


The Renaissance of Blue-Collar Work

Advanced technologies will continue to boost conventional blue-collar workers into tech-enabled, high-skilled, value-generating roles. To optimize this shift, organizations need to accelerate changes to their workforce strategies, according to our recent research.

By Euan Davis and Manoj Mathew





In our recent study, we found that less than half of respondents are making the necessary changes to their workforce strategies to realize the full value from augmented blue-collar roles. Failing to do so forfeits the 14% productivity bonus on offer by 2025, and fatally undermines future competitive performance.

Executive Summary



Blue-collar work isn't what it used to be. Look at some of today's construction sites, where digital hubs connect and empower construction workers and tradesmen through intelligent workflows and synchronized tasks and activities. Or consider the state-of-the-art factory floors festooned with sensors and algorithms sequencing intricate hand-offs between teams of people and banks of machines.

In these traditionally manual-labor-heavy environments, newly empowered workers don't just carry out routine, physical tasks – sometimes referred to as procedural work. Armed with the ability to exploit data, analytics or machine learning, they're equipped to add value in new and innovative ways, using human insight and judgment to master sophisticated technical process work with skill, dexterity and flair.


However, this renaissance in blue-collar work could be over before it really picks up speed. In our recent study, we found that less than half of respondents are making the necessary changes to their workforce strategies to realize the full value from these new roles. There's a stunning lack of urgency to map out future skills and roles, or forge career paths that encourage the best workers to stick around. Failing to do so forfeits the 14% productivity bonus on offer by 2025, and fatally undermines future competitive performance.

We partnered with Oxford Economics to chart the accelerated changes in blue-collar work and learn how workforce strategies should adapt to the structural changes. Our study focused on five traditional blue-collar industries in Western Europe and four occupational types (see methodology, page 25). In addition to our quantitative survey of 500 senior executives, Oxford Economics conducted one-to-one interviews with leaders and their employees.

Key findings from our analysis – which we believe apply to businesses worldwide – reveal that:

- I The dizzying pace of technology is fusing blue- and white-collar tasks.** Over 70% of respondents believe the biggest driver impacting blue-collar work is the growth of technology. This influx of advanced technologies will narrow the gap between blue- and white-collar job tasks. Blue-collar work will focus less on physical, repetitive tasks and more on knowledge-intensive, digital-oriented, non-routine roles.
- I Smarter machines will take on more (and more) decision-making.** The use of smart machines is predicted to rise over the next five years for routine and simple decision making, by nearly 26% and 35%, respectively, and even more so for complex and mission-critical decision-making (44% and 75% increases, respectively). Respondents agree, however, that the majority of operational decisions will still be made with lots of human input.
- I The balance of skilled and unskilled labor will flip.** Demand for skilled labor will grow at nearly the same pace as it shrinks for unskilled workers, by three percentage points over the next five years. The high-demand skills for procedural workers will include data and digital literacy (named by almost 60% of respondents), specialized technical skills and interpersonal and problem-solving skills (over 40% of respondents). Workers will be organized into smaller, agile teams (40%), and can expect to work more closely with customers and suppliers.
- I A productivity bonus awaits.** To support this new workforce, businesses will need to leverage technology, new management models and updated performance/reward mechanisms. Businesses that consider themselves ahead of the competition in these areas expect a productivity kicker of 13% to 14% over the next five years.
- I Businesses aren't moving fast enough to reap the rewards of future blue-collar workers.** Most businesses (62%) are ready to change how they measure performance in order to optimize the value of newly empowered blue-collar workers. However, less than half of respondents have other important initiatives underway to prepare for the blue-collar workforce of the future. As procedural workers become more aware of their worth, and businesses begin to experience severe staff shortages, organizations will need to work much harder to attract, retain and optimize their workforce. Leaders need to find new sources of talent, and shape flexible career paths to attract and retain their own cadre of "value generators."
- I Neglect the future workforce at your peril.** Failing to prime the workforce is a severe risk. The technology isn't slowing down, and the competitive pressure is only going to ratchet up. The time to act is now.

Based on our findings, we believe augmented blue-collar workers can be a force for productivity, creativity and problem-solving when guided by a strategy that enables them to think, act and do. Leading organizations need to focus their workforce strategy on skills rather than roles, worker autonomy and empowerment. They'll provide recognition for workers as knowledge brokers, spreading excellence throughout the enterprise.



A BLURRING OF THE LINE IN BLUE- AND WHITE- COLLAR WORK

Amazon’s latest UK distribution node illustrates how blue-collar work is evolving. Fleets of robots scuttle around its 8,000 vertiginous towers of products, sending uncountable numbers of products down 16 miles of conveyor belts strung out over two million square feet 24x7.¹ While robots rapidly pick and pack, human workers ensure order quality and accuracy.

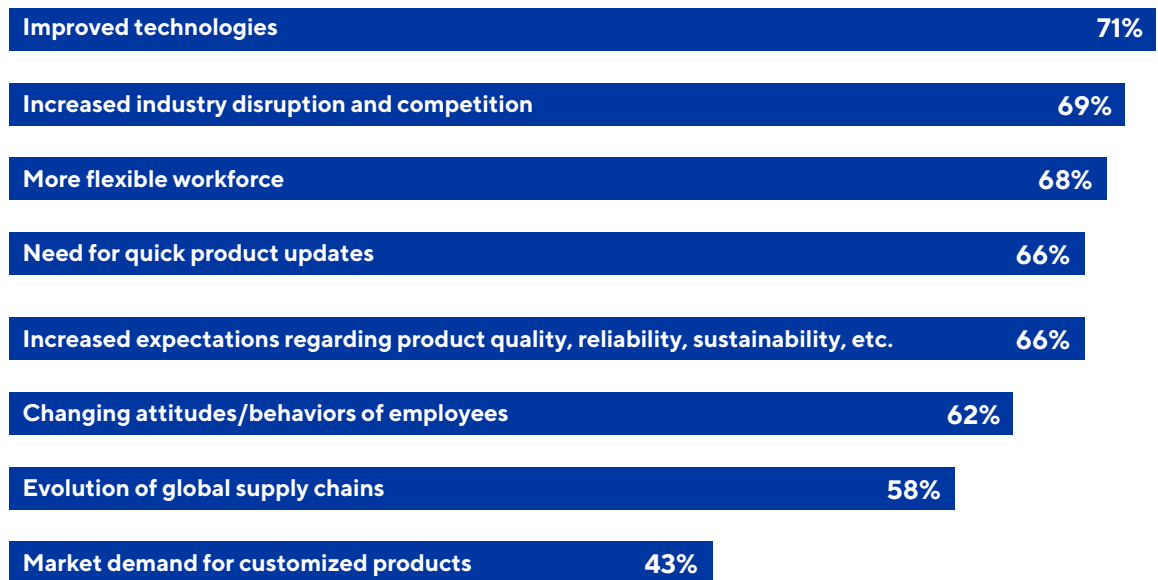
In our study, technology was cited as the most significant driver reshaping blue-collar work in the next several years, with over 70% of respondents pointing toward technology inexorably changing the tasks people do and how they work (see Figure 1).

Specifically, respondents cited factories reconfigured for shorter, more customized production runs, with advanced robotic techniques, improved sensors and connectivity changing how production work is done. Storage and logistics companies are readily adopting and using “track and trace” platforms, with human workers overseeing portable robots on warehouse floors to locate products and collate and package them in seconds.

So while blue-collar workers will continue to be valued for their stamina, resilience and dexterity in undertaking physical tasks, they’ll increasingly see their brains stimulated, not just their hands. Conveyor belt operators won’t just watch packages whiz past; increasingly, they’re fully computer-literate data interpreters and quality controllers, all rolled into one.

