

THE FUTURE OF WORK IN EUROPE

WHITE PAPER



JUNE 2017



The Future of Work in Europe

Table of Contents

1.	Introduction	5
2.	The global challenges of automation	6
3.	Europe is well-placed to meet these challenges	6
4.	How vulnerable is Europe?	8
5.	Is this time different?	12
6.	Crafting policy to create more winners	14
7.	Helping the displaced	17
8.	Determining the appropriate political level for policy delivery will be critical.	18
9.	No guarantees aside from a good-faith effort by all parties	18
10.	Our commitment	19

For the past thirty years, we have celebrated the huge benefits of globalization, with too little attention focused on its drawbacks.





Introduction

For the past thirty years, we have celebrated the huge benefits of globalization, with too little attention focused on its drawbacks. At the outset we should acknowledge that the benefits of globalization have greatly exceeded the costs both globally as well as individual countries.

While the free flow of goods, services, information, and people delivered dramatically higher standards of living for hundreds of millions of people – these processes also produced large numbers of economic losers alongside the winners. Those who suffered most from globalization are a relatively small minority of the population, and yet the political movements that claim to speak for them are now transforming politics on both sides of the Atlantic.

And yet even as we are just coming to terms with the political and social fallout of globalization, another structural challenge looms. Rapid advances in technology including automation, advanced manufacturing, machine learning, and other forms of artificial intelligence will fundamentally reshape the nature of work in the coming decades but which also will produce new groups of winners and losers.

To be clear, as the world's leading technology and manufacturing firm, we are optimists. We believe in the power of technology to boost productivity, raise living standards, and open new

horizons of human possibility all technological leaps, from Prometheus to the steam engine to the internet, have done so. We believe, in fact, that the keys to solving the problems posed by technology lie with technology itself.

But we also believe it is critical to temper that optimism with a frank recognition of the challenges that today's rapid technological changes pose to our economies, our politics, and our societies. We must recognize these challenges, and take action early to meet them effectively.



The global challenges of automation

From a labor perspective, automation, machine learning, and artificial intelligence pose two main challenges.

The first is that they **may displace or degrade hundreds of millions of jobs** globally in the coming years. Lower income countries with poor education systems, weak governance, and large youth populations seeking employment are at greatest risk of shocks. But even richer countries with stronger institutions and older populations will - as we are already seeing today - have to navigate choppy social and political transitions that result from this displacement.

The second, related, challenge is that, even if technological advances do ultimately deliver broad economic gains for our societies, they are also **likely to increase income inequality** from what are already politically volatile levels today. The consequences for social and political stability can be severe.

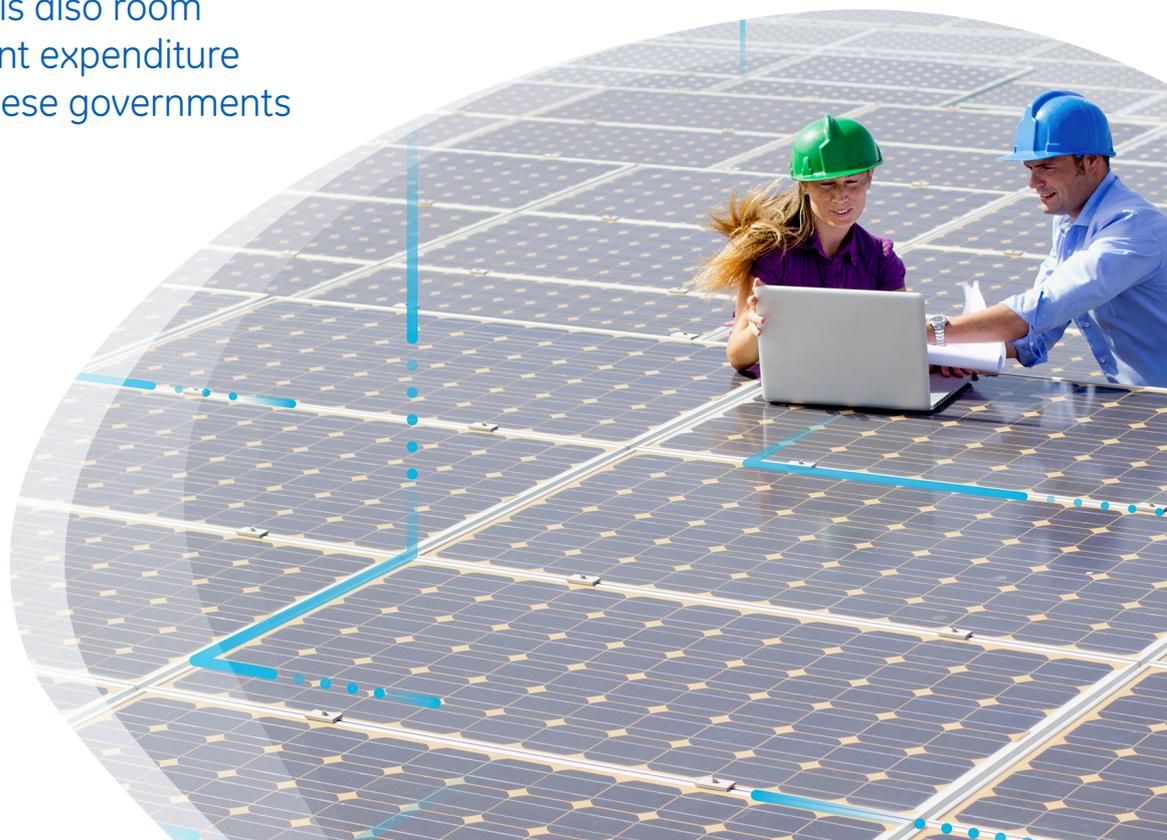
Europe is well-placed to meet these challenges

