

note that “retraining workers to work with the support of AI will be important to future economic success” (Ryan et al., 2018, p. 15)

Working with Data

Alec Ross, author of *Industries of the Future*, provides an historical perspective of the workplace. He describes land as the raw materials of the agricultural age, followed by iron in the industrial age, and data in the information age. He posits that whoever owns, controls, and/or can harvest meaning from data will define the future workplace. Ross (2016) emphasizes the sheer quantity of data being produced in recent history and the opportunity for data analytics to mine those data. For example, he notes that “90 percent of the world’s digital data has been generated over the last two years” (page 154). He opines that the sum of “all data from paintings on cave walls through 2003, we now produce every two days” (Ross, 2017).

PwC issued a report on the workforce of the future, using findings from a survey of 10,000 people in China, India, Germany, the United Kingdom, and the United States on how they think the workplace will evolve. From the survey findings, the authors developed four “Worlds of Work” for 2030 to describe hypothetical future scenarios defined along two continuums: collectivism and fragmentation. Authors concluded the increasing use of digital platforms and AI mean data are key. With augmented intelligence, humans and machines collaborate to make decisions. Uniquely human traits of emotional intelligence, creativity, persuasion, and innovation become more valuable. Adaptability will become increasingly important as work changes (PwC, 2017).

Human-Technology Interactions

Not only are data produced and stored at astounding rates, but individual access to such data through technology is expanding. Ross (2017) asserted that 20 billion networked devices were in circulation in 2017. He projected this number will reach 45 billion in 2020. This growth will likely not produce a steady expansion across all markets, but rather result in bursts of growth in traditional areas that have not been as impacted by the digital economy, such as transportation or mining.

PwC’s Annual Global CEO Survey predicts that businesses will initiate upskilling initiatives to teach employees the skills they need to augment their own work with the support of technology. The authors contend that companies will infuse AI into all aspects of their business, not just technology-related areas (Ryan et al., 2018).

New Technology Jobs

Technology jobs such as software engineers are on the rise, but two other trends may result in new technology jobs. First, the blending of AI technology with a human component, or augmented intelligence, may open opportunities for technology-enhanced versions of jobs that are available today (PwC, 2017).

Second, Ross (2016) points out an increasingly popular conviction that the opportunities of the future will no longer rigidly distinguish technical fields from liberal arts or humanities. He suggests hybrid studies will become more prevalent, such as a combination historian/electrical engineer or political scientist/computer scientist. He describes the thinking of Toomas Ives, President of Estonia: “...domains previously occupied only by people with backgrounds in the liberal arts, like government, will become increasingly occupied by people with more background knowledge in science and technology” (page 246).

Impact of Artificial Intelligence

Types of Artificial Intelligence

Although people may mean different things when they refer to artificial intelligence (AI), they generally mean the use of computers to perform tasks that require cognition and learning without programming the steps of the task. Often, AI is used to refer to machine learning, “where computers are taught or self learn how to recognize things” (Shaw, 2017). Bughin et al. (2017) describe other types of AI, including computer vision, autonomous vehicles, natural language, smart robotics, and virtual agents.

Machine learning is intensive, for the humans who must provide the “training data” and for the computer to process the information. Shaw notes that machine learning has many applications, such as predicting nefarious behavior or mechanical breakdown and identifying possible disease in 3D radiology images. Research is underway to explore the use of AI to make machine learning more efficient and accurate.

Shaw expects computer vision, using cameras to infer what they are seeing, to become the most prevalent type of sensor. Computer vision will be integral for self-driving cars and other autonomous vehicles such as self-driving trucks, buses, trains, and ships. Autonomous flying drones, which may be used for package delivery or to aid in aerial search and rescue, also will benefit from computer vision.

Natural language processors are familiar to many as they ask Siri for directions or to settle a debate. Smart home devices such as Google Home or Alexa are natural language processors. Once these devices understand what a person has said or written, Shaw states that a virtual agent is the next step. The virtual agent can help the human, provide financial advice, perform basic health diagnosis, or guide an individual through steps of an activity or job. Smart robotics are in use today, especially in manufacturing. Shaw expects robotics to become more prevalent in medicine, cleaning, stocking, agriculture, and food service in the future.

