

Should This Exist? Transcript – Contact Tracing

“Contact tracing: So promising. So invasive.” Should This Exist? with Caterina Fake

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CATERINA FAKE: Hi, it's Caterina.

TIMES SQUARE, NEW YEAR'S EVE: There are over one million revelers here getting ready to ring in 2020.

FAKE: It's hard to remember that we were ever so optimistic about 2020, gathering en masse in celebration of the new year and the new decade ahead. And now, only months later, we're wondering if 2020 could get any grimmer. Under the planetary cloud of COVID-19, we've seen pervasive social and racial outrage, economic panic, hundreds of natural disasters across the globe – and then California, Washington, and Oregon lit up on fire.

NEWS CLIP: Because what we're seeing right now could come up on us in minutes.

FAKE: The wildfires, on a grand scale, are a useful metaphor for introducing the topic and the technology we'll be discussing in this episode.

KEVIN ESVELT: And of course, what's difficult about this particular wildfire is that it can't always be seen.

NEWS CLIP: This fire has consumed a lot of acres.

FAKE: Kevin Esvelt is an evolutionary engineer at MIT. His specialty is mitigating global catastrophic bio-risks. This wildfire metaphor is his. And he believes that COVID-19 is behaving like a particularly dangerous one.

NEWS CLIP: I've been doing this for 12 years, and I have never seen a fire behavior like this.

ESVELT: Imagine it's your job to fight a wildfire. And yet you find that trees are spontaneously combusting without any visible sparks nearby. The fire advances and retreats, but in ways that are seemingly unrelated to your control efforts.

NEWS CLIP: We have a fast-moving fire front that's coming your way.

FAKE: COVID-19, with embers spreading far and wide and blazingly fast. Kevin Esvelt sees this pandemic as a global biological wildfire.

ESVELT: So how can you decide where to concentrate your efforts when this fire sometimes declines to generate smoke? So one way to say this is: contact tracing is about assessing the record of the winds to predict which trees were exposed to flaming embers.

NEWS CLIP: Trying to stay ahead of this kicks your ass.

FAKE: Contact tracing: where smartphones and human contact tracers try to figure out everyone an infected person has been near, and then notify the people who may have been exposed. Most “forward trace” to find and isolate people who were exposed so they don’t infect anybody else. But Kevin Esvelt believes we can do better.

ESVELT: Contact tracing is twice as effective if you trace backwards as well as forwards. Twice as effective.

FAKE: It’s called bi-directional tracing. Tracking what he calls “undiscovered branches of the viral family tree.” When you have a known case, trace back to try to find the “parent” infector and then trace forwards again.

Kevin says contact tracing, along with masks and isolation, is still among the most powerful public health interventions we have.

ESVELT: We still don’t have a vaccine. We still don’t have a particularly effective therapeutic. The single most effective treatment for COVID-19 is respiratory support. Just help the people breathe. It’s been months and months and months, and we don’t have anything better than that. That’s pretty appalling.

FAKE: There are contact tracing apps in use in the U.S., but only in a patchwork of states. And even where contact tracing apps are available, convincing people to use them has been challenging.

At this stage of the pandemic, how much data are you willing to give the government to fight COVID-19? Will contact tracing, even if it’s bi-directional tracing, miss those at the highest risk? And with a fragmented U.S. response within states, what’s now realistic for what was once a promising innovation?

[THEME MUSIC]

FAKE: So, Kevin, really good to be talking to you, again.

ESVELT: Absolutely.

FAKE: And a lot has changed in the world since we last spoke.

ESVELT: A wee bit, I'm afraid. A wee bit...

FAKE: [Kevin Esvelt of MIT was a guest on our show last season](#). He's credited as the first person to discover a technique called a gene drive that gives humans a power we've never had before: to change the DNA of entire species in nature. And like so many scientists worldwide this year, he's turned his attention to the pandemic.

ESVELT: One of the truly inspiring things about this year has been to see the entire world's scientific community coming together to tackle one problem. Not every scientist dropped everything and started up a COVID project. But an awful lot of us did.

FAKE: Kevin and I spoke in recent weeks – just before the nation learned about President Trump's COVID diagnosis. I called him from Helsinki, Finland, where I've been for the last five months.

