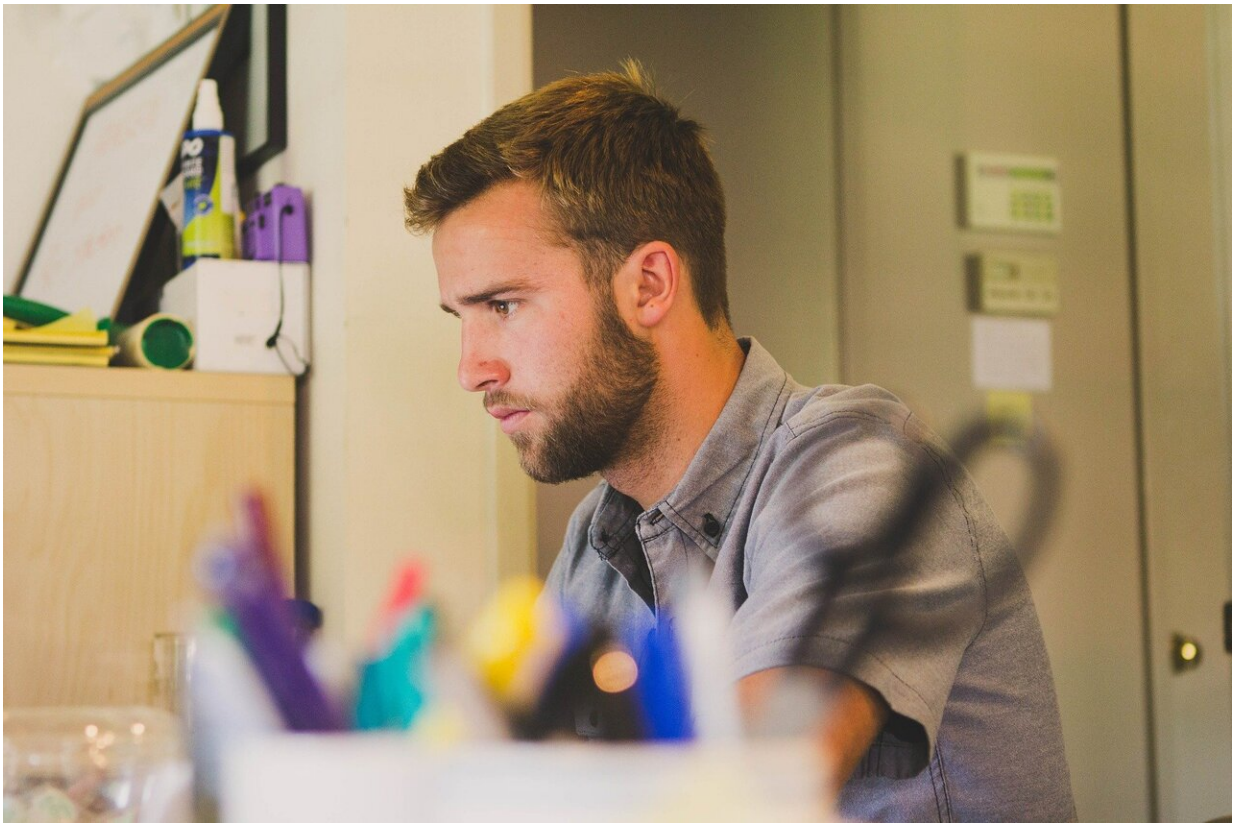


Report outlines route toward better jobs, wider prosperity

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Decades of technological change have polarized the earnings of the American workforce, helping highly educated white-collar workers thrive, while hollowing out the middle class. Yet present-day advances

like robots and artificial intelligence do not spell doom for middle-tier or lower-wage workers, since innovations create jobs as well. With better policies in place, more people could enjoy good careers even as new tech transforms workplaces.

That's the conclusion of the final report from MIT's Task Force on the Work of the Future, which summarizes over two years of research on technology and jobs. The report, "The Work of the Future: Building Better Jobs in an Age of Intelligent Machines," has been released today, and the [task force](#) is hosting an online conference on Wednesday, the "AI & the Future of Work Congress."

At the core of the task force's findings: A robot-driven jobs apocalypse is not on the immediate horizon. As technology takes jobs away, it provides new opportunities; about 63 percent of jobs performed in 2018 did not exist in 1940. Rather than a robot revolution in the workplace, we are witnessing a gradual tech evolution. At issue is how to improve the quality of jobs, particularly for middle- and lower-wage workers, and ensure there is greater shared prosperity than the U.S. has seen for decades.

"The sky is not falling, but it is slowly lowering," says David Autor, the Ford Professor of Economics at MIT, associate head of MIT's Department of Economics, and a co-chair of the task force. "We need to respond. The world is gradually changing in very important ways, and if we just keep going in the direction we're going, it is going to produce bad outcomes."

That starts with a realistic understanding of technological change, say the task force leaders.

The task force aimed "to move past the hype about what [technologies] might be here, and now we're looking at what can we feasibly do to

move things forward for workers," says Elisabeth Beck Reynolds, executive director of the task force as well as executive director of the MIT Industrial Performance Center. "We looked across a range of industries and examined the numerous factors—social, cognitive, organizational, economic—that shape how firms adopt technology."

