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Vinton G. Cerf

Interview

An Interview with U.S. Chief Technology Officer Megan Smith

*Recently appointed U.S. CTO Megan Smith
discusses her evolving governmental role.*

MEGAN SMITH, AN MIT-trained mechanical engineer and a former vice president in the leadership team of Google X, was appointed U.S. chief technology officer by President Obama in September 2014. With many years of entrepreneurial experience in Silicon Valley, Smith's role as CTO in the Office of Science and Technology has her serving as an assistant to the president, focusing on technology policy, data, and innovation in the U.S. ACM Past President Vinton Cerf recently interviewed Smith in her Washington, D.C. office; the interview presented here has been edited for clarity and length.

I had the most amazing opportunity to meet with Megan Smith at the headquarters of the U.S. Digital Service, just down the block from the White House. Megan was one of the spark plugs of mergers and acquisitions at Google as well as being involved in Google's educational activities among many other things. I wanted very much to hear from her directly about her work in the Office of Science and Technology Policy and am grateful for the time she was able to spare for this interview.

—Vinton Cerf

VINTON CERF: I am speaking with Megan Smith, who is now the chief technology officer of the United States. Megan, my first question is what key objectives do you bring to this task at the White House?

MEGAN SMITH: The chief technology officer's job is a position that President Obama started on his first day. It is embedded in the Office of Science and Technology Policy, together with Dr. John Holdren and his team, who is the incredible science advisor that I have the honor of working with. The idea is to advise the President and his team

on how to harness technology, innovation, and data on behalf of the American people. So that's a specific thing, and yet a broad thing. And it can evolve, based on what's happening in our nation and what's happening in tech.

In the beginning, the team focused a lot on technology policy, which we continue to do, and on how do we go about bringing a technical team to the group that's doing policy work and listening to the various constituents and the things that are happening. In this area we have all of the topics of the day. Patent reform, copyright, big data, pri-

vacy, student privacy, the Consumer [Privacy] Bill of Rights—these are the kinds of topics we are working on, being part of the broader policy team as the technical group at the table.

That's the first area?

Yes! Our second area is really digital and open government. We're here at the headquarters of the U.S. Digital Service (USDS), and they are such a great example of this effort.

This is the country that not only created the Internet—with the amazing work of you and your colleagues—but it is also the country that created Amazon, Twitter, Facebook, and all of these wonderful companies. We have this talent in the American people, and we need their talent in the American government. It's our government, and whatever we do will be what we do, and it's just that simple.

There's this idea of TQ [Technology Quotient]—like an IQ or EQ. Let's have TQ, technical skills inside government. And let's not just have it in our incredible places like NASA, or NOAA, or the amazing technical team at the Department of Energy. Let's also have it in the White House at the policy table. And let's have it in the digital services team, and let's lift these extraordinarily talented IT and other professionals who are already in government, and get the design thinkers, and the product managers, and the tech folks from industry to come and start collaborating, and make amazing products on behalf of the American people. So that's a big part of this second area, which also includes open government.

The president has been a real leader in getting data out. More than 125,000 datasets have been opened up in his administration. You know we have a long history as a country [of opening data]. Government holds a lot of value it can release so that other players can act. Lots of that opportunity—open government, the open government partnership, national action plans—things the president is leading that we can be a part of.

Our third area is called Innovation Nation. Our country is full of talent. Some people are ending up in high innovation jobs, or they're able to be in schools where they're able to do great STEM [science, technology,

engineering, and mathematics] programs, and have really solid education that lifts the youth straight into high-passion jobs that are interesting to them, that matter in the world, and that deliver great products, goods, and fulfill social missions.

But some people are not getting access [to these areas], and we want to fix that. What is interesting is that there is so much talent in most American cities that live in both of those worlds. So part of this project is less about government having to make some type of new program and much more about us integrating many of our play-space initiatives that some amazing local governments already have on behalf of the American people to actually introduce them to each other in all kinds of contexts so they can lift our country themselves, together, with the support of government in interesting ways.

To be specific, there are these things called Tech Meetups, and there are actually 500 Tech Meetups a day in America. Who knew? Now if you go to Silicon Valley and say, "I'd like to join a startup," and you want to join the tech industry, you'll trip over people. Your taxi driver, a person at a coffee shop, people will be like, "Oh do this, talk to this person," and you're in, right? Because that area is so dense with people plugged into that innovation network.

