

CS 4873: Computing, Society & Professionalism

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Week 12: Pandemics and Computing

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Slides adapted from Sauvik Das, Munmun de Choudhury, and Amy Bruckman

How can we, as computing professionals, respond **ethically** to the realities of the Pandemic?

It's been a long year, but it's also been fast

This was from one professor teaching this class just last November:

Some great news

Pfizer and BioNTech Announce Vaccine Candidate Against COVID-19 Achieved Success in First Interim Analysis from Phase 3 Study

 [PDF Version](#)

- Vaccine candidate was found to be more than 90% effective in preventing COVID-19 in participants without evidence of prior SARS-CoV-2 infection in the first interim efficacy analysis
- Analysis evaluated 94 confirmed cases of COVID-19 in trial participants
- Study enrolled 43,538 participants, with 42% having diverse backgrounds, and no serious safety concerns have been observed; safety and additional efficacy data continue to be collected
- Submission for Emergency Use Authorization (EUA) to the U.S. Food and Drug Administration (FDA) planned soon after the required safety milestone is achieved, which is currently expected to occur in the third week of November
- Clinical trial to continue through to final analysis at 164 confirmed cases in order to collect further data and characterize the vaccine candidate's performance against other study endpoints

NEW YORK and MAINZ, GERMANY, November 9, 2020 — [Pfizer Inc.](#) (NYSE: PFE) and [BioNTech SE](#) (Nasdaq: BNTX) today announced their mRNA-based vaccine candidate, BNT162b2, against SARS-CoV-2 has demonstrated evidence of efficacy against COVID-19 in participants without prior evidence of SARS-CoV-2 infection, based on the first interim efficacy analysis conducted on November 8, 2020 by an external, independent Data Monitoring Committee (DMC) from the Phase 3 clinical study. After discussion with the FDA, the companies recently elected to drop the 32-case interim analysis and conduct the first interim analysis at a minimum of 62 cases. Upon the conclusion of those discussions, the evaluable case count reached 94 and the DMC performed its first analysis on all cases.

The case split between vaccinated individuals and those who received the placebo indicates a vaccine efficacy rate above 90%, at seven days after the second dose. This means that protection is achieved 28 days after the initiation of the vaccination, which consists of a 2-dose schedule. As the study continues, the final vaccine efficacy percentage may vary. The DMC has not reported any serious safety concerns and recommends that the study continues to collect additional safety and efficacy data as planned. The data will be discussed with regulatory authorities worldwide.

- Vaccine with few safety concerns that appears to be over 90% effective (final figure may change)
- Dr. Fauci predicts “the very end of December of beginning of January” for the vaccine to go to the “people who need it most”
- Probably March and beyond for the general public

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How COVID-19 spreads

- CDC: COVID spreads “very easily from person-to-person” when people are physically near.
 - Mechanism of spread is through “respiratory droplets”, which are produced when people cough, sneeze, sing, talk or breath.
- Early research on coronavirus suggests that isolating people soon after they become symptomatic plays the “largest role in determining whether an outbreak [is] controllable.”

The solution?

- The solution for individuals:
 - Physical distancing (stay apart from one another), wear a mask, and wash your hands.
 - Empirical evidence to support all these things; not just rhetoric.
- The solution for policy makers:
 - Isolating and quarantining infected individuals and those with whom they were in close physical proximity while they were contagious

Where does computing fit in?

Role of technology – examples

Technology-based Contact tracing—using technology to identify the people that an infected person has been around

- This reveals potential outbreak hot spots, offers some idea of where the virus may spread next, and importantly, warns officials who to contact next and potentially isolate if they become symptomatic.
- Faster than manual contact tracing

