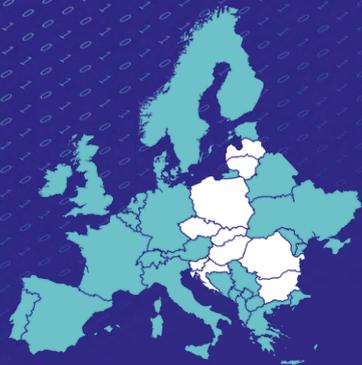


The rise of Digital Challengers

How digitization can become the next growth engine for Central and Eastern Europe



CEE



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and Eastern Europe

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About the Digital Challengers research

This report is part of a wider research into the potential of the digital economy in Central and Eastern Europe. In our November 2018 report, "The rise of Digital Challengers: How digitization can become the next growth engine for Central and Eastern Europe" we cover the regional perspective, joined by additional country reports for the Czech Republic, Hungary, Poland, Romania, and Slovakia.



Czech Republic



Hungary



Poland



Romania



Slovakia

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Preface

Our objective in writing this report was to analyze the opportunities presented by the digital economy in Central and Eastern Europe (CEE). Using new research of our own and an examination of published sources, we define the economic potential from accelerated digitization in ten countries in the region: Bulgaria, Croatia, the Czech Republic, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia. We consider these countries “Digital Challengers,” as they demonstrate strong potential for growth in the “digital economy,” emulating the group of relatively small countries with very high digitization rates that we call “Digital Frontrunners,” namely Belgium, Denmark, Estonia, Finland, Ireland, Luxembourg, the Netherlands, Norway, and Sweden.

Discussion about the opportunities and challenges of digitization has been ongoing for many years. We aim to provide a fresh and unique perspective: a comprehensive, fact-based analysis that attempts to quantify the size and growth rates of digital economies on a national and regional level in CEE and provides realistic scenarios for the economic impact of digitization through 2025.

Also for the first time in this report, we offer a combined perspective, looking at both individual countries and the CEE region as a whole from a digital economy perspective. This approach enables us to understand in a quantifiable and comparable way how the digital economy is evolving across countries and compared to the most relevant benchmarks. Furthermore, we provide primary insights on the level of digitization in individual sectors across all ten CEE countries (Chapter 1). A core part of the study is our investigation of the impact of digital transformation on the labor market (Chapter 2). Our discussion here covers both the shifts in society caused by the new technology and the increasingly accessible nature of the labor market as a result of the digital transformation. Following this, we turn to consider a comprehensive yet prioritized list of digitization enablers, including the relative strengths of the region and key areas on which the region should focus going forward (Chapter 3). Our insights in this chapter are based on quantitative analysis and discussions with numerous market experts.

In the final chapters of our study, we look at the vital role of collaboration in CEE, emphasizing the importance of capturing regional scale effects, tackling common challengers and sharing best practices (Chapter 4), and examine the implications for policy makers, companies, and individuals (Chapter 5). This final section contains a list of actions for these stakeholders to capture the digital opportunity.

The ideas we present build on those outlined in the previous reports *Digital Europe: Pushing the frontier, capturing the benefits; A future that works: Automation, employment, and productivity*; as well as *A new dawn: Reigniting growth in Central and Eastern Europe*. We would like to take this opportunity to thank the McKinsey Global Institute, as well as the authors of the above publications – in particular Jacques Bughin, Senior Partner in Brussels, and James Manyika, Senior Partner in San Francisco, for their expertise, insights, inspiration and guidance.

The work on this report was led by Jurica Novak, McKinsey’s Managing Partner in Central Europe, Marcin Purta, Managing Partner in Poland, Tomasz Marciniak, Partner, and Karol Ignatowicz, Local Partner, with significant contributions by McKinsey Partners across CEE: Dan Svoboda, Tomas Karakolev and Michal Skalsky in the Czech Republic and Slovakia, Levente Janoskuti and Andras Havas in Hungary, Daniel Spiridon in Romania and Tomislav Brezinscak in Croatia.

These individuals worked together with a team comprising Consultants Kacper Rozenbaum, Kasper Yearwood and Arkadiusz Żarowski, Communications Experts Joanna Iszkowska and Milena Tkaczyk, Graphic Designer Małgorzata Leśniewska and many others.

At the same time, we would also like to thank the many area experts from the public, private, and social sectors who provided insights, source data and helped advance our thinking. In particular, we would like to acknowledge the collaboration with Google on this research, including contribution of analytical inputs and insights leveraged in this report.

Executive Summary

AFTER THE SUCCESSFUL TRANSITION AND DEVELOPMENT OF A MARKET ECONOMY:

- 1 The current growth engine of Central and Eastern Europe is losing momentum.
- 2 Digitization can be the next driver of sustained growth for the region, with €200 billion of additional GDP by 2025 at stake.
- 3 The countries of CEE are uniquely positioned to capture this opportunity.
- 4 The business world, governments, and individuals all need to act in order for the transition to be successful.
- 5 Collaboration between CEE countries as Digital Challengers is key.
- 6 The time to act is now, otherwise the region may miss the digital opportunity.

For the countries of Central and Eastern Europe (CEE), the potential economic benefits of digitization are great: up to €200 billion in additional GDP by 2025. This economic boost would lead to greater global competitiveness and prosperity for the region's 100 million people. While the digital transition also harbors potential risks in the form of shifts in society, public and private-sector leaders can take effective actions to mitigate them whilst pursuing the digital opportunity.

1 THE CURRENT GROWTH ENGINE OF CENTRAL AND EASTERN EUROPE IS LOSING MOMENTUM

Since the transition to a market economy almost three decades ago, CEE has enjoyed a golden age of growth. The ten CEE countries examined in this report – Bulgaria, Croatia, the Czech Republic, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia – recorded on average a 114 percent increase in GDP per capita between 1996 and 2017, compared to an increase of just 27 percent in the European Union's "Big 5" economies: France, Germany, Italy, Spain, and the United Kingdom.¹ The CEE region has become one of the most attractive places to invest in globally.² This fact has enabled CEE countries to partially close the economic gap to Western Europe, and their populations to enjoy a significant rise in living standards.³

Growth in CEE has been driven by a number of factors, including traditional industries, dynamic exports, investments from abroad, labor-cost advantages and funding from the European Union. But now these drivers are beginning to weaken. CEE economies are generally undercapitalized compared to their more advanced European peers. The capital stock, measured as total gross fixed assets per employee, is 60 percent lower than the average for the EU Big 5.⁴ Workforce costs are also rising and there are limited labor reserves left to plug into the economy, with unemployment at record low levels – on average 6.5 percent in 2017, compared to 7.6 percent in the EU.⁵ Labor productivity still lags behind Western Europe⁶. And on top of it all, the inflow of EU funds to CEE countries is likely to slow down after 2020.

What does that mean for the countries of CEE? In a nutshell, if they hope to continue on their path to general prosperity, they need to redefine their growth strategies as a matter of urgency.

2 DIGITIZATION CAN BE THE NEXT DRIVER OF SUSTAINED GROWTH FOR THE REGION

Today, CEE has the chance to make a strategic choice that will determine its growth path for

decades to come. Our analysis shows that developing the region's digital economy across all sectors would bring significant economic benefits, primarily due to the resulting productivity gains. By closing the digital gap to Western and Northern Europe, CEE could earn up to €200 billion in additional GDP by 2025 – a gain almost the size of Portugal's entire economy in 2017.⁷ In this aspirational scenario, the region's digital economy would grow to represent 16 percent of GDP by 2025. That would mean up to 30 percent additional GDP growth, the equivalent of one extra percentage point on GDP growth each year over the period.

How would digitization secure this ambitious goal for CEE? Primarily by improving the region's productivity through a digital transformation of the public and private sectors, and by boosting e-commerce and offline consumer spending on digital equipment.

The alternative "business as usual" scenario is one in which the digital economy in CEE maintains its historical growth rate, expanding by just €60 billion and representing 8.7 percent of GDP in 2025. In this scenario, CEE countries would miss out on the additional one percentage point of annual GDP growth and remain a long way from the "digital frontier" represented by the countries of Northern Europe, for example.

3 THE COUNTRIES OF CEE ARE UNIQUELY POSITIONED TO CAPTURE THIS OPPORTUNITY

Looking at Europe from the perspective of digitization, we distinguish three broad groups of countries. The first are the ten countries of CEE listed above that form the core of this study. We call these countries "Digital Challengers" as they demonstrate strong potential for growth in the area of "digital" and can emulate the second group, consisting of relatively small countries with very high digitization rates, which we call "Digital Frontrunners": Belgium, Denmark, Estonia, Finland, Ireland, Luxembourg, the Netherlands, Norway, and Sweden.⁸ Finally, there is the EU Big 5, which typically rely more on their large internal markets

for economic growth. These five countries have digitization rates that are relatively high but not as high as the Digital Frontrunners.

In 2016, the digital economy of Digital Challengers accounted for 6.5 percent of their GDP.⁹ This is almost on a par with the EU Big 5 (6.9 percent) but well behind Digital Frontrunners such as Sweden (9.0 percent).

Notably, Digital Challengers are enjoying great momentum in their digital economies. Between 2012 and 2016, the region's combined digital economy grew by 6.2 percent a year, twice as fast as in the EU Big 5. The news for specific sectors of the economy in CEE is also good. Although most industries in Digital Challenger countries lag behind their equivalents in Digital Frontrunner countries in terms of digitization, some are almost level with EU Big 5 benchmarks – for example, financial services and information and communication technology (ICT).

Digital Challengers have the foundations for further digitization. In particular, these include the following:

- Good primary and secondary education in terms of math and science literacy scores, according to the international PISA ranking – almost on a par with Digital Frontrunners
- A large STEM (science, technology, engineering, and mathematics) and ICT talent pool, with over 230,000 graduates in these subjects in 2015 – more than any of the EU Big 5 markets and twice as many as the entire Digital Frontrunner region
- High-quality digital infrastructure with excellent 4G coverage, some of the best coverage rates in the world for ultra-fast broadband and good affordability for ordinary citizens
- A legacy “technology lock-in” that is milder than in Western and Northern European countries. Having joined the digitization race rather late, CEE economies are less tied up with older technology. For example, the CEE region almost entirely bypassed the use of payments by check, going

straight to payment cards. Today, the region has one of the highest contactless payment adoption rates in the world.¹⁰ So, while it may be more difficult for Digital Challengers to compete in the traditional economy, they enjoy a level playing field in the digital economy

- A vibrant emerging digital ecosystem. We have already seen multiple digital success stories across the region, with a number of digital-native companies achieving unicorn status (valuation of more than \$1 billion). Thanks to its strong talent base, CEE is becoming a hub for gaming developers and software development houses, many of which are among the fastest growing companies in the region. Moreover, incumbents in traditional industries are beginning to follow suit, successfully adapting digital solutions both internally and in their client offerings

4 THE BUSINESS WORLD, GOVERNMENTS, AND INDIVIDUALS ALL NEED TO ACT IN ORDER FOR THE TRANSITION TO BE SUCCESSFUL

To realize the aspirational digitization scenario described above, all stakeholders in Digital Challenger countries need to be actively engaged in the digital transformation. Businesses could increase their adoption of digital tools, improving their productivity and ultimately their bottom line. They would also be well advised to take advantage of digital solutions for reaching new customers and expanding into regional and global markets. This export potential is especially relevant in CEE, where the size of the domestic markets limits growth opportunities.

The public sector can play a role in the transformation by using digital technology to achieve faster, smoother processes and services for both companies and ordinary citizens. Individuals must be active, too; investing in lifelong learning will enable them to take advantage of new opportunities on the labor market. Individuals also need to embrace increasing flexibility in their career paths.

Policy makers can support the process on a wide range of fronts. They can promote the adoption

of technology by both public and private sectors. They can improve the ecosystem for startups and the opportunities for digital innovation – for example, by creating regulatory sandboxes. They can also support workers by setting in motion programs aimed at “reskilling” and “upskilling” workers.

5 COLLABORATION BETWEEN CEE COUNTRIES AS DIGITAL CHALLENGERS IS KEY

The countries of CEE will only be able to capture the full potential of the digital transformation by cooperating closely with each other, due to at least four factors:

- **Scale effects:** Together, Digital Challengers represent €1.4 trillion in GDP, making them the equivalent of the twelfth-largest economy in the world.
- **Similar starting points:** The countries of CEE have high levels of market openness and similar levels of digitization, besides their cultural and historic commonalities.
- **Common challenges:** The region's countries face many similar challenges, such as the “brain drain” and need to reskill the workforce.
- **Best practices:** Each CEE country has developed different areas of digital specialization, each with their own advantages. Sharing best practices can accelerate the process of transformation.

In the future, Digital Challengers could work together on digital policy solutions across the region. Efforts could include allowing access to standardized public datasets to fuel innovation and support the digitization of enterprises. Cross-border infrastructure projects would also be possible, such as the introduction of fiber optics or 5G technology infrastructure. The countries of CEE, marching shoulder-to-shoulder with other countries interested in furthering digitization, could likewise form a coalition at a European level to ensure that their digital interests are heard.

6 THE TIME TO ACT IS NOW, OTHERWISE THE REGION MAY MISS THE DIGITAL OPPORTUNITY

We believe that in order to benefit fully from the digital transformation, the time for CEE to act is now. Our sense of urgency is based on three factors.

First, Digital Challengers are currently booming economically, with thriving private sectors. In 2017, Digital Challengers saw their highest levels of GDP growth in more than a decade. This positive environment gives new digital initiatives a head start. History shows, however, that booms do not last forever. Indeed, there are already multiple signs that limitations on growth will emerge in the region, such as negative demographic trends limiting the positive effects from a growing labor force.

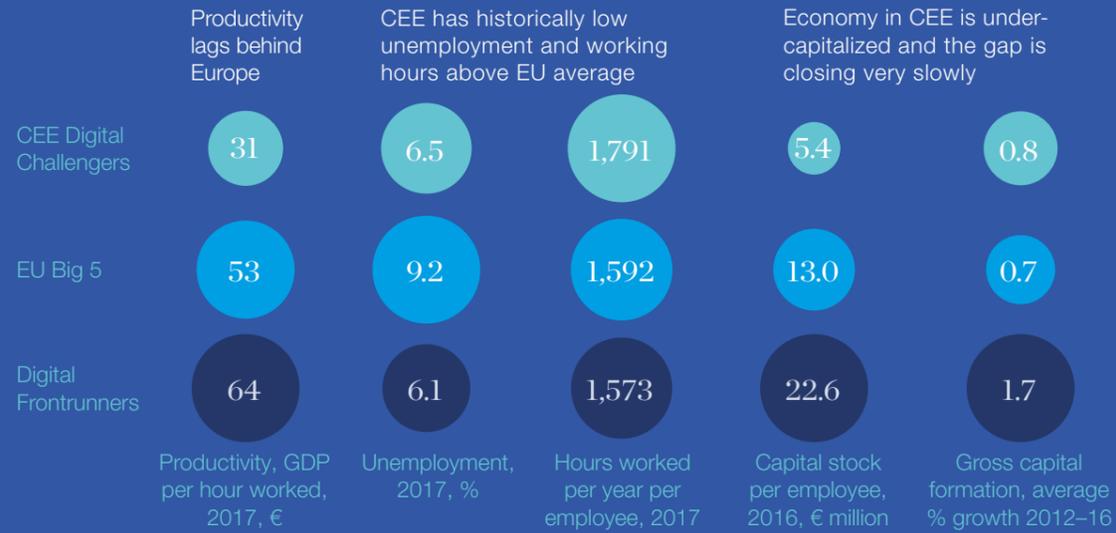
Second, we find ourselves on the cusp of a Fourth Industrial Revolution, in which new technology will fundamentally transform the economy and the labor market. This seismic change will drive growth and create many new professions – big data scientists, machine-learning engineers, new technology designers to name just a few. But it will also create serious challenges. Our analysis shows that up to 51 percent of workplace activities in CEE today – the equivalent of around 21 million jobs – could potentially be automated by 2030 (depending on the economy, future regulation, and the labor market) using technology that already exists today. This creates both an opportunity for increased productivity and challenges for the labor market. To avoid potential spikes in unemployment, immediate action is needed, such as updating the education system to teach the skills that will be required in the future and creating a support system for lifelong learning.

Third, we are at a point in time where the rules of the digital game are crystallizing and new ecosystems are emerging. This is the moment for drawing up digital strategies and developing toolkits for the digital transformation ahead. Many companies, countries and regions have realized this and are busy developing their long-term digital agenda. If the countries of CEE wish to compete and capture the €200 billion digital opportunity, they need to come together urgently and devise a robust long-term digital strategy of their own.