Machine learning is but one way of many to categorize AI. Hintze (2016) defines AI using a hierarchy from type I-reactive machines (e.g., Deep Blue, IBM’s chess supercomputer) to type II-limited memory (e.g., self-driving cars monitor information over time) to type III-theory of mind (e.g., understanding that thoughts and emotions affect behavior) to type IV-self-awareness (e.g., being aware of oneself).

New Artificial Intelligence Jobs

Research continues to advance AI (Bughin et al., 2017; Hintze, 2016; Shaw, 2017), with the implication that jobs developing and studying AI will continue to grow as the technology is incorporated into more daily life routines. Research firm Gartner, as cited in Singh (2017), predicts by 2020 more jobs will be created by the expansion of AI than will be lost. They estimate, that although AI will be responsible for the loss of 1.8 million jobs between 2018 and 2020, AI will create 2.3 million jobs. Healthcare, the public sector, and education will lead the way in incorporating AI into their sectors.

Increasing use of digital platforms and AI mean data will be key to creating new AI jobs (PwC, 2017). With augmented intelligence, humans and machines must collaborate to make decisions. Singh (2017) expects one in five workers will rely on AI to assist them in their jobs by 2022. It will be important for people to learn to work with and alongside AI machines.

Impact of Social Changes

Globalization

Globalization refers to the increasing interconnectedness of the world, both economically and politically. Along with automation, globalization is viewed as one of the main factors shaping the future workforce (Bernstein, 2016; Simon, 2016).

Companies operating on an international scale may have financial incentive to move jobs from the U.S. to other countries. This has been demonstrated historically through the loss of low-skilled manufacturing jobs due to offshoring (Hatzichronoglou, 2005). Today, higher skilled jobs also run the risk of offshoring, including computer-oriented science, technology, engineering, and mathematics (STEM) jobs (Lim, 2016).

Technological advances are closely linked with globalization's impacts on the workforce. "Labor-linking" technology allows geographically dispersed people to vie for the same job, creating a competitive environment that could potentially drive wages down (Basu, 2016). However, there remain numerous higher-skilled jobs that are less subject to this threat, particularly those in healthcare and service industries that require face-to-face interactions (Blinder, 2007).

The potential for interaction with clients, customers, and coworkers from across the globe has implications for the skills that are valuable as well as valued. For example, employees may find it easier to negotiate the workplace when they have the skills needed to communicate effectively with geographically dispersed people from a range of sociocultural backgrounds. Employers are increasingly recognizing the value of cultural competence and communication skills among new hires (Vozza, 2016), especially when those skills are needed to perform future jobs that involve interaction on a global scale.

Environmental Sustainability

Environmental policies have long been linked to the reduction of jobs in specific industries (e.g., coal), though a causal link is up for debate (Morgenstern, Pizer, and Shih, 2001). The availability of jobs in such industries in the U.S. may in fact be limited by a decreased demand for fossil fuels that has resulted from advances in energy efficiency technology (Magill, 2017). Regardless of the mechanism at work, there is reason to believe the jobs of the future will continue to be shaped by both policy and consumer behavior related to environmental sustainability.

Beyond contributing to the obsolescence of some jobs, the focus on environmental sustainability continues to create new jobs and to change jobs that currently exist. Job opportunities for innovation related to environmental sustainability may increase as individuals and corporations alike seek to reduce energy consumption and waste (Bakhshi, Downing, Osborne, & Schneider, 2017). Companies that are changing practices to reduce their environmental footprint may create jobs for "sustainability professionals" who will take on the role of managing company resources (Hamilton, 2012). The National Center for O*NET Development has identified green economic sectors, green increased demand occupations, green enhanced skills occupations, and green new and emerging (N&E) occupations, many of which will likely boast increased job opportunities in coming years. Green enhanced skill jobs are those in the existing occupation that require significant changes due to the impact of the increased focus on environmental sustainability (O*NET, 2018).

Demographic and Population Patterns

As of 2016, foreign-born workers constituted nearly 17% of the U.S. labor force (Bureau of Labor Statistics, 2017). By 2060, approximately 20% of the total national population is expected to be foreign-born (Colby & Ortman, 2015). Some raise concerns about the potential loss of jobs by American-born workers to immigrants (Hoban, 2017). Others argue the rising immigrant population will increase opportunities for U.S.-born workers, as immigrants frequently perform low-skilled jobs that are complementary to, and increase the productivity of, work performed by other Americans (Greenstone & Looney, 2012). However, many immigrants also hold advanced degrees, particularly in STEM fields (Solis, 2011), and could therefore play a crucial role in meeting the demand for highly skilled workers.

