Why Asking the Right Questions is Better than Having All the Answers

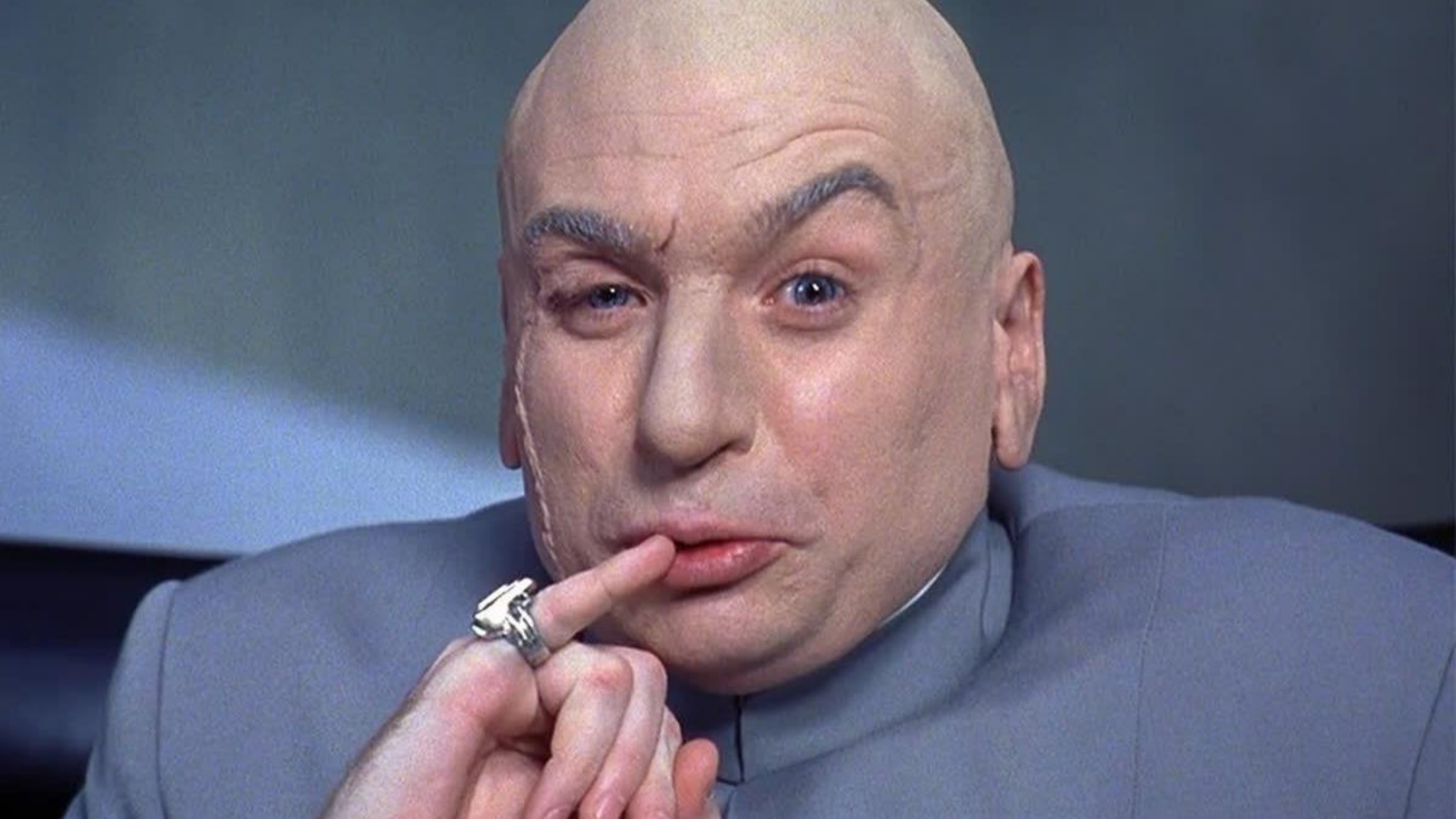
Neal Sample

Chief Information Officer, Walgreens Boots Alliance

#1

What was going on when the data was created?


