7-10-2022

Crafting an Innovation Ecosystem That Works for Working People

Amanda Ballantyne
AFL-CIO Technology Institute

Patrick Woodall
AFL-CIO Technology Institute

Katie Corrigan
AFL-CIO Technology Institute

Edward Wytkind
AFL-CIO Technology Institute

Crafting an Innovation Ecosystem That Works for Working People

Amanda Ballantyne
AFL-CIO Technology Institute
Patrick Woodall
AFL-CIO Technology Institute
Katie Corrigan
AFL-CIO Technology Institute
Edward Wytkind
AFL-CIO Technology Institute

Abstract

The rapid pace and expanding scope of technological change is reshaping work and the workplace. These innovations can benefit workers by improving safety, reducing physical or repetitive burdens, or creating new types of jobs. But automation and new technologies can also eliminate workers, deskill occupations, reduce autonomy and job satisfaction, and erode economic stability for working families that contribute to the rising economic and racial inequality. These technologies do not fall from the sky; they are incubated in an innovation ecosystem shaped by public policy and public-research funding that is driven largely by an oligopoly of Big Tech companies and universities that develop and impose new technologies on workers without their consent or input. The AFL-CIO, America's largest federation of labor unions, formed the Commission on the Future of Work and Unions, which launched the AFL-CIO Technology Institute to be a voice for workers and the labor movement to confront and shape the technological change that generates tremendous profits for technology titans without providing equitable benefits for working families. Workers and labor unions warrant an equal seat at the table to help shape the policies that drive public research, craft the development of more effective workplace technologies, and collectively bargain to safeguard the interests of workers.

The current wave of emerging technologies poses profound disruptions to the economic and social fabric. The widespread integration of digital technologies like artificial intelligence, advanced robotics, big data, and social media are changing the economy, workplaces, and our everyday lives. These changes are contributing to the yawning economic and racial inequality, sharpening political polarization, and posing significant threats to our economy and democracy. New technologies reshaping society and work could help solve these problems or amplify them—the choice is really up to us. Working people, and their unions, play an essential role in determining this future.

There is much at stake in this moment. Technological changes are too often imposed on workers, people, and communities without their consent or input. This has led to workers losing their jobs and economic security, the hollowing out of industries and communities, and a corrosion of social discourse and civic life. Many technologies have made work safer and easier and created new occupational opportunities, but the current raft of digital innovations and automation requires a much closer examination by the labor movement. Working people are justifiably concerned about the speed and scope of technological change in the workplace and society. More than one-fourth (27 percent) of US workers worry that automation, robots, or artificial intelligence will eliminate their jobs[1] and two-thirds of workers believe that the increasing use of these technologies will reduce the number of high-paying jobs in the future.[2]

But the technologists pitch a rosy future that too often leaves working people out of the picture altogether. These are not innovations that fell from the sky; they are the result of choices made by big business leaders and government officials that prioritize the profits of tech and other companies over the needs of workers and people that now imperil our democracy, our civil rights, and our children's futures in ways that many of us never anticipated.

The Big Tech firms have an increasingly tight grip on the entire economy, pushing their products, software, and innovations onto employers, workers, and people. This has propelled the stock market and minted a new crop of tech billionaires, but workers and communities have not gained a fair share of the economic benefits of the inventions and technologies. Instead, workers' economic stability, job quality, and job satisfaction have been in decline amid these rapid transformations.

Labor unions have been the bulwark that has enabled workers to navigate economic and social turmoil for decades by advancing workers' interests and promoting social justice for all. They have also played a key role in helping working people transition as new technologies and innovations have taken hold and changed the nature of work. Today, they have a vital role to play in technological transformation—to build the changes we need from the ground up. Workers must have a co-equal voice along with businesses, regulators, and researchers in shaping the technological changes that are sweeping society and the workplace.

Centering worker voices through the inclusion of labor unions in every aspect of the innovation process generates both immediate and longer-term benefits. Meaningful worker involvement in the innovation ecosystem creates more effective new technologies because the worker end-users can help craft approaches that meet real-world workplace needs. Collective bargaining can shape how or whether new technologies are brought to the workplace and can train and prepare workers to foster a less disruptive and more effective adoption of workplace technologies. It is also critical to ensuring that the prosperity generated by coming waves of technological change is shared widely and equitably without further eroding civic, social, and economic life.

Unions and allied worker organizations are the only institutions with the structural power and worker-centric focus to help workers navigate the deluge of technological changes through

bargaining, public policy advocacy, and training. The American Federation of Labor and Congress of Industrial Organizations (AFL-CIO), the largest US labor federation representing fifty-seven unions and nearly thirteen million workers, launched its Technology Institute to be a hub for developing and implementing multidisciplined strategies. This new institute, together with AFL-CIO affiliates, will be a central voice for workers and the labor movement to confront and shape the technological transformation. Our goal is to foster an inclusive, sustainable, and democratic future that creates union jobs and generates shared prosperity.

Confronting the Technological Challenges Upending Workers' Lives

Technological change has affected work and workers since before the Industrial Revolution. The advent of the plow changed farming and the invention of the printing press eliminated manuscript scribes. But today, the speed and scope of disruptive changes confront workers and unions in profound ways. These evolving technologies are not—as some corporate voices would have us believe—solely about their ingenuity; rather, innovation is being supercharged by public research directed by companies that reap the profits from taxpayer investments.[3] Digitization includes manifestations of long-standing problems for workers (automation-driven job loss, deskilling, and the explosion of contract and "gig" work that has fissured the relationships between workers and employers) and emerging impacts (such as more sophisticated workplace surveillance and algorithmic management).

Technology in the Workplace

Technology-driven worker replacement has been a persistent concern for generations. The telephone industry's transition from manual operators to mechanical switching in the 1920s to 1940s eliminated half the telephone operator jobs, and while younger women shifted to comparably paying clerical, retail, and restaurant jobs, more senior workers either left the workforce or took lower-paying jobs.[4] The rise in office computers, word processing software, and advanced photocopying displaced a hundred thousand clerical, secretarial, and stenographic jobs in the early 1980s, and by the end of the decade the share of these workers in the economy declined for the first time in the twentieth century.[5] Now, the proposed adoption of autonomous vehicles could eliminate hundreds of thousands of higher-paying jobs annually.[6] It all depends on whether workers are involved in the decisions about how or whether these technologies are implemented.

