Encouraging Privacy-Aware Smartphone App Installation: Finding out what the Technically-Adept Do

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Motivation

- Smartphones store a large amount of data
- Access to this data via app permissions
Contribution

- Idea: Learn from the technically-adepts
- Methodology: Semi-structured interviews and open-coding

- Results
  - Privacy-related selection heuristics if alternatives are available
  - Guidelines
**Interview Protocol**

- Introduction incl. request to audio-tape
- Warm-up: Current work & experience
- Demographics: smartphone type & related questions
- Main part
  - Selecting a Sudoku app
  - Selecting a photo-editing app
  - Further questions on decision tasks
- Recommendations for lay people
  → Generalized for every app
Demographics

- Experience in computer science
  - Industry & Academic research
  - IT security & non-security related areas

- 26 participants (6 female and 20 male)
  - 17 with Android
  - 8 with iOS
  - 1 Windows Phone
Evaluation

1. Transcription
2. Open-coding for privacy-related selection heuristics

- Data from either behavior or recommendations
- Composing list of categories and subcategories
- Cross-validation by at least two authors
- Group discussion about categories and subcategories
Results for privacy-related selection heuristics

- Permissions-Related
  - Reasonableness
  - Acceptability
  - Downloads
  - Recommendations
  - Ratings

- Developer-Related
  - Webpage
  - App Currency
  - Related Apps & Services
  - Reputation
  - Reviews
  - Data Leakage
  - Negative Vibes
  - App-Related
    - Free Apps
    - Alternatives
    - Numerous Apps

- Socially-Related

- Avoidance-Related

Install App
Permission-related heuristics

Judge whether permissions are **reasonable**

“A photo editing app needs access to my photos to be able to work.”

Judge whether permissions are **acceptable**

“For example, the photos of my family, access to some E-Mail accounts or something. This is sensitive data…”

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Developer-related heuristics

Developer’s webpage content

“If they didn’t write anything about data privacy, I would drop it.”

Developers themselves

“... well-known companies can’t afford to knowingly provide malware in their apps. This would ruin their business.”
Developer-related heuristics

- Check for related apps and services
  - “... if it is from an unknown developer, I check the Internet whether I can find something about it or if other users complain about their products.”

- Consider development process (recent)
  - “... This one, on the contrary, was last Updated on the 10th of February 2013, so it is significantly older and obviously no longer maintained.”

- App Currency
Socially-related heuristics

Look at **download-numbers**

“…apps, that are popular and downloaded a lot, yes, I would trust that there would be some people who would notice any [privacy issues].”

Ask for **recommendations**

“So, for me it would be nice to have a recommendation from a competent friend…”
Socially-related heuristics

- Read some reviews
  “… where someone had noticed, while having a firewall on his phone, that the app tries to send data to some server that has nothing to do with what the app does…”

- Inspect ratings
  “I would expect that some kind of crowd intelligence would also become apparent in the ratings…”
Avoidance techniques

Avoid data leakage

“…or even better, do not store photos there, or, if possible, transfer them.”

Avoid negative vibes

“This is a feeling I get as a computer scientist.”
Avoidance techniques

- **Avoid free apps**
  
  "I would, in any case, rather buy an app, in order to free myself from the permissions, than accept too many permissions."

- **Look for privacy-sensitive alternatives**
  
  "...try to find a simpler App that is not such a huge thing, but does what you want."

- **Minimize app installation**
  
  "I only install apps when I really have a very concrete feeling, that it would help me ..."
Further Findings: Disagreements

more control vs. more security holes?

“With it I actually wanted to install a firewall...”
“I do not want to introduce security loopholes.”

loss of control vs. more security?

“... and the Android phones were then very open.”
“Apple earns its money not with address data and similar stuff...”

closed source system builder vs. open source data crawler

“... if this app states: ‘Hey I will store nothing locally but everything in the cloud.’ This is really annoying.”
“... there is someone who maintains the system...”
Results for privacy-related selection heuristics

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  - Reasonableness
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- Avoidance-Related

- Developer-Related
  - Webpage
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  - App-Related
    - Free Apps
    - Alternatives
    - Numerous Apps

Install App
Deriving Guidelines

- Selection by **three** factors

1. Mentioning by at least **one** participant

2. **Practicability** or **applicability** for normal users

3. **Plausibility** related to privacy issues
Derived guidelines

Permissions
- Are the permissions reasonable?
- Are the permissions acceptable?

Compare numbers
- Is the app downloaded a lot?
- Does the app have a good rating?
- Does the app have a lot of ratings?

Development process
- Were there recent updates?
- Is the app actively developed?
Derived guidelines

Reviews
- Are there reviews with terms like “privacy issues”, “usability” or general “negative” ones?

Developers
- Are privacy terms mentioned on their webpage?
- Are these terms acceptable?
- Are there other apps or services?

Media reports
- Are there media reports or news about the app?
- Are there media reports or news about the developer?
Conclusion

- Various approaches to improve selection process
  - Permission
  - Reviews
  - Updates
  - ...

- Remark
  - Considering some aspects is better than none
  - The more guidelines you follow the better it’s going to be
References