The European Union is, in principle, well-equipped to thrive in an increasingly automated and digitized world. The EU has relatively high levels of education, a broad consensus on the need for strong safety nets, and a multilayered political structure with the institutional strength to deliver policy at the supranational, national, or local levels. As labor cost differentials become less important globally because of automation,

the already high caliber of Europe's workforce will position it well for the future. And Europe's aging demographic profile - which has raised fiscal concerns relating to high dependency ratios - will over time reduce the social strains associated with large, unemployed youth populations.

But Europe also faces obstacles. Economic growth remains sluggish - GDP has expanded just 3% over the past ten years, compared with about 10% in the United States - and productivity growth has largely stagnated as investment has slowed to a trickle. At the same time, given the constraints of the single currency area and the conditions of the Stability and Growth Pact, fiscal room for fresh investment by governments is limited in many countries. This is particularly true in some of the lower-productivity, high-debt economies of Southern Europe - though there is also room for more efficient expenditure allocation by these governments as well.

Lastly, the Union faces the task of streamlining and strengthening its institutions in the face of a growing Euroskeptic backlash in key economies such as France, Germany, the Netherlands and, of course, the United Kingdom. Even if anti-establishment parties do not fully take power in key EU economies, they are shifting the country-level political debate in ways that complicate the achievement of key growth-enhancing reforms such as fiscal and banking union, as well as the Digital Single Market.



How vulnerable is Europe?

According to a study by the Breugel Institute, **54% of Europe's jobs are exposed to at least partial automation or redundancy in the next two decades.** To be clear, this does not mean that half of Europe's jobs will disappear. It means that half of the types of jobs that Europeans do are exposed at some level to automation, and that exposure varies significantly among professions. Clerical, agricultural, or low-skilled manufacturing jobs are highly exposed, while highly-skilled professional, managerial, and creative jobs, as well as low-skill jobs that nevertheless require high levels of personal or communication skills, such as home care, hairdressers, hotel staff and so on, are less vulnerable.

VULNERABILITY AMONG EUROPEAN COUNTRIES

LEAST VULNERABLE



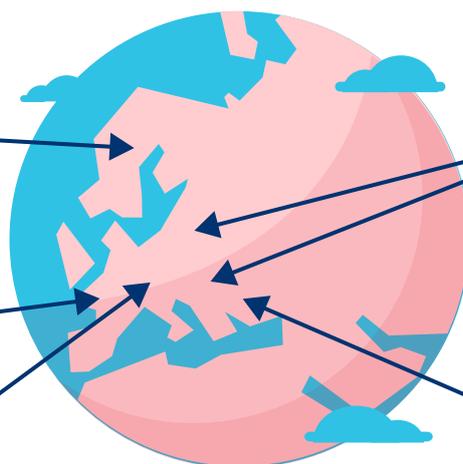
Sweden



France



Germany



MOST VULNERABLE



OR HIGHER

Most southern and Eastern European economies



Romania



The vulnerability also varies widely among European countries. **Sweden is among the least vulnerable – if that can be said of an economy in which 46% of jobs are exposed to some level of technological displacement. In France, the share is 49%, and in Germany 51%. Most of the Southern and Eastern European economies show rates of 55% or higher, and Romania's breaks 60%.**