NETFLIX
The
NETFLIX
NETFLIX
NETFLIX
NETFLIX



100,480,507 ratings

480,189 users

17,770 movies

<user #, movie #, date of rating, rating>


<user #, movie #, date of rating, rating>


2009
NETFLIX
DATE: 09·21·09
PAY TO THE ORDER OF: BellKor's Pragmatic Chaos
$ 1,000,000 00
AMOUNT: ONE MILLION 00/100
FOR: The Netflix Prize
Reed Hastings

#2

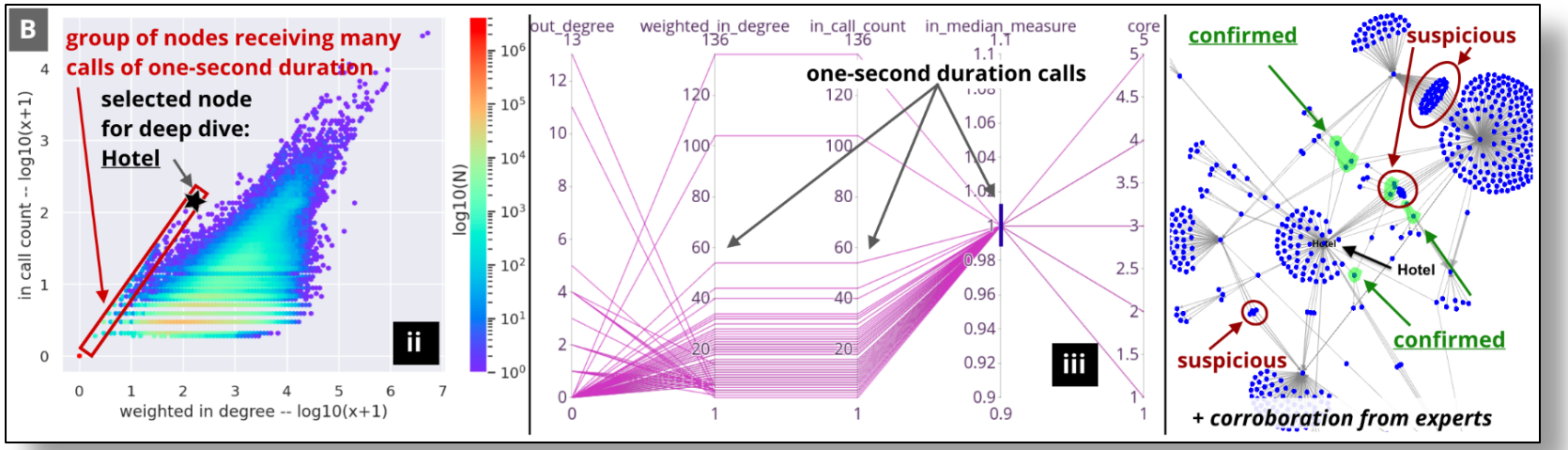
What information can we mix in?


CENTRAL INTELLIGENCE AGENCY
UNITED STATES OF AMERICA

Caller SIM	Callee SIM	Outgoing BTS	Incoming BTS	Timestamp	Call duration (sec)
0458685984	0488595496	12	365	2018-01-18 15:22:12	456
0458685984	0458685984	12	25	2018-01-18 22:24:12	35
0469875254	0498563201	879	567	2018-01-19 08:47:10	125
(...)	(...)	(...)	(...)	(...)	(...)

Short Calls
Burners

Diversity
Connectedness



Drugs
Spam

Fraud
Terrorism

Dynamic Network Anomaly Modeling of Cell-Phone Call Detail Records for Infectious Disease Surveillance

Authors: Carl Yang, Hongwen Song, Mingyue Tang, Leon Danon, Ymir Vigfusson Authors Info & Claims

KDD '22: Proceedings of the 28th ACM SIGKDD Conference on Knowl... • August 2022 • Pages 4733–4742 • https://doi.org/10.1145/3534678.3542678

Published: 14 August 2022 Publication History

Faster outbreak detection when phone calls are monitored: Pä...