WHY IS DIGITIZATION KEY FOR CEE?

HOW TO CAPTURE THE POTENTIAL?

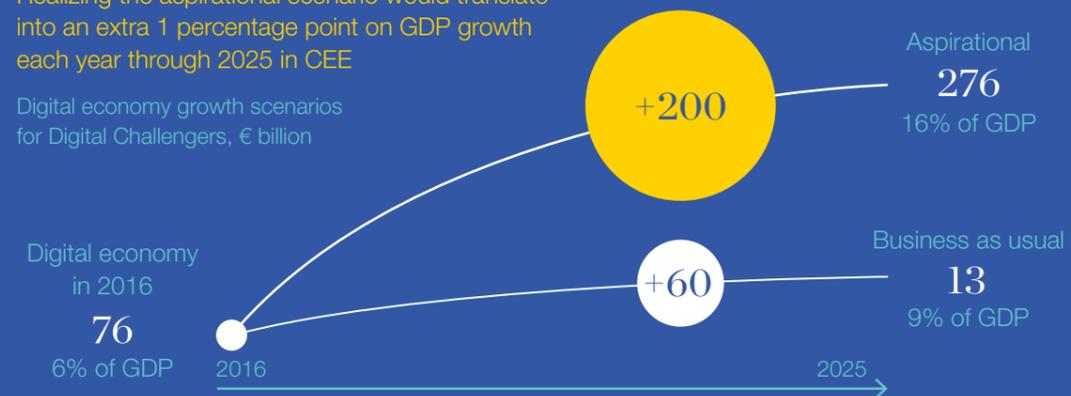
1 THE GROWTH ENGINE OF CENTRAL AND EASTERN EUROPE IS LOSING MOMENTUM



2 DIGITIZATION CAN BE THE ANSWER TO THIS CHALLENGE

Realizing the aspirational scenario would translate into an extra 1 percentage point on GDP growth each year through 2025 in CEE

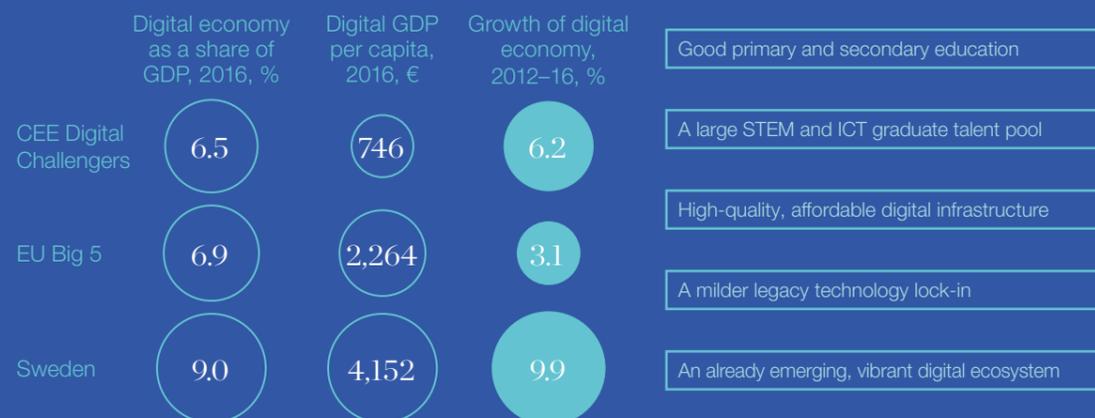
Digital economy growth scenarios for Digital Challengers, € billion



3 THE COUNTRIES IN CEE ARE UNIQUELY POSITIONED TO CAPTURE THIS OPPORTUNITY

Despite a lower size of the digital economy, Digital Challengers can build on a strong historical growth momentum

Digital Challengers have the necessary fundamentals in place for further digitization:

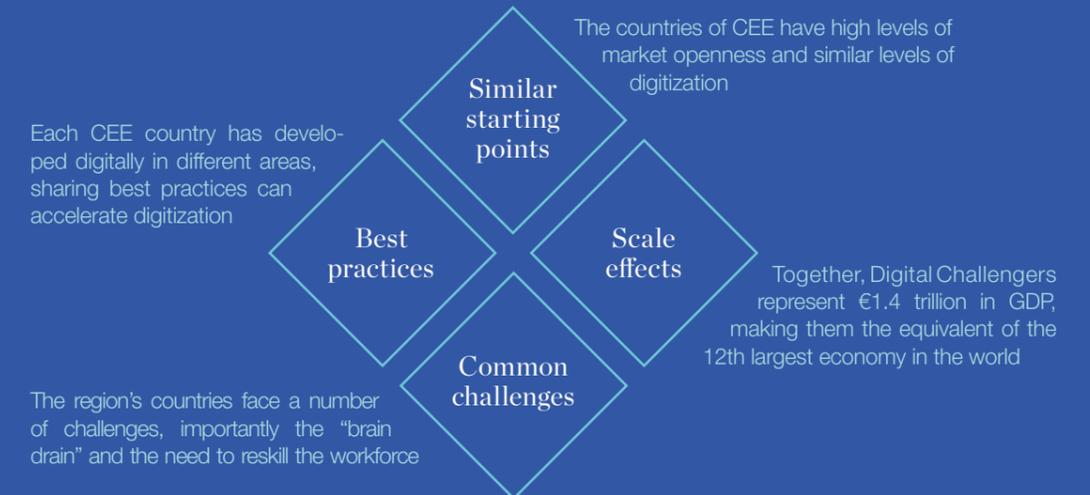


4 ALL STAKEHOLDERS NEED TO ACT FOR A SUCCESSFUL TRANSITION



5 COLLABORATION BETWEEN CEE DIGITAL CHALLENGERS IS KEY

There are four reasons why cooperation is necessary to capture the full potential of digitization in the CEE region



6 THE TIME TO ACT IS NOW – OTHERWISE THE REGION MAY MISS THE DIGITAL OPPORTUNITY



SOURCES: McKinsey Global Institute; Eurostat; McKinsey analysis

Introduction

Digital Challengers at a glance

The year 1989 was a very special date in the history of Central and Eastern Europe (CEE). It has now been almost three decades since momentous changes in the countries of the region resulted in political transformation and the introduction of market-based economies. Coincidentally, it was about 1989 that British physicist Timothy Barnes-Lee was putting the finishing touches to a new system designed to help scientists share data across a then little-known platform. That platform – known today as the World Wide Web – has since been central to the development of the internet and the dawning of the digital age.

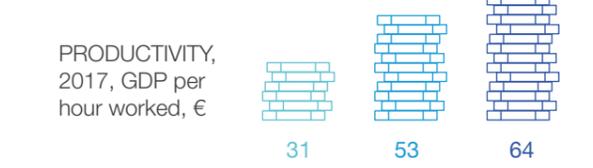
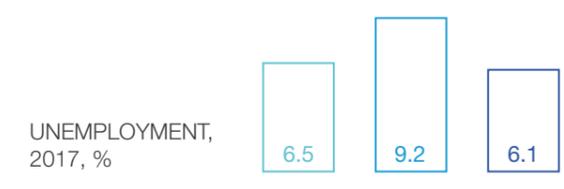
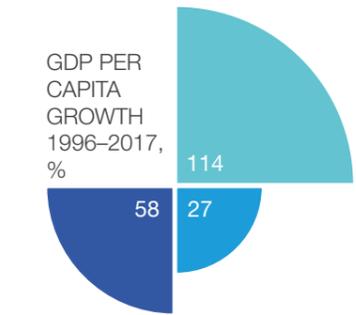
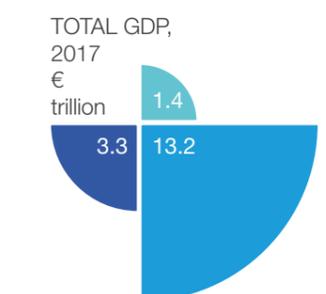
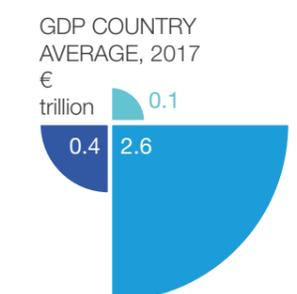
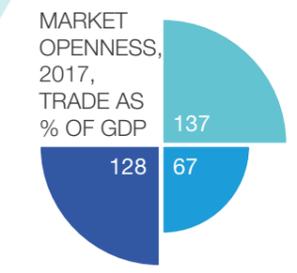
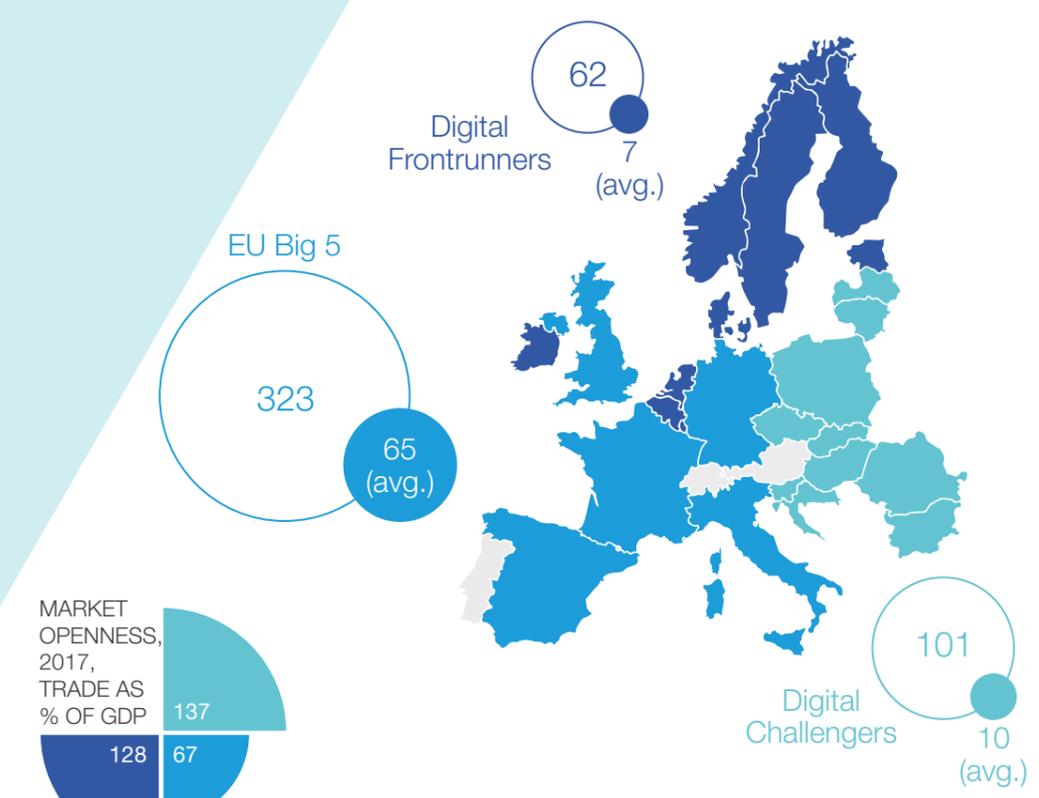
From the perspective of digitization, we can distinguish three broad groups of countries in Europe. The first are the ten countries of CEE that form the core of this study: Bulgaria, Croatia, the Czech Republic, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia. We call these countries “Digital Challengers” as they demonstrate strong potential for growth in the area of “digital” and emulate the second group, which consists of relatively small countries with very high digitization rates. We call this second group “Digital Frontrunners”: Belgium, Denmark, Estonia, Finland, Ireland, Luxembourg, the Netherlands, Norway and Sweden.¹¹ Finally, there is the EU Big 5 – France, Germany, Italy, Spain, and the United Kingdom – which typically rely more on their large internal markets. These five countries have digitization rates that are relatively high, but not as high as the Digital Frontrunners.

Since the early 1990s, our group of Digital Challengers have enjoyed significant economic growth. Gross domestic product (GDP) per capita¹² grew by

114 percent between 1996 and 2017. The main growth drivers during this period were traditional industries, dynamic exports, investments from abroad, labor-cost advantages, and funding from the EU. But now these drivers are beginning to weaken. The economies of CEE are generally undercapitalized compared to more advanced European economies. The capital stock, measured as total gross fixed assets per employee, is on average 60 percent lower here than for the EU Big 5.¹³ Workforce costs are also rising and there are limited labor reserves left to plug into the economy, with unemployment in CEE at record low levels – on average 6.5 percent in 2017, compared to 7.6 percent in the EU as a whole.¹⁴ Working hours in the region are above the EU average,¹⁵ while productivity lags behind Western Europe.¹⁶ Moreover, the inflow of EU funds to CEE countries is likely to weaken after 2020. Clearly, CEE needs a new engine to drive its future economic growth.

Based on our research, we believe that digitization can be the answer to this challenge, becoming the region’s new growth engine. The current level of digitization in CEE is almost on a par with the largest EU countries.¹⁷ The pace of development of the digital economy and the existence of key enablers of digitization, such as high-quality primary, secondary, and higher education, digital infrastructure almost as good as in Digital Fronrunner countries, a milder “technology lock-in” than in Western and Northern Europe and a vibrant digital ecosystem, mean that CEE countries are well positioned to take advantage of the potential of digitization to boost their productivity – and, in so doing, increase the prosperity of their populations.

REGIONAL POPULATION IN TOTAL VS. COUNTRY AVERAGE, 2017, MILLIONS



Digital Challengers EU Big 5 Digital Frontrunners

EU BIG 5: France, Germany, Italy, Spain, United Kingdom
 Digital Frontrunners: Belgium, Denmark, Estonia, Finland, Ireland, Luxembourg, the Netherlands, Norway, Sweden
 Digital Challengers: Bulgaria, Croatia, the Czech Republic, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia

Digitizing the economy

The digital economy of Digital Challengers accounts for 6.5 percent of GDP. While this is almost the EU Big 5 markets (6.9 percent), it lags behind Europe's Digital Frontrunners such as Sweden (9.0 percent).

Digital Challengers can build on the historical growth of their digital economies (6.2 percent a year from 2012 to 2016), which outstripped both Digital Frontrunners (5.9 percent) and the EU Big 5 (3.1 percent).

The development of the digital economy in CEE is having a significant economic impact – indeed, digitization could become the next major growth driver for the region. Digital Challengers could even close the gap to Digital Frontrunners, growing the region's digital economy by as much as €200 billion so that it represents 16.2 percent of GDP.

This could potentially deliver up to 30 percent additional GDP growth, the equivalent of an extra one percentage point GDP growth each year through 2025.

The term “digitization” is widely used by economists. Yet its precise meaning is a topic of much discussion, particularly when it comes to measuring the impact of digitization on economies.¹⁸ Consequently, uncertainty reigns about the scale of the digital economy in CEE.

In this report we shed light on just how big the digital economy is in CEE. We strike a balance between the various definitions of “digitization.” For us, it represents the sum of three components:

- The value of the information and communication technology (ICT) sector
- The value of the e-commerce market, measured as online sales of goods
- The value of offline consumer spending on digital equipment

We choose this definition for two main reasons. First, it is relatively comprehensive – broader than just the ICT sector, yet more concrete than, say, “all activities related to digital data.” Second, reliable data is available for each of the three areas it covers and so its total value can be calculated (see Appendix for details). This enables us to use a bottom-up modeling approach, drawing on data collected at a national level.

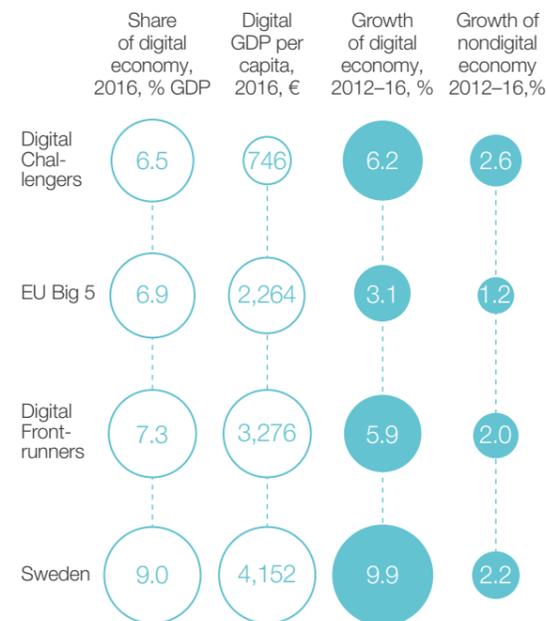
SIZE AND GROWTH OF THE DIGITAL ECONOMY IN CEE

As mentioned in the Introduction traditional growth drivers in CEE are facing increasing limitations, such as a finite labor supply, undercapitalized economies, and productivity levels that lag behind more advanced economies. The question we ask in this study is: Could digitization become the new growth driver for the region in the years to come?