Technology drives workforce change

Respondents were asked how important they expect the following business trends will be for their company by 2025 in changing the number of blue-collar workers and the activities they perform. (Percent of respondents saying “highly important” and “important.”)



Note: Multiple responses permitted
Response base: 550 respondents
Source: Cognizant Center for the Future of Work
Figure 1

Rather than take over workers' jobs, the influx of technology will drive an unprecedented expansion in the need for highly skilled labor as organizations fuse humans and robots into a cohesive workforce that drives productivity. Consider that even with all of Amazon's automation, the company still employs over 3,000 people at its latest UK facility, with plans for 500 more.²

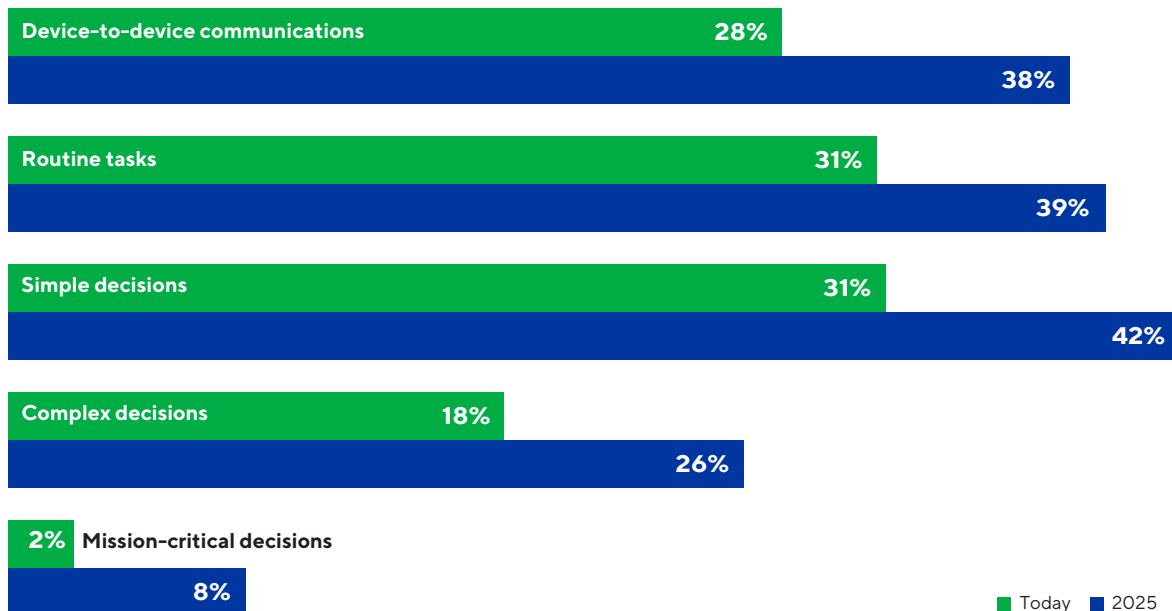
Collaboration between humans and smart machines

Automatically controlled, reprogrammable machines are already used for a host of physical activities, from processing materials (e.g., chemical production, laser cutting and mechanical grinding) to sophisticated assembly and disassembly. They're picking and sorting, painting and handling, and undertaking a wide range of operations for measurement, inspection, packaging, bending and casting. These machines can be fixed installations or newly mobile, like the smart robots now scuttling around Amazon's warehouses. But the latest versions are powered by algorithms – smart, location-aware and capable of automated decision making.

Indeed, over the next five years, respondents foresee a nearly 26% rise in smart machines making routine decisions and a 35% increase in automated simple decisions (see Figure 2). With advances in machine learning and artificial intelligence, respondents expect an even greater rise in the automation of more complex and even mission-critical decisions (44% and 75% increases, respectively).

Machines move from simple to more complex decision making

Respondents were asked to what extent the following operational decisions are taken independently by machines, with no direct oversight by humans, in their company today vs. by 2025. (Mean percent of respondents)



Note: Multiple responses permitted
 Response base: 550 respondents
 Source: Cognizant Center for the Future of Work
 Figure 2

The most significant performance improvements will be realized when people and machines are brought together for their complementary strengths – judgment, teamwork, creativity and social skills of the former, and the speed, scalability and quantitative capabilities of the latter.

At the same time, the vast majority of complex (74%) and mission-critical (90%) decisions will continue to be made by humans or with human intervention, according to respondents. The most significant performance improvements will be realized when people and machines are brought together for their complementary strengths – judgment, teamwork, creativity and social skills of the former, and the speed, scalability and quantitative capabilities of the latter.

As this happens, we can predict how the interplay between people and machines could start to look. In manufacturing, robots are evolving from potentially dangerous and “dumb” industrial machines into smart, context-aware “co-bots” working on the production line. A co-bot arm might, for example, handle repetitive actions that require heavy lifting, while a human worker performs complementary tasks that require dexterity and human judgment, such as assembling a hard-to-reach substructure or production part, without risk to the people doing it.³ This means companies will increasingly need employees who ensure that advanced systems and processes are functioning properly, safely and responsibly.

So while the use of machines in blue-collar work is nothing new, the rapid digitization of blue collar processes is. With the latter, the resulting insights from the process data can be used to add value to the work performed, by driving smarter decision-making with real-time analytical data processing to map component performance, for example.⁴ The challenge is to upskill employees to cope with the changes in work and how they can add value.

IN THEIR OWN WORDS

“Right now there is a demarcation between blue- and white-collar workers, but four to five years down the line, this difference will diminish, and we have to upskill our workers so they are comfortable working with new technology.”

Head of engineering and quality, German semiconductor manufacturer



OLD JOBS, NEW TASKS NEW SKILLS

Skilled job roles are expected to grow by three percentage points across all industries over the next five years, while unskilled roles will decline by roughly the same amount.

For this renaissance in manual, procedural work to take place, a digitally literate workforce needs to emerge, fully equipped with technical insight to perform specific tasks, as well as data literacy, analytical insight, machine-learning and machine-handling techniques, and the ability to co-work with robots when necessary. This symbiosis of man and machine changes how leaders find, and put, their best people to work.

A supervisor at a Swedish industrial products maker for example, foresees the need for skilled machine operators, as well as more technical roles on the production floor, such as data scientists, software developers and even e-commerce specialists.

Moreover, higher levels of automation and greater use of precision machinery demands better problem-solving skills from the people who use them; while automation relieves some direct production tasks, for example, it can't deal with errors or variations. Manufacturing workers on the factory shop floor are increasingly tasked with troubleshooting production lines, handling errors and providing the flexibility when production demands.

In our study, respondents verified this shift from unskilled to skilled labor when looking across the four occupational groups studied (see Figure 3, next page). Skilled job roles are expected to grow by three percentage points across all industries over the next five years, while unskilled roles will decline by roughly the same amount.

We also found that expectations for jobs growth will increase slightly between now and 2025, as demand for skilled job roles drives net job growth even when factoring in more automation. For example, the production sector (typically manufacturing) records the highest expansion of headcount at 4.2% compared with the other sectors, as well as the highest rate of automation.

