

# Jobs of Tomorrow: Technology and the Future of the World's Largest Workforces

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# **Executive summary**

Technology is transforming workforces; ensuring high-productivity, inclusive jobs requires diverse actions across the world's largest job families.

Much of the recent debate on the future of jobs has focused on generative artificial intelligence (genAl), large language models and their impact on white-collar desk-based occupations, yet technology-driven labour market change is transforming occupations beyond this space. This white paper considers four key technologies: artificial intelligence (Al), robotics, energy technology, and networks and sensing technologies. It assesses the potential benefits and challenges of their accelerating application across seven job families that comprise the world's largest workforces: agriculture, manufacturing, construction, wholesale and retail trade, transport and logistics, business and management, and healthcare.

The white paper finds that the potential benefits and challenges differ significantly across these seven workforces, as well as an economy's income level and industrial make-up. This means several aspects are necessary to ensure technology development

leads to higher-productivity jobs, including enabling greater investment in technology and enhancing diffusion, facilitating efficient and supportive market structures, understanding employers' strategic workforce goals, and discovering the potential capability of a technology-enabled workforce.

The Global Future Council on Jobs and Frontier Technologies is a multidisciplinary expert group exploring how technological progress can create higher productivity jobs and prepare a global workforce to perform them. In accordance with its mandate, this white paper identifies key areas where stakeholder actions are most likely to be impactful. The remainder of the council's term will seek to identify specific actions that economies, industries, technology developers, employers and other key stakeholders can take to enable a high-productivity, inclusive future of jobs that benefits businesses, workers and enhances global opportunity.

# Introduction

Four technologies will transform major workforces, creating opportunities but also risks that demand urgent action.

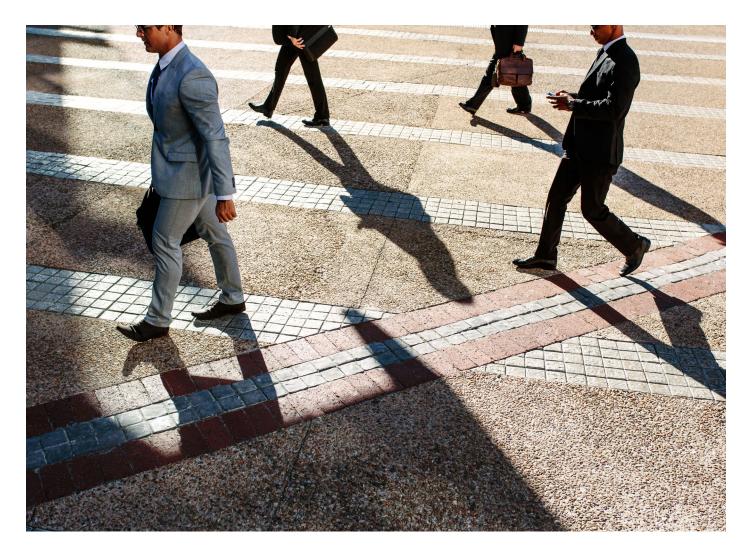
© Decisions made now and in the coming years will determine the future impacts of technology development. According to the World Economic Forum's *Future* of Jobs Report 2025, technology changes are expected to be the biggest driver of labour market transformation in the coming years. They have the potential to create higher-wage, better-quality jobs, increase global productivity and exacerbate inequalities within and across geographies. The decisions made now and in the coming years will determine the future impacts of technology development.<sup>2</sup>

The Global Future Council on Jobs and Frontier Technologies is a multidisciplinary expert group tasked with identifying ways to harness technologies with labour market transformation potential to inclusively provide more productive jobs to the global workforce.

While much of the recent debate on the future of jobs has focused on generative artificial intelligence

(genAl), large language models and their impact on white-collar desk-based occupations, technology-driven labour market change is transforming occupations beyond this space. To arrive at a more comprehensive understanding of the changes under way, this white paper assesses the potential impacts of the application of four workforce-transforming technologies on seven job families comprising the world's largest workforces. It aims to identify the greatest potential workforce opportunities and challenges.