As working Baby Boomers draw closer to retirement age, there is concern over the loss of the knowledge and skills of the overall labor pool (Burke & Ng, 2006). Globally, the ratio of non-working age people to working age people appears to be on the rise (Bakhshi, Downing, Osborne, & Schneider, 2017). This trend may be counterbalanced by policy changes that raise retirement ages or provide incentives for older workers to remain on the job (Lerman & Schmidt, 1999).

The overall aging of the population has implications for available jobs. Jobs in healthcare and the production of goods and services targeting the needs of older citizens are on the rise (Singh, 2015). However, the influx of highly-educated Millennials into the workforce has its own implications. These workers are anticipated to bring a new set of expectations of their employers, including demands for improved working conditions and human resources policies (National Academies of Sciences, Engineering, and Medicine, 2017). At the same time, there is rising concern regarding this full subpopulation's preparedness with the skills required in the ever-changing world of work (KRC Research, 2014).

Education and Training

It has been estimated that most children entering primary schools today will work in job types and roles that don't yet exist and that will be characterized by the need for not only technological, but also social and analytical skills (World Economic Forum, 2016). It is anticipated workers of the future will hold an increasing number of jobs over their lifetime (Pompa, 2015). These factors, coupled with increasingly rapid technological change, will necessitate a continuous process of education and training throughout these future workers' careers (Károly & Panis, 2004). This suggests the need for consideration of both the education and training offered to students prior to their entry into the paid labor force, as well as how systems for continued education and training will be implemented and sustained.

Numerous innovative approaches to preparing students with the in-demand middle level skills needed to perform jobs of the future are expanding in their implementation. Career and technical education (CTE) programs, apprenticeships, early college high schools, and career academies are among the approaches that seek to bolster the skill levels of Americans entering the workforce for the first time (Joint Economic Committee Democrats, 2018). On-the-job training (OJT) models are another innovative approach that provides incentives to employers to hire lower-skilled workers and offer them targeted training while they engage in paid labor, as well as offer continued training to allow for career advancement (Kobes, 2013).

Equity Issues

Many anticipate the trends of globalization and automation will lead to increasing inequality, as wages for highly skilled workers rise while low- and unskilled workers will compete with both automation and workers located in other countries (The [Foundation for Young Australians](#),

2017). Other areas of concern regarding equity in the workplace relate to gender and age. Women who seek to both parent and work continue to face potential wage reductions and loss of skill development when they take time off for family leave (O'Marah, 2018). Some anticipate women will be disproportionately impacted by job losses due to automation (Hayasaki, 2017). Aging workers may face threats to their continued employment over issues related to healthcare costs and age-related disabilities (National Bureau of Economic Research, 2018).

New Social-Oriented Jobs

Futurists envision new positions will be created to do work that has never been done before. Most of these jobs will develop in response to shifts in the marketplace or they will be created because of advancing technologies. Envisioned jobs include those that harness the power of social media to create tailored experiences for customers or clients (Wagner, 2010). With more companies using social media to connect with customers and to expand their presence in the market, employees' experience with and understanding of social media will be increasingly valued by employers (Kumar, Bezawada, Rishika, Janakiraman, & Kannan, 2016). Companies and organizations will need to monitor, maintain, and improve their online presence, and new positions will likely be created for that purpose (University of Kent, 2018).

Workplace of the Future

When examining the workplace of the future, Frey and Osborne (2013) convened human experts in machine learning to classify a subset of jobs according to the likelihood of their "automatability." Through analysis of O*NET variables as proxies for three irreplaceable attributes (i.e., perception and manipulation, creative intelligence, and social intelligence) they developed a model to predict the automatability of the full set of O*NET occupations. Results indicated that 47 percent of U.S. employment can be classified as high risk for automation within the next decade or so.

The Guardian's Workplace Benefits Study (2017) defines four top trends impacting the workforce in 2018 and beyond. Each of these trends is related to technology:

- Technology is enabling an on-demand workforce;
- Automation is requiring an enhancement of workforce skillsets;
- Employers are reinventing talent recruitment; and
- Varying workplace demographics require different strategies for adoption.

