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Employees: An endangered species?

The rise of robotics, artificial intelligence, and the changing workforce landscape

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Introduction

Are you ready for a world in which three out of 10 corporate jobs are done by a robot? Where digital talent is so scarce that you may need to compete with Amazon and Google to get it?

This is not a hypothesis on the distant horizon. It could be the reality in just 10 years. And it's already starting to happen.

That's because automation is rapidly becoming more intelligent and affordable, while the global supply of talent is getting smaller and more expensive. These changes are spawning new considerations in corporate operations, labor markets, and economies around the world.

What are you doing to prepare? What is your digital strategy? Inside, KPMG experts explore the changing tides, the rise of robotics, and how to respond.

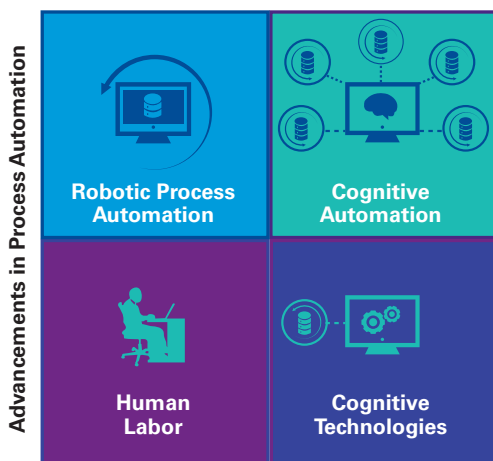# Contents

The cognitive revolution

Since the 1960s, artificial intelligence (AI) has been subject to swinging cycles of hype and disappointment. There is even a term for the periods of pessimism and reduced funding for AI research: the "AI Winter."

But now, with the massive investments in AI from companies such as Google, Dropbox, and Facebook, along with the launch of high-profile solutions like IBM's Watson and IPSoft's Amelia, we can safely declare that the AI Winter is over.
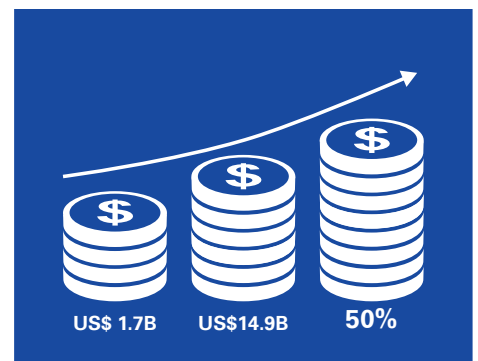
In fact, according to Quid[1], from 2010 to 2014, private investment in AI has grown from US$1.7 billion to US$14.9 billion, and is was on track to grow nearly 50 percent year-on-year in 2015 alone. And it's not just spending in R&D either. MarketsandMarkets estimates that the AI, or cognitive computing marketplace, will generate revenue of US$12.5 billion by 2019.

As the convergence of computer intelligence and business process applications accelerates, the market is creating a new class of intelligent automation that is capable of performing activities that currently require knowledge and skills by highly trained personnel. Some fear these smart robots may replace more than 100 million knowledge workers – or one-third of the world's jobs – by 2025 [2].

The knowledge worker segment that is primed for displacement is indeed massive. From clerical and administrative workers to sales and technology professionals, it includes categories of jobs that require higher levels of knowledge, judgment, decision making, and interaction (with other humans or directly with computers). Estimated at 240 million employees, the US$9 trillion segment represents more than 10 percent of the total global workforce and makes up more than 25 percent of total global labor costs [3].

US$ 1.7B   US$14.9B   50%

Private investment in AI has grown from US$1.7 billion to US$14.9 billion and is on track to grow nearly 50 percent year-on-year in 2015 alone.

100 Million
The number of global knowledge workers who could be impacted by RPA by 2025.

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Advancements in Process Automation

- Robotic Process Automation
- Cognitive Automation
- Human Labor
- Cognitive Technologies

Advancements in Machine Intelligence

RPA is the use of machine intelligence and software tools to perform human tasks. Cognitive automation is a confluence of many technologies – including natural language processing, machine learning, data analytics, and probabilistic reasoning – which combine to interact, learn, and simulate decision-making the way a human does.

[1] Quid is a platform that searches, analyses and visualises the world's collective intelligence to help answer strategic questions.
[2] McKinsey Global Institute – Disruptive technologies: Advances that will transform life, business and the global economy. May 2013)
[3] Ibid.