I've traveled here for many years over the summers to see family. And on this trip especially, it's felt a world away from my life in San Francisco.

FAKE: There was, I think, only about maybe two months of lockdown. Movie theaters are open, restaurants are open. And it was extremely liberating. It was a kind of an amazing thing to come here.

ESVELT: To be fair, Massachusetts is not that bad. But I'm sure Helsinki is much better.

FAKE: Kevin leads the [Sculpting Evolution Group](#) at MIT, where he and others in his lab have turned their attention to COVID projects. His concerns about COVID-19 began early on – not long after the New Year while he was traveling in Switzerland to the annual conference held by the World Economic Forum, Davos.

ESVELT: I was invited to talk about advanced biotech. I think of it as sort of a song-and-dance number of interesting ideas for the people with power.

FAKE: Coronavirus was just in the news, and global health leaders at Davos were discussing its spread.

NEWS CLIP: This is an evolving and complex situation, we need more information.

FAKE: And there were delegations from China there.

NEWS CLIP: We still don't know whether this virus is spread readily from person to person.

ESVELT: It seemed quite plausible that someone at Davos might actually have been infected. So given that, I actually went out and went pharmacy to pharmacy and got quoted some truly ridiculous prices for surgical masks.

FAKE: Already, in January.

ESVELT: Pretty much everyone I had met at Davos and spent time with I, enough to you know, be confident that I wouldn't be taken as a total raving lunatic, I just handed out these surgical masks to people and said, "you know, you might want to wear this on the plane home."

FAKE: No one knew then, would it spread? How lethal would it be? And what if most of the world got it?

ESVELT: Because we have enough trouble with computer viruses, right? And yet, at least most of our infrastructure for transmitting information was designed with some degree of security in mind. We didn't get to design life. Life is not a system that necessarily can favor defense in the same kind of way that a human-designed system could be built to favor defense.

FAKE: Since then he's been working on multiple fronts, including [Safe Paths](#), an MIT-led, free, open-source contact tracing technology with a new dimension.

ESVELT: On this pandemic, I think the single most important discovery that I have had any kind of hand in is how much more effective bi-directional tracing is relative to the forward-only variety that is basically mandated by all of the protocols throughout the world, with a few exceptions. So I think that could probably do more good in fighting this pandemic than anything else I've suggested.

FAKE: Contact tracing has been prominent in the news since President Trump announced his diagnosis in early October. Tracing efforts afterwards, led by the White House Medical Unit, have been criticized for lacking a robust investigation into the scope and origins of the outbreak surrounding the president.

To better understand Kevin Esvelt's thinking on a bidirectional approach, let's quickly review some history.

Since the 1920s, contact tracing has been used with syphilis, Ebola, SARS, MERS, tuberculosis and HIV – with the goal of breaking the chain of transmission – finding everyone an infected person has been in contact with, testing them, and isolating them if infected.

There is no national contact-tracing program in the U.S. And local contact tracers often struggle to reach patients who've tested positive. And when they do, they rely on their trust and cooperation.

ESVELT: 'Cause think about what you're asking of people. "Hi, we've never met before. But I work for the public health agency, and I know that you've been diagnosed with this nasty pathogen that's currently spreading through the population, which may carry some stigma. But I really want you to tell me everyone you've come in contact with. Who do you live with? What kinds of things do they do? Who have you spent time with over the last week or so? And I want to create a list, so that I can then reach out to all of those people and tell them that they might have been exposed." That's asking a lot of people.

FAKE: This kind of information is confidential health information and protected by law. But people have to trust the public health agency, the government.

Contact-tracing apps allow people to log their location and share it with public health authorities. Then there are exposure notification apps that notify users they may have been potentially exposed. A state or a country could have both. But platforms designed by private companies or local governments have sparked serious concerns over how sensitive data will be stored and used.

And so Kevin Esvelt is focused on a different improvement – one that might help human contact tracers and the tech: bi-directional tracing.

