

# AI & The Future of Work: What Every MBA Needs to Know

## Executive Summary

Whether we are aware of it or not, artificial intelligence (AI) is already influencing how people interact with the world. Massive surges in data collection, increased computing power, new algorithm development, and the Covid-19 pandemic have rapidly accelerated advances in the development and adoption of AI. While AI is still years away from possessing the ability to continuously learn and improve on its own (like humans), specialized AI is already proving useful in many applications. As adoption grows, it is becoming increasingly valuable for workers to develop new skills that could include programming, designing, or complementing AI processes. And while the World Economic Forum predicts more jobs will be created than destroyed by AI, job displacement will disproportionately impact low- and medium-wage workers.

**“The next 10 years can be the best decade ever for workers or one of the worst. The outcome depends critically on whether we use AI to augment and extend our capabilities, enhance the value of labor, or simply automate existing tasks.”**

- Erik Brynjolfsson, Jerry Yang and Akiko Yamazaki Professor  
*Stanford HAI May 2021 Industry Briefing: AI and the Future of Work Post-Covid*

Though it holds risks that must be addressed—including risks of bias, concerns about data privacy and security, and transparency—AI presents exciting opportunities to augment human skills to improve business efficiency, contribute to positive social and environmental outcomes, and accomplish things that we have yet to imagine. Through the strategic deployment of AI and concerted training efforts to prepare employees for in-demand skills, businesses can prepare themselves to stay competitive in the future. Still, preparing for this shift cannot be done in silos. Governments, businesses, educators, and other stakeholders need to work together to address the skill shift that AI requires and ensure workers can take advantage of the new roles created by this digital shift rather than exacerbate inequalities.

## The Issue

The phrase “artificial intelligence” (AI) tends to conjure images of a future where human-like robots take over everyone’s jobs (and the world). While that is not the reality, AI is already ubiquitous in our lives today. Mundane daily actions, such as opening our phones with face ID, scrolling through our personalized social media feed, or using Google Maps to find the fastest route, are all made possible by AI.

Businesses are rapidly adopting AI to streamline processes and decision-making and enhance their product offerings, especially in the wake of the Covid-19 pandemic. In a 2020 global survey of 800 senior executives, [McKinsey & Co.](#) found that two-thirds were increasing investment in automation and AI either somewhat or significantly, especially in work areas with high levels of human interaction.<sup>1</sup> More recently, the consultancy’s [“State of AI in 2021”](#) survey found that AI adoption within at least one function went up from 50% in 2020 to 56% in 2021.<sup>2</sup> In the same survey, they found the most popular use cases for how businesses are adopting AI to be: service operations optimization, AI-based enhancement of products, and contact-center automation.<sup>3</sup> These top three areas illuminate a range of AI impacts—from processes (impacting the way of working) to products (impacting the customer experience) to role relevancy (impacting the need for specific jobs).

Lead Author: Patricia Murray, MBA '22, EDGE Fellow, Fuqua School of Business, Duke University.

## Types of AI

**Machine Learning:** algorithms that can be descriptive, predictive, or prescriptive based on how the dataset is modeled

**Robotics:** machines that move and act independently with the purpose of automating physical tasks

**Computer Vision:** automating tasks done by the human visual system

**Natural Language Processing:** computers that understand and generate natural human languages in the form of speech recognition, translation, text generation, question answering (ex: chat bots)

Source: Malone et al, "[Artificial Intelligence and the Future of Work](#)," MIT

## Specialized vs. general intelligence

Today, the AI that we interact with is "specialized intelligence" or "narrow AI," capable of tackling only a specific and limited number of problems. Examples include personal assistant Amazon Alexa, contactless cashiers, and self-parking cars. This type of AI can help make tasks that are typically time-intensive, monotonous, or require complex decision-making much more efficient.

The AI sector's long-term objective is to develop artificial "general intelligence," closer to human thinking and reasoning. This type of intelligence would enable AI to undertake various tasks and continuously learn how to improve over time.<sup>4</sup> It's unclear exactly how far away we are from accomplishing general AI (as MIT researchers put it in a Dec. 2020 research brief, "human-level AI has seemed 20 years away for the last 60 years"<sup>5</sup>). In the meantime, however, specialized AI capabilities will continue to become more sophisticated over time.