To answer this question, we must first identify where the digital economies of CEE are today. According to our analysis (Exhibit 1), the digital economy accounted for 6.5 percent of total GDP in the region in 2016. While this is almost with the EU Big 5, it lags behind Digital Frontrunners, where its share of GDP is almost 40 percent higher. In per capita terms, the differences are even more pronounced. The digital GDP

per capita in CEE, at €746, is more than four times lower than the average for Digital Frontrunners and almost six times lower than in Sweden.

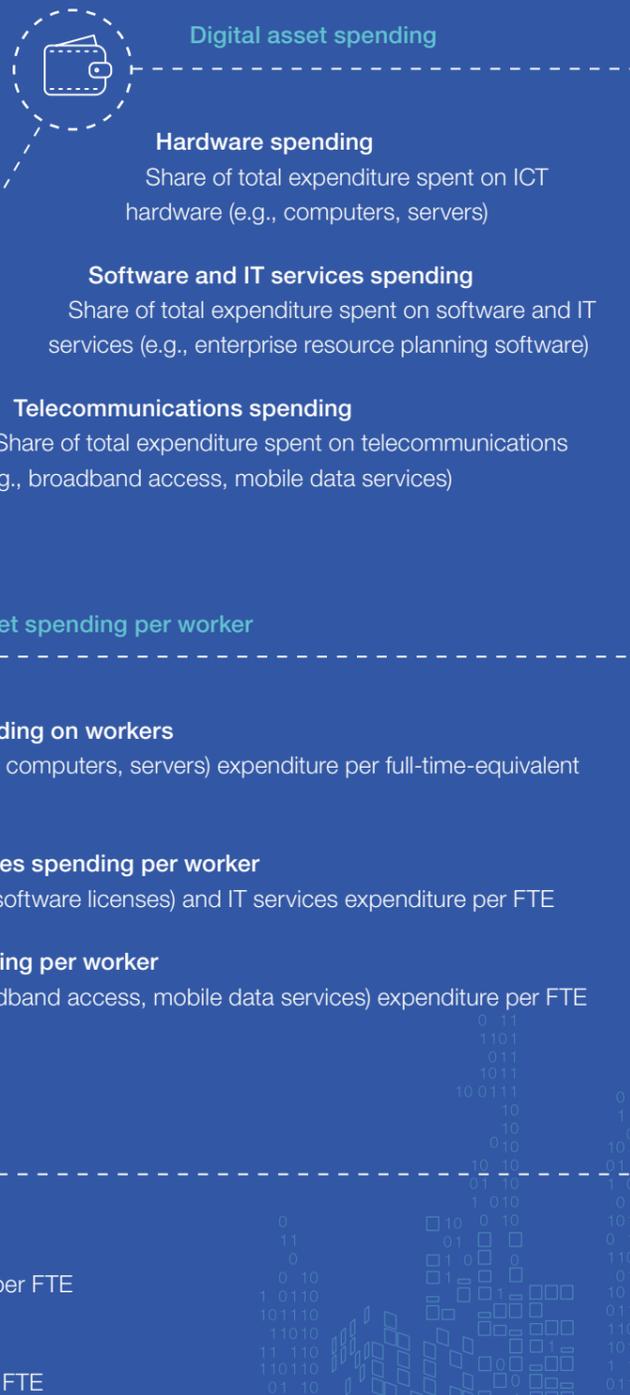
Exhibit 1.
The digital economy of Digital Challengers accounts for a smaller share of GDP than that of the EU Big 5 and Digital Frontrunners – but it is also growing faster.¹⁹



SOURCE: Eurostat; local institutes of statistics; McKinsey Global Institute analysis; McKinsey analysis

However, the digital economy in CEE is growing faster (6.2 percent a year between 2012 and 2016) than in the EU Big 5 (3.1 percent) and even Digital Frontrunners (5.9 percent). While this is a positive indicator, room for improvement remains. Despite starting from a larger basis, Sweden was able to grow its digital economy by 9.9 percent a year between 2012 and 2016, for example. In terms of growth rates, CEE countries – most of which are still classified as “developing countries” – also appear to be benefiting from the general momentum in their economies. With a little extra effort, Digital Challengers could accelerate the pace of growth of their digital economies and close the gap to, or even overtake, some of the more digitally advanced economies.

Box 1.
The McKinsey Digitization Index – drivers of digitization at sector level (referenced on the next page)



SECTOR-LEVEL DIGITIZATION

Before identifying potential levers for accelerating the digital transformation in CEE, we should look at how digitization has taken place around the world. It would appear that no standard route exists to achieving high rates of digitization. Most markets, including Digital Frontrunners, have digitized unevenly, showing large variations between different sectors and individual companies.

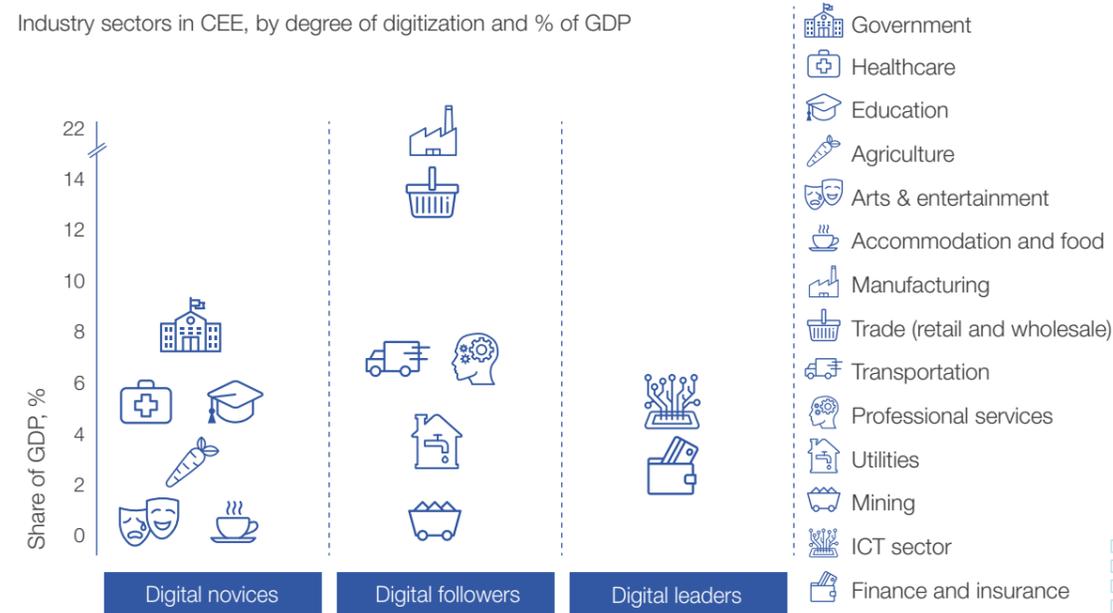
“The digital economy in CEE is growing faster than in the EU Big 5 and even Digital Frontrunners

To understand which sectors drive digitization at a “macro” level, we need a multidimensional view. The McKinsey Global Institute (MGI) Industry Digitization Index offers such a perspective, assessing digitization at the level of individual sectors (Box 1 on page 15).²⁰ It uses eight indicators to capture different ways in which companies are digitizing. For instance, digital assets include spending on computers, software and telecommunications equipment, and the stock of ICT assets. The Index also includes the perspective of

the workforce by incorporating per-employee spending. In addition, digital capital deepening is measured by comparing total hardware and software stock in a per-worker perspective. The results at sector level are weighted for the economic size of the sector and compared to the global “digital frontier,” which we take to be the ICT sector in the United States.²¹

The McKinsey Digitization Index shows us that the digital economy of CEE has developed unevenly, with three distinct industry groups emerging (Exhibit 2). The first group of sectors, exhibiting the highest digitization rates, can be considered “digital leaders.” This group comprises two medium-sized industries: ICT and finance and insurance. The second group, which we call “digital followers,” includes large sectors such as manufacturing and wholesale and retail trade, alongside medium-to-small sectors such as mining and transportation and warehousing. The final group are “digital novice” sectors such as the arts and entertainment, accommodation and food services, and agriculture. This group also includes medium-to-large public sectors such as healthcare, education, and government services.

Exhibit 2. CEE has digitized unevenly in terms of sectors – with leaders, followers, and novices emerging.



SOURCE: Eurostat; local institutes of statistics

Going forward, the priority for each sector will be to catch up with their counterparts in more digitally advanced countries. In Exhibit 3 we compare the digitization level of the biggest sectors in Digital Challenger markets with their counterparts in Sweden (taken as a benchmark for Digital Frontrunners) and other selected Western Europe countries.²² The biggest gap is found for utilities, manufacturing, government, and professional and business services. The finance and insurance sector exhibits the smallest gap. Notably, almost no gap exists between CEE and selected countries in Western Europe in government.

Support from the government can play a significant role in the development of the digital economy. Several CEE countries have national digitization strategies in place. However, they are not consistent across the region, which may also contribute to differences in digitization between countries. We explore examples of national strategies supporting the digitization process in Chapters 4 and 5.

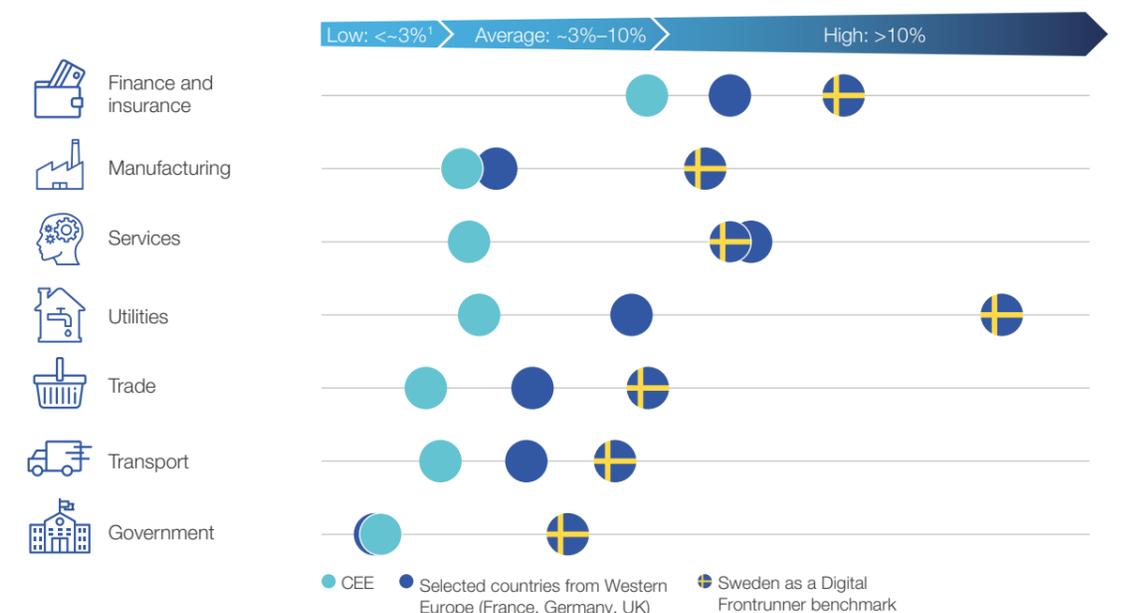
DIGITAL POTENTIAL IN CEE TO 2025

As we have seen, Digital Challengers lag behind Digital Frontrunners in terms of the overall size of their digital economy, with clear gaps at a sector level. The size of these gaps has slowly been decreasing in recent years, but CEE has not yet entered the fast lane. Looking ahead, we see two potential trajectories for further digitization in CEE (Exhibit 4).

In the first, “business as usual” scenario, the region’s countries maintain their historical growth rates for the digital economy. The digital economy expands by €60 billion to reach nine percent of GDP by 2025. The gap to Digital Frontrunners (measured as the digital economy’s share of GDP) remains almost unchanged, while the gap to the most dynamic markets, such as Sweden, widens.

The second scenario is an aspirational one. If Digital Challengers closed the gap to Digital Frontrunners, they would see their digital economy grow by €200 billion to reach 16 percent of GDP by 2025. This translates into an extra one percentage point

Exhibit 3. Large gaps in the digitization level of sectors exist between the CEE region, Western Europe, and Digital Frontrunners.



SOURCE: Eurostat; local institutes of statistics

GDP growth each year, or a one-third increase in the projected growth rate.²³ The additional €140 billion – on top of the €60 billion impact of maintaining the historical growth rate – breaks down as follows:

- An extra €120 billion from the increased productivity achieved by closing the gap to Digital Frontrunners in the digitization of the public and private sectors
- An extra €20 billion from additional growth in e-commerce and offline consumer spending on digital equipment

The first of these amounts – the extra €120 billion – comes from Digital Challengers increasing their ICT spending as a share of sector GDP to the level of Digital Frontrunners. To achieve this, they must speed up the digital transformation in their economies, especially in the sectors that lag farthest behind their Digital Frontrunner benchmarks and at the same time account for a significant share of the total national output. This includes asset-heavy sectors such as manufacturing, public sectors such as healthcare and education, and localized industries such as agriculture. The second amount – the extra €20 billion – comes from faster growth in e-commerce and offline consumer spending on digital equipment (see Appendix for details).

“If Digital Challengers closed the gap to Digital Frontrunners, they would see their digital economy grow by €200 billion to reach 16 percent of GDP by 2025.

Capturing this potential will depend on all stakeholders embracing digital technology in the coming years. For companies, it will mean taking advantage of solutions enabling growing sales through digital channels, including boosting their export capabilities. For both public and private organizations, it will mean improving operating efficiency by integrating automation and streamlining solutions. For individuals, it will mean investing in developing the skills needed in the digital economy. We explore these aspects in more detail in Chapters 2, 3, and 5.

Exhibit 4.
Scenarios for digital economy growth in CEE.²⁴

NEW DIGITAL INDUSTRIES – THE NEXT GROWTH HORIZON

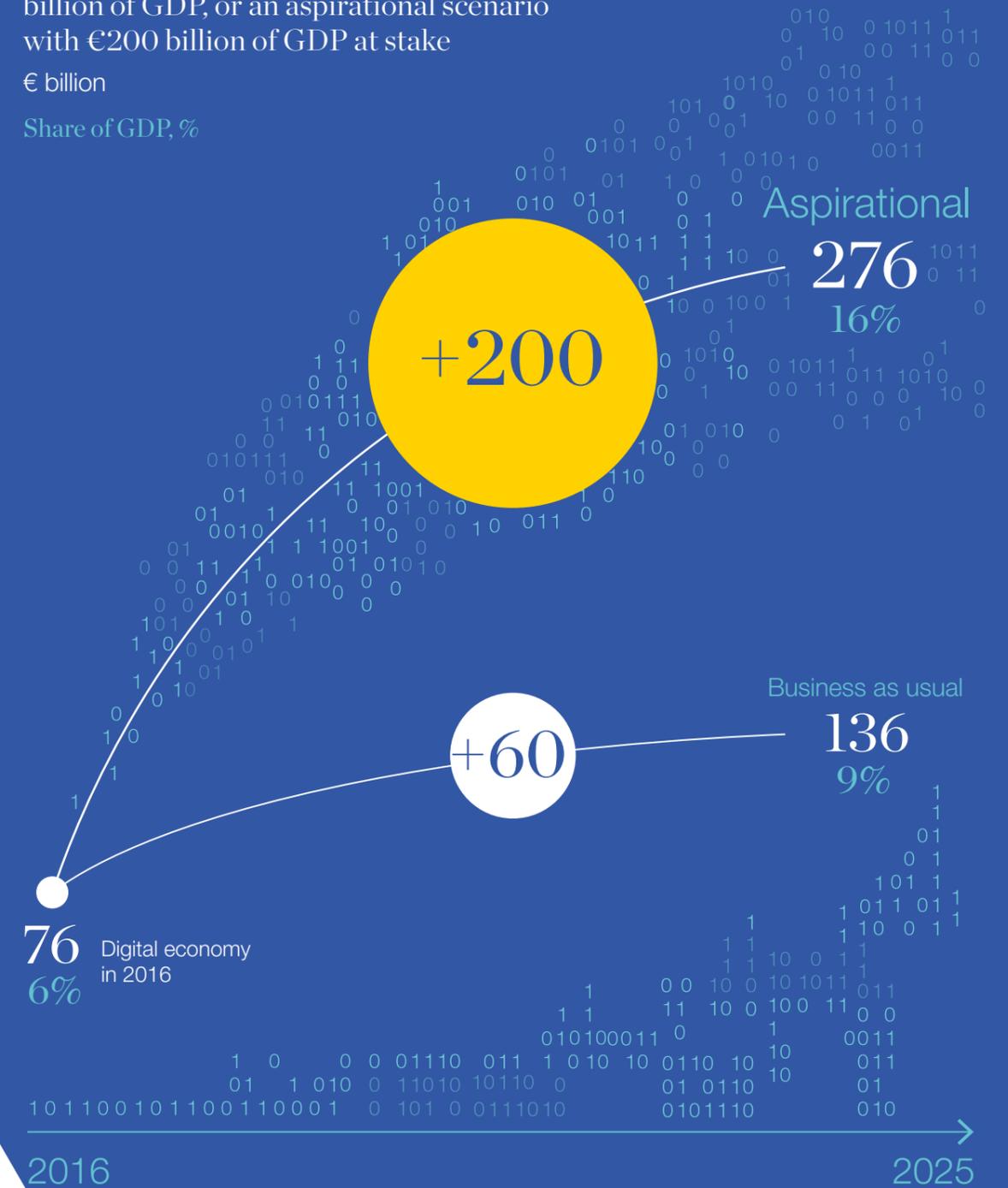
But it doesn't stop there. While accelerating the digitization of CEE's current industries promises significant economic gains, a whole new wave of digitization could be triggered by new digital industries based on the Internet of Things (IoT), big data and artificial intelligence (AI). These innovative fields represent a substantial economic opportunity, potentially over and above even our aspirational scenario. While the full size of the opportunity in CEE is still unknown, solutions that already exist today based on the IoT, for example, have the potential to boost the digital economy by €160 billion.²⁵

In the vast majority of cases, the additional economic value generated by these solutions stems from their use of data for improved decision-making, product and service innovation, and the exchange of

We see two trajectories for CEE to grow its digital economy: a business-as-usual scenario bringing an additional €60 billion of GDP, or an aspirational scenario with €200 billion of GDP at stake

€ billion

Share of GDP, %



Examples of how the Internet of Things creates value

information between vehicles, home appliances and the like, leading to increased operating efficiency.²⁶ We explore a number of use cases in different IoT verticals in Box 2.