An OECD study found separately that in population terms, 12% of people in Germany, Austria, and Spain are at high risk of seeing their jobs automated, while in the Baltic countries, by contrast, only 6-9% are vulnerable. It will hardly come as a surprise that OECD data also show that the greatest vulnerability to automation is among the poorest and least educated citizens.

Technological advances are already having two important effects on jobs in Europe. The first is the polarization of labor. As automation and artificial intelligence move into higher levels not only of routine physical labor but also clerical tasks, the remaining jobs are gathering at the extremes of the skill spectrum. **At the high end are people with strong technical, mathematical, managerial or technical skills whose tasks are not easily automatable.**

At the low end, meanwhile, are services jobs that require a human touch in sectors such as retail, hospitality, or personal care. According to recent data from the EU's Centre for the Development of Vocational Training (Cedefop), the share of professionals and technicians in total EU employment will have increased from about 30% in 2003 to 35% by 2025, while the share of clerks, trades workers and machinists will have fallen from 28% to 26% over the same period.

AUTOMATION EXPOSURE VARIES AMONG PROFESSIONS

LOW EXPOSED



Creative jobs with high levels of personal skills



Highly-skilled professional



Managerial

HIGHLY EXPOSED



Clerical



Agricultural



Low-skilled manufacturing

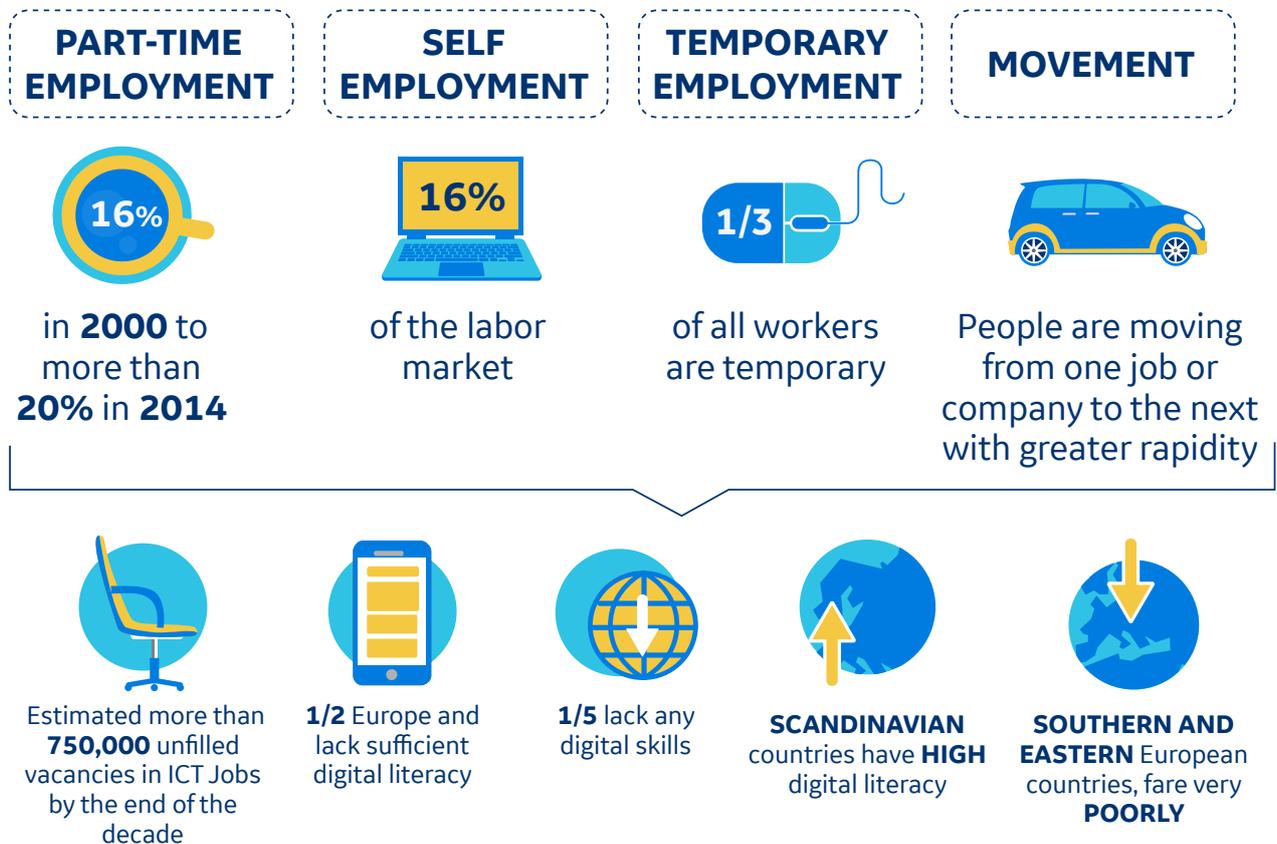
This polarization contributes to inequalities of income and economic security. Services jobs at the low end of the spectrum are less well-paid, and offer fewer opportunities for sequential income advancement, than either the remaining manufacturing jobs at the middle of the spectrum or the high-qualification jobs thriving at the top. In addition, as people displaced from mid-skill jobs increasingly seek employment in these services professions, wages in those professions will fall further.

