

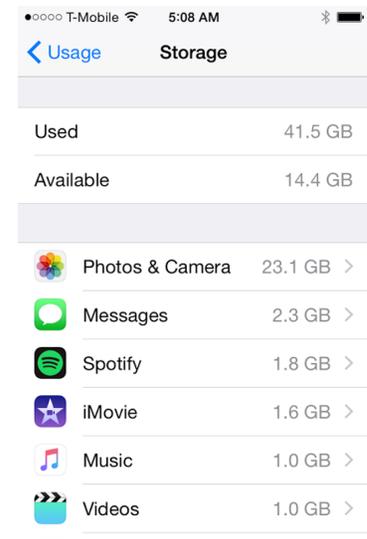
# Encouraging Privacy-Aware Smartphone App Installation: Finding out what the Technically-Adept Do

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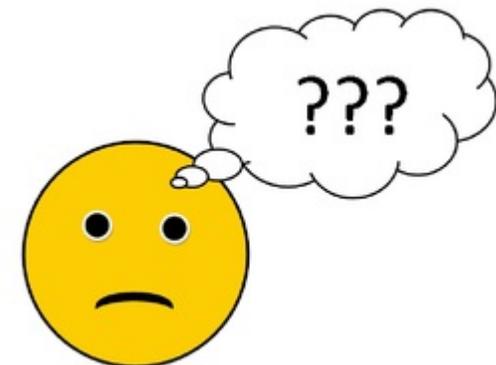
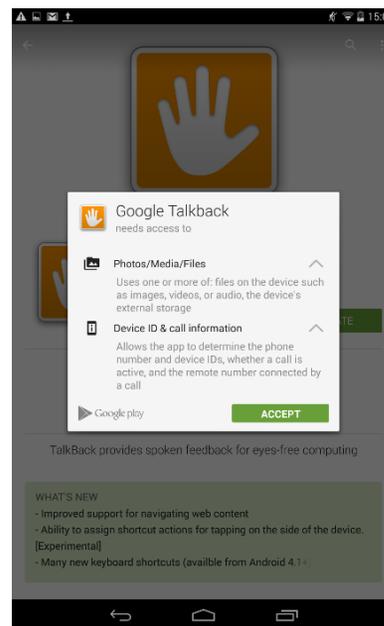
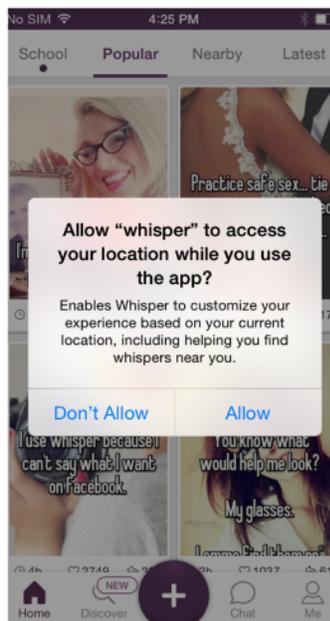


# Motivation

- Smartphones stores large amount of data
- Access to this data via app permissions



Category	Storage Used
Used	41.5 GB
Available	14.4 GB
Photos & Camera	23.1 GB
Messages	2.3 GB
Spotify	1.8 GB
iMovie	1.6 GB
Music	1.0 GB
Videos	1.0 GB



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# Contribution

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- Idea: Learn from the technically-adepts
- Methodology: Semi-structured interviews and open-coding
- Results
  - Privacy-related selection heuristics if alternatives are available
  - Guidelines

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# Interview Protocol

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- 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

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# Demographics

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- 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

