

Prepared Testimony on “Human and Economic Impact of Technological Advancements Across the American Workforce”

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Chairman Himes and Members of the Select Committee on Economic Disparity and Fairness, thank you for the opportunity to testify today on the human and economic impact of technological advancements across the American workforce. I am the author of *The New York Times* Best Seller *Digital Destiny: How the New Age of Data Will Transform the Way We Work, Live, and Communicate* and the president and CEO of Avrio Institute, a boutique research organization focused on the intersection of innovation and society.

Today many workers are divided on the societal benefit of using technologies like robots to automate jobs and artificial intelligence to imitate and replicate human behaviors.¹ There is incredible angst about technology replacing our jobs, and at the same time, companies can't seem to find enough workers to fill open positions.²

But I believe there are reasons to be optimistic and hopeful. And I believe the future can be very bright for both employees and employers.

My testimony makes four points:

1. Technological innovation both complements and displaces workers, but it creates more opportunity than it destroys.
2. The jobs of the future will be decidedly more human.
3. Continuous upskilling and training will be required to transition workers to new roles.
4. Mass adoption of advanced technologies will change the structure of the workforce.

The remainder of my written testimony expands on these four points.

¹ Johnson, Courtney, and Tyson, Alec. People globally over mixed views of the impact of artificial intelligence, job automation on society (Tech. Rep.). Pew Research Center. December 15, 2020. Retrieved from <https://www.pewresearch.org/fact-tank/2020/12/15/people-globally-offer-mixed-views-of-the-impact-of-artificial-intelligence-job-automation-on-society/>

² In August 2021, there were 10.4 million open jobs, a small decrease from the series high of 10.9 million open jobs in July 2021 (<https://www.bls.gov/jlt/news.htm>). A recent study from IPC reports that 70% of electronics manufacturers in the United States believe finding and recruiting skilled labor is getting more difficult (<https://emails.ipc.org/links/102021CurrentSentimentSupplyChain.pdf>).

1. Technological innovation both complements and displaces workers, but it creates more opportunity than it destroys.

At the end of the 19th century, we cut large sections of ice out of frozen lakes and rivers, stored them in large warehouses, and ultimately delivered them to households in the heat of the summer. There was an estimated 90,000 workers employed in the U.S. natural ice trade industry at its peak. Eventually, artificially produced plant ice would become both reliable and inexpensive and would replace the entire industry. Years later of course, this industry would be supplanted once more by automatic home icemakers.

In fact, the history of employment in the United States is largely defined by this type of technological innovation. In 1910, there were over 167,000 telephone and telegraph operators. In 1930, more than 67,000 Americans were employed as elevator operators. In 1940, an estimated 60,000 people were employed as linotypists, setting every word of every newspaper in hot metal typesetting.³

We know that technological innovation displaces American workers. But we also see how it complements work. Increasingly, there are few jobs not touched in some way by technology.

It seems every week there are reports of individuals being saved with the help of drones and, behind each one of those, a drone operator. In fact, drones are being used to complement many types of work. In just the last few weeks, drones have been used by animal control officers to count deer in Sioux Falls,⁴ to map the composition of debris located in the Great Pacific Garbage Patch,⁵ and to make numerous engineering inspections safer and more efficient.⁶

Technologies like virtual reality (VR) and augmented reality are changing the nature of work across diverse industries. These technologies are enabling architects, engineers, and construction workers to study their workspace virtually before entering a job site. They are being used to guide industrial technicians in routine maintenance⁷ and to train automotive mechanics on how to service some of the newest electric vehicles.⁸

As robots become safer, smaller, and more dexterous we are increasingly using them in collaboration with humans. Sacros Robotics, a maker of exoskeletons, partnered with Delta Airlines last year to aid

³ Employment Outlook in Printing Occupations: Bulletin of the United States Bureau of Labor Statistics, No. 1126. Retrieved from https://fraser.stlouisfed.org/files/docs/publications/bls/bls_0902_1947.pdf

⁴ Yost, Rae. "Drones used to count deer in Sioux Falls." Keloland.com. October 22, 2021. Retrieved from <https://www.keloland.com/keloland-com-original/drones-used-to-count-deer-in-sioux-falls/>

⁵ White, Jaxon. "Mifflinburg grad flies drones, evaluates pollution in Pacific Ocean." The Daily Item. November 1, 2021. Retrieved from https://www.dailyitem.com/news/mifflinburg-grad-flies-drones-evaluates-pollution-in-pacific-ocean/article_0add14ae-3aa5-11ec-a645-abef6ecc0130.html