ESVELT: What bothered me about this is that I wasn't convinced that we were doing contact tracing as well as we should. Now, I should be clear, I am not an epidemiologist. I'm a bit of a jack of all trades. My specialty is in biotechnology. I don't really do epidemiology, or even really virology. But I do kind of specialize in knowing a little bit about everything. And I noticed that the contact-tracing protocols that CDC and WHO were coming out with were very specific. They said you need to trace all the contacts back to 48 hours before the onset of symptoms.

And I thought, huh, that means that you're only going to find the people who might have been infected by this known case, which makes a lot of sense because that's what you're trying to do, right? You're trying to find the people who've been exposed so you can tell them to isolate, so they don't pass on the virus.

FAKE: But COVID-19 has some quirks which make traditional contact tracing less effective. It creates superspreaders – patients who are particularly contagious. Research shows that only 10 percent of infected people may account for 80 percent of the virus's spread. So even more effective than looking at who you gave the virus to would be figuring out who you got the virus from.

ESVELT: That means that the typical person who has it was infected by a superspreader. So the best way to find unknown cases is probably to trace backwards one generation. Find that probable superspreader and then trace forwards from them to find all of the other people they infected. And then trace their contacts forwards again.

FAKE: I do think that there's an issue also with how contact tracing intersects with the challenges of testing, which so far in the U.S. has been very difficult. They're very difficult to get, in many cases. They're too expensive. There's a lot of issues around that.

ESVELT: Right now in order for contact tracing to begin, they require a positive test result, which means test turnaround time is huge. Because remember, the whole point of contact tracing is you want to reach the people who've been exposed before they infect anyone else. So the longer your test results take, that's more days those people are out there infecting others.

And what's more, the gold standard test, which makes me laugh even saying that, has at best a 20 percent false negative rate here. That is to say, at best there is a one in five chance that if you have it, it's going to tell you you don't. And the point at which it becomes that accurate is the day after you're most contagious. The day when you're most contagious, it has maybe a 20 to 50 percent chance of actually telling you you have it. And before that, when you're still a little bit infectious, when you're first beginning to be contagious, it has essentially zero chance.

FAKE: Kevin Esvelt is deeply skeptical of anything that claims to be a silver bullet. But he believes contact tracing backwards would help a lot. How much would be determined by how many people are participating and exchanging information.

Thus far, no country seems to have topped 40% of its population participating in contact-tracing apps. And without a coordinated federal response, it's most complicated in the U.S.

ESVELT: Most interactions are not going to be recorded unless most people have the app. And since not everyone has a smartphone to begin with, you're starting with a lower fraction of the population. It's very clear that that is not going to help the vulnerable, because they are less likely to have smartphones to begin with. So to the extent that they can offer a benefit, it's by better protecting those who are already fairly resistant to the effects of the pandemic. So there's just an inequality concern, if nothing else.

But it's one thing to protect the wealthy, and it's another thing to protect the vulnerable, and the relative challenge of those two is just vastly different. It says something about our moral character.

FAKE: Coming up, lessons from contact tracing worldwide. Ultimately for contact tracing to work, do we first need to build trust and equity?

[BREAK]

FAKE: I think that Finland is a very special environment in that it is also very trusting in its government. And I also think it's a very rules-based society. I mean, this is the kind of place

where you will be standing there on a street and you know, the walk sign is red, and there are no cars for two miles in either direction. And people will stand and wait for the light to change to green. They will not cross early.

ESVELT: One of my favorite academic-like books. It's called [Albion's Seed](#). And it's about the different cultures.

FAKE: Oh I know this book. Yeah, I love that book.

ESVELT: And so New England was of course primarily colonized by the Puritans. And Fischer's description of the Puritans is, they stand for ordered liberty. The freedom of everything to be in its proper place.

FAKE: Yes. Ordered liberty. I would say that that accurately describes Finland.

FAKE: So here in Finland on September first, they launched a national COVID exposure alert app. It's called [Koronavilkku](#), "Corona Alert" in Finnish.

Mika Salminen is senior official for the Finnish Institute for Health and Welfare. When we talked in early September, Mika was watching Finland have one of the best download rates for a contact tracing app launched around Europe.

SALMINEN: Yeah, it's over 1.8 million people, and we are just 5.5. So that's fairly very good.

