



**Transcript for Law Enforcement and Genetic Data:**

Welcome everyone. This event will go ahead and get started because it is one p.m. Welcome to law enforcement and genetic data. This is the second in a series of four online discussions for journalists this fall. Produced by the Hastings Center in partnership with the Center for L.S. Resources and Analysis Sera, a federally funded project that builds the community of researchers focused on the ethical, legal and social implications of genetics and genomics. We are pleased to be joined by Sarah Zhang, a staff writer for The Atlantic. CeCe Moore, a genetic genealogist. And Ellen Wright Clayton, a professor at Vanderbilt University's Medical and Law School, who is a leader in the field of law and genomics and a Hastings Center fellow. We hope for a strong participation from the journalists, journalism students and journalism educators in the audience. Please type questions in the Q&A box at the bottom of your screen. You can also use the chat function to share relevant resources. This event is being recorded and will be available on the Hastings Center's website later today. It will also be available on the CERA website, Elsihub.org. Now I would like to introduce Mildred Solomon, president of the Hastings Center, who will say more about the annual journalism discussion series.

Thank you, Ana. And welcome to all of you, our guests. This event is the second in a series of events which the Hastings Center has launched this year and will continue to offer going forward on an annual basis. We're calling it bioethics for journalists. The series is a set of discussions to help journalists identify ethics questions and to pursue investigation of those questions on a wide range of emerging topics in health and science. The series is part of the Hastings Center's Callahan Public Programs, which is named for our co-founder, philosopher Daniel Callahan. Callahan Public Programs is an initiative that's been established and supported by the Andrew and Julie Kleynhans Dean Family Foundation and the John and Patricia Kleynhans Dean Fund. In honor of Dan and his commitments to public engagement, I'd like to express deep appreciation to the Klingons team family for their vision and for their support. The theme for this year's series is genomics and society, new developments, new questions, and we're undertaking this year's events in collaboration with the Center for ELSI Research and Analysis, which is a project led at Columbia University by Dr. Sandra Lee, who heads the Division of Ethics in the Department of Medical Humanities and Ethics at Columbia. Many thanks to Columbia and Dr. Lee for this partnership. The Hastings Center is a bioethics research institute that produces scholarly analysis and policy recommendations on a wide range of ethical questions in health, health care and the life sciences. In addition to our research, we have a co-equal commitment to public engagement. We believe that in a democracy, educated citizens should participate in decisions raised by advances in biomedical innovation, health and science policy and journalists are absolutely

essential to that kind of public engagement. Yet as a profession, you are under increasing assault. Business models for journalism have changed, creating major challenges. And now the proliferation of misinformation and disinformation has made it extremely difficult to figure out how to help people district distinguish truth from illusion. We've launched this series to support you in the difficult but important work that you do. Today's event is on the use of genetic data by law enforcement to identify criminal suspects data that comes from many sources, including a great deal from direct to consumer genetic testing companies and ancestry sites to help us grapple with these issues. We are lucky enough to have a very distinguished moderator, Sara Zhang. She's an award winning staff writer for The Atlantic, and she's covered a number of critical issues in science and health. Sarah, we feel very fortunate to have your steady hand as moderator for what promises to be a really great session, so I'll turn it over to you right now.

Oh, thank you for that really kind introduction. Thank you to our panel for being here today and thank you to everyone who's also tuning in today. As I said, the beginning of the panel, we will be having some time for audience Q&A. So do you be thinking about what you would like to ask our panelists and you can type them into 20 bucks to occurred to you? So, you know, as I was preparing for this panel, I was thinking that this is a really great time to be having a conversation about law enforcement and genetic data because of both elements of the DNA. And the law enforcement has kind of been at the center of a lot of conversations about how we talk about it in society, but also how we, as journalists should be covering it. On the DNA side, obviously, we're getting to the point where DNA is just mainstream in a way it never was, you know, 10 years ago it used to be. If you wanted to know about your DNA, you got to be part of a fancy lab. Now you can go get an Ancestry DNA or 23andMe. You can talk about Christmas with your mom. It's just we have we're having a lot more conversation about how we think about how to interpret our DNA and also how what expectations of privacy that we have. And on the other side, on law enforcement, you know, I think there has been a real conversation within journalism about how to cover crime, how to cover race in the aftermath of George Floyd's death and the protests last year. I think that really also sparked a lot of conversations about how to think about law enforcement as forces, you know, in a daily newspaper when you're kind of reporting just what happened every day, there's sometimes a tendency to take the police report as the default for what happened or the official record for what happened. And as we saw in the case of George Floyd's death, the initial police statement, it was man dies after medical incident during police interaction, which massively understates what actually happened, to say the very least. And so, you know, as we're having this conversation, I do want to keep in mind that DNA enforcement is not entirely new. It goes back to at least the 1990s. In the mid-1990s, when the Department of Justice and the FBI set up a database called CODIS, which stands for the combined DNA index system. And this is made up of today of millions of profiles, mostly of people who have been arrested or convicted of a crime or a crime scene DNA. And so if you've seen CSI and heard about a rape kit being processed, for the most part, they're probably searching for hits or matches in CODIS. Since then, there have also been state and local jurisdictions, state and local jurisdictions that have set up kind of their own DNA databases. They sometimes been called shadow DNA databases just because it isn't always that much oversight over who DNA can go into them. So, for example, there have been cases where people have been stopped for traffic violations or stopped just because there was a suspect nearby and the police were able to sit in front of everyone. And then that swab this momentary interaction then goes into DNA, of which DNA database might be kept forever. So I'm going to get a little bit technical here just because I