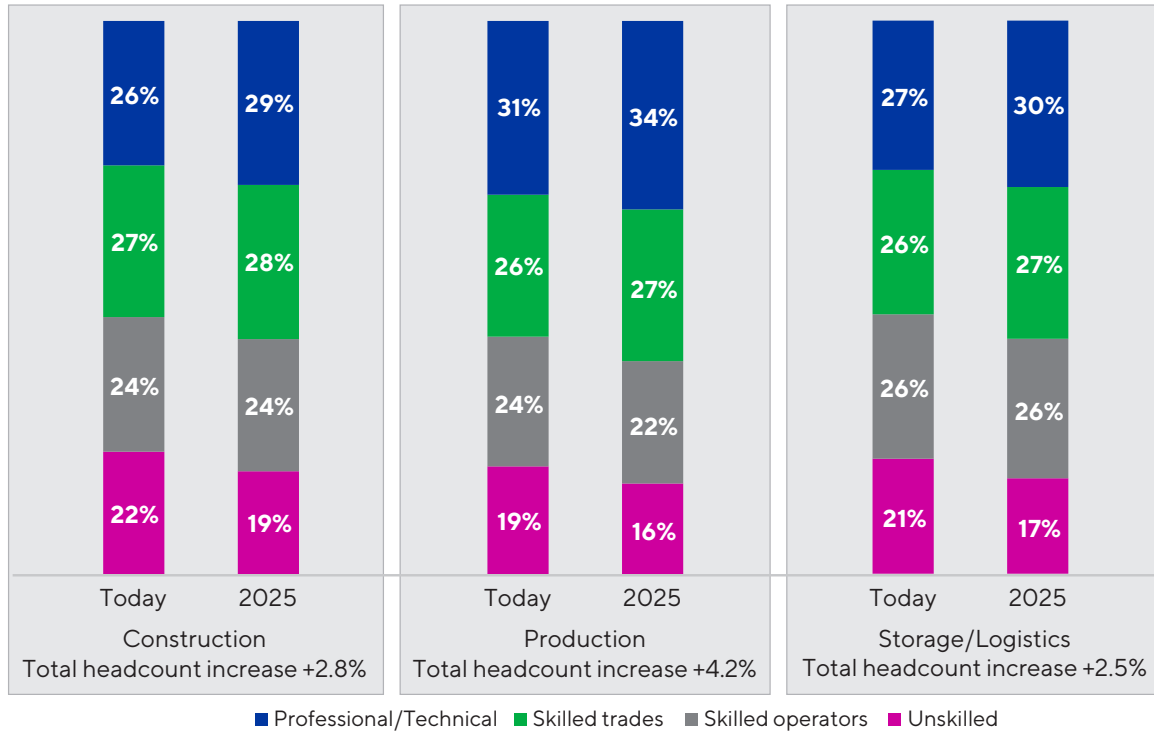
IN THEIR OWN WORDS

“In the future, tasks that are redundant or repetitive in nature will definitely be displaced by machines. But this will create more jobs if organizations upskill their employees frequently.”

Supervisor, Swedish industrial products company

The shift from unskilled to skilled tasks

Respondents were asked to break down their headcount by 2025 into the following broad occupational groups. (Percent of respondents expecting positive growth in number of employees.)



Percentages may not equal 100% due to rounding.
 Response base: 550 respondents
 Source: Cognizant Center for the Future of Work
 Figure 3

Human-to-machine tasks proliferate

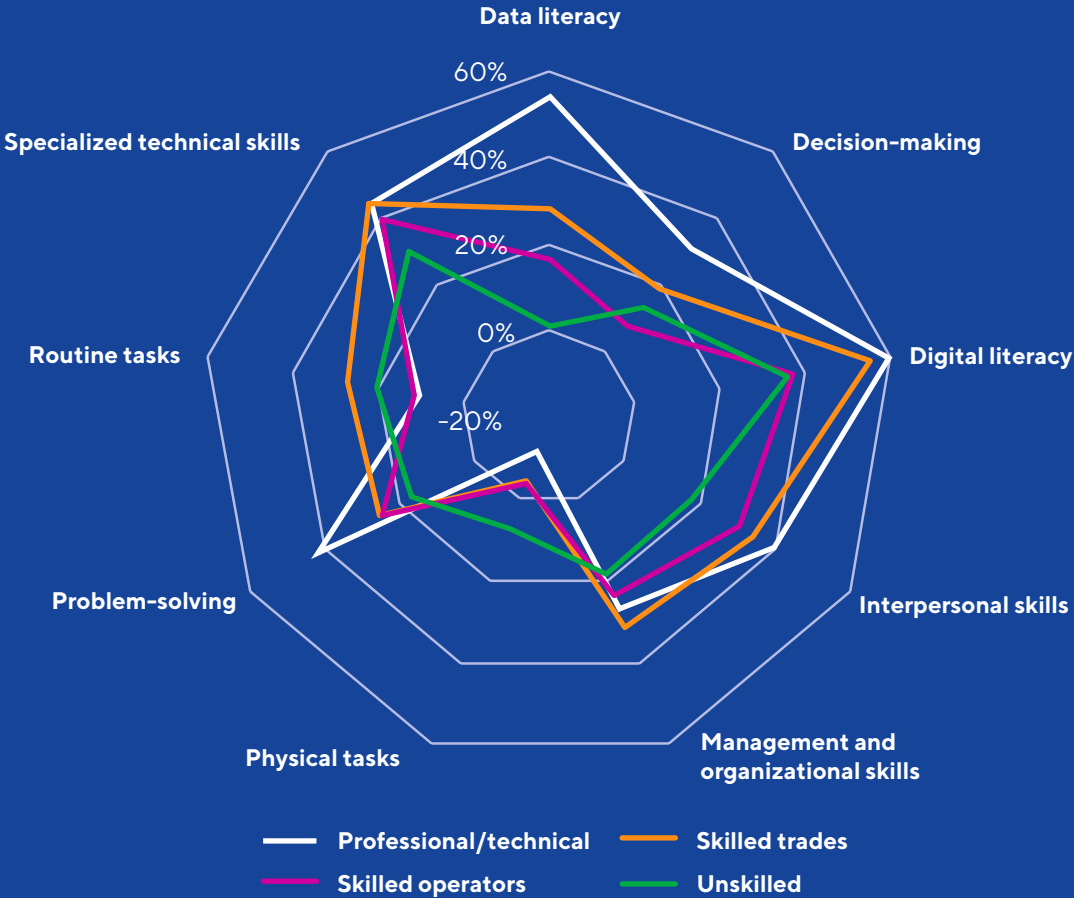
As more blue-collar work becomes knowledge-intensive, digital-oriented and non-routine, the workforce will be empowered to deliver higher rates of flexibility and speed, enabled by smart machines. For example, Mercedes-Benz executives found that the company’s inflexible processes presented a growing challenge: Its most profitable customers increasingly wanted individualized S-class sedans, but the automaker’s assembly systems couldn’t deliver on those customization demands.⁵

Traditionally, car manufacturing has been a rigid process, with automated steps executed by “dumb” robots. To improve flexibility, Mercedes replaced some of these robots with AI-enabled co-bots and redesigned its processes around human-machine collaboration. At the company’s plant near Stuttgart in Germany, co-bot arms guided by human workers pick up and place heavy parts, becoming an extension of the worker’s body. This system puts the worker in control of the build of each car, requiring less manual labor and more “piloting” of the robot. The company’s human-machine teams can adapt to this on the fly.

Our study reinforces this reality, where procedural workers increasingly become machine operators, quality controllers and computer programmers all rolled into one, which will require greater levels of data and digital literacy, as well as specialized technical skills (see Figure 4). For example, in the same Mercedes plant, the co-bots can be reprogrammed easily with a tablet, allowing them to handle different tasks depending on changes in the workflow. Such agility has enabled the manufacturer to achieve unprecedented levels of customization. Mercedes can individualize vehicle production according to the real-time choices consumers make at dealerships, changing everything from a vehicle’s dashboard

In-demand skills for procedural workers

Respondents were asked to estimate future demand for the following skills for each role in their company by 2025. (Percent of respondents expecting high demand for each skill in each job category.)



