BRIEF

BSR

Automation:
A Framework for a Sustainable Transition

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Introduction

Automation will have a profound impact on the future of work and society. In recent years, a great deal of research has been undertaken on the impacts and implications of automation. Most of this research has reflected one of two narratives. One narrative focuses on the negative outcomes of automation, by highlighting the degree to which traditional labor models are under threat. In this scenario, automation will produce a bleak future of permanent high unemployment as robotics and artificial intelligence systems take over more and more job tasks. A second narrative around automation has emerged that touts its benefits—cleaner and safer jobs, reduced carbon impacts, and new waves of productivity and prosperity resulting from yet another technological revolution. In this scenario, most or all workers will be able to reskill and find new and better jobs, and the positive impacts will outweigh the costs.

Neither of these scenarios addresses the practical issues that business leaders must actually confront: how to take advantage of the productivity and innovation opportunities presented by these new technologies while also preserving good jobs and livelihoods that ensure a thriving economy that works for all. Leading a sustainable transition to automation will require that companies take an intentional approach—one that considers both the positive outcomes of automation as well as the negative ones—and put a plan in place to engage the public sector and civil society to partner for this transition. This brief presents options for companies to adopt an approach to automation that will empower their current workforce to adapt to automation as well as build a future talent pipeline that is educated, trained, and capable of meeting the needs of the future.

This brief contains four sections:

The Age of Automation: Forecasting the Impacts: *What are the various forecasts of how automation will transform business? What are the unique impacts anticipated for specific industries and geographies? How will automation align with sustainable development ambitions for the environment and global health?*

Preparing the Workforce for Automation: *How can business partner with primary, secondary, and higher education systems to prepare the next generation of workers? And how should companies be investing in upskilling their incumbent workforce as they roll out automation technologies?*

Managing Displaced Workers: *What are the likely impacts to workers who will be displaced due to automation? How can company-led programs and public policy initiatives improve the employment prospects of these displaced workers?*

A Business Call to Action: *How can businesses engage with partners and suppliers to lead the way toward a sustainable transition to automation?*

Automation is a global phenomenon that will require a concerted societal effort to make this transition beneficial to the global workforce and society at large. The private sector can play an important role in this transition by making four commitments that constitute an action platform for a sustainable transition to automation:

1. **Forecast and Announce Planned Workforce Changes Early**
2. **Commit to Training and Support Educational Partnerships**
3. **Provide Support to Workers Who Are Displaced**
4. **Encourage Public Policies that Modernize Social Safety Nets**

1. The Age of Automation: Forecasting the Impacts

Automation has already begun to transform the global workforce. Innovations in artificial intelligence, robotics, additive manufacturing, remote connectivity, advanced analytics, and the Internet of Things have rapidly increased the feasibility of bringing these technologies into the workplace.[1] From virtual secretaries to robotic-assisted surgeries to self-driving vehicles, we live in an age where various forms of automation increasingly augment our daily work and sometimes threaten to supplant it.

While there is a temptation to quantify this "fourth industrial revolution" in terms of jobs lost or gained, there is more nuance to how these technologies impact the labor market. In most cases, automation does not directly supplant "jobs" but rather eliminates certain tasks and activities within an employee's job role. That said, there is evidence that, in aggregate, automation will likely reduce the overall number of hours and workers needed to achieve the same output. According to analysis by the McKinsey Global Institute, around 46 percent of time spent on work activities across occupations and industries is theoretically subject to automation based on currently demonstrated technologies.[2] As more activities become automatable, the drive for efficiency will almost certainly result in wider uptake of automation using new technologies and applications.

Forecasts predicting either a new technological job boom or mass global displacement are unlikely to be entirely accurate. Instead, automation will result in positive societal gains mixed with detrimental impacts. The global challenge of this new era will be to balance the benefits of labor efficiency with the risks of unemployment. A report by the National Bureau of Economic Research outlining the impacts of industrial robots in the U.S. workforce did "not find positive and offsetting employment gains in any occupation or education groups."[3] The study found that industrial robots not only resulted in job losses, they also may have contributed to a decline in wages.[4] Wherever the future lands on the spectrum of forecasts, one thing is certain: the nature of jobs in the 21st century will be changed, if not radically redefined, by the introduction of new automation technologies.

