ICANN73 | Virtual Community Forum – At-Large NARALO: Blockchain, NFT's, and Decentralized Domains - What is the impact on end-users, internet security and stability, and ICANN?
Tuesday, March 8, 2022 – 12:30 to 14:00 AST

YESIM SAGLAM: Hello and welcome to the At-Large NARALO meeting on the topic of blockchain, NFTs and decentralized domains: what is the impact on end users, Internet security and stability, and ICANN? My name is Yesim Saglam, and I'm the remote participation manager for this session. Please note that this session is being recorded and is governed by the ICANN expected standards of behavior.

During this session, questions or comments submitted in chat will only be read aloud if put in the proper form as I've noted in the chat. I will read questions and comments aloud during the time set by the chair or moderator of this session. Interpretation for this session will include English, French, and Spanish. Click on the interpretation icon in Zoom and select the language you will listen to during this session.

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With that, I will hand the floor over to Eduardo Diaz. Over to you, Eduardo.

EDUARDO DIAZ: Thank you so much. Welcome, everyone, to our monthly NARALO. And good morning, good afternoon, and good evening to everyone in this global sphere that we live on. Welcome to the March 2022 monthly North American Regional At-Large Organization or, in short, NARALO.

For those of you who are not familiar with this part of the ICANN family, NARALO is the organization that groups end user organizations and individuals who have engaged to participate in the ICANN policy development process through the At-Large organization.

This meeting is being livestreamed to about eleven social channels [and properties] located in Facebook, YouTube, and Twitter, some belonging to NARALO itself and others to At-Large Structures and individual channels. The streaming is done as part of our strategic plan for outreach and engagement in the North American region. Follow us on Twitter @TeamNARALO and like us on Facebook Groups' NARALO to keep abreast with these type of events and other information.

Today, we have invited Tom Barrett and Jeff Neuman to talk about blockchain NFTS and, most importantly, decentralization of domain names and alternate roots that are currently happening with these technologies. Glenn McKnight, who is our secretary, will be the moderator.

The idea for this presentation happened during the 2021 North American School of Internet Governance, or what we call NASIG, where Tom was one of the professors. Glenn and I thought this conversation was essential to bring to the ICANN community because of the [inaudible] intersection between the decentralized DNS system as we know it and the blockchain decentralized one.

By the way, Google "NASIG school" if you want to know more about it. It is free and open to anyone interested in learning about Internet governance concepts.

Before we jump to the presentation, bear with us a couple of extra minutes. I am giving the floor to Glenn for a brief intervention on our upcoming elections and then Judith Hellerstein, our NomCom liaison, to provide us a quick NomCom update.

Thank you for your indulgence. And now, Glenn, the floor is yours. Thank you.

GLENN MCKNIGHT: Great. Thank you so much, everyone, and welcome to this session. This is Glenn McKnight, the NARALO Secretariat. This is a normal NARALO

meeting but it is a little bit special because we have to announce our nomination process and election coming up.

So, as you can see in the timetable we provided—I provided the link in the discussion thread—we're opening up, on March 18th, the nomination process. We have a few positions that are open. The chair, which is not term-limited, is an available position. Also, if you go down, you can see the ALAC position. Marita Moll is not eligible for reappointment, so that position is available. And Judith Hellerstein's position, which is now currently with NomCom, is also eligible for reappointment. It's normally a two-year period with NomCom because, the first year, you just get your feet wet and, by the second year, you're much more of a performer. So we have a process that's available, so if you're interested in getting involved with NARALO, please check out this page. And [Barron] in your calendar a nomination period. You can self-nominate or have someone nominate you. So we welcome new blood into the system. And thank you for your time.

So back over to Judith to talk about the next part of our agenda, which is NomCom. Over to you, Judith.

JUDITH HELLERSTEIN: Thank you so much for coming. And thank you for all the people who are coming to listen to blockchain. But hopefully we can gather this quick audience, this large audience, to really showcase what we're looking for in the leaders. And here's this chart of what we're looking for in a leader. And we really encourage people to come and apply. As

you can see, many of the same things that come in—critical thinking, cultural awareness, all these different other [tactics] that you have …

We really need you to come and—next slide, please. The deadline is fast, fast approaching. We really have three more days. And we really want people to apply. As we noticed, there's been a smaller number of people than usual applying because people are really sick and tired of Zooms and everything, and they don't want to really engage as much if we're going to be on Zoom. So we really encourage people, as we're going for a hybrid meeting, and ICANN announced that, definitely, we're going to be hybrid. So there will be a in-person component at The Hague. So we really encourage people to apply.

Next slide. All the slides will be available. Keep going until Slide 8. Since we want to devote as much time to the thing, we're just going to straight to our summary slide. But all the slides are linked to the agenda, and it can be downloaded.

So what we're looking for are three members for the ICANN Board of Directors and one member for the PTI Board, which is the Public Technical Identifiers. We're looking for two reps from North America and Europe. And what we mean by that is one from North America, which is the U.S., Canada, and any of the U.S. territories, as well as one person from Europe, which is the EURALO region. So that's two people. And that is for the At-Large Advisory Committee.

On the NomCom side, they will have all the information on there of what you need to do and timing and how much time you need to devote

to the At-Large. If you choose this, if you choose the Board, there's time listings of how much time you need to apply/spend, whether you're a Board of Directors … Board of Directors are paid, PTI are not, and the other ones are not.

We are also looking for one member of the GNSO Council, and that could be from any geography/other areas.

And the last one is they are looking for one member of the ccNSO, and that also can be from any of the geographies/diversity. The only ones that are limited for diversity issues are the At-Large, where, right now, we have five members who come on ALAC who are appointed by NomCom. But this year, since they do staggered terms, we're only looking for two.

And so I wanted to post up … There's a slide which has the link for NomCom. So if you want to post that, I think it's maybe the next slide. Yes. And so here is how you can learn more about these positions, and we can post it in the chat as well. So thank you so very much. And remember March 11th—three days—23:59 UTC. Thank you so much.

EDUARDO DIAZ: Thank you so much, Judith.

Glenn, take it, and let's go to the presentation. Thank you, Judith. [inaudible].