Response base: 550 respondents
 Source: Cognizant Center for the Future of Work
 Figure 4

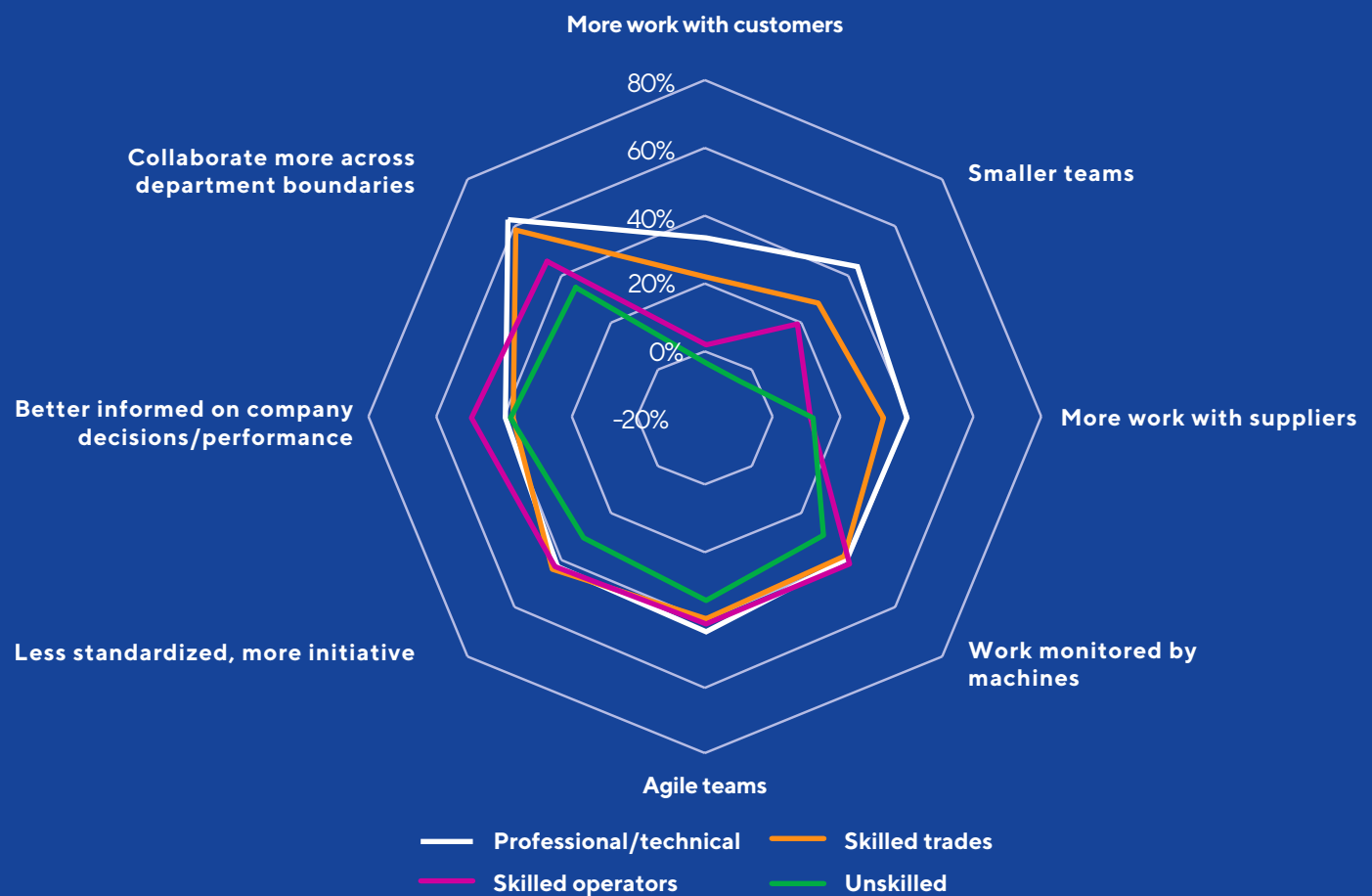
components to the seat leather to the tire valve caps. As a result, no two cars rolling off the assembly line at the Stuttgart plant are the same.

New tasks prime a management makeover

With changing skill requirements, businesses will also need to change how these workers are organized and managed (see Figure 5). According to our study, all four occupational groupings will

Management strategies pivot on the evolution of blue-collar work

Respondents were asked to what extent they agree with the following statements on management and organization by 2025. (Percent of respondents who agree with each statement for each job category.)



Response base: 550 respondents
 Source: Cognizant Center for the Future of Work
 Figure 5



Teams need to be data-literate, responsive, coordinated and able to multi-task. They need to work in smaller, agile configurations that can respond rapidly to changing demand.

be organized into smaller, agile teams (40%), and can expect to work more closely with customers and suppliers.

For example, suppliers, manufacturers, distributors and retailers now use APIs (application programming interfaces) to exchange process and product information. This allows for better planning, more customization and shorter delivery times. Increasingly, customers request product or packaging modifications after their goods complete the production process, and the task now falls to the warehouse to do. Much of the post-production quality testing, specialized packaging and display assembly, and returned-goods processing are done with real-time, highly integrated hand-offs between teams in the warehouse.

These teams need to be data-literate, responsive, coordinated and able to multi-task. They need to work in smaller, agile configurations that can respond rapidly to changing demand. A supervisor at a Swiss industrial products company reported that increasingly, its workers need to be highly adaptable, and able to work across two to three different roles at the same time.

IN THEIR OWN WORDS

“In five years, construction firms will start investing more in technology, using data to make better decisions, increase productivity and reduce risks. With changing trends and rising automation, companies would be on the lookout for a semi-skilled workforce.”

Construction manager, UK construction company



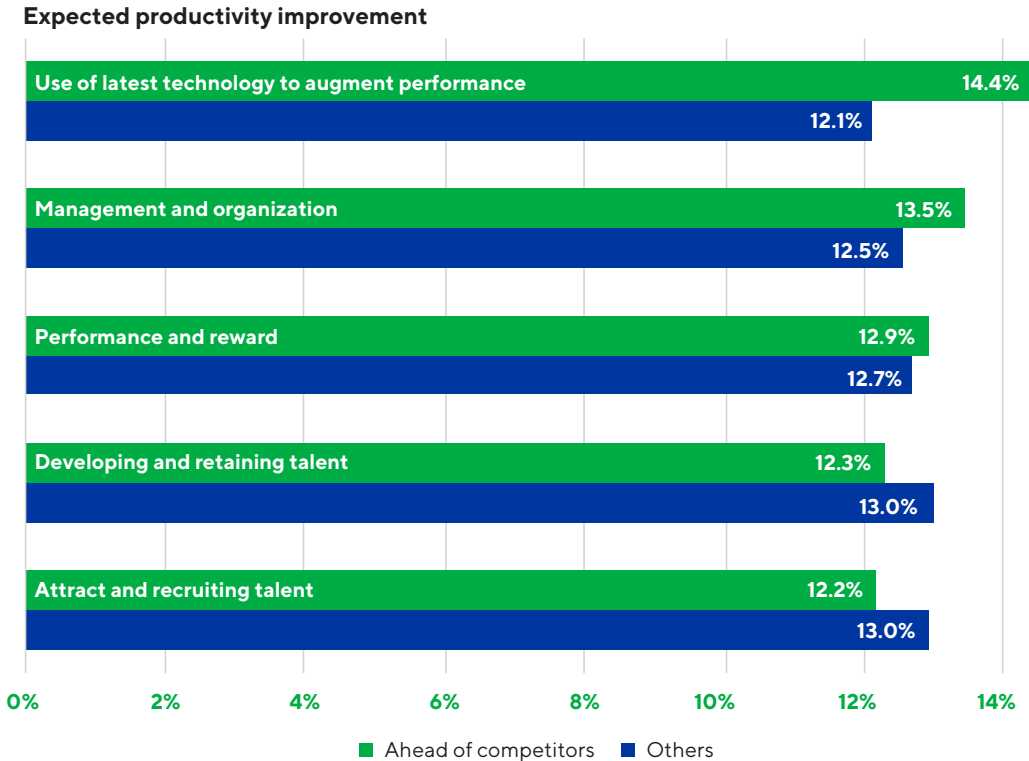
PRODUCTIVITY REWARDS AWAIT – BUT NOT FOR THE SLOW TO CHANGE

Given license to think, act and do – in effect, to be empowered – the augmented workforce could be a force of value creation, applying digital insights to technical work and raising corporate performance as a result (see Quick Take). The head of production at a mining processing company, for example, said he fully expects the productivity of his company’s machine operators to increase as digitization accelerates. As better insights emerge between the technical tweaks applied during mining operations and the bank of machinery knowledge, the company expects productivity to improve because extraction errors and miscalculations will be minimized.