Role of technology – Novel approaches

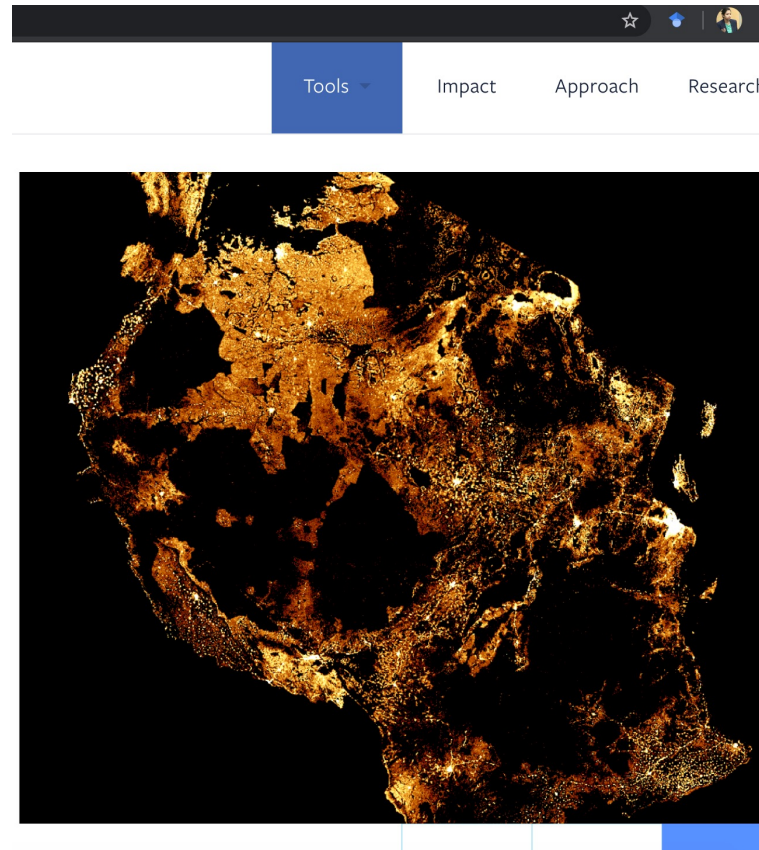
- Officials have a powerful potential surveillance tool unavailable in past pandemics:
smartphones
- Policy makers are anxious to tap the information from phones to help monitor and blunt the pandemic
- Gov't officials asking tech companies for more insight into our social networks and travel patterns

Role of technology – Early examples

- Israel rolled out a surveillance program that uses the country's domestic security agency to track the locations of people potentially infected with the virus.
- South Korea has released detailed information on infected individuals—including their recent movements—viewable through multiple private apps that send alerts to users in their vicinity.
 - Lauded for their early efforts at containing the virus

Facebook's Disease Prevention Maps

- Facebook created a disease mapping tool that tracks the spread of disease by aggregating user travel patterns.
- "Disease Prevention Maps have helped organizations respond to health emergencies for over a year and we've heard from a number of governments that they're supportive of this work," Laura McGorman, Policy Lead of Facebook's Data for Good project, said in a statement to Business Insider.



<https://dataforgood.fb.com/tools/disease-prevention-maps/>

Role of technology – Novel approaches

- Another potential -- tap the geofencing capability of phones, to learn who may have been near people infected with the virus
- Police have relied on geofencing in investigations, using broad warrants to request information on every smartphone near a crime scene.
 - In 2019, police requested location data from every “Google account that is associated with a device” within 150 meters of a bank robbery.
- In theory, phone platforms or providers could notify users whose phones were recently near an infected person.
 - Apple and Google worked together on a privacy-preserving Exposure Notification system

Role of technology – Novel approaches

- The controversial facial recognition startup Clearview AI says it is in talks with public officials to use its software to identify anyone in contact with people who are infected.
- The weapons detection company Athena Security claims its AI-enabled cameras can detect the coronavirus by spotting fevers.

Spot the pattern?

- Balancing collective good vs individual civil liberties
- “Now you’ve got a global pandemic, so you would think that [you] would be able to use this information for the global good, but you can’t...There’s expectations about privacy.” — Melissa Krasnow
- “We don’t live in a culture of public trust when it comes to data,” says David Leslie, an ethicist at the Alan Turing Institute
 - Few states created contact tracing apps using Google/Apple API, and few people in those states use them

Privacy threats

- These possibilities raised red flags to privacy advocates
 - European and US laws
 - There's already legal debate over whether such actions would overstep the Fourth Amendment's restrictions on the government's ability to search private property.
- What are the specific privacy threats?