FAKE: Almost a third then of the population. Yeah. Like one third, which is fantastic. And the big news of the week actually is that Prime Minister Sanna Marin received notice yesterday on the app that she may have been exposed.

SALMINEN: That's true. Yes.

FAKE: And she said she will work remotely until further notice and, of course, is being tested.

FAKE: Fortunately, Sanna Marin's test came back negative. But thanks to her visibility as Finland's Prime Minister, her exposure may have helped boost adoption, which is now an estimated 38%. Participation is voluntary.

SALMINEN: We have a web-based system where you can go in and you can tell about your symptoms. If there is judgment based on the answers that you may have really been exposed, then you will be booked a test time immediately.

FAKE: Automatically, from the app?

SALMINEN: Yeah.

FAKE: So this is, I think, a really important part of the app, which is that it doesn't just tell, they tell you that you're positive.

SALMINEN: That's right.

FAKE: It tells you then what to do next.

SALMINEN: Yes. Yes.

FAKE: Finland passed a law specifying the purpose and powers of the app, including that it's temporary.

SALMINEN: So the app will disappear after the pandemic is over. And the other thing is that the app does not store any personal information. That's specified in the law, that it's not allowed to do it. It does not store where you have been and who you have seen. It only recognizes that there are some phones that have been close to you in the past two weeks and after that forgets them. And then actually the whole source code was published. Several other institutions, both cybersecurity specialists, independent ones, sifted through it and tested it thoroughly. But I think the public sort of scrutiny of both the source code and the actual testing of the app in advance was quite beneficial.

FAKE: Countries across the globe have been racing to deploy contact-tracing apps. The rush is justified, but as anybody who's built an app can tell you, that speed comes at a price.

In the case of Norway, apps that were rushed out in the spring, then had to address major issues around data mining and poor security. Rushing out a contact-tracing app not only lowers its efficacy but also its adoption rate. And that could undermine the entire endeavor.

Despite the potential public health benefits of smartphone contact tracing, country after country has been trying to fight the pandemic while at the same time preserving privacy. That's also true in the U.S.

DANIEL KAHN GILLMOR: The top-level piece is that these things need to be voluntary. There's no reason why a society should require everyone in the society to opt into a form of electronic surveillance. Like, that's just a recipe for trouble.

FAKE: Daniel Kahn Gillmor is Senior Staff Technologist for the ACLU's [Speech, Privacy, and Technology Project](#). He's written guidelines about the safeguards we should expect from these systems in the U.S., so we can address, as he describes, "the crisis of the pandemic without also creating a permanent crisis for civil liberties."

GILLMOR: Part of the measurement is knowing as a society that these things are having an effect. But the individuals who use the thing also need to know that it has a positive effect on their life.

If we just tell people you have to quarantine now, therefore lose your job, therefore lose your income, therefore lose your ability to pay rent, therefore lose your home – like, forget it. I don't want that app. Right? I'm gonna turn that off.

Some people don't have a smartphone capable of running this, right? Some people have one phone, but they share it among the three people in their house that need to go out and work outside of the home. So if you're sharing your phone among three people, and it gets an alert, what does that mean for the folks who are sharing the phone? Right?

FAKE: Yeah.

GILLMOR: We can't require this, because people will also work around it if they don't feel comfortable with it.

FAKE: What do you think are the most important questions that a citizen could ask about the local deployment of a contact tracing system?

GILLMOR: That is a great question. I would love to see more people asking of their local health departments – that might be their state health departments in the U.S. So one question is, how are you decided that these things are actually useful? And what are your criteria for turning it off? Right? Don't just tell me what you're measuring. Tell me what the thresholds are that you think you need to turn it off. But like, let's hear it; like, do you have a plan for it? A responsible public health department will have an answer for that.

I also think they should be asking who gets to decide when someone is sick? Is it everybody who has a medical license? Is it nurses? Is it testing laboratories? Is it the guy at the convenience store?

I'd like to know that that's an alert coming from someone that has a plausible way of measuring whether or not somebody actually did have the virus. I'd also like to know, for the local authorities, what are your commitments to using this for non-public-health purposes? What if immigration enforcement simply stood down and said, "We promise we will never use this information for immigration enforcement. If it comes up in a hearing, judges should dismiss it." You could certainly ask your local police departments if they're committed to not using it. You can ask your local housing authority if they would commit to not measuring these distinct chirps as a way to try to bust you for having too many people in your home.