Bjelkmar FREE

P Bjelkmar, E van Straten, L Brouwers

European Journal of Public Health, Volume 26, Issue suppl_1, November 2016, ckw166.072, https://doi.org/10.1093/eurpub/ckw166.072

Published: 02 November 2016

Cell-phone traces reveal infection-associated behavioral change

Ymir Vigfusson[a,b,1,2], Thorgeir A. Karlsson[b,1], Derek Onken[a,1], Congzheng Song[c], Atli F. Einarsson[b], Nishant Kishore[d], Rebecca M. Mitchell[a], Ellen Brooks-Pollock[e], Gudrun Sigmundsdottir[f,g], and Leon Danon[h,i]

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Edited by Nils Chr. Stenseth, University of Oslo, Oslo, Norway, and approved December 16, 2020 (received for review March 19, 2020)

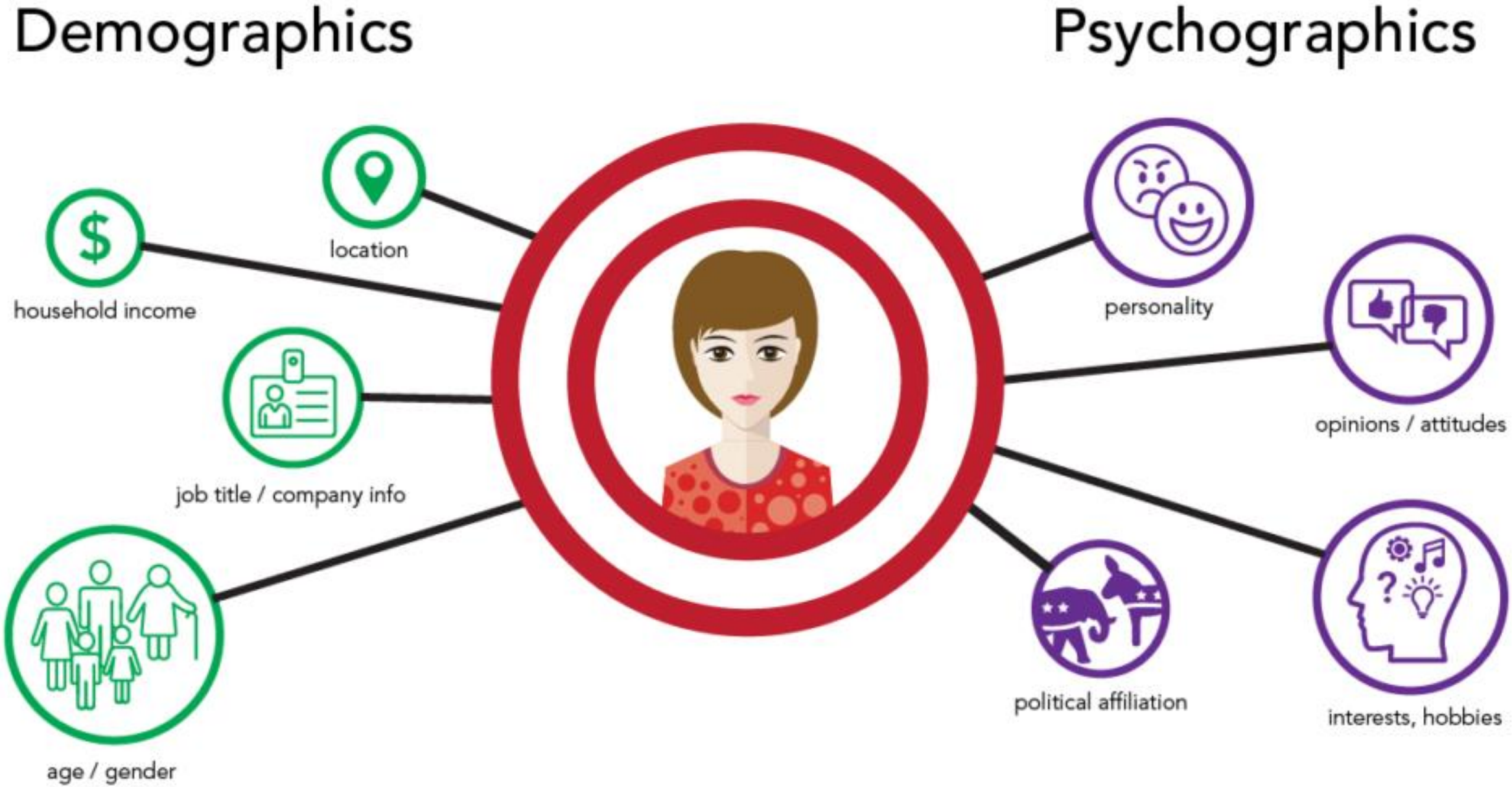
Evaluating the privacy properties of telephone metadata