"We want to inject into the public discourse a more nuanced way of talking about technology and work," adds David Mindell, task force co-chair, professor of aeronautics and astronautics, and the Dibner Professor of the History of Engineering and Manufacturing at MIT. "It's not that the robots are coming tomorrow and there's nothing we can do about it. Technology is an aggregate of human choices."

The report also addresses why Americans may be concerned about work and the future. It states: "Where innovation fails to drive opportunity, it generates a palpable fear of the future: the suspicion that technological progress will make the country wealthier while threatening the people's livelihoods. This fear exacts a high price: political and regional divisions, distrust of institutions, and mistrust of innovation itself. The last four decades of economic history give credence to that fear."

"Automation is transforming our work, our lives, our society," says MIT President L. Rafael Reif, who initiated the formation of the task force in 2017. "Fortunately, the harsh societal consequences that concern us all are not inevitable. How we design tomorrow's technologies, and the policies and practices we build around them will profoundly shape their impact."

Reif adds: "Getting this right is among the most important and inspiring challenges of our time—and it should be a priority for everyone who hopes to enjoy the benefits of a society that's healthy and stable, because it offers opportunity for all."

Six big conclusions

The task force, an Institute-wide group of scholars and researchers, spent over two years studying work and technology in depth. The final report presents six overarching conclusions and a set of policy recommendations. The conclusions:

1) Technological change is simultaneously replacing existing work and creating new work. It is not eliminating work altogether.

Over the last several decades, technology has significantly changed many workplaces, especially through digitization and automation, which have replaced clerical, administrative, and assembly-line workers across the country. But the overall percentage of adults in paid employment has largely risen for over a century. In theory, the report states, there is "no intrinsic conflict between technological change, full employment, and rising earnings."

In practice, however, technology has polarized the economy. White-collar workers—in medicine, marketing, design, research, and more—have become more productive and richer, while middle-tier workers have lost out. Meanwhile, there has been growth in lower-paying service-industry jobs where digitization has little impact—such as food services, janitors, and drivers. Since 1978, aggregate U.S. productivity has risen by 66 percent, while compensation for production and nonsupervisory workers has risen by only 10 percent. Wage gaps also exist by race and gender, and cities do not provide the "escalator" to the middle class they once did.

While innovations have replaced many receptionists, clerks, and assembly-line workers, they have simultaneously created new occupations. Since the middle of the 20th century, the U.S. has seen major growth in the computer industry, renewable energy, medical

specialties, and many areas of design, engineering, marketing, and health care. These industries can support many middle-income jobs as well—while the services sector keeps growing.

As the task force leaders state in the report, "The dynamic interplay among task automation, innovation, and new work creation, while always disruptive, is a primary wellspring of rising productivity. Innovation improves the quantity, quality, and variety of work that a worker can accomplish in a given time. This rising productivity, in turn, enables improving living standards and the flourishing of human endeavors."

However, a bit ruefully, the authors also note that "in what should be a virtuous cycle, rising productivity provides society with the resources to invest in those whose livelihoods are disrupted by the changing structure of work."

But this has not come to pass, as the distribution of value from these jobs has been lopsided. In the U.S., lower-skill jobs only pay 79 percent as much as compared to Canada, 74 percent compared to the U.K., and 57 percent compared to Germany.

"People understand that automation can make the country richer and make them poorer, and that they're not sharing in those gains," Autor says. "We think that can be fixed."

2) Momentous impacts of technological change are unfolding gradually.

Time and again, media coverage about technology and jobs focuses on dramatic scenarios in which robots usurp people, and we face a future without work.

But this picture elides a basic point: Technologies mimicking human actions are difficult to build, and expensive. It is generally cheaper to

simply hire people for those tasks. On the other hand, technologies that augment human abilities—like tools that let doctors make diagnoses—help those workers become more productive. Apart from clerical and assembly-line jobs, many technologies exist in concert with workers, not as a substitute for them.

Thus workplace technology usually involves "augmentation tasks more than a replacement tasks," Mindell says. The task force report surveys technology adoption in industries including insurance, health care, manufacturing, and autonomous vehicles, finding growth in "narrow" AI systems that complement workers. Meanwhile, technologists are working on difficult problems like better robotic dexterity, which could lead to more direct replacement of workers, but such advances at a high level are further off in the future.

"That's what technological adoption looks like," Mindell says. "It's uneven, it's lumpy, it goes in fits and starts." The key question is how innovators at MIT and elsewhere can shape new technology to broad social benefit.

3) Rising labor productivity has not translated into broad increases in incomes because societal institutions and labor market policies have fallen into disrepair.

While the U.S. has witnessed a lot of technological innovation in recent decades, it has not seen as much policy innovation, particularly on behalf of workers. The polarizing effects of technology on jobs would be lessened if middle- and lower-income workers had relatively better support in other ways. Instead, in terms of pay, working environment, termination notice time, paid vacation time, sick time, and family leave, "less-educated and low-paid U.S. workers fare worse than comparable workers in other wealthy industrialized nations," the report notes. The adjusted gross hourly earnings of lower-skill workers in the U.S. in 2015

averaged \$10.33, compared to \$24.28 in Denmark, \$18.18 in Germany, and \$17.61 in Australia.

