I thank for the Member Roundtable for this opportunity to comment on policy directions regarding automation and the future of work.

My perspective on this issue is shaped by my own research and teaching in artificial intelligence and machine learning for the past 30 years, by my more recent work co-chairing the U.S. National Academy study on “Information Technology, Automation, and the U.S. Workforce,” and by my followup research in this area. I can easily summarize my view in two sentences:

• Artificial intelligence and other information technology advances are significantly growing the total wealth pie - who could possibly be against that?
• But these technologies are also exacerbating the skew in the distribution of this wealth and opportunity – who could possibly be for that?

Therefore, federal policy needs to find ways to support the economy to grow that new wealth, and to find ways to distribute that new wealth, and the opportunity to create it, more evenly.

Our National Academy report identified multiple forces, both positive and negative, of artificial intelligence (AI) and information technology (IT) on the workforce.

First, AI will automate and eliminate some jobs, especially jobs involving a single task such as toll booth operators. However, for most jobs that involve multiple tasks, AI will augment but not eliminate the job, because it will assist in only some of the job’s tasks. For example, the job of a doctor involves tasks such as diagnosing the patient, billing, generating therapy options, and discussing those options with the patient to make final treatment decisions. Some of these tasks will become more automated or supported by computers, such as billing and diagnosis, but other tasks like discussing therapy options with the patient will not be. Therefore, the net impact of AI will not be to eliminate doctors, but instead to shift their job description. The majority of jobs fall into this multi-task category, and are not so
likely to be eliminated as they are to be redefined by shifting the distribution of tasks the worker will perform, with different types of computer support.

One key finding and recommendation from our National Academy study is that we are flying blind into this jobs revolution. That is, available government data doesn’t allow us to answer fundamental questions essential to making policy, such as “what new technologies had the biggest adverse impact on jobs over the past year?”. But fortunately, much of the data that could answer these questions is already online, in non-government organizations. Web sites for job search, like Burning Glass, and Indeed.com have huge data sets describing which jobs have gone unfilled for how long, requiring which skills. Resume sites like LinkedIn.com have data showing the supply of skills in the workforce, while community colleges and universities have forward-looking data on the new mix of skills that next years graduating classes will have as they enter the workforce.

Federal policy should create public-private data partnerships to support effective tracking of the evolving skills and jobs supply and demand, both to support rational policy making during an era of job instability, and to inform the general public about emerging employment trends and opportunities.

A second thread of the National Academy report involves education. Increased job insecurity is leading to increased demand for reskilling, upskilling and continuing education of all kinds. On a positive note, AI and IT are already improving our supply of, and access to, continuing education materials: the past decade has seen an explosion of online courses and training videos on the internet, and new research is developing AI-based online tutorials that customize to needs of individual students, adapting the next lesson to respond to errors the student made in the previous lesson. On a less positive note, however, these new online educational materials are not impacting all segments of society equally. Those who benefit most from online education are individuals who are already accomplished learners -- who have already acquired the discipline needed to self-study new material. Policy questions here include:

• What can be done to assure that the growing online educational materials benefit less prepared, less educated as well as more educated students?

• What kinds of incentives for retraining should be implemented? One policy in France involves continuing education incentives: just as workers accrue vacation days for each week worked, in France workers also accrue continuing education credits that provide time off and funding to take upskilling courses.

• How can continuing education opportunities be linked more closely to specific employment opportunities? For example, the OECD Skills for Jobs Database provides timely information about skills shortages and surpluses across European countries, as well as data on upskilling opportunities (e.g., the surplus
of European workers in Building and Related Trades can be trained with modest effort to shift to the undersupplied area of Metal and Machinery workers. Also, the US company Udacity.com has been experimenting with offering online continuing education courses for which a student receives tuition refund if they receive an A in the course but this does not lead to getting a job (based on agreements made in advance with potential employers). What federal policies can encourage better linking of training to work opportunities?

Third, AI is making possible new business models that are creating new kinds of wealth and new models for work. For example, new companies like Uber could not exist without the sophisticated AI algorithms that match drivers and riders just-in-time to one another, and that get the rider efficiently to their destination. Although Uber is perhaps the best known of the companies offering part time employment scheduled by workers, and therefore encouraging new kinds of workers to enter the workforce, this model of just-in-time gig work is also appearing at many skill levels, including software work (Upwork.com), appliance installation (Home Depot), and high end technical consulting (Gerson Lehrman Group), where again workers are matched just-in-time to work opportunities scheduled at their convenience.

A key policy question here is how to encourage the growth of this new gig economy which is drawing new people into the workforce, and providing an employment safety net to those whose jobs may be eliminated. One significant policy opportunity is to remove disincentives that inhibit worker participation, especially the lack of benefits such as retirement and healthcare benefits for temporary workers. Options include tax incentives and regulations such as requirements for employers to provide benefits to freelancers who work at least 35 hours/week for their company.

There are many additional policy issues related to AI and information technology, such as how to create a healthy ecosystem for AI startup businesses, dealing with the data dominance of incumbent companies which acts as a barrier to entry for new startups, obtaining societal benefits of AI that for-profit companies are unlikely to pursue due to lack of financial incentives, addressing the shortage in supply of AI expertise in response to recent spikes in business demand, and assuring continued U.S. leadership in AI in the face of rapidly growing international competition. I would be pleased to discuss these and other issues with the committee.