Workplace Culture

Agile Workforce

As organizations are required to respond quickly to changes in an increasingly globalized and technologically advanced world, they seek an agile workforce that is similarly capable of responding to unanticipated change with speed and flexibility (Breu, Hemingway, Strathern & Bridger, 2001). Workers of the future may be expected to rotate among a variety of roles and tasks, as employers seek to find the skills needed for a specific task at a particular time (Wadors, 2018). As companies leverage a variety of work models (e.g., ad hoc teams, crowdsourcing, independent contractors) to meet their needs, workers may find themselves entering into many different types of nontraditional work arrangements (Green, 2014). Andrew,

Ip, and Worthington (2014) expect an increase in distributed work places. Continual reskilling will be a key element in sustaining high levels of agility (Lyons, Blitz, & Whittall, 2017).

Less Structure and Predictability

Careers have been traditionally viewed as a progression of jobs, often upward through a predictable, hierarchical structure (Lyons, Schweitzer, & Ng, 2014). Careers of the future will likely unfold in less hierarchically structured environments, where there will be increased interconnectedness among departments and where individuals may assume different job roles depending on the context of the work at hand (Heerwagen, 2016). Job tasks themselves are expected to be less structured and predictable as new technologies replace once rote and predictable duties with ones that require abstract thinking and flexibility (National Academies of Sciences, Engineering, and Medicine, 2017).

Sharing Economy

More and more, modern day consumers and workers engage in short-term economic transactions around services that involve sharing some material good (e.g., car, living space) or skill for monetary compensation (Sundararajan, 2016). Also referred to as the gig economy, platform economy, access economy, or collaborative consumption, this sharing economy is anticipated to increase exponentially over the coming decades (Yaraghi & Ravi, 2016). Such work arrangements have both potential positive and negative consequences for workers of the future. It can be argued that individuals will be empowered by the sharing economy to go into business for themselves and gain returns on their assets. On the other hand, the sharing economy removes protections that workers have enjoyed under more traditional work arrangements (Lamberton & Rose, 2012).

Continuous Learning

McKinsey & Company (2017) recommend that workers of the future be prepared to be lifelong learners. McKinsey Global Institute (MGI) partner Susan Lund explained, “For young people today, what’s clear is that they’re going to need to continue to learn throughout their lifetime. The idea that you get an education when you’re young and then you stop and you go and work for 40 or 50 years with that educational training and that’s it—that’s over. All of us are going to have to continue to adapt, get new skills, and possibly go back for different types of training and credentials. What’s very clear is that what our kids need to do is learn how to learn and become very flexible and adaptable.”

Guardian (2017) recommends that employers address the need for continuous learning through experiential, retraining, and cross-training programs, as well as mentoring, e-learning opportunities, and tuition assistance.

Ross (2016) opines the U.S. adoption of free education until the age of 18 was appropriate as long as a high school graduate could get a job in a “port, factory, mine or mill—a middle class job.” However, in the information age, he suggests we know the pace of change demands that we be lifelong learners.

Flexible and Non-Traditional Career Paths

Predictions regarding future career paths are wide ranging. Popular “wisdom” has long asserted that younger generations no longer expect to join an employer after high school or college and stay with that same employer until retirement. Lyons, Schweitzer & Ng (2015) analyzed the career mobility patterns of four generations and found that job mobility increased with each

successive generation. Specifically, “The magnitude of the differences was large, as Millennials [born 1980 or later] had almost twice as many job and organizational moves per year as the generation Xers [1965-1979], almost three times as many as the Boomers [1946-1964], and 4.5 times as many as the Matures [born prior to 1946]” (page 16). However, this change in job mobility does not reflect an increase in employee turnover from one employer to another, but rather increased movement through various positions within a company. They postulate that technology, among other factors, may make some positions obsolete. The authors conclude the traditional career model is still strong and the “oft-cited truisms about the ‘new’ or ‘modern’ careers may be exaggerated” (page 18).

Intuit & Emergent Research (2017) predict that by 2021, 9.2 million American workers will derive at least some of their income as independent contractors operating within a “gig economy”—situations in which organizations establish short-term contracts on an as-needed basis. This is a substantial growth projection relative to the 3.9 million in 2016. McKinsey Global Institute (2016) estimates that 20–30 percent of individuals of working age in the U.S. and the European Union conduct independent work.

This trend is facilitated by technology that allows a job incumbent to be geographically distant from the employer; the advantages to an organization of selecting the best candidates for a given project, without a long-term commitment; and the ability to increase and decrease staff levels as demand warrants. This is further enabled by current and planned features in job-employee matching software such as Monster.com, Aftercollege.com, and Taskrabbit and networking sites such as LinkedIn (Brynjolfsson & McAfee, 2016).