AUTOMATION'S EMPLOYMENT IMPACTS

At the global scale, the projected impact of automation merits foresight and precaution from business and government. While less than 5 percent of all global job roles are currently fully automatable,[5] the potential for job

[1] BSR, 2016.

[2] McKinsey Global Institute, 2017.

[3] Acemoglu and Restrepo, 2017.

[4] Ibid.

[5] McKinsey Global Institute, 2017.

displacement in the medium to long term is significant. The most aggressive projections estimate as many as 2 billion global job losses due to automation by 2030.[6] While these figures are continuously debated and revised, research has also consistently found that the jobs most threatened by automation are those currently held by lower-paid, lower-skilled, and less-educated workers.[7] There is undoubtedly a high risk that automation will displace many millions of already vulnerable workers across the globe.

The effects of automation may not be evenly distributed because these technologies will have uneven impacts across skill levels and, therefore, across various sectors and geographies. Currently, the largest automation potential exists where jobs are characterized by predictable physical activities. Workers in goods-producing industries like construction and manufacturing, as well as those in accommodation and food service, face the most significant likelihood of automation of their work. But the challenge will be universal to all sectors because at least 30 percent of activities in most global occupations could be automated.[8]

Impacts by Industry

- **Hospitality, Retail, and Food Services:** Improved data capabilities and new customer interfaces, as well as robotics and self-service mechanisms, may redefine service industries and transform jobs in the hospitality, retail, and food services sector. Nearly 75 percent of labor-time in accommodation and food services has the potential to be fully automated; the retail sector faces less automation potential but still registers at 50 percent by the same metric.[9]

- **Manufacturing:** Automation of manufacturing is not a new phenomenon, but it is taking on a new nature and scale. As with many sectors characterized by predictable physical activity, the manufacturing sector is comprised of many jobs that can be automated to some extent. Though less than that of the hospitality and food services industries, the automation potential for manufacturing is calculated at 60 percent of current labor-time.[10] While the high degree of predictable physical activities in manufacturing suggests the sector will be highly susceptible to automation, adoption rates will depend—as with all sectors—on wage costs.[11]

- **Energy & Mining:** Assessments of the automation potential for energy and mining industries typically assume a significant disruption to these sectors. Mining operations, in particular, will likely be transformed by technologies that can potentially reduce the operational roles that comprise 70 percent of employment in mines.[12] In its assessment of the resource extraction industry, McKinsey calculated that 63 percent of labor-time has the potential to be automated.[13] In the United States alone, this translates into a high risk of displacement to more than 45 percent of jobs in mining, quarrying, and oil and gas extraction.

[6] World Economic Forum, 2017.

[7] Executive Office of the President, 2016.

[8] McKinsey Global Institute, 2017.

[9] Ibid.

[10] Ibid.

[11] Ibid.

[12] IISD and Columbia Center on Sustainable Investment Center, 2016.

[13] McKinsey Global Institute—Tableau, 2017.

- **Transport and Logistics:** Advances in automation will continue to increase technological capacity to collect and process data while accomplishing physical tasks in predictable environments. These technologies have the potential to automate an estimated 60 percent of labor in transportation and warehousing in the United States alone.[14] But while autonomous trucks and shared logistics will threaten many existing jobs, the World Economic Forum (WEF) estimates a net positive impact on jobs as a result of new digital platforms and logistics crowdsourcing. These new digital technologies are expected to increase global employment in the sector 8.4 percent by 2025.[15]

- **Financial, Management, and Professional Services:** Automation will also impact higher-skill professional services occupations. These impacts have already arrived in legal and financial services industries, where automation has led to mass reductions in stock floor traders, paralegals, and financial analysts.[16] While the automation potential varies among these professional services industries, anywhere from 35 percent to 43 percent of labor in these industries can be automated.[17] Automation can impact the highest levels of management professionals: It's estimated that as much as a quarter of any CEO's time is spent analyzing reports and data to inform decisions that could be better delegated to machines.[18]