Future work from the Global Future Council on Jobs and Frontier Technologies will seek to understand how these opportunities can be realised, and how risks can be mitigated – providing guidance to businesses and policy-makers to enable higher productivity in workplaces worldwide.





# Workforce-transforming technologies

Artificial intelligence, robotics, energy and sensing technologies promise productivity gains while intensifying risks.

The Global Future Council on Jobs and Frontier Technologies defines workforce-transforming technologies as recent technological advances with the potential to rapidly transform the workforce. Such advancements would provide productivity or capability boosts to help address society's key challenges, and have substantial or systemic risk that requires governance and/or compliance enhancements.

After reviewing global employers' expectations (set out in the Future of Jobs Report 2025), aggregating the council's experience with workforcetransforming technologies and assessing the workforce implications of emerging technologies, the council identified the following four frontier technologies as having the greatest workforce transformation potential.

## 1.1 Artificial intelligence

of employers expect genAl to transform their organization by 2030.

This technology incorporates machine learning and data processing, genAl, artificial general intelligence and agentic Al. Artificial intelligence (Al) has been especially topical since the release and rapid uptake of consumer-focused genAl models, and 86% of employers expect it will transform their organization by 2030.3 Organizations have long harnessed machine learning to enhance workforce efficiency in areas such as maintenance scheduling, fraud prevention and tailored customer services.4 GenAl, meanwhile, became commonplace after the release

of ChatGPT in November 2022. Many organizations continue to grapple with how this technology can be most effective and how it could transform their workforce needs. Some experts believe agentic Al will be the most transformative component of the technology, with Al agents drawing on genAl technology to perform tasks independently with user direction and oversight. While this technology carries potential to enhance worker productivity or capability, it carries substantial risks related to privacy, reliability and economic value structures.

### 1.2 Robotics and autonomous systems

The convergence of AI, advanced hardware and vision systems is beginning to enable robots and autonomous systems to perform an expanding array of functions. These systems are also referred to as physical Al. The application of robots and autonomous systems has been steadily growing around 5-7% annually since 2020.5 With an estimated 40% cost reduction in the last two

years,6 this growth is expected to continue. Robot installations are heavily concentrated in China, Japan, the US, the Republic of Korea and Germany, collectively accounting for 80% of global robot installations in 2022.7 Physical AI developments create an opportunity for new roles and enhanced worker productivity8 - however, this outcome will depend on choices made in the coming years.

## 1.3 | Energy technology

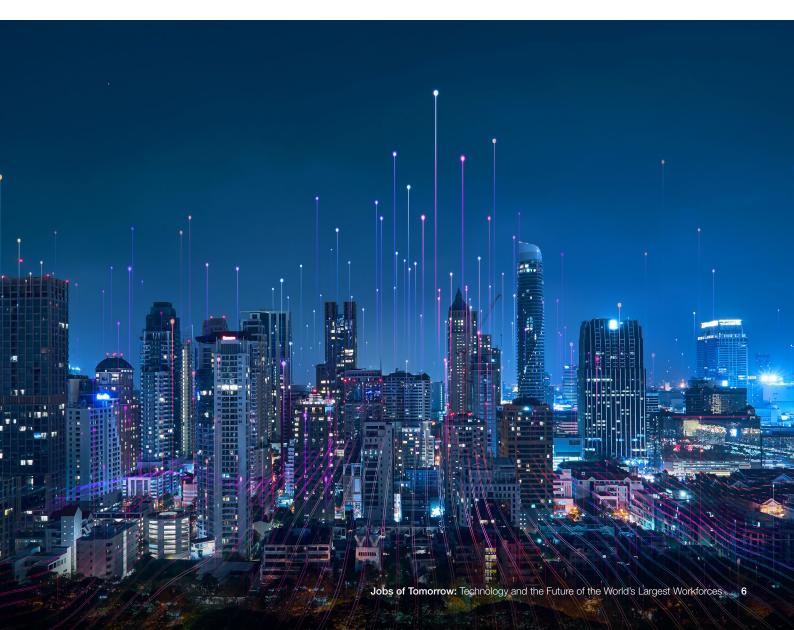
Overall, 41% of employers expect energy technology to transform their organizations by 2030.9 This encompasses energy generation, storage and distribution. These transformations can enhance energy efficiency and create new generation opportunities, and could lead to significant changes in workforce capability.