GLENN MCKNIGHT: So the title as we indicated is At-Large NARALO: Blockchain, NFTs and Decentralized Domains: What is the Impact on the End Users, Internet Security and Stability, and ICANN? As our NARALO Chair, at the beginning, indicated, he was impressed with Tom Barrett's knowledge on the subject matter back when we did our NASIG back in November. And we looked to complement Tom's session … One of our newest members of our unaffiliated membership in NARALO … We looked at Jeff Neuman, who was a cohost of a session we did last month. And Jeff and Tom are a great Tom. And, together, Jeff, as Tom's nemesis, they're prepared to make magic. So I'm looking forward to the session.

Now, as critical as the title indicates, it's the importance of understanding, to the ICANN end user community, the relationship of blockchain and NFTs to the ICANN situation and the obvious ICANN mandate to preserve security and stability of the domain system.

Our speakers today are eager to start and will be commencing with a series of very short polls and will be concluding with a few more. Depending on how things go today, we will be entertaining some questions. And I'm sure we'll get to it and we'll be monitoring the chat as we go along. And when there's natural transitions per sections, we'll try to slip in the most logical questions. We would also like to request folks to post their available resources to the chat if they know of studies and reports. Please post it to the chat and we can share these as collaborative notes.

So at this point, [I posted it] and I'll do it again. Instead of doing a long introduction of our two speakers today, I've been posting the LinkedIn connections to their background.

So, again, thank you so much, and I'm going to turn it over to Tom.

TOM BARRETT: Thanks, Glenn, and thanks, everyone, for joining us today. If we could go to the next slide, what we'd like to do first is just get a sense of how many of you are active in this space in terms of … We have three polls here that we're going to ask our ICANN staff to put up.

The first one is going to be how many of you actually own cryptocurrency. And so your choices are "I don't own anything," "I do but it's just one currently (it could be Bitcoin or Ether), or you have more than one currency, or "I do not know what crypto currency is." So we're going to give you five seconds to pick one of those. And I'm sorry we don't have "Heck no [inaudible]." All right. Three seconds, two seconds, one second. So submit your answers.

Let's take a quick look at the results. All right. So 64% do not own cryptocurrency. 13% own one. And then another 21% … So roughly, again, a third of you own cryptocurrency. Two-thirds don't.

So I think we can pretty much tell how the next questions will go, but let's just go ask the second question. How many of you own a hardware wallet? Here's a hardware wallet. It's called a ledger. I also have a treasure. So you use these to maintain your digital assets. You could

also do a hot wallet. So say either "Yes, I own a hardware wallet," "No, I do not," or, "What is a hardware wallet?" So those are your three choices. We'll give you three seconds. How many of you own [inaudible] hardware wallets? I would hope a third of you who own cryptocurrency have a hardware wallet, but it's possible you do everything in the cloud.

So can we see the results? All right. So, again 60%. So, very good. Pretty close to the 20+% that owned crypto. You're smart enough to keep it in this hardware wallet. Again, you can buy one of these off of Amazon for $100. I suggest, if you really want to keep them secure, you use something called a multi-signature wallet for the pretty valuable assets you might have. So we're going to talk more about wallets in a second.

Third question. How many of you own one or more NFTs? Could be a bored ape. Could be a crazy cat, a CryptoPunk. We don't know. But either say, "No," Yes," or, "I do not know what an NFT is." Again, three seconds, real quick. How many of you own an NFT? Three, two, one.

Let's see the results. All right. So we have 10% of you—excellent—who own an NFT. 75% do not. And, again, 15% do not know what an NFT is. So we're going to try to help educate you a little bit about NFTs and wallets today because that's pretty key to understanding decentralized domains, which are simply another type of NFT.

So let's go to the next slide, which is our agenda slide. We do want to make this interactive, as Glenn said. So feel free to put questions in the chat. That'd be ideal. Also, you could raise your hand when we open up the floor to questions. But we're going to try to go through these

different sections in our presentation. And, again, we will pause after each section to see if there are any questions that we should answer immediately. But hopefully we have a lively discussion as we go through this.

And so I'm going to hand this off to Jeff to do an introduction to NFTs and decentralized domains.

JEFF NEUMAN: Thank you, Tom. And that was really interesting about the poll. Actually, more people than I thought owned cryptocurrency, but NFT ownership was just about where I thought it would be.

Before I start, I just want to say that I'm going to be very, very, very general in this overview. There is a lot more complexity to all of these topics, but just to give everyone a general overview of what we're taking about in terms of blockchain, cryptocurrency, and then, ultimately, decentralized domains, in order to understand how NFTs work (and decentralized domains and cryptocurrency), you need to understand the concept of blockchain because all of those technologies are based off of the blockchain. And this is a term you hear all the time and, often, in undefined ways. And it's very kind of amorphous.

So a blockchain, in very general, [live] terms, is a tamperproof, distributed ledger of transactions that are linked together through complex mathematical algorithms. You'll hear that referred to as a hash. The important aspects of a blockchain is that it's decentralized—so there's no one entity that controls all of the transactions—and the

other critical component that we'll talk about several times is that everyone has access to the ledger. And each transaction is irreversible. And so when we talk about the applications, all of these factors will be very important.

If we go on to the next slide, one of the best ways to understand blockchain is to talk about the first application of blockchain, which was Bitcoin, but I'm going to just refer to currency here in general, just so you can understand why cryptocurrency, whether it's Bitcoin, Ethereum, or any other coin that's out there, has value and what is this whole craze.

So, in order to understand the value of this cryptocurrency, you have to take a step back and think about, what is money? So everyone has some of it that they use to buy whatever it is. But in general, money is a value that's accepted by everyone as a form of payment. So money itself, meaning the bills that it's printed on or anything else, yeah, has a number on it, but the money itself has no value in and of itself. The only thing that gives money any value is the fact that governments or a centralized authority recognized that it has got value. So, for a $10 U.S. bill, technically the paper that it's on is worth the exact same as a $1, $100, or $1,000 bill, but because it's got that number on it and because the government has declared the value of that as being a specific value, that's why it is worth something. And as in the chat, yes, in order to have faith in money, you have to faith in a government.

Money is centralized, as we were talking about. So it's controlled by the government. And your individual accounts by banks. And you have no

say in what the value of that money is. In other words, yes, if it says $10 on it, it's going to be worth $10. But what we mean when we say this is, if the government decides to print more money, which could lead easily to inflation, then the value of that $10, meaning what you can buy which that actual $10, drops. Your purchasing power gets reduced by things that are way outside of your control.

In addition, there's lots of fees that come with money. So, when you go from the United States to Canada, or Canada to the United States, not only do you have to exchange your money for the other currency but you usually have to pay a middleman for that right to have that money. So you're paying all of these fees.