For this to happen, businesses will need to change their approach to incorporating technology, managing the workforce, measuring performance and devising reward mechanisms. Respondents who consider themselves ahead of the competition in these areas expect a 14% productivity increase by 2025 over the next five years (see Figure 6).

A productivity boost

Respondents were first divided into two categories based on their own assessment of whether they were ahead or behind competitors in five areas of workforce initiatives. They were then asked to forecast productivity improvements between now and 2025. *(Productivity improvement expected by each group.)*



Response base: 550 respondents
 Source: Cognizant Center for the Future of Work
 Figure 6

As businesses experience severe shortages in filling roles, they will need to work much harder to attract, retain and get the best from their workers.

Currently, however, while respondents are aware of the changes needed to recruit, manage and retain these highly valuable workers, they've mostly been slow to adopt these initiatives, with the exception of updating their approach to rewarding performance (see Figure 7). Only a minority are changing their recruitment processes to attract high-demand workers or have workstreams in place to identify key roles and map them to skill shortages. As workers become more aware of their value, and businesses experience severe shortages in filling roles, organizations will need to work much harder to attract, retain and get the best from their workers. Otherwise, the renaissance of the blue-collar workforce risks a serious stall.

Preparation lags except in performance rewards

Respondents were asked which of the following initiatives they're taking now to prepare for the blue-collar workforce of the future. (Percent of respondents saying they have an initiative underway.)



Note: Multiple responses permitted

Response base: 550 respondents

Source: Cognizant Center for the Future of Work

Figure 7

Quick Take

Learning from the 'Master Craftsmen' at Lexus

When it comes to getting the most from their tech-enabled blue-collar workers, businesses can take a page from the handbook at Lexus. The luxury vehicle division of automaker Toyota nurtures its manufacturing workers to be guardians of an artisan philosophy, applying the human touch to every aspect of Lexus design and development. The company calls these workers "Takumi master craftsman," or Takumi for short.⁶

Takumi are extremely well-versed in the cutting-edge technologies increasingly used in the manufacture of Lexus's cars. Each Takumi brings at least a quarter-century's experience drawn from his or her respective technical and specialist fields. Testament to these years of dedicated learning is a depth and breadth of knowledge, as well as a finely refined intuition of what excellence looks like: Their heightened sense of touch for example, is legendary, with their hands considered to be their most prized tool – they're even recognized on the production line by the white gloves they wear when they operate machines.

Lexus uses the practice of "guerrilla testing" to ensure Takumi are always on top of their game: Tiny marks are deliberately hidden on a finished steel casing on a car's wing (fender), for example, to check these deliberate errors are caught. Takumi also program their unique sense of touch into the consistent and efficient movements of the robotic technologies installed on the moving assembly line.

There is no higher honor within the engineering ranks at Lexus of becoming a Takumi, and the concept offers other businesses a frame on how to nurture their own procedural workers. Lexus positions Takumi as team leaders – conservers even – of the company's longstanding traditions. They have an active role in fostering an innovative team spirit for the new talent that joins the company, and a duty to pass on their valuable skills and insights.



GETTING THE MOST FROM AUGMENTED BLUE-COLLAR WORKERS

Here are the measures we believe will help businesses upskill the workforce and attract talent into these tech-enabled blue-collar roles.

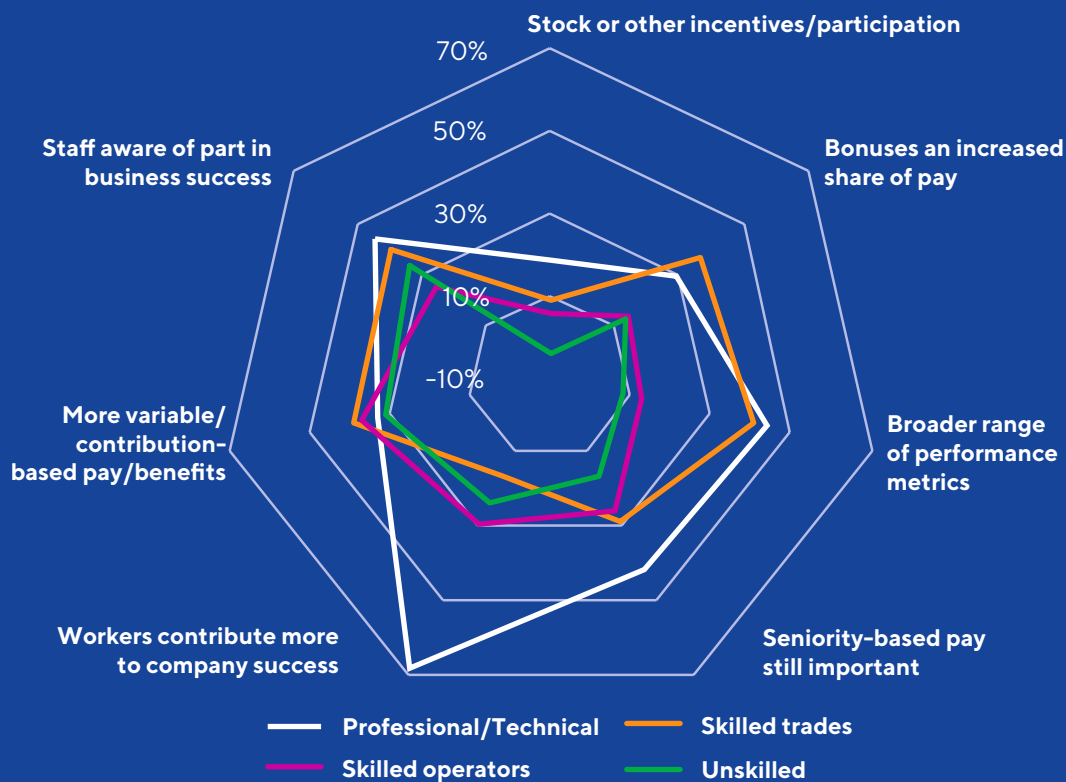


1 Evolve performance metrics and wage models. Given the right tools and empowerment, respondents expect a professional and technical workforce to be greater contributors to their business’s success (see Figure 8). Mirroring these changes, a majority of respondents (62%, as seen in Figure 7) are set to leverage a broader range of performance metrics to reflect these goals. This is the top area where we see businesses taking action today to embrace needed changes.

Rather than focus reward systems solely on production volume and production margin, respondents plan to align pay with improvements in customer satisfaction ratings (i.e., net promoter scores), work speed (i.e., process throughput) and supply chain efficiencies (i.e., KPIs on inventory cycles).

Performance metrics mirror workers’ increased value

Respondents were asked to what extent they agree with the following statements on management and organization by 2025. (Percent of respondents who agree with each statement for each job category.)



Response base: 550 respondents
 Source: Cognizant Center for the Future of Work
 Figure 8

Most respondents also expect to see better rates of pay for professional/technical roles, followed by skilled trades, skilled operations and unskilled workers. Of course, the question of wage is the elephant in the room for many categories of blue-collar work, but our study suggests change is coming, especially as businesses face a talent shortage both in unskilled and higher skilled areas of blue-collar work.⁷ Businesses will need to incorporate these wage shifts into their expectations on profit margins.

