

# BUILDING A SKILLS ENGINE FOR THE HUMAN ECONOMY

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The future will be won by skills. Skills differentiate careers, express the dynamism of the economy, measure the distance between people and opportunity, and open new avenues for equity. As the engine of the economy evolves from one that revolves around deskilling labor to one driven by continuous development of the skills base, our mechanisms for anticipating and identifying what skills will be needed and for developing talent are weak. Moreover, our metrics of productivity are rooted in a fading industrial paradigm.

The global economy is at an inflection point. We have a chance to recognize this moment, and to leave behind a history of commoditizing labor and undervaluing workers and to pursue national-level strategic efforts to build a multi-sector infrastructure focused on skilling workers. This represents a profound change, and an urgent one, particularly as a new generation of artificial intelligence promises to replace a far broader scope of human endeavor. It will not be an easy transition, and employers, workers, governments, and the education sector must collaborate to build the emergent human economy.

## **INDUSTRIAL PRODUCTIVITY STRATEGIES AND THEIR CONSEQUENCES**

### **Deskilling Labor, Replacing Labor, Labor Arbitrage, and Labor Flexibility**

For more than a century, the economies of the developed world have taken a reductionist approach to the people who work in them, one that frames the relationship within the single-minded pursuit of productivity. In the simplest terms, productiv-

ity can be computed as output divided by labor input. Throughout this period, the dominant mechanism industry deployed to increase productivity has been to manipulate labor input by altering the role, size, location, and cost of the workforce. From their roots in the assembly lines and timed tasks of Frederick Taylor and the “management science” of Alfred Sloan, the four key levers for this approach have been the commoditization of labor, labor replacement, labor arbitrage, and labor flexibility.

From a productivity perspective, the commoditization of labor is a way to deskill it so that it becomes mechanizable, substitutable, and transactional. Henry Ford realized early on that the skilled artisans he initially hired made high-quality cars, but they took too long and production was far too expensive. He then developed a process to employ workers who had fewer skills but easily learned repeatable tasks. He found that their performance could be accelerated over time and consequently was able to produce vastly more cars at a lower cost. These core ingredients of labor are still widely in use in the industrial economy to keep down the costs of acquiring and training new workers and boost profitability.

Labor replacement is the process of replacing workers with machines or with processes and routines that reduce the need for humans. The classic model is automation, which frequently involves robots or other machines capable of performing tasks once exclusively done by people. This has resulted in a massive decline in jobs in many industries, from the manufacture of cars and clothing to the widespread delivery of customer services by software systems with a soothing voice. Long before the recent specter of generative artificial intelligence (AI), software and AI have been exponential drivers of

labor replacement: Microsoft Office acts as a robot that enables many workers to perform tasks that once required the assistance of clerical, technical, budget, financial, and administrative staff. While reducing the number of employees, labor-replacement strategies also seek to increase the productivity of those who remain.

Over the past 40 years, labor arbitrage and offshoring have played major roles in the pursuit of productivity. Labor arbitrage, which has accelerated significantly since the 1980s, in tandem with the globalizing effects of changes in trade policy, has tapped into the enormous workforces and rapidly growing economies of China, India, Mexico, and Vietnam, among many others. Labor arbitrage works on the simple premise that companies can reduce costs by relocating their workplaces to countries where workers earn less, or offshoring. Since wages and operating expenses are so much lower in developing countries than in the industrialized world, offshoring strategies have been broadly applied across vast swaths of the consumer goods, manufacturing, and technology sectors.

Labor flexibility is a strategy for adjusting to variations in the marketplace and the economy by removing or adding workers to a company. It places a premium on reducing risk and drag so that, if the

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economy or sales suddenly go soft, a company can maintain a position of relative strength by laying people off. The rationale is that, by only paying for workers whose output remains high, companies stay lean and remain competitive. Adding workers fits into the same frame: if demand grows or the economy booms, employers with the flexibility to add new workers rapidly will always have an advantage.