Robotic advancements

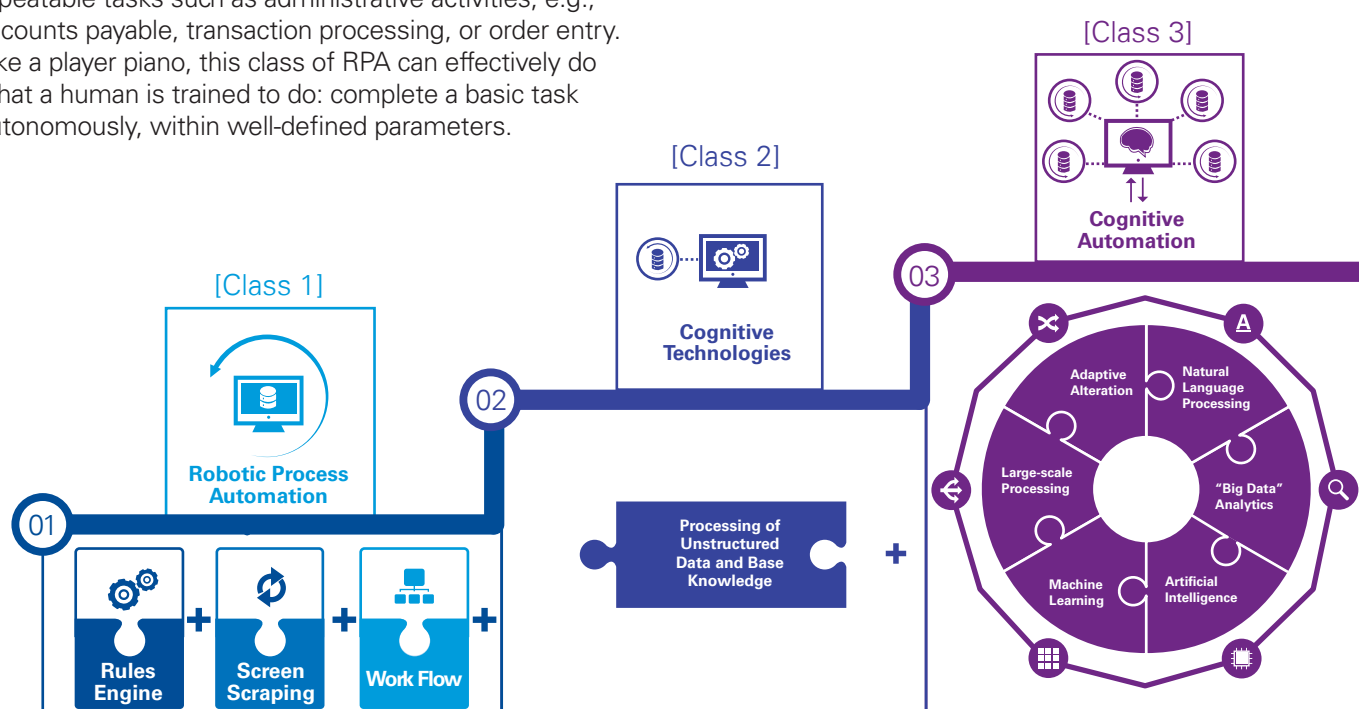Can a robot actually perform knowledge work as well as or better than a human?

When we hear the term "robot," we think of a machine that is programmed by a human, instructed by a computer, and primarily carries out physical actions. In 1961, General Motors first introduced this basic type of robot into the assembly line in Detroit, and since then, robots have been critical to improving productivity and increasing scale.

However, today's shift to automation and digital labor is being driven by a more advanced kind of "virtual robot" – software that can execute tasks that would previously require both a human and a computer. Fifty years after General Motors' robotic machines disrupted the automotive assembly line, BluePrism's virtual robots helped the British company's clients automate large segments of their offshore operations.

The nascent but growing class of software that automates the clerical tasks in a business is called robotic process automation (RPA). RPA tools do not infiltrate the IT system, but rather sit at the presentation layer, following instructions to perform highly standardised and repeatable tasks such as administrative activities, e.g., accounts payable, transaction processing, or order entry. Like a player piano, this class of RPA can effectively do what a human is trained to do: complete a basic task autonomously, within well-defined parameters.

It is important to note that basic Class 1 RPA (see graphic below), which executes tasks exactly as instructed, is not a "cognitive" technology. Cognitive technologies are a collection of machine intelligence technologies designed to interact, reason, and learn in a way that is similar to humans. As seen on popular American game show Jeopardy, IBM's Watson, a supercomputer in the cognitive class, was able to discern a probabilistic answer from a question posed in the form of a pun, riddle, or metaphor. Computer science experts around the world were awed to discover that a computer could parse a complex question, recognise its true meaning, analyse volumes of data, form a correct hypothesis, and ring the buzzer – all as fast as a human.