Impacts by Geography

As more assessments adopt a task-based rather than jobs-based approach, calculations of job impacts are much less pronounced, with the Organization for Economic Cooperation and Development (OECD) estimating that only 9 percent of jobs are currently automatable in its member.[19] The impacts of automation will vary across geographies as a result of varying sector mixes and wage levels. McKinsey calculates Japan to have the largest overall percentage of activities that can be automated (56 percent), but the economies of Europe, Asia, and the United States have similar potential for automation.[20]

The OECD estimates that, based on tasks, the percentage of current jobs that will be eliminated due to automation will range from 6 percent to 12 percent, depending on the country. The variation in rates derives from two factors: First, some countries have already made high investments in automating technologies (thus there are fewer jobs left to automate). Second, some countries have higher levels of educational attainment (thus there are fewer workers doing low-skill or routine work that is easier to automate). Estimates on the country and regional impacts are:

- **U.S.:** Approximately 9 percent of the U.S. workforce face a high risk of automation, defined as working in jobs with over 70 percent of activities able to be automated.[21] On average, approximately 46 percent of work activities in the United States are currently automatable.[22] In 2016 the White House echoed

[14] McKinsey Global Institute, 2017.

[15] World Economic Forum, 2016.

[16] Harvard Business Review, 2016.

[17] McKinsey Global Institute, 2017.

[18] Harvard Business Review, 2017.

[19] Arntz, Gregory, and Zierahn, 2016.

[20] McKinsey Global Institute, 2017.

[21] Ibid.

[22] Ibid.

research suggesting that these jobs "are highly concentrated among lower-paid, lower-skilled, and less-educated workers."[23]

- **Asia:** China, India, and Japan, in addition to the United States, account for half of the global 1.2 billion employees with automatable activities. China and India alone have 700 million employees who work in jobs with automation potential. Country-specific economic and cultural differences account for varying degrees of automation. OECD research has suggested that 7 percent of Japanese workers are at high risk of losing their jobs to automation technologies. Meanwhile, China remains the largest market for industrial robotics, and the government is advancing specific automation targets.[24] In Guangdong province, the government has announced a three-year program to subsidize automation with the aim "to have 80 percent of [Guangzhou] factories automated by 2020."[25] The large global manufacturer Foxconn has announced plans to replace more than 1 million Chinese workers with machines.[26]

- **Europe:** The share of employment at high risk of automation varies among European economies. This share is highest in Germany and Austria (12 percent), while it is lowest in Estonia (6 percent).[27] According to McKinsey's analysis, "62 million full-time employee equivalents and more than $1.9 trillion in wages are associated with technically automatable activities in the five largest economies—France, Germany, Italy, Spain, and the United Kingdom."[28]

- **Other Emerging Economies:** Latin America is significantly susceptible to automation; countries such as Mexico, Brazil, Peru, Chile, and Argentina have a higher percentage of automatable jobs than the United States has.[29] Africa's three largest economies all have automation potential of over 40 percent, with Nigeria, Egypt, and South Africa likely to adopt automation technologies as a means of sustaining their economic development.[30]

AUTOMATION'S IMPACTS ON ENVIRONMENT & HEALTH

Labor and cost efficiencies inherent in automation have driven adoption, despite the uncertain impacts of these technologies on global labor. Researchers have also identified several positive outcomes of increased automation. These technologies may ultimately provide significant benefits to the health of the environment and its citizens. As with automation's labor prospects, the benefits of these technologies may be offset by some new and unprecedented challenges.

Environmental Impacts

Automation may be instrumental in decoupling economic productivity from emissions and resource depletion. The clearest opportunity is to increase the environmental efficiency of transportation, which currently accounts for

[23] Executive Office of the President, 2016.

[24] BSR, 2017.

[25] Minter, 2015.

[26] Toobin, 2016.

[27] Arntz, Gregory, and Zierahn, 2016.

[28] McKinsey Global Institute, 2017.

[29] Ibid.

[30] Ibid.

nearly 20 percent of global emissions. Some studies report that in a best-case scenario of electric light-vehicle adoption, emissions per mile would drop by 94 percent by 2030.[31] The WEF estimates that the climate impacts of deploying automation technologies across just three automatable industries (automotive, electricity, and logistics) will potentially reduce global emissions 8.5 percent by 2025.[32] The WEF also estimates for each metric ton of CO_2 emitted by the Information and Communication Technology (ICT) sector, users save 10 tons. Emerging studies exploring the benefits of additive manufacturing compared with traditional models point to environmental efficiencies when these new technologies are taken to scale.[33] Though growing e-waste and data center consumption dampen its positive benefits, automation may contribute to maintaining global temperatures below the thresholds set by the Paris Agreement.