"It's untenable that the labor market has this growing gulf without shared prosperity," Autor says. "We need to restore the synergy between rising productivity and improvements in labor market opportunity." He adds: "We've had real institutional failure, and it's within our hands to change it. ... That includes worker voice, minimum wages, portable benefits, and incentives that cause companies to invest in workers."

Looking ahead, the report cautions, "If those technologies deploy into the labor institutions of today, which were designed for the last century, we will see similar effects to recent decades: downward pressure on wages, skills, and benefits, and an increasingly bifurcated labor market." The task force argues instead for institutional innovations that complement technological change.

4) Improving the quality of jobs requires innovation in labor market institutions.

The task force contends the U.S. needs to modernize labor policies on several fronts, including restoring the federal minimum wage to a reasonable percentage of the national median wage and, crucially, indexing it to inflation.

The report also suggests upgrading unemployment insurance in several ways, including: using very recent earnings to determine eligibility or linking eligibility to hours worked, not earnings; making it easier to receive partial benefits in case of events like loss of a second job; and dropping the requirement that people need to seek full-time work to receive benefits, since so many people hold part-time positions.

The report also observes that U.S. collective bargaining law and

processes are antiquated. The authors argue that workers need better protection of their current collective bargaining rights; new forms of workplace representation beyond traditional unions; and legal protections allowing groups to organize that include home-care workers, farmworkers, and independent contractors.

5) Fostering opportunity and economic mobility necessitates cultivating and refreshing [worker](#) skills.

Technological advancement may often be incremental, but changes happen often enough that workers' skills and career paths can become obsolete. The report emphasizes that U.S. workers need more opportunities to add new skills—whether through the community college system, online education, company-based retraining, or other means.

The report calls for making ongoing skills development accessible, engaging, and cost-effective. This requires buttressing what already works, while advancing new tools: blended online and in-person offerings, machine-supervised learning, and augmented and virtual reality learning environments.

The greatest needs are among workers without four-year college degrees. "We need to focus on those who are between high school and the four-year degree," Reynolds says. "There should be pathways for those people to increase their skill set and make it meaningful to the labor market. We really need a shift that makes this a high priority."

6) Investing in innovation will drive new job creation, speed growth, and meet rising competitive challenges.

The rate of new-job creation over the last century is heavily driven by technological innovation, the report notes, with a considerable portion of that stemming from federal investment in R&D, which has helped

produce many forms of computing and medical advances, among other things. As of 2015, the U.S. invested 2.7 percent of its GDP in R&D, compared to 2.9 percent in Germany and 2.1 percent in China. But the public share of that R&D investment has fallen from 40 percent in 1985 to 25 percent in 2015. The task force calls for a recommitment to this federal support.

"Innovation has a key role in job creation and growth," Autor says.

Given the significance of innovation to job and wealth creation, the report calls increased overall federal research funding; targeted assistance that helps small- and medium-sized businesses adopt technology; policies creating a wider geographical spread of innovation in the U.S.; and policies that enhance investment in workers, not just capital, including the elimination of accelerated capital depreciation claims, and an employer training tax credit that functions like the R&D tax credit.

Global issues, U.S. suggestions

In addition to Reynolds, Autor, and Mindell, MIT's Task Force on the Work of the Future consisted of a group of 18 MIT professors representing all five Institute schools and the MIT Schwarzman College of Computing; a 22-person advisory board drawn from the ranks of industry leaders, former government officials, and academia; a 14-person research board of scholars; and over 20 graduate students. The task force also consulted with business executives, labor leaders, and community college leaders, among others. The final document includes case studies from specific firms and sectors as well, and the Task Force is publishing nearly two dozen research briefs that go into the primary research in more detail.

The task force observed global patterns at play in the way technology is

adopted and diffused through the workplace, although its recommendations are focused on U.S. policy issues.

"While our report is very geared toward the U.S. in policy terms, it clearly is speaking to a lot of trends and issues that exist globally," Reynolds said. "The message is not just for the U.S. Many of the challenges we outline are found in other countries too, albeit to lesser degrees. As we wrote in the report, 'the central challenge ahead, indeed the work of the future, is to advance labor market opportunity to meet, complement, and shape technological innovations.'"

The task force intends to circulate ideas from the report among policymakers and politicians, corporate leaders and other business managers, and researchers, as well as anyone with an interest in the condition of work in the 21st century.

"I hope people are receptive," Reynolds adds. "We have made forceful recommendations that tie together different policy areas—skills, job quality, and innovation. These issues are critical, particularly as we think about recovery and rebuilding in the age of COVID-19. I hope our message will be picked up by both the public sector and private sector leaders, because both of those are essential to forge the path forward."

More information: The Work of the Future: Building Better Jobs in an Age of Intelligent Machines: [workofthefuture.mit.edu/wp-con ... 020-Final-Report.pdf](https://workofthefuture.mit.edu/wp-content/uploads/2020/02/20-Final-Report.pdf)

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