The second major effect – related to this “hollowing out” of mid-level jobs – is that employment is becoming more fragmented. Part time and temporary employment have risen significantly in Europe in recent years. This is in part because of structural impediments imposed by labor market restrictions. But it also has to do with the rise of the so-called “gig economy”, enabled by technological innovations in networking, connectivity, geolocation, and data collection. Part-time employment rose from about 16% of all EU employment in 2000 to more than 20% as of

2014, and temporary work now accounts for about a third of all workers, according to EU data. Self-employment has grown substantially as well, accounting for about 16% of the labor market in the EU. The part time economy spans the range of skills – from low-skilled professions such as drivers and janitorial positions to highly specialized skills like graphic design. While the gig economy can open opportunities for employment, it also carries with it the challenge of developing new regulations and safety nets to account for people whose employment has become more dispersed and fragmented.

At the same time, people are moving from one job, or company, to the next with greater rapidity than in the past. Among people between 25-34, job tenure of more than ten years fell from 17.5% to 12.5% between 2000 and 2014, according to EU data. The phenomenon of lifelong stable employment with one company – an often-idealized model that is actually, in historical terms, an anomalous feature of mid-20th century rich-world labor markets -- is becoming obsolete. The reasons for this phenomenon are still under debate – companies’ increased use of short term contracts in order to navigate labor market rigidities is certainly one explanation.

But the broader implication of this more fragmented work is that higher turnover, self-employment, and temporary or fixed contracts generally provide workers with less access to quality training schemes that enable them to upgrade or adapt their skills throughout their working lives. There are also indications that lower job tenure can negatively affect productivity growth. In a rapidly changing labor environment, that potentially places people at a disadvantage in terms of adaptability and skills.





Is this time different?

Concerns about the potentially negative effects of technology are certainly not new. The industrial revolution stoked concerns about the displacement of traditional communities and the loss of certain types of jobs. The reaction of the “Luddites” is well known (even if it has become somewhat stylized: a closer look suggests that the grievances of the loom-smashers were at least as much about ameliorating the conditions of industrialized work as they were about halting further progress altogether.) In the 1930s, it was in fact John Maynard Keynes who coined the term “technological unemployment”, in an essay that raised concerns about the ability of people to keep pace with rapid technological change. The 1960s and early 1970s saw a wave of concern about technology and automation in the US.

On the one hand, these fears proved largely unfounded. The steam engine displaced jobs for many agricultural and manual laborers, coachmen and so on – but it also created jobs for the builders and operators of railroads, steam ships, and automobiles, and dramatically increased productivity and living standards in ways that benefitted societies at large – including those who were displaced. However, there are three considerations to bear in mind when we look at today’s technological advances.

First, because they are happening in the area of computerization and data - where the compounding effects of Moore’s law produce exponential gains - they are happening at a much greater speed than earlier waves of innovation. It is worth recalling that it was less than a decade ago that even technological optimists thought it would be impossible to teach a self-driving car to negotiate a left turn. Google figure it out by 2010. In an age of such rapid technological advance, the question is: can people keep up?