Jonathan Mayer ✉, Patrick Mutchler, and John C. Mitchell Authors Info & Affiliations

Edited by Cynthia Dwork, Microsoft Research Silicon Valley, Mountain View, CA, and approved March 1, 2016 (received for review April 27, 2015)

May 16, 2016 | 113 (20) 5536-5541 | https://doi.org/10.1073/pnas.1508081113

$19.95 + 70min = 82%


Demographics
Psychographics
location
household income
job title / company info
age / gender
personality
opinions / attitudes
political affiliation
interests, hobbies

- Participant B received a long phone call from the cardiology group at a regional medical center, talked briefly with a **medical laboratory**, answered several short calls from a local drugstore, and made brief calls to a self-reporting hotline for a cardiac arrhythmia monitoring device.

- Participant C placed frequent calls to a local firearm dealer that prominently advertises a specialty in the **AR semiautomatic rifle platform**. He also placed lengthy calls to the customer support hotline for a major firearm manufacturer; the manufacturer produces a popular AR line of rifles.

- Participant D placed calls to a **hardware outlet, locksmiths, a hydroponics store, and a head sho**p in under 3 weeks.

- Participant E made a lengthy phone call to her sister early one morning. Then, 2 days later, she called a nearby **Planned Parenthood** clinic several times. Two weeks later, she placed brief additional calls to Planned Parenthood, and she placed another short call 1 month after.

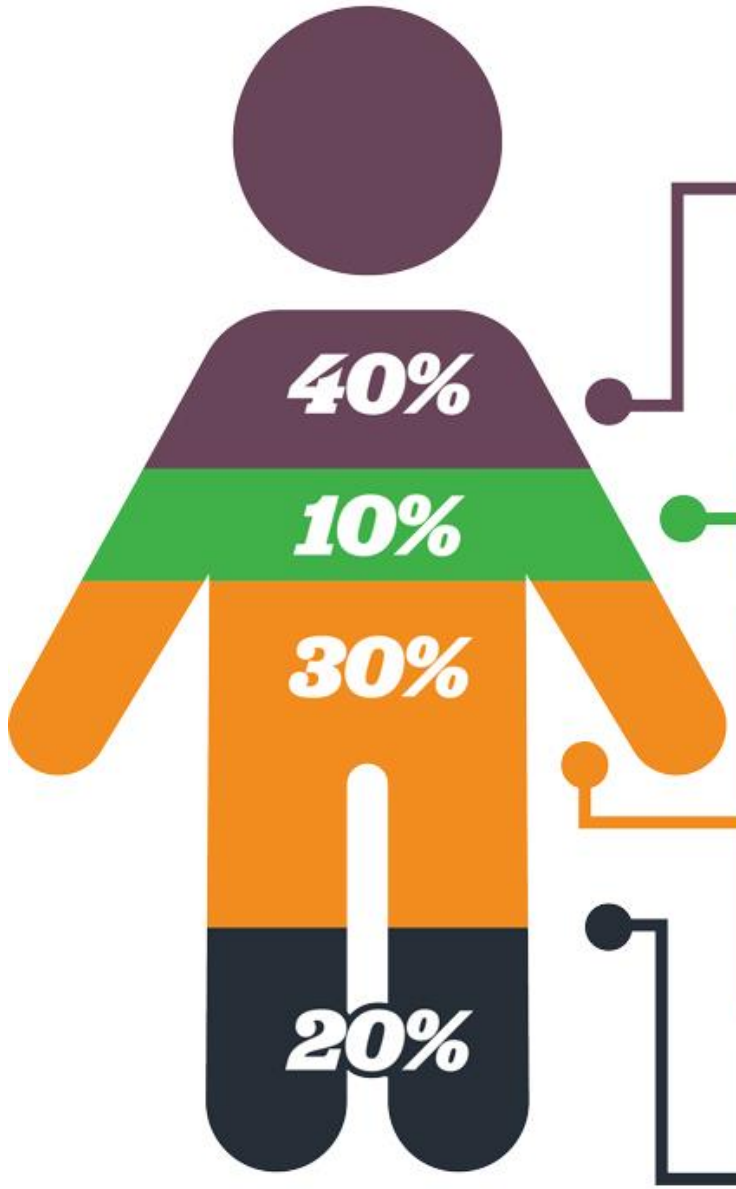
“Using public sources, we were able to confirm that participant B **had a cardiac arrhythmia** and participant C **owned an AR rifle**.”

