



The End of Work

The “end of work” has been a regular topic of discussion since the mid-1990s, sparking concern and even speculation about dystopian scenarios in which a large portion of the population is unemployable, aimless and destitute, replaced in every facet of life by some combination of robots and artificial intelligence (AI).

Automation has been changing the workforce for decades. Advances in robotics and AI have widened the scope of change and there are widely divergent predictions about how that will impact various sectors and occupations.¹ Nevertheless, there is a consensus that occupations held by lower-earning and lower-skilled individuals are the most vulnerable to automation. This should inform how we prepare the workforce today because it is clear that workers at all levels will need to be more adaptable as workplaces automate.²

The continuing integration of automation into workplaces is as likely to be an evolution of work as it is to be the “end of work.” As with previous industrial revolutions, in the automation revolution, the rates of adopting new technologies is uneven. They vary according to local and sectoral economic conditions, particularly labor market conditions, and the development of new solutions. Most importantly, the rate and manner of adoption are shaped by public policy, including but not limited to incentives, regulations, and workforce development programs.³

Experts predict automation will replace human workers doing anything from routine tasks like assembling hamburgers or reading reports to more complex, less routine tasks like performing surgery.^{4,5} This will undoubtedly displace workers but the extent and duration of displacement is unclear. In prior waves of technological innovation, more new jobs were created as people leveraged new technology to do new things than were destroyed, though this wave has the potential to be more disruptive than prior waves. Also, even with the most aggressive development and adoption of automation, there are some things that only humans can do, or at least, that only humans *should* do.^{4,6}

It is important to clarify what the forces are behind the “end of work”: automation, robotics, and artificial intelligence (AI). Automation is the umbrella term and simply means the moving from human-driven work to work done by machines. At one end of the spectrum is artificial intelligence (AI), which is automating cognition or decision-making. At the other end of the spectrum is robotics, which is automating physical labor.

1. Winick, Erin (2018). Every study we could find on what automation will do to jobs, in one chart. *MIT Technology Review*. <https://www.technologyreview.com/s/610005/every-study-we-could-find-on-what-automation-will-do-to-jobs-in-one-chart/>

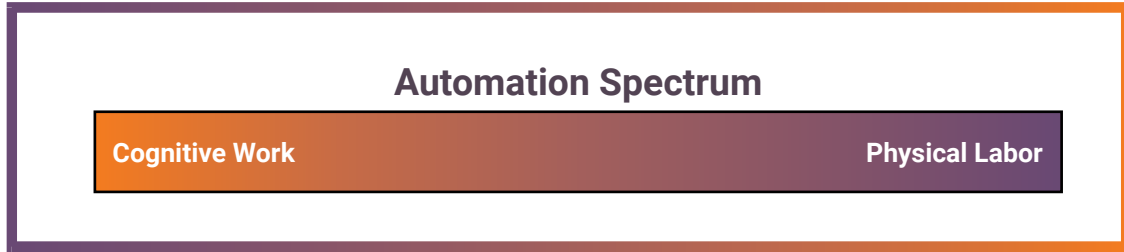
2. Rosen, Ellen (2018, Sept 11). Teaming up to get workers ready for technology of the future. *The New York Times*, F7. <https://www.nytimes.com/2018/09/11/business/training-tech-workers-for-future.html?action=click&module=RelatedCoverage&pgtype=Article®ion=Footer>

3. Viscelli, Steve (2018). Driverless? Autonomous truckers and the future of the American trucker. A report from the UC Berkeley Center for Labor Research and Education and Working Partnerships, USA. <http://laborcenter.berkeley.edu/driverless/>

4. Anderson, Jana & Lee Rainier (2018). Artificial intelligence and the future of humans. Pew Research Center Internet & Technology. <http://www.pewinternet.org/2018/12/10/artificial-intelligence-and-the-future-of-humans/>

5. Etzioni, Amitai & Oren Etzioni (2017). Should artificial intelligence be regulated? *Issues in Science and Technology* (33), 4. <https://issues.org/perspective-should-artificial-intelligence-be-regulated/>

6. Broussard, Meredith (2018). *Artificial Unintelligence*. Boston: MIT Press.



Automation through robotics has been underway for many years and has already displaced workers.⁷ This process will continue and expand as robotics and AI get more sophisticated and decrease in price. However, in the past 60 years, only one occupation has been entirely eliminated by automation: elevator operators.⁸ Instead of being completely eliminated, occupations have been partially automated. Partial automation has often realigned workers' tasks, with workers doing some components of the work and machines doing others, but it may also involve collaborative robots (cobots) working with humans rather than replacing them. Robot-assisted work has lower up-front costs and takes less time to implement than full automation while still improving accuracy and productivity.⁹

The impact of partial-automation of an occupation varies. Increasing productivity can reduce the number of positions as fewer workers are needed to do the same amount of work. Or it may allow for the expansion of the work and maintain or increase the number of positions.⁸