### **The Consequences of Established Productivity Practices**

Crucially, each of these approaches to labor deemphasizes and weakens the relationship between employer and worker. The ties between them are purely transactional, hiring and firing are interchangeable options driven by productivity considerations, and worker expendability is the norm. With commoditizing, the task defines the relationship, and employers have few incentives to invest in worker skills or knowledge. Labor replacement, frequently in the form of automation, not only eliminates jobs and workers from a workplace, it also restructures entire industries that rely increasingly on AI to simulate human social interaction in place of live workers. Underpinning labor arbitrage is the assumption that both workers and locations are interchangeable, that the loss of workers' accrued experience and the disruption of local economies are limited and controllable transactional costs. Labor flexibility erodes the relationship between employer and employee, steeply reducing incentives for either workers or employers to build ties to one another.

The cumulative effect of these approaches to productivity is a vicious cycle of negative incentives. Employers hire and fire at will. Without long-term prospects, employees reciprocate by switching jobs casually and frequently: the so-called Great Resignation is simply the logical manifestation of this trend in a seller's market. Given the high rates of employee turnover,

it is hard for employers to get a positive return on investment on worker training. In this situation, few employers put much effort into developing an employee workforce with the skills, support, and flexibility to adapt to good times and bad. Instead, employers tend to hire the talent they need in the moment and to fire people when changes occur—an approach colloquially referred to as rip-and-replace.

While these strategies provide greater flexibility for firms and the resulting flexibility of the modern industrial economy is widely celebrated, they also drive the deskilling and reduced flexibility of the workforce, which renders workers less able to adapt. In the absence of ongoing training or the means to identify high-demand skills, let alone to acquire them on their own, workers find themselves obsolete. They have neither the personal capability nor the employer support to reposition themselves. In the worst case, workers are forced to drop out of the market altogether. Workers in their fifties in particular, after coming of age in an economy that did not help them acquire skills early in their career, face steep learning challenges in getting or keeping jobs and are increasingly slipping from the labor force—a trend that was accelerated by the COVID-19 pandemic.<sup>1</sup> As advances in technology enable automation to replicate a wider swath of human effort, such displacement could become significantly more widespread.

Companies themselves are now beginning to pay a heavy price for these strategies. The success of a transactional, commoditized labor strategy depends on the ready availability of a large workforce that is infinitely flexible and work that can be fully commoditized. But negative or low population growth in many developed and developing countries alike, together with low workforce participation rates in industrialized economies, have created a talent shortage that is likely to worsen over the coming decades. Meanwhile, the quicken-

ing pace of skills change and a growing demand for the interweaving of skills across domains are making jobs more complex. This in turn highlights the shortage of workers with these essential skills and raises critical questions about whether deskilling labor will even be possible going forward. Lacking the workers they need, companies are being forced to curb their output.

Put these two phenomena together—worker displacement and a shortage of people with essential skills—and you find an economy in which severely unfulfilled demand exists side-by-side with an under-leveraged and atrophied supply. The commercial and human costs are intolerably high, and rising.

## **THE RISE OF THE HUMAN ECONOMY**

If the historic engine of our economy has relied on deskilling labor, an opposite force is now emerging. The last decade has seen the acceleration of what is sometimes referred to as the knowledge economy but is known more comprehensively as the human economy. In the human economy, the driver of productivity is the level of people's skills. The best software developer is not necessarily or even likely to be the one who writes the most lines of code or who works the fastest. Effectiveness as a worker is about a much more complex equation that includes quality of work, creativity, willingness to learn, capacity to collaborate, and innovation, among other things. Recent leaps in the capability of artificial intelligence extend the scope of automation into the human economy, in many cases for the first time. However, that only further highlights the importance of focusing on what truly distinguishes human capability—and to defining what will increase value in human endeavor over time. In that context, the human economy has a very different framework

for boosting productivity, one that is focused more on the numerator in the productivity equation (output) than on its denominator (the cost of labor input). In this calculus, the drivers of the human economy are the development of worker knowledge and skills, combined with the effect on employers of having workers who are constantly developing new skills and applying them to pressing problems, thus forging a path to a new kind of productivity. Whereas the focus in the industrial economy is on managing the size, location, and cost of labor, the focus in the human economy is on growing labor's contribution to output through its ever-increasing capability.

