

Visualizing Risk by Example: Demonstrating Threats Arising From Android Apps

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Introduction

- 67 million apps are downloaded daily from PlayStore
- Felt et al.: only 17% of Android users understand permissions
→ huge risk for security of personal data



Motivation

- Wall of text



FULL NETWORK ACCESS

Allows the app to create network sockets and use custom network protocols. The browser and other applications provide means to send data to the internet, so this permission is not required to send data to the internet.

MODIFY OR DELETE THE CONTENTS OF YOUR SD CARD

Allows the app to write to the SD card.

PREVENT PHONE FROM SLEEPING

Allows the app to prevent the phone from going to sleep.

READ PHONE STATUS AND IDENTITY

Allows the app to access the phone features of

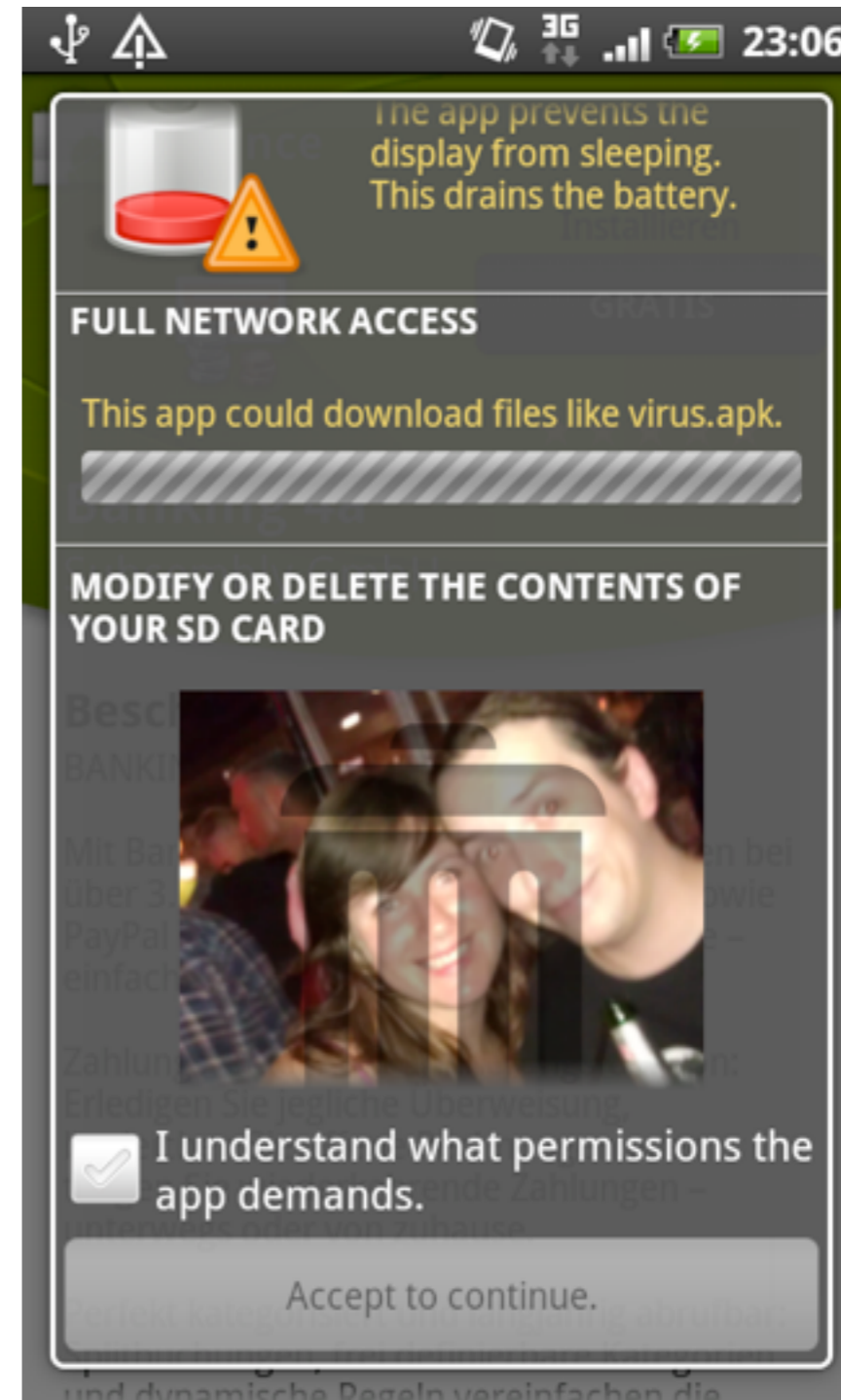
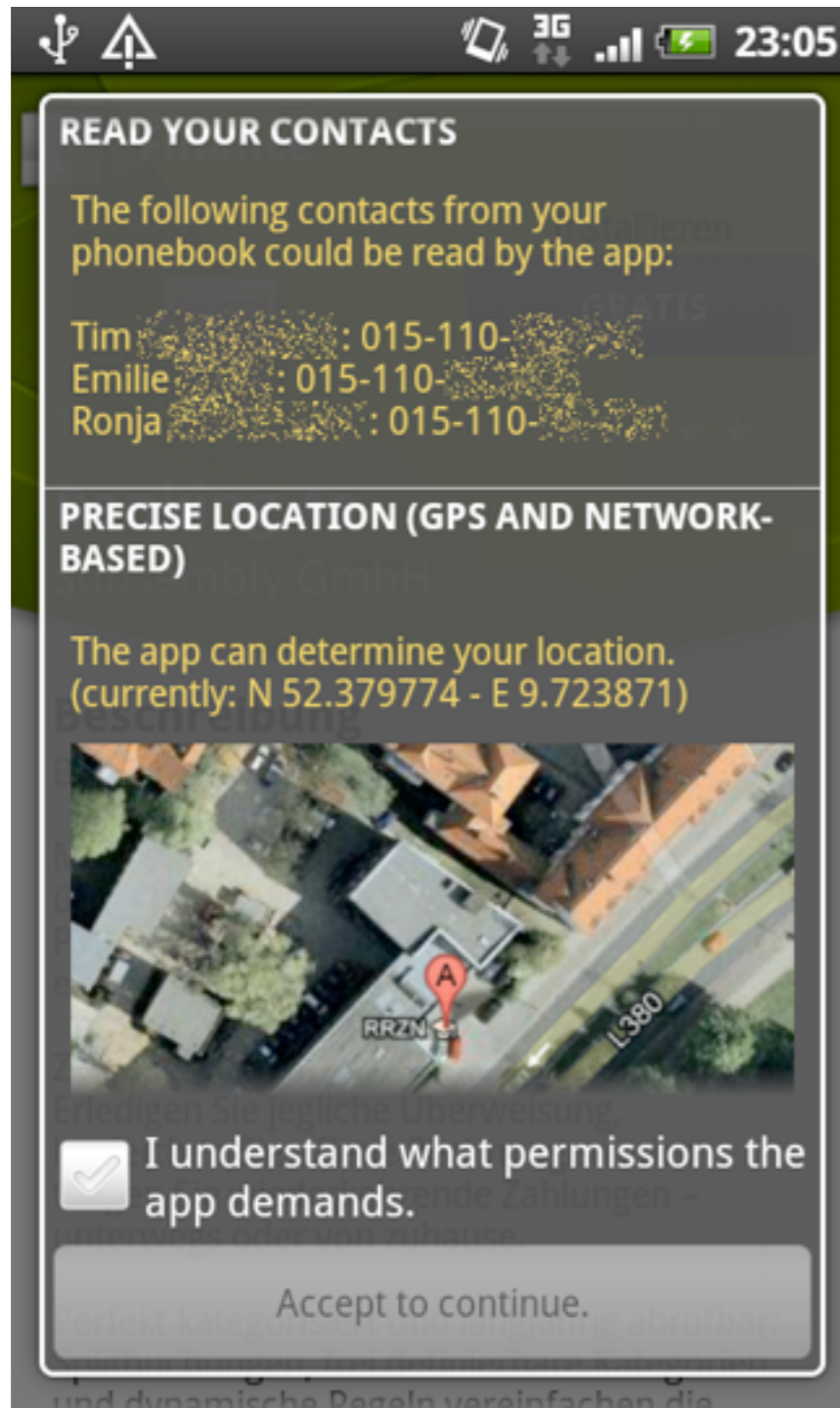
Motivation