Health and Safety Impacts

Automation may also produce societal benefits through improved public health and worker safety. The link between lowered emissions and improved public health has long been established, meaning that the environmental benefits of automation will translate directly to positive health outcomes. The health benefits of increased automation, however, are not limited to environmental impacts. Increased automation will improve delivery and efficiency of healthcare services, as evidenced by early detection rates made possible by artificial intelligence (AI) and automated scanning technologies. Automation is expected to increase productivity of nurses and doctors and reduce patient waiting time, leading to better healthcare outcomes.[34]

Automation will redefine current employment to yield employee health and safety benefits and disadvantages. According to a recent paper by the International Institute for Sustainable Development, safety in the mining industry is a "unanimously accepted benefit of automation."[35] The transportation sector will also provide significant health benefits in addition to its climate impacts. The transition to a driverless car society could reduce traffic fatalities by up to 90 percent, according to an article *The Atlantic*, putting the lifesaving qualities of autonomous transport "on par with the efficacy of modern vaccines."[36] Conversely, the potential displacement impacts of automation will increase the global incidence of mental and physical health issues that are linked with unemployment and job anxiety.[37]

2. Preparing the Workforce for Automation

The societal impact of automation will be defined by the global community's ability to prepare workers for transformation, including the adaptation of institutional support mechanisms such as education and social contracts and safety nets. As automation redefines work, the educational system will need to adapt and reimagine learning as a lifelong pursuit. Business must likewise evolve their approach to on-the-job training, talent retention, and recruitment to innovate new ways to support its workers. Ultimately, successful adaptation—if not

[31] Von Kaenel, 2016.

[32] World Economic Forum, 2016.

[33] Faludi et al., 2015.

[34] McKinsey Global Institute, 2017.

[35] IISD and Columbia Center on Sustainable Investment Center, 2016.

[36] Lafrance, 2015.

[37] Rosen, 2014.

transformation—of labor will require all elements of society to improve basic skills, promote continual education, and empower workers with the information to navigate a changing labor market.

Primary and Secondary Education: Building the Foundations of Future Workplace Success

Educational systems must be reconsidered to better prepare youth for a future of work redefined by automation. While science, technology, engineering, and math (STEM) skills are emphasized in the context of a more technologically sophisticated future, many employers are also looking for primary and secondary educational systems to address gaps in "workplace competencies" like teamwork, problem solving, and communication.[38] STEM skills may power new technologies, but the "soft skills" of collaboration, critical thinking, and interpersonal skills are vital components of the jobs likely to endure automation. The balance of these skills will remain essential, and business can play a role actively supporting educational systems that prepare students with the human-digital capabilities they will need.[39]

There are several examples for how the private sector can partner in the design and implementation of new educational models. One example is the Confederation of British Industry, a coalition of businesses that campaigned to include computer programming as a mandatory element of school curricula. In addition to commissioning reports to inform curriculum changes, the Confederation has also provided funding for these new programs to teach children basic coding and programming.[40]

In the United States, improving youth training of STEM skills is an increasing focus of the private sector's talent management programs. One of the most notable innovations is LIFT (Lightweight Innovations for Tomorrow). Operated by the American Lightweight Materials Manufacturing Innovation Institute, LIFT is a public-private partnership to develop and deploy advanced lightweight materials manufacturing technologies and implement education and training programs to prepare the workforce. To raise "awareness and increase access and equity in STEM," LIFT has developed educational models and curricula across the Midwest to help students acquire STEM skills as early as middle school.[41] In particular, the Institute's MakerMinded digital platform connects students and schools to market-leading STEM and manufacturing learning experiences. The program seeks to intervene "where STEM workforce pipeline begins to break—during the formative years of middle and high school."[42]

Vocational Schools: Technical Skills and Apprenticeships

A transition to more automated economies will also require additional training beyond secondary education. In particular, there is a need to develop new generations for middle-skills jobs. These positions require a set of skills that are more advanced than those available in secondary education but not so advanced that they require a four-year college degree.[43] In the United States, millions of underemployed workers are unable to connect with these positions. This "market failure" is blamed on an erosion of talent pathways that traditionally built the skills for these middle-skills jobs. As a result, workers are failing to adequately negotiate the leap from entry-level to mid-level

[38] Winthrop, 2016.