Interdisciplinary Teams

Based on research by Burkus (2016), some organizations encourage employees to engage in more face-to-face communication in an effort to increase problem solving and decision making efficiency (as cited in Colbert, Yee, & George, 2016). As a result, workplaces evolve to provide more flexible space for collaborating and working in teams (Giang, 2015). Experts from Unum Limited’s Futures100 network (2014) foresee more conversation and debate, either face-to-face or on conversation-based platforms. Employees will need to blend skills and disciplines when working with others. They will collaborate with each other rather than compete. Workers will need listening skills and to display empathy, and build relationships to enable collaborative and interdisciplinary ventures.

Summary of Themes of Work and Workplace of the Future

When it comes to work of the future, change is the only certainty. However, this review of relevant literature points to some overarching themes that provide a solid base for making predictions about the world of work that today’s kindergartners will need in 2030 when they graduate from high school. This world will likely look very different from the world of work their parents were prepared for, both in terms of the available jobs and the work environment in which those jobs are carried out.

Jobs of the future will undoubtedly involve technology. From searching job openings, to performing job tasks, to receiving professional development, interacting with new and emerging technologies will be a distinctive feature of future jobs. Fields that had previously been quite separate may be blended in new ways, and existing jobs may be blended with new technologies to create positions we’ve never seen (think: space junk recyclers!).

The high school graduates of 2030 will set out on a career pathway characterized by change. Whether they work independently through the gig economy, or move among multiple employers or across multiple departments or projects, workers of the future will likely find themselves part of an increasingly diverse and dispersed workforce. Jobs will be continually evolving to meet changing demands and to incorporate the latest innovations. Ongoing training will be a necessary component of future jobs. Employees will need to adapt and embrace life-long learning to be successful in the workplace.

With some sense of what the future holds for work and the workplace, it becomes clear expected changes in jobs and job environments will correspond to changes in associated skills. A key next step to ensuring that students graduate high school in 2030 prepared for the next step on their postsecondary pathway is to identify the skills and abilities needed to successfully perform the jobs of the future.

References

- Andrew, P., Ip, J., & Worthington, J. (2014). *Fast forward 2030: The future of work and the workplace*. Los Angeles: CBRE.
- Atkinson, R. D., & Wu, J. (May 2017). *False alarmism: Technological disruption and the U.S. labor market, 1850-2015*. Washington, DC: Information Technology & Innovation Foundation. Retrieved from: http://www2.itif.org/2017-false-alarmism-technological-disruption.pdf?_ga=2.117549709.544738862.1522704813-61893732.1522704813
- Autor, D. H., Levy, F., & Murnane, R. J. (2003, November). The skill content of recent technological changes: An empirical exploration. *The Quarterly Journal of Economics*, 118(4), 1279-1333. Retrieved from: economics.mit.edu/files/581
- Bakhshi, H., Downing, J., Osborne, M., & Schneider, P. (2017). *The future of skills: Employment in 2030*. London: Pearson and Nesta. Retrieved from: https://www.nesta.uk/sites/default/files/the_future_of_skills_employment_in_2030_0.pdf
- Basu, K. (2016) *Globalization of labor markets and the growth prospects of nations* (Policy Research Working Paper 7590). Washington, DC: World Bank.
- Bernstein, A. (2016, October). Globalization, robots, and the future of work: An interview with Jeffrey Joerres. *Harvard Business Review*, 74-79.
- Blinder, A. S. (2007). *How many US jobs might be offshorable?* (CEPS Working Paper No. 142). Princeton, NJ: Princeton University.
- Breu, K., Hemmingway, C., Bridger, D., & Strathern, M. (2002). Workforce agility: the new employee strategy for the knowledge economy. *Journal of Information Technology* 17, 21–31.
- Brynjolfsson, E., & McAfee, A. (2011). *Race against the machine*. Lexington, MA: Digital Frontier Press.
- Brynjolfsson, E., & McAfee, A. (2016). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. New York, NY: W.W. Norton & Company, Inc.
- Bughin, J., Hazan, E., Ramaswamy, S., Chui, M., Allas, T., Dahlstrom, P.,...Trench, M. (2017, June). *Artificial intelligence: The next digital frontier?* Discussion Paper. McKinsey Global Institute. Retrieved from: <https://www.mckinsey.com/~media/McKinsey/Industries/Advanced%20Electronics/Our%20Insights/How%20artificial%20intelligence%20can%20deliver%20real%20value%20to%20companies/MGI-Artificial-Intelligence-Discussion-paper.ashx>
- Bureau of Labor Statistics. (2017, May 18). *Foreign-born workers: Labor force characteristics – 2016* [News release]. Retrieved from: <https://www.bls.gov/news.release/forbrn.nr0.htm/Labor-Force-Characteristics-of-Foreign-Born-Workers-Summary>
- Burke, R. J., & Ng, E. (2006). The changing nature of work and organizations: Implications for human resource management. *Human Resource Management Review*, 16, 86–94.