While RPA has already had a major impact on the business services industry, we are poised to see a truly transformative shift in the economy and the larger society as it integrates with a new class of cognitive technologies. That's happening now. Recently, some RPA platforms have begun to incorporate cognitive technologies to make robots smarter, more intuitive, and more useful in a wider range of business applications.

[Class 1]
Robotic Process Automation
01
Rules Engine + **Screen Scraping** + **Work Flow** +

[Class 2]
02
Cognitive Technologies
Processing of Unstructured Data and Base Knowledge +

[Class 3]
03
Cognitive Automation
Adaptive Alteration · Natural Language Processing · Large-scale Processing · "Big Data" Analytics · Machine Learning · Artificial Intelligence

Process automation can free up employees from rules-based tasks by computerising stable, predictable activities. Cognitive technologies such as Watson, meanwhile, can support employees by providing quick and accurate answers to business questions. But to truly replace human employees, process automation and cognitive technology must converge. This combination of advancements is creating cognitive automation – or smart robotics – that can potentially automate new classes of knowledge work.

RPA in Action: Leading Global Company

At one large global company, employees were spending a lot of their time copying order information from three different applications and pasting it into spreadsheets that could be emailed for order processing.

To free up these employees for higher value work, the company is using RPA to automate these mundane, repetitive, rules-based tasks. Even more, the robots work through the night, so that when employees arrive at work in the morning, the order information has already been culled from the applications and organised in the spreadsheets.

Using a cross-functional approach, the company is developing bots that will save an estimated US$7 million in their first full year of operations.

RPA in Action: Automating Oilfield Maintenance

In the oil and gas industry, maintenance technicians often struggle to diagnose problems with legacy oilfield equipment that has been modified over the years.

But with Amelia, a cognitive platform agent from IPsoft, field engineers can quickly get their questions answered, helping to improve safety and productivity by reducing equipment downtime.

Amelia can instantaneously review machine manuals, company policies, and maintenance records for each piece of equipment to give technicians the information they need. Amelia reads natural language, understands context, applies logic, and infers implications.

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Replacing humans?

While automation is nothing new – for example, most major stock exchanges are almost fully automated – the sweeping scope of technologies targeting high skilled knowledge work is something we have never seen before.

Traditionally, activities such as responding to customer inquiries, performing administrative services, conducting clinical research, and managing aspects of financial and legal services has required humans to rely on their intelligence and situational analysis to make decisions and take action. However, advances in automation and cognitive technology in the ever-evolving digital economy is making this human requirement less of a barrier.

Given the promise of RPA and cognitive technologies to bring workforce costs down while improving productivity and quality – as well as the huge segment of the workforce potential in its cross fire – the cognitive revolution raises serious questions to the economics of offshoring and outsourcing.

In fact, as human workers are replaced with process automation technology, the entire value proposition of offshore outsourcing begins to crumble. Workforce costs in many of the top "low-cost" outsourcing locations have actually been accelerating year over year, while RPA technology gets better, faster, and cheaper. It is no wonder that headcount growth in offshore markets has begun to decline as revenue and profitability of major BPO service providers improves.

Thanks to automation that keeps getting better in all categories, companies are able to scale and expand their services to more customers and more markets at a lower marginal cost. But what about the jobs and the impact to the economy?

RPA will allow some companies to free employees from low-level work so they can focus on innovation and higher-value activities. Others may need to reinvent the workforce, finding new ways to deploy talent in order to remain relevant in the marketplace.

As was the case in the Industrial Revolution, there will be concerns that machines and robots will take away jobs and further expand income inequality. But what if we don't have people to fill the jobs anyway?

Cognitive Technology in Action: Tools for Law Enforcement

Timely information access and knowledge support is critical for law enforcement. Digital technologies play a key role in both as they provide a predictive analysis that can effectively anticipate and prevent crime.

Data mining can extract knowledge from a very complex and vast amount of data to determine crime patterns, geographic and demographic analysis, target profiles, and threat assessments, among other crucial policing supports.

Cognitive tools can be used to correlate and reveal relationships between different data about tangible evidence such as shoe prints, DNA, fingerprints, and intangible behavior evidence to identify formerly hidden or ambiguous correlations between crimes and people.