[39] World Economic Forum, 2016.

[40] Teaching Times, 2017.

[41] LIFT, 2016.

[42] MakerMinded, 2017.

[43] Accenture, Burning Glass Technologies, and Harvard Business School, 2014.

jobs and often lack the communication, critical thinking, and customer service skills that employers look for in job candidates.[44] In assessing this middle-skills gap, the Harvard Business School concludes that the private sector must "champion an employer-led skills-development system, in which they bring the type of rigor and discipline to sourcing middle-skills talent that they historically applied to their materials supply chains."[45]

Similarly, in order to address these challenges, the U.S. Chamber of Commerce Foundation is engaging the private sector to develop a new approach to talent pipeline management and leveraging "innovations in supply chain management."[46] In one such example, Caterpillar created the talent equivalent of a "continuity plan" by developing succession plans to ensure the talent pipeline is filled for six key enterprise roles around the world. By developing competency criteria, the company can now assess the volume of candidates in a 10-year horizon, and create development plans to transition current employees to these careers.[47] Boeing also participated in the program to protect against its aging workforce by developing a multi-university project that helps transition graduates to entry-level aerospace jobs.[48]

Another example of private sector leadership to address the skills gap is the reintroduction of traditional employee career ladder programs. Apprenticeship models, in particular, have seen a recent renaissance as large employers adopt this work-readiness model to fill their talent pipelines. The Global Apprenticeship Network (GAN) serves as a private sector alliance to "share best practices, to advocate and to commit to action around youth employability and skills development."[49] GAN's annual catalog of best practices highlights models implemented by members across a diversity of sectors including Hilton, IBM, and Nestle.[50] The alliance estimates that practices adopted by its 154 global members will yield an increase of over 9 million opportunities for youth by 2020.

University and STEM Degrees: Expanding Access for the Knowledge Workers of the Future

College educated students will also need support to adjust to an economy adapting to increased automation. While talent recruitment typically uses college degrees as a proxy for experience, there is growing frustration that these students are inadequately prepared with the combination of soft skills and STEM skills needed to succeed. The private sector can play a role in helping undergraduate programs implement opportunities to develop soft skills and promote programs that bring greater access to STEM education.

The private sector is beginning to monitor and address the risk of a soft skills gap. While not often perceived as the responsibility of the educational system or employers to develop these skills, surveys of HR leaders continue to highlight gaps in work ethics, communications, teamwork, and leadership.[51] In the U.K., a report prepared for McDonald's found that the soft skills deficit will hold back over half a million U.K. workers by 2020—leading to an annual US$11 billion of lost productivity by that year.[52] *Gap Inc. for Community Colleges* is that company's

[44] Ibid.

[45] Ibid.

[46] U.S. Chamber of Commerce Foundation, 2017.

[47] U.S. Chamber of Commerce Foundation, 2014.

[48] U.S. Chamber of Commerce Foundation, 2015.

[49] Global Apprenticeship Network, 2016.

[50] Ibid.

[51] Benitez, 2014.

[52] McDonald's UK, 2015.

attempt to address this soft skills gap by providing “upskilling workshops” that combine leadership theory training with opportunities to practice these kills under the guidance of Gap store leaders. Since 2010 the program has trained over 3,000 college students with confidence-building and communication workshops and helped fill over 20,000 store jobs with these students.[53]

The private sector has the opportunity to address a central reason for the STEM skills gap: underrepresentation of women and minorities. The WEF estimates that 27 percent of STEM graduates are women.[54] In the United States, Hispanic and African-American students are underrepresented among STEM graduates.[55,56] Companies have developed unique programs to increase access to STEM education and careers for these populations. Technology companies like Google have partnered with coding academies to offer free or reduced tuition for women and minorities interested in technology.[57]

TRANSITIONING THE INCUMBENT WORKFORCE

Providing training and capacity building for the current workforce will be essential to mitigate the impacts of automation. As economies transition towards greater digitalization and automation, there is a need to ensure that the current workforce is able to adapt to these trends. The private sector can play a role by developing automation early-warning systems that provide workers with the information and coaching opportunities to adapt to these transitions. Additionally, there is a need to further develop upskilling programs and align these programs with the demands of automation.