think it's important to understand why CODIS and for everything that came before the Golden State Killer, a case that you're probably familiar with quite well, that's actually a little bit different from what then happened in that case. So in CODIS, you're not storing everyone's entire genome. All that's being stored is actually just 20 markers a few hours. And what you have to know is that just a few years tend to be really, really variable from person to person. They differ a lot from person to person. So you can, in most simple cases, pretty reliably tell whether, for example, a blood spot belong to one person or not. But the reason that CEOs are chosen is that they actually don't tell you very much anything about anything else. They don't really give you any information. They can't tell you what genetic risk diseases that you're predisposed to, and they can't tell you, you know what color your skin or what you look like, what color you're at for that you actually have to use a technology called genotyping, which instead of looking at 20 markers, you're actually looking at something like maybe 700000 markers across the genome and looking at what letter is that that particular spot? So if you have taken an AncestryDNA test or a 23andMe test, this is what happened. And as you know, these are also way more powerful that can tell you a lot about your genetic ancestry. It can tell you about whether you're predisposed to cancer, breast cancer or colon cancer. They can tell you maybe your eye color and your hair color. And so the Golden State Killer case, where the police first made use of this technology, they used DNA profiles from companies like AncestryDNA and 23andMe cases. Those cases are not directly involved this company. And that case was users who had voluntarily kind of. Downloaded their own profiles and uploaded to genealogy sites. And before before we knew that this could be true crime genealogy are routinely used by people who are just simply trying to build out their own family tree, or sometimes those adoptees were looking for birth parents, or it was the children's sperm donor through looking for their biological father. But then, in April 2018, the Golden State Killer was arrested, and it became really clear how powerful this technique was and also how much more information was put in the hands of one person. So in the immediate months after the Golden State Killer, as police started using this technique, you saw dozens of cold cases that were just suddenly solved, and an awful lot of questions about privacy were raised, of course. So on one hand, these databases were originally created for genealogy with a lot of personal information at the time that these people didn't know how they thought their information could be accessed by law enforcement. On the other hand, you know, anyone can sign up for these sites. So why should we say that law enforcement can't do something that you and I can do? But if we're going to allow a law firm to do that, how do we then also safeguard the privacy of the people who been here? And if they do, and actually not just the people whose DNA are directly in those databases that people who are related to them because, you know, if my sister, for example, the data of her DNA that can implicate me even if I didn't want her to or didn't even know about it. So I think these are some of the questions I hope we can tackle over the next hour or so. I'm really excited and really be part of this conversation because a both know a lot about this topic would come from really different backgrounds. So CeCe Moore is the chief genetic genealogy probe on a lab where she has the genetic genealogy services for law enforcement. She's worked on dozens, if not hundreds, of cases. Find a person at this point. And Ellen Wright Clayton is a bioethicist, a professor at Vanderbilt, who's been writing about genetics and the law in all sorts of contexts and not just crime. So with that, I will hand it over to our panelists for the introductory remarks, and we'll start with.

Hello. How are you? Glad to be here today to get this started. I wanted to talk a little bit about investigative genetic genealogy and practice. And first of all, I wanted to talk about the terms

that we use for this new field. There's a lot of different terms that are being used out there by law enforcement and by the media. And I really prefer the term investigative genetic genealogy. I think it's maybe the second most popular one. The first is probably forensic genetic genealogy, but investigative genetic genealogy really sets apart what we're doing. There has been forensic genealogists in the field of genealogy for many, many years. And what they do is very different than the work that we're doing with law enforcement today. And so in order to delineate between those two different fields within professional genealogy, I strongly advocate for the use of investigative genetic genealogy because it's very unique and different from the others. Some people are using the term long range familial search, which is problematic because what we're doing is not technically familial search that's done within the law enforcement databases that Sarah just talked about that use the stars. So the CODIS database, we are using a totally different type of genetic marker and technique. And so by using familial search, it's really confusing between those two different types of genetic database searches. Also, familial searches are on compel DNA people that were compelled to provide that, and genetic genealogy is on voluntarily submitted DNA. And so I strongly request that we start using the investigative genetic genealogy term whenever possible. So what databases are we using for this? Well, primarily we're using GEDmatch, which is a third party raw data repository, meaning they are not taking DNA tests. You're not sending saliva into them or swabs. They are accepting raw data uploads from people that have tested at other consumer DNA testing companies. They have about 1.5 million genetic profiles now as of May 19, 2019. If you want to be part of the law enforcement matching tool, you have to actively opt in. And so about five hundred thousand people have done this. So for violent criminal identifications, we only have access to about a third of that database. However, in January of this year, they changed their policy. So if we are working on an unidentified decedent trying to identify someone who's passed a Jane or John Doe, we have access to compare against the whole database, which is about 1.5 million, as I said. We are also using family tree DNA as our secondary database. It has about one point twenty five million genetic profiles. And there you have to actively opt out if you don't want to be part of the law enforcement matching pool. And so only a very small number of people have done that. So we have access to most of that database where, as Sarah mentioned, these profiles contain about 700000 snips or genetic markers. Now, the largest database is our AncestryDNA 23andMe and My Heritage. DNA Ancestry probably has 15 million people in their genetic database now. 23andMe over 12 million and My Heritage DNA about five million. But we can't access these for law enforcement matching. This is a big misconception that's out there, and I really would love it if the media would become educated on this particular aspect. Very many articles will say that Ancestry DNA was used or 23andMe was used. And that's just not the case. We do not have access to them. There are terms of service for law enforcement's use. 23andMe and Ancestry DNA. I don't accept uploads, which means that you can't just upload a file into their database. For comparison, My Heritage DNA does accept uploads, but they are barring law enforcement uploads. We can't use the CODIS database. It has about 20 million profiles in it, but it's a different type of genetic marker, as Sarah explained. And so we can't use that for genetic genealogy. So once we've uploaded into these databases, it's not an automatic assault, as some people think there's a lot of work and a lot of considerations. And you have to remember that only the most dedicated genealogists have uploaded to GEDmatch. It's a much smaller database. A lot of people didn't know about it. Now, more do, but it's a small percentage of the people that have tested, and this is usually because they're highly motivated to solve a significant family mystery. They might be adopted. They might have misattributed paternity. Maybe they took a

consumer DNA test and found out their father wasn't their biological father. They might be donor conceived, or they might have significant genealogical brick walls. And so if they don't know their biological family tree and if their paper trail, their documentary trail is not representative of their true genetic inheritance, that, of course, can impact our our being able to use them to identify the person we're working to identify. The other consideration is that genetic genealogy databases have what I call a reverse bias in law enforcement databases. As you may know, it tends to be heavily weighted toward minority type of DNA in law enforcement, sorry in genetic genealogy databases. We are working with people who mostly have primarily northwestern European DNA ancestry. Sorry. And so that's not to say there aren't African-Americans people of Latin American ancestry or recent immigrant ancestry in these databases, but there are far fewer. And so we're much more likely to be able to identify someone of primarily northwestern European ancestry and someone who has deep roots in the United States. There's a lot of misconceptions out there that I'm always trying to dispel. One is that we have access to the matches, raw genetic data or DNA code. We don't we are not able to access that. What we get is a list of people who share what we consider significant amounts of DNA with the person we're trying to identify. That might be less than one percent of their DNA, and it often is. And so we just know how much DNA is shared between these two people and the locations on the chromosomes. I also don't have access to any sort of enhanced information on these matches. I only have access to what anyone would have. Most people only have their name and email address. A lot of people use aliases, and I don't have access to learning anything more about them any more than the public does. And at this point, as I'm working with law enforcement, I actually have less access because of the opt in requirements match. As I mentioned, we do not have access to the largest consumer DNA testing databases for investigative genetic genealogy. So I'm working on an adoption case to compare against about thirty five million individuals. But for law enforcement, it's a much smaller number. Maybe about one million, maybe 1.5 million or so. There's some overlap between the match and family tree DNA databases. Very often I get asked, what's the one match that solved the case? And this should never be the case. It should never be one match that identifies or helps to identify one of these individuals. It should always be a network or a web of matches that are all helping you reach the same conclusion or pointing in the same direction. So even if we get a very close family match, it needs to be vetted because somebody's family tree on paper may not reflect their true genetic origins. So this is an instance where skill level and experience is really important in doing this work. Another is that investigative genetic genealogy techniques are new, which is not true. They may be new for law enforcement applications, but I started developing these exact same techniques over a decade ago for people of unknown parentage. So these are already tried and true. We have helped hundreds of thousands, if not millions, of people reunite with newly found biological family. And so we've known the power of genetic genealogy for a long time. And for those who think that this is a new thing, Pandora has been out of the box for some time. It was just not something most people were paying attention to until law enforcement started using it. One of the most important misconceptions is that people believe most of the research that I'm doing is using genetic information, but it's actually public records. I don't spend much time analyzing the DNA. I really just need to know if two people share DNA, how much, and then I use that amount to predict how closely or distantly related they are. And then I'm immediately turning to the public records and building trees. Building trees is what I'm doing all day. Every day I'm using public resources like family search, dot org newspapers dot com genealogy bank, which is also a newspaper archive, an obituary archive been verified, which is a people search database. Google I might go

