



Supporting Labor Market Resiliency and Future-Readiness: The Case for Measuring Skill Demand in Real Time

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April 2021

Globalization and technological advances have fundamentally changed the landscape of workforce needs. There is rapid change in the skills needed by employers, which has made it harder for labor-market entrants and reentrants to get market-relevant education and training, for employers to find the talent they need, and for experienced workers to retain their jobs. Despite the U.S. unemployment rate recently being at its lowest at 3.6%,¹ fewer Americans had access to jobs that paid family-sustaining wages and offered benefits and job security. With the current COVID-19 pandemic-driven economic downturn, this problem has been greatly exacerbated.

Whether from technological advances or unexpected market shifts, ongoing upskilling and reskilling (both aspects of lifelong learning) have become an imperative for the modern workforce.² Furthermore, helping Americans upskill and reskill is a pivotal step towards creating a workforce development system that helps individuals, families, communities, cities, regions, and our nation thrive in the future of work. Some formal training programs do not specifically focus on how individuals can directly apply the training to their jobs (e.g., not focusing on the actual skills needed to succeed on the job or not ensuring the participants gain the needed skills at the target proficiency level), and therefore can fail to provide clear pathways to new work.³ Upskilling and reskilling programs need to be well aligned to both current and emerging job demands as well as the skill profile of available workers, to ensure that they (1) address the skills needed at the desired proficiency level and (2) are well matched to the needs of those seeking upskilling/reskilling. Understanding the relationship between jobs that may be waning and those that are emerging is a critical step in identifying promising reemployment and career development pathways, and can help the millions of workers who have been permanently displaced in the COVID-19 recession identify efficient ways to transition to different jobs. As workplace demands continue to evolve, information about future skill needs can help the workforce development system, training providers, employers, and workers understand where to invest to more effectively support upskilling and reskilling efforts.

Acknowledgment

This brief and the work on which it is based were self-funded by AIR, with support from its [Equity Initiative](#). The brief was developed under the [Workforce Development and Economic Mobility Workgroup](#), which is co-led by Drs. Irma Perez-Johnson and Harry Holzer at AIR. The Workgroup advocates for stronger evidence- and field-building to achieve a future-ready and resilient workforce and economy, provide equitable access to opportunity, and restore economic mobility and shared prosperity in the U.S.

This brief summarizes what we know about how the nature of work has been changing, and how the skills associated with jobs may continue to change. We then describe what we conceptualize as “future skills,” which must be accurately measured and understood to effectively align the supply and demand for future jobs. Next, we discuss why the current infrastructure to understand and predict skill needs falls short of what is needed to support a robust and modern workforce development system. Last, we identify several important research questions that must be addressed to ensure that future skills are accurately defined, captured in real time, and leveraged to effectively respond and adapt to the changing nature of work.

The Changing Nature of Jobs

Given the significant impact that technological advances such as artificial intelligence (AI), machine learning (ML), big data, cloud computing, and robotics are having on the current business environment, various analysts have asserted that we are entering—or may already be in the midst of—a fourth Industrial Revolution.⁴ Unlike prior industrial revolutions, however, analysts note that the current transformation is unique in the speed with which new ideas and technology are affecting business practices. For example, research from the World Economic Forum suggests that 54% of workers will require reskilling (for those displaced from their jobs) or upskilling (for those still employed but whose current jobs are evolving).^{5,6} The Organisation for Economic Cooperation and Development further estimates that, across its member countries, 14% of jobs could disappear because of automation in the next 15 to 20 years, and another 32% may change significantly.⁷ As a direct result of these trends, many enterprises find themselves needing to constantly update their ways of doing business to keep pace with rapidly changing technology and associated consumer expectations.^{8,9} And such updates require the identification of the workforce skills needed to both operate effectively in new technology-focused jobs and complement new technologies.

Technological advances are also facilitating the mechanization and automation of many routine, labor intensive, and/or dangerous tasks across blue- and white-collar industries and occupations, redefining both current and future jobs.^{10,11} In fact, it has been argued that nearly every occupation has at least some aspect that is suitable for machine learning.¹² In addition, the speed of technology-induced skill displacement is projected to double over the next decade.^{13,14} As jobs continue to change, the skills that are in high demand are also predicted to change,¹⁵ begging the question, “What skills will be most in demand in the future?”