Changing energy demands also lead to consumption changes, such as increases in the use of electric vehicles and demand for new energy to power data centres. These changes could also be disruptive, with significant changes in the types of demanded jobs and skills related to energy use.

## 1.4 | Networks and sensing technologies

The integration of networks and sensing technologies creates a platform that enables greater development and effectiveness of other technologies, including AI, robotics and energy technologies. As network technologies advance, their impact differs by region and income level. Currently, internet access varies widely across regions, from 91% in Europe to 38% in Africa. The regional workforce impact of network technology development will depend on whether it exacerbates accessibility discrepancies or

enhances access for less connected areas. This technological development will create opportunities to enhance the capability of workers while creating risks, including disruption and privacy concerns. Developments in sensing technologies enhance the role of networks as well as other technologies like physical Al. Recent advances include affordable high-resolution cameras, light detection and ranging (LiDAR) and next-generation tactile sensors, which allow interpretation of complex environments in real time.





# Large global workforces

Seven major job families face distinct technological transformation, with varied global impacts.

This white paper focuses on seven job families that comprise the world's largest workforces and where impacts are likely to be greatest: agriculture, manufacturing, construction, business and management, wholesale and retail trade, transport and logistics, and healthcare. Collectively, these workforces make up almost 80% of the world's

workers, with differing concentrations across economies at different income levels, as shown in Figures 1 and 2. The following section discusses characteristics of these workforces and assesses the opportunities and challenges created by the accelerated application of the four workforcetransforming technologies identified in Chapter 1.

#### FIGURE 1

Job family size by economy income level



Source: International Labour Organization (ILO). (2023). ILO Modelled Estimates (ILOEST database).



Economy income level

### 2.1 | Agriculture

The agriculture workforce is by far the world's largest, making up a quarter of total global employment. This workforce is far more prominent in lower-income economies, comprising 57% of workers in low-income economies and 39% of workers in lower-middle-income economies, compared to 20% of workers in upper-middle-income economies and just 3% of workers in high-income economies.

The four workforce transformation technologies could reform the way this workforce operates. Technology is already transforming demands on the agriculture workforce, although its impact varies significantly between regions and activities. For example, agricultural drones are being used in South America to transport cut banana bunches from steep hillside plantations. This technology enables drastic increases in the number of bunches a worker can harvest, with resulting increases in productivity and improvements in safety. Precision agriculture, meanwhile, is being applied to a variety of cropping operations. Powered by drones, network technology and Al-driven analytics, it allows farmers to monitor

soil health, water use and crop conditions in real time. This reduces reliance on manual labour for routine monitoring and creates demand for new roles, such as drone operators, data analysts and agritech technicians. Automation and robotics are also redefining on-farm labour by reducing dependence on seasonal and manual workers. Autonomous tractors, robotic harvesters and automated irrigation systems are being deployed across regions such as Europe and North America to address labour shortages and enhance productivity.

These technologies have significant productivity potential for farming operations with the resources to fund capital investment and could significantly change the expertise required of the workforce operating these systems. A significant proportion of this workforce, however, are smallholder farmers in lower-income countries where investment capacity is likely to be limited. Enabling global benefits of technology, therefore, requires interventions to support global technological diffusion, although this too comes with risks of displacing employment for vulnerable populations.