   Automation does not always replace workers. The rise of automated teller machines did not eliminate bank tellers, as banks opened more branches, but it narrowed the tasks these workers performed.[7] These new technologies instead molded workers into becoming effective inputs for the new technology. This has deskilled the workforce by transforming workers into cogs that accommodate the new technology or systems, reducing the skill set required, the wages paid, and the worker autonomy, job satisfaction, and dignity.[8] Burger-flipping robots still require human workers to do very specific tasks (putting the patty onto the robot spatula and putting the buns in a certain way).[9] Fast-food fry cooks were converted into robot-servicing drones. In the passenger-transport sector some autonomous technology developers want to convert skilled, licensed drivers into "monitors'' while the vehicle drives itself. This deskilling makes it easier for employers to fire workers because each worker has a smaller skill set, making them more easily replaceable, which makes workers more vulnerable to being terminated.

Technology and the Structure of Work

Technology has expanded the fissuring of workplace relationships, where employers outsource or subcontract workers without maintaining an employment relationship. One-fifth of US workers toil in fissured workplaces where companies have outsourced their workforces to subcontractors or converted their workforce into independent contractors that receive low-pay, no or paltry benefits, none of the labor law protections that employees receive, and no right to form unions.[10] This has been happening for decades, but the rise of the platform "gig workers" has created a sea of ride-hail and delivery drivers, home health aides, data processors, and other workers directed by smartphone apps who are routinely misclassified as "independent contractors" and do not get the protections they justly deserve as employees.[11]

There also are emerging workplace technology issues such as algorithmic management and workplace surveillance that can profoundly change the employment experience, with negative effects on workers. Employers are increasingly using algorithmic-driven analysis and predictive software to hire, control, assign, evaluate, and discipline workers. A 2021 review found that more than 90 percent of algorithmic management studies reported negative impacts on workers, including deskilling, lower worker autonomy, increased workplace control, heightened work intensity, and job insecurity.[12]

For example, a pilot program that used artificial intelligence to identify hospital patients susceptible to dangerous sepsis infections required nurses to develop new skilled approaches to navigate professional hierarchies and implement new workaround procedures and to develop other soft social skills to cajole physicians to act on the new infection-monitoring technology.[13] Other algorithmic management software can rate and even terminate workers using secret, black-box formulas.[14] Teachers are increasingly evaluated on how students perform on standardized tests compared to their expected performance on the basis of predictive computer analytics. Teachers could be rewarded, disciplined, even fired by proprietary algorithmic assessments that could be based on incorrect data points (classes teachers had not taught) or software code glitches—decisions that school administrators cannot explain or justify because even they did not know how the systems worked.[15]

Technology, Markets, and the Economy

These innovations are controlled largely by an oligopoly of Big Tech companies that flex their excess market power to capture data and economic value. These firms have secured their market dominance through mergers that have built almost insurmountable dominance. A 2020 House Judiciary Committee report highlighted how lax antitrust enforcement allowed the Big Tech companies to snap up hundreds of firms over the past decade to neutralize potential rivals or expand their market dominance.[16] Facebook bought its social media rival Instagram in 2012,[17] Google bought the digital ad platform DoubleClick in 2007,[18] and Amazon bought the e-commerce shoe giant Zappos in 2009.[19]

Today, these powerhouses have a stranglehold on the digital economy. Google alone controls an estimated 90 percent of Internet search, 60 percent of Internet browsers, 70 percent of global smartphone operating systems, owns YouTube and Gmail, and generates $150 billion in web advertising revenue.[20] The three biggest cloud computing companies—Amazon Web Services, Microsoft's Azure, and Google Cloud—controlled two-thirds (64 percent) of the $178 billion cloud market in 2021.[21] Amazon dominates US e-commerce sales with nearly 60 percent of the market—ten times larger than the next-closest rival, WalMart.[22] Meta's social media apps

(Facebook, WhatsApp, and Instagram) with 6.4 billion active users swamp the next biggest social media site, Google's YouTube, with over 2.5 billion users.[23]

The prize of this market dominance is data that fuels marketing and software services and big data tools the companies sell to advertisers and employers. Every mouse click, e-commerce purchase, Internet search, social media post, smartphone app, and, increasingly, workplace surveillance and algorithmic productivity metric is captured and commodified by the Big Tech behemoths. As a 2020 Brookings Institution essay observed, "the collection and hoarding of the digital data . . . is the 21st century equivalent of Rockefeller's 20th century monopoly over oil."[24]

The AFL-CIO Commission on the Future of Work

In response to these longstanding trends and emerging challenges, the AFL-CIO launched the Commission on the Future of Work and Unions (Commission on the Future of Work) at the 2017 national convention in St. Louis, Missouri, to address the "profound changes [technology] is driving, [and its] potential for creating better lives, but only if working people are able to shape the change that is coming."[25] The convention unanimously supported the commission resolution that noted: "The failure of progressive forces, including the labor movement, to nimbly confront these seismic changes must be addressed."[26]

The Commission on the Future of Work put workers and worker organizations at the center of the discussion of the technological transformations that were reshaping workplaces, the relationships between workers and employers, the centers of corporate power, and the economy. Workers are an essential voice in the conversation about the future of work, but their voices have been conspicuously absent from the discussions. The business community,[27] corporate consultants,[28] think tanks,[29] and many universities[30] have long been discussing the impact of technical change on work and the workforce, but largely without any worker voices. For too many thought leaders engaging in these conversations, the technological future was something to be imposed on workers not shaped by or built with workers.

The AFL-CIO Commission on the Future of Work was anchored by ten sectoral and constituency subcommittees led by affiliated and national unions that engaged academic and policy experts in labor and industrial relations to "rethink ways of building bargaining power and providing economic security for millions of Americans."[31] The deliberative, multiyear process culminated in the "Future of Work and Unions" report that provided a roadmap to build worker power to confront the technological forces trying to wrest control of the economy to the detriment of workers.[32] Most of the so-called futurist technological wonders just represented new facets of the same anti-worker approaches threatening the labor movement for decades—outsourcing and fissuring, globalization and offshoring, union-busting, and financialization.

The report and the commission also called for the creation of the AFL-CIO Technology Institute to shape the future of work to ensure that the benefits of emerging technologies benefit workers and people and are not captured by Big Tech and big corporations.