- Choi, J. (2017, July 17). *The future of jobs and the fourth industrial revolution: Business as usual for unusual business*. Retrieved from: <https://blogs.worldbank.org/psd/future-jobs-and-fourth-industrial-revolution-business-usual-unusual-business>
- Colbert, A., Yee, N., & George, G. (2016, June). The digital workforce and the workplace of the future. *Academy of Management Journal*, 59(3), 731-739. doi: 10.5465/amj.2016.4003
- Colby, S. L., & Ortman, J. M. (2015). *Projections of the size and composition of the U.S. population: 2014 to 2060*. United States Census Bureau. Retrieved from <https://census.gov/content/dam/Census/library/publications/2015/demo/p25-1143.pdf>
- Frey, C. B., & Osborne, M. A. (2013, September 17). *The future of employment: How susceptible are jobs to computerisation?* Oxford, England: University of Oxford. Retrieved from: https://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf
- Giang, V. (2015, January 12). What will work look like in 2030? *Fast Company*. Retrieved from: <https://www.fastcompany.com/3040701/2hat-will-work-look-like-in-2030>
- Gordon, A. (2011, January-February). Careers inspired by nanotech trends. *The Futurist*, 30-33.
- Green, S. (2014). Building the agile workforce. *Harvard Business Review*. Retrieved from <https://hbr.org/2014/01/building-the-agile-workforce>
- Greenstone, M., & Looney, A. (2013, August 2). *What new immigrants could mean for American wages*. Brookings. Retrieved from <https://www.brookings.edu/blog/jobs/2013/08/02/what-new-immigrants-could-mean-for-american-wages/>
- Guardian. (2017). *Top 4 trends impacting the workforce in 2018 and beyond*. Retrieved from: <https://www.guardiananytime.com/gafd/wps/wcm/connect/08172300-0fde-4add-a200-d6507e8f3670/4-Trends-Impacting-the-Workforce-in-2018.pdf?MOD=AJPERES&CVID=IZPOL44>
- Hamilton, J. (2012). *Is a sustainability career on your green horizon?* U.S. Bureau of Labor Statistics. Retrieved from <https://www.bls.gov/green/sustainability/sustainability.pdf>
- Hatzichronoglou, T. (2005). *The impact of offshoring on employment: measurement issues and implications*. Paris, Washington, DC: OECD.
- Hayasaki, E. (2017). Is AI sexist? *Foreign Policy*. Retrieved from <http://foreignpolicy.com/2017/01/16/women-vs-the-machine/>
- Heerwagen, J. (2016, October 5). The changing nature of organizations, work, and the workplace. *Whole Building Design Guide*. Retrieved from <https://www.wbdg.org/resources/changing-nature-organizations-work-and-workplace>
- Hintze, A. (2016, November 13). Understanding the four types of AI, from reactive robots to self-aware beings. *The Conversation*. Retrieved from: <https://theconversation.com/understanding-the-four-types-of-ai-from-reactive-robots-to-self-aware-beings-67616>