## 2.2 | Manufacturing

Integrated mobile robots, Al-based sorting and genAl-guided manipulators can enable faster delivery, increase the demand for skilled roles and create efficiency gains.

Manufacturing represents the world's secondlargest workforce, making up 14% of total global employment. This employment is particularly prominent in some Asian countries, including China, Viet Nam, and Taiwan, China, and European countries, including Czechia, Slovenia and Hungary. The type of manufacturing differs substantially by industry and region. Textiles, automobiles and pharmaceuticals form distinct manufacturing hubs in different countries and regions around the world. These manufacturing hubs also differ significantly in demographic makeup.<sup>10</sup> These differences have implications for the types of technology adoption possible and the current levels of infrastructure. Robotics systems incorporating AI are especially relevant for the manufacturing workforce, with the potential to significantly enhance human capability alongside the possibility of eliminating significant amounts of work through automation. The path of technology development and adoption will determine whether this technology leads to repetitive low-value tasks being replaced by higher-value activities or a reduction in total employment.

While robotics has been adopted in manufacturing processes for a long time, physical AI is increasingly enhancing the capabilities of these systems. Several cutting-edge use cases illustrate how this technology, combined with robotics, could transform the manufacturing workforce. To rexample, AI-enabled visual quality control inspections, combined with autonomous root cause analysis and process mining, identify factory line issues much faster than current quality control processes. Similarly, integrated mobile robots, AI-based sorting and genAI-guided manipulators to fulfil e-commerce orders can enable faster delivery, increase the demand for skilled roles and create efficiency gains. 12

These AI incorporations into existing manufacturing processes could transform jobs into higher-productivity roles with higher expertise requirements. The amount of productivity enhancement, and whether this is accompanied by an increase or decrease in demand for workers, will depend on several factors, including methods of adoption, investment capacity and existing manufacturing infrastructure.

### 2.3 Construction

Company of the second of th the benefits of technological development in construction will require new investment, the incorporation of this technology into new or existing workflows and a future-proofed workforce.

Around 8% of the world's workers are part of the global construction workforce. 13 A peculiarity of this job family is that it tends to make up a smaller proportion of a workforce as economies move up the income spectrum, except for in low-income economies, where it makes up less than 3% of the total workforce. The construction workforce also covers a wide range of projects, from small residential buildings to large-scale infrastructure like bridges and power plants.

Construction tasks are often variable, with job sites constantly changing. This makes full automation more complex; however, transformative technologies are changing the way this workforce operates and the requirements of its workers. Building information modelling systems are a major component of modern construction and involve digital planning of construction operations. Al is increasingly being integrated into these systems to enhance work planning and scheduling, optimize footprint use, ensure compliance with local regulations and incorporate local comfort and safety into buildings. These enhancements boost workers' efficiency and capabilities by improving the functionality of buildings.

The combination of AI and robotics in construction machinery could also transform construction roles. One example is semi-automated bricklaying machinery, which can lay bricks according to the design and specifications input by construction workers. This sort of technology relies on workers' masonry expertise but can increase worker output and reduce reliance on physical skills.

On a larger scale, the entire 84-metre-high Kawakami dam in Mie, Japan, was completed in 2023 using robotics.14 This included remotecontrolled crane operations, brushing machines that calculated the pressure and frequency required to smooth concrete surfaces and boxing machines that controlled the support structures of wet concrete – automatically adjusting position as the concrete dried. This sort of technology redirects the construction workforce towards planning and monitoring operations rather than actively participating in the construction process. This can enable capability-building in areas that are dangerous to access, while also improving efficiency. However, achieving this requires a fundamental workforce skill shift and entirely new training approaches.

A further example of combining AI and other technologies is using computer vision to monitor equipment for damage, provide real-time hazard detection, ensure rapid quality assurance by comparing executed work with blueprints, and support logistics planning by tracking project progression and identifying delays. This could have significant implications for the safety of the construction workforce, alongside productivity gains.