The human economy has very different financial drivers from those of the industrial economy and its four predominant productivity strategies. Unlike the industrial market and the market for local jobs in the caring, food, and service sectors, the human economy works with a much higher gross margin—the difference between the direct cost of producing something and how much you made when you sold it. For crankshafts, sound systems, or appliances, if you spend \$400 to make it and charge \$500 to sell it, your gross margin is \$100, or 20 percent of your selling price. Labor and materials comprise most of the direct costs. By contrast, for software, pharmaceuticals, or movies, the considerable investments a company may make in initial labor are more than offset by the low direct costs of future sales. Creating a popular software application could cost hundreds of millions of dollars, but selling an incremental copy may have a direct cost of only a few cents. Meta's average gross margin over the past five fiscal years was 83 percent, while that of General Motors was 12 percent. That margin is important, because when a firm has a high gross margin it can afford to worry less about the cost of labor and worry more about the value of what it produces.

In other words, the focus in the industrial economy is on making labor a scalable input, whereas the focus in the human economy is on scaling labor's output.

Saving a little on wages isn't nearly as important in the human economy as ensuring the availability of the kind of highly skilled talent that can design and produce more valuable products. Similarly, investing in skills becomes more important than investing in alternatives to labor because human capability, when well invested, can evolve even faster than the rapid advances in automation. Harvard economist David Deming's research shows that the jobs that have been growing the fastest are those that demand both quantitative skills and social skills—a hard combination to replace by even the emerging generation of advanced generative AI.<sup>2</sup> Our own research finds that skills are blending across domains.<sup>3</sup> For example, marketing people need to analyze and manipulate customer data, and tech and data specialists need to draw from writing, communications, and teaming skills. Intersections like these make work in the human economy harder and harder to automate, no matter how sophisticated AI may become.

What's more, rapid change in the nature of work is challenging the economics of labor replacement. In my research with the Boston Consulting Group and Lightcast, we find that jobs are being redefined by new skills at an astonishing rate. In fact, the average job has seen 37 percent of its skills replaced over the past five years, and that pace accelerated further during the last two years of the pandemic.<sup>4</sup> It's hard to mechanize labor when the drivers of output are constantly changing. Even if robotic capabilities can match or exceed those of human economy workers, the calculus of automation will depend on replacing variable costs with fixed costs. Fixed cost investments only make sense when they can be recouped through long-term savings, but if the task that needs to be

automated is itself subject to constant change, the payback window for capital investment shrinks. Large language models and other recent advances in generative AI are no exception. The underlying neural network technologies on which they are based are effective at mining existing knowledge but are not capable of driving fundamental innovation.

As promising as this emergent set of trends may appear, the relative attractiveness of investing in people instead of machines only bears out if workers are indeed becoming increasingly skilled over time. How can modern societies rise to this imperative? What are the most effective mechanisms for investment? The scale of ongoing talent development needed for workers and employers to thrive in the human economy demands a multifaceted approach. What is needed is significant innovation and investment by education systems, employers, governments, and labor, along with new and more effective collaborations within and across these actors.

## **AN EDUCATION INFRASTRUCTURE FOR INVESTING IN SKILLS**

The transition from an industrial economy to the human economy needs to be mirrored in fundamental change to the valence of our education system. An industrial economy that considers labor largely commoditized looks to education institutions simply to render additional factors of production. Colleges and universities function correspondingly to bring workers into the market, but there is no expectation that those institutions will continue to build the capability of that talent over time. However, the human economy demands continued investment in skills over time. What will it take for institutions to shift from educating 18- to 24-year-old youths in a once-and-done degree-based model to providing agile, on-demand pro-

grams designed to help those already in the workforce advance?