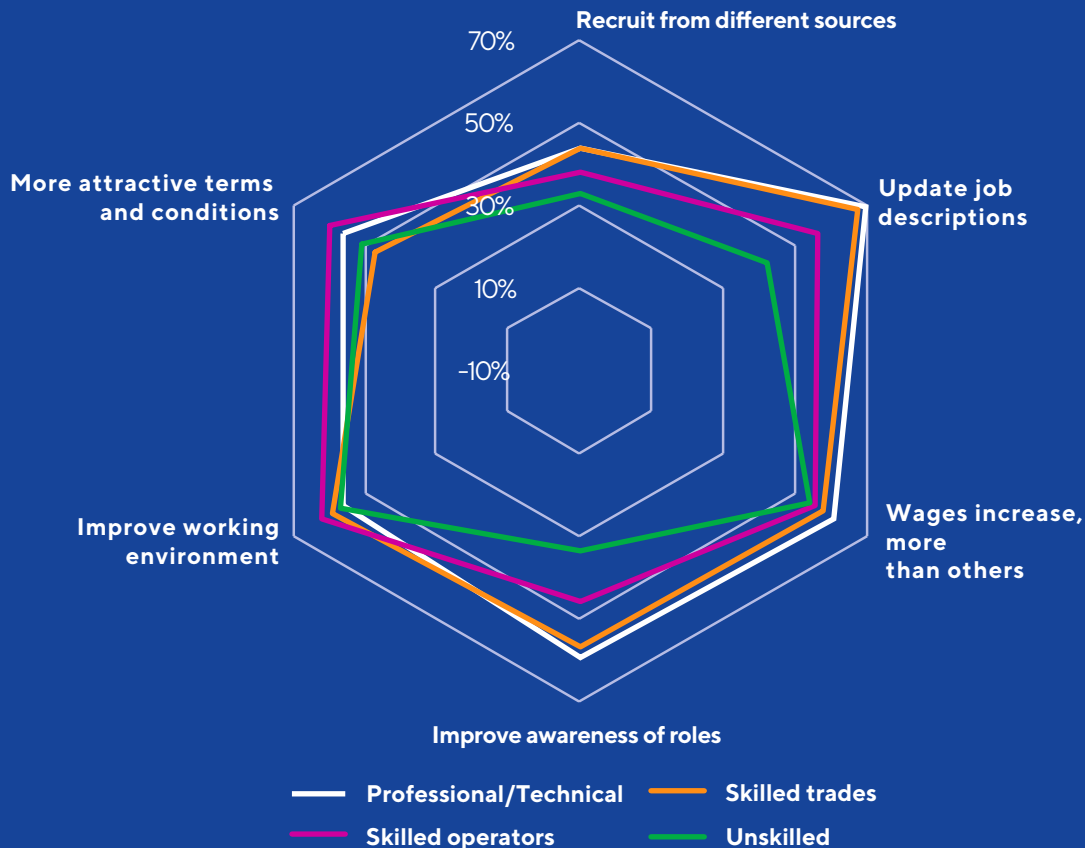


Reform recruitment strategies. The majority of respondents also plan to change their approach to recruitment to attract workers considered to be future “value generators” (see Figure 9).

This finding highlights these workers’ perceived value to organizations, with 70% of respondents believing that job descriptions will need updating to attract these workers. Efforts for unskilled workers aren’t on the same scale; even though 67% of respondents expect shortages of unskilled workers by 2025, only 42% of respondents suggest that job descriptions will need to be updated to fill these open roles.

Fighting the war for talent

Respondents were asked to what extent they agree with the following statements on attracting and recruiting talent by 2025. (Percent of respondents who agree with each response for each job category.)



Response base: 550 respondents

Source: Cognizant Center for the Future of Work

Figure 9

Longer-term career planning and different routes toward career progression are under the spotlight, with 60% of respondents expecting highly skilled workers to be given more flexibility and job mobility than before.

Other key focus areas will include better rates of pay, better terms and conditions and a better working environment. An assembly line operator at a manufacturing business said new channels of recruitment were in the process of being formulated and identified, and job profiles were changing as a result. For example, more apprenticeship schemes are being added to attract younger workers into the organization. Other companies reported co-developing outreach programs with employer/industry associations and partnering with schools and educational institutions to increase awareness.

There may be a perception gap among job seekers, however, that will slow these efforts at attracting and retaining workers. In addition to the skills gap slowing productivity for manufacturers in the U.S. and Europe,⁸ there are other reasons that younger workers may not be drawn to these types of positions. Recent grads may not consider a career in an industrial company as one worth pursuing, believing these jobs are repetitive and widget-based work, taking place in uncomfortable conditions, rather than at the leading edge where automation meets robotics, digitization and people.

Moreover, closing the gender gap, and reshaping how people think about blue-collar jobs and careers is an urgent priority.⁹ Businesses must do more to promote their potential careers as high-tech, highly skilled and higher paying.



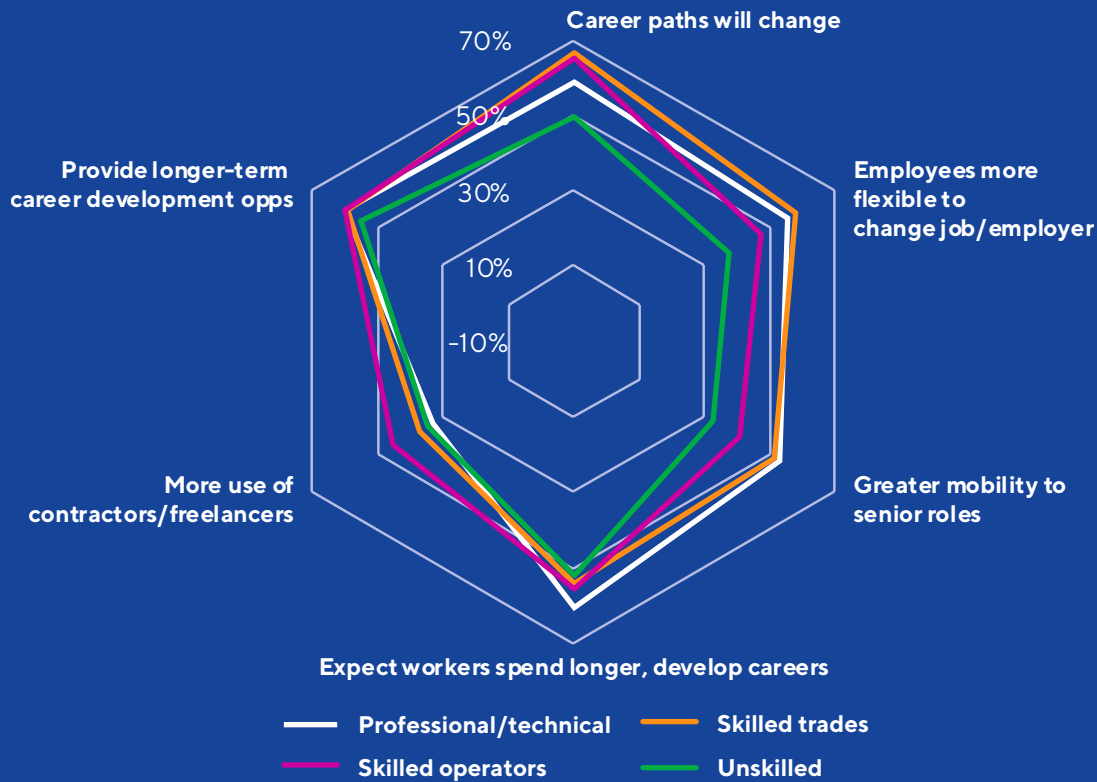
Reboot the career model. Leaders are also rethinking the career model for their blue-collar workers. Longer-term career planning and different routes toward career progression are under the spotlight, with 60% of respondents expecting highly skilled workers to be given more flexibility and job mobility than before (see Figure 10, next page). On the flip-side, businesses will need to reconstruct career models to provide continuous development opportunities, and foster a growth mindset among employees. (For more on this topic, read our white paper [“Cycling through the 21st Century Career: Putting Learning in its Rightful Place.”](#))

This career development-oriented view of the augmented blue-collar workforce represents a change in perspective. There is now a pressing skills gap evident for highly-skilled, digitally-literate workers, and career paths need to feed these employees into the business. Career routes need to be constructed into higher skilled, more senior roles. The focus, therefore, means providing the workforce with the skills to learn continuously, and the ability to improve on the job.