⁶ Hartz, Brian. "Lofty ambitions: Drone-based businesses navigate their way to success." Business Observer. October 28, 2021. Retrieved from <https://www.businessobserverfl.com/article/lofty-ambitions-drone-based-businesses-navigate-their-way-to-success>

⁷ Siemens. Augmented Reality Assisted Work Instructions. Retrieved from <https://www.plm.automation.siemens.com/global/en/products/manufacturing-planning/augmented-reality-assisted-work-instructions.html>

⁸ Ford. "How Ford, Bosch Are Using Virtual Reality to Train Technicians on All-Electric Mustang Mach-E." 2020. Retrieved from <https://media.ford.com/content/fordmedia/fna/us/en/news/2020/02/14/ford-bosch-virtual-reality-technician-training-mustang-mach-e.html>

and augment workers. Its robotic suit, which is worn by workers, enables employees to lift up to 200 pounds repeatedly without physical strain or fatigue, making their jobs both safer and easier.

Last year, the White Castle restaurant chain became the first fast food chain to use Miso Robotics' Flippy, a robotic French fry cook. Why is the restaurant industry employing robots? Because it faces massive turnover and a shortage of workers.⁹ White Castle recently reported it cold-called 550,000 past applicants from up to four years ago in an effort to fill open positions.¹⁰ By using technologies like Flippy, White Castle is able reduce excess demands on its existing employees and allow these employees to focus on adding value elsewhere in the customer journey.

Even some basic technologies we take for granted are just now finding their way to employees. This summer, Walmart announced it was giving more than 740,000 associates a new smartphone and, with it, access to a number of technological tools, including a voice-activated personal assistant that can help answer customer questions, a push-to-talk feature to facilitate team communication and coordination, and self-service HR tools so employees can manage their work experience more effectively.¹¹

We don't know yet how embedding technology within these jobs will change them over time. Some jobs will inevitably be lost, but new ones will be gained. We can look at previous technologies to see how this pattern has played out. For example, McKinsey estimates that the introduction of the personal computer destroyed 3.5 million jobs but created over 19 million new ones. Importantly, about 90% of these new jobs are occupations outside the personal computer industry.¹² In other words, the introduction of advanced technologies creates many jobs in adjacent industries by changing the nature of work.

2. The jobs of the future will be decidedly more human.

As employers integrate advanced technologies, they remove routine, repetitive tasks and ultimately free up employees to focus on more human-centric work. This work tends to be more service-oriented and often requires interpretation, communication, active listening, teamwork, analysis, and empathy. This work can be ambiguous and undefined, and because the tasks might not be fixed, they will require greater flexibility from both employers and employees.

As White Castle's Vice President Jamie Richardson put it, "we're not dialing down on the number of people in a restaurant. We're looking at Flippy as a tool that helps us increase speed of service and frees team members up to focus more on other areas we want to concentrate on, whether that's order

⁹ Rosenbaum Eric. "Panera is losing nearly 100% of its workers every year as fast-food turnover crisis worsens." CNBC. August 29, 2019. Retrieved from <https://www.cnbc.com/2019/08/29/fast-food-restaurants-in-america-are-losing-100percent-of-workers-every-year.html>

¹⁰ Te-Ping, Chen. "Good News: You Might Get That Job You Applied For in 2017." *Wall Street Journal*. July 21, 2021.

¹¹ Walmart. "Walmart Unveils All-in-One Associate App, Me@Walmart, and Gives 740,000 Associates a New Samsung Smartphone" June 3, 2021. Retrieved from:

<https://corporate.walmart.com/newsroom/2021/06/03/walmart-unveils-all-in-one-associate-app-me-walmart-and-gives-740-000-associates-a-new-samsung-smartphone>

¹² Manyika, James, et al. "Jobs lost, jobs gained: Workforce transitions in a time of automation." McKinsey Global Institute 150. 2017. Retrieved from

<https://www.mckinsey.com/~ /media/BAB489A30B724BECB5DEDC41E9BB9FAC.ashx>

accuracy or how we're handling delivery partner drivers and getting them what they need when they come through the door.”¹³

Human skills will become especially paramount in environments with a dearth of data. These are the environments ill-suited for robotics and artificial intelligence. Human skill will also be important in understanding innovation and how to implement new technologies. Researchers find that when technology-induced innovation is disruptive, it requires “repair work” to complete the process of making innovation effective.¹⁴

It is important to recognize that as we automate some of the routine and easy tasks, we are left with jobs that are increasingly ambiguous and mentally challenging. This, in turn, could bring additional worker difficulties like increased stress.