So the last thing about money is that all of your transactions that you conduct are controlled by your bank, or your banks if you have money in multiple banks. But the banks closely guard that ledger so that no one else can see it. You have no idea what's on the ledger of that bank, except as you're provided insight into that ledger by your bank and only with respect to you. So there's no way that someone else other than the bank can verify the money you have in the bank or any transaction you conduct.

So now, with all of that in mind, let's introduce the cryptocurrency. So cryptocurrency is a digitized form of money or value. It's decentralized, so it doesn't rely on any one bank or any government. The ledger, as with all blockchain technologies, is publicly available to everyone in the network.

And let me just say a note about that because that sounds a little scary—"Well, what do you mean the ledger is available to everyone in the network? Does that mean everyone knows the exact amount of money that I have or that other people have?" And the answer is no. It's in a—and I always say this word wrong—pseudonymous—I hope I said that right—format, which means that every transaction is recorded on the blockchain, so you know the transaction took place and you know it's someone with a very long string ID, but you have no idea who that person or organization is that transacted it. So that's why it's called pseudonymous. But everyone on the blockchain has access to the fact that a transaction took place.

It's protected against inflation, meaning that the supply of the coin is limited, so that it's protected against things like having more money printed, which would lead to inflation and a devaluation of the money.

And then there is something called the no-double-spending problem, which essentially means that, although it's a digital file and, although technically you can copy any digital file, it's got built-in mechanisms to make that the money that you use can only be used once and it can't be used on multiple occasions. So that's what referred to as the double-spending problem or no-double-spending problem. And that's key in cryptocurrencies.

So all of the transactions are stored on blockchains. And because they're on the blockchains—oh, sorry about that. Someone was trying to call me from Zoom, which is interesting. But because they're all on

the blockchain, not only are the transactions viewable, but they are irrefutable or they're irreversible, as other people have worded it.

So that's a little bit about blockchain currencies. There's a lot more discussion about the complexities, about how blockchains and Bitcoins are produced. I'm not going to go into that amount of detail and mathematical algorithms, although we'll talk a little bit about it on the next slide because, if you look at the diagram on the next slide … So, yeah.

So with Bitcoin, a transaction … So you purchase something with a Bitcoin. That transaction is then transmitted to a network of peer-to-peer computers scattered all around the world. The network of computers then solves mathematical equations to confirm that the transaction is valid. And we could probably spend a whole bunch of time talking about that. It is incredibly complex. But just know that there are lots of computers out there that validate transactions by solving mathematical equations. And then, once your transaction is confirmed to be legitimate, they are clustered together into blocks, and then the blocks are all chained together on this blockchain so that all of the transactional history is permanent. So that's just kind of a diagram of how Bitcoin works.

Go to the next slide. So then there's a concept you probably have heard a lot about. And it should not be confused with either the blockchain or NFTs, although NFTs do contain smart contracts, and smart contracts are stored on the blockchain. But they are not synonyms for each other. They are different things.

The other important thing to understand before I describe what is a smart contract is you have to understand that a contract does not always mean an agreement. In other words, just because something is called a contract doesn't mean it is a written agreement. And I know that there's confusion out there where I've even heard lawyers asking, when information has been submitted through a smart contract, or a transaction has been done through a smart contract … I have sometimes gotten the question of, "Okay, great. But where's the legal agreement?" or, "Where's the written agreement?" And, oftentimes with smart contracts, there are no written agreements.

So if a smart contract is not a legal agreement, then what is it? Well, a smart contract is just the term for computer code or programs stored on a blockchain that runs when predetermined conditions are met. In other words, it's self-executing. And I'll go into an example in a second.

And Marc Trachtenberg just said that smart contracts are written but they're written in code. That's true. It just does not necessarily have all of the legal boilerplate, necessarily. But we can talk about that more in a minute.

So a smart contract automates the execution of an agreement so that all participants can be immediately certain of the outcome without having an intermediary involved or time that's lost. So as I was just saying, smart contracts do not always have legal text-based contracts behind them.

So what's an example of a smart contract? So I lease my Tesla—and that's a picture of it right there—to Tom for .37 ETH—that's a form of currency—per month. At least as of when I wrote this slide, that was about $1,000 U.S. a month. I don't know what's happened in the last couple days, so the worth may have gone up or down. I don't know. But so long as Tom pays me that .37 ETH by the first of the month, then the digital key that I've created for the Tesla will allow him to keep driving it. If, for whatever reason, I don't get that .37 ETH by the first of the month, well, then the digital key gets revoked and Tom can't drive it.

So it doesn't involve Tom having to go to a car dealership. It doesn't have Tom having to go to a car rental place. There's no exchange of paperwork other than what was done in this transaction. So for all of those reasons—for anonymity, for all sorts of other things—this transaction is completed.

And Frank says, "What about insurance?" And that's a great point because, from the way that Tom drives, I need to actually have a guarantee that he's got insurance, but that can also be done through a smart contract, where Tom can submit the information of his insurance.

Okay, next slide. So, an NFT. So what is an NFT? So an NFT is a Non-Fungible Token, which doesn't understand what an NFT is because not many people know what a non-fungible token is. So "non-fungible" means that it is unique and that it cannot be traded for something of equal value. A token is a digital certification or ownership. So, put

together, an NFT is a unique asset that represents real-world objects, like art, music, in-game items, and videos.

So, for anyone that has played, let's say, Candy Crush and that purchases in-game items from Candy Crush, like those cool little clusters that blow everything up, in theory that could be considered a form of an NFT.

So each NFT has a unique digital signature, and it can only have one owner at a time. And, again, the token part of the NFT is what implies ownership over whatever is associated with that token. And of course, NFTs exist on the blockchain.

So in that example in the slide, you'll see that one of the most expensive—not the most expensive; the most expensive one was actually a little bit earlier this year, I think, or maybe late last year—is called Human One, and that achieved about $29 million in an auction at Christie's. So, as incredible as that is, this only exists in digitized forms. And it can only be owned by one person. Yes, in theory, anyone can copy that digital file, as I just copied here and put on this slide, but that work of art is only owned and can only be owned by one person. And that ownership is validated through the NFT on that particular blockchain.

So if we go to the next slide, NFTs have historically been thought of as only works of art or music or other kinds of tangible items, but more recently, NFT have been used as providing access to certain services or like a digital ticket. So if you look here on the slide, the NFL launched

league-wide NFT tickets with Ticketmaster so that not only did you technically own a copy of this work of art—and I'm being very specific of the terms I use; you own the copy of the work of art, not necessarily the work of art itself—but you use that as your ticket to get into specific NFL games.