RPA in Action: Contact Centers

One company is using cognitive technology to transform its contact centers, which is reducing headcount, improving reliability and speed to resolution, and providing an impetus for growth. In cognitive platforms for call centers, digital knowledge workers can understand callers' questions and execute a process to solve the issue. If the robot doesn't know the answer, it can find it by searching the web or intranet, or by escalating the issue to a human colleague. Then the robot "observes" the human's actions and learns new responses for future reference.

Demographics and robotics

Reshaping the Workforce

The change in the employment landscape is due in part to changing demographics. Indeed, at the same time that machines are getting more sophisticated, the global pool of talent is getting shallower and more expensive. That portends some significant consequences, as companies may increasingly embrace automation.

According to KPMG's demographic studies, the working-age population in the United States spiked in the 1960s and 1970s, following the Baby Boom, and then again in the mid-1990s through the mid-2000s, following the Echo Boom. However, the workforce pool has been declining dramatically since 2010 due to lower birth rates that began in the 1980s. This decline is expected to continue for the next 10 years, but may be helped in the 2020s by the rising birth rate in the Latino population.

Canada is in a similar position, as are Germany, Italy, France, and the United Kingdom. The Baby Boom of the 1950s has given way to a Baby Bust in 2010 and beyond.

Meanwhile, in Japan, the working-age population has contracted since 1994, and will continue to do so until 2050 and beyond. In China, likewise, the workforce pool will begin contracting later this decade and will continue through 2050, due largely to the country's one-child policy initiated in the 1970s.

As a result of these demographic shifts, businesses in these countries will simply not have the luxury of picking and choosing their work, which is another factor contributing to the increased use of robotics. But as companies move toward automation, they will increasingly need digital talent to manage it. Where will this talent come from?

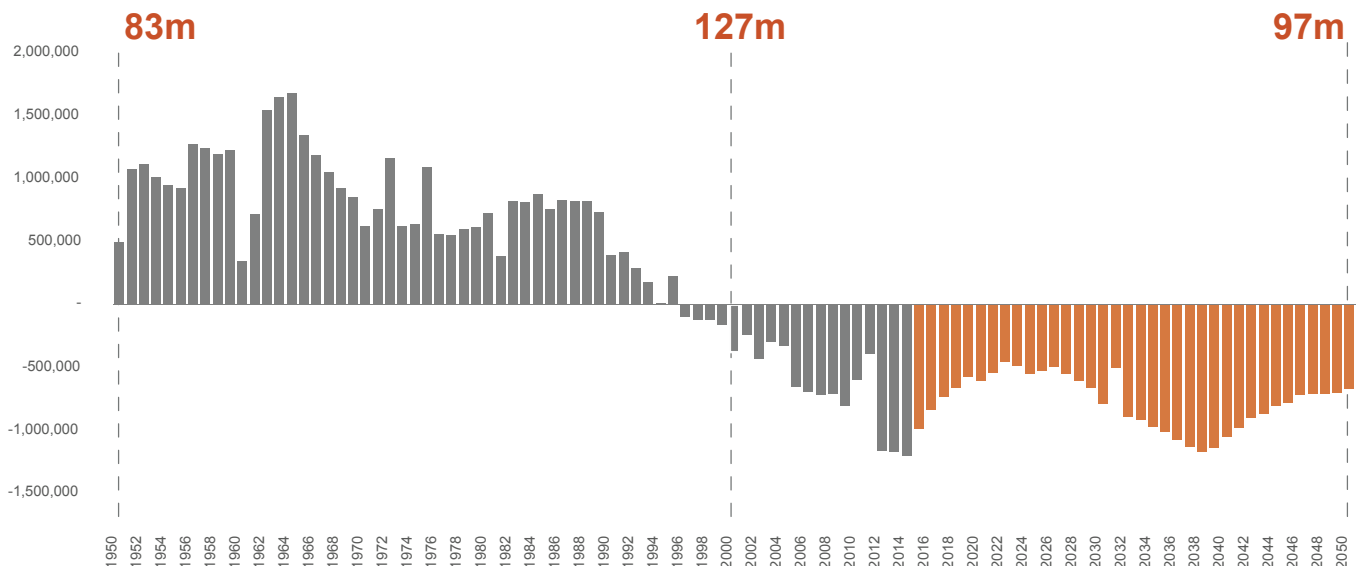### Demographics Around the World: The Incredible Shrinking Workforce
The following charts show the net annual growth in the working-age population between 1950 and 2050:
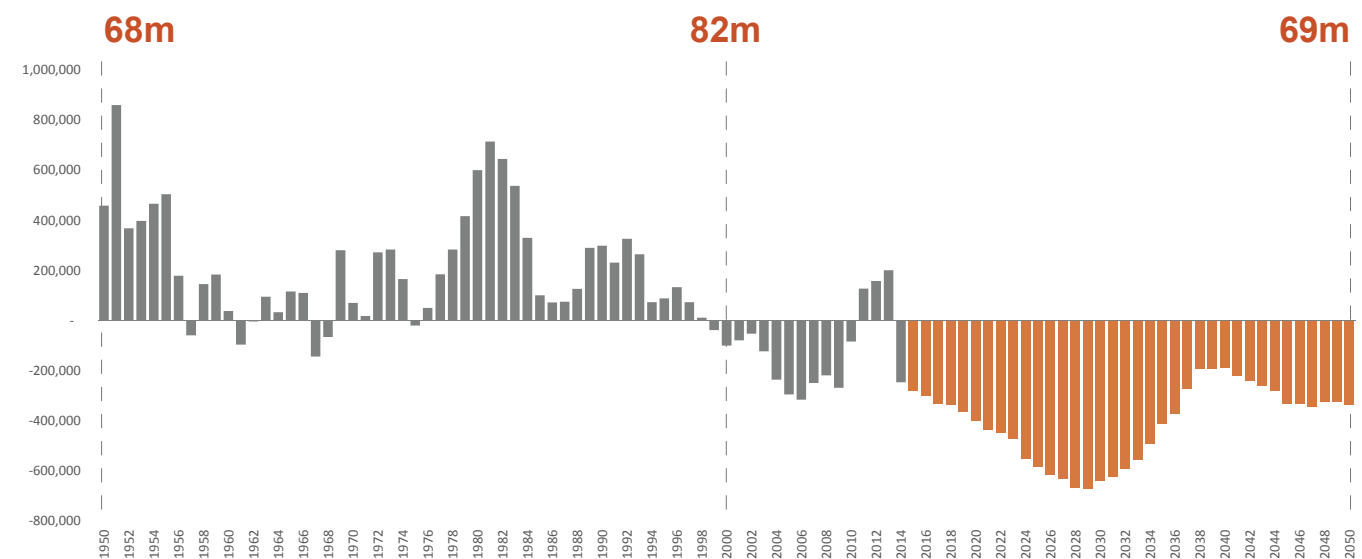
544m   **1,280m**   **1,385m**

