

IDF 9.12.13 9am to 1030am



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Male Voice: Ladies and gentlemen. Today's presentations contain forward-looking statements. All statements made that are not historical facts are subject to a number of risks and uncertainties, and actual results may differ materially. Please refer to our most recent earnings release and our most recent form 10Q or 10K filing, available on our Web site, for more information on the risk factors that could cause actual results to differ. Thank you.

Male Voice: Ladies and gentlemen, please welcome Dr. Genevieve Bell.

Genevieve Bell: Well, it's an extraordinary pleasure to be here, and just a little bit terrifying. I'm glad that you were at the party last night. I saw many of you. There's nothing like going to a party with engineers -- you all stood there while great music was playing, with your phones like this [laughter]. I know we will have come some way when you'll come and dance with me, rather than just standing there.

Anyway. I'm very excited to be here. As Ulmont said, I am the director of interaction and experience research here in Intel Labs. And I'm also an anthropologist. Just the sort of confession you should start all keynotes with.

It turns out I'm also the daughter of an anthropologist, which is important here because I have a couple of skills. I don't plan to demonstrate them on this stage, but if you ask me about them later I

actually know how to get water out of frogs. Really. Not good for the frogs [laughter].

You can also find me on Twitter, and because I know some of you were out late last night I've given you a little bit of assistance here. When you see the little blue bird dancing across the screen, that is a good slide to put on Twitter. See? Kind. I'm being kind to you. Exactly. I'm doing your work for you. You should imagine that.

So yes. I did actually say I was an anthropologist. I'm sure some of you are going, "What is that?" Turns out what I do is study people and culture. I do that at Intel. I have a team of people who work with me.

And our job is really to spend time in people's homes, in the places they make meaning in their lives, getting a sense of what makes them tick and what they care about. And we bring all of that back to Intel and use it to shape new product direction, and to shape the future of technology.

I know you've been here for the last two days. Thank you for that. I know you just heard Ulmont talk a little bit about what you saw. But for me one of the things that was extraordinary about listening to the last two days wasn't just the announcements of some amazing technology, but also that every person that stood upon this stage talked about people. They talked about why we needed to deliver technology that would change people's lives, why the technology

we deliver would make people happy, and about what it was going to be to kind of embrace a vision of this incredible sort of new future that we're all marching towards.

And I think you heard, moving through the last three days, this very clear view print of a future of mobile technology, and of a future I hope that you're as excited about as we are. And I wanted to kind of pause and say, what does it mean to really talk about mobility? We talked about Bay Trail yesterday and Quark on Tuesday, but what are some other ways of talking about it?

One of the ways to talk about it is just the sheer size that we are sort of discussing here, right? Six-point-three billion mobile subscriptions on the planet. Those of you who pay attention know there are about seven billion people on the planet, so one way of thinking about that is, almost everyone on the planet has a mobile subscription. But the reality is, there's only 4.4 billion people who actually have those subscriptions. So, I'm an anthropologist, math is not necessarily my strong suit, but this means some of us have more than one subscription, and I'm willing to bet most of those people are in this room. Yeah, that knowing laugh suggests I'm not wrong.

Another way you can think about this is not just how many subscriptions are there, but how many devices are there? In the next 24 hours -- so, between now and when you wake up tomorrow morning and have your next cup of coffee, 3.7 million mobile devices will have been sold on the planet. That's 154,000 devices

just in the next hour you're sitting here. Now, I hope you're not buying them while you're sitting here. It would be good if you were listening to me, not shopping, but if you were shopping, that's 43 every second of this keynote. So truthfully, maybe for Intel it would be good if you were buying those devices, not just listening to me.

We also know in order to have that world work, that world of devices and subscriptions, we're actually going to have to have an extraordinary infrastructure, an infrastructure of towers, of a cloud that makes it move, and of the data that will move on it. And the scope and scale of that is extraordinary. We're talking about 1.9 million cell towers in the US alone. There's nearly a million in China already. Those towers across the globe are moving 5 Exabytes of data this year, and in four years it will have grown to 21 Exabytes of data.

And if you just wanted to look at apps, in that space alone, for Google and Apple it's nearly 6.25 million apps downloaded every hour. This is an extraordinarily large space, right? We're talking about a lot of activity.

And if it wasn't just enough to think about the technologies that we carry, I think you can also think about mobility as the technologies that carry us. And in this space, again, there's a lot going on. On the planet, there's about 850 million cars. That'll double by 2035. In the US alone -- and I'm willing to bet this was an experience for some of you this very morning -- we spend 5.5 billion hours in the US not

sitting in our cars, but sitting in our cars in traffic, so just waiting. I'm willing to bet that's the time when some of you do things with your mobile phones you shouldn't. Yeah, over there, you know you do.

So, we have this sort of one way of thinking about it. So, how would you think about it as an anthropologist, right? Numbers are interesting, they're always helpful, they give us a framework, but what does it mean to talk about mobility from a human point of view? One of the things to remember here is that moving, the ability to move, walking in some ways, all of those things are intensely human. There's an argument in archaeology that says one of the things that made us human is the moment we moved from being on all fours to being upright -- so, becoming bipedal. And being able to walk freed our hands to do a number of things. In archaeology, mostly what they'll tell you is it freed our hands to kill things, because we are talking about, you know, several hundred thousand years ago. Today, you might argue that it freed our hands to do things like send text messages, and not pay attention in this keynote, those kind of things.