And another thing I just read recently about was rapper Post Malone planning to launch a celebrity beer pong league that anyone could participate in so long as you have a specific type of NFT which provides you the access to that beer pong tournament. Of course, I am not going to be participating in that because I do not drink and I think I would lose very quickly. But I can I think of many people in this community that would probably be very good at this particular service.

So the main point of this slide is not to talk about beer pong but to point out that new uses of NFTs are arising on a daily basis or hourly basis.

NFTs … I also saw that there are certain celebrities, especially in the hip-hop community, that own virtual real estate. So this only exists in the digital world. Very expensive. And if you wanted to purchase a plot of digital land next to these celebrities, you could buy an NFT to purchase that plot of land for close to a million dollars.

So NFTs are or can be incredibly value, and new uses of it are coming up every day.

So, with that, I think that's my last slide. I could turn it over to Tom to talk about—

GLENN MCKNIGHT: Jeff, before we go to Tom, Jonathan had a question that I think is applicable to your last slide. He said, "So does the person get the copyright to the image—the ability to license it?" So I think we need to clarify that because you jumped ahead on that.

JEFF NEUMAN: So I wish this was a quick answer. There's a lot of debate within the legal community. So the answer, as Marc put up there, is "It depends." The only thing for certain that you own by purchasing an NFT is you own the copy of what you bought. Whether you own the work of art itself is really dictated by the terms and conditions that underly the purchase of that NFT. So those can be in the form of self-executing smart contracts, or they can be supported in traditional legal-based contracts.

But that is certainly a question that is being debated in the legal community, as well as: can terms embedded in an NFT or a smart contract be legally enforceable? Most courts have hinted, even if they haven't necessarily resolved that, that, so long as the transaction follows the traditional contract rules, meaning there's an offer, acceptance, and consideration, traditional contract law will, in fact, apply.

So it's not an easy question. It's a great question but one that is not an easy answer. Thanks.

GLENN MCKNIGHT: Great. Thank you, Jeff. Back over to Tom. Thank you.

TOM BARRETT: Thank you, Glenn. Fantastic overview, Jeff. And, again, hopefully, if anyone still thinks an NFT, for example, is just a JPEG that you can do a right mouse-click on there, it's moving way, way beyond online art. And there's all kinds of innovative uses of NFTs.

So what I'm going to try to do now is to give you, again, my personal opinion on all these happenings and where I think it's going. We keep seeing different names: metaverse and decentralized web. So I'd like to give you an idea of where I think all of this is headed.

So if we can go to the next slide, you've head about cryptocurrency. You've head about NFTs. These are disrupting some pretty major parts of the economy. We're going to have decentralized finance. We're going to have supply chain tracking to combat counterfeiting. We're going to have blockchains focused on medical information. We're going to have blockchains focused on real estate—actual physical real estate. And so I see all of these different technologies coalesce there around what we call the decentralized web. And so this is where we start to get into the ICANN realm.

And so, if we can go to the next slide, I think the way I would sum up what is the decentralized web all about and what is driving it is, basically—now a cliché—if you're not paying for a product, you are the product. And so it's this sense that consumers and individuals have

essentially lost control of their personal information and their privacy when they go on the Internet today.

And so where I think this is going, if we go to the next slide, is a term called self … Basically, there's backlash against privacy. And what we see are a grassroots movement, so to speak, to regain control of your personal privacy. And that is where I think the decentralized web is going.

And so in that context, how will that end up? If you go to the next slide, we talked about the hardware wallet. We asked you up front, "Who owns a hardware wallet?" And today these hardware wallets are used to own Bitcoin and to control the keys to Bitcoin or the keys to an NFT, be it a piece of artwork or music or some other sort of NFT. But in the future, I also see these wallets as controlling your personal information. This is your identity wallet. And as you go on the Internet and visit various sites, you will be in control of your personal information and decide and who when you want to share that and when you want to revoke access to that site that you're visiting in the metaverse.

And so you've heard about censorship. It eliminates censorship because it's immutable, meaning it's irreversible. You own it. No one can take it away from you. It's anonymous if you choose to be. And it's actually enabled by new technologies that combine DNSSEC and another DNS standard called DANE that allow you to basically self-certify your identity without using a third-party digital certificate.

In the end, it will eliminate all the intermediaries out there that can [sniff] your data. I'm talking about Web 2 browsers, social media, ISPs, third-party certificate authorities, like Let's Encrypt or GeoTrust and even ICANN and the contracted parties, who collect your personal data, publish it into a WHOIS database and make sure you're subject to takedown policies.

So that's where I think the decentralized web is going to: these self-sovereign digital identities.

Next slide. And as these consumers move to this new decentralized web, brands obviously are going to follow them, just like they followed consumers to social media. And so there has been a spike in trademark filings by brand owners everywhere, all over the world. In the U.S. alone, trademarks related to NFTs went up 400 times for 2021. This is a headline from just a week or so ago. In China, again, not to be outdone, they've got 16,000 new filings just related to the metaverse. So trademark owners or brand owners realize this is where the web is going, and they want to make sure they're able to follow those consumers to the decentralized web.

Next slide. So as it turns out, if you have a self-sovereign digital identity and you want to share it with someone else, it's fairly hard to do that with these long cryptographic addresses. And so the decentralized web needs domain names. And so they're using what we call alternative roots or non-ICANN TLDs in order to enable domain names on the decentralized web. And they're doing this not just because ICANN is slow to launch the next round but because the whole concept of self-

sovereign identity is simply incompatible with the ICANN policies about disclosing your personal information. So I see this resulting in two separate Internets served by two different types of technologies.

Next slide. And one more point here is I see this resulting in what I call a third browser war. The first one occurred back in the late '90s between Mosaic, which was really the first web browser, and Microsoft Explorer. Microsoft Explorer was the victor in that first war and, by 2001, pretty well dominated by the browser space. It maintained that position until Google came out with Chrome, probably in 2008. And, again, these new browsers obviously supported new features that made the user experience more enjoyable. And certainly by 2015, Chrome was now dominating the web browser space. And this is important because the browser obviously is what most consumers use to access the Internet.

And I see there'd be a third browser war which will not include any of the Web 2 browsers but will be browsers like Brave, Puma, Opera, or [inaudible]. And so these browsers will basically have embedded in them the wallets I talked about where you can have the keys to your currency, the keys to your personal data. It will have DNSSEC and DANE enabled, so you don't need to rely on third-party digital certificates to encrypt your data and will allow you basically to decide when and where you share your personal information.