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# Evaluation

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

Data from either behavior or recommendations



Composing list of categories and subcategories

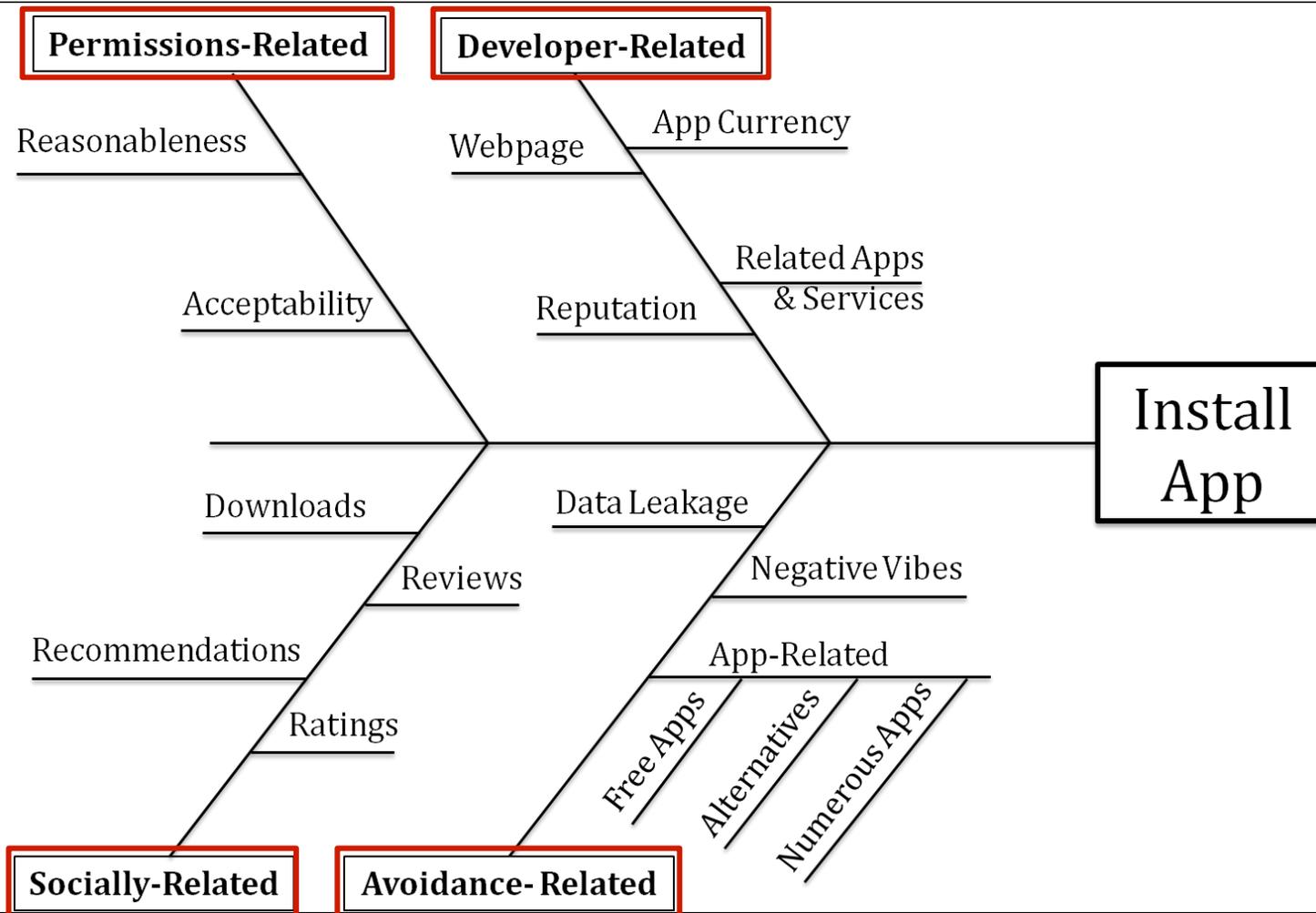


Cross-validation by at least two authors



Group discussion about categories and subcategories

# Results for privacy-related selection heuristics



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# Permission-related heuristics

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## Reasonableness

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Judge whether permissions are **reasonable**