20 pages back and Google looking for information and places like white pages premium. And so once I know how much DNA is shared, the rest of the time, I am trying to find information about this individual's family. It's somewhat rare that they have uploaded their family tree to these sites, so I have to determine who is the contributor of that DNA. Who are their parents, where their grandparents and so on. And to do that, I'm using public record resources. And let's talk about social media. I am spending a lot of time on Facebook learning about people's families, family structures, et cetera. And so if people are concerned about genetic privacy, my point is really they should be equally or more concerned about what's been put out there on social media about them and their family members. Your DNA means absolutely nothing to me. If I can't figure out how to build your family tree, who you're related to and then what that family structure is, another misconception is that genetic genealogy can lead to an arrest. Well, it can't directly lead to an arrest because what we provide is really just a tip. It's a highly scientific tip. It's a lead generator, but law enforcement has to do their due diligence and do their full investigation like they would if I called in a name to Crimestoppers. They should never arrest someone that you hopefully never will arrest someone based on genetic genealogy. They have to get that match to their cherished traditional forensic profile that CODIS profile before they arrest anybody. There's a lot of focus on the arrests, but genetic genealogy is real power is to eliminate the vast majority of the population from ever being under consideration, even if we haven't been able to narrow it down to one person or one immediate family. We can still help to eliminate the vast majority of the population from even being a person of interest. And the more matches we have and the more data we have, the more we can narrow it down. So this chart here, I don't have time to go through it. But this is an example of building family trees for 13 matches, identifying common ancestry, which you see a. Common ancestors, what you see up in the colors above and building forwardly. And so there's a misconception that limit we have for investing you. All in how less? It's absolutely the opposite. The more data, the more math we have, the more we can narrow it down to just one family or one individual in, the higher the skill level is of the genetic genealogist, the less number of people that will ever be looked at in an investigation through the genetic genealogy methods. So in this case, we had four genetic networks of common ancestors that tie together eventually through one marriage. And this ties all 13 matches to one immediate family, and there was the focus eventually to just two brothers. This is a case where they had interviewed thousands of people before DNA tested hundreds of men, and all of those people ended up being innocent because of the one person it ended up being. John D. Miller was not even. On their radar, he didn't appear in their final investigative genetic genealogy is we can eliminate the need to interview hundreds or thousands of persons of interest. We can keep the focus off the innocent from the very beginning, hopefully help lower or eliminate the number of people that are being wrongly convicted if they never get pulled into the investigation in the first place. We can conserve and focus their agency and public resources for more efficient investigations. Save public funds. Obviously, we can make society a safer place by helping to identify these violent criminals and get them off the streets, and we can provide answers to victims and their families. My team alone has had positive identifications and over one hundred eighty cases. Now we're averaging just a little over one four weeks since we started doing this service for law enforcement three and a half years ago. Most of these are violent criminals, although we also work with unidentified decedents, so some of our cases have been that as well. I don't call them solves because we're really not solving the case. We are helping to identify the DNA contributor and some of these cases. We were successful in doing that, but that person was ruled out through further investigation as having anything to do with the crime. So just because

their DNA was there and identified, it didn't rush law enforcement to arresting that person, and further investigation explained why that DNA was there and they were not believed to be the perpetrator. Have any of these cases gone to trial? Yes, 12 cases have gone to jury trials where the perpetrator or the suspect was identified through investigative genetic genealogy. 10 of those were paramount cases. My team's cases and two were cases worked by other genetic genealogy providers. All have resulted in conviction by jury, so the juries have been accepting this, understanding it. However, it really hasn't been a big part of the trials because the precedent so far that's being set is that genetic genealogy is really not relevant. It's not evidence what needs to be presented in court. It was just a lead, and what they present in court is that DNA match. They get to that traditional forensic S.T.A.R. profile. There are many more cases that have resulted in guilty plea convictions, and there are many cases that are working their way through the courts that have been delayed because of COVID and a lot of the the courts being shut down. So many, many, many are working their way through the courts still. So there is a real, immense power behind genetic genealogy. It can really help us to identify these violent criminals and to provide names to the deceased individuals that have been waiting for years and decades in some cases. But with this immense power becomes it comes responsibility. We have to treat this tool with in responsible ways and ethical ways if we do not follow best practices. It could slip out of our hands and we could lose this tool. We could lose public trust. And so it's so important that we use this tool ethically. We follow the rules. We follow the company's terms of service. We are very careful with the identities of the matches and protect those, and we make sure that we are handling this very powerful tool with responsibility. What's the future? I think it's very bright as long as we treat this tool with responsibility and ethics, as I mentioned, and I hope we will be able to use it to eventually identify tens of thousands of violent criminals and resolve these cases. This is my contact information. If you're interested in reaching out. Please feel free. Thank you.

Oh, thank you for such an informative presentation kind of close to the ground telling us exactly how this works. Next, we'll have Ellen whenever you're ready.