Another technologically enabled shift in the construction workforce is the increasing use of prefabrication in buildings and the development of robotics, including 3D printing to produce these. While these are likely to be limited to certain sections of the construction industry, they will change the types of expertise valued and shift labour demands towards advanced transport and logistics solutions.

Enabling the benefits of technological development in construction will require new investment, the incorporation of this technology into new or existing workflows and a future-proofed workforce to harness these advanced systems.

### 2.4 Wholesale and retail trade

of the global workforce is made up wholesale or retail sales workers.

This workforce encompasses people who engage in wholesale or retail sales and the services related to them. They make up around 13% of the global workforce, holding a consistent proportion regardless of country income level, although regional discrepancies exist, with a larger proportion of workers in Latin America and the Caribbean. 15 The wholesale and retail trade workforce is a large urban employer and can act as a key entry point for women and youth in low- and middle-income countries, who are overrepresented.

Al-enabled business-to-business (B2B) apps are changing how small and informal retailers restock. Across Egypt, Morocco, Kenya, Rwanda and Tanzania, small retail shops and hundreds of thousands of informal retailers now restock via B2B apps. Orders are scheduled with Al-driven demand forecasting and route optimization, which cuts stock-outs and wasted wholesaler trips. This can enhance the productivity of both wholesalers and retailers. Similarly, Al integration into click-andcollect processes is changing this workforce in Africa, India and Latin America.

This integration automates the assigning of tasks and logistics, shifting workers from tills to picking, packing and last-mile coordination. This shift enhances the capability of workers and enables rapid delivery times – including same-day and even within-hours delivery. Drones are also shifting the workforce from frontline retail towards operations and maintenance roles. In Ghana, retail drone delivery was piloted in 2022 so customers in remote areas could receive small e-commerce orders within minutes to a pick-up point. This is especially valuable for high-value, time-critical items.

Energy generation and storage technologies are also transforming the wholesale and retail trade workforce. In South Africa, Nigeria and India, wholesalers are implementing rooftop solar panels and batteries to avoid outages and reduce diesel use. This enables jobs to shift towards energy system monitoring, refrigeration management and predictive maintenance, and stabilizes hours for frontline staff who used to be sent home during power cuts.

These transformative technology shifts create opportunities for technical operators to maintain systems like energy, storage and refrigeration, and to operate robotics such as drones. Data-enabled supply chain and quality functions are also in demand, with roles in inventory planning, demand analysis and traceability. New workers will also be required for customer onboarding and retailer support for B2B applications. These roles will often be higher-wage than the existing wholesale and retail trade roles, however this also brings risks of displacement to the workforce, while the ability to develop new necessary skills will be limited for some workers. Returns will accrue to those with technical and data capability, while small retailers could face fees and data lock-in risks with large platform providers. Skill development will be essential, while the development of data standards or shared services will play a role in determining the distributional impact of transformative technologies on the wholesale and retail trade workforce.

## 2.5 | Transport and logistics

7%

of the world's workers are in the transport and logistics workforce. About 7% of the world's workers are in the transport and logistics workforce, with this job family making up an increasing portion of the workforce as economies move up in income distribution. These workers are involved in all aspects of freight and people transport, as well as handling and storing. Al is increasingly transforming this workforce, including through agentic Al processes that can automatically process order forms and optimize logistics. This enhances the productivity of the transport and logistics workforce by ensuring time and distance are optimized, and increases capability by enabling deliveries to be made with shorter lead times. Robotics, especially drones for delivery could also transform the transport and logistics workforce. This can be seen in countries such as the United Arab Emirates, where drone delivery forms part of a smart cities plan, moving demand away from road vehicle operators towards back-end control of autonomous or semi-autonomous drones.