Next slide. So we'll pause there, Glenn, if you've got any questions on that, before we jump into implications for Internet security.

GLENN MCKNIGHT: Yeah, we have a ton of great discussion. And some people are generous with their time and expertise. But maybe I can tick off the last question. I can't pull them all up, but here's a question I just see here. Sorry about this. Too many things open. Okay, it comes from [Tracy Proctor]. "Question. What would you suggest for a brand wanting to use Punycode domains: an ICANN proxy redirect, an [s.to], or teaching users to resolve Fingertip/BoB, or something else?"

TOM BARRETT: So that's a great question. I actually have a slide later, and I'll refer to it now. So the decentralized web is not a complete solution today. If you ever heard of Geoffrey Moore's Crossing the Chasm, we are before the chasm. We're in the early adopter space where these solutions are very incomplete. And so there are plug-ins that you can add to Web 2 browsers. You mentioned a few of them here: Fingertip, which is from the Handshake developer community, that allows you to take a Web 2 browser, and what it's basically doing is bypassing the ICANN root, bypassing the public suffix list, relying on handshakes as your public suffix list to navigate the decentralized web. If you wanted to do a brand Punycode or otherwise, those are available now on Handshake. And by the way, Handshake is not the only alternative namespace out there, but certainly we're going to talk more about it in a second. But you can do an IDN brand name in Handshake and, again, direct your target market to the compatible web browsers that support that particular alternative root.

GLENN MCKNIGHT: Okay, great. Thank you. Siva has a question. His hand is up but he hasn't typed it into the box. So we'll have to follow up with him when he posts it. So back over to you and the third item.

TOM BARRETT: Great. Thank you everybody. These are great questions. We'll have hopefully more time at the end as well to cover some of them. I'm going to hand this over to Jeff to talk about some of the implications for Internet security and stability.

JEFF NEUMAN: Okay. Thanks, Tom. And so I've already seen, if we go to the next slide, a bunch of comments anticipating what we're going to be discussing. So we'll get into a lot of that in these next few topics.

So to understand ICANN's view on alternate roots, you have to go back to really 2001, although the technical community had been talking to that prior to 2001. But in July of 2001, ICANN posted what they call ICP-3, the unique authoritative root for the DNS. It is a fairly lengthy paper, but I strongly encourage everyone to go back and read that. The link is here. But essentially, this paper affirms ICANN's commitment to a single authoritative public root for the Internet domain name system. And later, ICANN states that its mandate is that preserving stability of the DNS requires that it avoids encouraging the proliferation of alternate roots that could cause conflicts and instability. And then, even later on in the paper, it says alternate roots inherently [pose] danger [to] DNS stability.

So why do they make these statements? And I can't remember if I did this in another slide. Do I have another slide on this?

TOM BARRETT: Yes.

JEFF NEUMAN: Okay, good. So what does ICANN say that the consequences of alternate roots are? The first one is, well, if you have alternate roots existing with the one authoritative root, then it is possible that the DNS will provide the wrong location for where you're trying to go. So you think you're going to one URL—actually, this ties in with the second one—but it turns out, because the way the DNS was built, you end up going to the wrong computer. In other words, URLs no longer have that "uniform" in the "uniform resource locator."

The consequences would be unpredictable to most users. Intermediate hosts add to the confusion because Internet services are often dependent on action of DNS resolvers. And we saw that not necessarily with an alternate root but we saw that with Site Finder in 2003, where changes were made to the top level nameservers that were caused a different response than what had been expected. And that caused a lot of confusion with a number of services that were depending on the top-level domain nameservers responding in a certain way.

Cache poisoning is something that this paper points out, which means that activities by those intending to use the authoritative root could be

misdirected by records in the alternate root. And there is an RFC that was drafted by the Internet Architecture Board, RFC 2826, that talks about the support for a unique DNS root and the technical issues that could arise if we encourage the proliferation of alternate roots.

So that has been historically ICANN's position on alternate roots.

I will state that history shows that we've had alternate roots in the past before. So in the late 1990s/early 2000s, you had something called the Atlantic root. You had … I'm forgetting what Chris Ambler called his dot-web, but it was also an alternate root. There was then, in 2001—or maybe it was 2000—something called RealNames, which essentially operated as an alternate root. And since then, there have been other alternate roots that have come, and most of them have either not succeeded because of the non-acceptance of browsers and other Internet service providers, but some of them are still in existence for the limited purpose for which they are created.

Technically, private networks could be considered "alternate roots," but those are accepted forms of alternate roots, where you have a private network that's set up within a company or a few companies. So an example of that is what's called IXP carriers in Europe, [which] exchange information through a private enum alternate root network. But it's closed and it's very specific. Now, it could be [e]ffected if ICANN were ever to adopt a TLD that uses the same extension that they use, but at this point, it's a private alternate root that exists in its own kind of network—closed network.

So ICANN has actually been fairly silent on alternate roots for a number of years up until very recently with a blog post where ICANN has basically issued a warning to users or buyers of alternate root domain names, stating that consumers should be aware that those domains that they purchased may not work on all applications, may not work within their browsers without downloading a plugin, etc. So up until that point, ICANN had been very silent on alternate roots, with the exception of ICP-3 in 2001, until this blog post.

So I'll turn it over to Tom now to talk about some interesting questions that all of these alternate roots raise.

TOM BARRETT: Thanks, Jeff. As Jeff said, alternate roots have always been around, since 1995. They certainly have not seen a large degree of success, but they also haven't broken the Internet, so to speak.

So this is a great quote from Paul Vixie, a little bit out of context. He was referring to his attempts to do some experimentation with IPv6 and DNSSEC at the time. But this is the general attitude, certainly: "The alternate root name service is a third-rail of Internet governance. If you touch it, you die." And so that's something to keep in mind in terms of context.

So what does this mean? Why are we brining this up in terms of the decentralized web?

So let's go to the next slide. So it turns out that alternative roots are proliferating everywhere. Blockchains, as I mentioned, need domain names in order to give user-friendly identifiers to wallets and websites, etc. We've already heard about Bitcoin, which is what the first blockchain … Ethereum is more of a general-purpose blockchain. And it came out … These are just four examples. There are many more. I want to highlight these four to give you a little bit of a perspective. The Ethereum Naming Service is, again, its own ecosystem for building its own decentralized web outside of ICANN. They launched dot-ETH as their first TLD.