Artificial intelligence (AI) is another new digital industry poised to contribute significantly to the next wave of digital disruption. Globally, we are already seeing increased investment, job creation, and business impact for early adopters. Funding for AI-based services, software, and hardware are booming: the McKinsey Global Institute estimates that in 2017, €33 billion was invested in AI, three times the amount for 2016. This was partly fueled by expectations of an emerging AI market, predicted to be worth more than ~€45 billion by 2020.²⁷ A push can also be seen in the labor market for AI-related jobs. Of the five fastest-growing job titles claimed by LinkedIn members in the United States, three are AI-related.²⁸ Countries are also already busy shaping their strategies on how to capture this value – we explore examples of such initiatives in Chapter 5.

AI can unlock value for different industries in the future, but even now it is used in a number of applications across a range of sectors. The field is also starting to pick up in CEE. This can be seen already in the private sector, with many success stories of enterprises specializing in AI and automation solutions emerging across the region. For instance, Romanian software provider UiPath is a global leader in robotic process automation and a CEE “unicorn” – a company valued above \$1 billion.²⁹ Global giants are also investing in AI development centers in the region, for example Amazon³⁰ and Chinese appliance manufacturer TCL in Poland.³¹

AI promises to have a positive impact on both business, in the form of increased productivity, and consumers, by providing more personalized and efficient products and services. By contrast, its impact on the labor market is a matter of ongoing debate, as we explore in the next chapter.³²

Box 2.
Examples of how IoT creates value.



Impact on the labor market

○ As employment growth in CEE slows down, an increase in productivity levels is needed. Due to negative demographic trends, up to 21 percent of current GDP growth is at risk.

○ Digitization in the form of automation technology can help relieve pressure on labor reserves in CEE.

○ We estimate that 49–51 percent of work activities could be automated using technology available today, the equivalent of approximately 21 million jobs.

○ Growing adoption of automation technology will drive a significant shift in demand for skills, leading to a potential labor market mismatch.

○ Sectors such as manufacturing, logistics, agriculture and trade will experience the biggest need for workforce reskilling.

○ Demand for technology skills, social skills, and emotional skills will grow the most.

AUTOMATION POTENTIAL AMONG DIGITAL CHALLENGERS

49–51%

of working time is spent on activities that could be automated

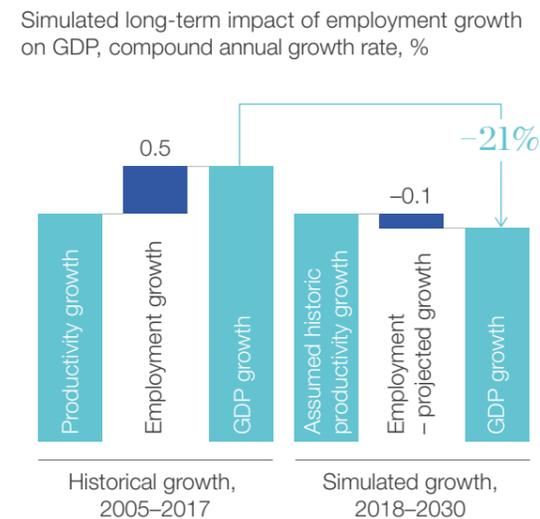
20.8 million

equivalent number of jobs

Long-term historical GDP growth in CEE has been driven by two factors: increasing employment and rising productivity. While the latter was the main contributor by far, growth of the working population was still responsible for around 17 percent of GDP growth between 2005 and 2017.³³ However, a growing consensus exists that the CEE region has now reached “peak employment.” Negative demographic trends such as declining birthrates, emigration, and aging could hinder the future development of the region. If the negative employment projections of –0.1 percent per year are correct and productivity growth rates remain at historical levels, GDP growth could be up to 21 percent lower in the period to 2030 than over the past dozen years (see Exhibit 5).³⁴

“We are likely to see occupations changing due to automation rather than disappearing completely, and many employees will need to learn how to work more closely with technology.”

Exhibit 5. GDP growth could be 21 percent lower in CEE in the period to 2030 as a result of negative demographic trends.



Note: Projection assuming historical productivity growth and projected changes in employment growth
SOURCE: McKinsey Global Institute analysis; McKinsey analysis

THE POTENTIAL OF AUTOMATION IN CEE

Given the trends outlined above, it is vital to understand the likely future impact of digitization on the labor market in CEE. One area of interest is the potential of automation technology to relieve pressure on labor reserves. A McKinsey Global Institute analysis studied around 800 professions, looking at the feasibility of automating the tasks that involve using technology already in existence today (see Appendix for details). By calculating the potential for automating specific tasks and the share of those tasks in the total working hours for each profession, we are able to estimate the potential of automation for each profession. The result? Up to 49–51 percent of workplace activities in CEE – the equivalent of approximately 21 million jobs – could potentially be automated by 2030.

The areas most susceptible to automation are physical activities in highly structured and predictable environments and tasks such as data collection and processing. These types of activities are most common in manufacturing, warehousing, and simple administrative

% OF ACTIVITY THAT COULD BE AUTOMATED



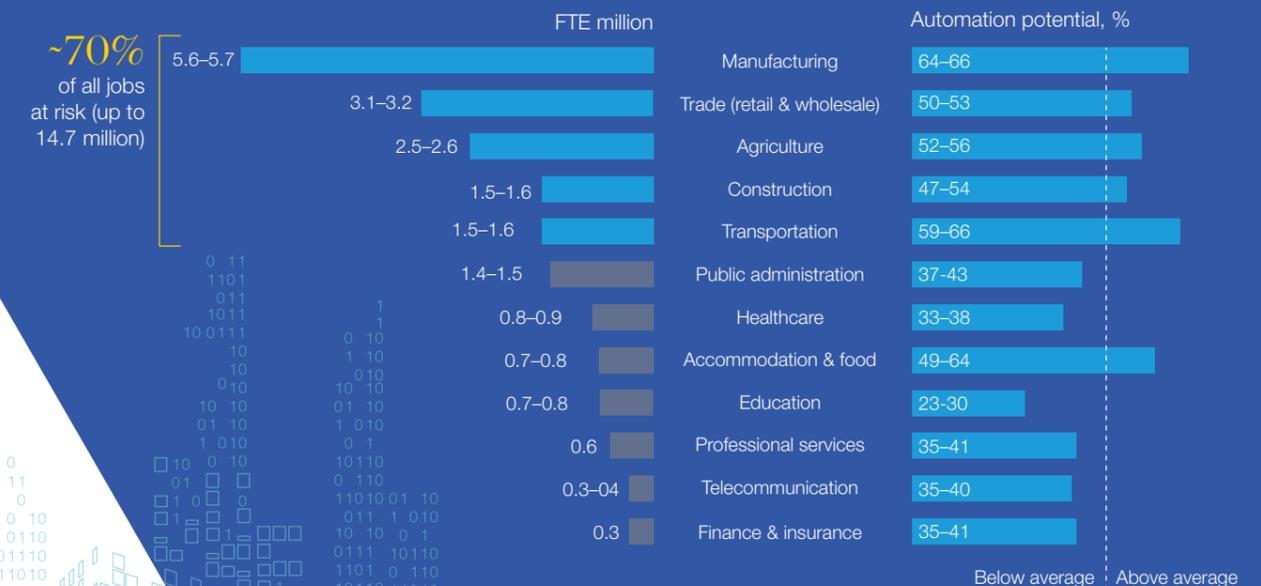
SHARE OF OCCUPATION TYPES WITH GIVEN AUTOMATION POTENTIAL

% of 820 occupation types



While few occupations are fully automatable, 60% of all occupations have at least 30% technically automatable activities

TOTAL AUTOMATION POTENTIAL IN EQUIVALENT NUMBER OF JOBS



SOURCE: McKinsey Global Institute analysis

jobs. While less than two percent of all occupations can be automated entirely, around 60 percent of all occupations have at least 30 percent of their constituent activities that could be automated. That means that we are likely to see occupations changing due to automation rather than disappearing completely, and many employees will need to learn how to work more closely with technology than they do today.

“Particularly in Digital Challenger markets, where labor costs are still relatively low compared to Western Europe, investments in technology may be delayed.

This effect will be felt to a varying degree across all sectors and occupations. For our Digital Challengers, automation could have the biggest impact on manufacturing, transportation and warehousing, where, according to our estimates, up to 66 percent of all activities performed today could be automated (see page 25). The use of industrial and service robots, 3D printing, automated production lines, autonomous vehicles and drones will lead to significant changes in these sectors.

Manufacturing, which is the biggest sector in CEE in terms of the number of people employed, accounts for a significant number of jobs susceptible to automation – around 5.7 million in total. Other sectors with high automation potential include mining, agriculture, accommodation and food services, trade and utilities. Automation will have the least impact on education and healthcare, areas where human contact and emotional skills play a key role. These skills are hard to replace by robots – at least, at present.

Automation mainly affects low- to medium-skilled jobs. Consequently, people with lower levels of education and low to medium wages are likely to be more affected by having some aspects of their jobs automated.

Speed and extent of automation

Many of the technologies for automation are not yet ready for broad application in the workplace. The

speed and extent of their use will depend on a number of factors, including technical feasibility, cost, labor-market dynamics, social acceptance and the regulatory environment.

Particularly in Digital Challenger markets, where labor costs are still relatively low compared to Western Europe, investments in technology may be delayed. However, Western companies with production plants in CEE may begin considering the possibility of “reshoring” part of their value-chain processes, most of which are manufacturing-related, to automated plants in their home countries. The European Reshoring Monitor is a Eurofund initiative that aims to identify examples of this phenomenon. Based on these, we can see that this is already occurring in CEE.³⁵

Opportunities and challenges of automation

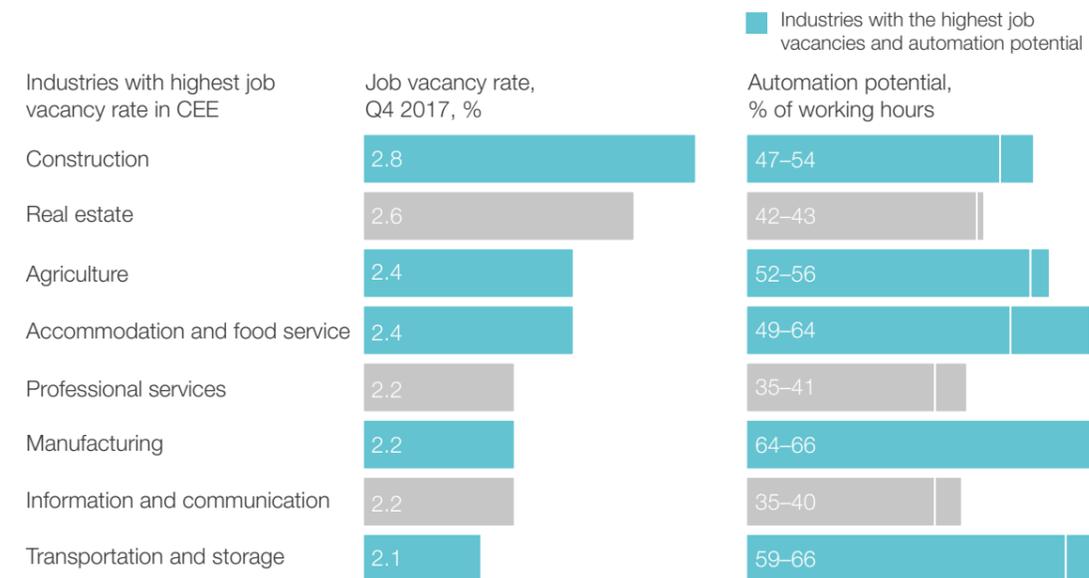
Automation brings opportunities as well as challenges. As we saw in Chapter 1, technology can contribute significantly to productivity, leading to stronger economic development. In the labor market, employees could be able to focus on more value-adding activities; for example, doctors and nurses could spend more time with patients rather than performing administrative tasks.³⁶ Additionally, as the workforce transitions to new job pools, a positive effect may be seen on both job vacancy and unemployment rates.

Industries with the highest job vacancy rates could benefit from automation, as it may solve the problem of the inadequate labor supply. In recent years, relatively low unemployment rates and a growing number of job vacancies in Digital Challenger markets have created a favorable labor market situation for employees, and challenges for employers.³⁷ Sectors such as manufacturing, transportation, agriculture and construction – all areas with a high potential for automation – have faced the biggest labor shortages³⁸ (Exhibit 6). Digitization and the implementation of technology could help companies in these sectors overcome workforce-related barriers and achieve growth.

At the same time, some employees will find that their professions alter significantly, with many of their

Exhibit 6.

Industries with the highest job vacancy rates could benefit from automation, unlocking economic growth stifled by inadequate labor supply.³⁹



SOURCE: Eurostat; McKinsey Global Institute

previous tasks now performed by technology. This may lead to a change in the requirements placed on them (for example, they will need to work more closely with technology), while in extreme cases workers may find themselves out of a job. For those affected, finding new positions may be challenging, and they will have to acquire new skills.

To illustrate the risk of a “labor market mismatch,” we estimate the potential impact of automation on unemployment (Exhibit 7). Here, we assume that by 2030 technologies that already exist today will have improved to such an extent that it will be cost-effective to use them to replace humans for the activities in question and introduce corresponding organizational solutions. We also assume that, by this point in time, both managers and rank-and-file staff will have gotten used to handing some tasks over to machines. In many sectors, it is also likely to take this long for appropriate legislation to come in.⁴⁰

Based on the assumption that 49–51 percent of workforce activities are automated by 2030 (the fastest adoption rate), we posit four reemployment scenarios, in each of which different percentages of

people return to the labor market within a year of their jobs being automated: 25 percent, 50 percent, 66 percent, or 100 percent. If only 50 percent of the people who lose their jobs to automation manage to find a new job within a year, the unemployment rate may rise temporarily to ten percent (see Exhibit 13). If just 25 percent manage to find a new job within a year – a pessimistic scenario – the unemployment rate may peak temporarily at almost 25 percent.