## Workforce impacts

In its [Future of Jobs Report 2020](#), the World Economic Forum estimates that technology will create 97 million new jobs and eliminate 85 million jobs

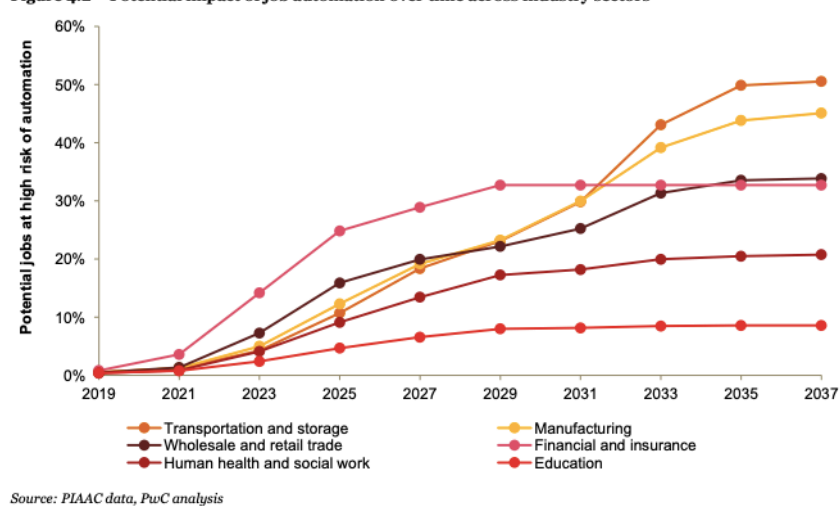
across 26 countries by 2025.<sup>6</sup> The net positive increase in jobs highlights that while the expansion of AI and technology creates new jobs, certain skills will become more important, while others will become obsolete. This is an especially pressing issue as job destruction is happening faster than job creation.<sup>7</sup> And it is accelerated by the effects of the Covid-19 pandemic; [McKinsey & Co.](#) estimates that, post-Covid, between the U.S., Spain, U.K., France, Germany, Japan, China, and India, approximately 100 million workers will need to find new occupations by 2030.<sup>8</sup>

While nearly every industry will feel the impact of AI, the timeline of this change will vary. The financial services and insurance sectors are expected to see the most rapid shift in job automation through AI in the next 10 years. [PwC](#) estimates just over 30% of jobs in these sectors are at high risk of automation by 2029.<sup>9</sup> These are data-driven industries that require a high degree of routine tasks and computation—things that AI is exceptionally good at. Alternatively, industries like transportation and storage jobs are at a lower risk until 2035, at which point, it is predicted that 50% of these jobs will be at risk of automation—due in part to the expected adoption of driverless vehicles.<sup>10</sup>

Unsurprisingly, industries that require interpersonal and social-emotional skills, like health, social work, and education jobs, are at the lowest risk for automation. Fewer than 10% of education jobs, for instance, are at risk for automation by 2035.<sup>11</sup>

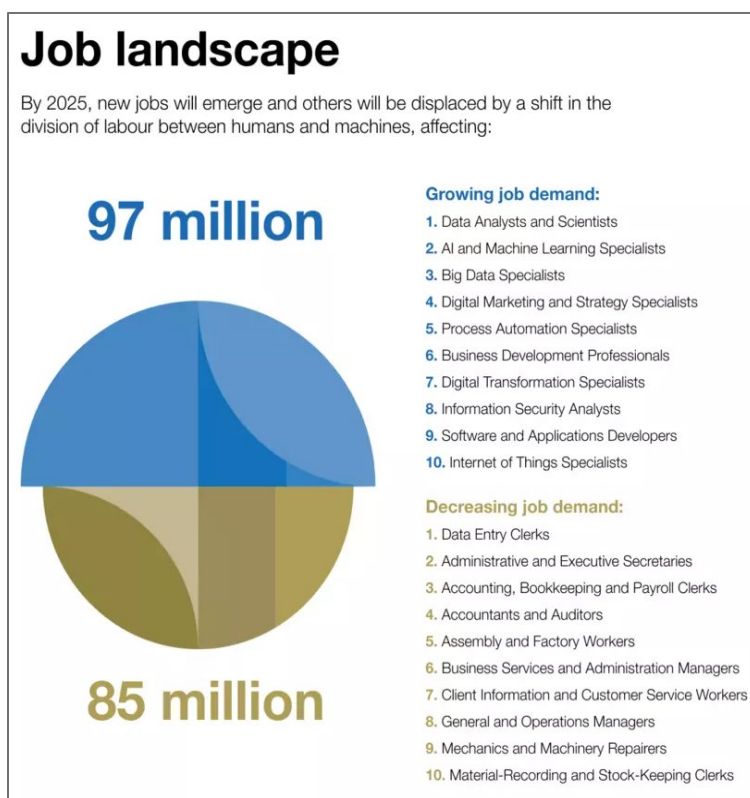
It is also essential to recognize that while AI will put some jobs at risk for automation, it also provides significant value for most industries, especially healthcare and financial services. For example, the introduction of AI into healthcare has enabled improved patient outcomes. From robot-assisted surgeries to