And then they decide, "You know what? We'll stop here. It just happened to be a reserved string by ICANN. And we're going to just focus on being complementary to the ICANN root and try to enable people with dot-coms or dot-nets or dot-bank domain names. If they wanted to be integrated into Ethereum, then we will enable that sort of integration." And so we have seen that, for example, with dot-lux, dot-xyx, dot-cred, and dot-art. Several of the ICANN TLDs have experimented with integrating their ICANN TLD into the Ethereum Naming Service.

Solana is a more recent entry, another new blockchain. Again, it launched a TLD for its ecosystem.

Unstoppable Domains is interesting is the sense that's not specific for a blockchain. They just went into business—a commercial, for-profit business—to sell second-level names. They started on the Ethereum Naming Service. That allowed them to essentially piggyback off of the

ecosystem that the Ethereum Naming Service had built around dot-ETH. It turned out that gas fees or transaction fees became unsustainable, as many of you may know, so they actually moved off of Ethereum to the Polygon blockchain last summer. So [very nimble.] And because they're not really investing in the underlying blockchain itself, they're available to devote much more of their budget to marketing and business development. So they're very well-run from a marketing perspective.

However, the move from Ethereum to Polygon also meant they lost access to that huge ecosystem that had been built around dot-ETH. And so instead of having 100 compatible wallets from dot-crypto, you might be down to 20 or 30 compatible wallets for dot-crypto.

So those examples are second-level names: Tom.cryto and Jeff.crypto.

The Handshake Naming Service really represents the model for the decentralized web because they're focused on open-sourcing the ICANN root itself—so top-level domains.

Next slide. So there's certainly potential for abuse here with these alternative roots. Jeff went into some of them. The Ethereum Naming Service is a non-profit. They're trying to do what's called a decentralized autonomous organization, which just launched in November. So we received some airdrops as part of this, which gives us these tokens to vote in a democracy type of environment for the various policies they want to adopt for ENS. Fairly weak on the right protection front. But despite very high gas fees—they're still on what's called proof

of work—they're at 750,000 second-level names under dot-ETH. If you look at the scoreboard or leaderboard for the new ICANN TLDs, that would put them right in the top ten and they're still growing rapidly.

Unstoppable Domains is again selling second-level names for ten generic strings. Unlike dot-ETH, those will likely have collision potential in the next ICANN round. They've tried to prevent trademark infringement by reserving the top 100,000 websites but also the ICANN root. But, again, about two million second-level names.

And as I said, Handshake is a little more interesting because they're focused at the top level. Again, they're trying to disintermediate ICANN and its regulations. They're trying to disintermediate certificate authorities. They also reserve the ICANN root and top 100,000 websites. But that's temporary. And so that's not going to be forever. They've already registered 3.5 million top-level domains, 1,400 of which are selling second-level names. And [the server] actually supports those. So if you're interested in seeing the list, you can visit our website. They're even selling, as I will expand on in a second, TLDs that you would not see ever in an ICANN root.

Can we go to the next slide? So I call Handshake the democratization of top-level domains. Whereas the entry fee to upper ICANN is $185,000, the entry fee in Handshake is less than the cost of a Starbucks coffee. So you can get your self-sovereign digital identity that I talked about before. You can get a community TLD. You can get a dot-brand TLD. And I do have dot-EnCirca currently on Handshake, and I do not anticipate

applying in the next ICANN round. It'll also be developed on the alternative root.

Next slide, please. So when Handshake launched—it was about two years—they had what I would call a sunrise period. That's not what they called it, but basically they did reserve the ICANN root as of February 2020, and the top 100,000 names, and they said, "We'll hold these for four years." That's their sunrise period. So they're more than halfway through that sunrise period, at the end of which they will—

JEFF NEUMAN: Hey, Tom?

TOM BARRETT: Yeah.

JEFF NEUMAN: When you say "reserve the ICANN root," there were some questions in the chat. Can you just explain what you mean when you say that Handshake reserved the ICANN root?

TOM BARRETT: Yeah. Great question. So Handshake, as you'll see in a second, wants to be a mega root, a super root. They want to be backward-compatible. But they only can be backward-compatible as of this instance, February 2020. So what they said is, "We will reserve the current ICANN root. And the only parties that can claim those ICANN TLDs that we have reserved

in Handshake are the current registry operators that own them or control them in the ICANN root." And so there's a DNSSEC claiming process for both reserved ICANN TLDs—both gTLDs as well as ccTLDs. As well, if you happen to own a domain in the top 100,000 list—in this case, generated by Alexa—you also can claim your corresponding domain name as a top-level domain in the Handshake root. And it does require DNSSEC. It does require the DNSSEC SHA-256 or higher.

And so we recently ran into a situation with a ccTLD. We were helping to claim the Handshake TLD, and they were using SHA-1. Well, that's been deprecated, as you know, by the Internet community. So they had to go through a process of upgrading their DNSSEC in order to claim their TLD in Handshake.

Same problem. We're working with another client who has a name on this top 100,000 list. They don't use DNSSEC today. They need to add DNSSEC in order to initiate the claim process for these reserved names.

So after reserving those 100,000+ strings, they went into what I call general availability auctions. These are auctions that, for any available string, anyone can initiate and anyone can participate in. So they're public auctions. It had its usual mix of early adopters and speculators. There are certainly bad actors in here, as we've seen everywhere. So we see some trademark infringement and homographs. A homograph is a TLD, such as where, instead of dot-com (C-O-M), you see dot-C-0-M. Obviously, it's intended to confuse people who have a dot-com. And it does ignore the traditional list of ICANN reserved strings and various

restrictions on emojis, for example, which are freely available under Handshake.

Next slide. Now I want to give you an idea of what happened when they launched two years ago, February 2020. They started at zero. The first month, they delegated over 3,000 TLDs. So in the first month they were twice the size of the ICANN root, which currently sits at 1,500 TLDs. After one year, they were at 5,000 TLDs. And as of the end of February, a week ago, they're at 3.5 million top-level domains.

Now, keep in mind that a lot of these are certainly speculators. A lot of these are consumers. These are consumers looking to have a self-sovereign digital identity, not so much companies looking to do e-commerce, although you would expect brands are going to follow the consumers into the decentralized web.

So I'm calling this mega root because it doesn't quite feel like an alternative root when we look at the relative scale between the ICANN root and the Handshake root.

