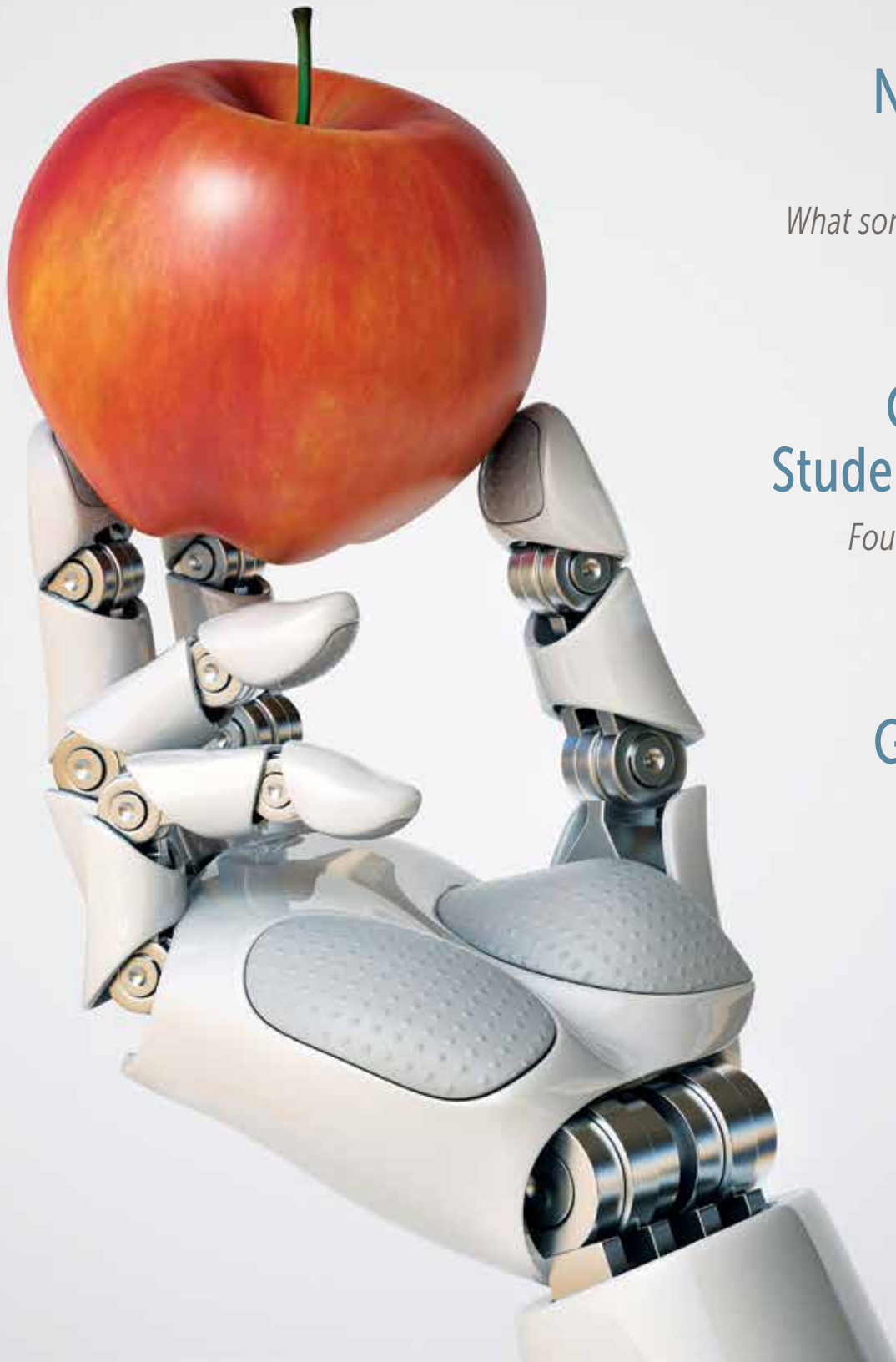


# THE AGE OF AGILITY

EDUCATION PATHWAYS FOR THE FUTURE OF WORK



## Next Industrial Revolution

*What some of America's largest companies have to say*

## Creating Agile Students & Workers

*Four profiles for the future*

## Where Do We Go From Here?

*Call to action*



AMERICA  
SUCCEEDS

# ABOUT AMERICA SUCCEEDS

**A**merica Succeeds works to ensure our nation's public education system prepares every student to succeed in a competitive global economy. Our mission is to elevate and expand America's business voice for the dramatic and continuous improvement of public education.

We believe:

- Education is the single most important influence on an individual child's success and the overall health and vibrancy of our communities and economies
- The most important changes in education are occurring through policies adopted at the state level
- Business leaders have a unique and valuable perspective to bring to the education policy discussion occurring in every state across the country
- There is an economic imperative for business leaders to engage in education policy dialogues and debates
- The long-term success of our economy, our nation's competitive advantage, and our national security require improving educational outcomes

Simply put, we believe great schools are good business.



1390 Lawrence Street, Suite 200 | Denver, Colorado 80204  
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## ***About the Report***

In this report, America Succeeds tells stories and presents data about the seismic shift underway in the education-to-employment pipeline.

Observing how companies are adapting provides insight into what educators, students, and current workers must do to remain competitive in the rapidly changing workforce.

We explore how each one of us will have to take ownership of a lifetime of learning—a constant process of retraining and reeducating ourselves as the world around us lurches into the uncertain future.

## ***About the Authors***

**Jason Gaulden** is Vice President of Partnerships at America Succeeds. With 20 years experience in nonprofit leadership, consulting, and philanthropy, he specializes in strategy, communications, and fundraising. He frequently writes on the topics of education, business, and music. Jason is a graduate of the University of Colorado at Colorado Springs, where he studied sociology.

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## SPECIAL THANKS

This report is inspired by, and published in partnership with the following nonpartisan business coalitions working to improve the education-to-employment pipeline in their respective states: Colorado Succeeds, Idaho Business for Education (IBE), Business for Educational Success and Transformation North Carolina (BEST NC), Arkansas Learns, Oklahoma Achieves, and Aligned.



# PREFACE

## FORWARD THINKING

### *Business Leader Perspectives on the Future of Work*

Imagining and planning for the uncertain future is both exciting and daunting. Many business leaders are thinking deeply about what the accelerating wave of automation and artificial intelligence means for their workforce pipeline, and employee training and retraining. They're also pondering how to pair humans with technology in new ways to create the greatest possible synergies. And they're grappling with the greatest challenge of all: how do you plan for a future with no clear and reliable sense of what it will look like?

Here are the views of several business leaders on the Age of Agility and the future of work.



*"Collaborate, Innovate, Accelerate is our strategy at The Boeing Company. Revolutionary advances in technology have translated to amazing new products in our businesses, which highlights the need for changes to the education and training of our future workforce. We need these changes to start earlier and to include both technical and soft skills, such as critical thinking, problem solving and working with diverse teams."*

David P. Eddy  
Boeing Colorado Site Director



*"We need to make sure our schools are educating kids and their parents on what is driving our economy, and their future opportunities, and prepare them for that."*

Brad Rhorer  
Human Resource Assistant Senior Manager, Subaru of Indiana Automotive



*"(Education needs to be) preparing students for jobs that don't exist and to use technologies, sciences, and methods that we haven't even discovered yet, to solve problems that we haven't identified."*

Jamie Casap  
Education Evangelist



*"Businesses, skills providers, non-profits and governments at all levels have to find new ways to work together to ensure people are equipped to succeed in rapidly changing workplaces."*

Sean Thurman  
Director of Global Public Policy



*"We can't just go out and throw up some ads and hire some skilled people. The numbers just are not out there. High schools and colleges in the U.S. are not turning out graduates with the mix of technical expertise, soft skills, problem-solving ability and communication skills that companies like Toyota need."*

Dennis Parker  
Assistant Manager, Toyota North American Production Support Center



*"There used to be a more or less steady state. Now it is just constant change. The ability to adapt and change is the key to the future."*

Alexis Sgouros  
Vice President and Business Information Officer



*"We need to hire people who can maintain and work on this high-tech equipment we're putting into the factories to keep up with growing worldwide demand for our products."*

Dan Moore  
Training Specialist



*"We have not solved the technical training problem of the last generation, even as we are very quickly moving into this new AI and robotics space."*

Mark Osowick  
Vice President for Human Resources Operations



*"We're looking for candidates who are passionate and driven to succeed in their particular area, who learn new concepts and technology quickly, who are curious and innovative and who have a strong sense of integrity."*

Shannon Garcia  
Senior Vice President of Recruiting and Human Relations

# EXECUTIVE SUMMARY

**T**he Age of Agility has arrived, yet the U.S. is not well prepared to face the challenges and seize the opportunities it brings.

To thrive in the future workforce, which is being drastically redefined by technological advances, workers will need to get comfortable with uncertainty, embrace flexibility, and reset expectations about the employer-employee relationship.

We are in the early stages of a rapidly accelerating revolution that will bring automation and artificial intelligence into sectors of the workforce that have, until now, been spared this latest wave of disruptive change.

Forward-thinking corporate executives, academics, technologists, and economists may not often agree, but on this they are virtually unanimous: the disruption we're just beginning to experience will rival any technological upheaval in history in both scope and impact.

This report presents compelling data about this seismic shift. We'll show how some companies are adapting. We'll explore how each one of us will have to take ownership of a lifetime of learning, a constant process of retraining and reeducating ourselves as the world around us lurches into the uncertain future.

*"The education system is not an assembly line to churn out students for the workforce. It's a civic bedrock to produce informed and engaged citizens who can contribute to their communities. For most of us, however, being successful in a job is an integral part of being a productive member of society."*

*-Tim Taylor, Executive Director,  
America Succeeds*

Millions of jobs are at short- or medium-term risk of disappearing. Many that don't disappear will be so radically restructured as to be unrecognizable, with enormous implications for today's workers.

The World Economic Forum describes these fundamental shifts as the Fourth Industrial Revolution, and its founder and executive chairman, Klaus Schwab, writes:

"As automation substitutes for labor across the entire economy, the net displacement of workers by machines might exacerbate the gap between returns to capital and returns to labor. On the other hand, it is also possible that the displacement of workers by technology will, in aggregate, result in a net increase in safe and rewarding jobs.

We cannot foresee at this point which scenario is likely to emerge, and history suggests that the outcome is likely to be some combination of the two. However, I am convinced of one thing—that in the future, talent, more than capital, will represent the critical factor of production."<sup>1</sup>

The response to this challenge must be a societal one that resets expectations about employment and embraces a new mindset for what it means to be employable, which has as much to do with adaptive interpersonal behavior as it does interacting with technology in the workplace.

At the moment, there's nothing on the horizon to replace many of the jobs that will be lost. Optimists insist that all technological revolutions always create entirely new sectors of employment, and this one will be no different, even if we can't yet envision what those sectors might include.