Scope creep

- "Crises as catalysts for change" — from Malcolm Gladwell's book, "The Tipping Point"
- Powerful institutions passing regulations that increase their power in crisis usually don't like reducing their power after the crisis.

Disproportionate distribution of benefits and harms for invasive tech

- Keeping society “safe from criminals” -> recidivism bias
- “contain spread of HIV” -> Grindr sharing HIV status and other personal data with 3rd parties
- “Simplify sharing health records” -> any medical professional can access without explicit consent



Secondary use

- How can we assure that the data collected is used only for COVID-19 safety purposes?
- How can we assure that the data is retained only as long as is necessary for these purposes?

EFF's Guidelines

“Public policy must **reflect a balance between collective good and civil liberties** in order to protect the health and safety of our society from communicable disease outbreaks”

A balance - Transparency

- The government should be clear in articulating what specific public health goals it's seeking to accomplish
- How are they limiting the collection of personal data to what's necessary to achieve those very specific goals?
- Making sure that there are appropriate privacy safeguards put in place before data starts to change hands.

A balance - Data collection based on science, not bias

- Ensure that any automated data systems used to contain COVID-19 do not erroneously identify members of specific demographic groups as particularly susceptible to infection
 - Avoid bias based on nationality, ethnicity, religion, and race—focus on facts about a particular individual's actual likelihood of contracting the virus, such as their travel history or contact with potentially infected people.

A balance – Parsimonious use of data

- Any data collection must be scientifically justified and proportionate to the need.
- Even anonymized, aggregate data can inform health efforts.
- Consider a scenario where city officials close bars and restaurants for a weekend, hoping to reduce the number of new coronavirus infections.
 - But instead, infections increase.
 - Some may be the result of exposures days earlier, but tracking where people went over the weekend could reveal new transmission hot spots.