So, we've got all that happening, this desire to be mobile, intensely human. But the idea of mobile technology we talk about as though it were new, and the reality is, it isn't. There's been mobile technology in our hands and on our bodies, and mobile technology that carried us for hundreds of years. The aboriginal people who raised me in central Australia really liked boomerangs and spears,

we know that swords are hugely important, we know that we have extended our bodies and our physical reach using all kinds of technologies for a tremendously long period of time.

We've also used technologies on our bodies to augment our deficits. I'm wearing a pair of glasses because I can't really see without them. I'm willing to bet there's a number of you in the room this is true for, too. Some of you have hearing aids because your hearing isn't what it once was. We've put technology on our bodies to make ourselves better, to find a way to kind of move through the world and extend ourselves.

So, if that's where it's been, where is it right now? So, as I said, I'm an anthropologist. I have a team of social scientists who work for me. We spend a great deal of our time out in the world, hanging out with people. And I wanted to just give you four really quick snapshots of mobile stories that have come back from the field in my lab just in the last year.

The first one here is a man standing in a train station in Seoul, in front of a huge screen, because it turns out being mobile isn't just about the devices you carry, it's about the places you go to. And he is there checking his horoscope and writing down the details, because he plans to go home and check them and think about what he should do tomorrow. So mobility, it's about how we think about our days, right?

The second image here is from South Africa, and it's effectively an ATM. I know it doesn't look like one, but it's somewhere where you go so that you can move money. And here, as in many parts of Africa, your mobile phone minutes are actually a form of currency, they're like money. And so here, you go to that kiosk to move money from one place to another using your phone.

I'm willing to bet that third image there is very familiar to all of you. Although we took it in Germany, we were in a car with someone who was texting while she drove whilst explaining to us she never did this except when it was an emergency -- yeah, that also sounds familiar, right? So, clearly one of the things about mobility is what we do, what we say we're doing, and what we're actually doing -- two completely different things, and we need to pay attention to the fact that we're not always doing, in some ways, what we should.

And then last but by no means least, this is actually one of the employees in my lab. This is [Pete Denman], who went to England for the first time this year and found himself with a mobile phone that didn't work and desperately needed to make a phone call, and then discovered that the thing about being mobile is that the world isn't always set up the way you need. So, he couldn't get his wheelchair into the phone box, which created a whole series of other problems about how it is that one is mobile.

So, how do we engage with the world, what are the technologies we need? And clearly, there's a lot more going on here. We can talk about history, we can talk about people, we can talk about devices, but how do we put that together in some kind of framework? In our industry -- and we all know this -- we tend to focus just on the devices. That's a convenient anchor point to a conversation about mobility. But I actually think you have to blow this sort of picture out and expand your thinking considerably. I think we have to think about the infrastructure in the cloud, because frankly, what's going to make mobile devices interesting in the future isn't just the thing in your hand, it's what they're connected to and what it can connect you to.

We also know it's going to be about the people who carry those devices, it's going to be about the data that runs on the network, it's going to be about the places in which mobility happens. It's an incredibly complicated picture.

And when you put all that back together, you can say okay, if that's the present of mobility, what does the future of mobility look like, where are we heading? I said earlier there were an enormous number of people on the planet, 7.1 billion and counting. You heard Renee on Tuesday talk about the fact that we're moving to an incredibly high rate of urbanization. So, we have a lot of people living in big cities with a capacity to buy devices in a way that's never been possible before.

As a complement to that, on the technology side, we have the capacity for computing to go everywhere. We're talking about device sizes getting smaller and smaller, the cost coming down, the power consumption coming down. Renee talked about it as the era of integrated computing. We sometimes talk about it as the internet of things. But, we have a capacity here to imagine technology everywhere.

So, what do you get when you put together this incredible kind of human piece and this technology piece? Well, one thing you get is the future of mobility. And in many keynotes that some of you have been to, some of you who have given them, you know at this moment what we should be doing is cuing a vision video, and they're of these lovely shiny people with shiny devices that all look great. They'll be thin, they'd have cheekbones. They'd be in some place that was really clean, and they'd have these flawless, wonderful mobile experiences. You all know that video, you've seen that video, you are familiar with that video. I don't want to show it to you, because I actually think the future's much more complicated than that, and as a result for me, intensely more interesting. Because actually we're talking about not just one mobile future, but lots and lots and lots of them.

So, there are many mobile futures. And what I wanted to show you was just one example of a possible future.

[Video begins]

[Video ends]

Genevieve Bell: This is good. [Lou] did not hit me. This was a mild concern we had. So, I know you're wondering, why does she have a bicycle onstage? So, this is a jacket, it's a prototype from the Fraunhofer Institute in Berlin. It has stretchable circuit boards here -- so, the flashy bits here. Each one of the LED lights in this object has a built-in accelerometer, and it sparkles for safety. That's my way of getting a sparkly thing onstage, really. When you look at this, what you should think is, the future of mobile isn't just going to be devices. Some of it's going to be clothing. It's going to be the things that we wear on our bodies, in this case, to keep us safe as we're on bicycles. I know that some of you in the room from San Francisco, this is a form of transportation you'll recognize.