China

83m   **127m**   **97m**

Japan

68m   **82m**   **69m**
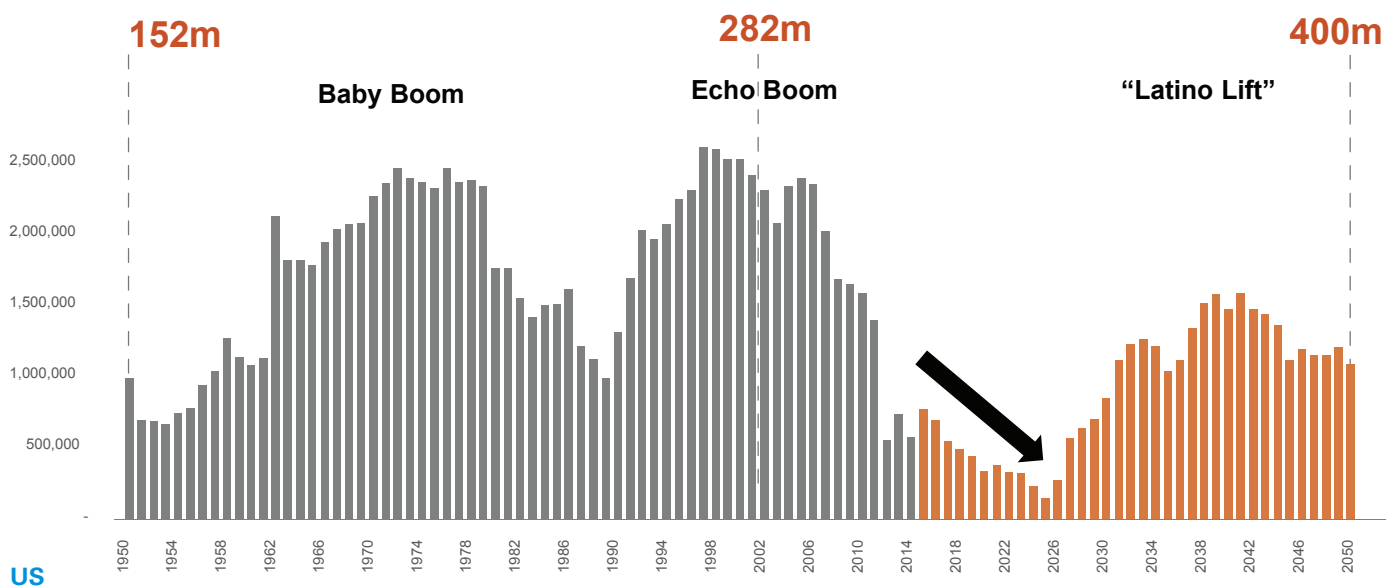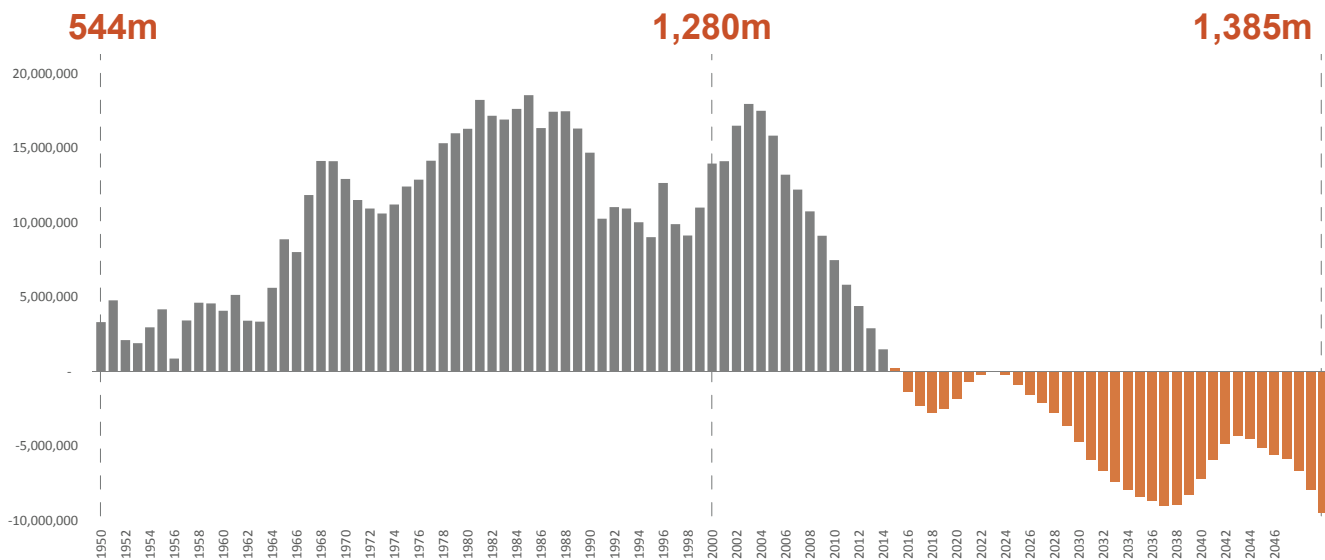
Germany, France, Italy, UK

Bucking the trend: Notably, a few countries are expanding their workforce pools. **Brazil's** workforce, for example, will grow for another decade, and **India's** will continue expanding through 2050. **Australia**, meanwhile, has solved its workforce problem by doubling immigration over the past decade.

A dearth of digital skills?

The Democratisation of Expertise

As professions that require judgment and expertise such as medicine, law, finance, and engineering are enabled on cognitive platforms, the marginal cost of adding new capacity is dramatically reduced and no longer tied to physical work. This means greater cost reduction and access to skills and expertise by people who have never been able to afford personalised health care, legal services, or financial advice.

As the automation of looms created higher-quality, mass-produced, mass-produced textiles, it also improved the consistency and quality at a dramatically lower cost. This opened up new markets and gave access to a much broader base of customers. The same will be true for knowledge and expertise. While temporary disruption will occur, the expansion of access will likely create new opportunities for services in markets that were previously not accessible.

In the United States, manufacturing peaked in 1979 with some 20 million jobs, but the offshoring of these manufacturing jobs over the next 30 years ultimately reduced the demand for professionals with science, technology, engineering, and mathematics (STEM) skills. In fact, between 1986 and 2009, the number of STEM graduates in the United States dropped from 97,000 to 84,000, as education in recent decades has gradually shifted to humanities. So ironically, the pool of digital talent has shrunk at precisely the time when it is needed most.

As a result of this shrinking supply, many companies are reengineering their business models, looking for opportunities to leverage digital work instead of human workers. For example, some large call centers are steering inquiries to social media and chat – and then using RPA to automate those interactions. Outsourcing providers are also feeling the shortage, as many have begun shifting their focus to RPA services versus traditional, labor-centric business process outsourcing.