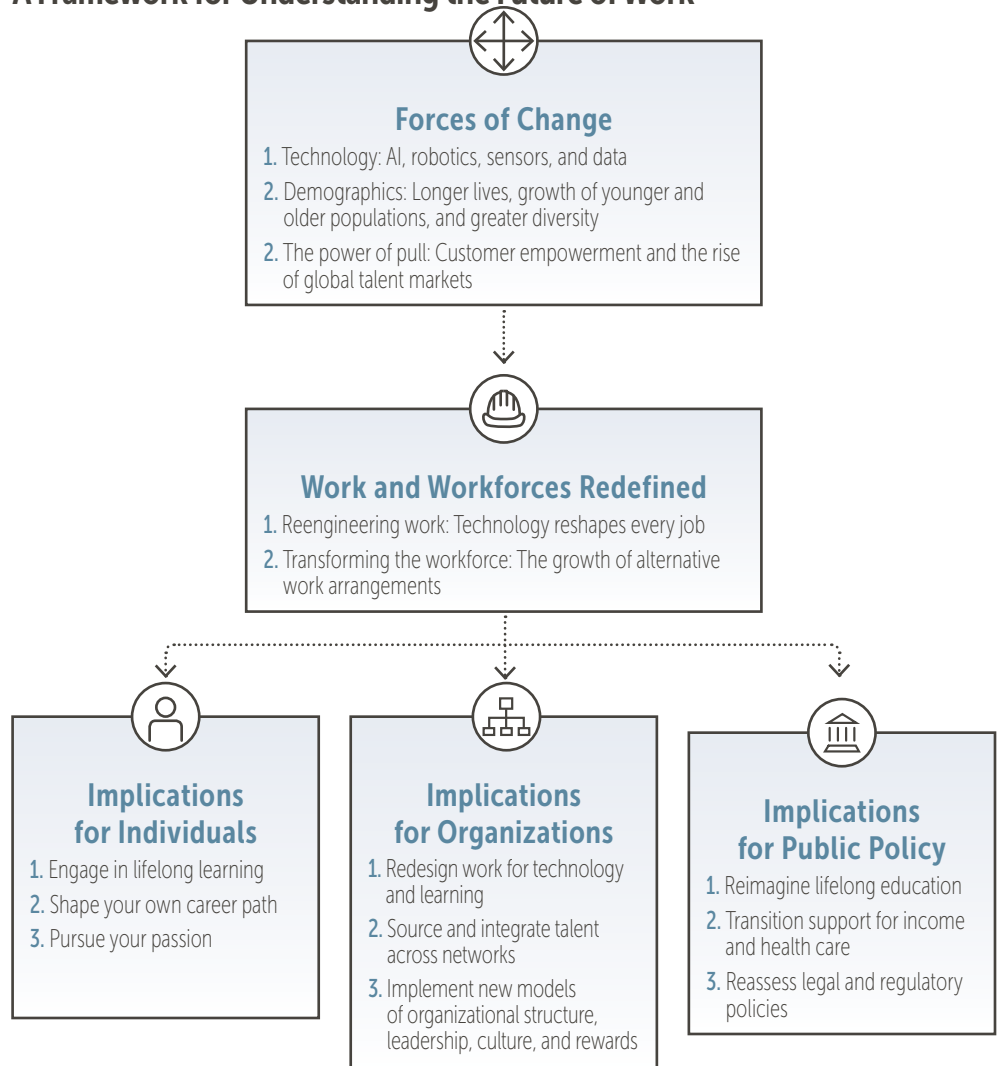
Despite the uncertainty, one thing is clear: those who will survive and thrive in this new reality will have to be highly agile, creative, critical thinkers, comfortable in diverse environments, and open to a future far more fluid than that to which we are accustomed.

Unfortunately, our current education system has long been behind the curve in preparing students for the current world of work, let alone the new Age of Agility. Without profound and rapid changes to how we educate our children, this nation faces the real possibility of falling farther behind countries with nimbler and more innovative education systems.

# EXECUTIVE SUMMARY *continued*

Deloitte, a global consulting and financial advisory firm, which works across multiple industries, illustrates the point in their Framework for Understanding the Future of Work:

FIGURE 1  
**A Framework for Understanding the Future of Work**



Source: Deloitte Review | Issue 21 | Navigating the future of work: Can we point business, workers, and social institutions in the same direction? | By John Hagel, Jeff Schwartz, and Josh Bersin | July 2017

## Alarming numbers

To understand the scale, impact, and implications, try imagining half the jobs in the U.S. workforce disappearing. An astounding 47 percent of all U.S. jobs are at risk of elimination in the next 10-20 years, according to analysis by Carl Benedikt Frey and Michael A. Osborne of Oxford University.<sup>2</sup>

Frey and Osborne estimate that 83 percent of jobs paying less than \$20 per hour would come under pressure from automation, as compared to 31 percent of jobs paying between \$20 and

47 percent of all U.S. jobs are at risk of elimination in the next 10-20 years.

\$40 per hour and four percent of jobs paying more than \$40 per hour. In other words, lower-wage jobs are 20 times more likely to disappear than jobs at the higher end of the spectrum.

Taking a seemingly more optimistic tone, a 2016 policy brief from the Organization for Economic Cooperation and Development estimates only nine percent of U.S. jobs are at risk.

But read the OECD report closely and more alarm bells go off. Many jobs that don't disappear will be fundamentally altered by automation and AI, meaning millions of Americans will require extensive retraining or additional education to stay employed.

And these aren't just low-level, menial jobs. Millions of truck drivers could be out of work as autonomous vehicles gain dominance. Many white-collar professionals, including radiologists, paralegals, and even lawyers could be profoundly affected as well.

### How individuals must adapt

Until now, people with post-secondary certificates, a community college degree, or a degree from a four-year college could take the credential and head out into the world with some confidence that they would find steady, gainful employment. That's still the case today in many industries. But not for long.

The likelihood of certain jobs being automated is largely driven by two factors: creativity and repetition. Jobs requiring high creativity and less repetition are, so far, less likely to be done well by robots. The less creative and more repetitive a job, or tasks within a job, the more likely it is to displace a human in favor of automation. This is true from mechanized line production, to reading x-rays, or processing basic legal documents.

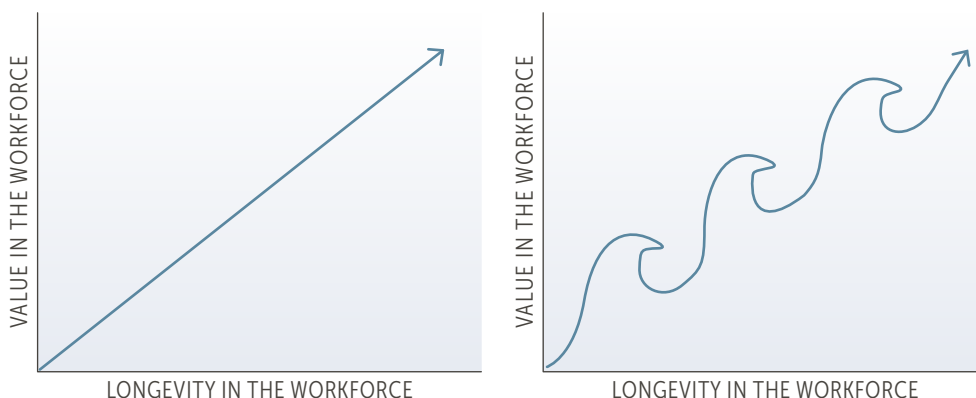
One idea currently in vogue is that we have entered the "gig economy." Increasingly, people will not have careers, or work in jobs as currently defined. Instead, they'll go from "gig" to "gig," like itinerant musicians, using whatever talents or skills they possess to perform tasks for others on a contract or freelance basis.

FIGURE 2

### Workforce Endurance in the Age of Agility

**OLD MODEL:** A single specialized skill or degree once led to enduring value and longevity in the workforce.

**NEW MODEL:** Continuous waves of learning and skills upgrades creates adaptability to changing conditions, increasing value and longevity in the future workforce.



Source: Deloitte Review | Issue 21 | Navigating the future of work: Can we point business, workers, and social institutions in the same direction? | By John Hagel, Jeff Schwartz, and Josh Bersin | July 2017

Some so-called "soft skills," like empathy and emotional intelligence, will always be in demand, because machines can't replicate them, at least so far.

## EXECUTIVE SUMMARY *continued*

Most people, however, will continue to seek regular, salaried work. It will be harder to find, require higher qualifications, and will be more prone to disappearing than it has been in the past.

Some so-called “soft skills,” like empathy and emotional intelligence, will always be in demand, because machines can’t replicate them, at least so far.

In addition to those soft skills, there are other strengths that people will need to develop if they’re to find a semi-secure place in this new order, including critical thinking skills, adaptability, and tenaciousness. Going forward, everyone will have to take ownership of a continuous cycle of learning, finding work, relearning, and finding different work (*see Figure 2*).

### ***Can schools adapt?***

Students exiting the pre-K-12 education system will need to be prepared for radical societal and workplace changes if they are to have any shot at thriving personally or professionally. By and large, however, our school systems are failing to prepare them for this emerging reality.

Far from making plans to educate students to thrive in the economy and society of the near-term future, most school systems are still struggling to do an adequate job providing students with the basic skills needed for twentieth-century life and work.

According to the National Assessment of Educational Progress, the largest nationally representative and continuing assessment of what America’s students know and can do, fewer than 40 percent of graduating students scored at college- and career-ready levels in recent years.

An evolving school of thought promotes scrapping our existing education systems and starting over. The basic argument here is that the current system is so rife with perverse incentives, entrenched special interests, and ideological polarization that even the incremental changes achieved to date have occurred only after protracted political battles. In many other sectors of our high-tech society, change is often transformative and quick.

There is a deeply embedded resistance to agility in the current education system, which demonstrates the need for an overhaul and simultaneously makes it difficult to do so.

But it’s hard to envision how a radically new system could be implemented while our current method of schooling limps along, with millions of schoolchildren inside its walls nine months a year. In isolated pockets, however, practitioners are beginning to provide real-life models.

One preliminary step school systems could take to prepare students for the future would be to create networks of truly diverse schools. Recent evidence demonstrates that integrated, inclusive schools are ideally positioned to help young people develop the capacities they will need to thrive in increasingly diverse workplaces.

### ***How business can adapt***

As individuals scramble to adapt to these emerging new realities, and the education system fails to keep up, employers should take steps to assist them, through ongoing training and retraining programs.

## Defining Agility

Here’s how Jaime Casap, Google’s “Chief Education Evangelist,” describes the opportunity and challenge the education system faces: “Preparing students for jobs that don’t exist and to use technologies, sciences, and methods that we haven’t even discovered yet, to solve problems that we haven’t identified.”



But that doesn't address a major challenge many businesses currently face: finding qualified workers. Some companies, like Subaru of Indiana Automotive, are revamping hiring practices to find diamonds in the rough, rather than using automated sorting mechanisms that eliminate many applications before human eyes see them. What it boils down to is looking beneath the surface, past basic qualifications and skills and into the essence of each individual.