At the moment, this is still a demo object. But start to think about what it would be like in your lives if the clothing that we wear also protects us, keeps us safe and let us be mobile in really different ways. This is yet another kind of example of what a mobile future will look like. Thanks, [Lou].

[Lou]: Thanks, Genevieve.

Genevieve Bell: You're welcome. [applause] Yeah. Thank you, Lou. Yeah. Ready to go. And yeah for not hitting me. [laughs] Small fear I had. So what I'm starting to kind of suggest here is that maybe what we're talking

about is not one future but as many futures as there are people on the planet.

Seven billion mobile futures -- that's kind of an extraordinary thing to contemplate, right, that lets us have this really interesting kind of conversation. So what might some of those futures look like? Well, let's start somewhere that I've spent my time, a city I really like to visit.

This is New Delhi in India. This is a pretty typical street scene. This is somewhere you might go on your way home to buy fruit or vegetables for dinner. Vendors are there. They're mobile vendors to get to the streets, and you're mobile to get there.

But imagine what will happen when you start to be able to introduce new layers of technology into this, like the smart solar-energy-powered, wireless, e-commerce vendor device. Intel is partnering with [Barrow] in India to deliver this object to the streets of India to make it a reality.

Completely different way of thinking about vending, different way of thinking about mobility and about streets. Here, what's important -- and it's always really important to me when we talk about the future -- is to imagine that the future doesn't erase the present.

As we make new forms of technology, as we make new objects, we're going to have to coexist. So what it means to create a future

that is comfortably able to sit with our present is hugely important. But hold that idea about vending for just a moment.

And let me give you a different example of a kind of other mobile space. So same idea, completely different instantiation. This is a smart kiosk in Japan. Here, when you come up to this kiosk, it recognizes you. It makes some determinations about what you would like to drink on the basis of prior activity.

And it edits the selection of drinks available to you and offers you up the things it thinks you will like so effectively making your life a little easier. Those of you who have been on trains and on train platforms on Tokyo, you know it is a very busy place.

You don't often have a lot of time. This is about efficiencies and about making our lives a little easier. So really, here, what I'm starting to say is mobility isn't just about devices. It's also about the places we all visit. And it's about what we might want to do while we're there. [music playing]

So what you're watching here is a research prototype that we build in Intel Labs. It was really designed to kind of start thinking about, how did people interact with places and spaces because it turned out it was really important to think about mobility from a couple of different ways.

We tend to think about mobility as mobile devices that connect us from one place to another and that we move around with. But it also turned out that where you were, the here and now was actually hugely important.

So for us, we're really starting to experiment with that. No, wait. My friends are going, aren't they? Do you want to know what they're doing over there? I know you do. So Matt --

Matt: Hey, Genevieve.

Genevieve Bell: Matt [Udana], a researcher from Intel Labs. Matt, what are you doing in the coffee shop?

Matt: Well, we've built a great experience for a dual-screen laptop. And this is about displaying images and text up to 140 characters on the second screen of the dual-screen laptop. And it's really about connections and interactions with people in the same physical location.

Genevieve Bell: So what did you learn from this research probe as we built it out?

Matt: Well, one of the things we've learned is that people really hunger for those connections with each other that are about the here and now.

Genevieve Bell: Mm-hmm.

Matt: And we have lots of ways to connect socially and virtually with a bunch of social networking surfaces. [laughter] But it's also hungering for those kind of face-to-face connections.

Genevieve Bell: Like this.

Matt: Yeah.

Genevieve Bell: So I'm judging by our colleagues here that they're having a good time with this. [laughter] Possibly a better -- they're married before you wonder too much what's going on here. [laughter] I feel I should add that -- or at least I think they are. Maybe? Yes. Okay. Good. [laughs] So when you built this out, how did people respond to it?

Matt: Well, actually, people have really loved it.

Genevieve Bell: Really.

Matt: [laughs] Yes. You know, people can instantly see how much fun it is. And one of my favorite examples is we actually had a group of 14-year-old girls who all know each other from the same community center.

And they actually asked if they could have a sleepover at the testing facility, so they could keep using it.

Genevieve Bell: You know you're doing well when people don't want to let go of your object.

Matt: That's true.

Genevieve Bell: All right, listen. I want to thank you.

Matt: Great.

Genevieve Bell: Thank you, Shelly. Thank you, Brad. You can stop now. [applause]
So what you can see there is a really different way of thinking about mobility. This was a design research project. We built it at Intel Labs.

We tested it in the Portland and Seattle area. And we got some very clear findings, right. People really wanted to communicate where they were right then. They wanted to be in the moment, in the here and now.

They absolutely wanted to express themselves. They got really cheeky very quickly. And it became very clear that mobility was about the places that you were, not just about the journey of getting there. And there's something really sort of interesting for that for me.

So when you put all this together, I think what also becomes clear is we're not talking about one mobile future. We're talking about lots of them. We're talking about a whole really different sort of space here.