Figure 4.2 – Potential impact of job automation over time across industry sectors



Source: PwC, [International Impact of Automation](#), 2018.

diagnosing pathology, AI has provided the capacity for patients to get better care than ever before.<sup>12</sup> The financial industry, and its customers, are also reaping the benefits of AI through applications like chatbots quickly answering customer questions and AI combatting fraud and managing risk.<sup>13</sup>



Source: [Future of Jobs Report 2020](#), World Economic Forum.

### Impacts on income inequality

Before the Covid-19 pandemic, both low- and high-wage jobs were growing. In contrast, job loss due to AI and automation was concentrated in middle-wage occupations in manufacturing and office jobs, such as accounting.<sup>14</sup> However, during the pandemic, with fewer workers available to come to work physically, businesses accelerated the adoption of AI and automation, especially in low-wage jobs in the food and customer service industries. **McKinsey & Co.** predicts that due to the pandemic, not only will low-wage jobs such as those in food and customer service industries see a steep decline, but for those displaced, more than half may need to shift to occupations in higher wage brackets.<sup>15</sup> This shift to higher wage brackets will require different skills, creating new hurdles for these low-wage workers and leaving them with few accessible job options. Without the proper social services and educational supports to balance this displacement, further income inequality is a risk.

### Workforce retraining

As more organizations adopt AI, some skills are declining in value while others are increasingly more

important for workers. Specifically, AI is better than humans at recognizing patterns, analyzing complex data sets, and doing repetitive tasks in predictable and structured environments. Because of this, the need for certain manual and physical skills and basic cognitive ones in jobs such as those required in retail, manufacturing, and customer service (among others) are in decline.<sup>16</sup> However, technological skills and distinctly human skills such as creativity, emotional intelligence, and complex reasoning are increasing in value.<sup>17</sup> This is an important shift to note, as it will significantly impact low- and middle-wage workers. Currently, workers in the lowest wage brackets use basic cognitive skills and manual skills 68% of the time, and workers in middle-wage brackets use them 48% of the time, implying a significant risk for job security.<sup>18</sup>

Though jobs of the future will still require specialized skills, **McKinsey & Co.** identified 56 foundational skills and attitudes that will serve employees well in the future; these included skills like critical thinking, problem-solving, adaptability, and communications skills in addition to digital literacy, programming and other technology-related skills.<sup>19</sup> This research illuminates that to sufficiently support this technological transformation, governments, schools, and adult-training programs need to ensure their training includes not only technology training but also skill-building related to cognitive flexibility and leadership.

## Business Risks

Businesses stand to gain in productivity, outcomes, and other benefits by adopting AI, but there are several risks that business leaders should be aware of when considering AI and workforce impacts. How these issues are addressed is part of an evolving industry conversation and regulatory landscape that will likely change in the next few years and will play a role in shaping the future of AI.

### **Bias in AI**

Bias in AI is a complex and significant issue. It's often assumed that bias originates from a lack of sufficiently robust data to train AI systems, but it's not as simple as that. From cognitive biases introduced by human developers and incomplete data sets to the ways in which AI is deployed, there are multiple and often interconnected points where bias can slip in. In a recent global survey of IT professionals, students, and academics, 31% of respondents felt the biggest problem to tackle in AI was the social impact of bias in data and models, but only 10% had done anything to mitigate this risk.<sup>20</sup> This is of significant risk to businesses, as a [Gartner](#) report predicted that 85% of AI projects through 2022 will deliver incorrect outcomes due to bias.<sup>21</sup>

A well-known example of AI bias eroding trust is [Amazon](#)'s use of an AI recruiting engine that did not rate technical jobs in a gender-neutral way.<sup>22</sup> In 2014, Amazon launched a system that automated the evaluation of resumes to recommend candidates for interviews. The models were based on resumes submitted over a 10-year period—most of which came from men—which in turn "taught" the engine that male candidates were preferable and the program began penalizing resumes that included references to being female (ex: "women's club captain"). Amazon couldn't adequately assess whether the bias had been completely removed from the model, so they ultimately decided to disband the team.