OK, here we go. Thank you so much for inviting me to come here today, and I'm going to follow up on on Susan's incredibly helpful talk to raise some of the ethical and legal issues that have been that have been raised by this technology. OK. The big question is to what and to what extent and under what conditions should law enforcement be able to access genetic information that was collected for other purposes? The focus today is on direct to consumer genetic testing. But the fact of the matter is there are other sources of identified genetic information, most notably the electronic medical record. And it should be noted that the Health Insurance Portability and Accountability Act allows access. This sort of data, however, is more useful for confirmation than it is for the genetic genealogy that see has so clearly discussed. So what is the added value of this direct to consumer data for law enforcement? We know that more than 20 million DNA profiles of people of people who have been arrested or were convicted of a crime either in CODIS or in state and state reports, state or local repositories. But as we know or would suspect, these profiles are primarily come from minorities because that's who gets arrested or convicted in this country by and large. And a recent law review article in California Law Review actually goes through some of the data that shows who is included in those databases. And as as we've already heard, and I'll make a few more points about this. More than 40 million people have pursued direct to consumer genetic testing, and many of them have posted their personal results on the internet, which some projects will make it possible for most people of northern

European ancestry to be identified. This is a citation to an article by Yaniv Erlich and his group that makes this claim. But one of the things that I want to make here and emphasize here is that something that Sarah pointed out, which is that it's not just the DNA of the person who posted their DNA up there, but it's also their relatives. I've never posted by DNA to the web that I know of, but certainly my sisters could my cousins, many other people in my family, all of those would implicate me. And so that is the reason why these data, because they primarily come from people of northern European ancestry, are potentially could identify most and most people of that ancestry. The public is deeply conflicted about this use of data by law enforcement. This is an article from the Duke Law Journal that came out this year, where they where they. Surveyed three hundred and twenty three respondents about how intrusive they thought that. So law enforcement use of direct to consumer genetic testing results would be and about 70 percent of them said that it would be that it would violate their expectations of privacy. There were actually a number of questions and it was all on a continuum. But nonetheless, the majority of them thought that the law enforcement using DNA data was problematic. Another study people who are more willing to permit access to DNA data to solve crimes and to prevent crimes. Another issue that people think about also another study that I would alert you to is one that appeared in Public Health Genomics just recently, where they interviewed a number of people who had had a direct to consumer genetic testing. And they too were somewhat concerned about about the invasions of privacy and particularly concerned by about law enforcement. This graph to my right, which I guess is to your left, is an interview study that was done a number of years ago by but McGuire at all, where they asked people about whether law enforcement should be allowed to search geologic databases to create fake profiles, which was a strategy that was used in identifying the Golden State Killer and about whether these companies should release their information about their customers, generally for nonviolent. They were less enthusiastic about nonviolent crime than they were about identifying perpetrators of violent crime or our children, or were missing missing individuals. But nonetheless, the picture that I want to give you here from the published data is that people are of mixed minds about this. They are really not at all clear. And then finally, I want to talk about some focus groups that we did in our group regarding ancestry testing, where we actually asked a number of questions about what they thought about family finding all the other reasons that people actually primarily use ancestry testing. And what we have found is that used by law enforcement was by far the most polarizing topic we discussed people in general. So that finding relatives was a pretty good thing. But the idea about law enforcement and what would happen was something that they were really quite troubled about. Some endorsed the importance of finding criminals, and so this issue is unequivocally great. Others cited Big Brother, and they do that in the most literal terms that they really were concerned that this would lead to the surveillance state. That in a way that they didn't like. They also varied in whether they thought it would be alright if one of their relatives were identified as a suspect in this way. One respondent said So you know, we all have that uncle who we think is kind of shady. So if they found him, they'd probably be kind of like where others said, You know, you have to protect your tribe. And so the one question that we didn't ask that I wish we had asked is what they were doing if they were detected as somebody who were possibly involved in criminal activity because one of their relatives, a sibling, a cousin, an aunt and uncle, had posted their DNA and that that was the tip, as she said, is never enough. You always have to do further police work that led them that way. So this is to the point that I want to emphasize is that this is something that people are worried about. I'm hopeful these results will be published soon, and I was hoping to say so today, but I didn't get the news in time. So I want to talk a little

bit about the evolving landscape. As U.S. has pointed out Ancestry and 23andMe, they vowed to resist access by law enforcement. Some prosecutors have sought warrants and some judges. A few judges have actually even issued warrants. This is a big deal because Ancestry and 23andMe may have been very important and very vigorous in opposing all of this. Other science, such as GEDMatch and Family Tree DNA, have varied in their policies, and I want to say how that is looked from my perspective, because you really laid this out appropriate very well. GEDMatch when the identification of the Golden State Killer happened, they got a ton of heat. This was a database that was simply set up to facilitate family finding and ancestry. And so they and they varied a lot in their immediate policy about whether to permit use by law enforcement. And as you say, they have had an opt in policy. Family Tree DNA, interestingly, decided to take a different tack for a while. They actually said, come and get testing or get testing at Family Tree DNA because we, your DNA, will be used to help law enforcement. Now, as you know, she says that having now doubt policy, but they are not using that as their primary advertising tool. So it really shows what a volatile space concerns. The U.S. Department of Justice has issued guidance. And in 2019, limiting the use to certain cases, usually involving very serious crime. Again, responding to public concern about how these data were going to be used, and you should know that this year, Tuesday, it's Maryland and Montana have passed laws that require a court permission before before direct to consumer genetic testing. Results can be used for genetic genealogy, and so other states are considering similar statutes, one of which is California. So this is which is, of course, 10 percent of the nation. So you are here, see that the states are beginning to listen to, what to listen to, what their citizens are saying and answering the question that we value privacy more than we value finding criminal suspects in some cases. I and my colleagues raised a fairly provocative suggestion a number of years ago, suggesting that what we needed was a universal genetic forensic database. Sorry, that's the title. I can't get rid of it. So you see, but our proposal there was. Might it be a desirable thing for people to be able to do direct to consumer genetic testing, which they do primarily for ancestry testing and primarily for family responding to a much lesser degree for health finding and and allow them to make those kinds of connections if they want them for that purpose and that instead for the purposes of law enforcement that what we may need instead is just a separate database that is just limited to use access by law enforcement. Now, why could that be a good thing on the one hand? This is, you know, some would say this has been brother. On the other hand, it avoids the bias that currently exists in CODIS. It also would make sure that everybody is involved and if everybody really were included, why lawmakers and like their families, maybe the lawmakers would then really put would really put protections in place to make sure that other people couldn't get access to this database? And that really would truly be limited to law enforcement as CODIS ends. So I think there are a number of questions out there that we that we will be need to be thinking about. So I want to say just a word about my acknowledgments. First of all, my collaborators on this James Hazel, who was a postdoc in our lab, who is currently now working on DNA access work in the Netherlands, Chris Slobogin, who is a Fourth Amendment scholar and who has been in this space for a long time. Brad Malin, who is a privacy expert and then our big projects in genetic privacy and identity and community settings. Because frankly, when you look at what people think about when they think about genetic privacy. One of the things they think about and that makes them anxious is access to genetic information by the government. And this is primarily what they're talking about. So I'm going to stop sharing now, and I look forward to further conversation.