A combination of network technologies and AI enable the rapidly growing digital platforms that already connect millions of consumers, merchants and couriers in real time. These platforms use AI to balance supply and demand in real time, optimize routing and incentivize design, enabling new ways for goods to move through cities and transforming how flexible work is organized. These platforms will continue to transform the logistics workforce, creating a clear income stream for self-contracted labour but with prices, tasks and performance incentives increasingly driven by automated systems. Sensing technology is also factored into these platforms, with data on speed, braking and driving patterns triggering real-time alerts in an effort to enhance safety.

These efficiency-enhancing technologies come with risks and uncertainties, including how to provide algorithmic transparency while protecting intellectual property, ensuring inclusivity and sustainability, and avoiding digital exclusion.



## 2.6 | Business and management

The business and management workforce includes roles such as accountants, lawyers, human resource professionals, operations managers, executive assistants and business processing workers. This job family makes up around 7% of the global workforce, with higher concentrations in higher-income economies. The increasing ability to do many of these jobs remotely (alongside rising global connectivity and education rates<sup>16</sup> and the growing capability of AI to perform elements of this work)<sup>17</sup> creates an uncertain outlook for this workforce. Projections include large productivity gains, increased ability for developing economies to use the workforce as a springboard to higher incomes, and wholesale job losses.

Al agents have particular potential to transform this workforce. Existing cutting-edge agents combine image recognition with data processing to automate many tasks, such as processing invoices and payments, onboarding staff and

inputting client data. Through process and task mining, these agents can then identify bottlenecks and missed value opportunities. Often, this can enable organizations to undertake tasks that could not have been achieved economically – such as technicalities on low-value invoices to optimize payments. 18 This technology can enhance the productivity of the business and management workforce. It is unclear whether the boost in productivity would lead to increased revenue and/ or wages, or a reduced demand for this workforce.

This technology could boost workforce productivity (potentially creating new value streams for the workforce to exploit), or organizations may prioritize cost savings through workforce reductions. The strategic objectives of organizations implementing this technology, alongside the development pathways prioritized by technology solutions providers, will determine which path is taken.

### 2.7 | Healthcare

of the global workforce is made up of the healthcare workforce.

The healthcare workforce makes up around 3% of the global workforce, but increases significantly with country income. Healthcare makes up less than 1.5% of the workforce in lower-income countries, around 2% in upper-middle-income countries and almost 10% in high-income countries. Healthcare workforce concerns include staffing shortages, workforce burnout and unrelenting demand for higher-quality, more accessible care. These concerns, alongside ageing populations generally increasing the demand for healthcare services, mean opportunities to automate tasks or otherwise alleviate demands on the healthcare workforce should enable the workforce to address unmet demand, rather than resulting in job losses.

Agentic Al systems are now being used to automate many administrative tasks, including documentation, data entry and initial referral assessments. With user fatigue and pressure removed from these processes, accuracy has been shown to increase, while processing times can be reduced, sometimes by 70-90%.<sup>19</sup> Al is also supporting predictive analytics, allowing healthcare professionals to have more targeted interventions.

Robotics, combined with Al data processing, could also reshape the patient journey and subsequently the demands on the healthcare workforce. A combination of Al analytics (to target testing on high-risk populations for specific diseases), rapid diagnostic testing equipment and drones or quadrupedal robots could enable the physical logistics, data processing and scheduling elements of diagnostic testing to be automated. This could increase healthcare workforce productivity by increasing time spent on patient interactions.20

The combination of network technologies and AI can enhance the capabilities of the health workforce, especially in remote areas. Healthcare workers can use AI to identify relevant, expert knowledge - although risks of misinterpretation and incorrect advice continue to exist. To meaningfully enhance the capability of the healthcare workforce, tools to provide this expertise without these risks need to be developed. Similarly, better network technologies are enabling experts to reach geographically diverse patients either directly, or by engaging health workers without the specific expertise.