Automation Early-Warning Systems

The private sector can significantly mitigate the impacts of automation by empowering its workers with the information and skills to negotiate a changing labor market. National governments have urged the private sector to adopt mechanisms to ensure they provide workers with early-warning systems. A public-private partnership allows companies to leverage country data to inform company-specific projections.

Labor Market Forecasts: France instituted early-warning systems by requiring publication of labor projections, while other countries like New Zealand have formalized career guidance as an attendant component of the educational system.[58] Providing new and current workers with the information that allows them to adequately assess their value on the labor market, as well as their security in that market, is essential to ensuring workers have a voice and agency in the age of automation. The European Center for the Development of Vocational Training (CEDEFOP) publishes an annual skills forecast and employment trends report that are not only available to workers, but provide companies with the research backing to develop their own projections to share with employees. The labor market forecast provides a comprehensive picture of skills required and the variance of available employment in the European market.[59]

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[53] Aspen Institute, 2016.

[54] World Economic Forum, 2016.

[55] U.S. Department of Education, 2014.

[56] Bidwell, 2015.

[57] Yuille, 2015.

[58] World Economic Forum, 2016.

[59] Cedefop, 2016.

Employer-Sponsored Career Coaching and Individual Training Accounts (ITAs): Governments are also supporting research into various "individualization practices" that provide additional employment security for workers. From vouchers endowed by governments to insurance accounts that build on employer savings accounts, there's a spectrum of private-public models to enable workers to weather automation risks and adapt to a changing labor market by pursuing relevant courses of study.[60] In France, the government created a "compte personnel de formation"—a personal training account that entitles workers to accumulate free tuition and paid leave to reskill throughout their career. Under this system, the employer must support workers' pursuit of career coaching and reskilling.[61] While these programs are installed by government and have mandatory employer participation, this model demonstrates a potential mechanism by which governments and businesses can share the responsibilities to meet future skills needs.

Training and Upskilling for Automation

Beyond creating the opportunity for workers to assess and adapt to a changing labor market, there's a need to refigure corporate learning and development in the face of automation. Automation will require companies to reconsider skills development and on-the-job training by better defining the skills need in the future while creating the opportunities that allow workers to upskill.

Companies will not be able to adapt to automation through a business-as-usual approach to skills development. Automation will require a shift in mindset. Companies will need increased agility to manage a shifting labor market and technological landscape. This will require companies to commit to continually reskilling their workforce, installing a lifelong learning mindset, and using digital resources to enable digital skills development.[62] These shifts are required not only by automation technologies but also because of a shifting labor demographic: In the United States, millennials already constitute the largest workforce population and are demanding greater flexibility and autonomy than previous generations.[63]

Micro-credentials: To specifically adapt to the rapid innovation inherent in increasing automation, companies can work to develop the micro-credential system for advanced technology skills. Recognizing that future job opportunities require a lifelong learning approach rather than a periodic disruption of an academic degree, employees and employers are advancing adoption of flexible education concepts like micro-credentials, learning badges, and nano-degrees. These programs target specific knowledge and skills—and emphasize mastery and practice over theory.[64] The specificity of these learning modules lends itself to the purposes of companies that want employees to receive job-focused credentials that accommodate employee work-life balance. Udacity, a provider of these new learning platforms, has connected with Silicon Valley companies and others to develop nano-degree programs that provide the digital skills needed for automation technologies.[65]

Onsite Automation Systems Training: In addition to new programming, there's an opportunity for employers to find ways to better integrate automated systems with current work tasks in order to create on-site training with these new technologies. These models serve to reframe the transition of automation from one of job supplanting

[60] Cedefop, 2013.

[61] Squire Patton Boggs, 2015.

[62] Accenture, 2017.

[63] Ibid.

[64] Tsai, 2014.