If value in the human economy is determined by skill, it is incumbent upon our education system to ensure two things: that students have the skills needed to launch, and that workers can acquire new skills over time. But which skills we build matters. If focused effectively, education can invest students with the particular skills that drive value and unlock mobility in the human economy. In our recent research on how people escape the poverty trap, we find that some skills in a given occupation—for example, project management skills for a customer service representative—can quadruple a worker's probability of moving out of poverty. We need to make sure that our students are acquiring those skills.

Given the job market's extraordinary dynamism, and the current dearth of analytical practice in the education and workforce development arenas, our schools and postsecondary institutions must be empowered with greater data capacity. They must improve the ability to track changes in the landscape of opportunity for graduates and to identify the specific skills and credentials required of graduates. A major 2020 study of US career and technical education programs found that only 18 percent of the credentials earned are in demand by industry, while many of the needed certifications are undersupplied.<sup>5</sup> Addressing such gaps will require educators and employers to engage more effectively with one another at all stages—from curriculum design to placement to post-hire performance reporting—so that the right feedback loops are in place.

It is a mistake to focus exclusively on tech skills. Research clearly documents the essential role of foundational skills such as creativity, collaboration, research, and writing; in the human economy these skills are even more important. In fact, the jobs most likely to require skills from across do-

main—typically those most data driven and technology enabled—seek creativity skills 3.5 times more than other jobs, demand double the collaboration and research skills, and are 50 percent more likely than other jobs to require research and writing skills.<sup>6</sup> Employers' expectations of workers in the human economy are high indeed, and helping workers and students acquire this broad array of skills is a vast undertaking. The existing local systems that support workers and employers are under-resourced and of mixed efficacy.

Developing a national skills-building infrastructure for the human economy means going well beyond the bounds of primary and secondary education and even traditional postsecondary education. In the human economy, as new skills keep emerging and the mix of skills needed is constantly changing, education will continue over the course of a lifetime. Creating an infrastructure that will enable workers to acquire new skills on the fly will be essential to ensuring that, as the economy evolves, the workforce we have can become the workforce we need—and that workers' skills will not lag behind.

The human cost of skills obsolescence is high, and in a world with a talent shortage, the cost to industry is higher still. The nations that invest in a lifelong education infrastructure will develop the agile workforce they need to become global competitors. They will have a mechanism for ensuring that workers are always one step ahead, invested with the skills of tomorrow, and not mired in the skills of a fading economy.

## **INVESTING IN SKILLS IN THE WORKPLACE**

In the human economy, labor is the most critical production factor. Given the essential importance of the workforce, placing full responsibility for its capability and readiness on students, workers, and edu-

cators is asking too little of industry, the primary beneficiary. The free pass many employers have come to expect within a deskilling framework has left the workforce anemically under-skilled. Workers are left to identify and pay for training on their own initiative and on their own time. Educators in many regions use guesswork and feedback from former students now in the workplace to discern the skill requirements that employers should be sharing with them. Employers and industry bodies are urgently needed at the skills-building table.

The good news is that the emergence of the human economy creates new incentives for employers. The rapid pace of skill change, together with the hybridization of skills across domains, makes talent less easily commoditized and therefore less replaceable. Workers become more integral to their employers because their stronger skillsets render them scarcer and more valuable and because employers benefit as their employees grow. As such, companies have more incentive to invest directly in building the skills of their workforce. Furthermore, industry is best positioned to invest in labor not only because of the resulting enhancement of firms' value but because their direct relationship with workers enables them to offer the clearest signal of what skills are needed and of how they can best be acquired. Employers who know how to identify what new capabilities they will need can advise and support workers on how to increase their value most efficiently.

The bad news is that relatively few companies have mature systems for identifying what new skills are needed and for helping workers skill up rapidly. Talent management of this kind is an undeveloped muscle for most firms, whose programs are often little more than a perfunctory exercise in employee engagement.

