



Normative and Non-Social Beliefs about Sensor Data: Implications for Collective Privacy Management

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A close-up photograph showing two hands holding a white sheet of paper. The word "PRIVACY" is printed in bold, black, uppercase letters on the paper. The hands are positioned at the top and right edges of the frame, with fingers gripping the paper. The background is a soft, out-of-focus light color.

PRIVACY

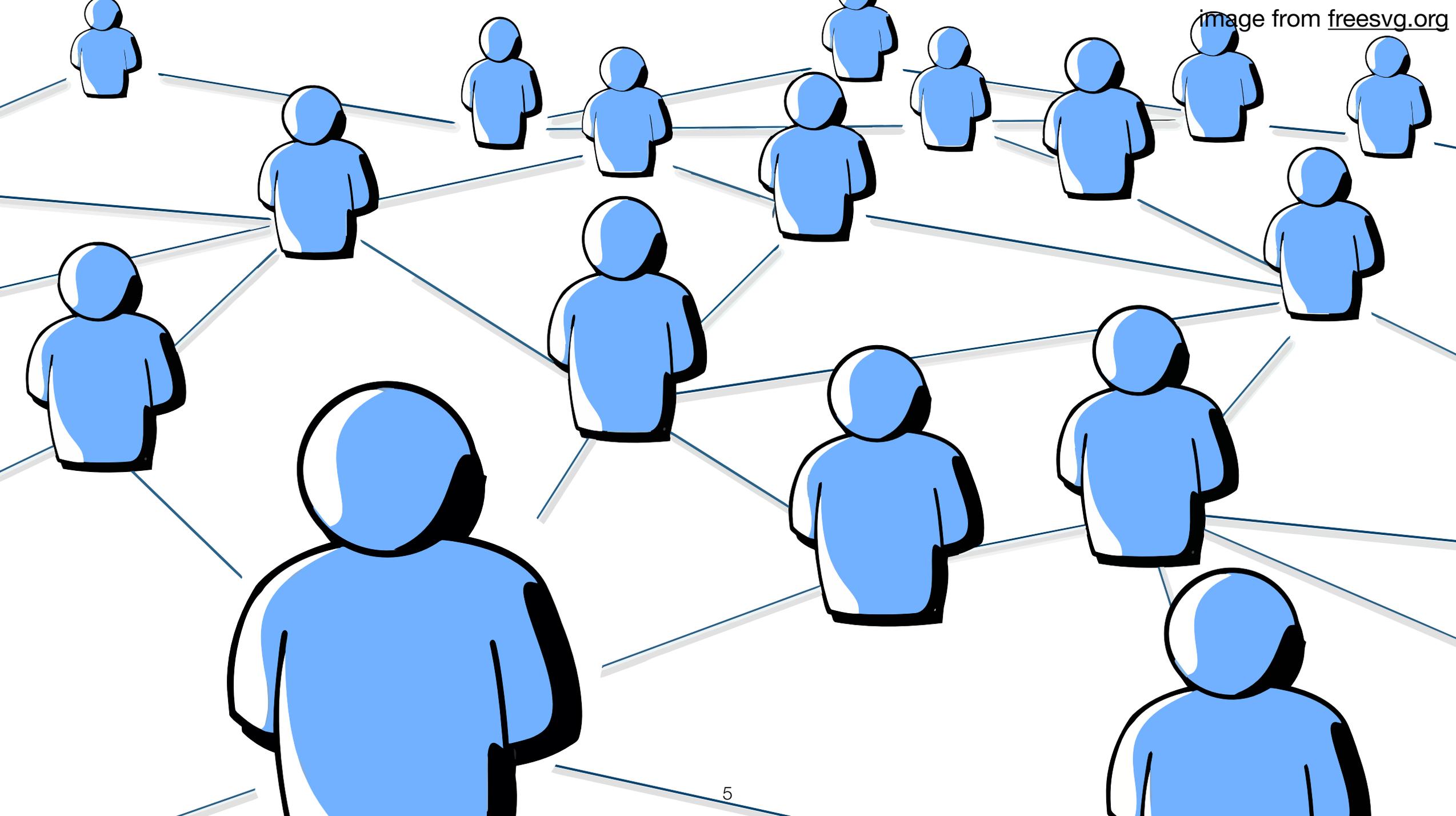


Data privacy is a collective
problem.