Future Skills

Current research suggests that, to succeed and thrive in the “future of work,” workers will need to possess strong skills in three important areas. Given this new age of automation, individuals in nearly every occupation will need to possess at least some basic level of (1) **technological/digital skills** (Bughin et al., 2018). Additionally, there is growing consensus that there will be increased demand for (2) **strong social and emotional skills** and (3) **higher level cognitive skills** that machines cannot easily replicate.^{16,17,18}

Within each of these three key domains, there is even some consistency about the specific level of proficiency that will be needed. For example, within the area of technological/digital skills, there is agreement that *advanced* IT and programming skills will be needed to program and operate technology systems. Meanwhile, *basic* digital skills will be needed to successfully perform most roles, given the broad influence of technology across occupations (e.g., spreadsheets, database searches, and technological tools to help perform work functions—which have become even more prevalent during the COVID-19 pandemic). Further agreement is needed, however, on how these key domains of skills are defined, including identifying what specific skills are included in the domains.

Several entities have been working to identify and develop taxonomies of “future-ready skills,” including McKinsey Global Institute, Burning Glass Technologies, Markle, and Lumina Foundation.^{19,20,21,22} Most of this work, however, does not provide detailed definitions of the identified skill domains or the underlying skills, making it challenging to assess the quality of the data and the soundness of the recommendations. Detailed skill definitions are needed to adequately and accurately identify and address skill gaps—that is, to ensure that providers are training the right skills, the workforce is acquiring the skills needed to succeed in available jobs, and employers are assessing candidates on the correct skills.

One notable exception is the Occupational Information Network (O*NET) online database, which is a source of occupational information developed under sponsorship of the United States (U.S.) Department of Labor’s (DoL) Employment Training Administration. It contains hundreds of standardized and occupation-specific descriptors on almost 1,000 occupations covering the entire U.S. economy, and the information is all publicly accessible (www.onetonline.org). O*NET data are sufficiently specific and detailed to allow for comparisons at a more general level of skill profiles across occupations. Even within O*NET, however, the identified skills are only defined at a relatively high level (e.g., *science* is defined as “using scientific rules and methods to solve problems”; it does not specify what exact scientific rules or methods are needed, which can vary considerably across occupations). This can make it challenging to confirm that a given skill is defined consistently or defined at the same proficiency level across occupations. For example, the O*NET profiles for both Respiratory Therapists and Cardiovascular Technicians and Technologists indicate that qualified workers in these occupations must possess Science, Operation Monitoring, Social Perceptiveness, and Medical Software skills. However, the operationalization (e.g., what scientific rules and methods are being applied; what operations are being monitored, what specific medical software is being used) of each of these skills is quite different across these two occupations.

This lack of detailed, standardized information can make it challenging for individuals and organizations to identify skill gaps (both across skills and by proficiency level within each skill) and how best to address them (e.g., formal training, shadowing/mentoring programs, job aids, reskilling/upskilling, micro-credentialing, apprenticeships). Detailed, standardized skill definitions are also needed to help



prioritize gaps so that, for example, workers can identify the specific skills they should develop to maximize their career advancement prospects and where to focus their upskilling and reskilling efforts. Otherwise, they may focus on skills that are not needed or pursue skill-building opportunities that do not address the appropriate proficiency level.^{23,24}

Additionally, given the rapid pace at which jobs are changing, techniques that leverage automation (e.g., natural language processing and machine learning) to determine future skills needs should be explored to help identify changes in skill demand in real time. Most of the current efforts examining the infrastructure of future skills do so from a static point of view (e.g., examining data from the prior 2 years to arrive at a set of proposed future skills, or asking HR managers to provide insight into what they believe future skills will be in 5 years for a given occupation). However, given the rapidly changing nature of work, a more flexible infrastructure is needed, to make it easier for workers to update their skills and to help both employers and workers focus on the appropriate skills as the nature of work changes in real time (rather than focusing on a fixed moment in time).