[65] Udacity, 2017.

to job augmentation. Examples are beginning to emerge of companies providing employees with access to automation technology. Airbus, for example, piloted a program that gave its assembly-line workers smart glasses that provided immediate access to a training manual while working on the line.[66]

3. Managing Displaced Workers

While some workers will be able to be upskilled and stay with their current employer, many others will be laid off as part of a transition to automation. This is because automation often requires a lower headcount to achieve the same output. While some workers who will be laid off during automation will quickly land on their feet and find good employment, these cases, historically, have been the exception rather than the norm. Extensive research conducted on displaced workers around the world has shown that workers who are laid off frequently experienced a very high level of negative financial, psychological, and health outcomes. (See Box: What Happens to Displaced Workers?) As companies plan their transition to automation, steps should be taken that will improve the outcomes for the workers who will lose their employment.

SOCIAL IMPACTS

What Happens to Displaced Workers?

While automation can produce "net-positive" impacts for the overall economy, studies of workers who lost their jobs through mass layoffs (due to automation, recessions, offshoring, or other reasons) have shown that they suffer disproportionate negative impacts, including:

- **Loss of Financial Security—**A study of U.S. workers who were displaced found that they earned on average 30 percent less in their next position.[67] The financial effects are exacerbated for those in remote areas where the company was the dominant employer and there were few good employment options. In these situations, employees sometimes also experienced a decline in home values[68] and had to pay thousands of dollars to retrain and relocate. Those who were unable to relocate (due to family obligations or other reasons) disproportionately ended up dropping out the labor force and on long-term disability.[69]
- **Psychological and Health Outcomes—**Global studies of displaced workers have shown that they experienced on average double the risk of developing clinical depression and 4-6 times the risk of developing substance abuse problems and engaging in domestic violence.[70]

At the same time, research conducted on European companies has shown that by adopting *a socially responsible restructuring approach*—one that gives employees early notice, company-paid support for training and relocations, and time to find new employment or retrain—these negative effects can be largely mitigated.[71]

[66] World Economic Forum, 2016.

[67] van Wachter et al., 2008.

[68] Greenstone and Looney, 2011.

[69] Foote et al., 2015.

[70] Goldman-Mellor et al., 2010.

[71] Brenner et al., 2014.

SOCIALLY RESPONSIBLE PRACTICES FOR DISPLACED WORKERS

Companies can plan for a transition by developing a socially responsible approach. According to the International Labour Organization, socially responsible restructuring is defined as "using one or more approaches to consciously take into consideration the interests of all stakeholders—the managers, owners (shareholders), workers, and the community.… Socially responsible restructuring respects the values of the enterprise, seeks the involvement of all those affected, practices open communications, and treats all employees with respect and dignity." [72] Companies will help achieve a better balance of economic benefit and social stability by committing to a socially responsible approach to their transitions to automation.

While the emerging wave of automation is new and substantial, this is not the first time such effects have been observed. Research on previous industrial transitions (such as those made during the 1980s and 1990s in offshoring and globalization and earlier waves of digitization and migration to online platforms) has revealed that a few elements are crucial to promote good outcomes for the workers who were laid off and for the economies of the communities where they reside.

- **Provide Early Notification:** Companies should aim to provide as much early notification and communication about their plans to transition to automation as is feasible. Early notification allows workers to begin their upskilling or career transition process early, thereby preventing or drastically reducing the amount of time spent in unemployment. It also allows the company enough time to upskill workers staying on board and to plan for a transition of operations.

- **Give Employees Choices: Upskill, Relocate, or Retrain**: Companies should engage their workers early on about the plans to automate, engage them in dialogue about their preferred options for a next step in their career, and provide financial and technical support that can help them achieve a new career. The options that are offered to employees typically include:[73]

    - **Internal Job Search:** Assistance for employees to search for new opportunities inside the company and retrain or upskill for a new role

    - **External Job Search:** Career counseling, resume and interview training, and job search assistance

    - **Training:** Grants for employees to pursue retraining for a new occupation

    - **Relocation Assistance:** Financial assistance for employees and their families to relocate for new employment opportunities

    - **Small Business Assistance:** Technical assistance and funding to start small businesses to support self-employment

    In some situations—particularly in remote areas where a company is a dominant employer—additional supports are also provided to small business owners in the community who are impacted by the loss of customers. Additional supports such as psychological and financial counseling services are also offered

[72] Hansen, 2009, p. 15.