Building a Hub for Expertise on How Technology Impacts Workers and Unions

In 2021, the Tech Institute was launched to leverage the power of innovation and technology to strengthen the labor movement. AFL-CIO president Liz Shuler described the Tech Institute as "a hub for skills and knowledge to help labor reach the next frontier, grow and deploy our bargaining power, and make sure the benefits of technology create prosperity and security for everyone, not just the wealthy and powerful." [33]

The Tech Institute has already begun its mission to build a hub for innovation and technology expertise, develop cutting-edge public policies to embed workers and unions in government innovation policies, collaborate with institutes and universities to incubate worker-driven technologies that assist and empower workers rather than replace them, and amplify labor power through new organizing and bargaining strategies in collaboration with front-line workers' unions.

The goal is to build a comprehensive knowledge center to understand the granular mechanisms of how technology impacts the workplace and workers. The Tech Institute will be a resource center for unions in the United States but also part of the global network of worker-oriented strategic development on technology issues by building intellectual capacity and by convening the phenomenal talent across the labor movement and other public interest and academic experts who are considering the thorny issues of big data, artificial intelligence, and digital privacy in the workplace.

Developing a Cohesive Technology Policy Approach to Innovation and Technology

The Tech Institute is actively engaging to embed labor into the decision-making tables that direct federal innovation policy and public research investments to build lasting structures and relationships that prioritize making technology work for working people. The Tech Institute aims to give workers a meaningful voice in how technology is developed and implemented—just like what the tech companies have done for decades.

The biggest tech companies have had dominant roles directing federal research priorities and enriching themselves by commercializing these technologies. Many critical innovations that later were profitably commercialized, such as smartphones and even Google, were launched or built with government research grants.[34] The federal government invests nearly $160 billion a year in university research—representing nearly half of all US spending on basic research and one-third of the money spent on applied research.[35] In some instances, workers' tax dollars are funding their own demise as federally funded research projects are commercialized overseas rather than creating US jobs.

Today's e-commerce giants are a great example. It took decades of government research funding into institutes, universities, and government agencies to develop the technologies and networks that became the Internet.[36] Commercial interests began offering private Internet network services in the early 1990s—after thirty years of federal funding had developed and demonstrated the Internet's value.[37] The federal government spent another $47 billion to expand broadband in rural areas before 2020 and another $65 billion in broadband funding was included in the Biden infrastructure bill.[38] All of these federal investments helped build the tools and connect customers to enrich e-commerce commerce.

But unlike union workers, some of the biggest tech companies are paying far less than their fair share of taxes. Amazon's effective tax rate has been far short of the 21 percent federal tax imposed on corporate income. Amazon paid no federal corporate income taxes in 2017 and 2018; it paid only 1.2 percent of pretax income in 2019; and it paid 7 percent in 2020, when it reaped record $24 billion in pretax income.[39] Amazon founder Jeff Bezos paid less than 1 percent taxes on his $4.22 billion in reported income from 2014 to 2018 according to an investigation by ProPublica.[40] The ability of tech giants to hoard profits while working people struggle to stay afloat exacerbates America's yawning income and wealth inequality. In 2020, Amazon CEO Andy Jassey earned $35.8 million, over twelve hundred times more than the typical Amazon worker, who made $29,000—making the Amazon CEO–worker pay ratio nearly double the national average, according to an AFL-CIO analysis from Executive Paywatch.[41]

The labor movement must be baked into the federal innovation infrastructure to ensure that the fruits of federally funded research are shared widely and create good US jobs. No president since Franklin D. Roosevelt has supported organized labor in word and in deed more than Joe Biden. But the technocratic levers of power in the byzantine scientific and research agencies have been primarily engaged with businesses and universities and have not been acculturated or equipped to consider the interests of workers. The Tech Institute is capitalizing on the political moment to advance the labor movement's interests in shaping innovation policy and funding to demand what workers and unions deserve.

The Tech Institute is pushing to prioritize labor unions and worker voices in the innovation ecosystem to ensure that public research money delivers good, union jobs in the United States. In 2022, a legislative effort to strengthen public research in innovation industries specifically names labor unions as stakeholders in new agency bodies to weave worker interests into the fabric of innovation research funding and governance.[42] It includes labor union participation in a new National Science Foundation (NSF) directorate to develop funded university-labor union partnerships and directs all NSF programs to "incorporate a worker perspective."[43]

This federal research legislation is only part of the effort to incorporate labor voices in the federal innovation agencies and federal economic development architecture. The NSF bestows billions of dollars in research grants but so do other federal agencies such as the Department of Commerce, the Department of Transportation, the Department of Energy, and others that also have considerable research grant budgets. The Tech Institute is working to include domestic job-creation requirements and labor union participation with these agencies as well.

Additionally, the Tech Institute is working to engage the labor movement in economic development initiatives funded by the American Rescue Plan designed to build regional innovation hubs across the country.[44] These grants are intended to build high-tech clusters and direct grant applicants to solicit participation from state and local labor unions as well as universities, governments, and businesses.[45]

The policy levers are critical. As President Shuler noted, "If we put the right policy guardrails in place, we'll actually have a higher quality of life and more time with our families, if the prosperity from all this technology and the wealth it creates is shared broadly."[46]

Building Worker-Centered Innovation Partnerships to Shape the Future of Workplace Technology

The Tech Institute is investing in a deeper understanding of emerging technologies, the research development ecosystem, and creating a structure to build strategies to address these emerging challenges facing workers. Former AFL-CIO president Richard Trumka described the approach as "breaking up the system that has Big Tech and corporate America exerting way too much power over how and why we innovate, with no consideration of workers' needs."[47]

The Tech Institute is partnering with prestigious research universities to incubate worker-centered innovations for the future of work. Innovation grows from people with experience and knowledge that can improve how work gets done. Workers bring the accumulated expertise of actually performing the tasks and unique insights into the needs and deployment of new technologies.

But most often, university and corporate research elites with engineering and business school degrees impose new technological "solutions" on workers without soliciting their needs, capacities, and specialized workplace expertise that could build better mousetraps. People working

on the front lines of jobs can be and should be engaged in the definition of workplace knowledge because involving the worker end users makes the technologies more intuitive and more effective.

The Tech Institute has developed closer relations between unions and universities, including Carnegie Mellon University (CMU), to develop technology in real time to bring workers into engineering laboratories to collaborate on the design and implementation of innovation.[48] CMU recognized that it was important to humanize their engineering and research programs to do more than innovate new technologies and launch new enterprises. The university also must recognize the role of workers and the impact on local economies and jobs.[49] Too much innovation was being developed at US universities but the intellectual property was creating jobs overseas rather than bolstering the domestic technology and manufacturing sector—a problem thrown into sharp clarity by the recent supply-chain meltdowns.