#3

What are people thinking about in this context?


EXPRESS SCRIPTS®
1 Express Way

Why aren’t people taking their medication?



Socioeconomic Factors

Education | Job Status | Family Social Support | Income | Community Safety

Physical Enviroment

Health Behaviors

Tobacco Use | Diet & Excercise | Alcohol Use | Sexual Activity

Health Care

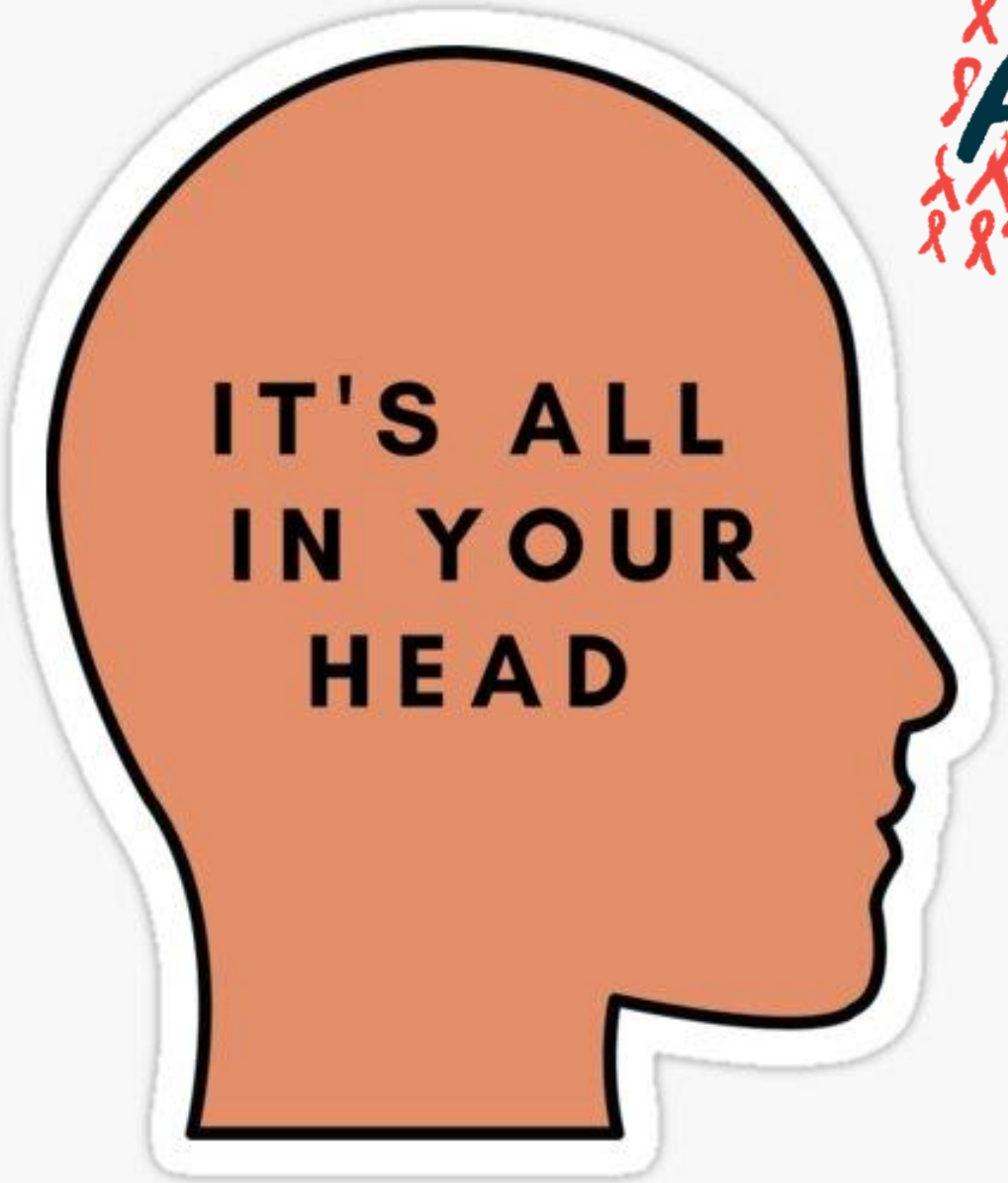
Access to Care
Quality of Care

50% can be traced back to your zip code!