How will you respond to the shrinking supply of digital talent? As you embrace automation, you will need to look closely at your talent strategies. For example, if you are using a cognitive platform to run your call center, who will manage that platform? How will you source the best engineers, mathematicians, and data scientists to manage your robotics, when giants such as Google and Amazon are paying top dollar for the limited supply?

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A changing employment landscape

The situation begs many more questions, as employers shift their attention to this kind of skilled talent and automate many lower-level jobs. For example, what will happen to the vast numbers of workers who heretofore have been soaked up by manufacturing assembly lines or call centers? Some speculate that if those jobs are automated, the workers will become unemployable.

Others postulate that the very makeup of society will change when knowledge workers contribute to technology and productivity while others are not engaged in that process. The scenario also invites questions about the distribution of wealth, especially when some parts of the population are not contributing to it.

Despite some foretellers' projections, RPA will not cause catastrophic global unemployment, with mankind becoming idle while machines do the work. Rather, by automating low-level activities, RPA will ultimately free employees to focus on higher-value work or discover innovative ways to provide value.
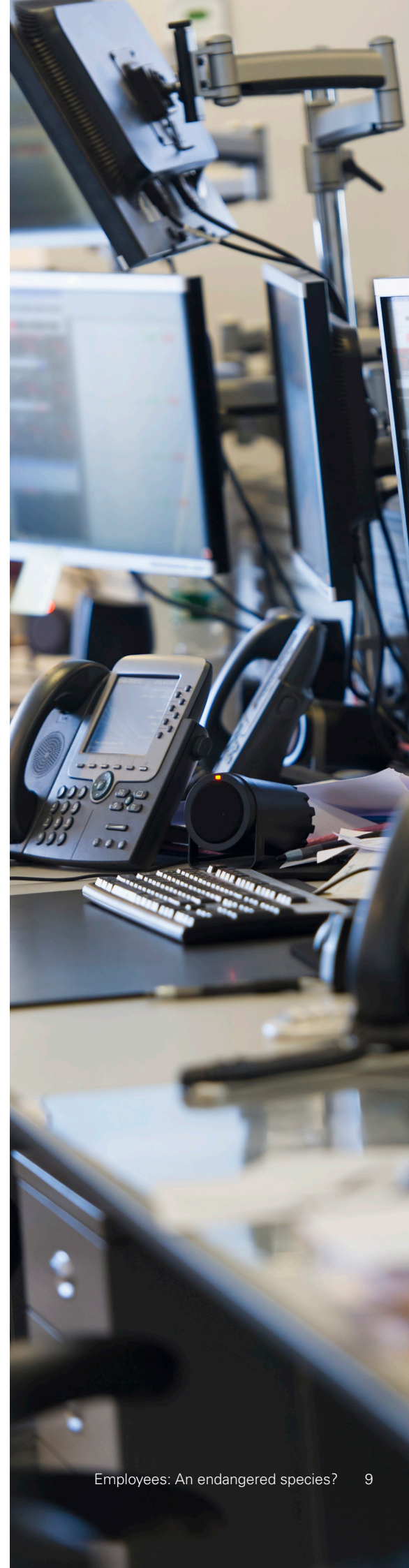
Six considerations on the road to cognitive automation

As you consider the future, ask yourself these six key questions:

1

Where can you pilot the use of RPA?

Opportunities for automation exist across industries and functional areas, and many companies have begun exploring them to reduce labor costs, improve business services, and drive competitive advantage.

To get started, work with process owners to identify activities that include a large number of manual, rules-based, or swivel-chair tasks, and then invest in a proof of concept for a targeted area. In addition to evaluating the technology, the proof of concept should consider factors such as costs (including licenses, infrastructure, and maintenance), anticipated return on investment, and payback period.

Some companies are exploring these kinds of basic projects as part of a self-funded automation strategy. Then, using the savings from those small projects, they can fund larger, longer-term enterprise projects.

Many companies are also creating innovation teams that monitor the technology landscape for new tools, so when a business unit is interested in automation, it can enlist the help of the innovation team to explore the technology, review prospective vendors, and execute a proof of concept. Other organisations are scaling RPA through centers of excellence that apply a test-learn-adapt approach.

2

Do you understand how to develop and manage digital processes?

A people-based process is linear, as activities move from one employee to another. In a digital process, on the other hand, activities are disaggregated, as technology pulls information from numerous inputs, kicks exceptions up to experts who can clear them, and then puts everything back together to create a solution. The Uber platform, for example, integrates GPS, statistical analysis, dispatch, billing, and demand management into one automated product – with very little personnel.