One of the first initiatives was to evaluate the future of autonomous vehicle transit technologies. The "what's human about work" project joined the Tech Institute, the Transport Workers Union, and Amalgamated Transit Union to share transit-operator expertise with the engineering and public policy professors who wanted to better understand what bus operators do on the job.[50] Bus operators are first responders who cope with medical and safety emergencies; navigators who deal with weather, traffic, and road emergencies; and caretakers who assist older passengers and those with disabilities to ensure that transit is accessible, and more. In 2022 CMU released a white paper that concluded that no self-driving transit bus could perform the essential tasks that require the quick responses of human operators to safeguard passengers and keep the transit system functioning.[51]

Another CMU-union project focused on the impact of algorithmic management and other technology in the hospitality industry, partnering with the nation's largest hospitality union, UNITE HERE, and other universities. For example, a Marriott housekeeping app that assigned rooms for workers to clean often directed them to spend time inefficiently moving from floor to floor cleaning some rooms but bypassing nearby dirty rooms, causing workers to worry that they would be disciplined for not completing their tasks.[52] The National Science Foundation funded a CMU-UNITE HERE research project to develop worker-centered prototypes to preserve jobs, improve job quality and satisfaction, reduce technology-accelerating economic inequality, and highlight the lack of worker voices in the rush to adopt automation in the hospitality industry.[53] UNITE HERE president D. Taylor explained CMU's worker-centered approach: "Most people who develop technology for the service sector don't feel a need to engage with the people who use their products. We've found that CMU researchers take the voices of housekeepers, servers and other service sector workers seriously and are willing to engage with their concerns."[54]

These projects demonstrated the importance and utility of bringing workers into the innovation development process to share worker experiences with engineers that show that someone with a good-paying job is necessary even to implement next-generation technologies and that these workers have a role to play in developing new workplace technologies.

Leveraging Capacity for Unions and Workers to Address Technology and Build Power through Bargaining, Training, and Workplace Policy

The Tech Institute is a hub for workers and unions to build power to confront the Big Tech companies and the emerging workplace technology issues such as electronic surveillance and algorithmic management that can upend workers' lives and economic security. Unions and allied worker organizations have the structural power and worker-centered vision to confront these treacherous and arcane technological waters. The Tech Institute has a systemic approach and

methodology to bring technology expertise to inform union strategies on organizing, bargaining, workplace policy, training, and workforce development.

This is an exciting moment in the labor movement. Although union membership has hovered just above 10 percent of the workforce for the past few years,[55] the number of workplaces where workers are trying to form unions rose 57 percent during the first half of 2022.[56] More than 80,000 workers at the largest employers (more than 1,000 workers) initiated work stoppages in 2021 and Cornell's ILR Worker Institute estimated the total number of workers involved in stoppages reached 140,000 workers, including high-profile strikes at John Deere and Kellogg's.[57]

Public support for labor unions has surged in the past few years, with more than two-thirds of Americans approving of labor unions in 2021, according to a Gallup survey, the highest level of support since 1965.[58] And three out of five people think that the decline in union membership has been bad for the country and for working people according to a recent Pew poll.[59]

Big Tech companies have been hostile to the labor movement even as they exert an increasing sway over the economy. Intel's founder stated that "remaining nonunion is essential for survival."[60] The biggest tech companies—Amazon, Alphabet, Apple, Meta (Facebook)—are all non-union employers.[61] Amazon is the second largest employer (behind Walmart) with 950,000 US employees and thousands more contract drivers that service its Prime deliveries.[62] Amazon warehouse workers in Staten Island, New York, recently won the first union vote in the company's history and another contested vote is being retabulated after allegations of illegal interference at a warehouse in Alabama.[63] Even at Google, tech workers formed the Alphabet Workers Union in affiliation with the Communication Workers of America (CWA) that is creating a venue for worker activism at the tech giant.[64] In June 2022, CWA secured a labor neutrality agreement with Microsoft covering workers at Activision Blizzard, workers at the first Apple store voted to unionize in Maryland in affiliation with the International Association of Machinists and Aerospace Workers, and CWA backed a union drive at an Apple store in New York City.[65]

It isn't simply the direct employees that need representation. There are a myriad of bus drivers, security guards, and cafeteria workers, as well as content moderators and other tech workers who work for subcontractors at the Big Tech companies, and building a fair economy means sharing the wealth these companies generate with everyone who works to make the companies successful. As President Shuler wrote in a letter to the *New York Times*, "Unions are for everyone, in every field. That's why the labor movement is working to organize Big Tech and fighting for a fair and equitable future of work, in every sector."[66]

Unions and workers have much at stake that requires cross-sectoral and multipronged strategies. That includes building union working groups to address artificial intelligence, algorithmic management, digital trade issues, employment policy, and next-generation automation in the workplace and building new policy, organizing, and bargaining strategies to stand up for workers. The Tech Institute's executive director, Amanda Ballantyne, was named to the National Artificial Intelligence Advisory Committee in 2022.[67] Already, the Tech Institute is working with universities to develop technology tools to build organizing capacity, strategy, and power.[68] The relationships the Tech Institute has fostered with engineering departments is germinating new projects to build worker organizing technology tools to bolster and strengthen unionization drives.

The Tech Institute is also beginning to build capacity to help member unions sharpen negotiations over the adoption of technologies in the workplace and ultimately have the ability to provide real-time guidance for unions during negotiations. Most bargaining has been over the effects of technologies (the impacts on job security or benefits) but not bargaining over the

adoption of worker-assistive (not replacement) technologies—what technology, the manner it is implemented, how it is used, and who has control over the data.

Some strategies have already begun. In 2018 and 2019, UNITE HERE secured agreements with hotel, casino, and food service employers that require advanced notification and negotiation over the implementation of new technologies.[69] The Las Vegas–based UNITE HERE affiliated Culinary Union secretary-treasurer Geoconda Argüello-Kline stated that the Las Vegas version of the agreements included "innovative automation and technology language, which set clear goals for worker retention, job training, advance notice of implementation, and severance package based on years of service if workers are laid off."[70] These are thought to be some of the first contract agreements that cover technologies such as algorithmic management and workplace software and provide a starting point for the future of collective bargaining over the adoption of new technologies in the workplace.