Oh, thank you. And thank you for that really great overview of the policy and ethical considerations here. You know, I I was really glad that you also talk a little bit about the limitations and who should be setting limitations on investigative. Genetic genealogy is the term that the U.S. has said. So maybe I'll just start there. You know, as you mentioned, the public is pretty split on what those restrictions and what those limitations should be. So where do you think there's? Should there be restrictions and if so, what should they be and why? And Ellen, I'll start with you.

Well, I think we can certainly talk about whether there has to be probable cause or some at least justification for why you're doing the search. And again, I think that what the work that CC does in, you know, putting together family trees and identifying suspects that would then be the foundation of, you know, going and doing a search and getting a warrant as the Fourth Amendment requires is a real is a real plausible way to go. And I think that. But, you know, fishing actually fixed fishing expeditions are not ideal. So let me try to seize you and see what she has to say.

I think we need to make sure that everybody in the field is following the rules. Right now, it is legal for law enforcement to, for instance, upload against terms of service they could upload to GEDMatch as a regular kit and not name it or not, let GEDMatch know that it's a law enforcement kit and they could technically compare against the whole database. I think that should not be allowed. And hopefully, we're all following those rules in those terms of service, but I think that it's important to make sure that's happening across the board. I can only speak for my team. We always try to follow best practices and follow all the rules. I'm not necessarily sure that that's happening across the board, so that would be one thing that I would be in favor of limiting. I'm very comfortable doing this work for violent crimes as well that, you know, people can debate that, but I think that is the most justifiable use for it. As well as identifying these, Jane and John Doe's.

As you're saying, a lot of this depends on best practices within the community, the terms of services of these companies. So you know, those those things in terms of services that leave can change any time we've seen them change several times as much as we were talking about earlier. So this whole kind of just relies on people, you know, doing as they say, how do we make sure that these restrictions actually happen?

Are you asking me first?

Yes, go ahead.

I think that's a very difficult thing, and one of the problematic things about this field is that the two databases are held in private for profit company hands at the moment, and they could change their minds at any time. As you mentioned, just like Jen matched it back in twenty nineteen when they opted their entire database out of law enforcement matching and instituted the requirement to actively opt in. I'm not saying it's a bad thing, but I do think that that's problematic, so I really think it would be beneficial if there was a database in nonprofit hands or in government hands. And I actually started advocating back in 2014 for the government to start building their own snip based database for forensic use. And Ellen, I'm fine with the use of forensic. I just don't

want it confused with what we are doing. So it is perfectly fine, just not for genetic genealogy, in my opinion. And so I think I - a lot raise the idea of a universal DNA database. What do you think of that?

That's extreme. I'm not sure. I'll leave that discussion to people like Ellen. I mean, it would obviously make my job not necessary, which is fine because I'm happy working with adoptees and others, but that's obviously the extreme compared to what we're doing now. So if people have a problem with the work we're doing using these profiles, I would think they would have even more of a problem with universal genetic database. But again, I'm not an expert on that. Well, that's Ellen who is-

Well, the truth is, you know, I mean, the likelihood that that could pass in this country at this moment is nonexistent. I mean, given what's going on in this country. But I think that at least part of our purpose in doing this was to say that we need to figure out how to get rid of the virus and how to get that. That was a cleaner solution to what we wanted to, what one wanted to do about these direct-to-consumer databases than what we were seeing now. I think that what we're seeing, which Judge Matsch and with Family Tree DNA, is that they're responding to what people were telling them, which is that we want a choice. Now I know from long experience that opt out is very uncommon. Option is harder. And so I think one of the things we would want to see going forward is whether is a more robust process where people could actually make a choice about whether there, whether data about them were included in these databases and where access by law enforcement. So that's always a possibility. I always think of these things. And what's the possibility for the individual to control? What's the governance mechanism? Know, what should these banks be doing? I am confident that one of the reasons that both GEDMatch and Family Tree DNA are more cautious than they were was they figured it out that doing what they were doing wasn't going to work and that it was going to make people unhappy. So. So I think that that kind of oversight and then looking, then looking at how we think about downstream users and what are appropriate and what are not. And and I think you're important to see about not uploading fake records is a really is a really important one because again, we want a notion of transparency at ways and that as a general rule and that violates that. So I think that those things are all are all part of the solution to this. I think a universal database is a nonstarter in this country at this point. But it sure allowed us to make some points about, you know, if legislators had a skin in the game, if they were it, if their family was at stake, maybe they'd pay more attention to protections. That was really part of where we were going.

Well, one of the good things about using these genetic genealogy databases is that reverse bias, as I call it, we are leveling the playing field to a certain degree because we are able to identify people that have stayed under the radar for years and decades using the law enforcement databases. People, as I said, was primarily Northwest European ancestry with deep roots in the United States. So it is making a lot of people identifiable through these databases that were not identifiable through the law enforcement databases. And so in that way, it does level the playing field a bit.

Yeah, I think that's what both of these are really good issues to keep in mind for journalists that both of these databases are biased, but they're biased in very different ways. I want to think of that back to the case that kind of kicked off this conversation, which is, of course, the Golden

State Killer case. And we're a little bit over two years out, the news first broke and I was hoping to ask both of you as you watched the journalism coverage, what did you think of it? Because in some ways this is like perfect catnip media story, right? This infamous serial killer serial killer case solved using innovative technique, Neal. Every journalist was trying to jump on this story. I'm sure you've got a lot of calls during that time. What did you think of the journalism about that case and were there good or bad examples that you would point to? Might we start with you this time, sir?

Because I was the genetic genealogist that was most known for educating the public about this, I did receive nonstop calls and requests. I had already spoken to a lot of the journalists in the past about this field, as I think Sarah knows. And so they knew to contact me, even though I wasn't directly involved in that case. What I spent my time trying to do was dispel these misconceptions the same things that I've talked about today and my PowerPoint that we used AncestryDNA or that they used AncestryDNA or 23andMe, that law enforcement had access to all those databases. Also that it's based on one match. Even in that case, although there was one match that they started with, there were multiple matches. The band of working with this shouldn't be on one person's shoulders that a family member gets identified in most, if not all, of the cases I've worked, you know, even without one person, we still would have identified the contributor of that DNA based on these other matches, we're using second, third, fourth cousins and beyond. And even if we get that closer match, we're still using those other matches as supporting information. And so I just spent a lot of time educating. Some people got it right. Some people didn't. I spent hours on the phone with many journalists from that day on a trying to make sure that the coverage was as accurate as possible and as transparent as possible. As Ellen said, I think transparency is incredibly important. I wanted the public to know how this is done so they can make an informed choice rather than from misconceptions. I want them to understand how we're doing this, and they can then decide whether it's something they feel comfortable with or not that they should do that from an educated standpoint.