Now, I know some of you in this room. I know some of you reasonably well. I know you are now thinking, this woman is asking us to design seven billion mobile futures. I want to promise you I'm not because I think that would be an awful thing to ask.

What in fact I want to say is that there are some common themes that run across the human experience. There are some common themes in what people want from mobility. And I think, you know, those become a really useful developer brief, a really useful design brief, a way of thinking about what that mobile space would look like.

And we know this because we do a tremendous amount of research in any given year, 250,000 interviews in 45 different countries. We spend a lot of time with people. So I have some sort of reasonable confidence in this new set of things I want to tell you.

So four things. Just four. And those of you who are tweeting, get ready. Four. Here we go. One, two, three, four. Number one, it turns out people want technology that's truly personal. They want technology that understands them, that knows them.

They have devices in their lives that are increasingly part of what they're doing and how they think about themselves. Best line we have heard in a focus group on this topic in years was in Chicago last year when a woman said to us, "My husband is going to be mad. But my smartphone is just as important to me as he is."

[laughter]

Truthfully, the husband was mad. [laughs] But the reality here is also that it tells us something about the affection we feel for our devices. They're in our hands most of the time. I'm willing to bet that the sum of you out there, you sleep with them -- the devices -- within arms reach. Hmm? Under your pillow?

Fifty percent of Americans sleep with their phones within arms reach, 75 percent of teenagers sleep with them under their pillow. So if you want to feel young again, [laughter] easy advice. So we know that the computing needs to be personal, right.

It needs to know something about us, which is going to mean all sorts of technical things. It needs to be constantly sensing. It needs to have low power. It needs to be contextually aware, and we're going to have to trust it.

But we're going to have to do all of that without weighing us down further. Technology has a habit of literally and metaphorically burdening us. You heard Kirk Skaugen say this on the stage

yesterday. But there is the moment in all of our lives where you think, I've lost the thing to connect to the thing.

You know this. This is the bit where someone says, I don't have a dongle. I hear this in meetings all the time. I still don't know quite how to respond to it. [laughter] And then, there's a lot of rummaging around in backpacks. [laughs] I'm willing to bet if I took most of your backpacks in the room, I turned them upside down, and I shook everything out, there would be a tremendous amount of stuff. Being mobile actually requires a lot of work. It requires cords and cables and battery packs and stuff. So we know that technology is weighing us down literally. But I also think it's weighing us down mentally. So how do I know that? Because I know that we did a study this year, average American has 18 passwords on the go at any given point in time.

Some of you write them down on bits of paper and stick them in your wallets. Not helpful. Best one I've ever seen is someone who wrote their passwords around their monitor. That was good. And then someone who had done them in a sharpie pen around the lid of their laptop. Clearly, they could find them. Not terribly secure. Now, some of you in this room, because I know some of you in this room, have an algorithm for working out your passwords, and yours are always secure.

The rest of us, not so much. Because really, the rest of us fall into a terrible trap of the really easy way out, by using the number one

most popular password in America. And do we know what that is? No, it's this. Because the number two most popular password in America is that. So really, how do we create a mobile future where we aren't burdened down with cables and with, effectively, passwords that are doing us no favors? So how do we solve those problems?

Those are going to be things we're going to need to address in a mobile future that we want to inhabit. Third thing is we desperately want technology to keep us in the flow. And the reality is technology interrupts us all the time. When we talk to consumers, they express incredible frustration about having a task happen and whatever the computational device in your hand at the moment says oh, I need a new driver, oh, I need a password, oh, I don't know what wireless network I can connect to.

We had someone say to us that, basically, trying to deal with their machine was just so frustrating that they'd go get a cup of coffee, come back, and then maybe things would be happening. For me, right here, right now, this would be the thing I would not want to have happen. Most of you have had a moment where the technology really didn't cooperate, when it didn't keep you in the flow. It was just kind of awful. Because what it is that consumers want is they want desperately to be in the moment of it all.

And the loveliest line I ever heard someone say about this was that she wanted to feel about her technology the way she felt about

running. So it's like the feeling she got when she ran and she forgot her knees hurt and how far she had to go because she was just in the moment of the running and the pleasure and the joy of it. Think about what it would be to have technology that did that for us, technology that knew we were reading to our kids and this was not a good time to have the phone ring, technology that knew we had a presentation that was due any second and it'd be really good decide that was not the time to update the drivers.

What would it mean to have technology that was effectively looking after us and letting us be in the flow? Because last, but not least, number four, what people really want from technology, ultimately, is they want it to make us our better selves. More and better. More connected to people, more informed, more creative, more productive, more healthy, more attractive. We know that's somewhere in there. And they want technology to make us better, to be better parents, better children, better friends, better partners, better employees.

And as we look across all of the really successful technologies over the last 100 years, this piece, hugely important. So how we have technology that makes us our very best selves, a big thing. So when you put all of that together, in my mind, with your help, we could deliver 7 billion mobile futures that would be personal, that would unburden people, that would let us stay in the flow, and that will let us be our best selves.