### **Conclusion and call to action**

In every state and local community, business leaders, educators, and policymakers must work together to confront and conquer the current skills gap and reconfigure the education-to-workforce pipeline. Because we can't predict the exact skills needed to succeed in tomorrow's jobs, our charge is to equip students with the tools of agility and inspire a mindset of lifelong learning.

To do so, we must remove barriers to innovation in education—any laws, policies, and regulations that make it impossible to adjust on the fly to changing circumstances. While

schools must operate within rigorous accountability frameworks, those frameworks must be focused exclusively on outcomes, not inputs, to avoid locking educators into any one model or path forward.

The pace of change in the workforce is accelerating; therefore, schools—or whatever learning system replaces them—must mirror that rapid-fire change.

America Succeeds will partner with local stakeholder groups in cities and states across the country to facilitate community conversations on what the future of work and the Age of Agility means for restructuring—as radically as deemed necessary—the way we deliver education. Through community-driven initiatives, policy, and advocacy (and with local business leaders fully engaged and supportive) we believe that much-needed systems transformation is possible.

We also believe in the power of a network, and therefore, each community conversation will contribute additional knowledge and resources to our free, online resource bank at [AgeOfAgility.org](http://AgeOfAgility.org).

*Autonomous vehicles use artificial intelligence to safely navigate roadways*



# INTRODUCTION

When the J.R. Simplot Company opened its new, highly automated potato-processing plant in Caldwell, Idaho, in the fall of 2013, it closed three older plants in the state and laid off 800 workers.

About 250 were hired to work in the new plant. But these were different jobs, requiring different skills. While some of the old workers were hired back on, many were not.

“Human contact on the product at our new plant is actually zero,” said Dan Moore, a Simplot training specialist. “On our operations side it is all equipment maintenance, and adjusting settings on the machine for different products. People don’t touch our product.”

This is far from an unusual story these days. What has happened at Simplot is happening across the country. Automation and artificial intelligence are becoming increasingly dominant players in manufacturing, and in a broad spectrum of other industries and walks of life as well. Over the next decade, millions of U.S.

workers could face the same fate as the 800 who lost their jobs at Simplot plants.

Yet while articles and studies on these issues appear daily, there’s distressingly little evidence that our education system is responding to this challenge with anything approaching an appropriate sense of urgency. With few exceptions, school districts aren’t poised to make the radical changes necessary to produce graduates with the agility they need to thrive in this emerging new reality.

Again, Simplot provides a clear example of this challenge. At the new plant, which cuts, fries, and freezes potatoes for fast food and other restaurants in the U.S., China, and Japan, most workers don’t need a four-year college degree, and some don’t even require a two-year associate’s degree. But that doesn’t mean anyone with a high school diploma can waltz in and land a job. Far from it.

Simplot is careful about who it hires to work there. The interview process is more arduous and the attributes hiring teams



*Robotic automotive manufacturing line*

seek are specific and different than what you might imagine for a manufacturing plant.

Plant employees share responsibility for making sure the machines are operating properly, and identifying solutions when glitches occur. The jobs require more brains than brawn, and even more important, softer skills that make people good team players.

So the competencies Simplot seeks are hardly surprising: accountability; being a team player; being dependable. And, perhaps most important, troubleshooting ability: being able to think logically and critically about a problem and take logical, sequential steps to solve it.

"We select people off their competencies and personality traits and we would rather spend money and effort to take this right person we know is going to be successful and train them, rather than the person who has all the training coming in, but may lack the competencies," Moore said.

These jobs pay well: between \$25 and \$30 an hour, which translates to an annual salary in the mid-\$50,000 range, a solid wage in a low cost-of-living state.

But Moore regularly confronts a vexing problem. Many graduates of local school systems either don't want or aren't qualified for the open jobs. Some look down their noses at manufacturing jobs in the belief they're menial.

A far greater number of high school graduates might want the jobs, but lack the basic competencies.

These aren't high-level skills. Why, then, is it so hard for schools in Idaho, and across the nation, to produce enough graduates prepped to succeed in the workplaces of today and the near-term future?

Simplot's hiring challenges raise red flags about our education system, our economy, and our society that we ignore at our peril. And Simplot is hardly alone in its struggle to find qualified workers.

We are in the early stages of a rapidly accelerating revolution that will bring automation and artificial intelligence into sectors of the workforce that have, until now, been spared this latest tsunami of disruptive change.

Forward-thinking corporate executives, academics, and

economists may not often agree, but on this they are virtually unanimous: the disruption we're just beginning to experience will rival any technological upheaval in history, in both scope and impact. In fact, you'd have to go back 100-plus years to the widespread adoption of electricity to find anything similarly transformative.

Millions of jobs are at short- or medium-term risk of disappearing. Many that don't disappear will be so radically restructured as to be unrecognizable, with enormous implications for today's workers.

At the moment, there's nothing on the horizon to replace many of the jobs that will be lost. Optimists insist that all technological revolutions always create entirely new sectors of employment, and this one will be no different, even if we can't yet envision what those sectors might include.

Despite the uncertainty, one thing is clear: those who will survive and thrive in this new reality will have to be highly agile, creative, critical thinkers, comfortable in diverse environments and open to a future far more fluid than that to which we are accustomed.

"We don't understand yet how all these changes will affect us in the future," said Alexis Sgouros, vice president and business information officer for Kaiser Permanente's Colorado region. "There used to be a more or less steady state. Now it is just constant change. The ability to adapt and change is the key to the future."

This report presents some compelling data about this seismic shift. We'll show how some companies are adapting. We'll explore how each one of us will have to take ownership of a lifetime of learning, a constant process of retraining and reeducating ourselves as the world around us lurches into the uncertain future.

In other words, we all must prepare ourselves for the Age of Agility.

We'll look at how far our moribund education systems must travel in a short period of time to meet evolving needs of individuals and businesses striving to adapt to fluctuating circumstances.

And finally, we'll issue a call to action. It's time for visionary education and business leaders to join forces with policymakers to declare a national emergency and attack this problem with the same urgency that drove us to the moon in the 1960s.

We should have started yesterday. It's not too late if we take concerted action now.

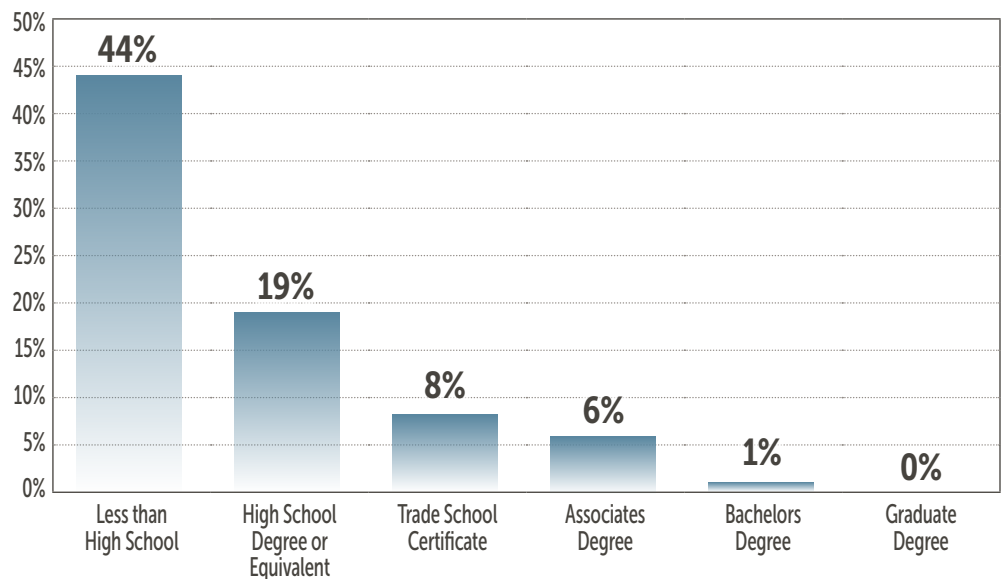
# WHAT WE'RE FACING

First, let's set the stage.

The growth of automation and the increasing sophistication of artificial intelligence in the workplace are starting to create an upheaval so profound that some people are calling it the fourth Industrial Revolution.

"What is different this time is that today's advances in digital technologies are remaking not just manufacturing and low-skilled labor, the focus of past revolutions, but every sector of the economy and society," wrote John Hagel, Jeff Schwartz, and Josh Bersin of Deloitte Consulting in a recent article.<sup>3</sup>

FIGURE 3  
**Share of Jobs with Highly Automatable Skills, by Education**



Note: Arntz, Gregory, and Zierahn (2016) calculations based on the PIAAC 2012.

Source: Executive Office of the President of the United States | Artificial Intelligence, Automation, and the Economy | December 2016

Dire warnings about robots equipped with artificial intelligence taking jobs might sound hyperbolic today, when Siri® and Alexa™ often fail to correctly answer even the most basic question. But the growing power of AI means tens of millions of jobs could disappear over the next decade or two.

An oft-quoted study<sup>4</sup> by Carl Benedikt Frey and Michael A. Osborne of Oxford University warns that an astounding 47 percent of all U.S. jobs are at risk of elimination in the next 10-20 years. "...most workers in transportation and logistics occupations, together with the bulk of office and administrative support workers, and labor in production occupations, are at risk," the study warns. It adds that "a substantial share" of service jobs are also "highly susceptible to computerization."

On the seemingly more optimistic side of the spectrum, a 2016 policy brief from the Organization for Economic Cooperation and Development<sup>5</sup> estimates 9 percent of U.S. jobs are at risk.

But read the OECD report closely and more alarm bells go off. Many jobs that don't disappear

Lower-wage jobs are 20 times more likely to disappear than jobs at the higher end of the spectrum.

will be fundamentally altered by automation and AI, meaning millions of Americans will require extensive retraining or additional education to stay employed.

Add a layer of complexity in the form of globalization—a worldwide competition for limited jobs—and the profundity of the dilemma becomes ever more apparent.

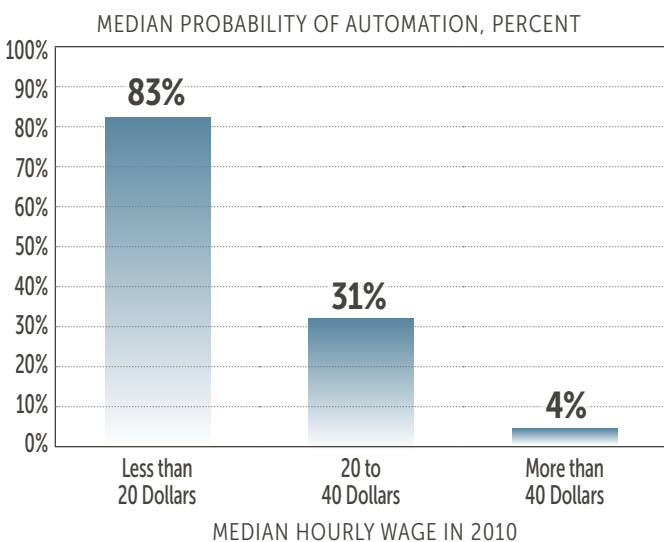
And these aren't just low-level, menial jobs. Millions of truck drivers could be out of work as autonomous vehicles gain dominance. Many white-collar professionals, including radiologists, paralegals, and even lawyers could be seriously affected as well.