Second, the advance of technology into cognitive tasks has started to erode the bulwark of what “only humans can do” – encroaching on analytical and sensing faculties that were previously thought to be beyond the reach of computers. At the same time, rapid advances in machine learning mean that the scope of specific computerized jobs is getting fuzzier, meaning that machines may in fact be able to teach themselves to perform larger batches of currently human tasks over time.

Lastly, even if this time is not different, it is important to recognize the tremendous social and political upheavals that occurred as a result of previous technological leaps, even when they ended up producing higher standards of living for societies in the long run. The social pressures unleashed by urbanization – made possible by the industrial revolution -- in the 19th century found their way into ideologies such as nationalism and communism, the historical impact of which is well known. The policy responses to those pressures were transformative: universal education, progressivism, and

the modern welfare state all owe their emergence in part to the challenges posed by the industrial revolution. Some economists argue that the outsized agriculture subsidies seen in the European Union are a legacy of compensating for the social upheavals visited on the countryside by industrialization and urbanization in the 19th century.

The lesson here is that while technological revolutions are ultimately a good thing – raising productivity, improving living standards, and opening new horizons of human creativity and possibility – they always entail dislocations that can have severe political and economic consequences if they are not managed carefully.



Crafting policy to create more winners

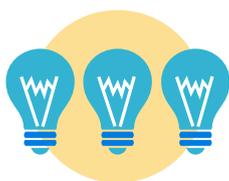
We wish to be clear about one thing: Europe must harness the possibilities of technological advancement to reinvigorate sustainable growth. Broad-based growth is the most basic prerequisite for tackling the new challenges posed by technology. In fact, part of the reason that Europe's productivity growth has lagged in recent years – particularly by comparison with the US – is that European economies were slow to adapt to and embrace the last wave of technological advancements in ICT in the 1990s, which is one partial explanation for Europe's relatively slower productivity growth compared to the US in the subsequent years. This time around must be different: both in how Europe prepares to create winners in a new economy, and how Europe prepares to minimize the impact on the losers.

The most critical task for industry and governments is to ensure that European workers – not only young people but also older people further along in their career paths – are able to develop, hone, and upgrade the right skills to thrive in a world where work is increasingly exposed to automation and AI. **This means, on one hand, better and broader education of technical skills such as STEM, digital literacy and fluency with ICT. According to the EU, there will be more than 750,000 unfilled vacancies in ICT jobs by the end of this decade. Nearly half of Europeans lack sufficient digital literacy, and about one-fifth lack any digital skills at all.** As with other indicators, there is huge variation across the European Union – Scandinavian countries show high digital literacy, while Southern and Eastern European countries generally fare very poorly.

Ensure that European workers are able to develop
and **UPGRADE THE RIGHT SKILLS**



BETTER AND BROADER EDUCATION of technical skills as STEM, digital literacy and fluency with ICT



STANDARDIZE SKILLS across EU



Labor **MARKET DATA** and **ANALYTICS** ensure labor mobility

While these technical skills are necessary for European workers to harness the productivity-enhancing power of new technology, softer skills such as management, problem-solving, pattern recognition, and interpersonal skills are, on the other hand, also essential. These skills are the least vulnerable to automation, and they command higher wage premiums across the labor spectrum. Working with industry's insights, country and region-level education systems must better incorporate these "foundational" or "transverse" skills into their curricula. Furthermore, once people are out of school and in the workforce, it is imperative to enable them to upgrade their skills better throughout their working lives. A key challenge here is to develop structures for training that do not depend on stable employment with a single company.

Another imperative is to better match the right people with the right skills to the right jobs. In part this is a question of expanding vocational training programs that directly align workers with employers. GE has signed the European Alliance for Apprenticeships, and committed to filling 30% of entry level positions with vocational training graduates. But it is also a question of more efficiently connecting people with jobs.

At a structural level, this means better-standardizing skills credentials across the EU. Here, industry must work closely with Brussels and with national governments to develop the right criteria and mechanisms so that skills credentials can be easily transferred from Dubrovnik to Dublin, from Portugal to Poland.