But to make all of that real requires an incremental amount of innovation. And it's going to require real work, right, to make it real, to make it mobile, to make it personal. It's an incredible amount of activity that's going to happen. Good news is you can count on Intel to do this. We have active research projects at every level of this stack here. We're doing work in all of these different places to make these kind of mobile futures possible. And what I want to do is just show you just a little bit of the things that are going on, so that you can be as excited as I am about the possibilities here.

And I wanted to start with a silicon demo. I know that seems odd. I'm not going to show a wafer, because that really would be odd, for me to show a wafer. I won't talk very much about silicon, but what I wanted to do instead was talk about the need for technology that consumes the lowest power we can get to. So if we want to have mobile technology that doesn't burden us down, that knows us, it turns out we're going to need to have really, really low power.

You saw our CEO talk on Tuesday about Quark, our most recent generation of low-power mobile technology, but I think we're going to need to go even lower. So I want to invite my buddy Mike Bell, general manager of the New Devices Group, on the stage to help me put all of this in context.

Mike Bell:

Hi, Genevieve.

Genevieve Bell: Hey, Mike.

Mike Bell: Good to see you.

Genevieve Bell: It's nice to see you, too. Now, before I talk to you about what you're actually doing --

Mike Bell: Wait, wait, does that bike shirt come in tall? Yeah, okay.

Genevieve Bell: Yeah, maybe not.

Mike Bell: Yeah.

Genevieve Bell: The bicycle might have to come in tall, as well.

Mike Bell: Yeah. It's a problem I have.

Genevieve Bell: I want to help you. I'd like to help you. But I figured -- so one of the things you may not know about Mike Bell, in addition to being the general manager of the New Devices Group, he also has a bit of a thing about wine. So I have something I want to show you.

Mike Bell: I heard it's a cool demo.

Genevieve Bell: It's a very cool demo, and I want you to come see it. So, Chuck, show us your demo.

Chuck: Hey, guys. How's it going? So you guys are talking about low power, so I'd like to give you a peek inside the Intel Labs that might redefine when you think of low power really is. So I have a little development board here, and on here, I've got a low-power communication solution, a low-power processing solution, and an accelerometer, right? Now, when I talk about low power, you might be thinking low power in that 1-watt, 2-watt solution you'd find in a phone.

Well, today, we're not here to talk about watts. We're not even here to talk about milliwatts. We're here to talk about microwatts. We're talking computing solutions so low that, in the future, we should be able to power them with the heat of our skin or the ambient light in the room or, like I show you today, maybe something just a little bit more entertaining. So you can see, next to my development board, I've got a laptop here, and on that laptop, I've got two screens.

Now, one screen's empty, and the other screen has a picture of a flower. Now, this empty screen, if I had a battery in my little development board here, would be transmitting data from that accelerometer through that low-power communication solution to the computer here, and on that screen, I'd be getting accelerometer data, which would then be sent to this flower, and it would reference that data, and it would look just like my accelerometer board. But since I have no power, nothing's happening. Now --

Genevieve Bell: So far, that's not a very good demo.

Chuck: Yeah, so far, we have nothing.

Mike Bell: It's a hardware problem.

Genevieve Bell: It is a hardware problem.

Chuck: But you might remember in grade school, you did a little experiment where you took some lemons and you put a copper penny and a nail in there, and you lit up an LED, right? Well, we're in California, so we're going to do the same thing, only wine is cheaper than lemons here. So we're going to do it today with wine. So I'm going to take my bottle of wine here, and I've got a glass, I've got some copper, and I've got some zinc in there, so I'm going to do really that same experiment we did in high school or in grade school. I'm going to fill this up.

Genevieve Bell: So how much did that wine cost, Chuck?

Chuck: It was dollars.

Mike Bell: I see Intel Labs spares no expense on the wine, yeah.

Genevieve Bell: Well, I'm not using your wine.

Chuck: Now, if you take a look on that empty screen, now that my development board has power, you see accelerometer data being

transferred, encapsulated from the processor, sent to the computer, and it's showing up here. Now, if I pick up this development board and I move that around, you will see that orchid starting to reference just like my reference board here. So you can see I'm powering my entire computing solution from what was left over from last night's dinner.

Mike Bell: Wow, cool.

Genevieve Bell: Nice.

Mike Bell: Nicely done.

Genevieve Bell: Thank you. So clearly, I didn't bring you out here just to show us turning wine into electricity.

Mike Bell: Which is pretty cool, though. Yeah.

Genevieve Bell: It's amazing. And I know you have a lot of wine, so I know what you'll be doing when you get home.

Mike Bell: Yeah.

Genevieve Bell: But tell us a little bit about why things like this, why low power's going to be important to --

Mike Bell: Well, I mean, yeah, absolutely. I think everybody knows it's going to be crazy important. I mean, we're really entering this year, as you've been pointing out, of very personal computing. We've been talking about it for years, but there's nothing more personal than electronics you wear, right? So no one wants to have to rush home to charge their clothing or charge their devices. I mean, we're talking about running some of these devices on a coin cell for weeks or months at a time.

And the really interesting thing from my perspective is low power doesn't mean low performance. I mean, you have to have both for some of these devices we envision building. And my group, we're like kids in the candy store. I mean, the stuff you guys have in the Labs, the stuff that is in the fabs -- we have the most amazing pieces of technology we can put together to build stuff that's very personal and also runs forever and has wonderful performance.