But if you go to many of our cities, you might not know where to find that community. And yet it's there. It's there in every city. You can see it on the Internet, which is so great. So how do we help more Americans participate in this? Or in startup weekends, or different types of maker festivals—things where there are opportunities for them

to begin to join this other community that has better paying jobs. So they can take their passion and apply it as a service or social mission.

That's fabulous. In fact, the way I would try to boil this down into one expression is this is putting policy to work. That's really what you're doing.

Yes! And unlocking talent in all of those sectors.

Speaking of talent and education, I am speaking now for the Association for Computing Machinery, and we are very concerned that there are a number of underrepresented cohorts in computer science. Women and other minority groups—you surely have thought about that. How do we get more of these people interested in STEM?

You know from working in this world for so many years that there used to be a lot more women in computer science until the 1980s. The numbers and statistics say 40% were women in the computing world. In fact, in the history of computing, women were the first computers. It was back when humans calculated, and like the idea of a lawyer or an accountant, people were computers.

I have met some of these women, and they're just incredible people. They went on to be a part of the founding of computing. And then suddenly we went off of a cliff. And we're down, certainly in computer science, but not all the STEM fields are in this position. Some of the more pure science areas—biology and others—are more balanced. But for some reason, in computer science we're staying at 10%, 15%, maybe 20% women at any given time. For some reason this is also true in physics, so we need to understand more about why.

Also people of color are not coming to these fields at scale. There are a lot of things going on. One of the most extraordinary ones is what pure bias was then and what unconscious bias is now. People are not aware of the unconscious bias we all have. Our brain works to make decisions with imperfect information, and we fill in things, so a lot of bias comes in.

One of the things I have been working on is the visibility of technical women and minorities. For example, there

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are roughly 16 million programmers in the world. That means there are two to three million women programmers. Why don't we ever see them? That's a lot of people. How do we make sure we're not forgetting to balance the panels at conferences, not forgetting to reach out to people?

One of the research points I learned from Brian Welle, who was my colleague at Google and is an amazing scientist in these areas, is a study that he came across showing that when people are applying for a job, if the job lists 10 characteristics, men will apply if they have at least three of the characteristics on average, and women will apply if they have at least seven of the characteristics on average. That just happens to be in our culture. So what do we do about that as managers or leaders when we're hiring? We need to notice there is a set of people with their hands up, and a set of people without their hands up. We need to consider the whole pool and get the right person, help encourage the women to put their hands up, and to take the time to notice this to help them.

The more we can make people like you visible, the easier it will be to convince others that this is a perfectly sensible technical career.

Totally, and also let's look at the people who have been here. Katherine Johnson was a former computer who joined NASA. She was there when Sputnik went up, and she got pulled into the teams that calculated trajectories. She's an African American woman, and she's 97 years old now. She calculated the trajectories for Alan Shepard. John Glenn wouldn't even fly until Katherine double-checked the math! She stayed up like 12 hours recalculating, and if she got the right number, he would say "Okay, Katherine agrees, I'm going." She was one of the trajectory calculators of the Apollo mission, but she's not in the *Apollo 13* movie.

The other day I came across this tweet about Margaret Hamilton, and I looked at her Wikipedia page. It said she had coined the word "software engineering" and created asynchronous software. She was standing with a pile of code as tall as she was that had been for the Lunar Lander, which she

We have extraordinary talent, and we have great history of amazing innovation.

managed and wrote. Margaret had written the design of the software so it would override, and it would only pay attention to landing. But as the Lunar Lander was landing, somebody had apparently left some switches in the wrong places. All this other stuff was coming at the computer, but it was ignoring that because of her code. The Lunar Lander would have been aborted without her software design, which was the first time it had been done that way.

And so we need to find more people like these people, know about them, get them the awards and the representation, put them in the movies because now our children don't see them in the movies, and don't think they could do these things. Hollywood is now doing these really interesting crime shows, and there are all these female forensic scientists who've been cast. So forensic science is off the charts for women going into that field, because they can see it.

We need the help of Hollywood, especially in children's television. I think it's 15 male computer scientists to women that they're depicting without even realizing it—back to unconscious bias. So it just perpetuates itself.

The last thing I need to add to this area is that a lot of the women I know in computer science tell me about their time as a young person in the 1980s and 1990s. A lot of families back then thought, "We'll just get this personal computer," but they just gave it to their boys. I know someone who had to get the key to her brother's room to get the chance to program. We didn't mean to, but that's what we did as a culture. The visuals, the ads, were framed in this handyman way, and we used this cultural bias.