Oh, and what about you? What did you think of all the journalism that came out of that particular case?

You know, I thought it was actually quite good. And the thing I thought about this case was that this is a case. Tha pretty much everybody was happy that he was part and and so I'm thinking about a case from two decades ago from Sweden, where the prime minister was killed in a shopping mall. And they identified the perpetrator using a newborn blood spot. Now, if I had to do a lot more policing to get to that and to make it just to identify the person for sure. But when there's something really bad happens, people are pretty happy when they're found. And the other thing that is such an important issue, as you said, is that it's never just the do you know, there's a ton of policing that has to happen. And that and all of that has to go on. And so I think overall, it went pretty well.

I have to say it's what helped make me make the decision to work with law enforcement because I'd been receiving inquiries for years asking if I thought my techniques could help solve some of these types of cases. And I had hesitated for a number of reasons, but it's too much to go into right now. But the coverage on that really convinced me that, OK, this everyone is seeing this very positively. Even some of the bioethicists that I really respect and look up to were writing

very positive things, and I thought, OK, well, what have I been waiting for this? Everyone seems to think this is a really good thing. And so it was incredibly positive. I think much more so than I ever imagined it would be because I was waiting for that day to come on pins and needles when this finally would happen and see how the public and my own community would react.

And so since then, it's sort of genetic genealogy has been used in that thinking. You mentioned it over almost 200 cases and your prosecution team, so it's probably three hundred approximately now, OK?

Yeah, yeah. So, you know, we've gone from this very extraordinary first case with you to I don't want to say it's routine. It's not routine yet, but it's a lot more routine. And it was what are the stories that journalists should be covering now that this is kind of like falling from the headlines, but it's still being used every day by law enforcement? What are the stories that journalists should be following and the issues they should be thinking about?

Who would you like to go first?

You know, I'll tell you what, I think the journalists needed your kind of attention to are these new laws that are being proposed in various states. The new law in Maryland, the new law in Montana, what's being considered in California? I mean, this is these are really big laws and you MAID and I don't know if you've noticed it, but there are a number of other states that have issued genetic privacy laws and various ways in the last year. Colorado, Virginia, Florida may do this. And so. And so I think and some of them are not so much having to do directly with law enforcement, others of them explicitly or doing so. And I think you really need to look and see what you know, what the states are doing and why they're doing it, what's driving it? I think that that is. You know that that's going to be enormously important going forward, so that if I mean, I'm a law professor, so, you know, so I would be interested in that, but I find this really intriguing. So what about university?

Yeah, I agree with that because there's a lot of questions about the interpretation of those laws. I was involved with the Maryland committee that worked up on that law, and I think a lot of what they put into it ended up being very beneficial. But it's difficult to understand and from the practice of it to know exactly how to interpret it and what our part is in it. Fortunately, most of the burden was put on law enforcement and that law, as it should be. But it is a little confusing for the genetic genealogist that are working in Maryland. And I haven't been working in Montana, but I'm sure will be to know what we're supposed to be doing. What we're not supposed to be doing so would be good to see some really in-depth analysis of those laws and the interpretations of what they actually mean in practice for us. Another thing I think journalists should be looking at is what I'm calling the maturation of investigative genetic genealogy. And Sarah wrote an amazing article about how the early cases were really focused on these very high-profile cases that often were white victims in line with the missing white woman syndrome. We've heard so much about recently with the Gabby case, it was following along those lines a lot of white female victims, a lot of blond women and children. And it's really changing. And I'm so happy to see that we're really getting a much more diverse type of cases where the victim is from perhaps riskier lifestyle or lower income or minority background. And I think that's something that should be covered as we're seeing less attention on genetic genealogy. I would like to see

attention on some of those cases where we're able to use this technique to benefit different groups of people, different socioeconomic status. And we're seeing a lot more cases where, for instance, sex workers have been murdered or raped. And I think those are important stories to tell as well. So I'm a little sad to see that less coverage is happening now that we're actually working with some of these cases that did not get much attention at all. I always try to read the articles about the cases when I start to work on one and a lot of the ones I'm working on now. There's almost no media coverage at all because it was this group of people that wasn't getting the type of coverage that we were seeing for the ones that were traditionally high profile cases. So I would encourage journalists to seek out some of those stories and tell those as well.

Well, it sounds like maybe you had something to add to this, or maybe you're just agreeing.

Oh, mostly just agreeing. I was thinking another thing that slightly tangential to this is that I think there's growing attention being paid to how family finding what the impact it is on people because that's also quite matched. We've done some people really like it. Some people really don't. One of my colleagues did looked at analysis from comments on Reddit, and by far the biggest emotion was about either finding family members that you didn't know you had or finding that some of the people that you were family members that you thought you were related to, that you weren't. I think that this this genealogy is an American passion. Maybe it's an international passion, but I know for sure it's an American passion. And but doing it in this way has really been a game changer. And the social consequences are going to be really interesting to follow as they as it all plays out. So I'm that's something that I'm also interested in. There have been a lot of stories in the New York Times and other places, but but so that's another thing that this kind of work as you look for adoption or sperm donors or other those or others like that, sincerely, I'm sure that the responses are sometimes complex.

Yes, and this is something that I've been working with for over a decade now, and I was encouraging journalists to write about these stories way back waiting for there to be attention put on this, and we really operated under the radar for many years. And as I mentioned, Pandora came out of the box some time ago, long before the Golden State Killer case. We have been able to help people learn. Millions of people have learned about their genetic heritage in a way they weren't expecting. I have a group on Facebook DNA detectives, and right now we have one hundred and sixty thousand members, people that have either taken tests and learned unexpected surprises or are trying to solve family mysteries. And we've probably had another couple hundred thousand passed through in the last six years or so that have resolved their mysteries. And there's been very little attention on that. And, you know, it is also complex, as Ellen said, there's a lot to study there. And I think that there's been a bit of a lag in doing that. This has been a really important development. Well before the Golden State Killer case, and there just wasn't much attention. I was, as I said, trying to get those stories out there. But it's really rich for study and there's so many different aspects of it that really should be studied by academics, by it.

Why do you think that has been under the radar for so long? Because as you were saying these techniques that you developed that you now use for with law enforcement, they were all developed to help people look for their families. And there are lots of people. Why was it under the radar?