And these are the kind of things we're working on. So this is very exciting. I mean, it's a great example of, again, milliwatts, I mean, that was -- now it seems like it's so yesterday. We really have to be thinking about new levels of power, so --

Genevieve Bell: So if I ask nicely, are you going to tell me what you're working on?

Mike Bell: Absolutely. Because the best way to keep stuff secret is to share it with several thousand of our closest friends, so yeah.

Genevieve Bell: Damn.

Mike Bell: Yeah, yeah.

Genevieve Bell: Well, it was nice to --

Mike Bell: Thank you.

Genevieve Bell: Thank you. Mike Bell, ladies and gentlemen, and Chuck.

Mike Bell: [Unintelligible] thank you.

Genevieve Bell: So some people turn water into wine, here at Intel, we're turning wine into electricity, not a bad thing, using an experimental low-power processor here. I hope what you can see is that it's possible to start to imagine a world of incredibly low power, but also really high performance, which will help do a number of things. It will help unburden us, it will help us do things that are remarkable, and it will have this ability to power things like constant sensing and computation and communication, all of which are ultimately going to be necessary to develop and -- develop and deliver a mobile future.

But it's not just about the underlying silicon, right? We also have to build up this stack. So as Mike said, one of the things that is compelling to him about low power is that it lets us not only run an object for a really long time, but run an object that's close to our

bodies, that has to know something about us. So when we talk about that, for me, that's always about talking about context. So how do devices know who we are, know what we're up to, thinking about how we develop future applications and services that will be personal to us. So I want to talk a little bit here about context. And to help me explain this better, I wanted to welcome onto stage one of the principal engineers in Intel Labs, Lama Nachman.

Hey, Lama. It's nice to see you. I know you've been here talking about context before, so what's new, and what are we talking about?

Lama Nachman: All right. So you talked about this vision of mobility, right? That's personal, unburdened, and so on. And for our devices to be able to do that, they really need to start to understand this, because if they actually don't take context into account, they're not going to be behaving properly or acting in the proper way.

So at Intel, we've been working on context awareness for a very long time, and we take data from all sorts of different sensors. And thank God, now we have tons of sensors on platforms, and off platforms. So we get all of that data -- you know, acceleration, location, radio, audio, etcetera -- and we make sense out of that data through different types of machine learning algorithms, signal processing, etcetera. So we start to know things like what you're doing, who you're with, how you're feeling, and so on.

Genevieve Bell: Now I bet, because you've got your hands behind your back there, that you've actually got something you want to show me.

Lama Nachman: Exactly.

Genevieve Bell: So what have you got?

Lama Nachman: So basically, what we're trying to do here is trying to understand who we're with. And the reason we're trying to do that is, if you think about it, today devices, when they make recommendations, they make recommendations based on understanding what we're doing. Right? So you have your phone. It's a smartphone. It knows that you've been going to different places, so maybe it knows you like Japanese, for example. Right? You're in San Francisco. It's going to recommend Japanese. Now the problem is, what happens when we are together?

Genevieve Bell: So wait a second. These phones are going to know we're together?

Lama Nachman: Absolutely.

Genevieve Bell: How are they going to do that?

Lama Nachman: So basically, what we're really trying to do here is it knows that we're in the same venue, it knows that we're physically proximate, but it also needs to understand more than that. So think about audio. So audio can start to tell things like if you were, say, ten feet apart

from me, but you're across a wall, you're not really with me. Right? But if you happen to be in the same environment, our devices will be hearing the same thing. So now, if you actually look at what we have behind me, you can see real data streaming from these devices into our backend server.

Genevieve Bell: So what you're telling me is this phone knows it's you, and this phone knows it's me?

Lama Nachman: Well, it knows that. But first of all, it knows that we're together because it's hearing the same thing. Right? And then if we turn on speaker identification, because my phone tends to actually hear me over time, it will build a model of what I sound like. And then now, as I'm talking, you can see that it's actually starting to show what that is.

Genevieve Bell: And this is why you made me read that very strange passage to you last week, so that it would know it was me. Sneaky. So effectively, we have two phones. They know who their owners are because they can hear us. But they also know they're together because they have models of proximity.

Lama Nachman: Exactly.

Genevieve Bell: That's pretty cool. Because that means you could start to do interesting things in terms of recommendations, right?

Lama Nachman: Exactly. So now, every time we actually go together, it will start to understand that these are the type of things that we do, which could be very, very different with what we do actually when we're alone. Right?

Genevieve Bell: Nifty. Cool. All right, I know that's not all you want to show me. What else have you got?

Lama Nachman: So I have actually something in my pocket. As always. So you mentioned earlier the whole notion of passwords, and how complex that is. And honestly, if you think about it, there is this tradeoff between usability and security. Right? I have to get my phone out, I have to enter some password. That's actually problematic. Right?

Now if you start to think about different signals -- you know, we talked about my phone being able to recognize me from my voice. But what if I'm actually in a noisy environment? What actually happens? So I've been thinking about how do we change this tradeoff, because security is not really binary. If I'm trying to access my bank account, I need much more security than the type of security that I might need if I just want to know where my next meeting is.