Conclusion

Digitization and technological innovations is profoundly altering our lives and our workplaces. These changes can present real benefits but also can pose genuine threats that exacerbate the racial and economic inequality and political polarization. Workers and unions must have a meaningful voice in the development and deployment of technologies that impact the quality and security of more and more jobs. Today, the Big Tech companies often collaborate with publicly funded research institutions to impose new technologies on workers without their input or consent.

Workers often lose out while tech titans reap rewards. The pandemic has highlighted the yawning economic inequality exacerbated by technology for workers—some telecommuting by video conference but millions of essential workers toiling harder, vulnerable to infection, and increasingly monitored and directed by computer systems. And these impacts fall heaviest on low-wage workers and Black, Latinx, and Native workers who have long faced occupational segregation and discrimination.

This has to change. The AFL-CIO Technology Institute injects union and worker voices into the policy maelstrom and confronts the Big Tech monopoly power over people's lives. We need to craft a future that delivers the economic and social benefits of technology more justly and equitably and puts workers and people at the forefront rather than at the end of the line. Workers and labor unions must be partners with companies and regulators to shape a future that benefits everyone, the same way the labor movement has helped workers navigate economic dislocation for more than the past century.

Notes

[1] Jacob Douglas, "These American Workers Are the Most Afraid of A.I. Taking Their Jobs," CNBC, November 7, 2019, https://www.cnbc.com/2019/11/07/these-american-workers-are-the-most-afraid-of-ai-taking-their-jobs.html.
[2] H. W. Geiger, "How Americans See Automation and the Workplace in 7 Charts." Pew Research Center, April 8, 2019, https://www.pewresearch.org/fact-tank/2019/04/08/how-americans-see-automation-and-the-workplace-in-7-charts/.
[3] Marina Mazzucato, "Taxpayers Helped Apple, but Apple Won't Help Them," *Harvard Business Review*, March 8, 2013, https://hbr.org/2013/03/taxpayers-helped-apple-but-app; Paris Marx,. "Love Your iPhone? Don't Thank Apple, Thank the Government," *Salon*, January 6, 2018, https://www.salon.com/2018/01/06/love-your-iphone-do-not-thank-apple-thank-the-us-government_partner/.
[4] James Feigenbaum and Daniel P. Gross, "Automation and the Future of Young Workers: Evidence from the Telephone Operation in the Early 20th Century," National Bureau of Economic Research Working Paper No. 28061, August 2021, https://www.nber.org/papers/w28061

[5] Warren Brown, "Computers Said to Zap Clerical Jobs," *Washington Post*, September 5, 1985, https://www.washingtonpost.com/archive/business/1985/09/05/computers-said-to-zap-clerical-jobs/0ce2fec4-e9f6-41d9-aa1a-c7d6ee1b50f6/; Michael Handel, "Implications of Information Technology for Employment, Skills and Wages: A Review of Recent Research., SRI International for the National Science Foundation No. P10168, July 2003, 61, https://files.eric.ed.gov/fulltext/ED574891.pdf.

[6] Anita Balakrishnan, "Self-Driving Cars Could Cost America's Professional Drivers Up to 25,000 Jobs a Month, Goldman Sachs Says." *CNBC*, May 22, 2017, https://www.cnbc.com/2017/05/22/goldman-sachs-analysis-of-autonomous-vehicle-job-loss.html.

[7] James Bessen, International Monetary Fund, "Toil and Technology," *Finance & Development* 52, no. 1 (March 2015), https://www.imf.org/external/pubs/ft/fandd/2015/03/pdf/bessen.pdf; Tess Townshend, "Eric Schmidt Said ATMs Led to More Jobs for Bank Tellers. It's Not That Simple," *Vox*, May 18, 2017, https://www.vox.com/2017/5/8/15584268/eric-schmidt-alphabet-automation-atm-bank-teller.

[8] Ashley Nunes, "Automation Doesn't Just Create or Destroy Jobs—It Transforms Them," *Harvard Business Review*, November 2, 2021, https://hbr.org/2021/11/automation-doesnt-just-create-or-destroy-jobs-it-transforms-them.

[9] Joe Berkowitz, "Chippy Comes in Peace: How Robots Will Coexist with Humans in the $800 Billion Restaurant Business," *Fast Company*, April 11, 2022, https://www.fastcompany.com/90736134/chippy-comes-in-peace-how-robots-will-coexist-with-humans-in-the-800-billion-restaurant-business; Marwa Eltagouri and Peter Holley, "'Flippy' the Fast Food Robot, Temporarily Decommissioned for Being Too Slow," *Washington Post*, March 9, 2018, https://www.washingtonpost.com/news/innovations/wp/2018/03/05/meet-flippy-a-burger-flipping-robot-alternative-to-wage-earning-workers/.

[10] David Weil, "Understanding the Present and Future of Work in the Fissured Workplace Context," *Russel Sage Foundation Journal of the Social Sciences* 5, no. 5 (December 1, 2019), https://www.rsfjournal.org/content/5/5/147.

[11] Juliet B. Schor and Steven P. Vallas, "The Sharing Economy: Rhetoric and Reality," *Annual Review of Sociology* 47, no. 1, 2021, https://doi.org/10.1146/annurev-soc-082620-031411; Sarah Leberstein and Catherine Ruckelshaus, National Employment Law Project, "Independent Contractor vs. Employee: Why Independent Contractor Misclassification Matters and What We Can Do about It," May 2016, https://www.nelp.org/wp-content/uploads/Policy-Brief-Independent-Contractor-vs-Employee.pdf.

[12] AI Now Institute, "2019 Report," December 2019, 10, https://ainowinstitute.org/AI_Now_2019_Report.html; Xavier Parent-Rocheleau and Sharon K. Parker, "Algorithms as Work Designers: How Algorithmic Management Influences the Design of Jobs," *Human Resource Management Review*, May 2021, https://doi.org/10.1016/j.hrmr.2021.100838.

[13] Madeline Claire Elish and Elizabeth Anne Watkins, "Repairing Innovation: A Study of Integrating AI in Clinical Care," Data & Society, September 2020, https://datasociety.net/wp-content/uploads/2020/09/Repairing-Innovation-DataSociety-20200930-1.pdf.