### **Data security and privacy concerns**

To develop and deploy AI, companies must collect, store, and use enormous amounts of data, which can range from personal financial data to facial recognition and biometric inputs, and search and browsing history. As the amount of data captured continues to explode (Statista forecasts the amount of data created, consumed, and stored to double from 97 zettabytes in 2022 to 181 zettabytes in 2025<sup>23</sup>), cybersecurity and protecting customer data will be more critical than ever. This is a well-known concern to companies as [McKinsey's "The State of AI"](#) survey found cybersecurity to be the number one risk companies listed in both 2020 and 2021.<sup>24</sup> Data privacy and the ability of companies to ensure privacy is also a concern. A study from software company [Pegasystems](#) found that over one third of the 6,000 respondents were uncomfortable with businesses using AI to interact with them.<sup>25</sup>

### **Regulatory risks**

Concerns about AI bias, security, and data privacy have led to a rallying cry for stricter AI regulation. At least 60 countries have adopted some form of AI policy in the past five years.<sup>26</sup> The EU is currently debating contents of a proposed Artificial Intelligence Act, which, as explained by The Brookings Institute, "would create regulatory oversight for a wide range of high-risk AI applications in both digital services (e.g., hiring and admissions software) and physical products (e.g., medical devices)."<sup>27</sup> In the U.S., the National Institute of Standards and Technology (NIST) has drafted an [AI Risk Management Framework](#) to address risks including safety, privacy, bias, and transparency. Many experts expect to see more regulatory attention focused on AI in short order, with implications for businesses in many industries.

## **Business Opportunities**

Proactively addressing workforce concerns and retraining workers for new roles gives companies an opportunity to eliminate the concerns of employees, regulators, and customers about the future of work and ensure that AI transitions can have positive workforce impacts as well as business outcomes.

### **Workforce training: upskilling and reskilling**

By focusing on enhancing skills rather than replacing them, businesses can be in a strong strategic position and help the transition to the work of the future. [Accenture](#) estimates 6x cost savings by reskilling and upskilling workers rather than hiring new workers with required skill sets.<sup>28</sup> A company taking this to heart is [AT&T](#). In 2018, they realized only half of their employees had the skills that the company would require of its workers in the future to stay competitive. In response, they invested \$1 billion into an online based "Future Ready" reskilling initiative.<sup>29</sup>

AI itself can be used to aid the worker upskilling transition.<sup>30</sup> For example, training provider [EdCast](#) uses an AI-driven engine to develop customized learning programs for employees. [SkyHive](#) uses an AI-driven platform to match employees to new opportunities based on their individual skillsets, and [Eightfold](#) uses deep learning AI to connect employees' career aspirations to growth opportunities, predicting the projects and roles that will spur career growth.

### Reducing bias in AI applications

Finding ways to reduce bias in AI can be a differentiator for a product, service, or company. For example, HR tech company [Pymetrics](#) claims to use "uniquely ethical and transparent AI"<sup>31</sup> to match talent with opportunities based on their skills and not only their resumes—an application which ought to be more effective at finding diverse candidates than other existing HR platforms. Other examples include: toolkits that recognize and eliminate bias in machine learning models, such as [AI Fairness 360](#) from [IBM](#) and [Google's What-If Tool](#).<sup>32</sup> The "Ethics by Design" approach to AI development offers a methodology for incorporating ethical considerations into the design and development of AI systems from the outset.

**"On average, 15% of a company's workforce is at risk of disruption in the horizon up to 2025."**

- World Economic Forum,  
The Future of Jobs Report 2020

### Collaborative machine-human applications ("superminds")

There is an opportunity for businesses to leverage machines to enhance work done by humans rather than replace it. Thomas Malone refers to this opportunity as creating "superminds," or "cyber-human systems," that leverage the skills of machines and humans to work together to solve the same problem better.<sup>33</sup> Combining the creative skills of humans with the processing and analytical capabilities of machines creates a more intelligent system than any group of people or computers alone. An example of a company effectively using this approach is clothing retailer [Stitch Fix](#), which uses machine learning to assess a customer's style preferences based on questionnaires and algorithms and make styling recommendations to a human stylist. The human then completes the final selection of items for the customer, taking into account details not captured by the computer (such as what specific occasion the customer is hoping to find an outfit for), and adding a human eye to the system's analysis.<sup>34</sup>

## Takeaways for MBAs

1. Development of new skills is becoming increasingly more valuable as AI continues to influence how we work. More jobs will be created than destroyed by AI, but the shift will disproportionately affect low- and medium-wage workers.
2. AI often exceeds human data analysis and computation capabilities. However, it's crucial to remain cognizant of its limitations and concerns for bias as well as data security and privacy.
3. Augmenting human skills with AI presents an exciting opportunity to run businesses better, make positive social and environmental impacts, and accomplish previously impossible things.