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

## Acceptability

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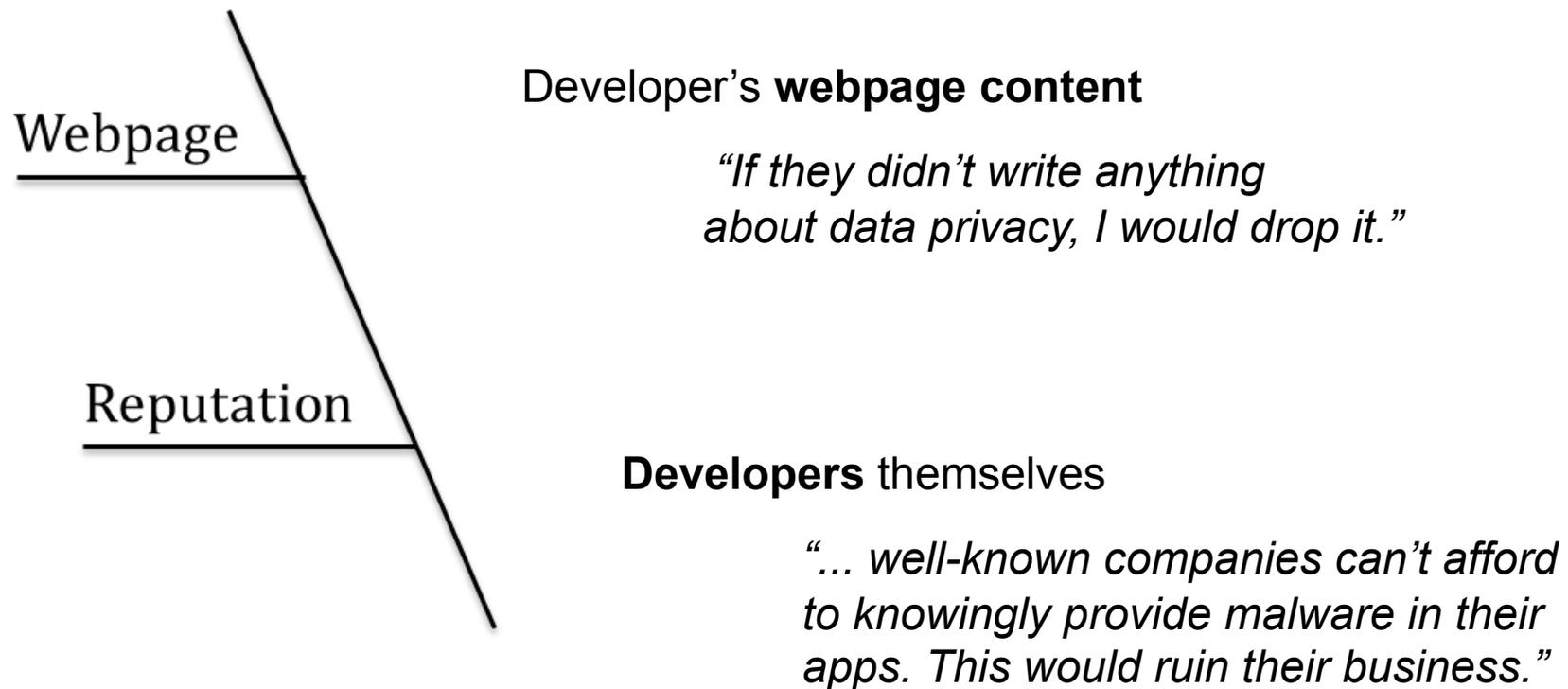
Judge whether permissions are **acceptable**

*“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

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# Developer-related heuristics

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App Currency

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.”*

Related Apps  
& Services

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.”*

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# Socially-related heuristics

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Downloads

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].”*

Recommendations

Ask for **recommendations**

*“So, for me it would be nice to have a recommendation from a competent friend...”*

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# Socially-related heuristics

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Reviews

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...”*

Ratings

Inspect **ratings**

*“I would expect that some kind of crowd intelligence would also become apparent in the ratings...”*