And again, this is just the leading decentralized web today. There are several others that I'm aware of that are just coming out of the starting gate, but none have the growth that we've seen with Handshake.

I'm going to pause there real quick before I move on to the next section. Glenn, do you want to entertain anything?

GLENN MCKNIGHT: Yeah. I'm aware of our time, but I did promise Siva to slip in one of his questions. He's been quite generous with his time as well. So let me go back. I believe you addressed this, but I'll just do this real quick one. "Can you please explain 'temporarily reserved ICANN root' and "the top 100,000 websites'?" So I'm not sure if you've addressed that, but I'll repeat it: "Please explain temporary reserved ICANN roots and top 100,000 websites."

TOM BARRETT: So these are strings. Just like ICANN reserves for the launch of any new TLD, Handshake also reserves strings, primarily designed to be backward-compatible with the ICANN root but also to prevent trademark cybersquatting.

And if you look at the top 100,000 websites—they took it from the Alexa list—after 20,000 or 30,000, you don't see many famous trademarks. So it covers most of the famous trademarks that we're all familiar with—the household brands on this list. And they basically said, "We will not let people cybersquat on that exact string." But it's only available to be claimed if you can demonstrate you own the corresponding legacy domain name, be it dot-com or dot-uk or whatever TLD you have it on.

So there's a claim process where, again, you need to have DNSSEC enabled on your domain name. Make sure it's not SHA-1 but SHA-256 or higher. Basically, what you need to do is, from a Handshake blockchain, you start the claim process to generate this Handshake key. And that then gets inserted into the DNS of the dot-com domain list, say, as a TXT

record in the DNS. And then that enables the Handshake blockchain to verify the ownership for that reserved string and then allows you to initiate the claiming of that reserved string. So typically, if you have DNS in place, it's a 30-day process on the Handshake blockchain.

Can we go to the next slide? So this is really our final section. We want to talk a little bit about implications for ICANN and Internet governance.

So if we can go to the next slide again, I mentioned this earlier. There are a lot of comments in the chat about, "Oh, but it doesn't do this. Oh, but it doesn't do this," and they're all exactly correct. We are looking at a very incomplete solution of the decentralized web today. When you hear people say it doesn't work on normal browser, which really is absolutely correct, you need to add a plugin. Or you find a Web 3 browser. It's no different from when the web first came out, and some websites will say, "Optimize for Netscape," or "Optimize for Microsoft Explorer." Decentralized web websites will say, "Optimize for Opera," or, "Optimize for Brave." And if you are using a Web 2 browser, it simply won't be a great experience for you.

And so we're still very early on in this process. We're before what I called a chasm, where people are willing to tolerate an incomplete solution in order to enjoy the benefits that are being promised by the decentralized web. So it's something to keep in mind.

So the question is, what will it take to cross that chasm? Part of it will be the browser war that I referred to earlier.

But if we go to the next slide, I can tell you what I don't think it's going to be. It's not going to be the policies that we all are very familiar with in ICANN. So those policies are missing on purpose, not as a big. And so the decentralized web is anonymous. There is no WHOIS. There are no zone files. There are no rights protection or enforcement mechanisms. There's no accredited contracted parties, like registrars and registries, that could be used to enforce a consensus policy. And so instead, they're trying to create these decentralized, autonomous organizations. And, again, there will be dozen and dozens of these DAOs for various ecosystems that are out there. And, again, they all are trying to operate on a community-based democracy type of policy setting.

As a final note here, there is no unified alternative root. So if it turns out, for example, I was not able to get dot-EnCirca in Handshake, well, I could go to an alternative to Handshake and get dot-EnCirca. And then there would be a fight between my target customers, my EnCirca customers, versus someone else's EnCirca's customers. And I would probably say, "You use this browser that's optimized for[__], where dot-EnCirca lives, that I want you to see." And someone else might say, "You use this browser because that's optimized for the version of my EnCirca." And so this is certainly a totally different type of regime than we've seen under the ICANN world.

So let's talk a little about looking ahead. Next slide, please. I just have a few more. So this is my rough forecast of the ICANN root. We started in 1995 with roughly 206 [GSO] TLDs, mostly ccTLDs. We added a few

through the 2000s—2005, ’08. And of course, as you know, we had around, back in 2010 … And started to add additional TLDs to the root.

So, in rough, we have 1,500 today. I would expect, around 2026, we would start adding more TLDs to the root. This is anyone’s guess. I’m expecting the root will double in size by 2030. So we’ll go from 1,500 to 3,000.

And as you know, there’s a lot of work being done—it’s called root scaling analysis—to make sure that doubling the size of the root won’t break the Internet. I think they still have a policy not to add more than one 1,000 TLDs per year. And so they’re very careful in terms of how they scale up the ICANN root.

So if we go to the next slide, let’s see where we think Handshake might be by 2030. It’s already at 3.5 million. By the time the next round starts, I’m guessing it’ll be between 20 and 30 million TLDs. And by the time 2030 comes around, ICANN will be at 3,000 TLDs, roughly, and Handshake will be close to 100 million TLDs.

So, again, it’s not quite an alternative root that we think of when we look at the alternative root today, but that’s what the decentralized web will look like. It might not just be Handshake. There could be multiple instances that are doing something similar to what Handshake is doing.

Next slide. So where does ICANN [come in]? So as we said earlier, they have alternate roots today. They exist today. It doesn’t break the

Internet. ICANN is mostly concerned about collisions to the root that can cause confusion or abuse of some type.

And so, again, picking on Handshake here, let's say the next round is going to double the root—so 1,500 more TLDs. A good percentage of those will probably be in this top 100,000 list. So if those domain name owners, in the next two years, claim those strings, there won't be a collision problem. If they're not on that list—they're, say, a newer trademark or a newer idea—then they could already be taken in Handshake or in fact still be available.

But overall, certainly, I would expect in the next round to have all those new TLDs collide in some way with a decentralized web. So I'd say close to 100% in the next round will collide. But on the Handshake side, it constitutes pretty much a rounding error, given that it'll be tens of millions of TLDs on the alternative or decentralized web.

And finally, we talked about the browser war earlier. The browsers in the decentralized web, by design, are going to alternative roots. So as ICANN introduces new TLDs, if you are using a web browser for the decentralized web, you may not see that new ICANN TLD. You would have to be back on a Web 2 browser in order to see the new ICANN TLDs. The folks who are using Web 3 browsers may never see what ICANN is adding to the Internet.

