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Chairman Bowman, Ranking Member Weber and distinguished members of the committee. I appreciate the opportunity to testify at today's hearing on the future of scientific computing at the Department of Energy.

I am an Associate Professor of Computer Science at Brown University, where I conduct research in cryptography and privacy and direct the Encrypted Systems Lab and co-direct Brown's Computing for the People project. I am an affiliate of the Brown Data Science Initiative, the Brown Center for Human Rights and Humanitarian Studies and the Policy Lab. I am also a Principal Scientist at MongoDB, a company that provides one of the most widely used platforms to store and process "big data". Prior to this, I was a research scientist at Microsoft Research. I am testifying today in my capacity as an academic researcher.

By the end of the year, the Oak Ridge and Argonne National Laboratories will receive

the world's first exascale supercomputers. These computers will be able to process 10^{18}—or a quintillion—operations per second. It is hard to overstate how difficult this is to achieve and what an accomplishment this is. This considerable leap in computing power will open the doors to new discoveries and significantly impact a multitude of fields including medicine, meteorology, cosmology and artificial intelligence. It is clear that the world-class research in high-performance computing that has been conducted by US Universities, National Labs and Industry in order to achieve exascale computing will affect our lives for the foreseeable future.

But as we enter the era of exascale computing, I would like to to provide a word of caution. I am sure we can all agree that computing and the technologies it enables have had a tremendous impact on Society. Because of this it is easy to assume that technological progress always leads to positive outcomes and that new technologies benefit everyone equally.

But this is not the case. Technology—like policy—can have disparate impact: it can enable positive outcomes for some and cause great harm to others. Consider, for example, advances in facial recognition which allows us to log into our smartphones faster but also enables suspicionless mass surveillance. Or the progress in computer vision and robotics that enables new drones that can deliver medicine to hard to reach rural areas or missiles at the push of a button by someone sitting in a room thousands of miles of away. We must always remind ourselves that technology is not inherently good and does not benefit everyone equally by default. In fact, we need to think hard about the harms technology can cause and work even harder to mitigate those harms.

One of the many important applications of exascale computing is artificial intelligence and machine learning; for example to predict how a cancer patient might respond to a particular treatment. But as we know thanks to the work of scholars like Cathy O'Neil, Joy Buolamwini and Timnit Gebru and to outlets like Pro Publica, machine learning algorithms can be biased and can exhibit different behaviors on different populations [3, 2, 1]. And, as has been widely documented, these biases in machine learning most often harm people of color and those from marginalized communities.

So while we should appreciate that thousands of world-class scientists and engineers across the country are diligently working towards making exascale machine learning for cancer a reality, we also have to ask: how many are working to ensure that these cancer treatment prediction models work for people of all genders and of all races? The investments we are making in exascale computing will improve National Security, the US Economy and Industry. But will everyone benefit equally from this investment? Will the 13 year old girl from Washington Heights, New York, benefit from this investment as much as the Tech, Energy and Pharmaceutical industries? Will there be as much effort to use these supercomputers in the fight against sickle cell anemia as other diseases?

Exascale computing is not only an incredible achievement but an incredible resource with the power to shape our lives and those of future generations. As such, we must be careful and thoughtful about how we make use of it. In particular, it is incumbent upon us to

make sure that we deploy and use this resource in a manner that is fair and inclusive; that benefits not only the powerful but those who have historically been marginalized by society and technology.

Thank you. I look forward to answering your questions.

References

[1] Julia Angwin, Jeff Larson, Surya Mattu, and Lauren Kirchner. Machine bias, 2016.

[2] Joy Buolamwini and Timnit Gebru. Gender shades: Intersectional accuracy disparities in commercial gender classification. In *Conference on fairness, accountability and transparency*, pages 77–91. PMLR, 2018.

[3] Cathy O'neil. *Weapons of math destruction: How big data increases inequality and threatens democracy*. Crown, 2016.

Seny Kamara is an Associate Professor of Computer Science at Brown University, where he co-directs Brown's Computing for the People project and the Encrypted Systems Lab. He is also affiliated with Brown's Center for Human Rights and Humanitarian Studies, the Data Science Initiative and The Policy Lab. Kamara is also a Principal Scientist at MongoDB, a company that provides one of the most widely used platforms to store and process data. Prior to this, he was a Research Scientist at Microsoft Research in the Cryptography Research group.

Professor Kamara conducts research in cryptography with a focus on problems motivated by social and policy issues; especially issues that impact marginalized groups. His pioneering work on encrypted search algorithms laid the foundation and pushed the state-of-the-art of end-to-end encrypted database technologies. His work has consistently appeared in the top peer-reviewed venues in data security and cryptography and has been featured in numerous outlets including Wired, Forbes and The Register.

At Brown, Professor Kamara teaches "Algorithms for the People", a course that surveys, critiques and tries to address the ways in which computer science and technology affect marginalized communities.

In 2016, he was appointed by the National Academies of Sciences to study the impact of end-to-end encryption on law enforcement and intelligence and in 2019 he testified to the Financial Services Committee of the U.S. House of Representatives about the privacy and fairness implications of Big Data. In 2020, he was appointed by the National Academies of Sciences to study the future of encryption. He has received a Google Faculty Award and was named a Leadership Fellow by the Boston Global Forum for his work and commitment to global peace.