So we figured, okay, what are other modalities that we can use that don't require a lot of manual intervention? So if you think about this, my phone can recognize the way I walk. Because walking

pattern -- or gait -- of people is actually very specific to who they are.

Genevieve Bell: So basically, your phone knows it's you because of the way you're walking?

Lama Nachman: Yes, because it has seen me walk over a very long time. So let me show you.

Genevieve Bell: Can you prove that?

Lama Nachman: Oh, absolutely. You know I can. So look at this.

Genevieve Bell: As if by magic, prove it.

Lama Nachman: Now, it's actually streaming accelerometer data. And as I start walking, it will recognize I'm walking. And then, it knows that it's me because it has seen me walk for a very long time. Now, of course, when I change what I'm wearing and all of that, it will have to learn all these new things. But I bet --

Genevieve Bell: So are you telling me if I run off with your phone, it will not --

Lama Nachman: That's what I would hope -- it actually knows me well. But let's see if it does.

Genevieve Bell: Should we test this?

Lama Nachman: Please.

Genevieve Bell: All right. Oh God, it knows I'm doing something. Uh-oh. Oh, there we go. That's what we like better. So wait a second. Will it know if I'm wearing flat shoes -- which we know almost never happens -- versus heels?

Lama Nachman: Well, the thing is, what's really cool about this is the idea is your phone, over time, will start to learn.

Genevieve Bell: So it accumulates information?

Lama Nachman: Exactly. So now when you wear something else, it won't know that, right, because your gait would change. It's not like it's 100 percent. But the thing about it is, over time, as it learns you, it will know this is what you look like in heels, and this is what you look like on these surfaces versus other surfaces.

Genevieve Bell: It's kind of amazing. So what you're basically telling me -- take the phone away because you know I'll do nothing but trouble with it. What you're basically showing us here is some really different ways of thinking about context, about how technology will know us, know our bodies, and be able to do things. That's actually really cool. Will you join me in thanking Lama?

Lama Nachman: Thank you so much.

Genevieve Bell: Thank you, Lama. So if people want their devices to know them, there's going to be lots of ways of doing that. Not all of them are going to be about inputting passwords. Some of them are going to be about devices that actually physically recognize our bodies. They recognize the sound of our voice. They recognize the way we walk. And they behave appropriately on the basis of that.

So imagining a future where context isn't just about sensing but about making determinations on the basis of that sensing is kind of remarkable. And I know we've talked about context for a long time here, but this is technology that is now actually in our platforms and being built out. So what it means to start seeing these things in the marketplace is really fascinating. And it also promises the opportunity of technology that will be personal and that lets consumers ultimately stay in the flow, which we know is important to them too.

So working our way up this stack, for me, the kind of last place I want to sort of take a stop here and have a look is in the services space. So we've talked a lot about people having devices in their lives, devices that know them. That means they need to have devices that they can trust, devices that are secure, devices that are with them and, as a result, are known by them. So what does it mean to start thinking about that? What would it mean to think about trust and security, and to think about effectively devices that we trust to know things about us?

To talk about that, I wanted to ask Peter Biddle, the General Manager of Intel's cloud services platform group, to join me on the stage. Peter?

Peter Biddle: Jazz hands.

Genevieve Bell: It's nice to have them, right, Peter. I know you've got something you want to show me. What have you got?

Peter Biddle: So at IDF last year, we showed sort of a combination of services that we were thinking about doing. And in that time, in the ensuing year, we've actually put a lot of these services online. And central to what we're doing is this thing called federated identity. And there's been a lot of awareness in the public in the past year around privacy and security -- in particular, recently with three-letter agencies helping us understand what we're doing every day. And we've been thinking about this a lot too.

So what we have here is an HTML5 app. And it uses FedID and other services that we've shipped to enroll devices and social networks, and give you sort of a report card on what's your privacy exposure. So we have an overall score for this. This is the account here. You can see in the upper right, it says "Genevieve Demo." That's the name of the person that's using this.

I'll start with the devices tab. So if you go into "devices," we've enrolled the Ultrabook. We can see that we've got sort of a report card here, with the green stuff. The red is there's things accessing cookies. We've got 358 persistent cookies, 433 session cookies. One of the interesting things about this tool is that the team that worked on it, every single person who ran it has gone, "Holy -- wow. I have over 1000 cookies on my machine. What do I do now?"

Genevieve Bell: So really part of what you've got here is a prototype, a research concept that really lets you start to think about what it is that is already happening around you that you wouldn't necessarily know how to make visible?

Peter Biddle: Absolutely. Telling someone they have 1000 cookies, but not telling them what they are, what they do, or giving them any sense of being able to organize them or understand them or think about them at all. It's really confusing. So another thing we have is you can enlist multiple devices and view them all on the same HTML5 app. This app also runs on Android tablets and Android phones. It runs, obviously, in Windows.

So you can see here your phone, because this is Genevieve Demo's phone. This is a real phone. You may not know, but there are 39 apps on your phone that can see your contacts. And ten of them can actually read your SMSes, which is kind of surprising.

Genevieve Bell: That's kind of disturbing.