- Hoban, B. (2017, August 24). *Do immigrants “steal” jobs from American workers?* Brookings. Retrieved from <https://www.brookings.edu/blog/brookings-now/2017/08/24/do-immigrants-steal-jobs-from-american-workers/>
- Houser, K. (October 19, 2017). Is technology really going to destroy more jobs than ever before? *Futurism*.
- Intuit. (2016). *Dispatches from the new economy: The on-demand economy worker study*. Retrieved from: <https://intuittaxandfinancialcenter.com/wp-content/uploads/2017/06/Dispatches-from-the-New-Economy-Long-Form-Report.pdf>
- Joint Economic Committee Democrats. (2018, January 11). *Expanding opportunities through middle skills education*. Retrieved from https://www.jec.senate.gov/public/_cache/files/25915db9-709b-4b09-87f5-768cc6fe8206/middle-skills-pathways.pdf
- Karoly, L. A., & Panis, C. W. A. (2004). *The 21st century at work: Forces shaping the future workforce and workplace in the United States*. CA: Rand Corporation. Retrieved from <https://www.rand.org/pubs/monographs/MG164.html>
- Kobes, D. (2013, November). Making on-the-job training work: Lessons from the Boeing Manufacturing On-the-Job Training Project. *Jobs for the Future*. Retrieved from <http://www.jff.org/publications/making-job-training-work-lessons-boeing-manufacturing-job-training-project>
- KRC Research. (2014). *The Prepared U Project: An in-depth look at millennial preparedness for today’s workforce*. Retrieved from https://www.bentley.edu/files/prepared/1.29.2013_BentleyU_Whitepaper_Shareable.pdf
- Kumar, A., Bezawada, R., Rishika, R., Janakiraman, R., & Kannan, P. K. (2016). From social to sale: The effects of firm-generated content in social media on customer behavior. *Journal of Marketing*, 80, 7–25.
- Lamberton, C. P., & Rose, R. L. (2012). When is ours better than mine? A framework for understanding and altering participation in commercial sharing systems. *Journal of Marketing*, 76, 109–125.
- Lerman, R. I., & Schmidt, S. R. (1999). *An overview of economic, social, and demographic trends affecting the U.S. labor market*. Retrieved from <https://www.dol.gov/dol/aboutdol/history/herman/reports/futurework/conference/trends/trends.pdf>
- Lim, D. (2016) *The work that can’t be offshored or automated*. Committee for Economic Development. Retrieved from: <https://www.ced.org/blog/entry/the-work-that-cant-be-offshored-or-automated>
- Lyons, M., Blitz, M., & Whittall, N. (2017). *Shaping the agile workforce. Accenture Strategy Report*. Retrieved from <https://www.accenture.com/us-en/insight-shaping-agile-workforce>

- Lyons, S. T., Schweitzer, L., & Ng, E. S. W. (2015). How have careers changed? An investigation of changing career patterns across four generations. *Journal of Managerial Psychology*, 30(1), 8-21. Retrieved from: <https://doi.org/10.1108/JMP-07-2014-0210>
- Magill, B. (2017, April 8). Americans used a lot less coal in 2016. *Scientific American*. Retrieved from <https://www.scientificamerican.com/article/americans-used-a-lot-less-coal-in-2016/>
- Manyika, J. (2017a, May). *Technology, jobs, and the future of work* (Executive Briefing). McKinsey Global Institute. Retrieved from: <https://www.mckinsey.com/global-themes/employment-and-growth/technology-jobs-and-the-future-of-work>
- Manyika, J. (2017b, December). *What is the Future of Work?* (Podcast). McKinsey Global Institute. Retrieved from: <https://www.mckinsey.com/global-themes/future-of-organizations-and-work/what-is-the-future-of-work>
- McKinsey & Company. (2017). *The digital future of work: What skills will be needed?* Retrieved from: <https://www.mckinsey.com/global-themes/future-of-organizations-and-work/the-digital-future-of-work-what-skills-will-be-needed>
- McKinsey Global Institute. (2016, October). Independent work: Choice, necessity, and the gig economy. Retrieved from: <https://www.mckinsey.com/~media/McKinsey/Global%20Themes/Employment%20and%20Growth/Independent%20work%20Choice%20necessity%20and%20the%20gig%20economy/Independent-Work-Choice-necessity-and-the-gig-economy-Executive-Summary.ashx>
- Morgenstern, R. D., Pizer, W. A., & Shih, J. S. (2001). Jobs versus the environment: An industry-level perspective. *Journal of Environmental Economics and Management*, 43, 412-436.
- National Academies of Sciences, Engineering, and Medicine. (2017). *Information technology and the U.S. workforce: Where are we and where do we go from here?* Washington DC: National Academies Press.
- National Center for O*NET Development. The Green Economy. O*NET Resource Center. Retrieved April 8, 2018, from <https://www.onetcenter.org/green.html>
- National Center for O*NET Development. O*NET Online. Retrieved from <https://www.onetonline.org>
- O'Marah, K. (2018). Gender equity: Redesigning work for tomorrow. *Forbes*. Retrieved from <https://www.forbes.com/sites/kevinomarah/2018/01/12/gender-equity-redesigning-work-for-tomorrow/#444f8b9f482e>
- Osborne, M. A., & Frey, C. B. (n.d.) *The Future of Employment*. Oxford, England: University of Oxford. Retrieved from: https://futureoflife.org/data/PDF/michael_osborne.pdf
- Pompa, C. (2015). *Jobs for the Future*. London: Overseas Development Institute. Retrieved from <https://youtheconomicopportunities.org/sites/default/files/uploads/resource/ODI-JobsfortheFuture.pdf>