It also means creating more sophisticated real-time structures for understanding where - geographically and by sector -

certain skills are needed, and where the people with those skills are to be found. Initiatives of this kind are coming into existence at the national level, such as the Czech Republic's Education and Work Portal, but there is a much bigger opportunity here to expand the reach of labor market data and analytics across the entire European Union.

GE is well-positioned to contribute significantly to solutions here, using the breadth of its cloud-based industrial internet platforms such as Predix and the power of its data analytics to identify emerging skills needs more quickly than conventional surveys can, reducing the frictions between qualified workers and appropriate jobs not only at the country level, but at the regional and municipal levels too. This dimension is an important and instructive example of how technology can be a solution even to the problems created by technological advancement itself.

To realize this promise, however, industry and governments must continue to make clear the benefits of the proposed Digital Single Market – the departure of the UK from the EU removes one of the strongest, and most powerful, advocates for facilitating cross-border data flows.

Lastly, governments must continue to ensure labor mobility. First in basic terms of maintaining the free movement of labor - something that has come into question because of fears of terrorism and refugees - and through streamlining the legally-guaranteed portability of benefits from one country to another. A 2015 study by the University of Bath found that for the EU's roughly 18 million internal migrants, only pensions access is in practice straightforward across national borders – access to healthcare, social security, and family benefits is still complex and inconsistent.

Within countries, innovative approaches to targeting benefits are in process – France's recently begun *Compte Personnel d'Activite* provides a model for how benefits programs can target the most vulnerable or precariously employed with support, while still creating the right incentives to people to seek work and develop their skills.

benefits, making social safety nets more expansive, supple, and responsive. These are all approaches that can help European students and workers to benefit from the advances in technology that will boost their productivity and living standards. But what about those people who are unable to successfully make the transition?

Here too, cloud-based data and analytics can help streamline the targeting and delivery of





Helping the displaced

It is critical that we think proactively and creatively about how to address the grievances of those who – even in a world of improved training and mobility - are unable to find substantial employment that delivers sufficient economic security. While innovation leaders like GE are committed to expanding the horizons of technological development, we also recognize that we will have certain obligations and responsibilities when it comes to offsetting the negative externalities of technological advancement. If we fail to do this, we run the risk of social instability that undermines economic growth and, likely, regulatory backlashes that stifle precisely the innovation that we believe will deliver long-term, broadly-distributed benefits to our societies.

This is, above all, a question of how to reform and adapt social safety nets to accommodate a world in which, for a sizable and vocal minority of the population, work may become increasingly precarious and poorly compensated. More broadly construed, it involves rethinking the very nature of the social contract between citizens and states. Over time, governments may start to look more to technology companies to support these new social contracts through higher taxes or other obligations. The idea of a so-called “robot tax” was even floated by Bill Gates recently, himself certainly no supporter of burdens on innovation.

For this reason, industry leaders such as GE intend to be out in front on this question, working with policymakers to craft the right balance between government and industry responsibility for crafting, expanding, and funding the broader social safety nets of the 21st century. If this entails a greater contribution to governments’ ability to expand social safety nets, then we must not only anticipate those conversations with policymakers, we should be proactively helping to start and frame them.

Determining the appropriate political level for policy delivery will be critical.

Pragmatism will be critical: policies should be pan-European where necessary – on regulation of labor standards, portability of credentials and benefits – but increasingly country-level or local where possible in the implementation of training and educational schemes. Given the broader crisis of credibility of supranational and even national institutions in Europe and other advanced democracies, it is wise to bring policy implementation as close as possible to the local level. At the local level accountability and trust in institutions are highest, and local needs and sensitivities best understood.

No guarantees aside from a good-faith effort by all parties.