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Are there norms for the collection
and use of sensor data?



Participants

- 65 users of either activity trackers (AT) or voice assistants (VA)
- Recruited using a subject pool and snowball sampling on social media
- Phone interviews (~1 hour) conducted in two rounds, pre-pandemic



photo by [Kentut Subiyanto](#)



Interviews

- Reactions to hypothetical scenarios involving inferences from sensor data
- Inferences were plausible, and unexpected
 - Plausible: involving data typically generated by the technology
 - Unexpected: not directly related to typical use cases of the technology



photo by [John Tekeridis](#)



Example Scenarios

Activity tracker

Imagine that instead of time spent sitting down in a location, a wearable sensor device could use information about a user's movements and location to count **how many times [he/she/they] went to the bathroom** yesterday.

Voice assistant

Imagine that it's possible to use [voice assistant] while preparing meals, to read recipes and provide cooking instructions. This means that it would have access to information about ingredients, cooking methods, and meals the user prepares, and could determine **how healthy a person is** based on his or her eating habits.



	Activity Tracker	Voice Assistant
Scenario 1	how many times/how often the user overslept last week	how many times/how often the user overslept last week
Scenario 2	how often the user was sitting down at his or her desk	content of some of the user's conversations
Scenario 3	how many times the user went to the bathroom yesterday	how healthy a person is based on his or her eating habits
Scenario 4	how many floors/levels there are in the user's home	how many different guests or visitors the user has over
Scenario 5	whether a user has young children at home or not	whether a user has young children at home or not
Scenario 6	estimate a user's carbon footprint and rank against other users in their area	estimate how safe the user's neighborhood is and rank against nearby neighborhoods



Qualitative Analysis

- **Social beliefs:** about what others do or believe, often with an evaluative component
- **Non-social beliefs:** participant's own perspective on the scenario, often in first person
- **Privacy-oriented beliefs:** about awareness, consent, control over information
- **Other beliefs:** e.g., beliefs about the usefulness or believability of the scenario



Norms about private information

- Norms were about:
 - Bodily functions
 - The inside of the home
 - Information about children
- 53 of 65 participants (82% overall; 90% AT, 74% VA)

“I would think people would just be, maybe, upset or angry that there would be information being kept on how many times you’re going to the bathroom...” (AT21)



Norms about data collection as unavoidable

- Using technology means giving up control
“that’s something that I feel is probably out of my control” (AT02)
- Use implies consent
“I think people who use [voice assistants] are probably okay with it, 'cause they're already doing it.” (VA22)
- 33 of 65 participants (51% overall; 43% AT, 57% VA)



Objecting to data collection is “crazy”

- Acting concerned about privacy means one is “crazy” or “paranoid”

AT25 said she is “a little paranoid” because she “[doesn’t] think that people need to know exactly what I’m doing every minute of every day.”

VA07 talked about the “crazy conspiracy nuts”

VA22 said, “I don't want to sound like a paranoid person”

- 23 of 65 participants (35% overall; 17% AT, 51% VA)



Non-social beliefs: Control over data

- Privacy — awareness and control over data — was important to participants
 - “But if that’s a possibility we do need to be made aware of that, it can’t just start happening.” (VA04)
- This contradicts the norm about how data collection is unavoidable
- 52 of 65 participants (80% overall; 73% AT, 91% VA)



Non-social beliefs: Usefulness

- Initial speculation about usefulness
 - 64 of 65 participants (98% overall; 97% AT, 100% VA)
- But, usefulness “depends on the individual person” (AT21)
 - 44 of 65 participants (68% overall, 67% AT, 69% VA)

“...you could have [voice assistant] suggest certain changes to your diet that she’s been tracking for however long and you can be like, wow, I haven’t eaten a fruit in two weeks, I should add an apple in or something.” (VA09)



Are there norms for the collection
and use of sensor data?

Yes and no...



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What if we could provide visibility into something that's typically invisible: the kinds of information people choose to protect?



Thank You!

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