In fact, internal job mobility looks set to be a big part of the future career path for tomorrow’s blue-collar worker. This means employers will need to provide substantial learning opportunities so that workers can quickly move, if needed, to a different position or be redeployed into another team that can use their skills.

Changing career paths

Respondents were asked to what extent they agree with the following statements on developing career paths by 2025. (Percent of respondents who agree with each statement for each job category.)



Response base: 550 respondents

Source: Cognizant Center for the Future of Work

Figure 10

Recommendations

There is a growing need across all industries we studied for highly-skilled blue-collar employees. New workforce management strategies are needed to shift the workforce in preparation for digitally enabled, blue-collar work. Here are our recommendations for getting the most value from these workers:

- **See augmented employees as your value generators (and reward them).** Businesses should identify and nourish a superset of tech-savvy workers and style them as workplace dynamos, boosting efficiency and productivity. Given license to think, act and do, these workers are the organization's next-generation craftsmen, applying digital know-how to technical process work with impact. This next generation of the workforce will need to work fast, multi-task, have a good mix of soft and hard skills, and be highly collaborative. Because they are difficult to find, train and retain, there needs to be a strong link between performance and reward.
- **Move from roles to skills.** As machines do more, and processes digitize, people clearly need a different raft of skills to excel. Employers need their workforce to be flexible, agile and digitally literate. This new way of working, where skilled employees multi-task and move in and out of teams with some frequency, requires a shift in focus from roles to skills.
- **Turn your newly minted craftsmen into knowledge brokers.** Knowledge capture is key, so unique process/digital/technical insight can be coded and shared. Turn your best craftsmen into knowledge brokers, having conversations across the organization and knowing who's working on what at any given time. Brokers can then use this insight to share best practice across the organization, and benefit from the reputation they develop for their skills.
- **Build an in-house corporate university.** Over 50 years ago, General Electric and McDonald's founded their own internal universities for employees. Since then, Apple, Facebook, General Motors, Google, Twitter and many more have developed their own universities to meet the needs of employers in a future-of-work environment. In-house education programs have the advantage that the curriculum can be applied in specific scenarios by your organization.
- **Tread between short and long-term corporate interests.** The renaissance in blue-collar work means higher rates of pay for enabled workers and higher rates of productivity for firms. The trade-off between

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short-term profitability (higher rewards hitting the bottom line) and long-term productivity benefits demand careful calibration. Marshal your evidence and present to the CFO, or the budget holder, why you need the money and talent to develop your next-generation workforce.

Final Word

For too long it seems, common wisdom said only knowledge work would deliver sustainable growth and career opportunities. The story is, in fact, more nuanced. The people doing procedural work could be future workplace dynamos, powering productivity, profits and results. Moreover, they will be paid more for doing so.

Given the right tools, technologies and skills, procedural workers can add value to the bottom line. In fact, they are set to be the 21st century craftsmen and women of the modern technological age, fusing blue- and white-collar tasks together and valued for their unrivaled technical dexterity and digital insight.

We see a new industrial and management orthodoxy emerging to serve these workers too, with new ways of cascading tasks and activities around the organization that takes into account the workforce autonomy and organization they will require.

Methodology

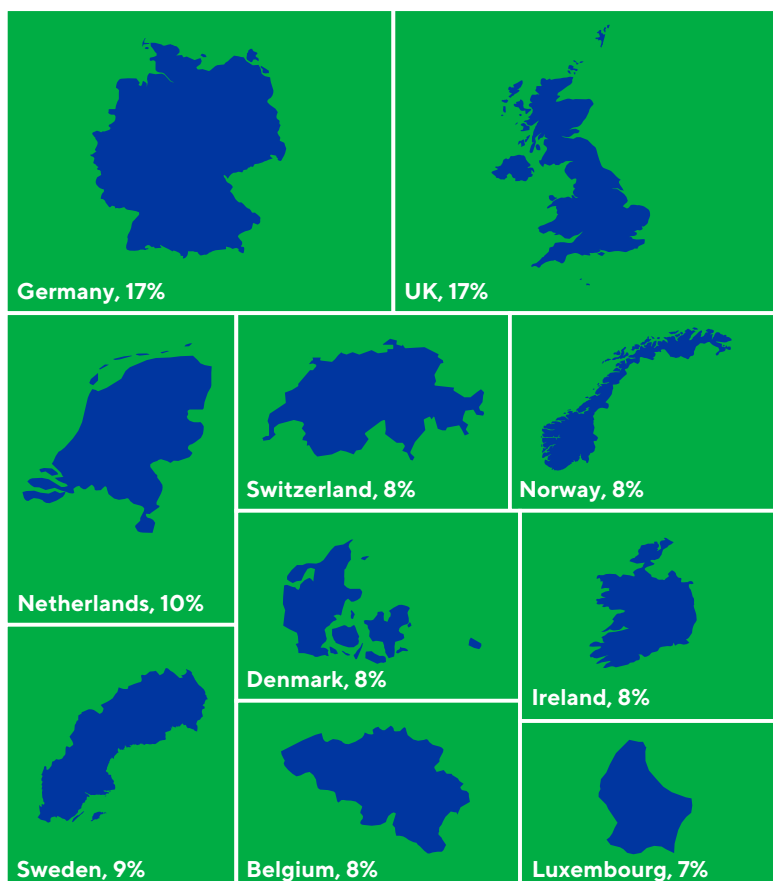
In June 2019, we partnered with Oxford Economics to explore the changing nature of blue-collar work between now and 2025. Oxford Economics surveyed 550 executives at European businesses in five industries with high concentrations of blue-collar roles across three areas of work: production (factory floor), storage/logistics (warehousing) and construction, maintenance and repair (on-site services). We examined the implications for different roles (unskilled, skilled operators, skilled trades and professional/technical). Click [here](#) for a dashboard view of the survey and data.

Occupational groupings by industry

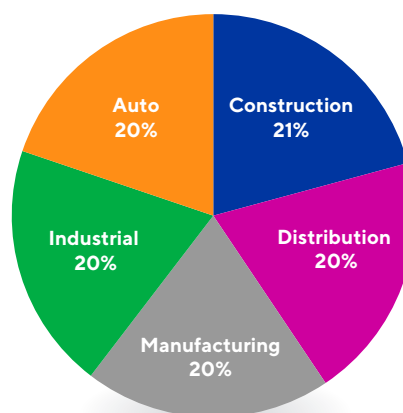
Occupational grouping	Manufacturing, processing & assembly	Storage, logistics and distribution	Construction, repair & maintenance
Professional/technical	Designers, engineers, QC inspectors	System design and integration activities	Draftsperson, repair/service engineers
Skilled trades	Electricians, tool fitters	Truck repair and maintenance	Carpenters, joiners, bricklayers
Skilled operators	Machine operators, welders	Drivers, machine operators	Crane operators, scaffolders
Unskilled work	Line workers, polishers	Loading/unloading, packaging	Laborers, cleaners