- PwC. (2017). *Workforce of the future: The competing forces shaping 2030*. Retrieved from: <https://www.pwc.com/gx/en/service/people-organisation/workforce-of-the-future/workforce-of-the-future-the-competing-forces-shaping-2030-pwc.pdf>
- Ross, A. (2016). *The industries of the future*. New York, NY: Simon & Schuster.
- Ross, A. (2017). *The industries of the future*. Presentation at Politics and Prose, Washington, DC.
- Ryan, T., Sapin, D., Rao, A, & Ampil, C. (2018, January). *US Business Leadership in the World in 2018: US Supplement to the 21st Annual Global CEO Survey*. PwC. Retrieved from: <https://www.pwc.com/us/en/library/ceo-agenda/ceo-survey.html>
- Shaw, M. (2017, September 11). *The 6 types of artificial intelligence*. Hewlett Packard Enterprise. Retrieved from: <https://community.hpe.com/t5/Digital-Transformation/The-6-types-of-artificial-intelligence/ba-p/6976199#.WsgQG7wbcs>
- Simon, S. (Host). (2016, December 10). *Economist says manufacturing job loss driven by technology, not globalization* [Radio broadcast episode]. <https://www.npr.org/2016/12/10/505079140/economist-says-manufacturing-job-loss-driven-by-advancing-technology-not-globali>
- Singh, S. (2015, October 7). Future of United States to 2025. *Forbes*. Retrieved from <https://www.forbes.com/sites/sarwantsingh/2015/10/07/future-of-united-states-to-2025/#79b99c5445a2>
- Singh, S. (2017, December 13). By 2020, artificial intelligence will create more jobs than it eliminates: Gartner. *The Economic Times*. Retrieved from: <https://economictimes.indiatimes.com/jobs/by-202-artificial-intelligence-will-create-more-jobs-than-it-eliminates-gartner/articleshow/62053363.cms>
- Solis, H. L. (2011). Immigrants and America's future. *America's Quarterly*. Retrieved from <http://www.americasquarterly.org/node/2419>
- Sundararajan, A. (2016). *The sharing economy: The end of employment and the rise of crowd-based capitalism*. Cambridge, MA: MIT Press.
- The Foundation for Young Australians. (2017). *The new work order: Ensuring young Australians have skills and experience for the jobs of the future, not the past*. Retrieved from <http://www.voced.edu.au/content/ngv%3A69383>
- University of Kent. (2018). *Future Jobs*. Retrieved from <https://www.kent.ac.uk/careers/Choosing/future-jobs.htm>
- Unum Limited. (2014). *The future workplace: Key trends that will affect employee wellbeing and how to prepare for them today*. Surrey, England: Author.
- Vale, R. (2016, August 12). *The four industrial revolutions in a glimpse*. Retrieved from: richmondvale.org/industrial-revolutions

- Vozza, S. (2016). Eight career skills you need to be competitive in 2016. *Fast Company*. Retrieved from: <https://www.fastcompany.com/3055352/eight-career-skills-you-need-to-be-competitive-in-2016>
- Wadors, P. (2016, February 9). *Bet big on agility... The agile workforce*. Retrieved from https://www.huffingtonpost.com/pat-wadors/bet-big-on-agility-the-ag_b_9175648.html
- Wagner, C. G. (2011, January-February). 70 jobs for 2030: Emerging careers and how to create them. *The Futurist*, 30-33.
- World Economic Forum. (2016). *The future of jobs: Employment, skills and workforce strategy for the fourth industrial revolution*. In Global Challenge Insight Report. Retrieved from http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf
- Yaraghi, N., & Ravi, S. (2017). *The current and future state of the sharing economy*. Brookings. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3041207