You could look for assurances from the agencies that might abuse the system, that they won't abuse it and get those things in writing and get them public.

FAKE: Right. Well, I mean, having actually the question asked of public officials, I think, in and of itself, is a worthy action.

GILLMOR: Yep.

FAKE: You know, even if you can't get assurances, it's publicly discussed, statements are made, you know, you can go back to these if there's any kind of violations in the future.

ANIKA ULLAH: So I think typically, at least in Silicon Valley tech culture, you know, I see people, people who don't have lived experiences with something that come with a really cool idea – and they say, “Hey, I think this could help a lot of vulnerable people,” but we're so removed from the reality of the world that we often have these very simplified models in our mind of how the world works.

FAKE: Anika Ullah is someone who is uniquely positioned to reflect on many sides of this conversation. A former Fulbright/National Geographic Fellow, she's doing research at the intersection of tech and health and environmental justice. The impact of this pandemic on her life has been profound.

ULLAH: So overall, we've had a, just from our extended family members, 32 people who have been infected. Out of that, nine people have passed in our extended family, and six people in our direct family.

FAKE: Anika is now a masters student at the MIT Media Lab, and an aspiring physician who was born and raised in Silicon Valley.

ULLAH: My family currently spans a lot of different places, but in terms of where they've been impacted most by COVID, it's been in three places. So it's been in Bangladesh. It's been in the Kolkata region, in India; and in New York, in the Jamaica community.

FAKE: Among her many personal stories, in Bangladesh, she has a cousin who's a manager in one of the garment factories.

ULLAH: When COVID hit it, it turns out that they were actually only shut down for a week or so before the workers themselves, and many people, were saying that they needed to reopen. Because without that source of income, they had no means to feed their family or themselves.

FAKE: Her cousin brought the virus home. The whole family was infected and his wife died. In Queens, Anika had a family friend who worked as a cashier at a grocery at the street level of an apartment complex, who also died.

ULLAH: And that apartment building had something like, I think about 50 cases of COVID identified. And from that, 17 people had passed. I find that for immigrants, especially in vulnerable community members, you know, people still face a lot of these difficult decisions of, you know, financial burdens versus being able to provide for their family.

FAKE: For Anika, the potential downsides to contact tracing and smartphone apps aren't simply about getting people to trust the technology – it's about making sure that people are empowered enough to use it in the first place.

ULLAH: What I think the main hurdle might be, though, is the lack of coordination with either government or the nonprofit sector to ensure that people have the means to comply with the things that make contact tracing work — which means, you know, if you get phone calls and you're likely to have COVID, you need to be able to, you know, have the capacity to stay home for 14 days. So there needs to be maybe social welfare or a system to be able to drop off food for these people. We really need to provide people those things so that they can comply.

FAKE: She raises an important question: How do you develop a technology that's flexible and adaptive enough not only to serve vulnerable communities but to earn their trust as well?

ULLAH: If it was me, what I would do is I would try and find out what demographic of people are most likely to contract COVID. Who has the highest mortality rate? And then I would probably try to assemble a committee of, you know, these diverse people where they can come and share their experiences of what's happening. And sort of almost like a steering committee, where a technologist could work directly with people from vulnerable communities. Compensating them for their time, that sort of thing.

When I go on the ground to these different communities that are impoverished, we're just so far behind. And it's just really sad and made me think, how can we be talking about these really high-level sparkly ideas without looking at the reality of things and sort of our infrastructure?

[BREAK]

FAKE: Kevin Esvelt of MIT calls this pandemic “a tragedy that's an opportunity.”

ESVELT: Even most scientists don't agree that we're in as much peril from future pandemics as I do.

FAKE: We've been talking about how contact tracing depends on widespread participation and trust in the entities doing the tracing. But while we are still trying to figure out how to control our current pandemic, Kevin is thinking about the next one.

ESVELT: I look at it as, look, we get hit with something COVID-level every hundred-ish years. And that means next year there's a 1 percent chance of a new COVID. And there's a 1 percent chance the year after and the year after and the year after and the year after. And that's if nature takes a crack at us.