The McKinsey Global Institute estimates that 50% of work activities across all occupations are technically automatable and that 60% of occupations are more than 30% automatable.¹⁰ The OECD, however, suggests that there are bigger barriers to full adoption of automation including the current capabilities of automation. The OECD study estimates 38% of occupational tasks are automatable. It estimates that 9% of individuals work in occupations that are 70% automatable and face a high risk of losing their jobs to automation.¹¹

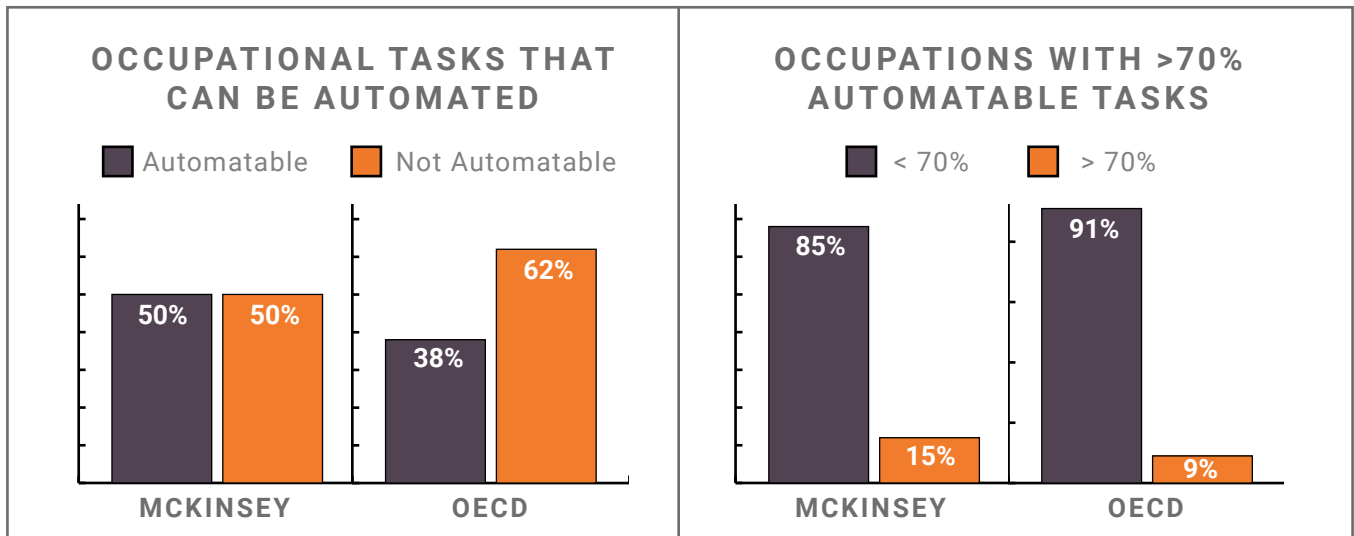
7. Rainie, Lee & Janna Anderson. (2017). The future of jobs and job training. Pew Research Center. <http://www.pewinternet.org/2017/05/03/the-future-of-jobs-and-jobs-training/>

8. Bessen, James (2016). How computer automation affects occupations: Technology, jobs, and skills. Boston University School of Law's Law & Economics Working Paper No. 15-49 <http://www.bu.edu/law/faculty-scholarship/working-paper-series/>

9. Elejalde-Ruiz, Alexia (2018). Manufacturers adopt robots that help human workers, not replace them. *The Seattle Times*. <https://www.seattletimes.com/business/manufacturers-adopt-robots-that-help-human-workers-not-replace-them/>