I think people just saw it as this hobby thing genealogy. It was created by citizen scientists, not by academics and traditional scientists. And so it wasn't something that most people were that interested in unless you were interested in genealogy or you had one of these significant family mysteries. I think it just wasn't getting that much attention from people that weren't directly affected by it. But now we've seen, as Ellen said, probably 40 million people have participated in direct to consumer testing and many of those people, I would say the majority of those people have a story of their own now how it's changed, their perception of their biological family or heritage, or they know somebody that was significantly impacted. And so it's mostly, I think, because so many people have now participated and this has become so much more common for people to experience it. When you experience something personally or someone you love does that really brings it home to a much greater degree than just hearing it from someone else.

Yeah, I'm glad about the fact that know geology kind of services and science, there aren't necessarily academic papers that are published about it. You don't get a degree in it. And so I'm wondering for journalists like how do journalists then find about sources who understand what they're really talking about? There aren't really official quotations. And if you're looking for people who can comment on the larger implications, how how do you find these experts? Well, let you start with your thoughts on this.

Well, I can see as you talk about the technical part, I can tell you that there is a lot of interest now in looking at the impact of direct to consumer genetic testing. As you can see by the fact that I started a whole bunch of articles in the middle in my talk and and so I think that that and there's actually a growing popular literature, you know, the book and here are the book My was the lost family, random families by. So there there was a growing. There was a growing amount of literature out there looking at what this meant for families, and as I said, this is I mean this, this is such an important phenomenon. And 40 million people was well over 10 percent of the U.S. population. I mean, this is a big, big proportion of the population here. The impact can be dramatic. So there is some I mean, I've followed this literature, there is some literature. There's going to be more because it's such an important force. And academic literature, there's a ton of Typekit lots of. Which is gathering again to write a paper about, so yeah.

I mean, ever since the Golden State Killer suspect was arrested, it really has focused changed the focus and that has included looking more at the implications on families as well. And I think, you know, like 23andMe has recently gone public, and I've seen a lot more articles about medical findings and a known family member findings in the news as a result as well. And I think there's some connection there. I'm concerned what lurks on 23andMe stories of people finding this type of information positive stories. So I think there's been a much bigger push to get those stories out there. I will say my Heritage DNA. That company has always really seen the power of these stories and has worked really hard and put a lot of marketing money behind getting those stories out. But that hadn't happened really in previous years. I was, you know, as I said, constantly trying to pitch these stories to journalists and get these stories told. And for instance, one of those did eventually end up becoming that book The Lost Family. That was the story that I had told her and the author about many years before and eventually grew to that. And so those stories were just waiting to be told. There are hundreds of thousands of those stories out there that are very compelling as far as to your question about finding out who to talk to. Fortunately, there's a lot more educational materials out there now. There was nothing when I

started, we had to create those from scratch. There still is no degree or certification or licensing for genetic genealogy, which is problematic, but I'm sure that's going to be fixed in time. The Maryland law is requiring that investigative genetic genealogist are licensed. I'm not sure if it's by 2023 or 2024. So that's going to force the hand there. I am concerned about who is going to be making those decisions and running those programs because there are so few people that are really educated about this technique in this field, and it's still a very limited number. So it is difficult not only for journalists to know who to talk to, but also for law enforcement to know who to hire, who to trust with these cases. And it worries me. It's definitely a big concern of mine. I think to get education, you have to really be proactive and you have to seek it out. But it is out there now. There are so many webinars about genetic genealogy that can be accessed online. Just my Institute for Genetic Genealogy alone has a lot of videos on genetic genealogy. We have been doing annual conferences for several years now, and we have that online, but there's also many, many others out there. But you have to be proactive, and many journalists have spent hours on the phone with me over the last several years, even over the last decade trying to learn about this. And so you really do have to invest the time because if it's something you just cover very briefly, that's where we really see those misconceptions and those mistakes being. Presented to the public, and that can be very damaging, in my opinion.

So, yeah, I think got it.

I want to answer one of the questions that's in the queue and if you don't mind. Sure. So there we're talking about pharma funded research that collects genetic samples and can you get to? And can you get the generic pharma genetic databases? So I want to say something about genetics research in general in general. You really don't keep the first name with it. In general, what you do is you get the data, you identify it to some extent. I mean, at least take the name off and put a coat on or something like that. So that so the data that are in research databases mostly don't say Ellen Clayton. I was going to Vanderbilt University Medical Center professor, but I don't mostly don't say that they would say if anything, you know? A woman of northern European ancestry who lives in Nashville, Tennessee. I mean, we lived in Tennessee, not even Nashville, Tennessee, so. So one of the things that we think about in terms of where you're going to go to get data to do a Real ID or research database is not your first place you want to go. I mean, that's why GEDMATCH and I mean, I mean, please correct me if I'm wrong so much. But that's why I get matching family tree DNA or so valuable because people put their names on them. I mean, they may not put everything else, but they put a lot more than what's on and pharma. So then and so and then if you're going to go to a farmer to work for a match or something like that, not only are you going to have to identify the person, but you also have to have some reason. I think they're in there. So I think so. I know we worry about Boeing. I mean, I spent a lot of time thinking about protecting genomic research data, believe me. But they're not your primary place. You go if you want to find some, some way to identify somebody. So I just wanted to mention that because I think that's that's another that's a misconception. It is. Data and research databases typically are not identified with names and all that sort of stuff. So a great point. It's like I mentioned, it's useless to me if I do not know who you are. You can build your family tree because I'm usually working with those distant cousins. I need to know who your great great grandparents are. And so if I don't even know who you are, then I can't use that data. And as in GEDMATCH and Family Tree DNA, there are names. Sometimes there are initials, sometimes their usernames. I can usually figure out who that DNA contributor is from that. And

if I can't, I can't use that match. And so that's a really good point that Ellen makes. I'm glad she did, because I do get asked that question. And now I know how to answer it. Thank you. I hadn't thought about that identified. So of course. Yeah. Not useful to us.

Yeah, I think that really underscores the point how it's not really DNA or DNA as a small part of the work that it has to be done to actually find these matches. It's not easy using public records searches, very, very laborious one example that I've known about sometimes and a lot of information that we may not realize we've been putting out there on social media, on white pages. There's a lot of stuff. As a journalist, I can also say there's a lot of stuff about all of us out there. Very easy to find it with Google. We have one of those.

Well, no, I just want to comment on that briefly. You know, as you journalist well know, you can find a lot of information about people. And if people have not done their look up on themselves, they might be shocked. And I think when we talk about choosing for your family, when you put your genetic information on GEDMatch, for instance, that we're doing the same thing when we post on Facebook or social media about our families. But not just that. If you order flowers for your friends and you give their address and their name, that very likely is going to end up being one of those people search databases that then is sold to consumers. Things end up in credit report. And I think that our society, if we're really concerned about privacy, we need to be considering those things as well. People, these companies, these for profit companies collect information on us and sell it. And that is really a huge privacy issue from where, from my perspective, because that's where I'm getting all my information, when I'm working in Canada. It's extremely difficult to put family trees together to find who relatives are because they have laws that protect their citizens from things like that. And so I think that's an important thing to think about when we're having this discussion.