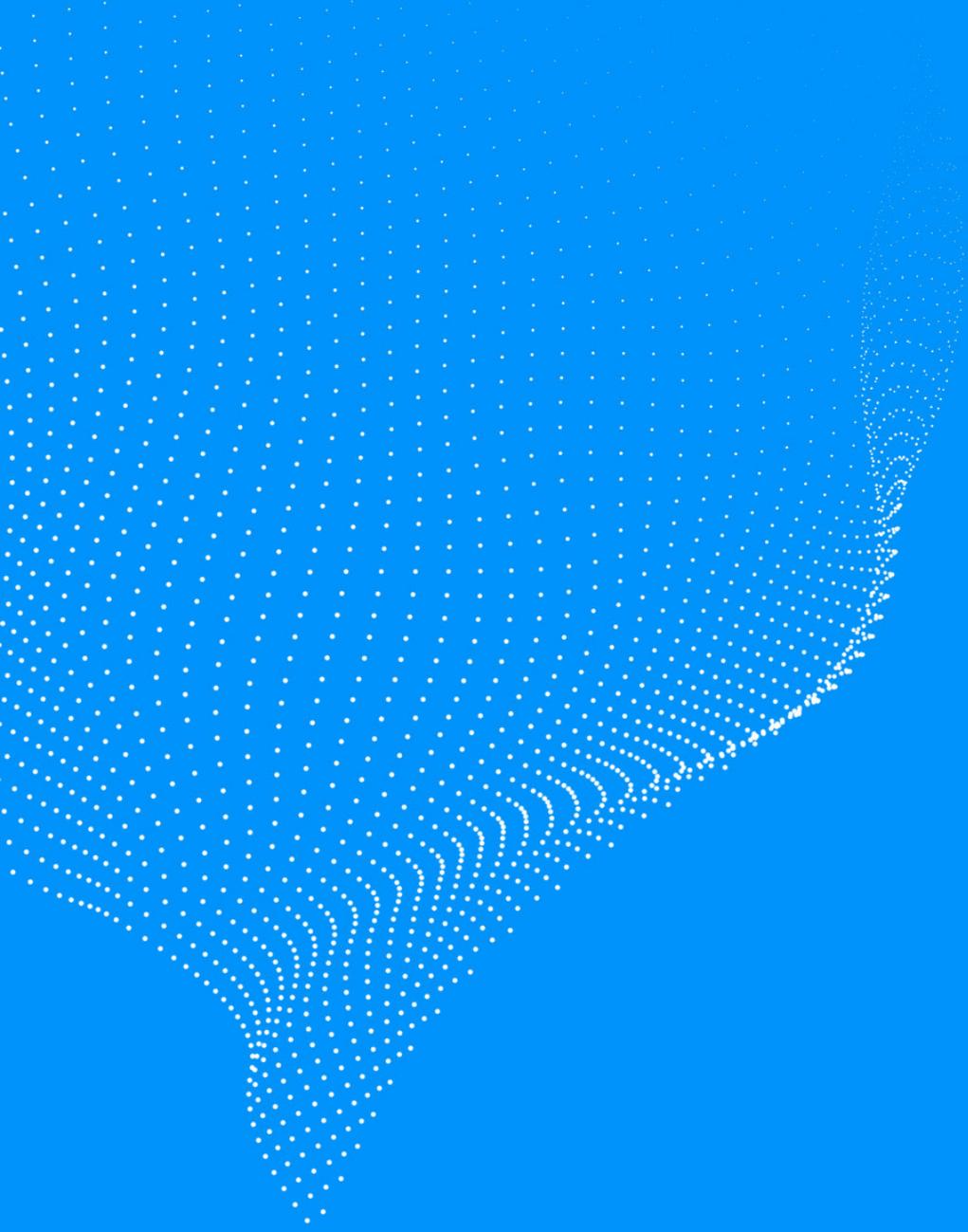
Nothing guarantees that Europe will be able to effectively meet the challenge of automation and the future of work, but the continent starts off from a privileged position. And so an approach that actively anticipates the needs both of losers as well as winners, puts technology to work intelligently to help solve these problems, and tailors policy responses to the appropriate levels of government can deliver success. It can make Europe a model. In short, it is a future that can work for the future of work.





Our commitment

At GE, we are deeply invested in Europe and its future. We've operated in the continent for more than a century, and today, our production and distribution activities there—in aviation, energy, oil & gas, power & water, transportation, healthcare, and digital—generate EUR 19 billion in annual revenue and employ more than 90,000 people in 900 different locations. We are a key investor in innovation, including 60 R&D, engineering, and manufacturing centers across the continent, and we have established many partnerships with companies, institutions and individuals to foster European innovation and competitiveness at all levels of the Union. We see our future as integrally bound up with the future of the European Union, and we stand ready to engage with national, regional and local leaders and share our global experience in fostering innovation and growth. In partnership with policymakers—in Brussels, national, regional and in local governments—we are ready to invest in the future of European leadership and prosperity.



www.ge.com/europe



@GE_Europe

An initiative by
GE Voices