Calendar of Events

June 1-3

20th ACM Symposium on Access Control Models and Technologies
Vienna, Austria,
Sponsored: ACM/SIG,
Contact: Edgar Weippl,
Email: edgar.weippl@tuwien.ac.at

June 3-5

ACM International Conference on Interactive Experiences for TV and Online Video,
Brussels, Belgium,
Sponsored: ACM/SIG,
Contact: David Geerts,
Email: david.geerts@soc.kuleuven.be

June 4-6

SIGMIS-CPR '15: 2015 Computers and People Research Conference,
Newport Beach, CA,
Sponsored: ACM/SIG,
Contact: Diana L. Burley,
Email: dburley@gwu.edu

June 10-12

SIGSIM-PADS '15: SIGSIM Principles of Advanced Discrete Simulation,
London, U.K.,
Sponsored: ACM/SIG,
Contact: Simon JE Taylor,
Email: Simon.Taylor@brunel.ac.uk

June 14-17

STOC '15: Symposium on Theory of Computing (part of FCRC),
Portland, OR,
Sponsored: ACM/SIG,
Contact: Rocco Anthony Servedio,
Email: rocco@cs.columbia.edu

June 15-16

IWQoS '15: International Symposium on Quality of Service 2015,
Portland, OR
Co-Sponsored: ACM/SIG,
Contact: Jun Li
Email: lijun@cs.uoregon.edu

June 15-16

TRANSACT '15: 10th Workshop on Transactional Computing,
Portland, OR,
Sponsored: ACM/SIG,
Contact: Justin E. Gottschlich
Email: justin@nodeka.com

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Association for
Computing Machinery

Many people are coming to government from the tech world, building products and services and ideas.

Bletchley Park is where the incredible team cracked the Nazi enigma codes during World War II and saved 11 million lives. *The Imitation Game* movie is about this team. Yet the visitors to the Bletchley Park museum are 25:1 boy visitors to girl visitors. So even today the British public thinks this museum is for boys and yet, of the 10,000 people who worked at Bletchley Park, 8,000 were women including elite code breakers like Joan Clark. The Duchess of Cambridge's grandmother, it turns out, was a code breaker. So one of things I am hopeful about is that Kate will lead the charge on getting girls to visit the museum along with the boys, because we need everyone to know about these heroes.

Let me shift our conversation a little bit, and let's talk about the United States and competitiveness on a global scale. What do you see we need to do to make ourselves continue to be competitive?

I really believe it's about talent. We have extraordinary talent, and we have great history of amazing innovation, and so we can keep that if we can keep pulling everyone. One of the greatest times was actually during World War II, when a lot of diverse groups sat at the table together to rebuild the Pacific fleet. So sometimes it's about enabling people. When the women and men who rebuilt the Pacific fleet were working in the Bay area, they opened something like 30 daycare centers in three months. We need to be thinking about how we can support parents in our workforce. We're really paying attention to those kinds of important policies, and so I am happy about

what the president is doing with early childhood education on that front to enable parents. I am also really happy about the early childhood education work because my mom was a kindergarten and pre-K teacher who's retired now, but I just know from growing up how important those years are. I think three-year-olds' brains are twice as wired as grown-up humans, so the more we can do to make sure those [underprivileged] kids are staying up with other kids the better.

I brought a Raspberry Pi and an Arduino. This is the older Raspberry Pi [holding the unit up]—they just launched the new one. This is, of course, from the U.K.—the old BBC micro team kind of reincarnated into this new one; well, it's really the board from your cellphone. The U.K. is also making sure that all of their children are learning how to play with it, program it, and they're bringing it into school—especially elementary school.

The Arduino is the American one, there's also Intel, Galileo, and bunch of great, great, products here in the U.S. Not only is it cool and a real computer—it can run YouTube and Minecraft and programs.

My friend Dr. Sue Black has second, third, and fourth graders taking the board and plugging in the speaker and the mic. They're learning to ask, "What is this thing, this computer thing?" This is just like Steve Jobs, Wozniak, and Gates got to do when they were young so they became intuitive with these technologies. So I think [it's important to be] doing this so children can have active experiences playing with these things when they're younger. Dr. Black also notes that for second, third, and fourth grades, the parents are not afraid of their homework, as opposed to fifth, sixth, and seventh grade and on. So it's actually a good way to help your 20-, 30-, and 40-year-olds learn about this too, because the second graders can teach their parents.

This must fit well into the Maker movement in some way.

