U.S. SENATE COMMITTEE ON
COMMERCE, SCIENCE, & TRANSPORTATION

Senator Maria Cantwell

Hearing: Securing U.S. Leadership in Emerging Compute Technologies

September 29, 2022

Opening Statement
VIDEO

This morning we will be having a hearing on securing U.S. leadership in compute technologies – or in other words – what are we going to do with the CHIPS and Science money and the actual appropriations that we need to get to keep our competitive edge in compute science.

In August, the President signed the bipartisan CHIPS and Science Act into law, with a historic commitment to U.S. technology leadership. This hearing is about ensuring what we do as a nation to keep that commitment, by building the workforce needed to stay competitive in the most leading edge and consequential computational disciplines.

Leading the world in computation grows the economy, creates new jobs, and keeps America safe. Computing helped put Americans on the Moon, develop faster and stealthier planes, better weather forecasting, [and] artificial intelligence for precision agriculture. That is why the CHIPS and Science Act was so focused on building America's computing capabilities.

America knows that the new law invested more than $50 billion into chip manufacturing. And they are already seeing results, with groundbreakings and announcements in Ohio, Idaho, North Carolina, and even in my home state of Washington – have all put manufacturing resurgence to the point of gaining steam.

But just as important in the law is the focus on research and workforce development in ten key technology areas. Four of these areas — artificial intelligence, semiconductors, quantum science and distributed ledger technologies—deal with improving computation.

Job openings in these areas are soaring, but the number of workers definitely is not keeping pace. This is a crisis. That's why the CHIPS and Science Act authorized $13 billion for STEM education, including funds for nearly 40,000 scholarships, fellowships, and traineeships. That's why it has money for faculty hiring and training. Make no mistake, America's workforce shortages are serious. Failing to make these investments and failing to retain the talent from around the world is not an option.

With six decades of AI development, computers now operate vehicles, translate languages, create art, and help on the factory floor, and most of you in this room are probably carrying AI technologies right now.

But AI doesn't work alone and it is far from perfect. AI must be trained by humans and must often must be partnered with a human to do its work. That means we need a generation of AI-literate workers.

A recent Georgetown study reported that we will add one million AI jobs between 2019 and 2029.

AI requires vast amounts of information and excellent data retrieval capabilities, which is one of the promises of distributed ledger technologies. But in computer science, a foundational discipline for this technology, universities are turning away students because the supply of teachers isn't able to meet demand.

The country that combines the power of quantum computing with artificial intelligence could make an insurmountable leap forward in technology and rewrite the rules of the road for cybersecurity, for creating medical innovations and saving thousands of lives, and developing battlefield technologies.

The nation faces a shortage of quantum talent, with fewer than 5% of U.S. PhDs in relevant fields focusing on quantum sciences.

So, the stakes are high. International competition is mounting. Funding for CHIPS and Science must not stop with the appropriations for chip manufacturing. America needs access to better chips, but it also needs the research and the workforce to put those chips to use.

That is why I am proud to have with us, one of our witnesses, Dr. Albritton, who we will hear from shortly. Washington is a leader in emerging computation technologies. Seattle has the nation's third largest AI workforce and the University of Washington is one of the nation's top institutions for AI.

In the Spokane region, home to more than 7,000 farms and ranches, WSU leads the institute on agricultural AI, with a focus on an AI-enabled workforce. And companies like Amazon, Microsoft, T-Mobile and Starbucks are applying distributed ledger technologies to telecommunications and supply chain.

And we are building the quantum workforce, through efforts like University of Washington's "QuantumX" institute, which is creating a graduate certificate program in quantum science.

With the CHIPS and Science Act, I hope to see Washington continue to grow this leadership in developing a workforce.

Each of these technologies will face challenges. But if America is to lead, we need to continue to lead in talent.

So, I look forward to hearing from our panel of distinguished witnesses.

Question & Answer
VIDEO

CANTWELL: I'm going to ask my questions first and then turn it over to Senator Hickenlooper to chair the rest of the meeting and I appreciate his leadership at the Subcommittee level.

Dr. Albritton, obviously, one of the things we need to do to further our efforts here is the $13 billion that was authorized for NSF foundation STEM education efforts. And as we have passed previous COMPETES Acts, what's happened – circumstances you could say. The downturn of the economy, and we didn't fully fund the competition bill.

So how do we explain to people the need for these STEM dollars? And secondly, you mentioned the areas of NSF expertise you're already involved in as it relates to these computational sciences. The bill was all about translational science. It was about a new directorate to translate science faster. Can you explain what are the testbed needs of - an example, the University of Washington, to actually help us combine both the workforce and the infrastructure that's needed to do the translational science?

DR. ALLBRITTON: Absolutely. I'll start with the first question about, I believe, explaining to the public about our workforce needs and how we need to fund this, if I have it right Senator Cantwell.

I think, you know, look at me, I grew up in Louisiana. So having the opportunity as a young person to understand the excitement of science and engineering. If you look at my career, I happen to ping-pong in that area. But make sure we intentionally tell young people, hey, this is for you. This is an exciting area, you can have a future. Tell their parents too, this is for their children, they can grow and become great contributors to the US economy.

So I think starting early, but then making the opportunities valuable. We hear about college costs, for example. But as we bring in these more diverse groups of people, I think there should be funding to make sure that they succeed and prosper.

So programs that support our students as they come into the universities ensure that every one of them graduates, has interactions with industry, so that they can see their future and prosper. So those are some of them.

CANTWELL: Well, is it safe to tell our appropriator colleagues, who may look at this authorization and then decide to pass, that they're going to fumble the ball?

DR. ALLBRITTON: Yes, they will fumble the ball. And we've already heard from my colleagues that other countries are out in front of us.

If you look at the numbers of students going into STEM, it's far lower than we need. And the state of Washington, we don't have the capacity even for the students that want to. We cannot fumble this ball.

It's a global competition. We don't want to lose this competition. And we need everyone moving forward and playing on this football field, so to speak, so that we've got all the brainpower in the US, moving us towards the goalpost.

So I think yes, we would have fumbled badly if we don't one, invest, make sure we have good educational support systems for our students so they can see themselves succeeding in engineering and science. And then put in the necessary infrastructure and support systems so that they grow as students and they actually graduate and prosper.

CANTWELL: So on the translational science part, what are the things that we need to get test labs established?

DR. ALLBRITTON: Yeah, so test labs. So our vision at the UW is to have open accessible regional hubs. And let's talk about quantum. Very, very expensive technology, state of the art systems are cooled to almost absolute zero, very environment sensitive.

The National Quantum Initiative funded some regional large areas, but it would be truly great to have Qubits for our students to come and interact with, for example. Where they can learn the quantum foundations technology, they can just get really jazzed up because of what they've just done by flipping a Qubit or something.

So we want regional hubs that have state of the art infrastructure for education, workforce development, even people that are already out beginning their careers, pulling them back to reeducate them for this new emerging area. And then also testbeds that have state of the art characterization tools, etc. So researchers don't need monumentally huge grants, but they can go into this regional facility that's easily accessible, and do their wild and crazy ideas, their innovative thinking.

So all of these I think done as regional hubs would really lift the US quantum ability.

CANTWELL: Thank you for that. I think we're going to have to explain to our colleagues on appropriations exactly how the other aspects - there's already some foundation in the bill for us to do the testbeds. But we have to show them that this is a combination of both, so thank you.