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# Avoidance techniques

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Data Leakage

Avoid data **leakage**

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

Negative Vibes

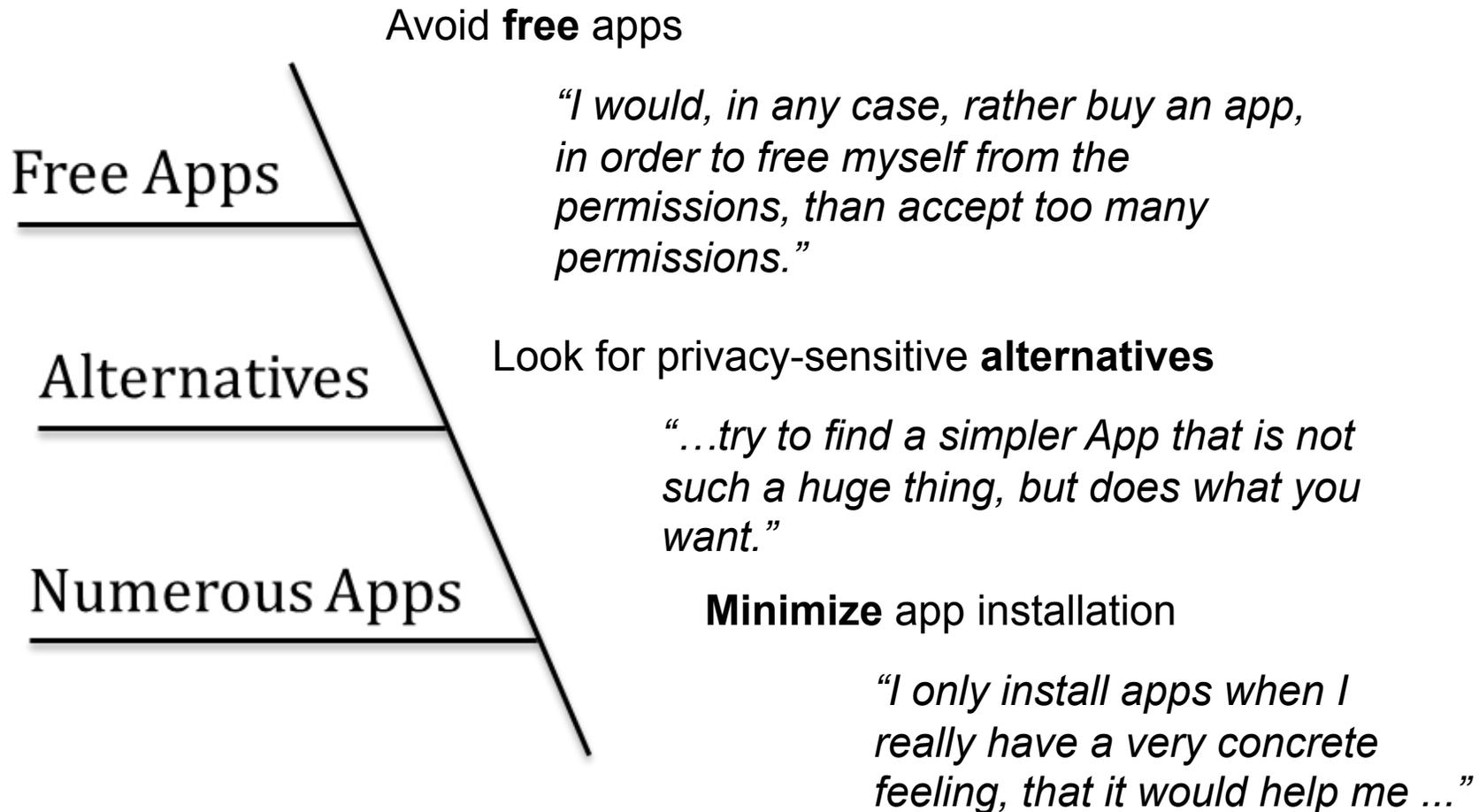
Avoid negative **vibes**

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

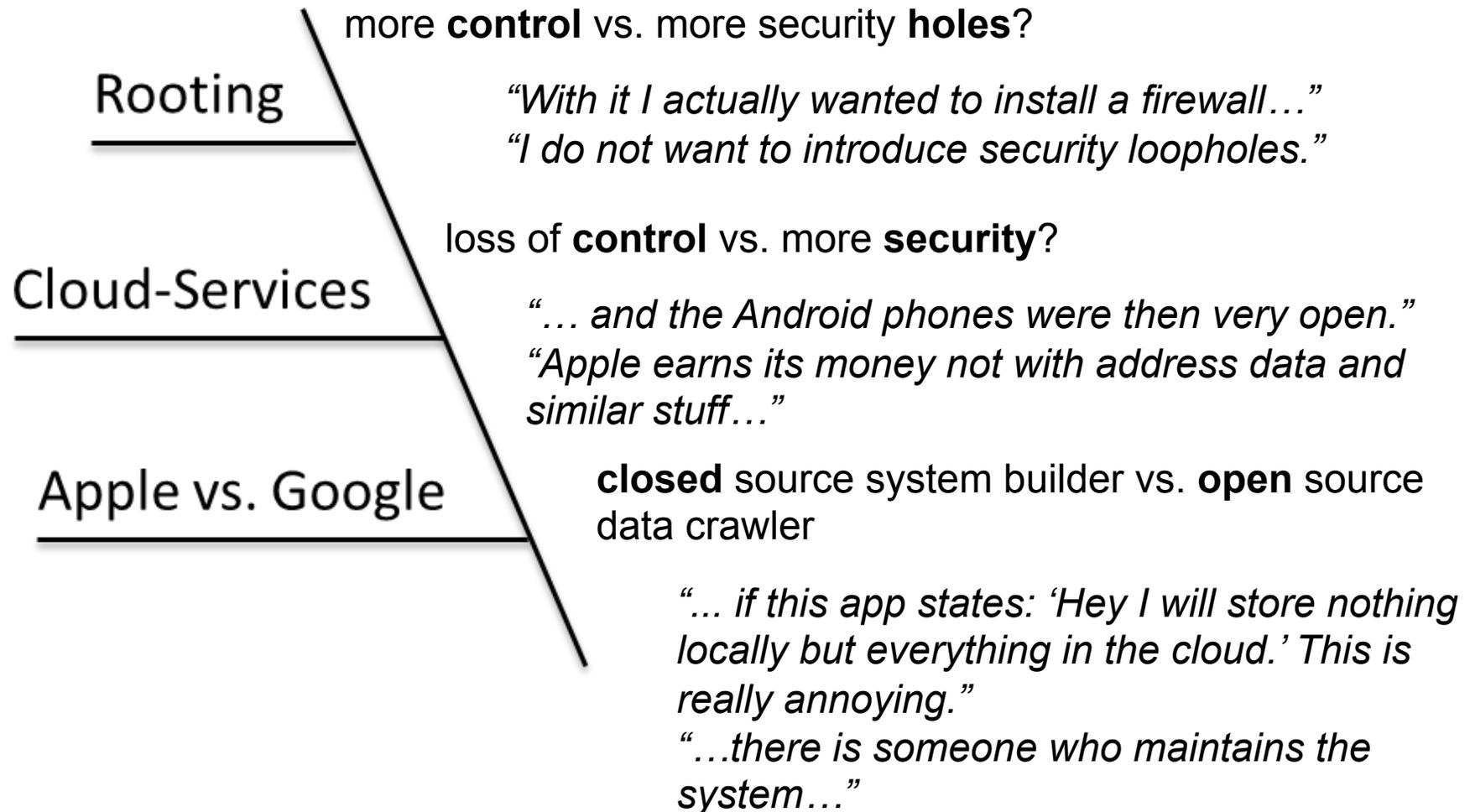
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# Avoidance techniques