Klaus Schwab, founder and executive chairman of the World Economic Forum, said it succinctly in a recent article:<sup>6</sup>

"In the future, talent, more than capital, will represent the critical factor of production. This will give rise to a job market increasingly segregated into "low-skill/low-pay" and "high-skill/high-pay" segments..."

Frey and Osborne put numbers to this gloomy scenario, estimating that 83 percent of jobs paying less than \$20 per hour would come under pressure from automation, as compared to 31 percent of jobs paying between \$20 and \$40 per hour and four percent of jobs paying more than \$40 per hour.

FIGURE 4  
**Share of Jobs with High Probability of Automation, by Occupation's Median Hourly Wage**



Source: Bureau of Labor Statistics; Frey and Osborne (2013); CEA calculations.  
Source: Executive Office of the President of the United States | Artificial Intelligence, Automation, and the Economy | December 2016

That doesn't mean white-collar workers can get complacent. Even journalists and other writers should be looking over their shoulders, according to the 2015 book "Rise of the Robots," by Martin Ford. Ford details the development of an automated writing platform named Quill, invented by a company called Narrative Science. What he describes seems like the stuff of science fiction:

*"Narrative Science's technology is used by top media outlets, including Forbes, to produce automated articles in a variety of areas, including sports, business, and politics. The company's software generates a news story approximately every thirty seconds, and many of these are published on widely known websites that prefer not to acknowledge their use of the service. At a 2011 industry conference, Wired writer Steven Levy prodded Narrative Science co-founder Kristian Hammond into predicting the percentage of news articles that would be written algorithmically within fifteen years. His answer: over 90 percent."*

And jobs, indeed entire industries, that wouldn't immediately spring to mind as being in the path of the automation/AI steamroller had better get ready: "The personal auto insurance sector could shrink to 40 percent of its current size within 25 years as cars become safer thanks to self-driving tech, according to a report by the global accounting firm KPMG," Business Insider reports.

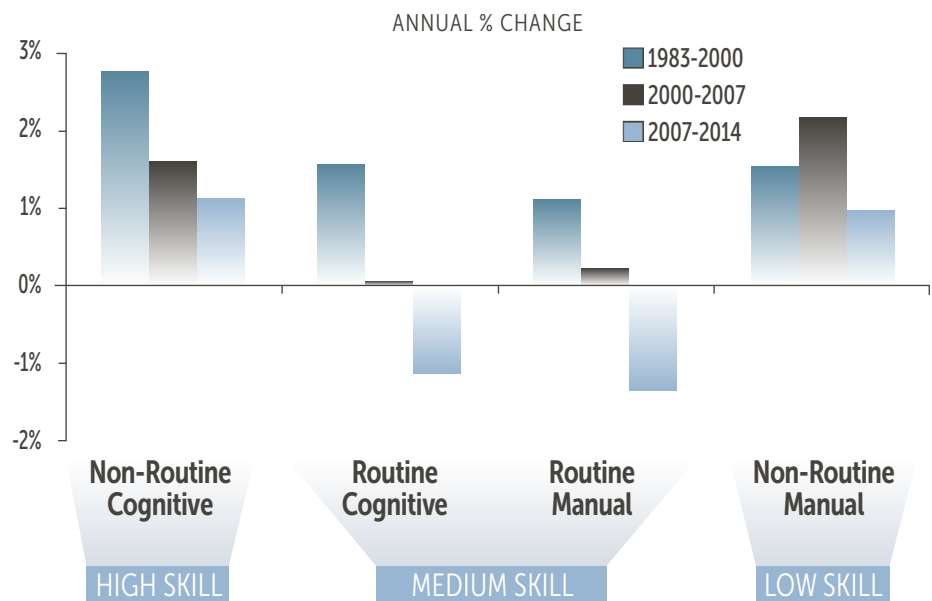
High-level financial deals that used to consume thousands of billable legal hours are increasingly being farmed out to machines. JPMorgan Chase & Co. uses a new computer program called COIN (short for Contract Intelligence) to interpret commercial loan agreements that "until the project went online in June, consumed 360,000 hours of work each year by lawyers and loan officers," Bloomberg reports.<sup>7</sup> "The software reviews documents in seconds, is less error-prone and never asks for vacation."

The ironic flip-side to all this justifiable concern about work disappearing for millions of people is that in other sectors of the economy, there could be acute labor shortages. According to a 2015 report by McKinsey and Company: "By 2020, around the world, there is likely to be a shortage of approximately 40 million high-skilled workers and 45 million medium-skill workers. Against that will be a surplus of 95 million low-skilled workers."

## WHAT WE'RE FACING *continued*

FIGURE 5

### United States — Employment Growth Reflecting Job Polarization, 1983-2014



Note: Employment categories, using Household Survey data, are based off Valletta's (2015) calculations.

Source: BLS and Citi Research

Source: Citi GPS: Global Perspectives & Solutions | Technology at Work v2.0 | The Future Is Not What It Used to Be | January 2016

This raises some big questions. How do individuals and institutions adapt to this ever-accelerating cycle of disruption and change? How do we reinvent ourselves and redefine education and training so that we can match people to the tasks and jobs of the near-future? And how has our education system lagged so far behind that vast numbers of people are unqualified for the jobs of today, to say nothing of tomorrow?

The good news is that people in key positions in the business, policy, and education sectors are thinking deeply about these issues. Pockets of innovation and creative thinking are forming. If the preceding pages have made you feel gloomy, we hope the following pages will fill you with a sense of hope—but not complacency.

The good news is that people in key positions in the business, policy, and education sectors are thinking deeply about these issues. Pockets of innovation and creative thinking are forming.

# A GLIMPSE INTO THE FUTURE

Let's examine the stories of four different hypothetical future workers, who come up against the changing world of work with different experiences, from different backgrounds, and with varied habits of mind. We apply the facts, projections, and perspective from our research and interviews to paint a vivid picture of how students and workers will experience the future of work.

## CARLA: A HIGH SCHOOL GRADUATE'S SUCCESS STORY

Carla graduated from a racially and socioeconomically mixed central Indiana public high school in 2022. She was a good student, but family circumstances and a desire to enter the "real world" led her away from post-secondary education and into the world of work straight out of high school.

She graduated with an industry certificate in electronic systems, a work ethic certificate, and diploma endorsements showing that she worked well in diverse teams and was bilingual in English and Spanish. She also immersed herself in two year-long paid apprenticeships during high school in manufacturing plants, where she learned about the culture of work and how to succeed in a high-performing team.

She also had a 99-percent attendance rate during her high school career.

Within weeks, Carla landed a job assembling components at an auto parts manufacturing plant. The plant had been struggling to find dependable, qualified workers, so Carla's certificate, endorsement, and attendance record made her a star prospect.

She earned about twice the minimum wage, and found the work enjoyable. She worked alongside and befriended people from vastly different backgrounds, which reminded her of the diversity of students in her high school classes.

After 18 months on the job, though, Carla's supervisor called her into his cubicle and told her that her job was being eliminated. A new generation of automated assembly units (aka robots) was coming online, and would be able to assemble parts at a rate three times faster than the swiftest human. Other jobs at the plant required at least an associate's degree, which meant Carla didn't qualify.

Carla was initially discouraged, but her supervisor suggested

that she apply for one of several open jobs at the Subaru of Indiana Automotive plant in Lafayette, just a few towns over from where she lived.

Although Carla lacked directly relevant experience, after an interview, she was offered a slot in a rigorous four-week training class. She'd be paid for her time, and if she completed the training successfully, she'd be hired at \$30 an hour.

Subaru used to overlook some strong candidates because it screened for mechanical aptitude and experience, but missed important soft skills, said Brad Rhorer, a senior human resources executive at the plant.

Corporate leaders recognized these deficiencies several years ago, and revised their screening systems. Now Subaru learns a lot about prospective employees during the training class: their work habits, attitude, and ability to get along with others and handle stress. Since implementing this new hiring system, Subaru's turnover rate had dropped by almost 50 percent, Rhorer said.

During the four weeks of training, Carla also acquired the skills she'd need to place all the wiring in an Outback or Impreza door every 63 seconds as it moved past her on the assembly line.

Carla passed with flying colors and became a star employee. After a few months, she enrolled in courses at a local community college and over time earned an associate's degree in computer technology.

This qualified her for one of the 200 coveted maintenance jobs at the plant. Carla now keeps the growing cadre of robots on the assembly lines running smoothly. She earns \$70,000 per year and has built-in job security.

Even if the plant becomes more fully automated over time, it will require humans to troubleshoot and maintain the robots. As robot technology changes, Subaru will continue to make sure Carla receives the updated training and education she needs to stay on top of her ever-evolving duties. And she is on track to become a trainer of new maintenance workers, at a higher salary.

**What does Carla's experience teach us about how a high school graduate might succeed in the near-future world of work? This scenario offers a few lessons, which we'll elaborate on later in this report:**

## A GLIMPSE INTO THE FUTURE *continued*

- The most sought-after employees will be those who have a mindset and practice of lifelong learning, and experience working closely with people from different racial, ethnic, and socioeconomic backgrounds. As the workforce becomes more diverse, this will become an increasingly vital qualification for all kinds of jobs.
- No job is safe long-term, and people who want to stay employed will have to take initiative to continually enhance their skills and further their education. While good jobs exist today that don't require a four-year college degree, the future for people with a high school education or less looks bleak. They're likely to be virtually unemployable.
- Soft skills like empathy, dependability, and teamwork will matter a great deal, perhaps more than technical qualifications, which can more readily be acquired on the job or through on-the-job training.

### MARCUS: A COLLEGE GRAD REINVENTS HIMSELF

Marcus loved literature, so he didn't hesitate before deciding to major in English at the University of North Carolina. He found class discussions stimulating, especially because there were students from such varied backgrounds in his classes. Some came at the texts from perspectives so far removed from his own life experience that they helped him view great works of literature and criticism in an entirely new light.

He learned to look at literature, and life, from multiple perspectives, never accepting the first answer or conclusion that came into his mind. During dinner party conversations, he enjoyed playing the devil's advocate and arguing unpopular positions.

Marcus also had an analytical, detail-oriented mind. Shortly after graduating from college in 2020, he landed a job as a paralegal at a medium-sized firm in Durham, a job that made good use of his reading and writing skills. He enjoyed researching past cases, helping craft arguments, writing briefs. Though he occasionally toyed with the idea of attending law school, he felt content in his job, and made a respectable living. Five years passed.

Over time, he read articles about the exponential growth of artificial intelligence, and how AI was disrupting a wider array of professions—white collar, as well as blue.

Still, it came as a shock when his firm's managing partner took him to lunch one day and told him that they were eliminating his position as well as the positions of two other paralegals who worked at the firm. New software could, with just a small initial investment, analyze an almost infinite number of cases, tease out precedents, formulate arguments, and draft briefs at a pace no human could ever hope to match.