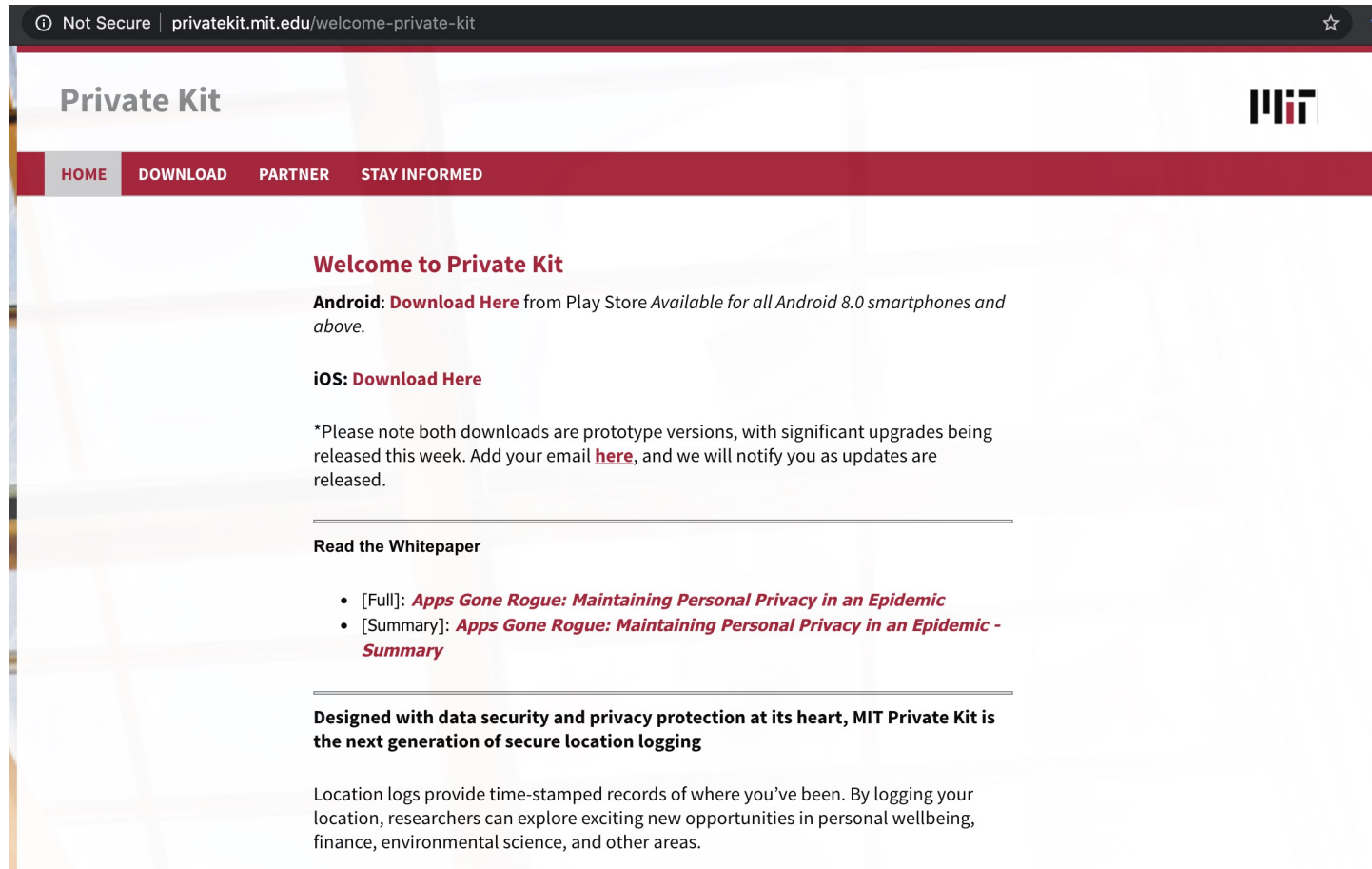
A balance – Due process

- If the government seeks to limit a person's rights based on this "big data" surveillance (for example, to quarantine them based on the system's conclusions about their relationships or travel), then the person **must have the opportunity to timely and fairly challenge these conclusions and limits.**

A balance - Expiration

- There is a hazard that the data surveillance infrastructure we build to contain COVID-19 may long outlive the crisis it was intended to address.
- The government and its corporate cooperators must **roll back any invasive programs created in the name of public health after crisis has been contained.**

Voluntary, privacy-conscious phone tracking systems



- **But such apps will reduce the spread of disease only if a lot of people use them.**
- Because a tracking app can't capture every possible source of infection, it risks creating a false sense of security for users.
- Just because you don't see a dot on a map where a contact might have been doesn't mean that areas that don't have dots don't have infected people.

“People give their stem cells for patients that need a stem cell transplantation. They give their blood. We hope that people think about the crisis, and are willing to give their data.” – Creator of the MIT Private Kit app

Is this a reasonable comparison?

How much does this matter?

- With multiple vaccines, distribution happening quickly in the US, and picking up elsewhere, it is possible that we may soon “return to normal”?
- So, does any of this matter? The last pandemic was 100 years ago — are we done until 2120?

I hope so, but...

Scientists are seeing an 'acceleration of pandemics': They are looking at climate change

Doyle Rice USA TODAY

Published 6:01 a.m. ET Sep. 10, 2020 | Updated 5:08 p.m. ET Sep. 10, 2020



Story Highlights

- "We have entered a pandemic era," a recent study in the journal Cell said.
- Almost certainly, the impacts of pandemics like COVID-19 are exacerbated by climate change.
- "It is hard to imagine that climate change will be anything good for human health."

COVID-19 may only be the beginning of [global pandemics](#) – a future scenario in which climate change may also play a role.

"We have entered a pandemic era," said a [recent study in the journal Cell](#). Written by Dr. Anthony Fauci and medical historian Dr. David Morens, both of the National Institute of Allergy and Infectious Diseases, the study paints a picture of a future where pandemics become more numerous.

"I don't have a crystal ball, but what we are seeing looks very much like an acceleration of pandemics," Morens told [BuzzFeed News](#). Causes he cited include deforestation, urban crowding and wet markets for wild game.

- It is conceivable we may see another one of these in our lifetimes.
- We will (hopefully) be better prepared for deploying computing to help