To make skill development a mission-critical business process, leaders must weave together five fundamental strategies:

- *Know your talent.* Few employers truly understand their talent base. They know their employees' titles and tax ID numbers but not their skills and capabilities. Absent that awareness, companies are unable to identify high-value skills within their organization or predict critical gaps relative to future talent needs. Profiling systems designed to create such an inventory are often challenged by low employee engagement, which in turn is tied to workers' skepticism about any actual benefits of participation. Companies can do better by defining the skills of each talent pool—often called role architecture—and by leveraging new, more integrated methods for cataloging each worker's capabilities that are closely tied to opportunities for learning and advancement.
- *Know what skills will be needed.* Most firms have a strategic workforce plan, but it is typically an exercise in financial planning rather than a tactical program for connecting the firm's future direction to specific talent acquisition or skill development. What skills will be needed to execute the firm's business strategy? Future skill requirements will continuously change, even in occupations well represented in the current workforce. What new skills will be needed can sometimes be predicted, but this is not always possible. What matters most is learning, and learning fast; the key is to become acutely aware of new and emerging skill demands and gaps in order to provide a prompt, clear, and reliable system for addressing them. Absent this, a workforce is always playing catch-up and always at risk of obsolescence.
- *Craft a new set of productivity metrics.* Current productivity metrics are stuck in the industrial era. An industrial model asks how many calls per hour a customer

service representative takes or how many door hinges per hour a worker installs on an automotive assembly line. The productivity calculus of the human economy may be harder to frame, but it will be just as essential. It may be the impact an individual's creativity has within a team, or the effect an operations analysis has on product quality or timeliness. Without effective metrics for output value, companies will be unable to evaluate the return on investment yielded by skill-building programs. That will make it hard for them to develop a scalable commercial logic for making and prioritizing investments over time.

- *Build an agile learning and development program.* Three critical priorities in the human economy are knowing existing talent, anticipating future skills needs, and tracking the impact of skill investments. To encompass all three, companies will need a learning and development program that can adapt to emerging imperatives, such as ensuring that the skills of workers in a certain function stay relevant or redeploying a set of workers to higher value roles. Companies need the ability to write “skill prescriptions” for specific skill-building experiences that are tailored to each talent pool and each worker. At the same time, companies must have an effective dispensary to fill these prescriptions, including providing a fast track that enables workers to learn and apply new skills. To do this in a way that is efficient, personalized, and agile, it will be necessary to tag learning catalogs to skills so that training programs can be compiled on demand.
- *Engage the workforce.* In the human economy, employers and employees have a shared incentive to see human capital value rise. However, employers can't assume that employees will know the best way to develop their abilities without clearly communicated guidance. To date,

however, few companies, even those that spend a considerable amount on employee learning programs, consistently provide effective signals to their employees. They often frame their learning programs as a benefit rather than as an opportunity to increase earnings and earn promotions. Companies also need to provide the supports such as time, space, and reimbursement mechanisms to make it simpler for employees to take advantage of the training opportunities that are important to both parties.

Data is at the heart of each of these strategies, and implementing them calls for firms to build up their analytic capacities. Whether it is understanding their own talent, devising ways to identify and respond to skills gaps, reinventing productivity measures, developing more agile and systematic mechanisms for skill development, or engaging workers more effectively in their own careers, companies will need to be guided by data—data about their own talent, data about the broader market landscape, and data that provide a window onto future skill requirements. But thriving in the human economy will require more than that. It will depend not only on knowing what questions to ask but also on systematizing the asking of the questions. Talent analytics—the robust understanding of the talent a firm has, the talent it needs, and the opportunities to connect the two—must be embedded in the gamut of commercial processes.

## **AN ENGINE FOR SKILLS IS AN ENGINE FOR EQUITY**

Having an effective skill development infrastructure creates a new engine for workforce equity. The industrial era focus on hiring as a nearly exclusive talent strategy has left firms unable to fulfill the imperative to build a more inclusive workplace. A skills engine enables firms to identify and tap underleveraged talent pools within



their existing workforce, and thus to build diversity from within by developing effective skill pathways.<sup>7</sup> Because the same skills engine that increases opportunity and access for historically underrepresented workers can underlie the broader, companywide talent development program, preparing effectively for the human economy will also yield a more equitable workforce and, ultimately, a more equitable society.