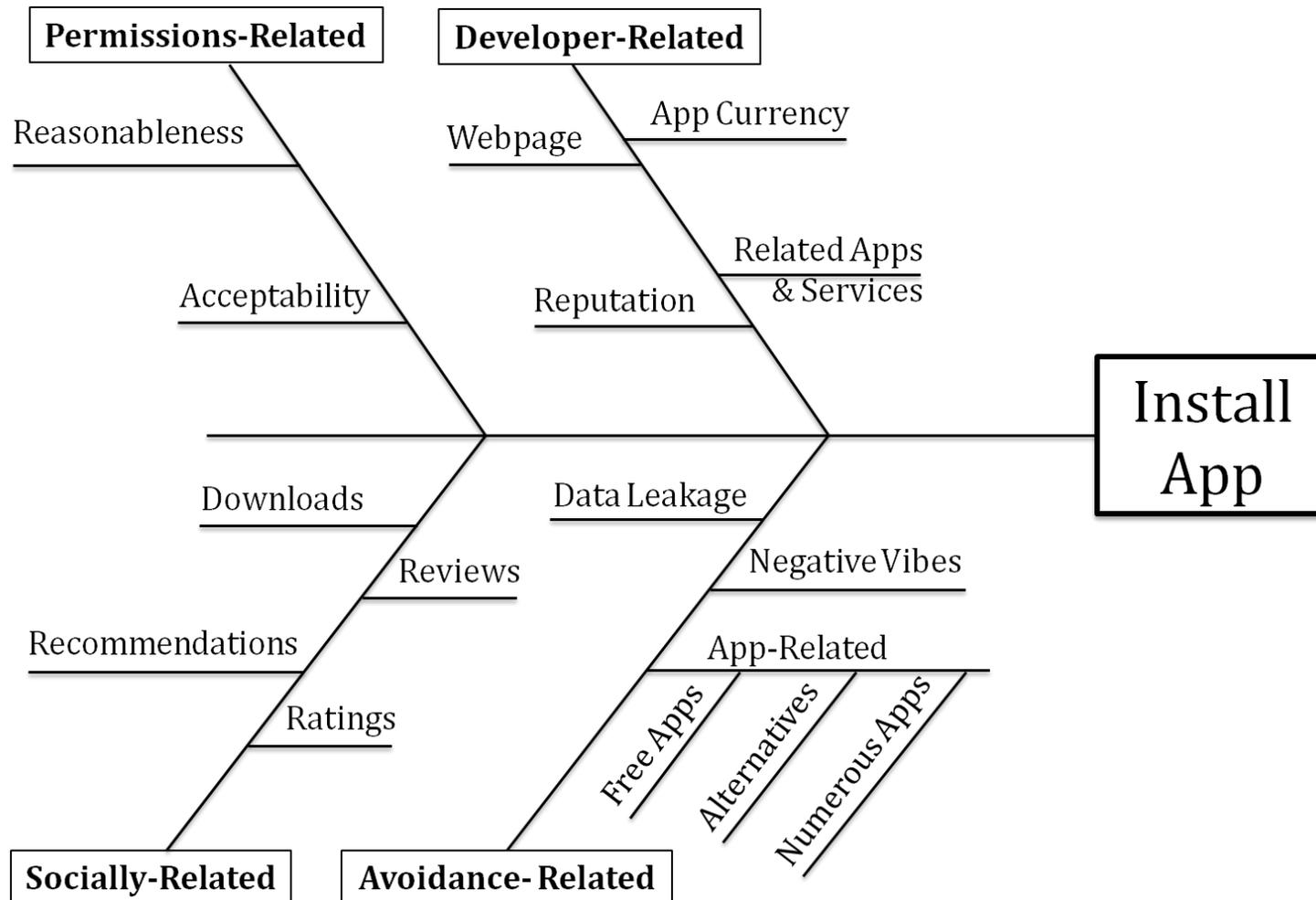
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# Further Findings: Disagreements



# Results for privacy-related selection heuristics



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# Deriving Guidelines

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- 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 has a good rating?
- Does the app has 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?

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# Conclusion

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- **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

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# References

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