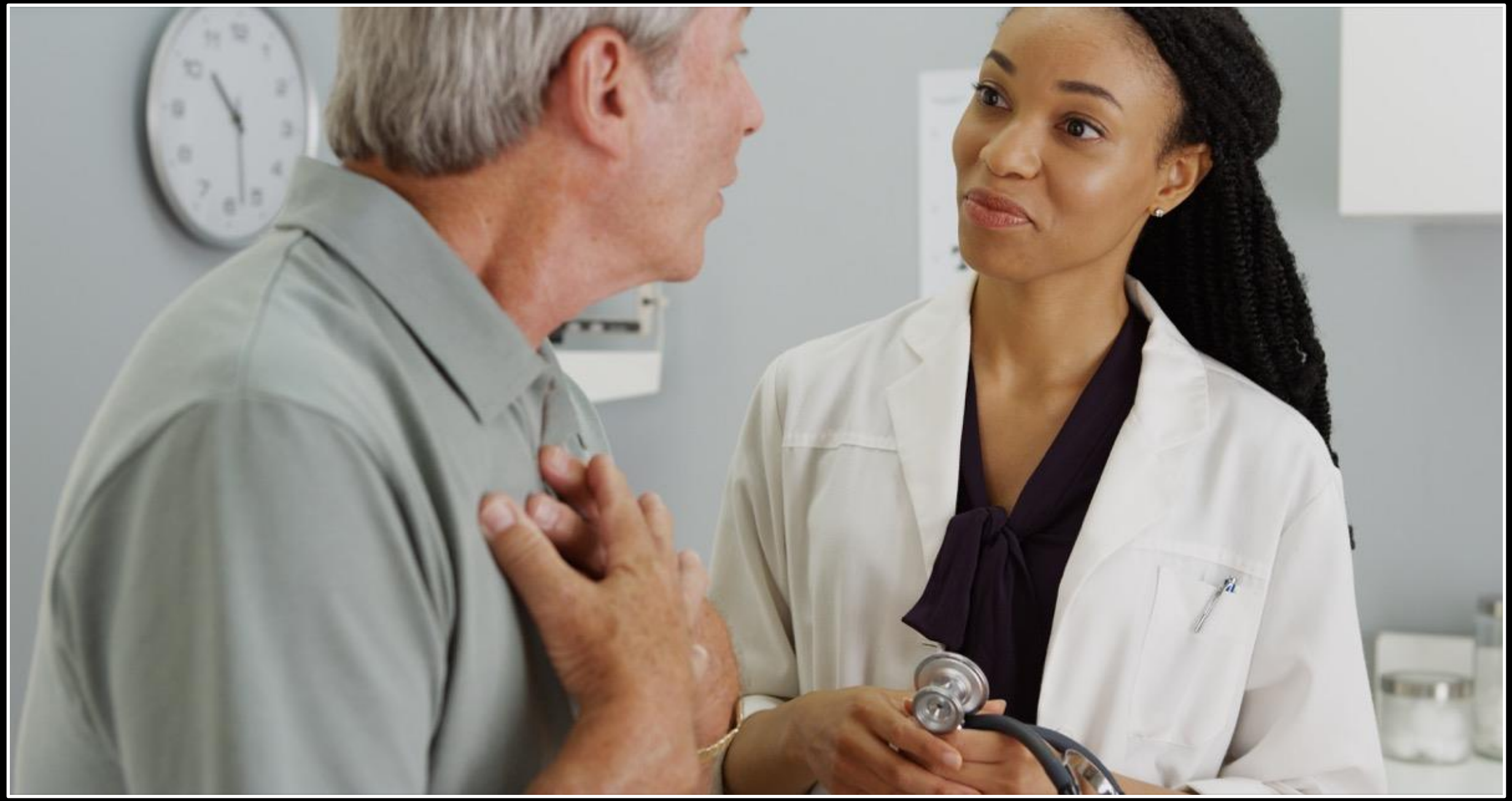
Only 20% include those moments in a healthcare enviroment.