The managing partner provided Marcus with a sterling reference letter and the firm offered to pay for a course or two if Marcus decided to switch careers—which he suggested was highly advisable under the circumstances.

Marcus was devastated. He called his college advisor, seeking sympathy. The advisor, an English professor, asked Marcus if he was aware of the lifetime readmission guarantee that

Soft skills like empathy, dependability, and teamwork will matter a great deal, perhaps more than technical qualifications, which can more readily be acquired on the job or through on-the-job training.



came with his initial acceptance letter. It was the first that Marcus had heard of it.

He called his alma mater's alumni office and learned that a team of university employees was available to help him explore options. There were any number of continuing education pathways available to him as a graduate, at only a nominal cost, since he had already invested tens of thousands of dollars in tuition.

Marcus discovered a new major offered at the university, and he had already fulfilled most of its requirements with his English degree. The major, augmented intelligence, required him to take classes in coding, machine thinking, psychology, and information systems.

He had always thought of himself as a humanities type, not a hard science or computer science geek. Still, he enrolled and took the courses while earning money through several writing "gigs." He was surprised at how many commonalities there were between analyzing literature and developing a deep understanding of information systems. He loved the courses, which he took online, and he aced them all.

His new degree in hand, Marcus interviewed with a startup and was hired full-time as an information systems manager, at a salary of more than \$150,000 per year. He knows that job could be automated out of existence someday, but if that happens, he now knows he can reinvent himself.

**Here's what we can learn from Marcus' experience, as we ponder how individuals and institutions need to prepare for the ongoing, accelerating disruption:**

- Individuals will increasingly need to take the initiative to reinvent themselves and prepare for the likelihood of multiple careers—if *career* is even a relevant term going forward.
- Higher education, not typically an adaptive, fast-moving sector, will need to reinvent itself as well to serve students of all ages who enter or return to campus (brick and mortar or virtual) in a variety of ways.
- Liberal arts degrees are increasingly looked down upon by some as irrelevant to the world of the future. But quite the contrary is true: the habits of mind, like critical thinking, instilled during a rigorous liberal arts education, track well with the attributes employers are and will be seeking.

## BONNIE: ADAPTABILITY IS KEY

Bonnie finished high school in 2018 with about half the credits she needed to get an associate's degree in accounting from her local community college. Concurrent enrollment (taking college classes while in high school) was a much-touted offering at her inner-city school, and Bonnie was glad to have the opportunity.

In retrospect, though, she wished someone had counseled her that a two-year accounting degree might offer a decent wage to start, but was also highly subject to automation in the near future.

Still, Bonnie would be the first person in her family to graduate from college, a source of great pride for her and her parents.

She had to take a remedial math course at her own expense when she entered community college, but she graduated in 2020, after 18 months, with a two-year accounting degree. She also had several thousand dollars in student loans to pay off.

She found a job in a large accounting firm doing rudimentary work, little more than clerical, really. And then, after being there less than a year, she was let go, with one week's worth of severance pay. All the duties she had been performing were being fully automated.

Bonnie was single and had a three-year-old daughter. She felt a sense of rising panic. She went to the career office at her college and asked for help.

They steered her to an in-depth, online survey that would help Bonnie learn about which soft skills she was strong in, and those where she could use some strengthening. The program also offered online tutorials that would help shore up those weak spots. Finally, it helped match her with employers seeking people with her blend of strengths and skills.

All of this cost Bonnie just \$50, because her college had a contract with PAIRIN, a Denver-based "social enterprise company" designed to "make education and hiring equitable" (according to its cofounder and CEO Michael Simpson), offering the survey, curriculum, and one-to-one coaching. When Bonnie took PAIRIN's online survey and then went over the results with a coach, she learned a lot about herself. Like many young people from low-income, single-parent homes, she was high in self-blame, seeing herself as at fault whenever something went wrong. She had high emotional self-awareness and empathy,

## A GLIMPSE INTO THE FUTURE *continued*

and a strong concept of herself, but her confidence was low. She handled stress well, and was good at resisting temptation in pursuit of an important goal.

After six weeks of self-guided tutorials, Bonnie took the survey again. Her scores in her most deficient areas had climbed significantly. And she realized that working with numbers was neither her passion nor something she was naturally inclined to. But she loved interacting with people, and she had a passion for animals.

A veterinary clinic that screened applicants using PAIRIN data saw Bonnie's application and snatched her up. The clinic paid for Bonnie to go back to community college and get a second associate's degree, as a veterinary technician.

Bonnie doesn't worry much about being automated out of her job. While a robot might someday be able to take a dog or cat's vital signs, it's unlikely to acquire the skill to look into a terrified pet owner's eyes and assure her that the seizure her puppy suffered is not life-threatening.

Empathy is a skill a machine can't replicate, at least not yet. In Bonnie's situation, it provides her with long-term job security.

### **Bonnie's experience offers lessons about how individuals and systems will have to become increasingly adaptable:**

- Individuals will need help learning how to reinvent themselves—how to be agile and adaptive. In some cases, employers like Bonnie's vet clinic will need to invest in getting their workers additional education and training.
- K-12, as well as higher education systems, will have to take longer-term ownership of their students' futures. A career and technical education program won't be useful if it prepares kids for jobs that are on the verge of vanishing.
- There is a great deal of angst about the lack of qualified workers for mid-level jobs in particular, but lower-level jobs as well. As Michael Simpson of PAIRIN points out, it's time for employers to get smarter about hiring practices. Automated processes, in the form of applicant tracking systems, are efficient in some ways, but they tend to eliminate many potentially qualified candidates. A combination of automated sorting and human subjectivity and perception would maintain efficiency while adding the all-important human element to preliminary screenings.

### **JIMMY: FEW SKILLS = NO WORK**

Jimmy never cared much for school, but didn't mind working hard. It was just all that sitting still that school required, with someone talking at you for six hours straight. That was not the kind of work he enjoyed.

He liked tinkering with computers and working on the robotics team in middle school. But that didn't last because he kept getting suspended for acting out in class. Then he started ditching, missing consecutive days in a row, and pretty soon, gave up on the idea of completing high school.

Individuals will need help learning how to reinvent themselves—how to be agile and adaptive. In some cases, employers like Bonnie's vet clinic will need to invest in getting their workers additional education and training.

Jimmy dropped out at 16, in 2019, just before he finished 10th grade. He got a job cooking at a fast-food joint, flipping burgers and yanking baskets of fries and nuggets out of the hot grease. The pay and hours left a lot to be desired, but it was enough to keep him in clothes and new strings for his Stratocaster guitar. Moving out of his folks' place would have to wait until something better came along.

Which never happened. In fact, 18 months into the cooking gig, just when he had enough seniority to work more day shifts and fewer weekends, the entire restaurant went to the robots. The counter staff was already long gone, replaced by kiosks or tablets.

Now a line of mechanical arms flipped the burgers with precision timing, and always got food out of the fryer when it was just the perfect shade of brown.

It didn't take long for Jimmy to find a part-time job at an auto parts warehouse store, stocking shelves, running parts out to the customers. That lasted a year. Then all but two of the human employees were laid off.

Robots had come down in price and had gone up in sophistication and even a relatively small business like the warehouse could afford robot workers, who never called in sick and never stocked a shelf wrong or talked back.

A high school pal found Jimmy a part-time job as a cashier at a convenience store off the interstate. The job paid only minimum wage, but it beat unemployment—barely.

And wouldn't you know it? Six months later, he was let go. Once again, it was a machine that took his job. The store installed a new system that automatically scanned barcodes on products and charged people without them even having to stand in line.

The week after losing his job, Jimmy went and parked out near the gas pumps and just watched for an hour. A truck pulled in, a human in the passenger seat monitoring, but no one behind

the wheel. A machine on wheels rolled up to the truck and into the trailer, loaded the merchandise and rolled to the door of the store, where a smaller more delicate machine took the boxes of chips and cases of soft drinks and stocked the shelves.

Customers walked in, grabbed what they wanted, bagged it and walked out. Not a human worker in sight.

What was this world coming to? Where did he possibly fit in?

Jimmy's is a cautionary tale, a story of what can (and already is) happening to people who—through a combination of circumstances, choices, and an education system that wasn't designed to meet their needs—find themselves poorly positioned to correct course. Dropping out of high school has long been a ticket to poverty, and a lack of education will become a bigger obstacle in future years.

And that's a pity, because there are millions of jobs in search of a worker, if only workers were better prepared to be attractive candidates.

#### **Here's what some employers are saying about the mismatch:**

- "When your job changes, or the machine you're on changes, your skills will need to change or you'll be out of luck." — Michael Simpson, PAIRIN
- "Half the high school graduates we look at can't meet the attendance requirements we have, and lack the teamwork skills and the ability to locate basic information." — Brad Rhorer, Subaru In America.
- "We just need to focus on the skills of how do you be a contributor outside the walls of school, and what the workplace looks like. We need to hire people who can maintain and work on this high-tech equipment we're putting into the factories to keep up with growing worldwide demand for our products." — Dan Moore, Simplot

# INDIVIDUALS: BE AGILE

**A**s the four scenarios you've just read illustrate, workers in the near-term future will face significantly more uncertainty and instability than they do today, though that instability has been on the rise for some time.

So what must any given individual do to not just survive but thrive in this increasingly unstable environment?

Gordon Jones, dean of Boise State University's College of Innovation and Design, said he has a basic framework he presents to high school graduates for how to succeed in the future world of work. At the most basic level, workers need do only three things: "show up on time, get along with people, and do your job with as much excellence as possible," he said.

If you want to get promoted to the next level of responsibility—supervising people—answer affirmatively these two questions: can you lead people? Are you trustworthy?

If you aspire to an executive position, you need to be able to think strategically, and to create custom solutions to problems that a team or group under your tutelage can deliver.

And those with the highest ambitions "must be able to do all of the above and multiples of them, at the same time," Jones said.

Until now, people with post-secondary certificates, a community college degree, or a degree from a four-year college could take the credential and head out into the world with some degree of confidence that they would find steady, gainful employment.

That's still the case today in many industries. But not for long.

Going forward, everyone will have to take ownership of a continuous cycle of learning, finding work, relearning, and finding different work.

"I suggest that each of us should think about our career as a series of waves from post-education to pre-retirement: we'll catch a wave and ride it until it crests, and then, as it calms on the beach, we paddle out and catch the next one. In each new wave, we gain new skills and new experiences, retraining and educating ourselves along the way," Josh Bersin of Deloitte consulting writes in a July 2017 article.<sup>8</sup>

"I suggest that each of us should think about our career as a series of waves from post-education to pre-retirement: we'll catch a wave and ride it until it crests, and then, as it calms on the beach, we paddle out and catch the next one. In each new wave, we gain new skills and new experiences, retraining and educating ourselves along the way."