- Problems: misunderstanding and habituation
- Users ignore security advices → security risk!
- Kelley et al.: Permissions as a part of the decision-making process
- Rader et al.: users learn better about security from personal stories
- Our approach: visualize threats by example

Mockup of the Market

- Option to switch between visualization and normal version
- Four categories
 - Office (reasonable permissions)
 - Finance (slightly unreasonable permissions)
 - Weather (obviously unreasonable permissions)
 - Games (no permissions)
- Each contained four apps

Visualization



Study Structure

- Two questionnaires
- Practical part
 - Within-subject
 - Together with the participant, we installed our mockup market on his personal device
 - Each participant was asked to install an app out of every category
- At the end, we debriefed the participants

Results in Numbers

- 11 Participants, 2 women and 9 men
- Before: 36.4% of participants worry about security
Afterwards: 65.3% will be more mindful in future
- Number of installed apps: textual 2.9, visual 1.7
(significant - paired-samples t-test)
- High requesting app installations decreased from 50% to 13.6%

Results in Words

- “Omg, it can see my photos? I don't want that! This scares me a bit...”
- “Now I understand what this „phone status“ permission means. I did not get that before. Prospectively I'll be more careful!”
- “The new system is a lot better. I'd prefer to use it in future because it helps me to understand whether a permission might be necessary or not.”