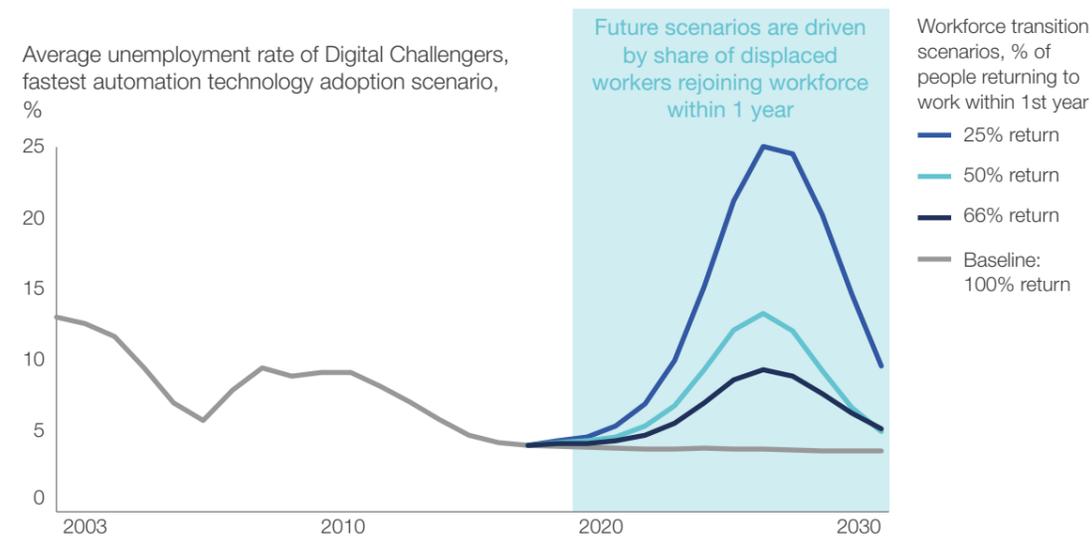
In light of the above, it is important that CEE countries ensure the rapid reskilling of their workers to prepare them for the changes ahead and to mitigate the risk of spikes in unemployment. In Chapter 3, we identify the need for effective labor reskilling as a key enabler for digitization. Furthermore, we explore a number of successful reskilling programs and initiatives, including examples from the CEE region. Additional examples appear in Chapter 5.

SHIFTS IN SOCIETY DRIVEN BY NEW TECHNOLOGY

So far, automation has not caused a spike in unemployment. However, it will be a driving force of change in the labor market. Progressive digitization

Exhibit 7.

Depending on the workforce transition scenario, CEE could experience a peak in unemployment.



SOURCE: McKinsey Global Institute analysis

of the economy will increase demand for people who understand how to work with technology and are able to innovate in the workplace.

The upward trend in the number of jobs, triggered by digitization, is already visible in the fast-growing number of ICT specialists in CEE. These are increasing at a rate of five percent per year, far outpacing the general employment growth trend of one percent. However, the share of ICT specialists in total employment in Digital Challengers is 43 percent lower than in Digital Frontrunners, indicating that there is still room for growth.⁴¹

“It is important that CEE countries ensure the rapid reskilling of their workers to prepare them for the changes ahead and to mitigate the risk of spikes in unemployment.

Technology will also help create new jobs in the future. We identify three key types of professions that may benefit:⁴²

- **Creators and suppliers of technology:** People engaged directly in developing technology and

infrastructure and introducing it into companies – engineers, programmers and so on.

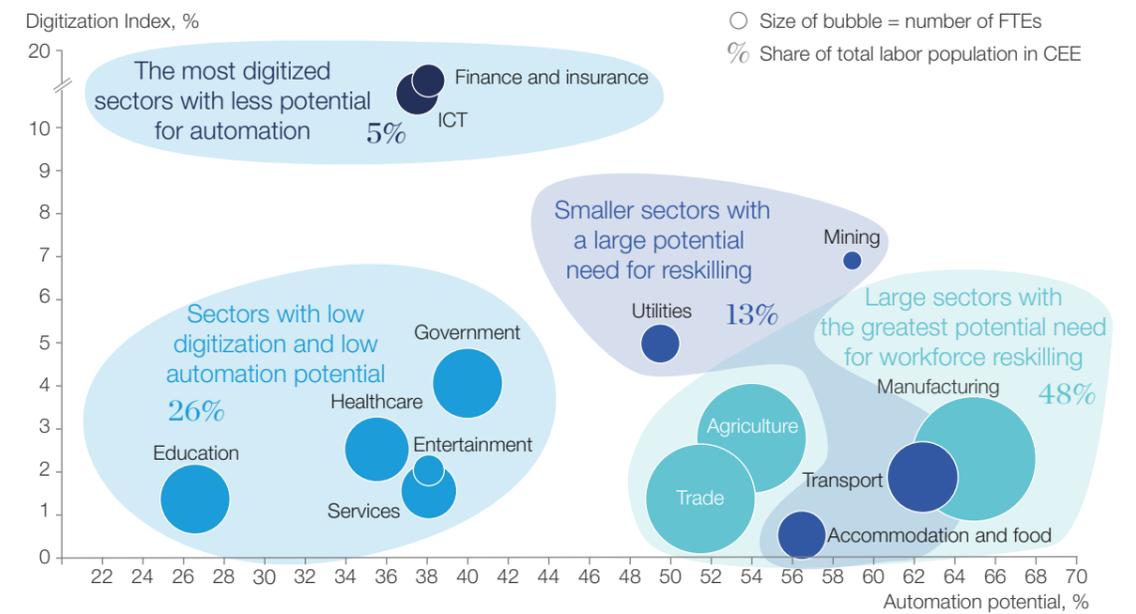
- **Users and enablers:** Participants in the ecosystem who maximize the value created by the new technology. This includes people gathering, analyzing and protecting data (potentially collected for the first time ever thanks to the new technology) and people using that data to improve organizations’ performance.
- **Other professions related to automation:** Including experts in legal matters related to automation and experts in managing the organizational changes needed to exploit the full potential of automation.

Of course, the social and emotional skills of machines are worse than those of humans, at least for the time being. Despite advances in AI, machines still have difficulty identifying social and emotional states (sensing), drawing accurate conclusions about them (reasoning) and responding with emotionally appropriate words or movements (output). Jobs strongly leveraging these “soft” capabilities, such as the caring professions, are therefore likely to grow in importance in the labor market.



Exhibit 8.

Sectors with low digitization rates and high automation potentials are likely to experience the biggest need for workforce reskilling.



SOURCE: Eurostat; McKinsey Global Institute; McKinsey analysis

Transformation of individual sectors

The need for new skills (explored in more detail in the following section) will be particularly great in sectors where the potential for automation is high and the current penetration of technology low. These industries may experience the biggest workforce mismatch in the future.

We distinguish four groups of sectors in CEE that differ in terms of their digitization needs (Exhibit 8):

- **Large sectors with the greatest potential need for workforce reskilling:** The biggest labor pools in CEE are found in manufacturing, agriculture, and trade. These sectors also display a mismatch, with low current digitization rates and high future automation potential. Given that these sectors are responsible for almost 50 percent of jobs in CEE, the stability of the region’s labor market is potentially at risk and they should constitute priority areas for reskilling efforts. Employees in these sectors will likely see their workplaces transform the

most as a result of the new technology. To stay relevant, they will have to update their skills or refocus on roles that are less susceptible to automation.

- **Smaller sectors with a large potential need for reskilling:** Utilities, mining, transportation, and accommodation display a similar mismatch in CEE, with low current digitization rates and high future automation potential. These sectors will also have to significantly update their skill base, but they are significantly smaller than the first group in terms of their share in the total CEE job market.
- **The most digitized sectors with less potential for automation:** Telecommunications and financial and insurance services were the first sectors to undergo digital transformation, and they are now the leaders in terms of technology adoption in CEE. They have already started attracting the digital talent that they need. We estimate their further automation potential to be just 36–38 percent. To retain their pole position,

these sectors need to continue updating the digital skills of their workforce.

- **Sectors with low digitization and low automation potential:** Sectors such as education, healthcare, and arts and entertainment are not facing a drastic change in the form of automation. Nevertheless, given their low starting point in terms of digitization, they should prepare to gradually adopt more technology and not underestimate the effort that will be required.

Skill shifts

Skill shifts have accompanied the introduction of new technology in the workplace since at least the Industrial Revolution. But the adoption of digital technology, automation and AI will trigger faster skill shifts than those of the past.

The McKinsey Global Institute has developed a model for these skill shifts.⁴³ In Western Europe, the strongest growth in demand will be for technological

skills, which constitute the smallest skill category today in terms of hours worked. Demand for these skills is expected to rise by around 50 percent, representing 17 percent of hours worked in 2030 (see Exhibit 9).

Demand will grow for both basic and advanced technological skills. Occupations requiring advanced technological skills include big data scientists, IT professionals, programmers, engineers, technology designers, advanced technology maintenance workers, and scientific researchers. Advanced technological skills will be critical for digitizing the economy in CEE; however, workers with these skills will still be in a minority. At the same time, all employees will have to develop at least the basic digital skills needed to use online applications and other technological tools in their day-to-day work.

Demand for social and emotional skills will also grow, representing 22 percent of hours worked in 2030. The skills in question include leadership and

managing others, entrepreneurship and initiative-taking, adaptability and continuous learning. These “soft skills” will be particularly important as they are hard to replace with technology.

“Strongest growth in demand will be for technological skills, which constitute the smallest skill category today in terms of hours worked.”

We divide cognitive skills into higher cognitive skills and basic cognitive skills. The trends for these skills differ depending on how feasible it is to automate them using technology. Demand for higher cognitive skills such as creativity, critical thinking, decision-making, and complex information-processing will grow through 2030 at cumulative double-digit rates. Other types of higher cognitive skills, such as advanced literacy and writing and quantitative and statistical skills, will not see such an increase in demand. Demand for basic cognitive skills such as literacy, numeracy, communication, and simple data

management is expected to shrink. For example, in writing and analytics, computer algorithms already produce basic news stories about sporting results and stock-market movements for many newspapers.

Finally, demand for physical and manual skills is expected to decrease the most. Nevertheless, this category will still represent the biggest share of working hours in 2030.

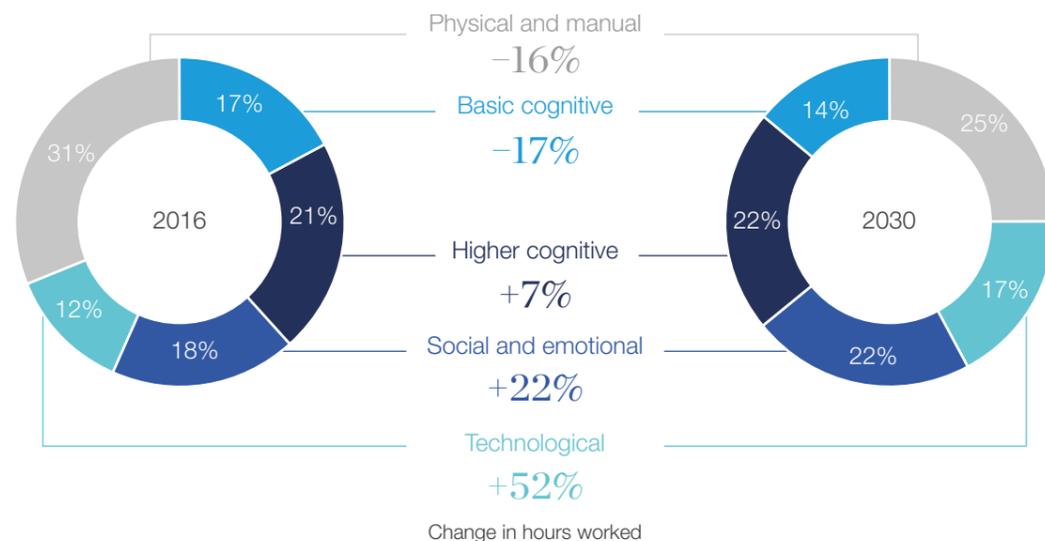
Many organizations have drawn attention to the significance of these skills shifts, including the European Commission, the World Economic Forum,⁴⁵ and UNESCO.⁴⁶ The European Commission’s “New Skills Agenda for Europe” focuses on improving the quality and relevance of training, increasing comparability of skills, enhancing information, and improving understanding of trends and patterns in demand for skills and jobs.⁴⁷

Our analysis of education systems in Digital Challenger countries indicates that the current focus is

Exhibit 9.

Demand for technological skills could grow by around 50 percent and for social and emotional skills by around 20 percent.⁴⁴

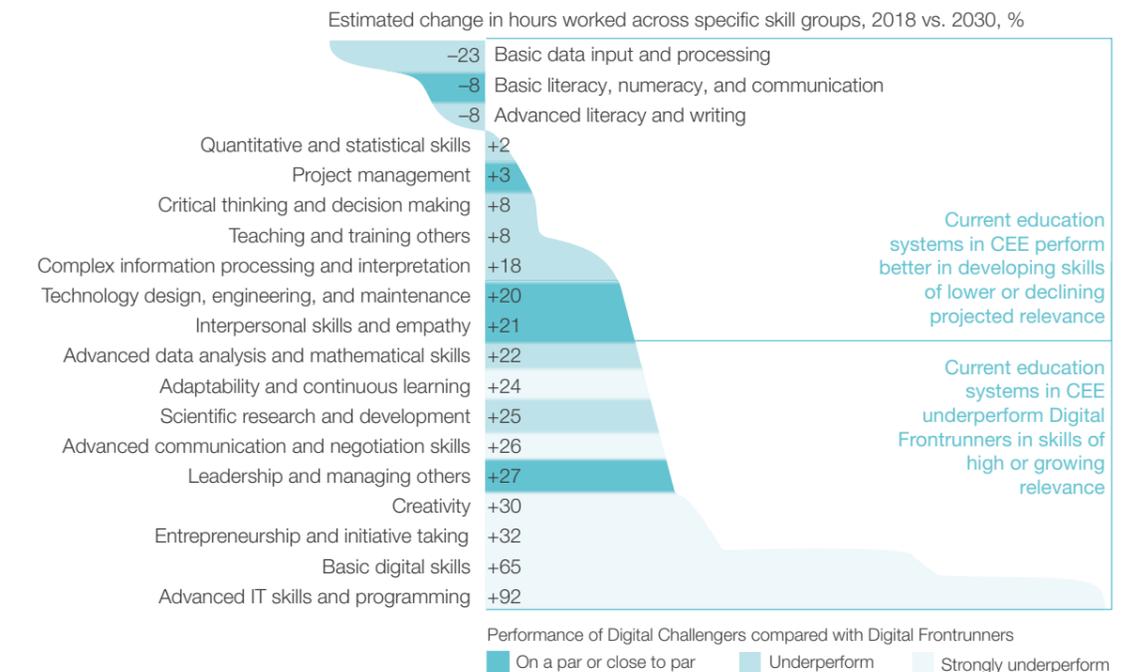
Skills used, by category, Western Europe, all sectors, 2016–2030, % of total hours worked



SOURCE: McKinsey Global Institute workforce skills model

Exhibit 10.

CEE’s education system underperforms on precisely the skills that tomorrow’s labor market will require.



NOTE: Based on Western Europe: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Netherlands, Norway, Spain, Sweden, Switzerland, UK. Assessment of current education focus is based on performance indicators associated with the given skills, Digital Challengers vs. Digital Frontrunners. Indicators include proficiency levels and enrollment rates.
SOURCE: McKinsey Global Institute; McKinsey analysis

on precisely those areas that will be less required in the future. In traditional skills areas, such as basic literacy, numeracy and communication skills, Digital Challengers are almost on a level with Digital Frontrunners (see, for example, their PISA scores⁴⁸). But the skills areas that are most likely to be in demand in the future show great room for improvement (Exhibit 10).⁴⁹ We present a number of examples of how education can be adapted in Chapter 5, including cases from CEE.

Basic digital skills, advanced IT skills and programming are the areas most likely to increase in value in the future. However, people in Digital Challenger countries, across all age groups, currently have much lower basic and advanced digital skills than in Digital Frontrunner countries. Importantly, the older the age group, the bigger the gap, especially when it comes to advanced digital skills (Exhibit 11).⁵⁰ This indicates a strong need for promoting lifelong

learning among the general population in CEE, as we explore in Chapter 3.

