- Modern devices have a short life cycle and are frequently "disposed of" (e.g. every 3.2 years for smartphones[1])

- Before disposal, devices should be "sanitized"
  (i.e. personal data removed with a low recovery probability before disposal)

- Garfinkel and Shelat found that disposed-of hard drives are often improperly sanitized.[2]

We explore <mark>why</mark> users fail to sanitize when disposing-of devices.

1. Linda Serges and Hyla Mobile Inc. *Q3 2020 mobile trade-in data*. 2020
2. Simson L. Garfinkel and Abhi Shelat. Remembrance of data passed: a study of disk sanitization practices. IEEE Security and Privacy 2003

Research Questions

1. How do consumers dispose of their old devices?

2. How do consumers prepare devices for disposal?

3. What barriers and misconceptions do consumers face when trying to sanitize their devices?

We answer these questions through a **survey** (n=131)
and a **semi-structured interview** (n=35)

Revisiting Garfinkel and Shelat (IEEE Security and Privacy 2003)

We found evidence supporting:

- **Lack of training** – 12/35 simply deleted data to prepare a device for sale. 5/35 reported that deleting files was the only sanitizing method known to them.

- **Hardware failure** – 6/35 reported disposing of devices that no longer function or have a hardware failure (broken trackpad or screen)

- **Tool error** – Observed the wide use of manual deletion coupled with the misunderstanding that is it a secure sanitizing choice

"It said it would be permanently deleted if I emptied the recycle bin" (P104)

Revisiting Garfinkel and Shelat

We found no evidence supporting:

- **Lack of knowledge** (about the problem) – All participants appeared to understand the problem

- **Lack of tools** – Free sanitizing tools are widely available and are often built into different operating systems. However, these tools may not be readily available to non-expert users.

Barriers to Secure Sanitizing

- Side effects of sanitizing

  "There is a wipe software called DBAN my IT friend said to use but if I use that the computer won't boot anymore because Windows will be wiped out. I wouldn't have sold it if it didn't work." (P19)

  "I used the delete all button on a Canon camera before donating. I donated it with my memory card so someone could actually use it." (P109)

- Slow sanitizing process

  "It takes way too long to delete everything, even removing programs took forever so I deleted the "My Documents" folder then gave it away." (P68)

Barriers to Secure Sanitizing

- Missed Data:

  7/12 participants who manually deleted data reported missing a personal data category

  Participants who manually deleted data often forgot:
    - Browsing history
    - Saved passwords in browsers
    - Credentials in applications

Improving Device Sanitizing Practices

- **Device Manufacturers:** Rectify any misleading prompts and ensure users have the relevant information at the **right** moment

- **Retailers:** Provide privacy policies to increase transparency where devices are returned, exchanged, donated or recycled

- **Recyclers:** Increase consumer awareness of secure sanitizing to increase recycling and eco-responsibility

- **Researchers:** Develop AI to detect device disposal, e.g., moving accounts to another device, deletion of personal data, and nudging user
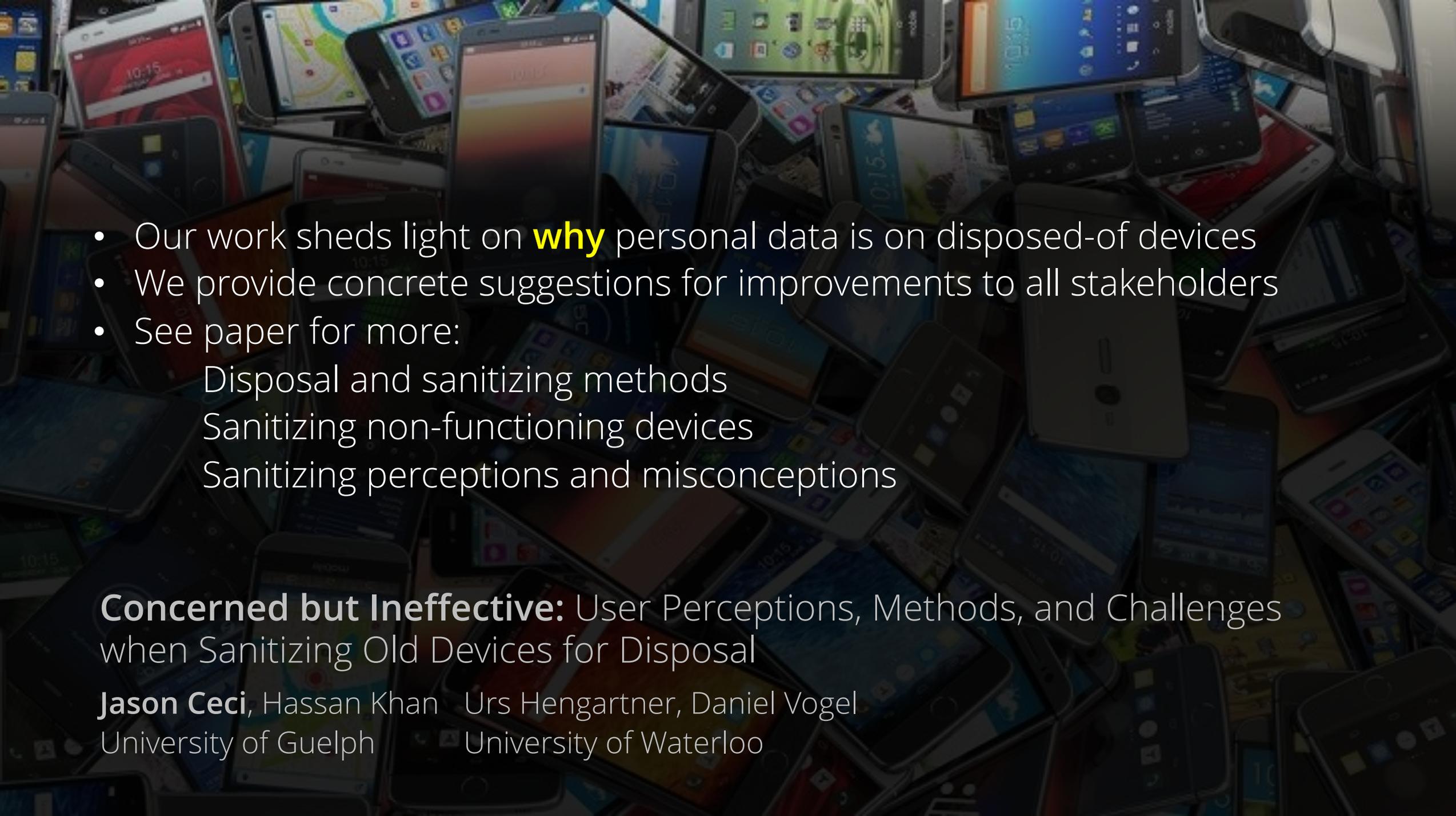
- Our work sheds light on **why** personal data is on disposed-of devices
- We provide concrete suggestions for improvements to all stakeholders
- See paper for more:
  Disposal and sanitizing methods
  Sanitizing non-functioning devices
  Sanitizing perceptions and misconceptions

Concerned but Ineffective: User Perceptions, Methods, and Challenges when Sanitizing Old Devices for Disposal

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