Demographics

BY GEOGRAPHIC REGION



BY INDUSTRY



Percentages do not total 100% due to rounding

Endnotes

- 1 "Meet the Robots in Amazon's UK Warehouse," BBC, Aug. 18, 2016, <https://www.bbc.com/news/av/business-37114318/meet-the-robots-in-amazon-s-uk-warehouses>.
- 2 "Amazon to Open One of Its Largest Warehouses in Essex," Invest Essex, Nov. 14, 2019, <https://www.investessex.co.uk/amazon-to-open-one-of-its-largest-warehouses-in-essex/>.
- 3 H. James Wilson and Paul R. Daugherty, "Collaborative Intelligence: Humans and AI Are Joining Forces," *Harvard Business Review*, July-August 2018, <https://hbr.org/2018/07/collaborative-intelligence-humans-and-ai-are-joining-forces>.
- 4 "Nurturing Digital Twins: How to Build Virtual Instances of Physical Assets to Boost Performance," Cognizant, June 2019, <https://www.cognizant.com/whitepapers/nurturing-digital-twins-codex4653.pdf>.
- 5 H. James Wilson and Paul R. Daugherty, "Collaborative Intelligence: Humans and AI Are Joining Forces," *Harvard Business Review*, July-August 2018, <https://hbr.org/2018/07/collaborative-intelligence-humans-and-ai-are-joining-forces>.
- 6 Lexus website description of Takumi masters: <https://www.lexus.co.uk/discover-lexus/craftsmanship/takumi-masters/>
- 7 Kenneth Rapoza, "In 2019, Blue-Collar Workers Disappearing and In Hot Demand," *Forbes*, Dec. 16, 2018, <https://www.forbes.com/sites/kenrapoza/2018/12/16/in-2019-blue-collar-workers-disappearing-and-in-hot-demand/#56159922441b>.

- ⁸ There are more than half a million open jobs in manufacturing, and 2.4 million jobs could go unfilled between now and 2025, putting about \$2.5 trillion worth of GDP at risk. For more, see “Skills Gap in Manufacturing,” Deloitte Insights and The Manufacturing Institute, <https://www.nam.org/how-manufacturers-are-closing-the-skills-gap-3323/?stream=series-practical-insights>.
- ⁹ Carolyn Lee, “Women Are Critical to Manufacturing’s Future,” IndustryWeek, April 11, 2019, <https://www.industryweek.com/talent/women-are-critical-manufacturings-future>.

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Euan Davis leads Cognizant’s Center for the Future of Work in EMEA. A respected speaker and thinker, Euan has guided many Fortune 500 companies into the future of work with his thought-provoking research and advisory skills. Within Cognizant’s Center for the Future of Work, he helps ensure that the unit’s original research and analysis jibes with emerging business-technology trends and dynamics in Europe, and collaborates with a wide range of leading thinkers to understand how the future of work will look. Previously, Euan held senior analyst, advisory and leadership positions at Forrester Research, IDC and CEB.

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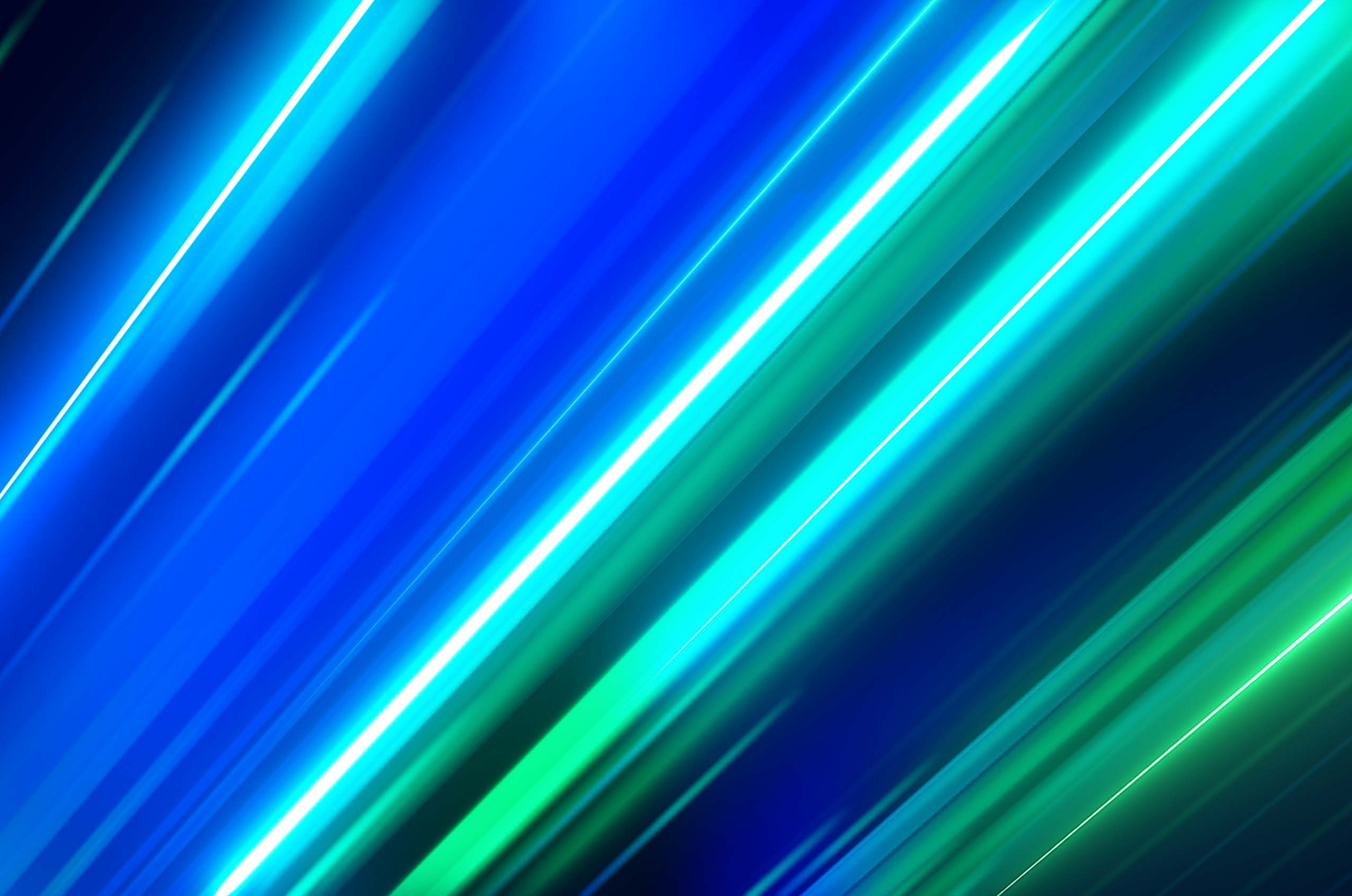
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About the Center for the Future of Work

Cognizant's Center for the Future of Work™ is chartered to examine how work is changing, and will change, in response to the emergence of new technologies, new business practices and new workers. The Center provides original research and analysis of work trends and dynamics, and collaborates with a wide range of business, technology and academic thinkers about what the future of work will look like as technology changes so many aspects of our working lives. For more information, visit [Cognizant.com/futureofwork](https://www.cognizant.com/futureofwork), or contact Ben Pring, Cognizant VP and Managing Director of the Center for the Future of Work, at Benjamin.Pring@cognizant.com.

About Cognizant

Cognizant (Nasdaq-100: CTSH) is one of the world's leading professional services companies, transforming clients' business, operating and technology models for the digital era. Our unique industry-based, consultative approach helps clients envision, build and run more innovative and efficient businesses. Headquartered in the U.S., Cognizant is ranked 193 on the Fortune 500 and is consistently listed among the most admired companies in the world. Learn how Cognizant helps clients lead with digital at www.cognizant.com or follow us [@Cognizant](https://twitter.com/Cognizant).



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