### **CHANGING THE RELATIONSHIP BETWEEN INDUSTRY AND LABOR**

The traditional focus of organized labor has been on wages, benefits, and working conditions. Capital costs are high in the industrial economy, so any work stoppage is financially crippling; loans must be repaid whether or not the machine is running. In an era in which labor was relatively undifferentiated by skill, the union's sole point of leverage was withdrawal from work. As capital-intensive industries moved offshore, unions struggled to gain equivalent leverage in the service sector; as a result, membership in many countries has declined.

In the human economy, framing negotiations around wages, benefits, and working conditions may be missing the bigger opportunity for both labor and employers. On the one hand, wages can only rise so much without a corresponding increase in productivity, and that productivity enhancement can only happen through an increase in workers' skills. On the other hand, even deftly won pay raises are unlikely to yield the same kind of boost for workers as an increase in their marketable skills and economic mobility. Traditional labor-management interactions might help a work group go from making \$18 per hour to \$21, but the only way those workers will earn \$35 per hour is if they gain the skills needed to move up to altogether better jobs.

Organized labor could find itself shaping the future of the human economy if it focuses on the learning, training, and skill-building needs of union members and prospective members. This approach would enable labor to take on the important new tasks of championing the skilling of the workforce, advocating for workers' mobility by protecting their ability to learn and earn, and preventing the erosion of their skill base. The result would be a new social contract anchored in the promise of mobility rather than stability.

Employers also have a lot to gain from forging a new kind of partnership with labor. A return to longer term, more committed relationships with their employees will enable employers to cultivate the workforce they will need in the future from within the workforce they have, making them less vulnerable to a labor market shortage while increasing the payback period on their worker-training investments. Turning from an approach of "buying what we need for now" to embracing a "building for the future" strategy offers employers new options for creating stronger, more enduring, and more productive ties to their workers.

### **MEASURING PROGRESS**

Broad exhortations don't lend themselves to effective transformation. They lack the concreteness needed for charting a way forward, for setting tangible goals, and for tracking progress. The forces described here are indeed overarching, but the emergence of new skill-level data makes possible the development of innovative metrics that describe the strength of a workforce in both relative and absolute terms. In fact, these same metrics can be applied at any unit of aggregation, whether organizationally, regionally, sectorally, or nationally.

For a comprehensive view, skill investment should be considered through three

complementary lenses: input—the value of a talent pool as a factor of production; output—the return on investment in skill development; and impact—the value added to the labor factor of production. Put in different terms, the physics of the human economy can be measured in ways not dissimilar from those used to measure cosmic bodies. In the industrial economy, we have grown used to measuring what physicists might call the kinetic energy of labor—that is, how much output is produced. In a human economy that recognizes talent for both its present value and its future potential, we also need to measure the potential energy of a workforce—that is, the skill value of a workforce as economic input. What’s more, to track progress over time, we need a measure of change in potential energy, or what we call the human impact of the investment made.

These new measures are relatively simple to construct and operationalize. Here are specific opportunities to develop effective metrics for input, output, and impact:

*Input.* Skills represent a currency for the human economy. In any given role, skills distinguish between high- and low-value definitions of the work and, correspondingly, between a high- and low-value workforce. For example, a workforce whose marketing managers have strong product management and product marketing skills earn a 46 percent premium over the median wage for marketing managers overall, whereas marketing managers with Adobe skills make 19 percent less than the median. In a market economy, wages are a proxy, albeit sometimes imperfectly, for expectations of productivity. As such, a skill-based measure enables both effective relative comparison—the company whose marketing managers are invested with product management capability is considered to have a workforce of “potential energy” 80 percent greater than that of peers who over-index on the Adobe suite—and absolute value—

measured as the sum of the wages of workers in a given role.

*Output.* Productivity is the most direct measure of the output or kinetic energy of a workforce. In our discussion above of investing in the skills of a workforce, we proposed an approach to reinventing productivity metrics for the human economy.