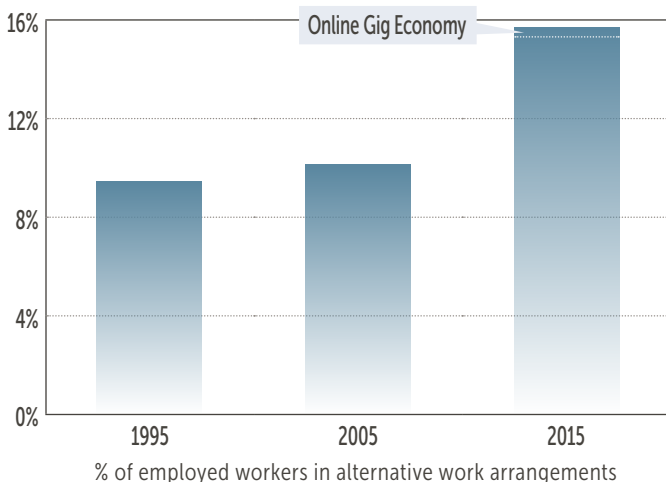
Those who can adapt to this new reality will thrive. Those who don't will struggle to an extent beyond anything even today's displaced workers experience.

"The complexity of all this is delicious, if you're not someone who has to fight through it," said David Shane, a retired Indiana corporate executive who has spearheaded education and workforce development issues for Gov. Eric Holcomb. "We've been through some version of this societal shift before, but never of this magnitude. Hope is essential here, and so is endurance."

One idea currently in vogue is that we have entered the "gig economy." Increasingly, people will not have careers, or work in jobs as currently defined. Instead, they'll go from "gig" to "gig," like itinerant musicians, using whatever talents or skills they possess to perform tasks for others on a contract or freelance basis.

Websites like TaskRabbit match people with skills to others who need work done. Even Uber and Airbnb are manifestations of the gig economy. People use their car and spare hours, or a room in their home, to generate income. It's not stable and it comes without fringe benefits, but the gig life offers freedom, flexibility, and at least a semblance of a living wage, if you're diligent.

FIGURE 6  
**Growth in Contingent Workforce**



Source: Kate and Krueger 2016

Source: New America & Bloomberg | Shift: The Commission on Work, Workers and Technology | May 2017

According to The Commission on Work, Workers, and the Economy,<sup>9</sup> the proportion of workers in "alternative work arrangements" climbed from 10 percent in 2005 to 16 percent

in 2015, though only a fraction of those found work through online "gigs." The rest were more traditional contractors or freelancers. Still, it's undoubtedly a growing trend, and one economists expect to accelerate.

Most people, however, will continue to seek regular, salaried work. These positions will be harder to find, require higher qualifications, and will be more prone to disappearing than it has been in the past.

One way people can cope with this monumental shift is by finding ways to join others in the quest for stability, argue DeLoitte's Bersin and co-authors John Hagle and Jeff Schwartz in an article titled "Navigating the Future of Work."<sup>10</sup>

"Individuals will need to find others who can help them get better faster—small workgroups, organizations, and broader and more diverse social networks. We are likely to see much richer and more diverse forms of collaboration emerge over time."<sup>11</sup>

Some so-called "soft skills," like empathy and emotional intelligence will always be in demand, because machines can't replicate them, at least so far.

In the health care field especially, the human touch will remain essential, probably forever, said Jerry Hartbarger, vice president for human resources at Kaiser Permanente in Denver.

"Our mission is meeting each (patient) where they're at," Hartbarger said. "You can automate and sterilize data and you risk losing the mission—the ability to identify disparities in each member. The amount of emotional intelligence needed in the patient-facing part of our work is unrelated to the ability to pull a report."

In addition to those soft skills, there are other strengths that people will need to develop if they're to find a semi-secure place in this new order. Foremost among them is the ability to think critically.

### **The importance of critical thinking**

Just about everything you read about the future of work stresses the importance of critical thinking for people who want to fill jobs machines can't do. Machines can analyze reams of data, but to ask higher-level questions about it requires the peculiar twists of the human mind.

But calling for more critical thinking isn't anything new. It has

## INDIVIDUALS: BE AGILE *continued*

become one of those buzz phrases, so ubiquitous that it's lost much of its meaning. Given the importance everyone places on critical thinking, what are some practical, useful definitions? Here are a few.

In his recently published book "You Can Do Anything: The Surprising Power of a 'Useless' Liberal Arts Education," former Wall Street Journal writer George Anders parses the meaning of 'critical thinking' in the context of key attributes for a worker in the age of automation and artificial intelligence.

"Academic leaders keep portraying critical thinking as the ability to examine assumptions underlying an argument and the capacity to consider competing perspectives without rushing to judgment," Anders writes. "Invoke such abstract, languid phrases in a job interview, however, and you poison your chances."

Anders undertook a thorough analysis of job listings on Indeed.com—5,600 in all—that "offered six-figure pay while calling for critical thinking." He dissected those listings and came up with the following five attributes that define critical thinking, at least in this practical, non-abstract context:

- **Working on the Frontier:** "A confident willingness—perhaps even eagerness—to tackle uncharted areas where nobody knows the rules yet. You bring imagination to your job; you adapt well to new situations." This is a form of critical thinking, Anders argues, because it demonstrates a comfort with "knowing what to do when you're on your own."
- **Finding Insights:** In this era of "too much data, not enough clarity," employers ask of prospective hires: "Are you naturally curious? Are you good at connecting the dots? Can you filter and distill information? Are you calm and productive in the face of ambiguity?"
- **Choosing the Right Approach:** Anders defines this as the ability, gained through experience, of taking insights and synthesizing them "in ways that make you a trusted expert when complex decisions need to be made."
- **Reading the Room:** The ability to "balance different perspectives and agendas" and "still keep everything moving forward."
- **Inspiring Others:** At a time when "morale is more fragile and cynicism runs deeper... hard-nosed assertions of authority end up being the opposite of leadership." What employers need instead are workers who can "inspire confidence...and energize others to embrace change." The ability to present cogent, persuasive arguments in written or spoken form is an essential component of this trait.

Dan Moore, the trainer at Simplot's highly automated potato processing plant, is looking for some of those same skills for his lower-level, yet decent-paying jobs. Here's how he describes the critical thinking skills he seeks:

"Can you take information surplus—we have a ton of data within our facilities now, and that

Those who  
can adapt to this  
new reality will  
thrive. Those who  
don't will struggle  
to an extent  
beyond anything  
even today's  
displaced workers  
experience.

is fairly new—and make an educated decision on whether a production line is down or if there is a quality issue or a throughput issue? In other words, can you see a problem, can you go through logical steps to be able to identify it, and fix it?”

Someday, smart machines might be able to conduct that kind of self-diagnosis and fix themselves. But for now, Simplot needs workers who, to use Anders’ terminology, find insights and choose the right approach.

In job interviews, Moore tries to suss out whether candidates have a history of inspiring others (“were they actively engaged in team settings, or did they sit back and wait for somebody to tell them what to do?”), and are comfortable working on the frontier (“The skills you need are always going to be adapting to whatever technology has been invented, so you need to be able switch gears multiple times in your career.”)

At PAIRIN, which helps people develop the soft skills employers seek, CEO Michael Simpson hears a lot about critical thinking, and concludes that hiring managers don’t think deeply enough about what it means.

PAIRIN’s website says people who use critical thinking “are those who say things such as, ‘How do you know that?’ ‘Is this conclusion based on evidence or on speculation?’ and ‘Are there alternative possibilities given this new data?’”

That’s extremely useful in any organization, but it’s best in moderation, Simpson said.

“Everyone says ‘we want people with really high critical thinking,’” he said. But often employers don’t really think that through. “If everyone in your organization rates extremely high in critical thinking, you won’t get anything done,” he said. “Everyone will spend all their time questioning, doubting.”

Instead, Simpson said, you probably want most of your employees to be “high-average” in critical thinking. Here, Simpson is not dismissing the importance or value of critical thinking. He is speaking in terms of the scoring system his company devised to optimize individual and team performance, and is backed by reliable data that reveals critical thinking is most productive when balanced with other essential skills, like initiative, problem solving, creativity, productivity, grit and interpersonal skills.



*Doctor oversees the operation as a robot conducts complex, invasive surgery*

# SCHOOLS: TOO FAR BEHIND TO CATCH UP?

Students exiting the pre-K-12 education system will need to be prepared for radical societal and workplace changes if they are to have any shot at thriving personally or professionally. By and large, however, our school systems are failing to prepare them for this emerging reality.

Here's how Jaime Casap, Google's "Chief Education Evangelist," describes what education should be doing, today and in the near- and mid-term future: "Preparing students for jobs that don't exist and to use technologies, sciences, and methods that we haven't even discovered yet to solve problems that we haven't identified."<sup>12</sup>

If Casap's framing is correct, and there's every indication it is, then public education in the U.S., with notable exceptions, is decades behind the curve. That's one issue on which almost everyone who thinks about the future of work is in agreement.

Far from making plans to educate students to thrive in the economy and society of the near-term future, most school systems are still struggling to do an adequate job providing students with the basic skills needed for twentieth-century life and work.

According to the National Assessment of Educational Progress, the largest nationally representative and continuing assessment of what America's students know and can do, fewer than 40 percent of graduating students scored at college- and career-ready levels in recent years.<sup>13</sup>

Too few graduates of American high schools possess even the most rudimentary literacy and numeracy, analytical, or problem-solving skills to succeed even in an entry-level job that requires no post-secondary education. And as discussed previously, the bar is only going up from here.

As illustrated in this report, many employers struggle to find workers with even rudimentary skills required to perform basic tasks. These firsthand accounts are bolstered by numerous reports written over the years about the ongoing failure of our education system to prepare young people to be productive, contributing citizens, capable of supporting themselves and a family.

Fortunately, there are organizations and individuals across the country thinking deeply about these challenges, and coming up with ideas to address them.

An evolving school of thought promotes scrapping our existing education systems and starting over. The basic argument here is that the current system is so rife with perverse incentives, entrenched special interests, and ideological polarization that even incremental change has become almost impossible.

ReSchool Colorado<sup>14</sup>, a project of the Denver-based Donnell-Kay Foundation, is one such effort. ReSchool envisions a highly personalized system that guides each student down her own path, putting a wealth of community resources at her disposal.

"The new education system is designed to connect learners with resources and experiences, passions with needs, individuals with peers, peers with communities and a community with

"The new education system is designed to connect learners with resources and experiences, passions with needs, individuals with peers, peers with communities and a community with the world."



the world. By leveraging the potential of technology and people, learners in this new system will create customized paths to connect their present learning to their desired future,” as a ReSchool document describes it.<sup>15</sup>

Here’s the essential question, posed by a consortium of thinkers who came together at a recent gathering of Pioneer Lab, a national “community of practice for diverse learner-centered practitioners” working to create the future of education together:

“If society ‘did away’ with schools, how could student-centered learning be implemented while maintaining a sense of order and advancing equity, learning, and employment in communities?”

These are big questions, and they are prompting out-of-the-box thinking, which is light-years ahead of our sclerotic political and educational systems. But it’s hard to envision how a radically new system could be implemented while our current method of schooling limps along, with millions of schoolchildren inside its walls nine months a year.