Yes, very much. Arduino and all of these others are doing a kind of Internet of Things. You may think that sometimes these more playful things are not really related to advanced man-

ufacturing's future, but they very much are. As we think about Smart Cities and using advanced computers and sensors to compute, these great tools are here. So I think a combination of focusing on our youth to make sure they feel really fluent in coding and with these kinds of technologies, and also focusing on the adults who are here, who are going to live for many, many years. We have to get scrubbed in on this kind of work, whether it's the actual tech, or being a designer, in marketing or sales, or using this for a social mission—we need all of the talents at the table.

So this field is very much like the kind of virtuous circle, where the introduction of these ideas and technologies going on makes you comfortable with them, and lets you invent with them without fear?

Right, exactly.

And there's no bias, associated with that at all?

I was lucky because we had mandatory science fair when I was a kid, and I went to an inner-city public school in Buffalo, a great school. Because we had to do science fair, everybody did it, and we had a very diverse group of kids who went off to the city science fair, county science fair, and so on. It will work if you get everybody in, and get them early.

Let's see if we can finish up with a couple of other questions Megan. One of them has to do with your experiences in Silicon Valley. You came from a very intense, highly technically oriented place to Washington, D.C., which is not necessarily always known for that. Did

Sometimes I feel like in the past, government built this amazing car and accidentally left one tire flat.

you bring any experiences to your job at the White House that you have been able to apply, or have struggled with?

Yes, many, many experiences. We brought a lot; many people are coming to government from the tech world, building products and services and ideas. The teams here are very entrepreneurial. They're similar to us culturally—they just haven't been doing tech entrepreneurship or technology as much. They had been doing more distant contracting for all of that, rather than having [technical expertise] in the room with them.

And still you might contract, and you'll be more informed about how you're doing things, or how you're buying things, or architecting the system with a teammate in the room who knows the stuff.

But really, to do great legislation, to do economics, you have to not only leverage great academy and corporate ideas, but also a level of entrepreneurship to get things moving as a cohort. Sometimes I feel like in the past, government built this amazing car and accidentally left one tire flat. [Cerf laughs out loud.] So it's not that you need all of these [technical] people, you just sometimes need a few to get things going.

And we really have a great team, and I love my colleagues here. We actually have the most diverse group I have ever worked with as a leadership team. There are people from all different parts of America, all age groups, men and women, in a really interested, talented team. I'm happy the president stepped up through some tough experiences like Healthcare.gov. He saw how people fixed it, and he saw that a set of Americans were missing from his team, and he went to collect them. And we're here, and we're happy to be here. It's an honor to be here.

That actually sounds very entrepreneurial. You take some risks, and bring people in to fix things. Let's finish up with a really important question: What advice would you give to young people about what they should be thinking about or doing for the future?

I was really lucky to take acoustics from Professor (Amar) Bose. He was amazing, and he taught us a lot of incredible physics of acoustics, and

a little bit about business, and about the things he had been part of. The main thing he emphasized was that you have to find your passion. Find what you love ... and that doesn't mean you'll know right away. There are so many things you have to do in the world, but if you practice a lot of disciplines and try a lot of things, especially as a young person, don't let your bias make you think you can't do this or that or whatever.

You're going to live to 100-something years probably if you're born or young today. So you'll have a lot of chances to do a lot of things, so don't pigeonhole yourself. Try a lot of things, and then as you try them, let your passion steer you.

You have to find what you want to bring to this world. The more you can be doing the things you love, developing your wonder and curiosity, and being in service to other people, the more you can be helping other people, the more you get back in life. So it's sort of combining those things. If I hadn't had incredible teachers who made us do this science and tech stuff—in addition to the other topics of history and writing, which are also incredible and I love—I wouldn't have known about this secret world of innovation. And to be of service using innovation and invention and technology, which can really solve some of our greatest challenges with other colleagues, is an honor.

That's terrific advice. I hope that the kids who read this take your advice, so they can take us all into the future. Thank you so much Megan, we really appreciate your time.

Thank you! And thanks for your incredible leadership, and what you've brought to our world with your innovation, your invention, and also just the way you approach the world. For people who haven't gotten to interact with Vint, he is an amazing colleague who includes everyone, encourages everyone, and can see how big the talent base of this world truly is.

Well I'm just glad to be of service. Thanks, Megan!

Vinton G. Cerf is vice president and Chief Internet Evangelist at Google. He served as ACM president from 2012–2014.

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