Finally, standardized definitions of future skills (i.e., detailed skill definitions, with proficiency information) are needed to properly understand the interrelatedness of jobs. A detailed skill taxonomy would enable individuals to determine the specific skills needed for an occupation and the necessary proficiency level. Workers could then use this information when looking for new opportunities within an organization, considering a career change, or needing to adjust due to factors such as the COVID-19 pandemic or the automation of certain tasks in their jobs. Employers could also use this detailed information to determine how to upskill/reskill their current workforce. This would make it easier to retain existing workers who have demonstrated that they are a good fit for the organization and reduce the need to fire existing workers and hire new employees, likely resulting in net cost savings for firms. In addition, employers could use this information to ensure that any upskilling/reskilling programs address the specific skills needed to be successful in the targeted occupation.

Research Questions

Looking ahead, four key research questions need to be answered to further our understanding of future skills needs and provide better, more actionable information:

Question 1. What skills will be needed by workers to succeed in the future of work? There appears to be general agreement that technological/digital skills, socioemotional, and higher level cognitive skills will be priority domains for future work. But agreement on exactly what skills are included in each of these domains and the level of proficiency or mastery required for each skill for particular industries and occupations is lacking. This hampers efforts to determine what strategies and developmental opportunities should be used to bridge any skill gaps. We also lack details on the relative importance of skills within each domain (i.e., a hierarchy). Specifically, are each of the skills in a given domain of equal importance, or is there a subset of skills that are essential while others are “nice to have”?

Question 2. How are each of these skills defined? Even skills that may seem straightforward (e.g., communication) are not as easy to define as we think. Do we mean oral or written communication? If it is oral communication, are we referring to talking with a co-worker, talking with a supervisor, talking

with a client or patient, or talking with the press? Each definition will influence the types of developmental opportunities an individual worker should pursue to meet the needs of an employer. Even “basic digital skills” (which are meant to capture the technological proficiency that most jobs may require) can be defined in different ways (e.g., social media skills, use of search engines, desktop applications). It would also be important to specify the point at which basic digital skills become intermediate, advanced, or even expert, which may still all be different from advanced IT skills such as programming. In sum, much more refined and standardized definitions of skills are needed to guide training and educational content, individual training decisions, and employer HR practices. They can be used to define what specific skill profiles are needed across different jobs so that job seekers and employees understand how best to develop the targeted skills at the appropriate proficiency level.

Question 3. How can we continuously identify and develop future-ready skills more effectively?

A unique aspect of what has been dubbed by some as the “fourth industrial revolution” is the speed at which new ideas and technologies are affecting jobs. As a result, the skills and skill profiles associated with future occupations (based upon not only the skills, but the proficiency levels needed) should be expected to continue to evolve and change quickly. Gathering and validating current, real-time data about the skills of the present and future may require using machine learning methods to identify emerging new skills or skill profiles. These methods might include gathering information from current job postings, resumes, and job and practice analyses from emerging fields. It may also necessitate periodic surveying of representatives from large global organizations (e.g., human resources, research and development, chief information/technology officers) to identify what changes they believe are needed with respect to future-ready skills.

Question 4. How can we best understand the interrelatedness of jobs and facilitate transitions from one job to another? COVID-19 provides a case study for how comparisons of skill profiles between occupations can be important. The pandemic has shown that shortages of specialized occupations (e.g., respiratory therapists, ICU doctors, epidemic intelligence service officers, grocery store/warehouse workers, delivery drivers) can easily occur at periods of peak demand. While not all of these occupations require advanced skills, understanding what skills are needed to ramp up supply quickly would be easier if standardized skills (with operational definitions) and skill profiles (at a more detailed level than O*NET provides) existed. It is also important to recognize that the next major event may lead to completely different occupational shortages. Determining a method for quickly looking at relationships between occupations could help us quickly identify occupations that are similar to one another and leverage this information to more easily fill jobs or specific job tasks when occupational shortages occur unexpectedly. Determining how this information is best maintained, along with how needed skills can be most efficiently acquired (e.g., formal learning, upskilling/reskilling, micro-credentialing, shadowing) can significantly enhance our ability to respond quickly when the next event occurs.

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