[14] Jay Greene, "Amazon's Employee Surveillance Fuels Unionization Efforts: 'It's Not Prison, It's Work,'" *Washington Post*, December 2, 2021, https://www.washingtonpost.com/technology/2021/12/02/amazon-workplace-monitoring-unions/; Athena Coalition, "Packaging Pain: Workplace Injuries in Amazon's Empire., December 2019, https://2cc07e6d-5f6d-4eca-8f4f-7c1165780818.filesusr.com/ugd/a25838_1646a965daf04d3e8b626a4df8d1fcc4.pdf.

[15] Shelby Webb, "Houston Teachers to Pursue Lawsuit over Secret Evaluation System," *Houston Chronicle*, May 11, 2017, https://www.houstonchronicle.com/news/houston-texas/houston/article/Houston-teachers-to-pursue-lawsuit-over-secret-11139692.php; Cathy O'Neil, "Don't Grade Teachers with a Bad Algorithm," *Wilmington News-Journal*, May 15, 2017, https://www.delawareonline.com/story/opinion/2017/05/15/dont-grade-teachers-bad-algorithm/101715082/.

[16] Subcommittee on Antitrust, Commercial and Administrative Law of the Committee of the Judiciary, U.S. House of Representatives, "Investigation of Competition in Digital Markets," October 6, 2020, 11, https://judiciary.house.gov/uploadedfiles/competition_in_digital_markets.pdf.

[17] Kurt Wagner, "Here's Why Facebook's $1 Billion Instagram Acquisition Was Such a Great Deal," *Vox*, April 9, 2017, https://www.vox.com/2017/4/9/15235940/facebook-instagram-acquisition-anniversary.

[18] Steve Lohr, "This Deal Helped Turn Google into an Ad Powerhouse. Is That a Problem?," *New York Times*, September 21, 2020, https://www.nytimes.com/2020/09/21/technology/google-doubleclick-antitrust-ads.html.

[19] Brad Stone, "Amazon's Expanding with Deal for Zappos," *New York Times*, July 22, 2009, https://www.nytimes.com/2009/07/23/technology/companies/23amazon.html.

[20] Sara Morrison, "How Much Longer Can Google Own the Internet?," *Vox*, May 20, 2022, https://www.vox.com/recode/23132580/google-antitrust-search-android-mobile-ads.

[21] Felix Richter, "Amazon Leads $180-Billion Cloud Market," February 8, 2022, https://www.statista.com/chart/18819/worldwide-market-share-of-leading-cloud-infrastructure-service-providers/.

[22] Pyments, "Amazon's Share of US eCommerce Sales Hits All-Time High of 56.7% in 2021," March 14, 2022, https://www.pymnts.com/news/retail/2022/amazons-share-of-us-ecommerce-sales-hits-all-time-high-of-56-7-in-2021/.

[23] Simon Kemp, "Digital 2022: Global Overview Report," DataReportal, January 26, 2022, https://datareportal.com/reports/digital-2022-global-overview-report.

[24] Tom Wheeler, "Big Tech and Antitrust: Pay Attention to the Math behind the Curtain," Brookings Institution, July 31, 2020, https://www.brookings.edu/blog/techtank/2020/07/31/big-tech-and-antitrust-pay-attention-to-the-math-behind-the-curtain/.

[25] "Resolution 5: Commission on the Future of Work and Unions," AFL-CIO Convention. October 24, 2017, https://aflcio.org/resolutions/resolution-5-commission-future-work-and-unions.

[26] Ibid.

[27] See Microsoft, "The New Future of Work," January 2021, available at https://www.microsoft.com/en-us/research/project/the-new-future-of-work/; Tam Harbert, "Technology and the Future of Work: Which Way Will We Go?," Society for Human Resource Management, accessed April 1, 2022, available at https://www.shrm.org/hr-today/news/all-things-work/pages/technology-and-the-future-of-work.aspx; JPMorgan Chase & Co., "Technology and the Future of Work," March 2019, accessed April 1, 2022, available at https://www.jpmorganchase.com/institute/research/labor-markets/insight-technology-and-the-future-of-work.

[28] See "Technology and the Future of Work," Deloitte Insights, 2020, available at https://www2.deloitte.com/us/en/insights/focus/technology-and-the-future-of-work.html; "The Future of Work," McKinsey & Company, accessed April 1, 2022, available at https://www.mckinsey.com/featured-insights/future-of-work; Cognizant, Center for the Future of Work, accessed April 1, 2022, available at https://www.cognizant.com/us/en/latest-thinking/future-of-work.

[29] See "The Work Ahead," Council on Foreign Relations, April 18, 2018, available at https://www.cfr.org/report/the-work-ahead/; "Future of Work," American Enterprise Institute, accessed April 1, 2022, available at https://www.aei.org/tag/future-of-work/; "Future of Work," Chatham House, accessed April 1, 2022, available at https://www.chathamhouse.org/topics/future-work; "Workforce of the Future Initiative," Brookings Institute, accessed April 1, 2022, available at https://www.brookings.edu/product/workforce-of-the-future-initiative/.

[30] See "Managing the Future of Work," Harvard Business School, accessed April 1, 2022, available at https://www.hbs.edu/managing-the-future-of-work/about-the-project/Pages/default.aspx. The project notes that employers should partner with "policymakers, educators, and nonprofits as well as in collaboration with other companies," but not labor unions or workers. See also David, David Mindell, and Elisabeth Reynolds, "The Work of the Future: Building Better Jobs in an Age of Intelligent Machines," MIT Task Force on the Work of the Future, 2020. https://workofthefuture.mit.edu/wp-content/uploads/2021/01/2020-Final-Report4.pdf. Then AFL-CIO secretary treasurer Liz Shuler and a representative from SEIU Local 775 were on the advisory board to the MIT task force, but they were greatly outnumbered by executives from Alphabet Inc., Amazon Worldwide, Custom Rubber Corp., Esquel Group, Evercore, Ford Motor Co., IBM Corp., Liberty Mutual Insurance, Moeilis & Co., PepsiCo, Santander Group, Rethink Robotics, Robert Bosch GMBH, Toyota, and Two Sigma.

[31] "Resolution 5: Commission on the Future of Work and Unions," AFL-CIO Convention, October 24, 2017, https://aflcio.org/resolutions/resolution-5-commission-future-work-and-unions.

[32] "AFL-CIO Commission on the Future of Work and Unions," AFL-CIO, September 13, 2019, https://aflcio.org/reports/afl-cio-commission-future-work-and-unions.