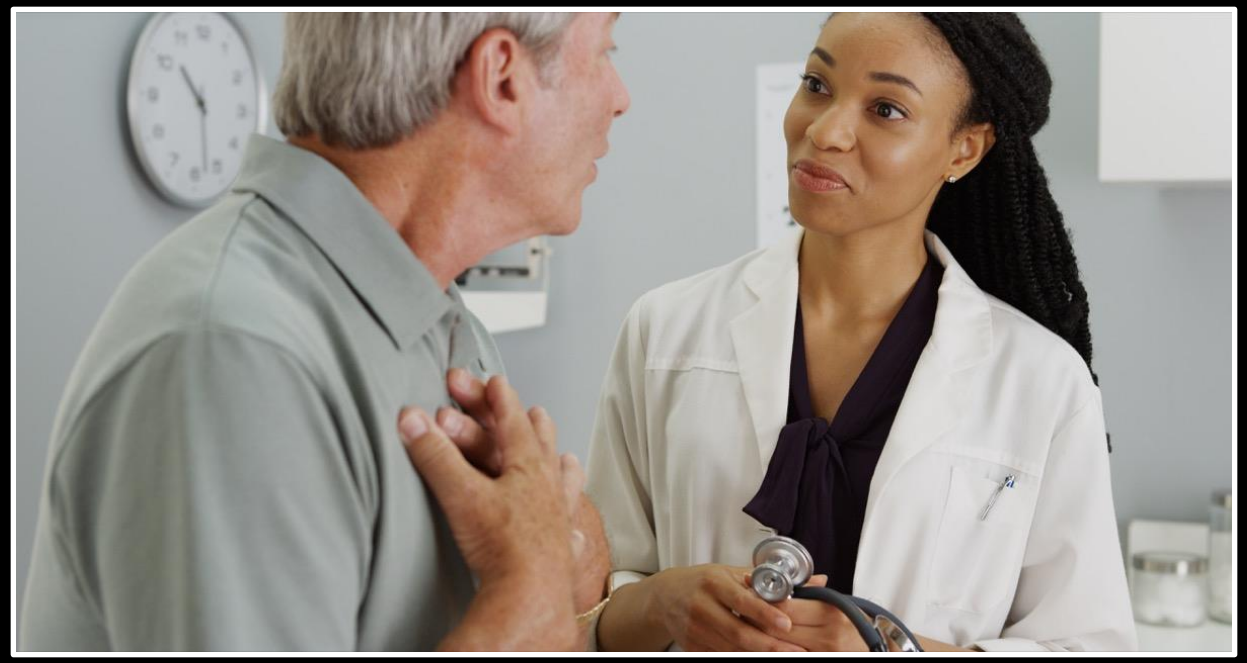
Source: Institute for Clinical Systems Improvement, Going Beyond Clinical Walls: Solving Complex Problems (October 2014)

STRESS!



Illness
vs
Disease





70 bps

Male patient

> 40 years age

Female Physician

Some questions to improve answers:

1. What was going on when the data was created?

2. What information can we mix in?

3. What are people thinking about in this context?

Some questions to improve answers:

1. What was going on when the data was created?
   <user #, movie #, date of rating, rating>

2. What information can we mix in?
   Internet Movie Database (IMDB)

3. What are people thinking about in this context?
   Find out their politics, beliefs, and secrets

Robust De-anonymization of Large Sparse Datasets

Arvind Narayanan and Vitaly Shmatikov
The University of Texas at Austin

We apply our de-anonymization methodology to the **Netflix Prize dataset**, which contains anonymous movie ratings of 500,000 subscribers of Netflix, the world's largest online movie rental service. We demonstrate that an adversary who knows only a little bit about an individual subscriber can easily identify this subscriber's record in the dataset. Using the **Internet Movie Database** as the source of background knowledge, we successfully identified the Netflix records of known users, uncovering their **apparent political preferences** and other **potentially sensitive information**.

RYAN SINGEL SECURITY MAR 12, 2010 2:48 PM

NetFlix Cancels Recommendation Contest After Privacy Lawsuit

Those fears were highlighted in December, when **an in-the-closet lesbian mother sued Netflix for privacy invasion**, alleging the movie-rental company made it possible for her to be outed when it disclosed insufficiently anonymous information about nearly half-a-million customers as part of its $1 million contest.

Some questions to improve answers:

1. What was going on when the data was created?

2. What information can we mix in?

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Thank You!