Peter Biddle: So another thing that we're doing is looking at being able to enroll more devices. So Internet of things, right? Internet of things is really like a --

Genevieve Bell: Well, we talk about it all the time. Consumers are not just going to have one device. They're going to have lots of them. And thinking about how you manage yourself across all of those is always a real challenge.

Peter Biddle: It's huge. It's kind of -- it's exponential from a privacy perspective, because now you've got wearables embedded in your shoes, your wine glass, and it gets very complex. So the last thing I want to talk about is social. Because I'm bad at actually clicking and talking I'm going to have --

Genevieve Bell: Someone else drive?

[Crosstalk]

Peter Biddle: Someone else drive the rest of the demo. What we did is we used the Facebook API. We go into Facebook. We can show sort of what the exposure from a Facebook perspective is. One of the things that is interesting is it's really hard sometimes to understand what's happening in your social network in your presence.

There's a photo here; you can see your photo is marked as public. You may not know that any of your photos are marked as public, so let's click on that. We go out to there --

Genevieve Bell: You've just told the entirety of the IDF audience that I eat Pop-Tarts for breakfast?

Peter Biddle: Pop-Tarts for breakfast.

Genevieve Bell: My mother would not be pleased with that.

Peter Biddle: No. So we can go here and change the privacy to let's say friends or only me. We'll go to friends, and then we'll go back to the privacy control panel, do a refresh, and you can see -- if it works -- that the privacy for that photo has changed and we fixed that problem.

Genevieve Bell: So basically creating a dashboard for how we start to think about our privacy and how things sit together here?

Peter Biddle: Yeah.

Genevieve Bell: Wow.

Peter Biddle: Absolutely.

Genevieve Bell: That's kind of cool.

Peter Biddle: Yeah. It is. We like it.

Genevieve Bell: Yeah.

Peter Biddle: Thanks.

Genevieve Bell: Thank you, Peter Biddle [applause].

So what you start to see here that's possible through the pieces of research we're doing is really creating a different kind of world, right? A different set of possibilities. How it is that we can start to think about being able to see the data that's there about us, how we manage that, how we manage an ensemble of devices -- many different devices in our worlds -- in a way that is comfortable and easy and transparent as we get into an ever-increasingly complicated space becomes an interesting challenge.

And it's things like this demo, where you can start to see all the bits of your life and how you can manage those in effective ways, is kind of remarkable. So how we manage our privacy settings through a single, central identity service becomes another way of thinking about what's going to be necessary as we deliver this future.

So I'm hoping from just those few tantalizing glimpses of what is going on in Intel Labs and other research around the company you've seen a couple of different things here. But for me what's

really important is how they all come back together. What you've seen we've got here is research at every level of the stack. For us it's about making mobile technology that is truly personal, and it's going to require significant innovation at every level.

Good news here is our commitment to you is that you can count on us to deliver that innovation. We will deliver that innovation to you. We will partner with you. This is hugely important for us, to make all of these possibilities -- all of these futures -- something that are kind of amazing, and that you can participate in. And we want to lead from silicon to experiences and to have you come with us as we do that. A big, important part of how we think about what we're doing here.

And I also hope that as you've listened to me and over the last two days there is something else you've heard, too. Historically at Intel - - and I think in our industry -- we focus on technology. It's good. We have amazing technology. It's a good thing to talk about. But the reality is I think there is more going on that we need to pay attention to.

And if I had my way, we'd just talk about people all the time. Because I think that's kind of fabulous. What people need, what they want, what frustrates them, what they desire -- those for me are hugely inspirational and motivating things. But I'm realistic enough to know you can't do that in isolation. We can't just talk about people. We also have to talk about the technical piece. And so for

me it's really about how do we consider both technology and people equally.

[Video plays]

Female Voice: The ultimate mobile platform. It intuits moods and intent. Recognizes routes and deducts destinations. It is contextually aware, sensing the slightest changes and trends in its environment. It processes new information through multiple channels at lightning speed. It's highly social, ever expanding its personal relationships across time and space. Incredibly power efficient. And goes virtually anywhere. It even has a sense of humor.

The ultimate mobile platform? It's you. And me. And her. And them. Which means that when it comes to what lies ahead for mobile computing, there is not just one future. There are seven billion. And counting.

[Video ends]

Genevieve Bell: So for me it's incredibly important that we think about those seven billion. As an anthropologist who studies people and what they really want and need, that number -- that seven billion and counting -- it's really important, because I think that's where all the opportunities are.

But I also know there is sort of one thing I need to leave you with before I send you out into the great, wonderful world to help us build those seven billion futures. The first thing is I really want you not to be seduced by all of those glossy futures.

And the second thing is that I desperately want us to work together, because I think if we do that together we can make this mobile future more personal, safe, and most importantly for me, more fun. So thank you. Welcome to seven billion mobile futures and counting.

[Applause]

Male Voice: Ladies and gentlemen, the tech sessions will begin at 10:45. Please check your mobile app for more information. Thank you.

[Music plays]

Male Voice: Ladies and gentlemen, we would now like to invite the press and analysts to the stage for your photo opportunity. Thank you.

[End of recorded material.]