Dr. L. Rafael Reif
President, Massachusetts Institute of Technology
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Chairman Neal, Ranking Member Brady and Members of the Committee,

Thank you for inviting me to testify today on this critically important subject. I will focus my remarks on competition; my fundamental message today is straightforward: Whatever else the U.S. does to counter the challenges posed by China, we must increase our investment in research in key technology areas, and we must enhance our capacity to get the most out of that investment. U.S. strategy is unlikely to succeed if it is merely defensive; to stay ahead, the U.S. needs to do more to capitalize on our own strengths.

We need to start by making sure that we do not underestimate China. Specifically, we should not lull ourselves into thinking that China's rise is being fueled solely by stealth and subterfuge. Illicit and improper Chinese activities must be stopped, but we also need to recognize that China now has internal strengths in key fields, such as artificial intelligence (AI). China is making substantial investments in its own research and researchers, as well as in commercialization. The U.S. needs to plan accordingly.

I believe our strategy needs to have three elements – first, a visible, focused and sustained research program for technologies that are critical to future U.S. prosperity and security, like AI and quantum computing. Second, a targeted effort to ensure the U.S. has the talent we need to

stay ahead. And third, policies to accelerate the U.S. capacity to get new ideas into the marketplace. Let me speak briefly about each of these.

The U.S. has extraordinary research capability; we are home to most of the world's top research universities. That's why others want to steal our ideas. But our research system is not optimized for our current challenges, with other countries pouring money into select fields under programs like Made in China 2025. The U.S. lacks an effective, coordinated way to target research toward specific areas, and funding has fallen far behind what's needed to stay ahead of our competitors.

Constraints on federal discretionary spending have made it impossible to invest at necessary levels; what's required is an allocation more akin to what was devoted to the Apollo program. I have been delighted to see proposals recently from both parties, and on both sides of the Capitol, to increase U.S. research to advance our competitiveness. But this has not translated yet into real funding.

But money is not all that's missing. A portion of federal research funding should be focused on addressing far-reaching questions in key technology fields, like AI. One promising proposal is to create a new directorate at the National Science Foundation with that mission, and giving that new unit the authority to be run more like the Defense Advanced Research Projects Agency (DARPA).

I should emphasize that I am talking about fundamental research problems, not narrower applied research. An example would be creating algorithms that would enable machines to learn with less data – thereby eliminating a Chinese advantage. That's different from just further

perfecting the algorithms we have now. It's the kind of leap-frog research most likely to be done at universities.

To make such research strides, the U.S. needs talented researchers. At the university level, that requires two parallel tasks -- attracting top U.S. students to key fields; and attracting and retaining the best researchers from around the world. The federal government should be offering scholarships, traineeships and fellowships aimed at drawing U.S. undergraduates, graduate students and post-docs into the fields where we need them most.

But the U.S. has never succeeded solely with domestic talent; we need to reach beyond our borders. The vast majority of students who come to the U.S. for their doctorates in science and engineering remain here -- but we make that difficult, and the percentage who stay has been declining.

To keep top talent, we need to look at changing both our policies and our rhetoric. The U.S. should be offering green cards as a matter of course to those who complete advanced studies in our country. We also need to understand that anti-immigrant rhetoric and widespread visa delays cause all students and researchers to consider taking their talents elsewhere. The federal government must appropriately vet those coming to our nation to avoid security risks, but that should not be done in a way that unduly deters those we want and need here.

Leading in research is a necessary but not sufficient condition for prosperity and security. We also have to be the best and the fastest at translating ideas into products and processes. That's not something that can be accomplished by closing off our system – that just would shut down intellectual exchange that benefits us. Rather, we have to experiment with new ways to hasten the pace from lab to market in the U.S.

I offer some ideas for doing that in my written testimony, but this is an area where we need to experiment. This Committee may have a role to play because tax policies could create more patient capital, which is needed to avoid killing promising ideas in the cradle. Tax policy might also deepen the cooperation between universities and industry in key technology areas.

The U.S. edge in science and technology has been a foundation for U.S. security, prosperity and quality of life. But that edge has to be regularly honed; it is not ours by right or by nature. We can best sharpen it with a strategy founded on confidence in ourselves, not fear of others.