3. Continuous upskilling and training will be required to transition workers to new roles.

The changing nature of work requires new skills and capabilities. Data suggests a major reason for elevated unemployment is a mismatch between the skills employers want and the skills employees have, what some refer to as a “skills gap.” As one example, the Maine Department of Labor recently surveyed unemployment insurance claimants and active jobseekers on Maine JobLink. The most cited barrier these job seekers faced in returning to work was a lack of opportunities that matched their skillset.¹⁵ To help bridge this gap, companies like Amazon and Aurora are offering “returnship” programs to help individuals restart their careers if they’ve been away from the workforce for a period.

An increasing share of jobs will require digital skills of varying degrees. Roughly 83% of technology companies report they will need more employees with technical skills.¹⁶ According to research from Accenture, 86% of executives agree their organization must train their people to think like technologists.¹⁷ This doesn’t mean that they are computer programmers but rather that they can coexist with technology and most importantly co-produce with technology.

Many organizations are building programs today to ensure they have the skilled workers they will need tomorrow. Amazon, for example, has also introduced a mechatronics and robotics apprenticeship program to help train workers for technical maintenance.¹⁸ Rockwell Automation is working with Georgia Piedmont Technical College on an advanced manufacturing program.

¹³ Jiang, Irene. “Meet Flippy, White Castle’s new robot chef that can fry food and flip burgers.” *Business Insider*. July 14, 2020. Retrieved from <https://africa.businessinsider.com/strategy/meet-flippy-white-castles-new-robot-chef-that-can-fry-food-and-flip-burgers/tstmqm7>

¹⁴ Elish, Madeleine, and Watkins, Elizabeth. “Repairing innovation: A study of integrating AI in clinical care.” *Data & Society*. September 30, 2020. Retrieved from <https://datasociety.net/library/repairing-innovation/>

¹⁵ Maine Department of Labor. “Barriers to employment: Key findings from recent survey effort.” 2021. Retrieved from: https://www.maine.gov/labor/docs/2021/Barrierstoemployment_Findings%20and%20Analysis_091321.pdf

¹⁶ Consumer Technology Association. “Future of Work.” 2021. Retrieved from <https://www.cta.tech/Who-We-Are/Future-of-Work>

¹⁷ Accenture. *Leaders Wanted: Experts at Change at a Moment of Truth*. 2021. Retrieved from https://www.accenture.com/us-en/insights/technology/_acnmedia/Thought-Leadership-Assets/PDF-3/Accenture-Tech-Vision-2021-Full-Report.pdf

¹⁸ Amazon Jobs, Mechatronics and Robotics - A career for your future. 2021. Retrieved from https://www.amazon.jobs/en/landing_pages/rme-apprentice

Technology is also being used to train workers for the jobs of tomorrow. VR is being used to train diverse workers. Companies like Osso VR are enabling medical professionals to train with new medical devices in a three-dimensional space. In this way, surgeons can reach high levels of proficiency with emerging surgical techniques before using them in practice. Walmart is using VR to help train employees to have hard conversations and practice kindness during stressful encounters.¹⁹ Bank of America is using VR to help bank associates prepare for sensitive financial conversations with customers.²⁰ Airline pilots have long trained on simulators so they can practice what to do before they have to do it. Emerging technologies like VR are enabling employers and employees to prepare for myriad jobs in similar ways.

4. Mass adoption of advanced technologies will change the structure of the workforce.

One of the ways in which digital technologies disrupt is by bifurcating traditional value chains. The same unbundling that disrupted industries like music and newspapers is breaking apart our historical view of jobs. Digital tools are also disintermediating traditional employment relationships. This is especially true for creative workers who have new tools that enable them to interact and transact directly with customers.

Consider as one example the massive changes we've seen take place in newsrooms across the country. U.S. newsrooms have seen employment drop an estimated 26% since 2008.²¹ While digital-native newsrooms have grown significantly, they have not yet surpassed the aggregate job loss of newspaper publishers. But the rise of platforms like Substack are enabling writers to go directly to customers. Today there are 500,000 paid subscribers across the Substack network of thousands of newsletters, with the top 10 writers collectively making more than \$20 million annually in subscription revenue.²²

This type of disintermediation will likely lead to greater specialization and work that is structured around projects instead of permanent employment. In the shadow of the pandemic, businesses are, with fits and starts, more fully embracing a remote workforce.²³ This, in turn, is enabling businesses to more fully embrace non-full-time (i.e., freelance or "gig") workers. The number of self-employed workers is up significantly,²⁴ and more businesses are reporting an increased willingness to use freelancers.²⁵ All of this suggests that we are likely at the beginning of a very long transition toward a decentralized