This kind of process model is very different from the traditional linear execution of a business process, and it requires some new thinking. Competitive advantage in the next few years will come from how well you can harness data and technology to run your business – not about running the same old business processes with cheaper labor in offshore markets. How quickly can you go from a human labour-centric model to a technology-centric model for business processes? That question will define the winners of tomorrow.

3

What is your capital investment strategy for business processes?

Thanks to advances in RPA and as-a-service delivery, you can potentially shed much of your back office and rent it from service providers. Or, you could choose to build some of your own infrastructure and rent the rest. Either way, your investment strategy now requires a shift in thinking: Instead of trying to manage the transaction, as you would in a traditional business process or outsourcing agreement, focus on

mastering the outcome. That is, do you want to master the audit or master compliance and shareholder value? Do you want to be a master of the recruitment process or a master of talent?

With this in mind, think about where you should pilot cognitive and automation technologies. Also, be on the lookout for new, disruptive competitors who will embrace a digital model and may come out of nowhere. With a virtual infrastructure, these new, nimble companies have little to lose as they vie for your market share.

4

How will you manage fallout from displaced labor?

The automation of human jobs may cause some unrest, so as your plans materialise, prepare to have honest, open discussions with your organisation.
Also, keep a close watch on employee morale, which can quickly turn to active disengagement in the face of new technology that threatens jobs. Keep in mind that even an early-stage investment in a proof of concept can send ripples through all

levels of your organisation. Resistance may come not only from the workers in automatable roles, but also from directors who may fear erosion in their span of control, as they potentially go from managing employees to managing bots.

To mitigate the risk, proactively work with your human resources department to develop a plan for employees who may lose jobs to robots. Consider training your top performers to help manage the robotics program, or shift them to more critical or revenue-generating functions.

5

How will you get the digital talent you need?

Amid the shrinking supply of digital talent, consider how you will compete for the expertise you need to manage automation. Another option is to reskill some of your existing employees, noting that different types of RPA require different skill sets.

For example, if you're building and maintaining robots for transaction processing and repetitive tasks, you need people with strong analytical skills who understand how to translate business rules into logic statements. While a programming background is not required, it does help shorten the learning curve of the new technology and ultimately decreases the payback period for the investment.

On the other hand, if you are pursuing robots for

cognitive technology, you need people with deep subject matter expertise to provide the robot's initial knowledge base, validate that knowledge base over time, and respond to cases when the robot does not know the answer. You will also need people who can codify the robots' knowledge base, which may require some technical expertise depending on the product.

Either kind of robot will require people to set up and maintain the technology's infrastructure, identify opportunities for adoption throughout the business, and mitigate risks. You may already have people with the aforementioned skill sets, so work with functional leaders across your organisation to identify them. Also consider your strategies for training, retaining, and incentivising your top performers.

6

How will you manage risk?

In addition to managing impacts from widespread job loss, you will face a nexus of risks related to cloud, social, mobile, and analytics technologies. To ensure that you are not just scaling your problems through automation, consider

appointing a digital risk officer. This person should collaborate with IT and functional executives to identify and mitigate risks associated with innovation, which can help you gain an early advantage.

Preparing for the rise of the machines

RPA in Action: Autonomous Vehicles Get in Gear

Self-driving cars, powered by robotics that can learn from driver behavior, continue to make headway. Traditional carmakers are equipping vehicles with features such as automatic parking, while tech companies such as Google, Apple, and Uber are aggressively developing completely driverless cars, which will change the face of personal and commercial transportation.

Already, in the mining industry, Rio Tinto has implemented a fleet of autonomous, ore-hauling trucks that are improving productivity by safely moving more ore in less time than human drivers.

Similarly, Caterpillar, as a manufacturer of such autonomous equipment, has developed robotic trucks that can haul material from loading points to dump sites – all while negotiating complex roads and maneuvering among employees and other vehicles.

The rise of RPA is clearly not just about new technology; it is a significant shift toward digital workforce, which presents compelling opportunities to reduce costs and drive new kinds of strategic advantage. It also presents tremendous challenges related to recruitment, skills training, the redeployment of workers, and the redesign of business models.

As automation increases, how will you tap the scarce digital skills you need to compete? To benefit from robotics, how will you focus on value and outcome versus process and people? It's time to change your thinking.

Is RPA putting employees on the endangered list? No. But the world of work is starting to look vastly different.

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