[73] Rogovsky, 2005.

to workers and their families during the process. These services are typically provided by outplacement service providers, and through partnerships with local colleges and vocational training schools. The funding for these programs is provided through a combination of company funds and nonprofit and government-sponsored programs.

PUBLIC POLICIES TO MODERNIZE THE SOCIAL SAFETY NET

Governments will need to adapt social safety net programs to help their workforces navigate the transitions necessitated by automation technologies. In the United States, a White House report on automation acknowledged that social insurance protections for displaced workers have weakened over time and currently provide the lowest level of coverage in at least 50 years.[74] Several countries are proposing or implementing new programs to help workers impacted by globalization and automation that go beyond strengthening of education systems or traditional worker benefits. Automation presents risks that traditional safety nets will become obsolete.

The private sector can support innovative policy initiatives that address the social risks inherent to automation, including:

- **Wage Insurance**: Wage insurance is a policy tool developed to assist workers who must reskill and enter new occupations that pay lower wages than their previous position. Wage insurance programs provide a temporary income supplement that replaces the wages lost.[75] These programs require wide-scale participation by employers in order to make them affordable and effective because the risk must be shared across the general population. The private sector can support efforts to further test and modify these insurance products as an added protection for displaced workers.

- **Universal Basic Income**: Another policy initiative gaining interest from some governments across the world is to provide a universal basic income (UBI). Under these programs, the government provides an unconditional cash grant to all citizens that can supplement or replace citizens' wages. Canada, Finland, and the Netherlands are beginning to experiment with UBI programs,[76] and in the United States, Y Combinator, the tech startup accelerator, is piloting a small-scale program in California.[77]

- **Tax on Automation:** Bill Gates has proposed that robots should be charged a tax to replace revenues on payroll taxes of workers.[78] This proposal has spurred new discussions on whether automation technologies that supplant jobs should be reclassified as labor rather than capital. The private sector can participate in dialogues around taxation models that both support business objectives and also ensure there are sufficient revenues for governments as increasing shares of work are completed by automated systems.

[74] The White House, 2016.

[75] Wandner, 2016.

[76] The Economist, 2016.

[77] Lowrey, 2017.

[78] Smith, 2017.

4. Business Call to Action: A Four-Point Plan for a Sustainable Transition to Automation

Companies can play an important role in the transition to automation by making four commitments toward their workforce and their suppliers' workforce:

1. **Forecast and Announce Planned Workforce Changes Early**: Companies can contribute to forecasting and early-warning systems around the world by making known their intentions to automate. Companies should give sufficient advance warning and provide projected workforce numbers and skills changes as early as possible to give governments, education providers, and workers time to adequately prepare for the transition.

2. **Commit to Training and Support Educational Partnerships:** Companies can commit to partnerships with local educational systems and open-source and online education to help prepare new generations of workers and to sponsor the upskilling of their incumbent workforce. These partnerships can range from those with secondary schools and colleges, to teach technical skills and coding, to those with formal workplace training programs. Companies can also directly fund upskilling of their workforce for automation through on-site training and micro-credential programs.

3. **Provide Support to Workers Who Are Displaced:** Companies can play an important role in improving the outcomes for workers who lose their jobs to automation by giving them early notice and extensive support to help them retrain and/or relocate to pursue new opportunities. Companies can partner with nonprofits and governments to go beyond the normal severance payment and outplacement packages to include additional benefits, such as training grants to reskill for a new role in the company or to train for a new occupation, relocation assistance, and technical support and funding to start a new business.

4. **Encourage Public Policies that Modernize Social Safety Nets:** Companies can play an active role in shaping government policies around the world that support workers who will lose their jobs through automation by using their collective voice to encourage adoption of wage insurance programs, individual training accounts, and other programs that improve financial security and facilitate access to lifelong learning for workers. Companies can also help expand global trials of Universal Basic Income and engage in dialogues around transformative policies, such as one proposed by Bill Gates for a "robot tax" to help governments make up the shortfalls in payroll taxes.

Whether adopting and sharing the lessons of their individual company programs, forming industry-wide partnerships with education providers, or advancing public policy solutions, business leaders can play a critical role in the global effort to ensure a future of good jobs in the age of automation in the 21st century and build an economy that works for all.

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