So, Glenn, I'm going to pause there. You've got ten minutes to—

JEFF NEUMAN: Can I quickly …

TOM BARRETT: Yeah, go ahead, Jeff.

JEFF NEUMAN: So Tom and I have a little bit of a differing opinion on these alternate roots. I appreciate DNS's ability and willingness to work with ICANN, with the ICANN root, and I think they should be separated from the discussion and certainly separated from Handshake and Unstoppable domains. Handshake and Unstoppable market themselves on not being tied down by ICANN rules, ICANN policies, WHOIS, and all of the things we spend so much time discussing here. They don't accredit, as Tom said, registries. There's no standards. In short, there's no end user protection whatsoever.

So there are some in the community that are afraid that, the longer that ICANN takes in coming up with the perfect new TLD process, the more proliferation of these alternative roots are going to have and the more that the world will have passed ICANN by.

I think it's a real concern. In the past with alternative roots, like I mentioned before, whether it was the Atlantic root or the Open-Root or the Chris Ambler-whatever-that-root was, or RealNames, those were not big threats. Those did not have any kind of takeup. This is different. This is very different. For those that were around back then, they know what I mean. And New.net, as Frank says, was another one. This is very

different. This has more uptake. This has a number of ICANN-accredited registrars selling these domains. So this one is not going away like the others.

And so we can spend lots of time within ICANN arguing about every detail about WHOIS and everything else while, and these other groups love that we're doing that because that gives them more time to proliferate. And that's their goal. In fact, I have obtained a communication from one of these organizations whose strategy now is to try to get ICANN to delay and delay so that they have more time to get acceptance. This is something we need to deal with.

And so one of the top questions that you'll see coming up is, what do we do if a proposed new gTLD in the ICANN root conflicts with one that exists in the Handshake root? Tom and I have a very different answer. I would say, well, since they're not abiding by the ICANN rules and they're not playing within the ICANN world, my answer would be we shouldn't care. If they don't care about the ICANN rules, why should we have to care that they exist? Tom feels differently. But this is something we need to discuss.

TOM BARRETT: So, Jeff, let's go to the next slide and let's ask the audience how they would respond to that.

So can we go to the next slide, please? So we have another audience poll to ask you guys. So let's first start with, should ICANN expand its role to include to the decentralized web? So what would people think?

Yes or no? We could put up that question. Again, let's move quick because we're running out of time. You get three seconds. Should ICANN expand its role to include the decentralized web?

Hard no, David says. Can we see the results? All right. So it's fairly split. 52% of you think, yes, ICANN should expand its role. And the next question will try to get into what you mean by that. 48% say no.

So the next question—

SEBASTIEN BACHOLLET: Tom, you can give some time for the people to answer. You're running so fast that it's not possible. You don't take into account—

GLENN MCKNIGHT: Please, Sebastien … Okay, we'll take our time. Okay, we'll read it slowly. Poll #2: Should ICANN differentiate between accidental and intentional collision in the next application round? Answer yes or no. We'll give you a few seconds to answer that.

TOM BARRETT: Right. And just to elaborate on this, "accidental" we consider to be corporate networks, like we saw back in the first round, that had leakage into the greater Internet. So we're calling those accidental collisions. Intentional collisions we're saying are alternative roots who intentionally went outside of the ICANN standards, basically, and process to launch their own TLD. So the question is, is there any

differentiation in terms of assessing potential consumer harm if it's accidental or intentional collisions.

GLENN MCKNIGHT: Okay, I think we gave enough time for that. Can we see the answers, please?

TOM BARRETT: Interesting. So 71% of you believe, yes, we should differentiate between the two. I think this is in line with what Jeff was saying earlier—that we want to make sure we don't reward people who deliberately bypass ICANN. 27% says we should not differentiate.

Which leads us to the next and final question: should ICANN consider potential consumer harm of delegating a new TLD that collides with a TLD in the decentralized web? Yes or no? We'll give you a few seconds. If you need an example, Unstoppable Domains has a dot-crypto. Let's say they have ten million consumers using dot-crypto as second-level names. Should that be a consideration if someone else within the ICANN community wants to apply for dot-crypto in the next round? So three more seconds and we would love to see the results.

Can we see the results?

JEFF NEUMAN: So on this one, while the results are being pulled up, there are arguments on both sides of this. And if CANN does consider the

potential consumer harm, then it could encourage the proliferation of these alternate roots. If it doesn't consider the harm, well, then end users could be harmed.

And this is actually the results, which are pretty indicative of the difficulty of this problem.

TOM BARRETT: Right.

JEFF NEUMAN: So you see 52% believe that ICANN should consider the harm, and 48% say no. So, again, you must ask yourself, if we're saying that an alternate TLD that picks up a significant amount of users should … no one should be able to apply for that TLD in the next round, then are we just encouraging people now to go out and start their own TLDs so that, in four or five years, when ICANN does launch the next TLD process, they're sort of grandfathered in? Is that fair to those that are following the rules? Remember that none of these new registries in the alternate root have any protections. There's no, as Tom says, WHOIS, no registrant protections. There's no regulation. There's diligence done on the registry operators. They can fold the next day, right? There's no escrow. None of that. So this is a difficult issue. Very difficult.

TOM BARRETT: Thanks, Jeff. So, Glenn, if you want to stop at the top of the hour, we'll hand this back to you.

I want to thank everyone for their attention. There's some great discussion in the chat. Obviously, it'll be interesting to see what happens in the ICANN community going forward if this becomes part of the normal discourse.

GLENN MCKNIGHT: Great. Jeff, any final words?

JEFF NEUMAN: No. I mean, I thank you for letting us discuss this. And it just shows you that we can't continue to just ignore what's going on in the rest of the world. We need to get out of our bubble and we need to recognize that the world is evolving with or without us. Thanks.

TOM BARRETT: Thanks, everybody.

EDUARDO DIAZ: Thank you. Thank you, everyone, for participating today. Again, this presentation is available on one of the social channels. You're free to share them with your colleagues. And let's see if we have another meeting going forward to answer some of the questions that we saw today.

Thank you so much. This meeting is adjourned. And thank you to Tom and Jeff.

JEFF NEUMAN: Thank you. Bye-bye.

TOM BARRETT: Bye, guys.

GLENN MCKNIGHT: Thank you, everybody. Thanks again, Tom and Jeff. You did a great job. Thank you again.

YESIM SAGLAM: Thank you, all. This meeting is now adjourned. We will now stop the recording.

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