In isolated pockets, however, practitioners are beginning to provide real-life models. One of them is just 30 miles east of the Simplot potato processing plant you read about at the beginning of this report.

In the heart of Boise, Idaho a group of high school students is conducting a “crash-up,” or design-thinking workshop, for a large, regional architectural firm. Students at One Stone School, a private but tuition-free high school, have become experts in the design-thinking process<sup>16</sup> pioneered by the Stanford University D. school.

The architects want a student perspective on collaborative workspaces. Who better to help them think this through than students who go to a school without traditional classrooms, who design their own curriculum, and know how to walk a group through the design-thinking process: empathize, design, ideate, prototype, test, and then start the whole process over.

Students at One Stone have also designed a play space for younger students next to an underused building, and created

*Automated vehicles and machines moving containers and managing cargo at an industrial shipping port*



## SCHOOLS: TOO FAR BEHIND TO CATCH UP? *continued*

a visual bicycle repair guide for refugees after seeing many abandoned bicycles on the side of the street in areas of Boise where refugees live.<sup>17</sup>

One Stone students also run a social venture business called Two Birds. It's a creative-services agency, offering strategy, millennial audience marketing, street-team services, facilitated design thinking, and communication tools to clients from the nonprofit and private sectors. Money made from the business is invested back into the school.

And students comprise the majority of One Stone's board of directors.

This tiny school, now in just its second year of operation, is producing the kind of thinkers and self-motivated learners that companies are desperately seeking.

Unfortunately, One Stone is the rare exception in a national public education landscape that in many instances remains deeply mired in outdated practices. It's hard to imagine a school quite this student-centered and unconventional thriving inside a traditional public school system. That needs to change, and soon.

### ***Diverse schools take on new importance***

You might recall that corporate executives interviewed for this report stressed that increasingly they need employees comfortable working with colleagues from different racial, ethnic, national, and socioeconomic backgrounds. This will become even more important as the workforce becomes increasingly diverse as the years progress.

One preliminary step school systems could take to prepare students for the future would be to create networks of truly diverse schools, through strategically located magnet programs, enhanced transportation between schools, and controlled choice policies designed to promote socioeconomic diversity in as many schools as possible. While this has proven politically challenging in the past, it seems simple compared to tearing down the existing system and starting from scratch.

What's more, recent evidence demonstrates that integrated, inclusive schools are ideally positioned to help young people develop the capacities they will need to thrive not only in diverse workplaces, but in a societal environment of growing ambiguity and uncertainty.

**Consider these skills**, among several identified by the Institute for Future Work<sup>18</sup> as being most in-demand by employers anticipating the looming automation and artificial intelligence wave. And then look at how neatly they line up with research-based findings on the benefits of integration:

**Sense-making** (the ability to determine the deeper meaning or significance of what is being expressed)

- "Students who experience positive interactions with students from different racial backgrounds (develop) more open minds and engaging classroom conversations. And improved learning actually occurs in these classrooms because abstract concepts are tied directly to concrete examples drawn from a range of experiences," (*Michigan Journal of Race and Law*).<sup>19</sup>

**Novel and adaptive thinking**

- "Students' exposure to other students who are different from themselves and the novel ideas and challenges that such exposure brings leads to improved cognitive skills, including critical thinking and problem-solving," says a Century Foundation report, citing research from the journal, *Psychological Science*.<sup>20</sup>

**Cross-cultural competency**

- "Diversity encourages students to question their assumptions, to understand that wisdom may be found in unexpected voices, and to gain an appreciation of the complexity of today's world," (*amicus curiae* brief, *Fisher v University of Texas* 2015).<sup>21</sup>

**Design mindset** (the ability to represent and develop tasks and work processes for desired outcomes)

- "Diversity enhances creativity. It encourages the search for novel information and perspectives, leading to better decision-making and problem solving," says an article in *Scientific American*.<sup>22</sup>

**Cognitive load management** (the ability to discriminate and filter information for importance)"

- See the "novel and adaptive thinking" citation above.<sup>23</sup>

Many of the nation's largest corporations are explicit about the hiring preference they give to candidates comfortable working in diverse teams, and who come from schools with diverse student bodies. More than 40 Fortune 100 companies, ranging from Apple to 3M to Walmart, explained why in a 2015 U.S. Supreme Court brief.<sup>24</sup>

"When (we) make decisions about hiring and promotion, it is critical that (we) be able to draw from a superior pool of candidates—both minority and non-minority—who have realized the many benefits of diversity" during their school years, the brief says. It continues:

"People who have been educated in a diverse setting make valuable contributions to the workforce in several important ways. Such graduates have an increased ability to facilitate unique and creative approaches to problem-solving by integrating different perspectives and moving beyond linear, conventional thinking; they are better equipped to understand a wider variety of consumer needs, including needs specific to particular groups, and thus to develop products and services that appeal to a variety of consumers and to market those offerings in appealing ways; they are better able to work productively with business partners, employees, and clients in the United States and around the world; and they are likely to generate a more positive work environment by decreasing incidents of discrimination."

The brief goes on to argue that the need for a workforce comfortable with diversity will only grow in future years, as the nation's population becomes increasingly diverse and as businesses continue to span international borders.

Put another way – if our schools continue to follow the same segregation patterns as our communities, students of every color and background will be at a disadvantage.

### **The role of higher education**

In theory, community colleges, which already provide a bridge between secondary and post-secondary education, are well positioned to adapt to the evolving needs of college students, as well as adults displaced by automation and in need of additional education.

In practice, community colleges have a long way to go to fulfill this promise. They must focus on improving student proficiency, increasing completion rates, and placing a greater emphasis

on academic rigor. But, to their credit, community colleges have proven to have a responsive and agile model that certain companies and industries rely upon for talent development.

In fact, at some community colleges (and even high schools), lines already have blurred between what traditionally has been called training and education, as students acquire an increasingly wide range of industry-endorsed certificates. Those lines need to blur further as adults move from career to career—or gig to gig—during their working lives.

But four-year colleges and universities need to get in the game as well. Some are beginning to take steps in this direction.

"To the extent that there is a tension between education and training, my argument is they need to coexist in our universities, and we have to find a way to make peace and embrace both. It's a false dichotomy," said Gordon Jones, dean of Boise State University's new College of Innovation and Design.

Higher education can be both intellectually stimulating and practical, Jones argues. "There is a level of disservice we're doing our students, because we all know life is interdisciplinary and yet we chop everything up into very narrow academic areas," he said.

Jones came to Boise State to open the new college in 2015, after founding the Innovation Lab at Harvard University and running it for five years. In his view, higher education, like K-12, must become far more nimble and responsive to the lifelong needs of its students and graduates if it's to remain relevant and useful to society.

"How do we institutionally organize ourselves in a way that we share the ownership of the outcome of our graduates?" he said. "So we're not just doing it in a purely input-driven way, where you earn 120 credit hours, we believe you spent time transforming your mind, and go forth and prosper. We need to recognize that people make an investment of up to \$300,000 in themselves (by attending college)."

In Jones' view, colleges and universities need to stop viewing the post-secondary educational experience as a finite set of classes taken during a fixed number of semesters.

"Many universities are excellent at knowledge conveyance; the creation of an **educated** citizenry. We need to think about how we create **empowered** citizens. How do we move people through their whole life cycle?" Jones mused. "We are all going

# SCHOOLS: TOO FAR BEHIND TO CATCH UP?

*continued*



*3D printers are transforming industrial and small-scale manufacturing*

“There’s a mismatch of the educational development kids get in local high schools compared to what we need” Rhorer said. “The prospect pool is super shallow.”

to have eight careers. Do we think about lifetime admissions? Do we reorganize jobs (within the university) and shepherd people through with account managers instead of admissions, academic advising, and fundraising? Why don’t those all become one role, and we just manage (graduates) throughout their lives?”

The concept of majors in one field or discipline may not be obsolete, but needs to be augmented with more nimble, flexible alternatives.

It took Jones’ college just eight months to launch a new major in augmented reality. And the beauty of this major is that it is cross-disciplinary, an essential component of future higher education, in Jones’ view.

“It pedagogically blends art, psychology, and computer science. The likelihood that those disciplines would find each other and be working with each other in a traditional university is very low.”

The day could come in the near future where this major is no longer relevant, Jones said. In that case, it might need to go away, and be replaced by something new. Faculty members need to adapt to this new, more entrepreneurial way of thinking, he said.

“We serve to catalyze faculty to get them thinking in cross-disciplinary ways. Where are there new degrees, majors, minors, certificates, where faculty wants to work across traditional academic disciplines and provide a benefit toward the emerging needs of the workforce of tomorrow?” he said.

Addressing some of the concerns of employers expressed in this report, the College of Innovation and Design offers an elective in professional skills.

“Basically, it’s how to be an employee,” Jones said. “How to collaborate, how to communicate professionally. What are five things wrong with how I am dressing today for a white-collar environment? Teamwork. How do you manage yourself person to person? How do you write an email?”

# HOW BUSINESS ADAPTS

As individuals scramble to adapt to these emerging new realities, and the education system fails to keep up, employers should take steps to assist them, Deloitte's Bersin suggests.

"Organizations can make it easier by adopting an active program to support people's reskilling, reeducation, and career development," he writes. There are positive signs: A recent Deloitte report on global human capital trends shows that 83 percent of companies are "reengineering their career programs." This means providing optimized on-the-job training, as needed, and maximizing productivity by surrounding each employee with other highly effective, team-oriented co-workers.

In some cases, though, too many applicants lack even the most basic skills required to perform entry-level jobs.

On the outskirts of Lafayette, Ind., on Subaru of Indiana Automotive's sprawling manufacturing campus, Brad Rhorer confronts a hiring conundrum similar to that faced by trainer Dan Moore at Simplot. He's in constant hiring mode for jobs that pay a solid wage and provide top-notch benefits. But they're difficult to fill with the graduates from local school systems.

And the jobs will become more sophisticated—and therefore harder to fill—as automation progresses at the already state-of-the-art plant.

Cummins, Inc., a Fortune 500 multinational engine manufacturer based in Columbus, Ind., has similar issues.

"We have not solved the technical training problem of the last generation, even as we are very quickly moving into this new AI and robotics space," said Mark Osowick, Cummins' vice president for human resources operations.

"That last generation challenge we're still dealing with is we're not driving enough basic STEM (Science, Technology, Engineering, and Math) education at the secondary school levels. So those skilled manufacturing and distribution resources are getting harder to find. Really strong basic science and mathematics knowledge is just not there."

Cummins and Subaru aren't exactly asking for superstar credentials. They want people who have mastered core high school academics. And then they want those graduates to show up for work regularly and punctually, to work well with others, to manage conflict constructively, and to be comfortable working

*Robotic arm conducting a delicate task*

## HOW BUSINESS ADAPTS *continued*

around people of different races, ethnicities, and nationalities.

They also need to have basic skills in what Rhorer termed “the ability to locate information.” By his estimate, half of Indiana high school graduates can’t clear that relatively low bar.