FAKE: And those wildfires we mentioned at the top of the show are still on Kevin's mind.

ESVELT: Do you know what fraction of wildfires today are somehow human-related?

FAKE: I don't.

ESVELT: Data from California says it's over 70 percent are somehow related to human activity. That might be our electrical lines. It could be, you know, engines backfiring and sparks. But a lot of them are human-related.

FAKE: Yeah.

ESVELT: And 10 percent are arson.

FAKE: For real? Wow.

FAKE: Kevin's unique in that he feels morally responsible for the consequences of his research. It's worth noting again in his personal history that he played an instrumental role in developing a technology that allows a single researcher to edit an entire species.

ESVELT: Here's what haunts me. A lot of scientists, and many people who are just interested, the lesson they've taken from COVID-19 is that we need to know which viruses in wild species might jump to humans and create a pandemic. We need to map all the viruses out there from bats, from pangolins, from civet cats, from mice, from rats, from whatever – we need to sequence all of them. And we need to learn exactly what it is that allows them to jump into humans. And that makes a lot of sense if what you're worried about is natural, biological wildfires. Natural pandemics. But if you think, well, you know, 10 percent of forest fires are the result of arson? And then you think of the famous Richard Feynman quote. "What I cannot create, I do not understand."

And it makes you wonder, do we really want to know exactly what it takes to turn a given natural virus into a human pandemic? Because if we learn that, and we disclose that information as we will, because that is what the scientific community does, we are telling everyone how to make a new pandemic.

Is that something we really want to do?

Now, many of my colleagues say, "It's always better to know. Because if we know, then we can come up with defenses, we can work together." And that's a shining, inspiring vision of human cooperation. But I look out at the world, and I think, are we managing to defend against this pandemic effectively enough? Because remember, this one only kills 1 percent of people. Past pandemics had much higher fatality rates. And we should take that into account when we're deciding should we learn how to make pandemics.

FAKE: Kevin says we were caught off guard by this pandemic, and we must never be surprised again. The next biological wildfire could burn with invisible smoke and flames, leaving no signs of its passage until it's swept through.

And he says there are a few things we should have two years from now, and has developed strategies, like an early warning system, protections that we can develop faster than a vaccine, and dedicated resources for coordination.

ESVELT: So what I've learned from all of this is that we just need to be humble. We don't have all the answers, and so we need to respectfully listen to other people with different ideas of how things work. Because they probably know something we don't. We probably know something they don't. And we have to give one another the benefit of the doubt. Because only if we trust one another to have good intentions can we get anything done at all.

FAKE: Kevin Esvelt's vision of a near future where pandemic response has been fully reformed may be years away, but the future arrives bit by bit. Progress is piecemeal. The situation seems dire, but perhaps there are reasons for cautious optimism.

Maybe we've hit enough dead ends, learned enough about what not to do, and the remaining options are a little clearer. And maybe bi-directional contact tracing is one piece of that future that will get here soon enough to make an impact.

Look, I don't get to decide should this exist? And neither does this show. Our goal is to inspire you to ask that question and the intriguing questions that grow from it.

LISTENER: How are we not already doing this? How is contact tracing not going backwards and forwards all the time?

LISTENER: Brings me back to post like 9/11, when the major question on everyone's mind was like well, how much privacy are we willing to give up for security?

LISTENER: I don't trust the phone companies. I don't trust big tech. God knows, I don't trust the government with my data. What a mess.

LISTENER: I hate Americans. You know, just none of us are gonna do this.

LISTENER: But then I start thinking, everybody's got my data everywhere.

LISTENER: Stop worrying about the data?! 200,000 people have already died in this country, and it's not over.

LISTENER: Contact tracing requires the public to fundamentally believe experts and believe in science. That's the first problem that we need to solve.

FAKE: Agree? Disagree? You might have perspectives that are completely different from what we've shared so far. We want to hear them.

To tell us the questions you're asking, go to www.shouldthisexist.com where you can record a message for us.

And join the Should This Exist newsletter at www.shouldthisexist.com. I'm Caterina Fake.