[33] "AFL-CIO launches Technology Institute," AFL-CIO, press release, January 11, 2021, https://aflcio.org/press/releases/afl-cio-launches-technology-institute/.

[34] Greg Satell, "Innovative Companies Get Their Best Ideas from Academic Research—Here's How They Do It," *Harvard Business Review*, April 19, 2018, https://hbr.org/2016/04/innovative-companies-get-their-best-ideas-from-academic-research-heres-how-they-do-it.

[35] John F. Sargent Jr., "Federal Research & Development Funding: FY2022." Congressional Research Service report no. R46869, January 19, 2022, 4 and 6, https://crsreports.congress.gov/product/pdf/R/R46869.

[36] Michael Meyers, "Yes, Government Researchers Really Did Invent the Internet," *Scientific American*, July 23, 2012, https://blogs.scientificamerican.com/observations/yes-government-researchers-really-did-invent-the-internet/; Farhad Manjoo, "Obama Was Right: The Government Invented the Internet," *Slate*, July 24, 2012, https://slate.com/technology/2012/07/who-invented-the-internet-the-outrageous-conservative-claim-that-every-tech-innovation-came-from-private-enterprise.html.

[37] Janet Abbate, "How the Internet Lost Its Soul," *Washington Post*, November 1, 2019, https://www.washingtonpost.com/outlook/2019/11/01/how-internet-lost-its-soul/.

[38] Andrew Von Ah, "Broadband: Observations on Past and Ongoing Efforts to Expand Access and Improve Mapping Data," Government Accountability Office, GAO-20-535, June 2020, https://www.gao.gov/products/GAO-20-535; David Shepardson, "Commerce's Raimondo on How the U.S. Will Spend $65 Billion on Broadband," *Reuters*, November 9, 2021, https://www.reuters.com/world/us/commerces-raimondo-how-us-will-spend-65-billion-broadband-2021-11-09/.

[39] Tom Huddleston Jr., "Amazon Had to pay federal income Taxes for the First Time since 2016—Here's How Much," *CNBC*, February 4, 2020, https://www.cnbc.com/2020/02/04/amazon-had-to-pay-federal-income-taxes-for-the-first-time-since-2016.html; Chris Isadore, "Jeff Bezos Endorsed Higher Corporate Tax Rates. But It Won't Cost Him Much," *CNN*, April 10, 2021, https://www.cnn.com/2021/04/10/business/jeff-bezos-amazon-corporate-taxes/index.html

[40] Jesse Eisinger, Jeff Ernsthausen, and Paul Kiel, "The Secret IRS Files: Trove of Never-Before-Seen Records Reveal How the Wealthiest Avoid Income Tax," ProPublica, June 8, 2021, https://www.propublica.org/article/the-secret-irs-files-trove-of-never-before-seen-records-reveal-how-the-wealthiest-avoid-income-tax.

[41] Gibson. Kate. 2021. "It takes 300 worker salaries to equal the average CEO's pay, data show." *CBS News*. July 14, 2021. https://www.cbsnews.com/news/ceo-pay-300-worker-salaries-compensation/.

[42] U.S. House of Representatives, 117th Congress. America Creating Opportunities for Manufacturing, Pre-Eminence in Technology, and Economic Strength Act of 2022 (America COMPETES Act). H.R. 4521. House Rules Committee Print 117-31, January 25, 2022 at§10304(b)(2), §10305(b)(2), §10308(e)(2)(A), §10308 (h)(2)(C), https://www.congress.gov/117/bills/hr4521/BILLS-117hr4521eas.pdf; U.S. Senate, 117th Congress, U.S. Innovation and Competition Act of 2021 (USICA), June 8, 2021 at §2104(a)(4)(C), §2401(b)(1)(A), §2401(b)(2), §2404(e)(1)(B), https://www.congress.gov/117/bills/s1260/BILLS-117s1260es.pdf.

[43] U.S. Innovation and Competition Act of 2021 at §10308(c)(3) and (9).

[44] U.S. Economic Development Administration (EDA), U.S. Department of Commerce (DOC), "U.S. Department of Commerce Announces Build Back Better Regional Challenge Applicants, Shows Incredible Enthusiasm for Transformational Investment in Regions across the Country," press release, October 21, 2021, https://eda.gov/news/press-releases/2021/10/29/build-back-better-applicants.htm.

[45] EDA DOC, "Build Back Better Regional Challenge Grants Notice of Funding Opportunity," Funding Opportunity No. EDA-HDQ-ARPBBB-2021-2006976, July 22, 2021, https://eda.gov/files/arpa/build-back-better/ARPA-BBBRC-NOFO.pdf.

[46] Braden Campbell, "AFL-CIO 2nd-In-Command Discusses Labor's 'Next Frontier,'" Law 360, January 17, 2020. https://www.law360.com/articles/1235233.

[47] Richard Trumka, AFL-CIO president, "Trumka: We Will Prove We Can Use Technology for Good, Not Greed" (speech given at the Battle of Homestead Foundation, January 25, 2021), https://aflcio.org/speeches/trumka-we-will-prove-we-can-use-technology-good-not-greed.

[48] Ibid.; Liz Shuler, AFL-CIO president, "We Need a Modern Labor Movement That Brings Good Jobs," *Chicago Sun-Times,* September 16, 2021, https://chicago.suntimes.com/2021/9/16/22677636/liz-shuler-modern-labor-movement-unions.

[49] Jordan Markley, "CMU Researchers Are Helping Frontline Workers Shape the Technology That Is Shaping Their Work," *Making Possible*, Winter 2022, https://makepossible.cmu.edu/impact-stories/workforce-development/.

[50] "Transit Future of Work Research Project with Carnegie Mellon University," Transport Workers Union, March 3, 2022, https://www.twu.org/our-campaign-update/.

[51] Nikolas Martelaro et al., "How to Make Sense of Bus Transit Automation: Considerations for Policy Makers on the Future of Human-Automation Teaming in the Transit Workforce," Carnegie Mellon University Traffic 21, Spring 2022, https://www.cmu.edu/traffic21/research-and-policy-papers/traffic21-policy-brief-22.1---apr-14-002.pdf.

[52] Jonathan Vanian, "How Unions Are Pushing Back against the Rise of Workplace Technology," *Fortune*, April 30, 2019, https://fortune.com/longform/unions-workplace-technology/.