Over the years, though, Subaru has refined its approach to finding qualified workers, particularly for the roughly 4,700 jobs that don’t require an education past high school. After a preliminary screening, prospective hires are paid to take a four-week training class “that teaches you everything you need to know about manufacturing,” Rhorer said. “We couldn’t rely on the K-12 system to provide the talent we need coming out of high school.”

The training class “builds a skill set from zero to being what we call an industrial athlete.” More important than the skill-building, however, is what takes place under the surface.

Trainers are plant employees with deep first-hand knowledge of the requirements of the job. While they’re delivering the training curriculum, they are also keeping a close eye on the trainees.

“At the end of the four weeks, a significant number say ‘this is not for me. I’m out. I’m done,’” Rhorer said. “But among those who stay, my turnover has dropped 50 percent.”

In a similar vein, Cummins seeks employees who “are a fit for our organization first,” said Lorrie Meyer, Cummins’ executive director of global talent management. “If they share our values of collaboration and work ethic, then look at their hard technical skills.”

Meyer said she has observed over the years that workers who

come from schools with diverse student bodies adapt more readily to the Cummins work environment than do students from more homogenous schools.

In recent years, Osowick said, Cummins has gotten highly specific with its job descriptions and training protocols, and has standardized them across its global operations. Workers with the same jobs in Brazil, China, India, or the U.S. receive identical training.

Even as automation and technological advancements drive rapid change, this allows Cummins to “do more scalable and higher quality training, and to evolve it more rapidly,” Osowick said.

At Cummins and Subaru, hiring officials said they are committed to keeping their workers trained to work with new technologies, whatever they may be, and to help employees advance in their careers into supervisory or training roles.

While some types of jobs might disappear as automation and AI progress, new jobs will replace them, they said.

“Ours isn’t a story where robotic processes have squeezed out employment, at least not yet,” said Osowick. “We definitely have some operations that are more automated, more efficient, and where we need fewer people. But that makes us more cost effective, which means we sell more products, which means we need more people. There is a raging debate going on about whether there is a true displacement effect or does it just create demand in different places?”



*Team of robots welding metal*

# CONCLUSION & CALL TO ACTION

America Succeeds believes that despite the uncertainty that still clouds the future of work, a few basic truths have become evident in the Age of Agility:

STUDENTS & WORKERS	EMPLOYERS	EDUCATION PROVIDERS
More than ever, individuals will require agency over their lifelong educational needs, and they'll have to exercise it. People will have to be agile, flexible, and adaptive as employment requirements continue to shift.	For the foreseeable future, employers will have to facilitate and deliver significant portions of the education and training they need their workforce to possess. Employers will also need to carry some of the burden of retraining workers as their needs evolve.	K-12 must meet higher expectations for preparing every student for continuous, rigorous learning. Education systems must also become much more responsive, providing seamless educational opportunities grounded in the mastery of academic fundamentals and by experiences relevant to an ever-evolving, increasingly connected world.

## Time to Act

While the central mission of the public education system is not only to produce sufficiently skilled workers to fill the available jobs in the workforce, it is also true that most productive members of communities do and will have jobs. Therefore, all students should graduate high school with the knowledge, skills, and behavior to succeed in their subsequent step, whatever it may be—continuing education, entering the workforce, or both.

This may mean creating education systems that are so nimble and agile that they will bear little resemblance to our present-day schools. The problem to solve is how we get from here to there as quickly as possible.

## Defining the Goals

In every state and local community, business leaders, educators, and policymakers must work together to confront and overcome the current skills gap and reconfigure the education-to-workforce pipeline to meet these demands:

1. K-12 systems must redouble efforts to ensure all students leave elementary school reading, writing, and calculating on-par with their peers in the world's top-performing countries. This may mean phasing in an entirely new, more personalized system with the capacity and agility to evolve into the future.
2. Secondary and post-secondary systems must be restructured so that everyone has a chance to succeed in post-secondary education and has access to lifelong education and retraining, including practical, hands-on experience. This education must enhance each individual's hard skills and soft skills. Whether it takes place within the walls of what we currently call *school* is an open question.

“All students should graduate high school with the knowledge, skills, and behavior to succeed in their subsequent step, whatever it may be - continuing education, entering the workforce, or both.”

## CONCLUSION & CALL TO ACTION *continued*

We must remove barriers to innovation in education—laws, policies, and regulations that make it impossible for educators and school leaders to adjust on the fly to changing circumstances. While schools must operate within stringent accountability frameworks, those frameworks must be focused exclusively on outcomes, not inputs.

Education policymakers at every level—local school boards, state boards of education, legislators, and other elected officials—need to understand and emulate the agile mindset required of both the employers and employees the education system produces. They must invite business leaders to the table to share their industry expertise, and use that insight to create learning experiences for students that expand their options and ensure their employability.

The pace of change in the workforce is accelerating, and to keep pace, schools, or whatever learning system replaces them, must mirror that rapid-fire change. This will make learning consistently relevant and cutting edge. It will also allow students to gain experience in their learning environment that helps them adapt quickly to constantly evolving workplaces.

So how do we make this happen?

### **Community Conversations**

No corner of the country will dodge the impact of technological advances and globalization, and their profound implications for jobs and the economy. It's time to talk about it.

We recommend local and state-level convenings, led by business leaders with their colleagues in education and policy—problem-solving summits with the goal of making the education system more rigorous, relevant, and agile.

Turning these conversations to action, civic leaders must work together to establish education policies—funding, human capital, access to information, quality options, credentialing, etc.—that better align the knowledge, skills, and behaviors taught by the education system with the actual needs of the local and global workforce.

Today, if we were building an education system from scratch, would it look anything like the system we currently have? Almost certainly not.

### **Call to Action**

No one has all of the answers about how best to train and

retrain students and workers for the jobs of the future. Based on the data presented here, however, we conclude that our current education system is not up to the task.

**This means everyone has urgent work to do:**

### **Business Leaders**

#### **SPEAK UP AND HELP OUT**

Employers, you are on the leading edge of the workforce revolution and see first-hand the advances of technology and innovations in the workplace. Therefore, you should be poised to help both educators and students—current and future workers—keep pace with changing needs for talent, and ways to acquire those skills.

- Invest in getting workers additional education and training by providing experiential learning opportunities (apprenticeships, internships, and work-based degrees and certifications) that allow workers to upgrade or reinvent their skill set while maintaining employment.
- Seek strategic partnerships with K-12 and higher education institutions to inform their offerings, ensuring curricular alignment to in-demand workforce needs (both technical and interpersonal skills), and provide information and resources that optimize teaching and learning experiences.
- Stop eliminating talented workers from the candidate pool through rigid and undiscerning automated screening programs. Instead, adopt a thoughtful combination of automated sorting and human subjectivity and perception to maintain efficiency while adding the all-important human element to preliminary talent screenings.

### **Education Leaders**

#### **MODEL THE WAY FOR STUDENTS**

Adopt new ways of understanding and demonstrating the agile mindset and practices students need to be well-prepared employers and employees. Invite business leaders to share their industry expertise with you and students, and use those insights to create learning experiences that expand options and make graduates more employable.

- Make the K-12 and higher education institutions (brick and mortar or virtual) offerings adaptive and rapidly responsive to workforce demand.
- Provide longer-term investments in students' futures, providing in-demand skills and training and make your resources available to returning students who will be seeking to continually upgrade their skills.



## *Students & Workers*

### **EMBRACE LIFELONG LEARNING & TRAINING**

You must adopt a mindset of continuous learning and retraining to maintain ever-evolving proficiencies—technological and interpersonal—that demonstrate workplace value. Gone are the days of getting a single college degree or professional certification and expecting it to provide a career of employability.

- Develop a mindset and practice of lifelong learning
- Seek experiences working closely with people from different racial, ethnic, and socioeconomic backgrounds.
- Take initiative to continually enhance your skills and further your education.
- Along with efforts to remain technologically savvy, also hone soft skills like empathy, dependability, and teamwork.

### *Invest in Success*

America Succeeds will partner with local stakeholder groups in cities and states across the country, starting with our affiliates, to facilitate community conversations on what the future of work and the Age of Agility means for restructuring—as radically as deemed necessary—the way we deliver education. Through community-driven initiatives, policy,

and advocacy—and with local business leaders fully engaged and supportive—we believe that much-needed systems transformation is possible.

Believing in the power of a network, America Succeeds has launched a website – [AgeOfAgility.org](http://AgeOfAgility.org) – designed for stakeholders to learn more, ask questions, share success stories, and exchange resources. Each community conversation can contribute additional knowledge and resources—strategies, best practices, model policies, advocacy methods, coalition-building—to this free, online resource bank.

We hope this website will serve as an interactive tool to help users—business leaders, educators, policymakers, parents, and students—work together to succeed in the Age of Agility.

The bottom line is straightforward: if students and workers must be agile and adaptable to succeed in this new world, then the same holds true for our education systems that prepare them.

Think of it as history’s biggest barn-raising. Let’s get to work.

[AgeOfAgility.org](http://AgeOfAgility.org)



# ENDNOTES

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AMERICA  
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Welcome to the  
Age of Agility.



# THE AGE OF AGILITY

## WHAT PEOPLE ARE SAYING ABOUT THIS REPORT

*"This report provides sobering insight into what the future holds for students planning to enter the workforce in the coming years. Even if this report is only half right about what's coming, there is still a stark lack of preparedness. To close the nation's skills gap, change in the education system will have to be as impactful and immediate as those happening in the workplace."*

**Andy Rotherham**

Co-Founder & Partner, Bellwether Education Partners

*"Who should read this report? It's hard to read this case defining the Age of Agility and not see yourself in it, and gain from its insights. This applies to business leaders, educators, students, parents, policymakers, and everyone along the spectrum of education to employment. This report is revealing and instructive for anyone currently navigating the work world or helping a student prepare to do so."*

**Lisa Graham Keegan**

Executive Director, A for Arizona

*"America Succeeds is well positioned to carry the conversation about the future of work from the business world into the K-12 education world, where preparation for the rapid transformation of our economy is lagging. This is a timely and important report and provides a much needed wake-up call for employers, educators, students and the workforce to face the inevitable future head on and to rethink the way Americans are equipped with essential skills."*

**Brian W. Jones**

President, Strayer University

*"This report sounds the alarm. Today's job market no longer asks for better, it demands it. This changing world can become a crisis or an opportunity—an opportunity to adapt and respond, to build partnerships, to innovate in spaces never before explored, and to deliver on the promise of a truly world-class education that leads to successful citizens and a thriving economy. The Age Of Agility is a call to action."*

**Hanna Skandera**

Former Secretary of Education of New Mexico

*"This report outlines the change forces of the automation economy that are reshaping lives and livelihoods. It's most important prescription—community conversations about the changing landscape and the vital role of quality K-12 education and access to lifelong learning. The communities and states that skill up will win in the new economy. Get a glimpse of the future and read the Age of Agility."*

**Tom Vander Ark**

CEO + Partner, Getting Smart

Continue the conversation at [AgeOfAgility.org](https://AgeOfAgility.org)