That's really interesting, but it's so different, even between Canada and the U.S., I imagine Europe would probably also a lot more difficult to get.

Much more difficult.

So we have a question in the Q&A, and I think, Ellen, you took a crack at answering it, but I also like Peter Legg, and so the question from Donna Light is how confident are you? The jury members understood the genetic genealogy information that was presented in court. Did they receive training prior to the trial? Ellen, you said, hard to know how much I understand lawyers are supposed to do the teaching. What is it from your perspective?

The point is that it was not presented in the trial. That was the decisions made by either the judges or stipulations between the defense and the prosecution that the genetic genealogy research was not relevant. What was relevant was the investigation they did after that and whether did they get that S.T.A.R. CODIS profile match? And so so far in these trials, genetic genealogy has been discussed very little. In fact, usually just summarized by the detective, I've been on hold as an expert witness for many, many trials. I've been canceled every single time because they decided it's not relevant. It's not exculpatory evidence for the defense. It's not something that's going to be used against this suspect in this defendant and trial. So I have testified for some pretrial hearings for the judge to help the judge. I understand it and also in

some grand jury trials. But it's been very brief and it really hasn't been relevant to these cases. And that is what we're seeing. That's the that's what we hoped would happen. Now, that's not to say that some judge will rule completely differently later. But so far, that is how it's been handled in court. And so the jurors probably didn't understand it and they weren't required to to make their decisions.

So I got one question before I turn it to both of you for closing remarks, but this is relevant to privacy, not just in the context of law enforcement, but in the context of all these family discoveries that we've been talking about too, which is that we normally think of privacy as my personal privacy. But as we've been saying when you talk about uploading someone's DNA affects not just me, but my entire family. So how should we think about privacy in the context of impacting your entire to your third cousins even and not just you? How do we think about privacy in that in that context? And if you want to take a crack at that first?

Well, I actually briefly addressed this already in my comments about what we put out there about our families in other aspects, in social media in particular, it's hugely valuable for me that people are tagging their family members, posting pictures, they're writing back and forth in the comments. You know, Hey, cousin, hey, aren't racists. There is a spot on Facebook where you can actually list your relationships, and many people do. And so we are making those types of choices for our families and our loved ones all the time when we're putting information out there. And as I said, including with these people search type databases, they are telling us if you pay for those services, they will tell you who is living in the same households, who is buying homes and property together and registering cars, and it'll list all of the associates and family members on those lists. And so that's what I'm spending my day digging. It is those types of resources in order to figure out who's related to who, who's associated with who. I'm GEDMATCH. Many times we'll see people who handle other people's kids. So for instance, I manage, say, 50 kids on GEDMatch. Well, it's going to have my email address, but I'm not the donation for there. So if I find one of those kids that is one of the key matches and one of my cases, I have to figure out how this owner of this email address is associated with this other person with initials oftentimes figure out who are they related to or who are they friends with with these initials? And so how do I do that? I'm going to look at people search databases, I'm going to look at Facebook, and most of the time I can figure out who it is through that. And so I think the conversation is much larger than just if you upload your DNA to match your exposing your family, there's a lot more that goes into it.

I couldn't agree more. I think that we implicate our families and things all the time. And I wonder about people who use pictures of their young babies. I'm old enough that my kids were grown by the time this all happened. And so I think that we live in a much more connected world than I think we know, and that we and we and our actions affect many more people than we know. And whether you think that that requires more thoughtfulness or whether you think that this is all fine is actually sort of an open question that people can think about it. But I completely agree with you. It's a I don't spend time doing what she does, but I do know that all those data are out there and it's really kind of spooky sometimes.

Yeah, there's a lot out there. I know. Well, if there are any more questions, I'm going to ask you to just kind of maybe get a couple of minutes summing up, getting some concluding remarks. So Ellen, why don't we start with you this time?

Sure. I think the big question is still open, which is how much we want law enforcement to have access to these data. But there's a secondary question which is we need to do a better job or how do we do a better job of telling people what actually is possible and what is not possible so that they are not surprised when when these data are used in this way and the. Which is, I think, an enormously important issue. So I think our expectations of privacy are probably greater than our realistic most much of the time. And and and I think we have to weigh the social good of allowing people to connect in the way they want to connect and but and living in a society that in fact is going to try to punish serious crime. I mean, that's the tradeoff, and we have to figure that out.

I fully agree, and I think education is just paramount here. People really do need to understand the process, as I said before, they can make an informed choice, whether this is something they support want to contribute their genetic profile to or not. And if lawmakers, judges, attorneys don't understand this. I believe we're going to run into problems. And that was one reason I was really happy to be invited to present to the committee that wrote the Maryland law, because I think it's just so important. And I think it's often surprising to people that are not doing the actual work like I am. What we really are doing and what we really aren't doing and what information is made and what isn't being accessed. And so the more education that we can have, the better. And that's why you all journalists, the media are so important. I did a TV series for ABC about my work, which I really didn't want to do, believe it or not. I had a hard time convincing me. But ultimately, I decided to do it. But with the agreement that we would be very transparent and educational about the process. Otherwise, it wouldn't have been worth it for me. I wanted the public to get a real view of how I do my work and how this how we work with law enforcement and how that information is used, how I come to those conclusions or those hypotheses. And so I am very appreciative of the media and you journalists of educators, academics, researchers, everyone that's trying to get a deeper look into genetic genealogy as a whole and specifically investigative genetic genealogy to help educate the public and help people get a much broader understanding of this. And so we can make informed choices as individuals, but also as a community and as a society.

I do hope this panel has been really educational for everyone who's attended. Thank you to you for sharing your expertise. Thank you to the Hastings Center for hosting us today and thank you to everyone who tuned in.

Thank you so much.

Thanks for having us.

Thank you all for joining us today. A recording of the discussion will be available shortly on the Hastings Center's website www.the Hastings Center.org and on the CERA ELSIhub.org website along with resources. We would like your feedback on this event. You will receive a brief survey via email shortly after this event. Please return it as soon as possible. We will use your feedback

to improve future events. Please join us on November 12 for the next discussion in this series. “Precision Medicine Research, All of Us, and Inclusion” with Nidhi Subbaraman, a writer for Nature, Sandra Soo-Jin Lee, chief of the Division of Ethics in the Department of Medical Humanities and Ethics at Columbia University and PI of the CERA, Carolyn Neuhaus, a research scholar at the Hastings Center, and Katharine Blizinski, the policy director for the All of US research program. Thank you again and have a great day.