¹⁹ Mayer, Kathryn. "Walmart's solution to teaching workers kindness: virtual reality." *Human Resource Executive*. July 2, 2021. Retrieved from <https://hrexecutive.com/walmarts-solution-to-teaching-workers-kindness-virtual-reality/>

²⁰ Cross, Miriam. "Bank of America using VR to prep for sensitive customer interactions." *American Banker*. October 7, 2021. Retrieved from <https://www.americanbanker.com/news/bank-of-america-using-vr-to-prep-for-difficult-customer-interactions>

²¹ Walker, Mason. "U.S. newsroom employment has fallen 26% since 2008." Pew Research Center. July 13, 2021. Retrieved from <https://www.pewresearch.org/fact-tank/2021/07/13/u-s-newsroom-employment-has-fallen-26-since-2008/>

²² Mullin, Benjamin. "Journalists Venture Beyond Their Newsrooms to Try to Cash In." *Wall Street Journal*. October 30, 2021. Retrieved from <https://www.wsj.com/articles/journalists-venture-beyond-their-newsrooms-to-try-to-cash-in-11635606509>

²³ Gallup. "Remote Work Persisting and Trending Permanent." 2021. Retrieved from <https://news.gallup.com/poll/355907/remote-work-persisting-trending-permanent.aspx>

²⁴ Haltiwanger, John C. Entrepreneurship During the COVID-19 Pandemic: Evidence from the Business Formation Statistics. No. w28912. National Bureau of Economic Research, 2021.

²⁵ Ozimek, Adam. "Future Workforce Report 2021: How Remote Work is Changing Businesses Forever." Upwork. 2021. Retrieved from <https://www.upwork.com/research/future-workforce-report>

workforce. In this environment, organizations might “rent” the skills they need to fill skills gaps they have, and workers may enter and exit the workforce more frequently.²⁶

Conclusion

I’ll close with a personal story. My oldest son is a freshman in college where he is studying data science, a major that only launched two years ago at his school. It is an outcome of the melding of computer science and mathematics.

A few months prior to the pandemic, as a junior in high school, he started a job at the grocery chain Wegmans where he was initially trained as a cashier. When the pandemic hit, his job role evolved and increasingly took on digitally infused tasks like helping to fulfill or process custom online orders. In the months that would follow, his job evolved once again as he became part of his store’s Helping Hands team. My son loved this change to his job. Let me quote from a typical Helping Hands job description to provide a feel for the job:²⁷

“...you will make sure customers end their shopping trips with a positive experience. In this role, you'll provide incredible customer service by engaging customers in friendly conversation, carefully handling bagged items, and keeping the parking lot clear and safe for everyone. You'll leave a lasting impression and transform first-time shoppers into loyal Wegmans customers!

What will I do?

- Engage customers in friendly conversation while making eye contact and smiling
- Proactively offer additional assistance or services and thank the customer for shopping at Wegmans
- Maintain the appearance and safety of the parking lot and offer additional service during inclement weather"

There seem few skills as human as engaging “customers in friendly conversation while making eye contact and smiling.”

There are numerous examples of technology at work in a typical grocery store. The cashier’s job is complemented by technologies like bar code scanners and point-of-sale software systems. In the case of self-checkout options, the technology might displace a cashier. More often than not, technology is complementing and displacing simultaneously. But in so doing, it creates adjacent opportunities.

Technology helps to standardize the customer experience, but Wegmans, like many of its peers, does not want to deliver just a standardized experience. They want to deliver a differentiated customer

²⁶ Holtz-Eakin, Douglas, Ben Gitis, and Will Rinehart. "The gig economy: Research and policy implications of regional, economic, and demographic trends." In *The Aspen Institute's Future of Work Initiative and American Action Forum*. January 10, 2017. Retrieved from <https://www.americanactionforum.org/research/gig-economy-research-policy-implications-regional-economic-demographic-trends/>

²⁷ LinkedIn. Wegmans Helping Hands Customer Service Job Description. 2021. Retrieved from <https://www.linkedin.com/jobs/view/helping-hands-customer-service-at-wegmans-food-markets-2755323419/>

experience. Wegmans, as an employer, recognized an opportunity for its front-end customer service employees in the form of a special team of Helping Hand employees. These jobs exist today because technology made cashiers more productive, which made the employer more productive and, in some instances, displaced employees who could then move to new adjacent opportunities.

While we worry about the firms that are adopting advanced technologies like automation and artificial intelligence, we should be equally worried about the firms that are not adopting these technologies. Our companies, and our country, are competing in globalized marketplaces.

Thank you, and I look forward to your questions.