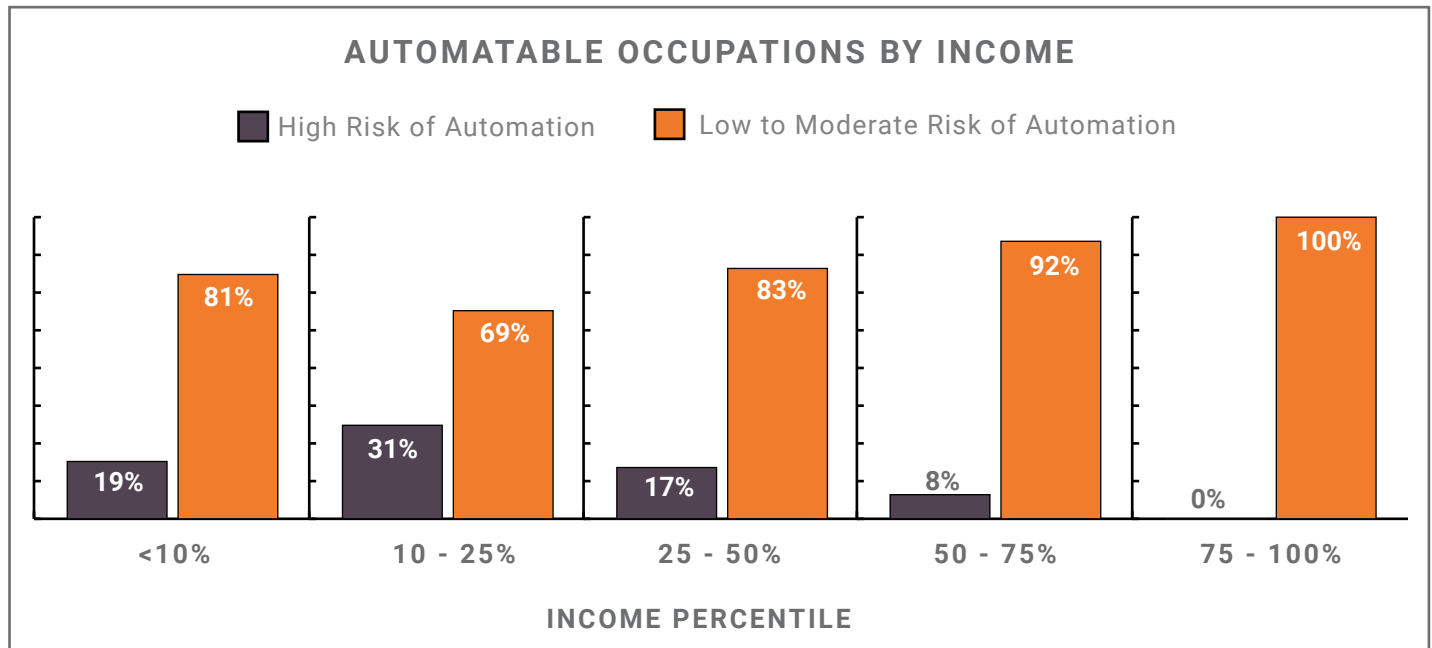
10. Manyika, James, Susan Lund, Michael Chui, Jacques Bughin, Jonathan Woetzel, Parul Batra, Ryan Ko, & Saurabh Sanghvi (2017). Jobs lost, jobs gained: Workforce transitions in a time of automation. McKinsey Global Institute. <https://www.mckinsey.com/mgi/overview/2017-in-review/automation-and-the-future-of-work/jobs-lost-jobs-gained-workforce-transitions-in-a-time-of-automation>

11. Arntz, M., T. Gregory and U. Zierahn (2016). "The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis," OECD Social, Employment and Migration Working Papers, No. 189, OECD Publishing, Paris, <https://doi.org/10.1787/5jjz9h56dvq7-en>



The reasons for these and other discrepancies are that there is no agreement on what constitutes “automatable.” For example, one expert explains that a physician’s job is more automatable than a nurse’s job¹² while another study asserts on a task-by-task basis, 29% of the registered nurse’s occupation can be automated while only 23% of a doctor’s or surgeon’s job can be.⁹

Rates of automatability also vary substantially across sectors and income brackets. In the US, for example, the OECD estimates that, in the near term, 19% of individuals in the bottom 10% of income earners and 31% of those in 10th to 25th percentiles are at high risk of their job being automated compared to 0% of those in the 75th percentile and above.¹¹



12. Khosla, Vinod <http://fortune.com/2012/12/04/technology-will-replace-80-of-what-doctors-do/>

Recommendations for Employers & Policymakers

Prioritize upskilling and retraining. While experts anticipate that automation will displace workers at an increasing pace, there are already critical shortages of skilled labor in multiple sectors. The changing nature of work will exacerbate that. In some sectors, a substantial portion of the skills that will be needed are not yet required in those industries. There is consensus that current post-secondary education and training is not preparing students well for the changing workforce.^{6,13}

The most promising efforts to reskill and retrain are collaborations between industry, higher education institutions, and the public sector. They focus on continuous learning and soft skills, particularly those used to collaborate. These programs need to reach both displaced workers and employed workers who need to stay current on their skills.⁶

Strengthen and expand the safety net. Even the best-case scenarios for the expansion of automation include substantial worker displacement. It is imperative that people have access to adequate resources during this transition. There are many policies on the table from rebuilding existing safety net programs to implementing a universal basic income, a negative income tax, and a jobs guarantee in addition to well-funded reskilling and upskilling programs.¹⁴

Develop industry-specific policies and strategies. Automation and its impact vary across sectors and there are few one-size-fits-all policies. Industry leaders, workers, and policymakers need to collaborate to develop industry-specific policies and programs that promote socially beneficial innovation, develop good career pathways, and protect workers, supporting them during transitions.¹

13. The Future of jobs: Employment, skills and workforce strategy for the fourth industrial revolution. (2016). World Economic Forum. http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf

14. Nicolaci, Pedro da Costa (2017). Robots are going to take a lot of jobs – here's what we could do about it. Business Insiders. <https://www.businessinsider.com/policy-responses-to-automation-and-robots-taking-jobs-2017-4>

Beyond the Headlines

Policy and labor market updates for those working to help low-income and low-skill individuals advance through education, training and living-wage jobs

About Seattle Jobs Initiative

Seattle Jobs Initiative creates opportunities for students, workers and business to succeed by helping education and job training programs meet the demands of a new economy. We find and apply solutions for people to gain the skills they need for good jobs that create prosperity for all in today's marketplace.

Supported by the City of Seattle Office of Economic Development

Contact Information

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