MAKING THE LABOR MARKET MORE DEMOCRATIC

Technology will also change the way in which individuals find and navigate work opportunities. We can already observe advances in technology making the labor market more “democratic,” that is, more accessible for all. New platforms are enabling people to find employment where this was not previously possible. For example, inadequate forms of demand and supply have been resolved by means of remote or on-demand working. The McKinsey Global Institute estimates that up to 540 million people could benefit from marketplaces for independent work and talent platforms by the year 2025. As many as 230 million could find new jobs more quickly, reducing the amount of time that they are unemployed, while 200 million who are inactive or employed part-time

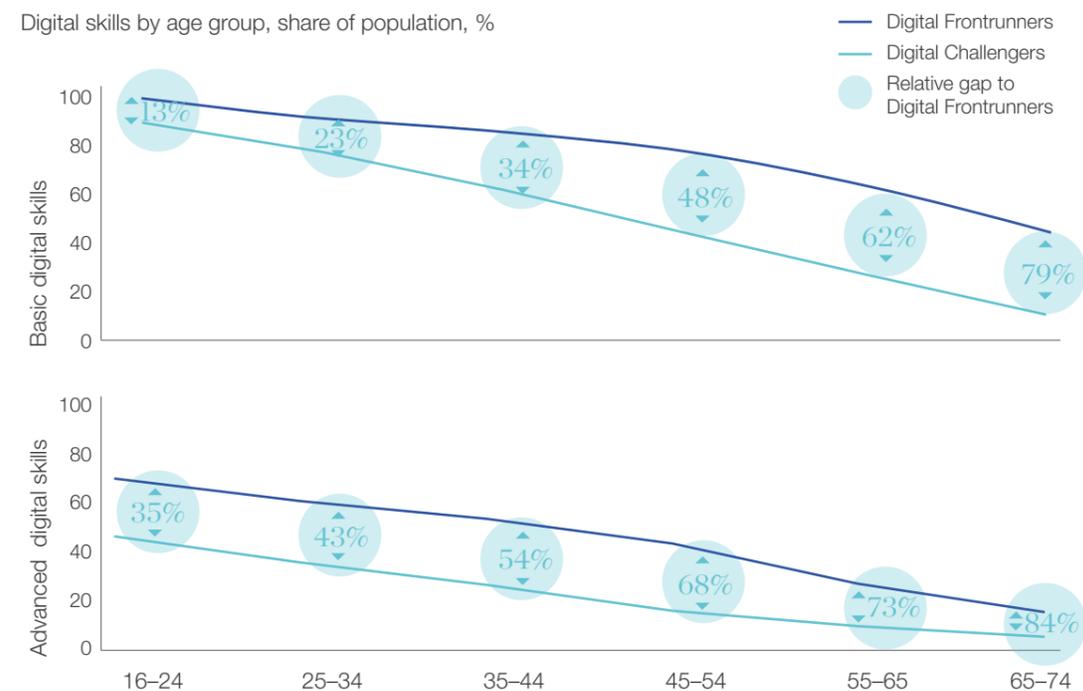
could find additional hours thanks to freelance platforms. Moreover, as many as 60 million people could find work that more closely suits their skills or preferences, while an additional 50 million could shift from informal to formal employment.⁵¹

“Our analysis of education systems in Digital Challenger countries indicates that the current focus is on precisely those areas that will be less required in the future.”

Digital Challengers are especially well positioned to benefit from platforms activating the workforce as economic activity in the region currently falls behind Northern European benchmarks. CEE, despite high job vacancy rates, still has around 8.6 million people in untapped labor reserves (Exhibit 12). In the total population of CEE there are 14 percent fewer active people than in Sweden, one of the most active labor markets. The biggest gaps are for young people (40 percent) and the elderly (43 percent). The gap for women of childbearing and middle age is 13–14 percent.

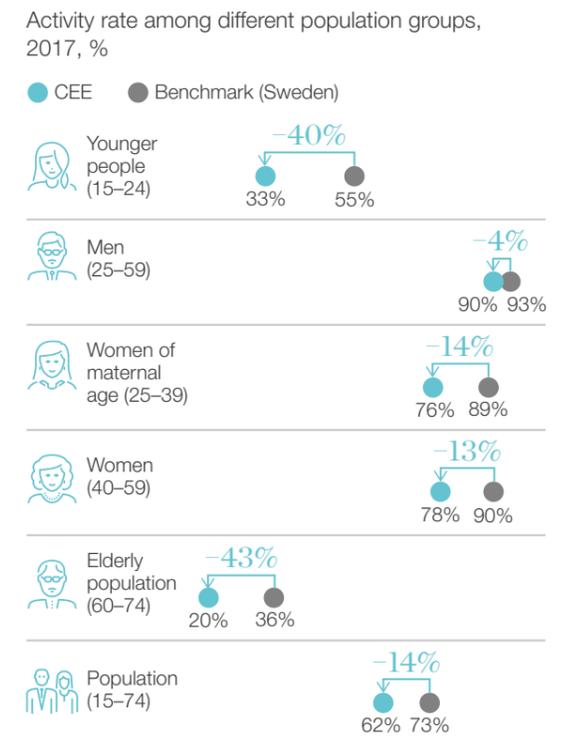
Supporting new marketplaces for independent work would be one way to increase Digital Challengers’ activity rates. Indeed, many different types of independent work platforms already exist in CEE today. They empower people to find new forms of flexible employment or remote working opportunities around the globe. People can also use them to generate primary or supplementary income by selling goods (either physically or via e-commerce) and monetizing unused assets (by listing a spare room or sharing an unused car, for instance).

Exhibit 11. People in Digital Challenger countries currently have lower basic and advanced digital skills than in Digital Frontrunner countries, across all age groups.

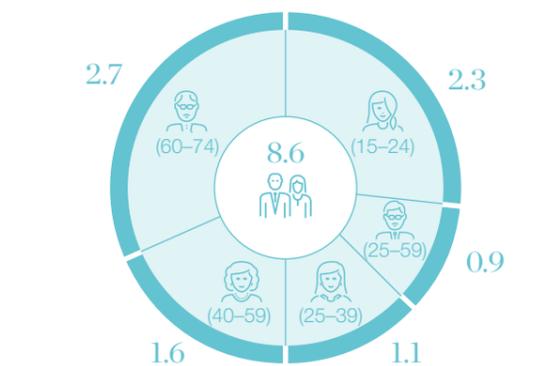


SOURCE: Eurostat; McKinsey analysis

Exhibit 12. Relative to Digital Frontrunner benchmarks, Digital Challengers still have 8.6 million people in untapped labor reserves.



CEE labor reserves compared with activity rate of Sweden, million people, 2017



NOTE: Activity rate = share of population, both employed and unemployed, that constitutes labor supply
SOURCE: Eurostat; McKinsey analysis

Key enablers of digitization

For historical reasons, it is often difficult for Digital Challengers to compete with Digital Frontrunners in the traditional economy. But when it comes to the digital economy, which has only recently begun developing around the world, the playing field is more level.

We identify five dimensions where Digital Challengers compare favorably with more digitally advanced markets, areas that can form the foundation for further digitization: competitive advantages at a macroeconomic level, including a milder “technology lock-in”; good foundations in primary and secondary education; a large, high-quality graduate pool in STEM subjects and ICT; a high-quality digital infrastructure with good coverage; and a vibrant emerging digital ecosystem.

We also identify a number of areas where Digital Challengers need to make improvements in order to realize the ambitious digitization scenario, a €200 billion opportunity. We call these “key enablers.”

KEY DIGITIZATION ENABLERS IN CEE

- 1 Increase the adoption of digital skills and take-up of internet services by CEE's general population.
- 2 Increase the adoption of digital tools by CEE's small, medium and large enterprises.
- 3 Leverage and grow CEE's ICT specialist labor pool.
- 4 Increase the provision of trainings to develop/upgrade digital skills of employees by CEE enterprises.
- 5 Develop, implement and promote e-government solutions in CEE's public sectors.
- 6 Improve & standardize CEE's ICT regulatory environment to ensure investment attractiveness and easy scalability across the region.
- 7 Foster entrepreneurship in CEE to stimulate the startup ecosystem.

The digitization of a country or region is ultimately the outcome of many processes and factors. All levels of the economy have a role to play – policy makers and institutions, large corporations and small and medium-sized enterprises (SMEs), and even individuals. In this chapter we look at key areas of importance for digital transformation and identify which of these areas should be prioritized for action by various stakeholders in Digital Challenger markets.

Our investigation covers all dimensions, from talent and innovation to infrastructure and governance. For each of these dimensions we have tested multiple hypotheses, looking at the experience of Digital Frontrunners and comparing it with the current performance of Digital Challengers. By calculating scores for KPIs in these areas and combining this data with qualitative assessments by experts, we are able to identify key dimensions for digitization where Digital Challengers already perform close to or on a par with Digital Frontrunners. These areas can be thought of as the foundation for growing the digital economy in CEE. We are also able to identify areas where improvements are necessary in order to enable further digitization in CEE – areas that we call “key enablers.”

THE FOUNDATION FOR FURTHER DIGITIZATION

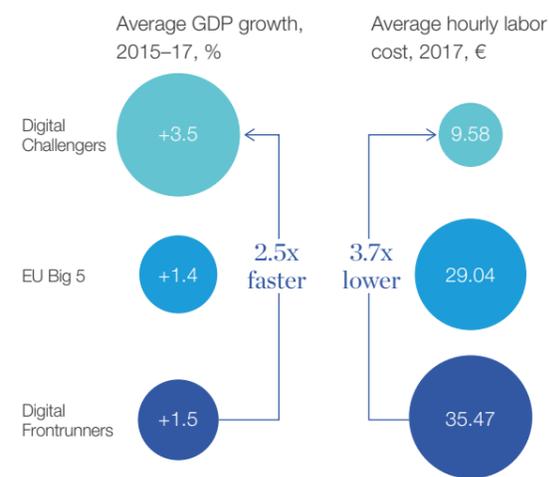
We identify five key dimensions for digitization where Digital Challengers compare favorably with more digitally advanced markets. These areas, which we examine in turn below, should form the foundation of future digitization efforts in CEE.

Competitive advantages at a macroeconomic level, including a milder legacy technology lock-in

Digital Challengers possess multiple advantages at a macroeconomic level compared to their Western and Northern European neighbors (see Exhibit 13). Since the beginning of the 1990s, CEE has been one of the fastest-growing regions in the world. The privatization of state-owned industries and implementation of effective labor reforms unleashed the inherent strengths of the local economies.⁵² After the slowdown caused by the 2008 financial crisis, the

region quickly regained momentum. With average GDP growth of 3.9 percent between 2015 and 2017, Digital Challengers developed 70 percent faster than Digital Frontrunners and more than twice as fast as the EU Big 5.⁵³

Exhibit 13.
Digital Challengers have high-growth economies, combined with still relatively low labor costs.⁵⁴



SOURCE: World Bank; Eurostat

Despite labor costs rising strongly in recent years in CEE, the region still benefits from a relatively affordable workforce. Eurostat estimates that the average cost for high-skilled workers, including bonuses and taxes, is more than 2.5 times lower in CEE than in the EU Big 5, and three times lower than in Digital Frontrunner markets.

A stable and growing economy, combined with robust domestic demand and an educated yet affordable labor force, make Digital Challengers highly attractive for knowledge-intensive foreign direct investment (FDI). This includes investments in research and development (R&D) facilities and software development centers. Through spillover effects, the inflow of technical and managerial knowhow has a positive effect on domestic companies, driving up the competitiveness of the entire market.⁵⁵ With more and more FDI globally being classified as “digitally intensive,”⁵⁶ the ability of CEE countries to attract digital investment from frontrunner markets

will be key for furthering their own digital capabilities and developing home-bred digital champions.

Digital Challengers also benefit from the fact that their “technology lock-in” – their dependence on technology that is already in place – is milder than in more advanced European economies. Many Western and Northern European companies developed their core IT systems during the 1970s and 80s. These systems worked well until the past decade. In recent years, however, the IT environment has changed significantly, with the arrival of Web communications, network computing, and plug-and-play system designs. Having joined the digitization race rather late, Digital Challengers are often less bound to such legacy systems as they do not have to depreciate large, previous-generation investments. Consequently, they can find it easier to adopt new technologies, allowing them to leapfrog intermediate technologies. The banking sector is a case in point. In CEE, financial transactions based on payment cards entirely bypassed the use of checks. Today, countries in the region boast one of the highest adoption rates for contactless payments in the world.⁵⁷ Thus, while it may be more difficult for Digital Challengers to compete in the traditional economy, they enjoy a level playing field in the digital economy.

“With more than 230,000 STEM graduates, CEE has the largest talent pool of this kind in Europe.”

Good foundations in primary and secondary education

A good education system is another factor strongly correlated with digitization. Digital Frontrunners have some of the leading school systems in the world – systems that are actively engaged in providing a backbone for the digital society. They produce a large number of high-school graduates who are proficient in English, have strong math skills and show a willingness to pursue a career in the ICT sector.

Performance in CEE varies, but according to the OECD Program for International Student Assessment

(PISA)⁵⁸ most countries are either close to or on par with Western economies in terms of developing reading, mathematics, and science literacy skills (see Exhibit 14). Furthermore, most countries in the region have been reporting constant improvement in this area.⁵⁹ The Slovenian education system provides an example of best practice in this area within CEE. In 2015, schoolchildren in Slovenia performed on average better than their Digital Frontrunner peers, PISA scores increasing by as much as ten points between 2010 and 2015 despite the fact that public spending on education per student fell by nearly one-third in the same period.⁶⁰

The area in which CEE markets have the most ground to make up is English-language proficiency. But even here, Digital Challengers already perform better than the EU Big 5 average excluding the United Kingdom.⁶¹

Yet, while the fundamentals for primary and secondary education quality are in place, it will be vital to adapt the national education systems in CEE to be in line with future trends. This will mean placing increased emphasis on technological and soft skills such as creativity and entrepreneurship. These areas are not measured under PISA, but evidence suggests that they show room for improvement in CEE.

A large graduate talent pool in STEM subjects and ICT

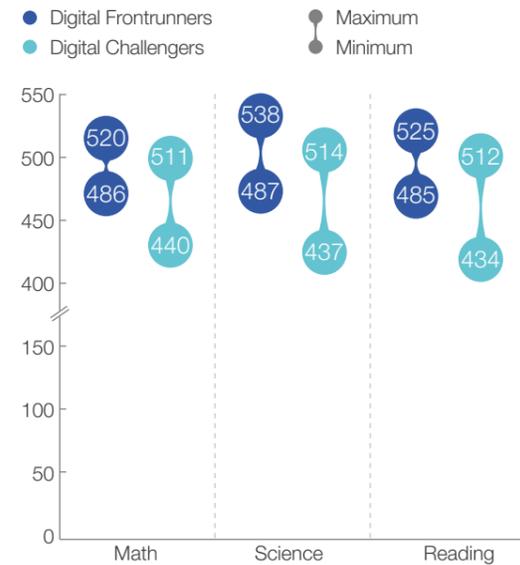
Highly skilled technical graduates are needed in order for innovation to flourish.⁶² As sectors transform and new industries emerge, demand for graduates in science, technology, engineering, and mathematics (“STEM” subjects) increases. Despite multiple economic crises, employment of graduates in STEM subjects in Europe rose by 12 percent between 2000 and 2013.⁶³ With more than 230,000 STEM graduates, CEE has the largest talent pool of this kind in Europe (see Exhibit 15).⁶⁴ Slovenia, Poland, and Lithuania lead the pack, with almost 20 STEM graduates per 1,000 citizens aged between 20 and 30.

The share of graduates in information and communication technology (ICT) is 3.7 percent in Digital

Exhibit 14.

The overall quality of primary and secondary education does not differ widely between Digital Challengers and Digital Frontrunners.

PISA (OECD), range of country scores, 2012–2015 average



NOTE: PISA – The Programme for International Student Assessment

Challenger markets. This is still below the Digital Frontrunner average, but already higher than some large Western European countries such as the United Kingdom (3.6 percent), France (3.0 percent) and Italy (1 percent).

Digital Challengers not only have a large quantity of STEM and ICT graduates; those graduates are also of a high quality. Indeed, certain CEE countries are considered to have the best programmers in the world,⁶⁵ and those programmers regularly place highly in coding competitions.⁶⁶

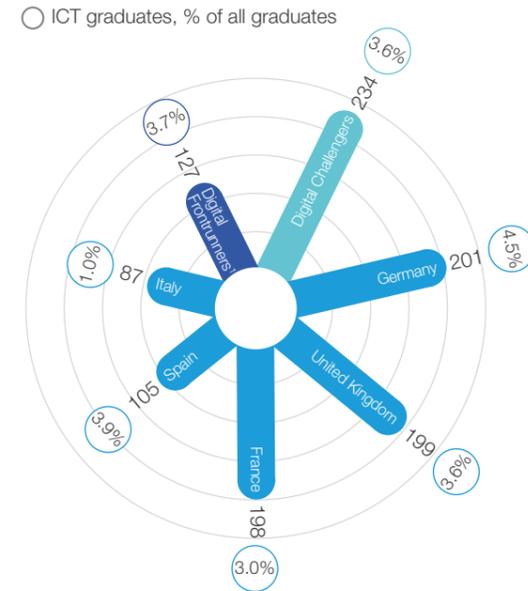
High-quality digital infrastructure with good coverage

Connectivity is one of the key drivers of global economic growth. Between the years 2005 and 2014, cross-border bandwidth grew 45 times and contributed to increasing global GDP by around 3.6 percent – more than the increase in the flow of goods and finance.⁶⁷

Exhibit 15.

