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AI INSIGHT FORUM ON INNOVATION
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Thank you for inviting me to participate in this extremely important Forum. I want to focus on three overarching points:

- It is essential that the U.S. remain a leader in artificial intelligence to protect our economic competitiveness and national security. That will require, among other things, increased government investment in research, and policies that enable the U.S. to attract top talent from around the world.

- The government should help ensure that innovation addresses legitimate concerns about AI systems, including bias, hallucination, and the lack of "explainability." That can be accomplished through both research funding and thoughtful regulation. Government funding should also incentivize the development of new approaches to AI that can advance the field beyond incremental improvements.

- Regulation should not be seen as a barrier to innovation, and the need for innovation should not be used as an argument against regulation. As has been the case in many fields, appropriate regulation can spur innovation and public acceptance of technology, and help create a well-functioning market.

I start from the premise – shared, perhaps, by everyone involved in these Forums – that the U.S. must be a leader, and ideally, *the* leader, in AI. AI has the potential to revolutionize our economy and to increase productivity. One can already see advances in areas like drug discovery that have been assisted by AI. AI will also play an increasingly central role in national security, in both the analysis of data and the operation of military and intelligence equipment like drones. As is well known, our chief economic and geopolitical rival, China, has made AI a priority. We simply have no choice but to ensure continued U.S. leadership in this technology.

The private sector has played, and will continue to play, a critical role in advancing AI. But we should not be relying exclusively on the private sector – today represented by a handful of strong and successful firms with their own business interests – to advance AI. The very idea of AI was first conceived in universities – where researchers can take the long view – and universities still have a central role to play.

University research is especially important in two broad areas. First, universities can delve into important current challenges with AI, including its "black box" nature, that companies may have less incentive to address or to address sufficiently. (Regulation can increase private sector interest in these issues, but universities are still likely to investigate solutions with fewer constraints.) Second, universities can come up with new algorithms and approaches to AI that can enable the field to move forward in leaps, not just incrementally.

For example, researchers at MIT are studying how children learn in an effort to come up with ways to enable computers to "learn" with much less data. Toddlers do not have to see a thousand pictures of cats to be able to identify a cat; could computers become more like that? Such a leap might make AI systems much more readily available and affordable, and also erase advantages attributed to China thanks to their perceived greater access to data.

For university research to live up to its potential, government funding of academic AI research will have to increase significantly. Funding is perhaps needed most to give academic researchers sufficient access to computing resources. Even top universities now are unable to meet the enormous demand for computer time needed for AI research, and that is one reason they also find it hard to keep faculty and students from departing for the private sector – where they may not be able to work on the same kinds of research questions.

I should note that a number of fields contribute to AI advancement, beyond computer science research on AI itself. This includes research on the design and fabrication of the semiconductors that enable AI systems to process information, as well as research in the social sciences, ethics and humanities on how humans interact with AI and on its societal impacts.

I do not have a precise spending level to recommend. Studies by advisory groups like the National Security Commission on AI and the advisory committee on the National AI Research Resource have suggested numbers. I will say that while the top-line, government-wide figure is important to know, it matters what kinds of research institutions are getting money and for what purposes. Approaches that focus insufficiently on universities, or that spread money around so widely that its impact is limited, or that tend only to national security concerns, or that ignore societal issues, will not produce optimal results, however ample the total dollar amount may sound. Another unique and important advantage of universities and university research is talent development, as universities need to be equipped to help educate the next generation of AI experts, and there is significant demand and need for AI talent. In fact, lack of AI talent is a serious bottleneck.

The government may also want to invest more in its own AI research, in federal and national labs, for example. There are many arguments for that – especially if it helps officials figure out how the government can best make use of AI. But such work would not be a substitute for university research (or of course, for research at private companies).

The government role, though, extends beyond providing money and helping to establish a research agenda. As mentioned above, the single most important resource needed to advance AI is people. The U.S. has been the leader in AI and other areas of technology because we are able to attract and retain the top talent the world has to offer. But our advantage is eroding.

The U.S. faces increased competition for talent – both from our allies, like Canada and Britain, which have ramped up their efforts to lure top students and faculty; and from our rivals, like China, that have improved what they have to offer at home and that may be trying to reduce the flow of students to the U.S. In the face of such competition, the U.S. has, if anything, been making our nation seem like a less appealing destination.

Our policies, our official statements and sometimes our culture send a message that we are reluctant to have international students and faculty come to the U.S. and even more reluctant to have them remain. The U.S. of course needs to do more to develop and give opportunities to our homegrown talent. But if we are serious about competing in AI, we have to move away from policies and attitudes that are characterized by complacency, at best. A solution cannot await some distant, golden moment when our polarized nation reaches consensus on a grand bargain on overall immigration issues (much as I dearly wish that moment would come).

I hope I've clearly described the pressing need for continued innovation in AI and for government investment and policy that would facilitate it. I want to be equally clear that I do not see anything inherently at odds between the necessity of innovation and the desire to regulate AI, which I know is the ultimate concern of this series of Forums.

Most widely used technologies in the U.S. today are regulated in some fashion – both directly through the government and through liability and contract law – and I see no reason why something as potent and far-reaching as AI should be an exception. Obviously, statutes and regulation have to be written and implemented thoughtfully so as not to be overly constraining, but that has been accomplished for many other technologies.

In most cases, Congress sets the parameters for regulation and leaves the details to the agencies, and that would make sense here as well. But the fact that details will remain to be worked out is not a reason for Congress to avoid acting. Just as Members of Congress in the 1930s did not need to know how to design or fly a plane to create the Federal Aviation Administration, Congress does not need to grasp all the inner workings of AI systems to regulate AI. It does need to have a sense of what the pressing societal issues are, how the market might develop, and what may and may not be technically feasible. I assume these Forums will offer insights on those questions.

A thoughtful, workable, effective regulatory system would likely accelerate the adoption of AI and public acceptance. Appropriate regulation can also spur research, especially in areas that would promote the "safety" of AI. Just as regulating automobiles has increased the amount of corporate and university research on pollution control and passenger safety, so the regulation of AI can increase research on matters like avoiding bias, limiting hallucination, understanding how AI reached a particular conclusion, and making AI systems auditable.

Regulations should also ensure that humans are always in the loop in decision-making, whether civilian or military.

This testimony is focused on innovation so I will not go into detailed thoughts on regulation here. I will just say that the place to start is ensuring that existing regulations cover the use of AI in their relevant domains.

The U.S. has to continue to lead in advancing AI – but that should mean advancing safe, socially beneficial AI. Federal policy and federal funding can, and must help ensure that AI moves ahead in a way that maximizes its benefits and minimizes concerns. The foibles and

impacts of AI cannot be an afterthought; dealing with them has to be an integral part of research moving forward.

Thank you again for inviting me.