*Impact.* We can measure return on investment in skills—essentially, the change in a workforce’s potential—by comparing measures of skill value directly as a time-based comparison in input metrics or, more simply, as proxied through worker advancement. In the direct measure, we evaluate the addition of human capital value through a change in skills or, more generically, through a change in compensation, adjusted for regional and sectoral wage inflation. The advantage of the former is that it is likely to be more accurate; for example, a software engineer who has accrued Python skills is more valuable than one who has only Java skills, regardless of whether she is now paid any more, whereas a compensation-based metric of value-added is easier to compute. However, tracking worker mobility may be altogether superior, in that such a measure aligns with a more fundamental understanding of the human economy. When people rise, they become more valuable—not only to their employers but to themselves and to society. Someone who started at a company as an accounting clerk and now serves as a compensation and benefits manager is doing higher value work for the company, is presumably bringing home higher pay, and is adding to the competitiveness of their nation. Until recently, measuring worker mobility proved surprisingly elusive, but The Burning Glass Institute’s recent American Opportunity Index project provides a repeatable methodology for tracking worker advancement.<sup>8</sup>

## A NEW GLOBAL PLAYING FIELD

Society today is at an inflection point. We find ourselves at the confluence of a 100-year-old economy driven by the deskilling of labor and a new economy that can only be fueled by skilling people up. Points of inflection are always fraught with risk and opportunity. The human economy may be ascendant, but it cannot thrive in any country without major changes in practice across industry, education, labor, and government.

In the 21<sup>st</sup> century, jobs will be won or lost based not on labor costs but on talent. That will be a monumental shift that has deep implications for modern education, for national competitiveness, and for the global society.

A new human economy defined by skills will become a playing field on which a wide array of nations can change their standing and reverse their fortunes. Nations that build learning workforces that are aligned with the needs of industry and supported by a collaborative national infrastructure will enjoy unprecedented growth. This applies to all nations. Developing economies will be able to leapfrog their more developed peers by building the skills most likely to be sought in the future. In an economy that is less sensitive to labor cost advantages and more motivated by the quality and availability of talent, developed countries will get the chance to reset their long-established industrial patterns and to draw on their strengths.

But this is no time for industrialized countries to rest on their laurels. A high-cost, high-productivity economy can win in this new paradigm, but many countries, the US included, have a long way to go in achieving this goal. The alternative—to become a high-cost, low-productivity economy—is a recipe for stagnation, inequality, and social decay. Our work is cut out for us.

To build the workforce of the future, we must build the skill infrastructure of the future, one that is dynamic, prescriptive, and endowed with the data-centricity and capacity to build an engine for the human economy. The recommendations offered here can be seen as a guide for employers, educators, labor unions, and policy-makers; the action steps proposed offer benefits to each of them. The true promise of this moment, however, is what these separate entities might create in concert: an infrastructure that can fuel the engine of the human economy—an engine that is uniquely valuable, truly agile, and endowed with the data-centricity to empower people, firms, and nations to reach their full potential.

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- 1 An 2013 AP-NORC survey found that 40 percent of older workers reported not having the right skills for the available jobs. Associated Press-NORC Center for Public Affairs Research. (2013). *Working longer: Older Americans' attitudes on work and retirement*. [https://apnorc.org/wp-content/uploads/2020/02/AP-NORC-2013\\_Working-Longer-Poll\\_Topline\\_FINAL.pdf](https://apnorc.org/wp-content/uploads/2020/02/AP-NORC-2013_Working-Longer-Poll_Topline_FINAL.pdf)
  - 2 See [https://scholar.harvard.edu/files/ddeming/files/deming\\_socialskills\\_aug16.pdf](https://scholar.harvard.edu/files/ddeming/files/deming_socialskills_aug16.pdf).
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  - 4 Sigelman, M. et al. (2022). Shifting skills, moving targets, and remaking the workforce. Boston Consulting Group and Burning Glass Institute.
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  - 7 See <https://hbr.org/2021/04/to-build-a-diverse-company-for-the-long-term-develop-junior-talent>.
  - 8 See <https://americanopportunityindex.org/>.