Digital Challengers have a large pool of STEM graduates and a focus on ICT education that is comparable to Digital Frontrunners.

Number of STEM graduates, thousands, 2016



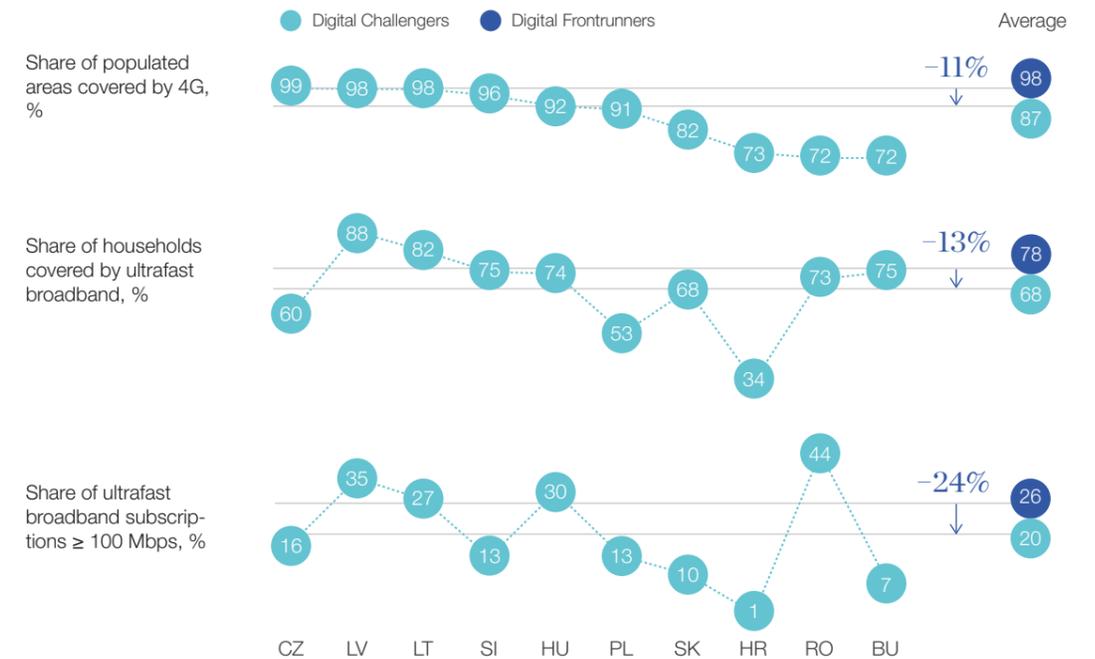
NOTE: For the Netherlands, data taken from 2015. SOURCE: Eurostat

With globalization now largely occurring online,⁶⁸ the availability of a stable, fast broadband connection is fundamental for growth of the digital economy and the digitization of society.⁶⁹ In this regard, the CEE region is well positioned: Over the past 20 years, the average CEE country managed to develop a 94 percent household coverage for fixed broadband, very close to the 98 percent benchmark for Digital Frontrunners (see Exhibit 16).

In terms of mobile broadband coverage, CEE countries are also well developed, with average coverage of 87 percent. While this falls below the average level of 98 percent coverage for Digital Frontrunners, the gap has closed somewhat in recent years, as Bulgaria, Romania, and Slovakia have made significant progress.⁷⁰ CEE can also boast some of the highest coverage rates of ultrafast (100+ Mbps) broadband in Europe, at least in certain countries. Latvia and Lithuania clearly outperform the average for Digital Frontrunners, for instance, while Romania

Exhibit 16.

Broadband coverage is similar in Digital Challengers and Digital Frontrunners – some Digital Challengers have coverage rates for ultrafast broadband that rank among the highest in Europe.



SOURCE: DESI 2018

has the highest share of ultrafast broadband subscriptions – approximately 1.7 times the average for Digital Frontrunners.

This impressive performance is the result of multiple initiatives taking place across the CEE region, which can serve as examples of good practice when developing network infrastructure. Projects include Hungary’s “Superfast Internet Program” (SZIP), implementing the network infrastructure required for minimum 30 Mbps broadband speed in less developed regions, and Poland’s “Operational Program,” bringing broadband to approximately 400,000 homes and 2,500 schools in largely rural, underserved regions of the country.

Finally, the enviable digital infrastructure in CEE is matched by affordable broadband prices. In most Digital Challenger markets, the amount spent on broadband represents a smaller share of household earnings than in Digital Frontrunner markets.⁷¹

A vibrant emerging digital ecosystem

Although Digital Challengers lag behind Digital Frontrunners in terms of the size of their digital economy, that digital economy has grown more than twice as fast as the non-digital economy in the last few years. The first digital “unicorns” have emerged in CEE and many companies leveraging the digital economy have become household names – not just in CEE but globally. Large incumbents in traditional industries have also begun following suit, digitizing their operations and consumer offerings.

New digital industries have begun taking shape. The “app economy,” for example, is already well established, and companies from CEE are beginning to make their mark both locally and globally. In 2017 the European Parliament estimated that the app economy had created more than 1.8 million jobs in Europe (around one percent of all jobs in the region), compared to 1.7 million jobs in the United States.⁷² Just ten percent, or roughly 173,000 jobs, are in

CEE, but that figure does not do justice to the full scale of the digital ecosystem that has developed in the region. By leveraging the advantages outlined further above – good education standards, a large pool of ICT graduates, competitive labor costs – CEE has developed a number of software development powerhouses that operate on a global scale. Indeed, these firms are some of the fastest growing in Europe.⁷³ The gaming industry is particularly prominent in the region.

On page 41 we explore a number of CEE-based organizations working within the digital ecosystem. Stimulating further growth of the ecosystem will be key as the region continues on its digitization journey. It may also lead to positive ripple effects. Attractive workplaces directly connected to the digital economy can help keep local talent in the region, or even attract back specialists who have left previously – a potentially crucial avenue for combating the issue of talent leakage that has been troubling the region over the past two decades (see Chapter 4).

EXAMPLES OF DIGITAL CHAMPIONS

Many digital success stories can be found around the region – companies that have leveraged the digital economy to achieve scale and revolutionize their industries. For example, robotic process automation (RPA) software provider UiPath was valued at more than \$3 billion in 2018, achieving “unicorn” status. Polish e-commerce marketplace Allegro is the fifth most-visited marketplace in Europe. Avast, a Czech cybersecurity software company, boasts one of the highest market shares among anti-malware application vendors worldwide. Other CEE players, such as Prezi, LiveChat, Booksy, Doc Planner, Brainly, and SkinVision, to name but a few, are also making a mark in their fields.

Box 3.

SELECTED AREAS OF CEE DIGITAL ECOSYSTEM

GAMING INDUSTRY

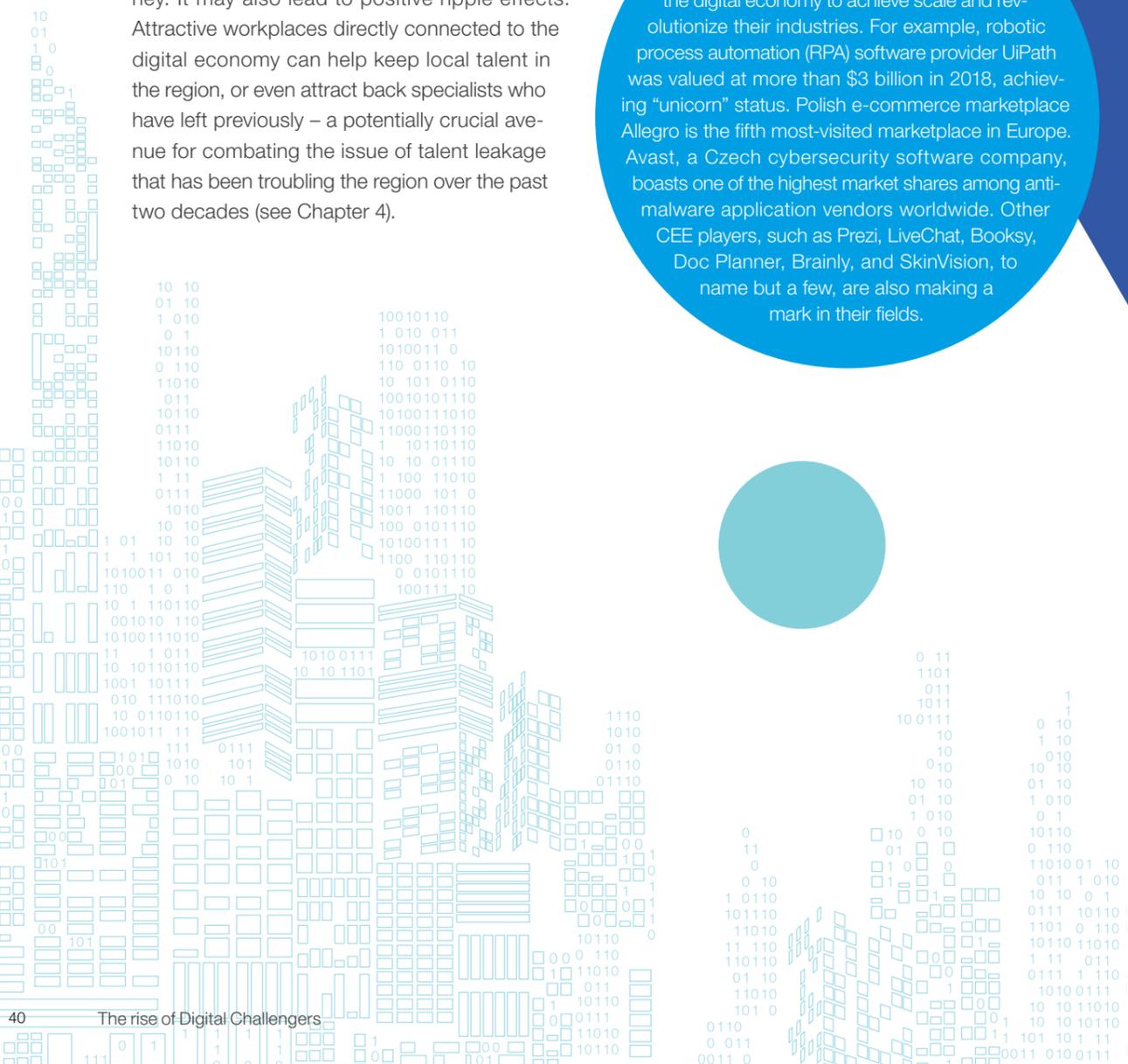
CEE boasts a dynamic gaming industry for both mobile and desktop computers. CD Project Red (Poland), Outfit7 (Slovenia) and Nanobit (Croatia) are among the fastest-growing companies in Europe, and their projects such as “The Witcher” or “Talking Tom and Friends” are widely acclaimed. CD Project Red is also listed in the index of the top-20 most valuable companies on the Warsaw Stock Exchange. Several CEE studios, such as Huuuge Games, are responsible for games that are among the region’s top mobile games by download or revenue. Moreover, some of the largest global video games producers have begun investing in office locations in CEE, leveraging the local talent base. For instance, EA, Ubisoft, Bandai Namco, and King all have offices in Romania, where the government recently announced the creation of a €94 million investment fund for tech companies.⁷⁹

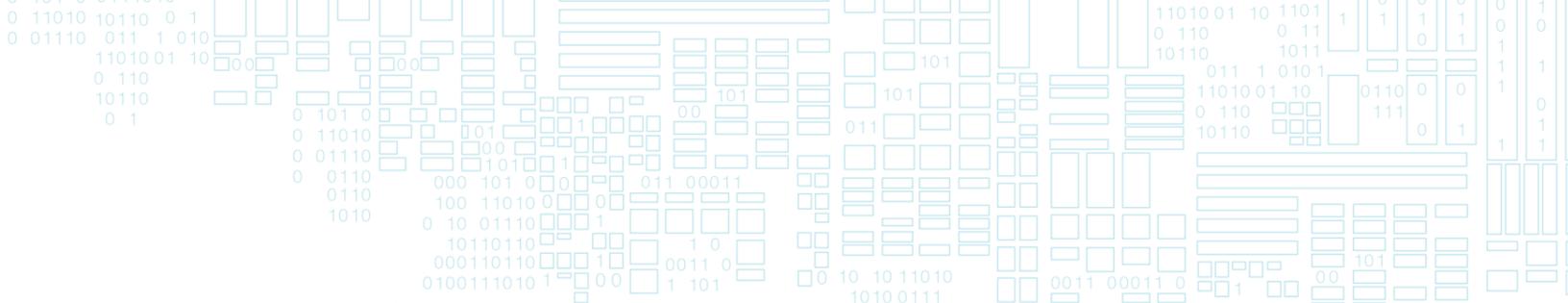
SOFTWARE DEVELOPMENT HOUSES

CEE-based software development companies are regarded as powerhouses in their fields, with many ranked among the fastest-growing companies in Europe.⁷⁸ Examples include Bulpros Consulting (Bulgaria), Infinum (Croatia), STRV (the Czech Republic), Supercharge and Attracto (Hungary), Tooploox, CodiLime, and Miquido (Poland) and Trencadis, Tremend, Accesa IT Consulting, and Qualitance (Romania).

TRADITIONAL INCUMBENTS ADOPTING DIGITAL

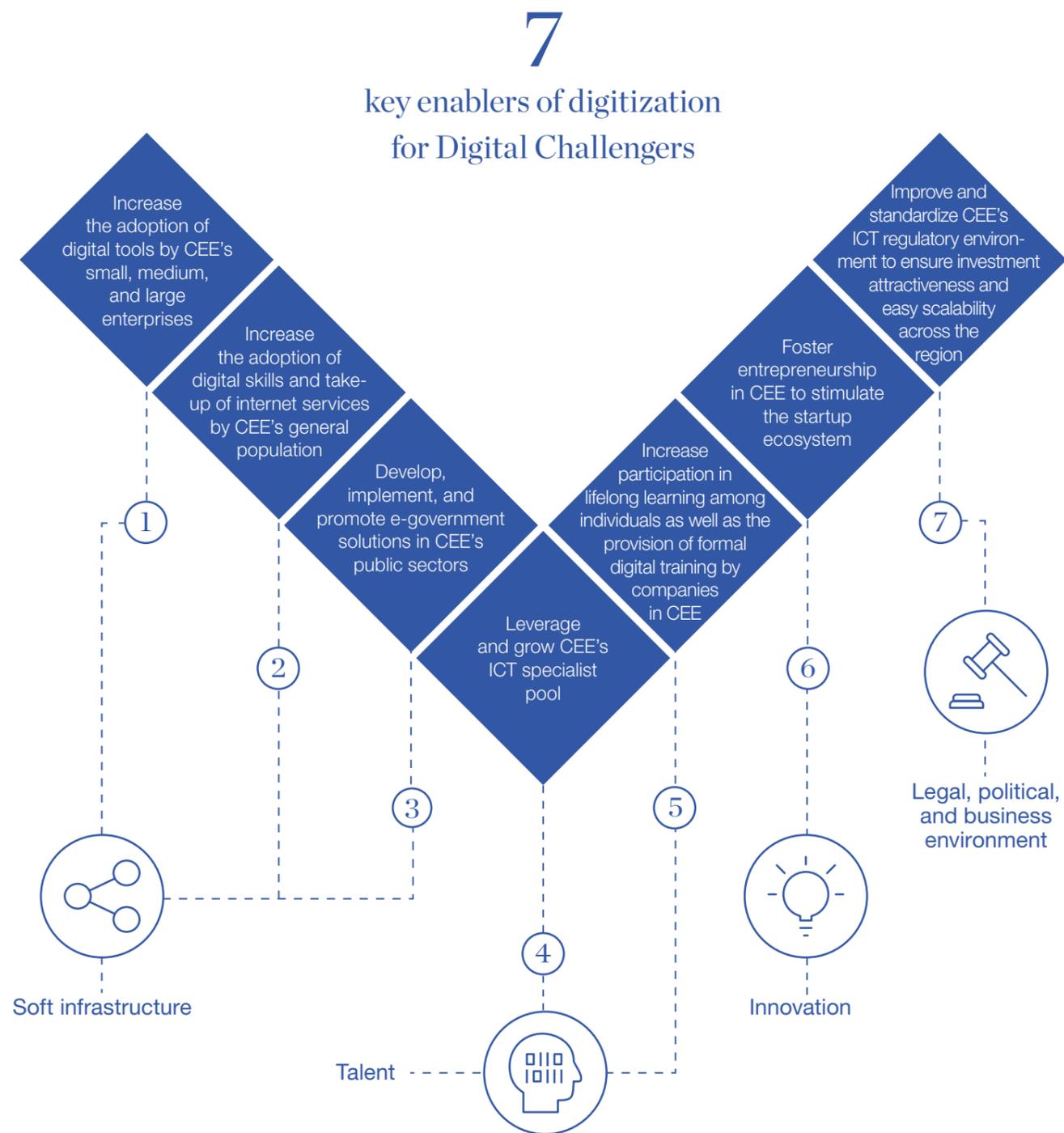
Large incumbents from more traditional industries are beginning to follow suit. The financial services sector has been at the forefront of this development. Recently, for example, Moneta Bank in the Czech Republic set a target of 40 percent of its core products to be distributed online or via various digital channels by 2020.⁸⁰ Other examples in CEE include Santander Bank, which has used the power of advanced analytics to improve the potential assessment of its corporate clients. PKP Energetyka, the electricity distributor for the Polish railway network, implemented field-force automation technology to monitor and measure the execution of maintenance tasks in real time. In Hungary, a global automotive supplier operating in CEE for more than 20 years has embarked on an Industry 4.0 transformation program driven by widespread automation, machine connectivity, and advanced analytics; in some areas the company has realized productivity improvements of 30 percent.⁸¹ And Żabka, the Polish convenience store chain, has recently unveiled a “store of tomorrow” concept, using AI and automation technology for improved customer service.⁸²





KEY ENABLERS OF DIGITIZATION

Several areas exist where Digital Challengers need to make improvements in order to fully tap the region's potential. We identify seven "key enablers" for digitization, where closing the gap to Digital Frontrunners would have a major positive impact on the digital economy of CEE.



