- Low priority
- Little value
- Lower user retention
- Small company, not get sued
- Website vs. within app



Trade-offs Between Privacy, Security, and Resources

- Need to monetize app
- Limited resources
- Personal desire to respect privacy
- Policies for deleting old data

Outline

- ~~Introduction~~
- ~~Related Work~~
- ~~Interview Method and Results~~
- Survey Method and Results
- Further Discussion and Conclusion

Survey Methods

- Hypothesis Testing
- Participant demographics
- App company characteristics

Behavior	percent
Use SSL	83.8%
Encrypt data on phone	59.6%
Encrypt data in database	53.1%
Encrypt everything (all data collected)	57.0%
Revenue from advertising	48.2%
Have CPO or equivalent	78.1%
Privacy Policy on website	57.9%

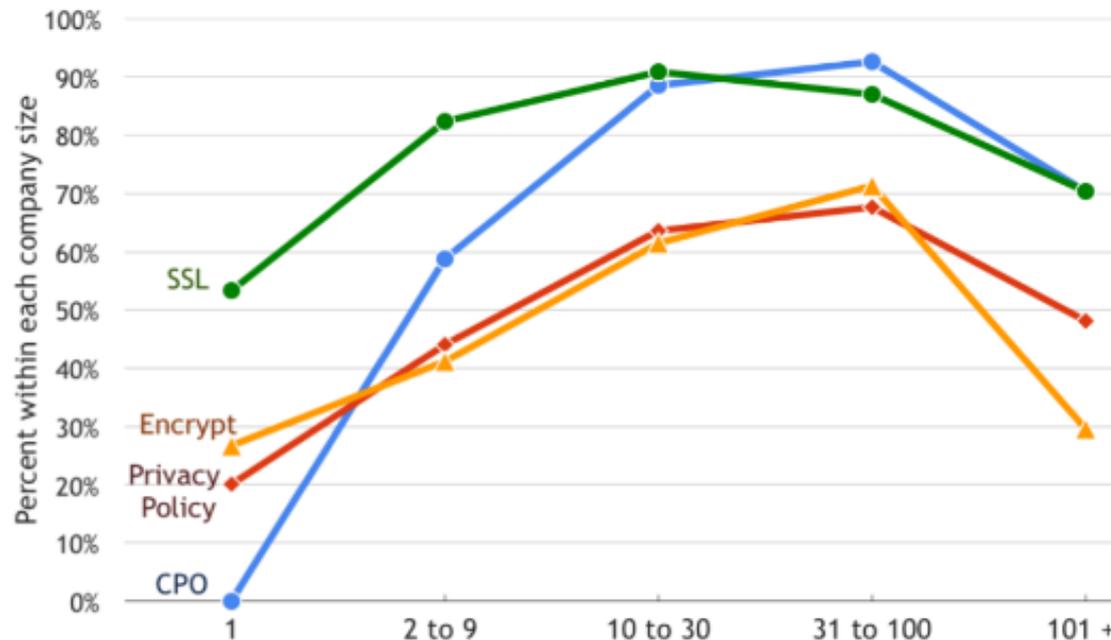
TABLE III. PERCENTAGE OF RESPONDENTS WHO REPORTED VARIOUS PRIVACY AND SECURITY-RELATED BEHAVIORS. PARTICIPANTS COULD SELECT MULTIPLE OPTIONS.

Hypothesis Testing and Results

- Relationships between security, privacy and
 - Company size
 - Revenue model

Company Size

- Hypothesis 1: Smaller companies less likely to engage in privacy and security behaviors.
 - Company size correlates to having a CPO
 - Company size correlates to having a privacy policy
 - Company size correlates with encrypting everything
 - Company size correlates with using SSL



Revenue Model

- Hypothesis 2: Certain revenue models were less likely to show privacy and security behaviors
 - Revenue model is correlated to having a CPO
 - Revenue model is correlated to having a privacy policy
 - Advertising revenue model indicates low adoption of privacy policy
 - Revenue model is correlated with encrypting everything
 - Revenue model is correlated with using SSL
 - In-app purchase has the lowest adoption of SSL
- There is not much of a correlation between revenue and privacy and security behaviors

Outline

- ~~Introduction~~
- ~~Related Work~~
- ~~Interview Method and Results~~
- ~~Survey Method and Results~~
- Further Discussion and Conclusion

Discussion and Conclusion

- Third-party tools should be more transparent about data collection
- Support from security and privacy advocates
- Legalese hinders reading and writing of privacy policies
- Smaller companies need privacy and security tools

QUESTIONS?