## Further Reading

[Artificial Intelligence and the Future of Work](#), MIT Work of the Future Research Brief, 2020.

[The Future of Jobs Report 2020](#), World Economic Forum, 2020.

[The Future of Work Post-Covid and AI](#), Stanford University HAI, 2021.

[AI Should Augment Human Intelligence, Not Replace It](#), *Harvard Business Review*, 2021.

- 
- <sup>1</sup> <https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-after-covid-19>
  - <sup>2</sup> <https://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/global-survey-the-state-of-ai-in-2021>
  - <sup>3</sup> <https://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/global-survey-the-state-of-ai-in-2021>
  - <sup>4</sup> <https://workofthefuture.mit.edu/research-post/artificial-intelligence-and-the-future-of-work/>
  - <sup>5</sup> <https://workofthefuture.mit.edu/research-post/artificial-intelligence-and-the-future-of-work/>
  - <sup>6</sup> <https://www.weforum.org/reports/the-future-of-jobs-report-2020/in-full/infographics-e4e69e4de7>
  - <sup>7</sup> <https://www.weforum.org/reports/the-future-of-jobs-report-2020/in-full> (p.5)
  - <sup>8</sup> <https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-after-covid-19>
  - <sup>9</sup> <https://www.pwc.co.uk/economic-services/assets/international-impact-of-automation-feb-2018.pdf>
  - <sup>10</sup> <https://www.pwc.co.uk/economic-services/assets/international-impact-of-automation-feb-2018.pdf>
  - <sup>11</sup> <https://www.pwc.co.uk/economic-services/assets/international-impact-of-automation-feb-2018.pdf>
  - <sup>12</sup> <https://www.forbes.com/sites/forbestechcouncil/2021/06/02/five-industries-reaping-the-benefits-of-artificial-intelligence/?sh=6add7a8859ca>
  - <sup>13</sup> <https://www.forbes.com/sites/forbesagencycouncil/2019/04/15/five-industries-being-transformed-by-artificial-intelligence/?sh=739a59894c7e>
  - <sup>14</sup> <https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-after-covid-19>
  - <sup>15</sup> <https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-after-covid-19>
  - <sup>16</sup> <https://www.mckinsey.com/industries/public-and-social-sector/our-insights/defining-the-skills-citizens-will-need-in-the-future-world-of-work>
  - <sup>17</sup> <https://sloanreview.mit.edu/article/getting-your-employees-ready-for-work-in-the-age-of-ai/>
  - <sup>18</sup> <https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-after-covid-19>
  - <sup>19</sup> <https://www.mckinsey.com/industries/public-and-social-sector/our-insights/defining-the-skills-citizens-will-need-in-the-future-world-of-work>
  - <sup>20</sup> <https://www.anaconda.com/state-of-data-science-2021>
  - <sup>21</sup> <https://www.gartner.com/en/newsroom/press-releases/2018-02-13-gartner-says-nearly-half-of-cios-are-planning-to-deploy-artificial-intelligence>
  - <sup>22</sup> <https://www.theguardian.com/technology/2018/oct/10/amazon-hiring-ai-gender-bias-recruiting-engine>
  - <sup>23</sup> <https://www.statista.com/statistics/871513/worldwide-data-created/>
  - <sup>24</sup> <https://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/global-survey-the-state-of-ai-in-2021>
  - <sup>25</sup> <https://hyken.com/wp-content/uploads/what-consumers-really-think-about-ai.pdf>
  - <sup>26</sup> <https://www.brookings.edu/blog/techtank/2022/02/01/the-eu-and-u-s-are-starting-to-align-on-ai-regulation/>
  - <sup>27</sup> <https://www.brookings.edu/blog/techtank/2022/02/01/the-eu-and-u-s-are-starting-to-align-on-ai-regulation/>
  - <sup>28</sup> <https://www.accenture.com/us-en/services/technology/future-talent-platform>
  - <sup>29</sup> <https://eightfold.ai/blog/reskilling-and-upskilling/>
  - <sup>30</sup> <https://www.weforum.org/agenda/2020/10/ai-jobs/>
  - <sup>31</sup> <https://youtu.be/lgZdlIHVgME>
  - <sup>32</sup> <https://venturebeat.com/2021/08/08/ai-bias-is-prevalent-but-preventable-heres-how-to-root-it-out/>
  - <sup>33</sup> <https://cci.mit.edu/superminds/>
  - <sup>34</sup> <https://sloanreview.mit.edu/article/how-human-computer-superminds-are-redefining-the-future-of-work/>