# Workforce transformations and further work by the Global Future Council

Transformative technologies present both opportunities and risks, requiring tailored actions to maximize benefits.

Reaping the potential benefits of technology for the agriculture workforce requires enhanced technological dispersion to areas that may currently lack the investment capacity.

This section reviews how transformative technology applications could impact each of the seven key workforces and identifies opportunities and risks. This assessment will guide the remainder of the Global Future Council on Jobs and Frontier Technologies' term, identifying actions for employers, governments and researchers to boost productivity and expand job opportunities.

Clear opportunities exist to enhance the productivity of the agriculture workforce, where there is capacity to invest in new technologies like precision agriculture and drone harvesting. Often, this will be in higher-income economies where agriculture represents a smaller proportion of the total workforce and where worker shortages are often a concern. Globally, reaping the potential benefits of technology for the agriculture workforce requires enhanced technological dispersion to areas that may currently lack the investment capacity.

The manufacturing sector has played a key role in the economic development of many countries and has significant diversity across the region, industry and income levels. As transformative technologies reshape the manufacturing workforce, new comparative advantages could shift the geography of jobs, while differing investment capacity could also shape the speed at which workforces transform. Enabling higher-productivity jobs will require industry, geographic and economic analysis to understand the potential actions stakeholders need to take to shape the future of the global manufacturing workforce.

Transformative technologies could enhance productivity and safety for the construction workforce, while the less predictable nature of worksites means large scale automation is less likely here than in manufacturing. Roles are still likely to evolve, however, with increasing demand for semi-automated machinery skills and technician capabilities. Changing methods of construction,

such as prefabricated buildings, could also alter the nature of the construction workforce, although it's unclear how much of the workforce is likely to be impacted. Enhancing the benefits of transformative technology in the construction workforce will require further development of technologies alongside efforts to boost adoption.

Opportunities for the retail, wholesale and logistics workforces are inherently linked. There are significant opportunities to increase access to markets and jobs, especially for small business owners in lower-income economies where distribution network structures may be more changeable. There are also efficiency opportunities with improved routing, new delivery methods and direct access to consumers. A key risk will be the level of control and gains accrued by the network owners, as the workforce - often constituting micro-enterprise owners - will be reliant on B2B and business-to-consumer (B2C) platforms.

The future of the business and management workforce will be substantially shaped by technology development and adoption choices. As agentic AI, in particular, is developed to take on more tasks, employers will decide whether to adopt it for cost savings or to enhance business capability. These decisions will be influenced by the focus areas of technology developers. To ensure benefits are realized, an understanding of the potential capabilities of these technologies and how they operate within the workforce will be important.

Global healthcare worker shortages,<sup>21</sup> alongside unmet healthcare needs, mean potential productivity gains are unlikely to be offset by large reductions in demand for healthcare workers. To realize the potential benefits for this workforce, stakeholders will need to source finance for initial investments and ensure policies enable technology to be integrated into healthcare work programmes.

# Conclusion

Enabling a future with high-productivity, inclusive jobs requires multistakeholder action, including from employers, governments and technology solution providers. The appropriate focus areas will differ for economies based on industry structure and income level. For employers and technology solutions providers, the appropriate focus areas are determined by the workforces that will implement technology developments. For many workforces, including agriculture, construction, healthcare and elements of manufacturing (determined by industry), the focus should be on enabling investment and technology diffusion. The transport and logistics and wholesale and retail trade workforces, meanwhile,

require efficient and supportive market structures. In the business and management workforce, an understanding of strategic workforce goals and technology-enabled workforce capacity possibilities will determine the level of potential transformation.

As a key component of the World Economic Forum's Future of Jobs Initiative, the Global Future Council on Jobs and Frontier Technologies will spend the remainder of its 2025-2026 term assessing ways to ensure technological development enables higher productivity jobs inclusively. It will identify specific actions for stakeholders based on relevant regional and industry differences.

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