ORAL TESTIMONY
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Thank you Chairman Brooks, Ranking Member Lipinski, and the other members of the Subcommittee, for the opportunity to speak with you today.

My name is Ed Lazowska. I am a long-time faculty member in computer science at the University of Washington. I recently co-chaired the Working Group of the President's Council of Advisors on Science and Technology charged with reviewing the NITRD program. I speak with you today as an individual, endorsed by the Computing Research Association.

I have ten quick points I'd like to make:

1. **Information Technology R&D changes the world.** Shopping through Amazon.com. Movies through Netflix. Books on your Kindle. The world of the Internet through your iPhone. Learning from the Khan Academy. Maps and directions and navigation from Google and GPS. Roomba robot vacuum cleaners. Adaptive cruise control in your car. National security through information superiority. Dramatic advances in scientific discovery. All of this is the result of IT R&D.

2. **Information Technology R&D drives our prosperity.** Both directly, in the growth of the IT sector itself, and indirectly, in the productivity gains that all other sectors achieve from the application of IT. Economists agree that information technology has boosted U.S. productivity more than any other set of forces in recent decades.

3. **Information Technology is the dominant factor in American S&T employment.** The Bureau of Labor Statistics projects that 60% of all new jobs in all fields of science and engineering in the current decade will be jobs for computer specialists – more than all of the physical sciences, all of the life sciences, all of the social sciences, and all other fields of engineering <u>combined</u>.

4. **Federal support is a key part of the vibrant ecosystem that drives IT innovation.** Every major sector of the IT industry bears the clear stamp of Federally-funded research. The vast majority of industry R&D is focused on the engineering of the next release of products, not looking out further. It is the role of Federally funded research to take the long view, creating the ideas that can later be turned into game-changers like the Internet, the Web browser, and GPS.

5. **There is tremendous potential – and tremendous need – for further breakthroughs.** Without going into details, the prospects for, and the need for, further breakthroughs in this field have never been greater.

6. **Many areas of IT R&D are crucial to national priorities and national competitiveness.** Yesterday, my young University of Washington colleague Shwetak Patel received a MacArthur Foundation "Genius" Award for his work using machine learning to tell you exactly which devices in your home are consuming exactly how much electric power, using a single inexpensive monitor that you plug into an outlet anywhere in your home. A few years ago, my young UW colleague Yoky Matsuoka also received a MacArthur Foundation "Genius" Award for her work on prosthetics that couple directly to your nervous system, giving new hope to thousands of veterans who return home disabled. If you want breakthroughs in energy, in health care, in education, in transportation, in national security, in scientific discovery, then you need breakthroughs in computer science. The Federal agencies with responsibility for these other fields sometimes don't fully understand this – broadening this understanding is an important role for NITRD.

7. **The nation is investing far less on IT R&D than is shown in the Federal budget.** Much of what gets reported by NITRD agencies represents spending on IT equipment that supports R&D in other fields, not spending on IT R&D. This reporting needs to be improved so that we know what we're actually spending on R&D in this critical field.

8. **The Federal Government needs high-level, sustained, expert strategic advice on IT R&D**. PCAST cannot do it. For the sake of our future, we need to re-institute something analogous to the President's Information Technology Advisory Committee, which was abandoned under the previous administration.

9. **Computer Science must be viewed as an essential component of STEM education.** Fluency in IT concepts – in "computational thinking" – is essential for all Americans.

10. **No other field comes close.** PCAST said "As a field of inquiry, Networking and Information Technology has a rich intellectual agenda – as rich as that of any other field. In addition, NIT is arguably unique among all fields of science and engineering in the breadth of its impact." That's why your work matters.

Thank you for the opportunity to share my views. I look forward to your questions.