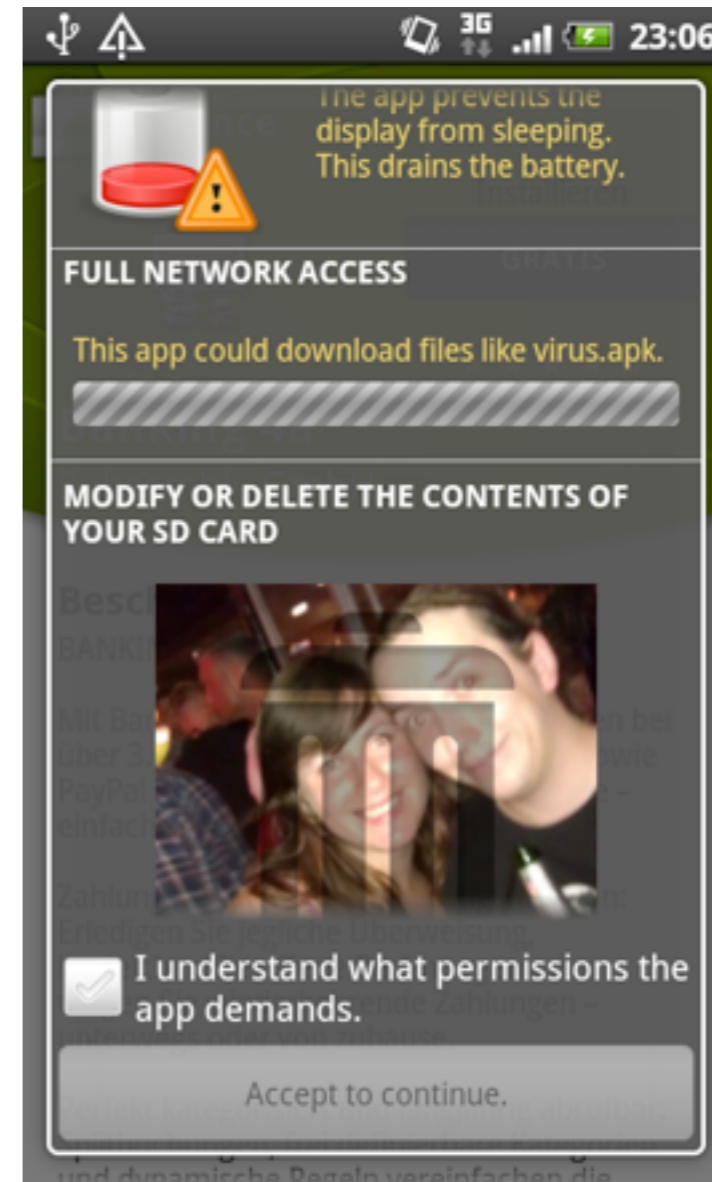
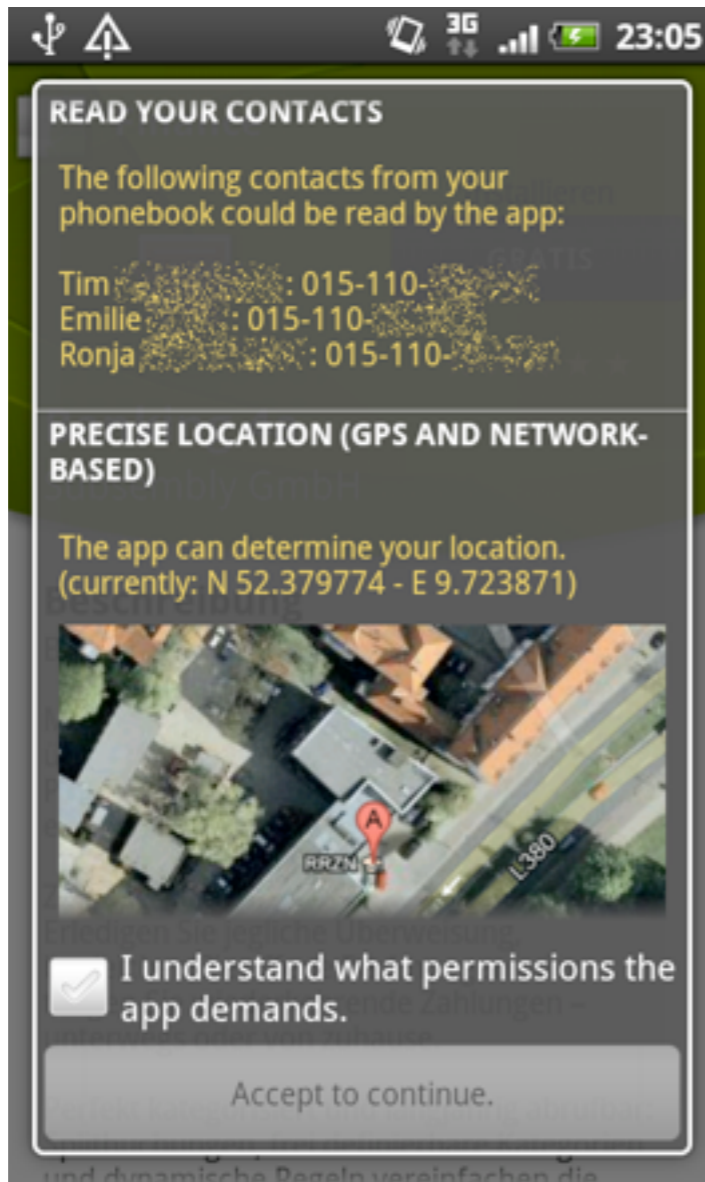
Conclusion

- Promising results
- Concrete examples: more effective way of warning users
- More intuitive, easy to understand for non-IT-experts
- Can lead to increased awareness of private data and the risk of disclosing it unintentionally

Future Work

- Validate results in a larger study
- Further problems:
 - How to display & explain permissions which cannot be visualized that easy?
- Retrospective use: warn user afterwards
- Use this strategy in other scenarios where comprehension is a problem

Thank you for your attention



Questions?