

Carnegie Mellon University

**FINAL ORAL REMARKS
FOR TESTIMONY**

BY

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**HEARING ON
BUILDING REGIONAL INNOVATION ECONOMIES
HOUSE COMMITTEE ON
SCIENCE, SPACE, AND TECHNOLOGY
SUBCOMMITTEE ON RESEARCH AND TECHNOLOGY**

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Thank you Chairwoman Stevens, Ranking Member Lucas, Ranking Member Waltz, and Members of the Subcommittee.

Trained as an engineer, I bring perspectives from my “research laboratory” – the factory floor of manufacturing firms across the U.S. and around the world.

Over the last half a century, the global geopolitical balance of scientific, economic, and production capabilities has shifted away from U.S. dominance. Today, China is the largest producer and second largest consumer market. The U.S. is also no longer in a singular position of scientific and technological leadership across domains. Meanwhile, we face equal or greater challenges on our home front: Economic inequality has increased and social mobility declined. Central to both of these trends are trade and technology. While increased and more evenly distributed science and technology funding is essential for national security, economic prosperity, and social welfare, realizing policy-makers’ multiple goals for these federal investments will require institutional innovations to ensure our technology investments realize the economic and social benefits we seek.

First, strategic investments in science and technology can change the playing field and rules of the game. To regain and maintain global economic competitiveness, our priority should be making products that can only be made here, and that everyone in the world wants.

In advanced semiconductors for communications, our research finds that while firms can save costs in the short term by producing older generation products offshore, the innovative next

generation products hold potential to address national security concerns, and enable firms to access new, larger markets. Those innovative next generation products can only be produced in the U.S. and Europe and involve more skilled and innovative jobs for high-school educated operators.

Similarly, as the world scales up electric vehicle production, the country that leads in innovations in battery recycling and cobalt-free batteries has the potential to change global market prices, change the global location of production, and free itself from single-country supply risks. Our research again suggests that battery production may involve more skilled and empowered jobs for high-school educated shop-floor workers.

We need to invest to ensure we make these and other critical technologies here.

Second, to help regions reap locally the longer term economic benefits of research and technology investments, we need to strategically invest in infrastructure now.

Nation-wide investments in the infrastructure of the future hold promise not only to improve security, productivity, and equity, but also to revitalize the U.S. worker skills and manufacturing ecosystems necessary to manufacture the products of the future. The mason, foreman, engineer, and computer science skills relevant to intelligent transportation and urban infrastructure systems have corollaries in resilient grid infrastructure, privacy-preserving health infrastructure, and intelligent manufacturing. Our investments and training should be strategic to leverage these overlaps, and career transitions between them.

Third, the US must invest in the intellectual foundations, data infrastructure, and analytic capabilities necessary to inform technology investments. Research by ourselves and many others shows that inadequate data and analytic capability is weakening government decision-making regarding critical technologies, supply chains, and infrastructure. Our research demonstrated the possibility of using text processing of public information to substantially improve the government's real-time situational awareness of critical medical supply chains during COVID. In other work, we are leveraging new tools to quantify the skills required for emerging technologies before large-scale investments are made, and to better understand skill cross-walks that enable firm pivots and skill transitions. The executive branch, legislative branch, and all agencies need access to and to be informed by the data and analytics today's technology and public-private collaborations could make possible.

Finally, the U.S. should create a nimble entity with national technology strategy as its mission. U.S. agencies are single-mission-driven. And yet, technology investments by their very nature simultaneously affect national security, economic competitiveness, and social welfare (including health, environment, and equity.) Regional investments in research and development, in infrastructure of the future, and local economic development have the potential to have their investments multiplied if thoughtfully linked. A new directorate focused on national technology strategy will need to be empowered to influence and have incentives to collaborate with the excellent mission-oriented agencies in our government. Getting these investments right is non-trivial, but as we've shown in our

research win-win solutions exist. This directorate must be backed by the star-studded interdisciplinary data and analytic team necessary to make trade-offs transparent and help policy-makers ensure the security and welfare of all citizens in our nation.