[53] National Science Foundation, Division of Information & Intelligent Systems, "Upskilling Workers and Re-Designing Workplaces for the Future of the Hospitality Industry," NSF Award abstract no. 2128954, August 24, 2021, https://www.nsf.gov/awardsearch/showAward?AWD_ID=2128954&HistoricalAwards=false.

[54] Markley, "CMU Researchers Are Helping."

[55] "Union Membership Rate Declines in 2021, Returns to 2019 Rate of 10.3 Percent," Bureau of Labor Statistics, January 25, 2022, https://www.bls.gov/opub/ted/2022/union-membership-rate-declines-in-2021-returns-to-2019-rate-of-10-3-percent.htm.

[56] "Union Election Petitions Increase 57% in the First Half of Fiscal Year 2022," National Labor Relations Board, press release, April 6, 2022, https://www.nlrb.gov/news-outreach/news-story/union-election-petitions-increase-57-in-first-half-of-fiscal-year-2022.

[57] Margaret Poydock et al., "Data Show Major Strike Activity Increased in 2021 but Remains below Pre-Pandemic Levels," Economic Policy Institute, February 23, 2022, https://www.epi.org/publication/2021-work-stoppages/; Johnnie Kallas, Leonardo Grageda, and Eli Friedman, "Labor Action Tracker Annual Report 2021." Cornell University ILR School, February 21, 2022, https://www.ilr.cornell.edu/worker-institute/blog/reports-and-publications/labor-action-tracker-annual-report-2021.

[58] Megan Brenan, "Approval of Labor Unions at Highest Point since 1965," Gallup, September 2, 2021, https://news.gallup.com/poll/354455/approval-labor-unions-highest-point-1965.aspx.

[59] Ted Van Green, "Majorities of Adults see Decline of Union Membership as Bad for the Country and Working People," Pew Research Center, February 18, 2022, https://www.pewresearch.org/fact-tank/2022/02/18/majorities-of-adults-see-decline-of-union-membership-as-bad-for-the-u-s-and-working-people/.

[60] Gerrit De Vynck, Nitasha Tiku, and Jay Greene, "Six Things to Know about the Latest Efforts to Bring Unions to Big Tech," *Washington Post*, April 30, 2021, https://www.washingtonpost.com/technology/2021/01/26/tech-unions-explainer/.

[61] Hamilton Nolan, "The Failure to Unionize the Tech Industry Will Eat the Labor Movement Alive." *In These Times*, August 26, 2020, https://inthesetimes.com/article/union-tech-industry-labor-2020.

[62] April Glaser, "Amazon Now Employs Almost a Million People in the U.S.—Or One in Every 169 Workers," *NBC News*, July 30, 2021, https://www.nbcnews.com/business/business-news/amazon-now-employs-almost-1-million-people-u-s-or-n1275539.

[63] Chris Isadore and Sara O'Brien, "Amazon and Starbucks Union Votes Are Small Wins—but Important Ones—for US Labor," *CNN*, April 13, 2022, https://www.cnn.com/2022/04/13/business/amazon-starbucks-union-votes/index.html; Annie Palmer, "Amazon Illegally Interfered in Alabama Warehouse Vote, Union Alleges," *CNBC*, April 7, 2022, https://www.cnbc.com/2022/04/07/amazon-illegally-interfered-in-alabama-warehouse-vote-union-alleges.html.

[64] Sam Harnett, "Tech Workers Organizing Is Nothing New . . . but Them Actually Forming Unions Is," *KQEQ*, June 2, 2021, https://www.kqed.org/news/11874325/tech-worker-organizing-is-nothing-new-but-actually-forming-unions-is; Bobby Allyn, "Google Workers Speak Out about Why They Formed a Union: 'To Protect Ourselves,'" *NPR*, January 8, 2021, https://www.npr.org/2021/01/08/954710407/at-google-hundreds-of-workers-formed-a-labor-union-why-to-protect-ourselves; Kate Conger, "Hundreds of Google Employees Unionize, Culminating Years of Activism," *New York Times,* January 4, 2021, https://www.nytimes.com/2021/01/04/technology/google-employees-union.html.

[65] Noam Scheiber and Karen Weise, "Microsoft Pledges Neutrality in Union Campaigns at Activision," *New York Times*, June 13, 2022, https://www.nytimes.com/2022/06/13/business/economy/microsoft-activision-union.html; Tripp Mickle and Noam Scheiber, "Apple Workers at Maryland Store Vote to Unionize, a First in the United States," *New York Times*, June 18, 2022, https://www.nytimes.com/2022/06/18/technology/apple-union-maryland.html; "Workers United, Communication Workers of America Join Forces on Apple Retail," Communication Workers of America, press release, June 8, 2022, https://cwa-union.org/news/releases/workers-united-communications-workers-of-america-join-forces-on-apple-retail.

[66] Liz Shuler, "Big Tech Organizing," *New York Times,* January 17, 2021, https://www.nytimes.com/2021/01/17/opinion/letters/lincoln-alcohol.html.

[67] "U.S. Department of Commerce Appoints 27 Members to National AI Advisory Committee," US Department of Commerce, press release, April 14, 2022, https://www.commerce.gov/news/press-releases/2022/04/us-department-commerce-appoints-27-members-national-ai-advisory.

[68] Keith Wagstaff, "As Amazon Union Vote Starts, AFL-CIO's Tech Think Tank Considers Future of Labor," *Mashable*, February 8, 2021, https://mashable.com/article/amazon-union-afl-cio-think-tank.

[69] Jonathan Vanian, "How Unions Are Pushing Back against the Rise of Workplace Technology," *Fortune*, April 30, 2019, https://fortune.com/longform/unions-workplace-technology/; Regina Garcia Cano, "Unionized MGM Workers in Las Vegas Ratify Contract," Associated Press, June 19, 2018; https://apnews.com/article/cd3f3d9ab6244b1e877cb0178aae8ce1; "Las Vegas Union, MGM Reach Tentative Deal for a New Contract," *CNBC*, June 4, 2018, https://www.cnbc.com/2018/06/04/las-vegas-union-mgm-resorts-reach-a-tentative-deal-for-a-new-labor-contract.html.

[70] Devin O'Connor, "MGM Resorts Might Replace Certain Jobs with Automated Technologies," Casino.org, March 6, 2019, https://www.casino.org/news/mgm-resorts-ruffles-union-feathers-with-job-cuts-automated-services/.