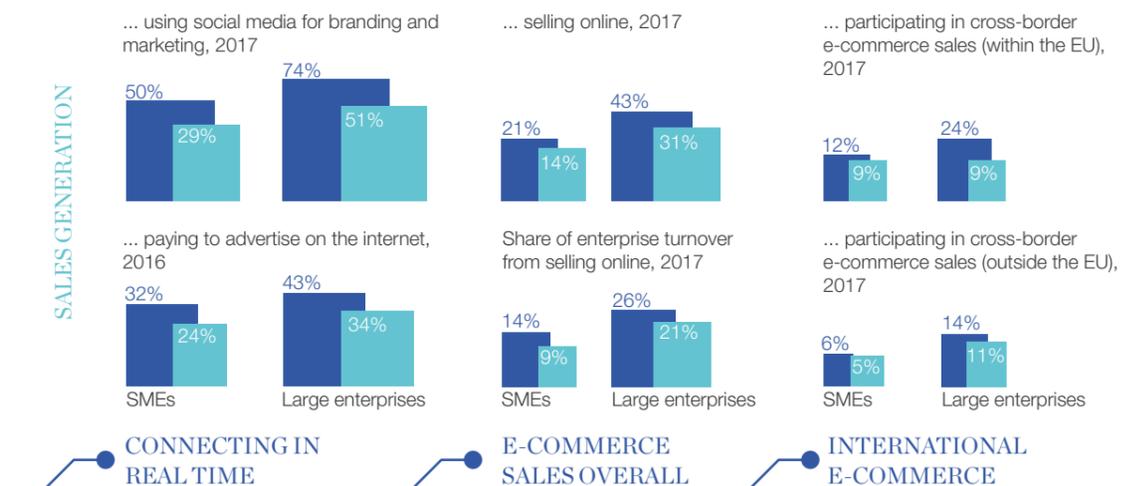
1 DIGITIZATION ENABLER

Increase the adoption of digital tools by CEE's small, medium, and large enterprises

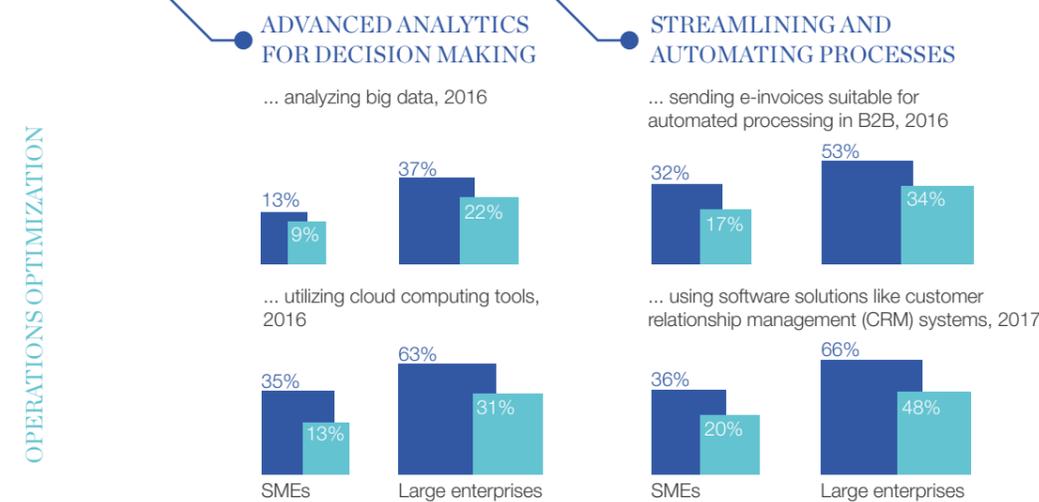
With the help of digital tools, businesses can enhance their performance through boosting their revenue growth capabilities as well as increasing their efficiency through better resource allocation. By benchmarking the CEE region against Digital Frontrunners, we look at five dimensions for companies to achieve such benefits.

REGIONAL AVERAGES, LARGE COMPANIES VS. SMALL AND MEDIUM-SIZE ENTERPRISES (SMEs)

% of companies ■ Digital Frontrunners, average ■ Digital Challengers, average



Digital-tool adoption: Proxy metrics



SOURCE: Eurostat

In terms of leveraging digital tools to connect with customers, CEE enterprises lag Digital Frontrunners. Clear gaps are visible, especially for SMEs when looking at the use of the internet for online advertising, including social media for branding and marketing. In terms of leveraging digital tools for revenue growth, enterprises of all sizes in CEE exhibit low adoption rates, with the share of enterprise selling online below the Digital Frontrunner

average. CEE enterprises are also relatively less inclined to use online channels for cross-border sales. Gaps can also be seen in proxy metrics measuring the degree to which businesses streamline and automate their processes in CEE. Finally, a significantly smaller share of both SMEs and large enterprises in CEE leverage cloud-computing technologies as well as digital solutions for analyzing big data.

DIGITIZATION ENABLER

2 Increase the adoption of digital skills and take-up of internet services by CEE's general population

We consider the widespread adoption of digital skills among the general population a key enabler for digitization in CEE. It is an area where Digital Frontrunners excel, with clear gaps for Digital Challengers to close.

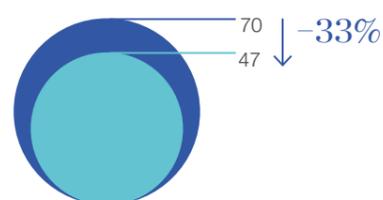
DIGITAL TOOLS AND SKILLS PERSPECTIVE

● Digital Challengers (avg.)
● Digital Frontrunners (avg.)

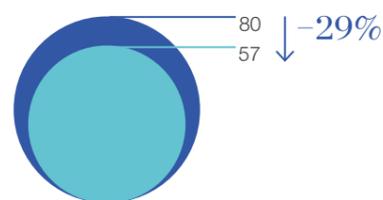
Basic digital skills

% of population aged 16–74 (2017) ...

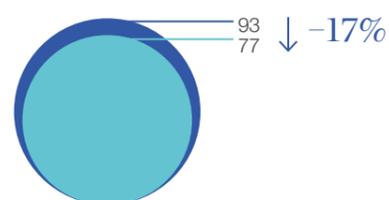
... with at least basic digital skills



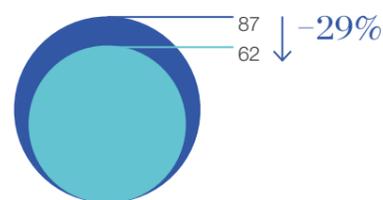
... looking online for information about goods and services



... using the Internet in the last 12 months



... sending/receiving email



Digital Challengers differ significantly from Digital Frontrunners in terms of basic digital skills, with a gap of around 33%.

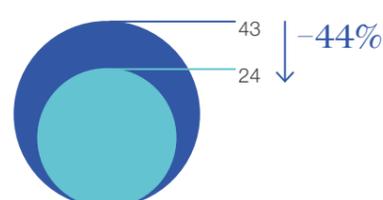
The vast majority of the population in CEE uses the internet. However, internet penetration, at 77%, is still clearly below the Digital Frontrunners benchmark.

Gaps are also visible in other proxy metrics for basic digital skills, such as using the internet as a source of information about goods and services or sending/receiving email (-29%).

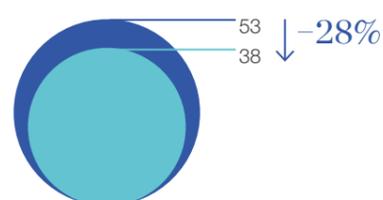
Advanced digital skills

% of population aged 16–74 (2017) ...

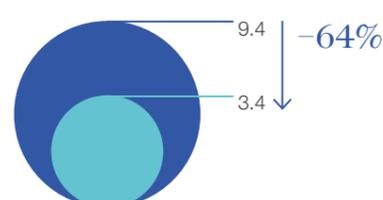
... with above basic digital skills



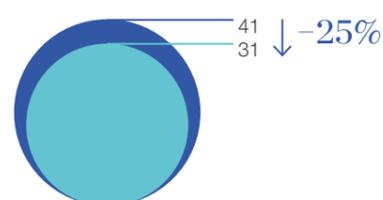
... with software skills for content manipulation



... who have written a computer program



... have uploaded self-created content to any website to be shared



Looking at advanced digital skills, the gap to Digital Frontrunners is even larger. The share of people with above-basic digital skills is almost twice as large compared to the CEE region. Looking at proxy metrics, such as the share of individuals having written a computer program or having software skills for content manipulation – all indicate that this is an area for improvement.

Eurostat; Digital Economy and Society Index, 2017

Take-up of internet services is also clearly lower in Digital Challenger markets than in Digital Frontrunners. Closing this gap in terms of demand and supply of products and services available online will be an important driver for the growth of e-commerce in the region.

TAKE-UP OF INTERNET SERVICES PERSPECTIVE

% of population aged 16–74 (2017) ...



Looking at the adoption of various internet services in CEE, the gaps are even bigger than for digital skills. For instance, the share of Digital Challengers who have used online banking is only half the share of Digital Frontrunners who have done so. Similar gaps can be seen in other proxy measures, such as the share of people having used online travel and accommodation services (-55%), participating in online social or professional networks (-25%), or using health and care services provided online (-50%).

Eurostat; Digital Economy and Society Index, 2017

Develop, implement, and promote e-government solutions in CEE's public sectors

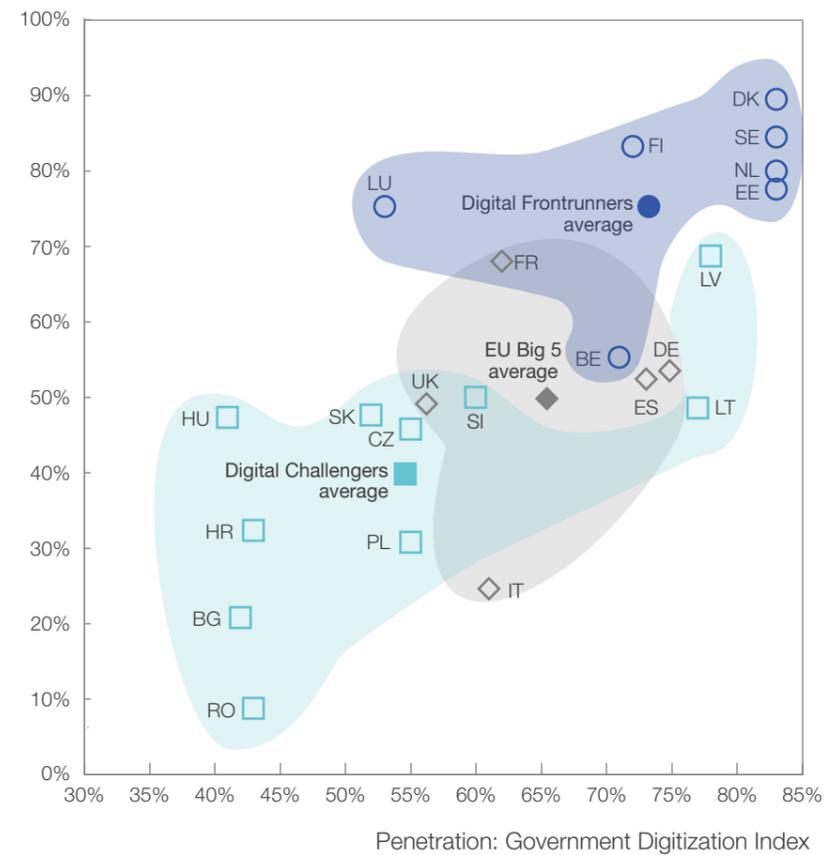
Digitizing public services has various benefits for citizens, businesses, and the government itself.

Digital government services can significantly reduce the administrative burden on citizens and firms. It also increases transparency about decisions and thus reduces the risk of corruption.

E-GOVERNMENT PENETRATION AND UPTAKE

- Digital Challengers
- Digital Frontrunners
- ◆ EU Big 5

Uptake: Individuals accessing public services online, % of individuals aged 16–74



On average, Digital Frontrunners lead the way in both penetration of digitization in the public sector and uptake of digitization by society. Close to 80% of the population in these countries access public services online.

Among Digital Challengers, Latvia is well above average in terms of both penetration and uptake, with levels on par with Digital Frontrunners.

Slovenia, the Czech Republic, and Slovakia, and Poland are in the middle of the spectrum, while Romania and Bulgaria have the furthest to go, with penetration rates below 25%.

eGovernment in Estonia

Estonia has one of the most advanced e-governments in the world. Indeed, e-government has become the country's trademark.

Impact of e-government in Estonia

99% of public services available online	96% of people file their tax returns electronically	2% of GDP – the equivalent value of savings achieved
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eDelivery Slovenia Supreme Court

The Slovenian Supreme Court has succeeded in digitizing the process of notifying participants of judicial proceedings, which has speeded up the process, saved staff from mundane tasks, and generated savings of over €4.5M per year.

TendersForAll – eProcurement tool in Croatia, Slovakia, and Slovenia

The Ministries of Economy for Slovenia and Croatia and the Ministry of Interior in Slovakia joined forces to establish TendersForAll, an automated translated eProcurement tool, enabling businesses to find relevant tendering information. It is a platform that grants access to cross-border information on recently open public procurement tenders in each nation's respective language.

e-Gov training for Italian public-sector employees

The Italian Union of Chambers of Commerce – Unioncamere – has launched an e-Gov training and certification scheme for staff at local chambers of commerce. This scheme develops employees' ability to plan, develop, and operate electronic services.

SOURCE: Eurostat; Digital Economy and Society Index, 2017

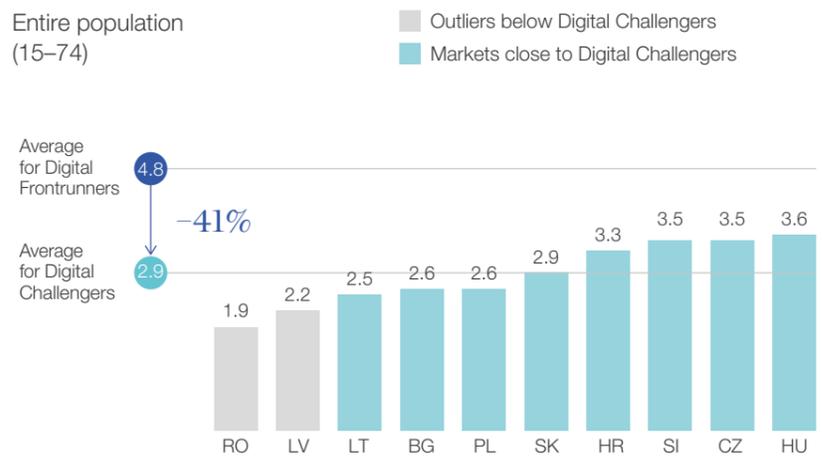
SOURCE: e-estonia.com; Ministry of Public Administration of Slovenia, McKinsey & Company

4 Leverage and grow CEE's ICT specialist pool

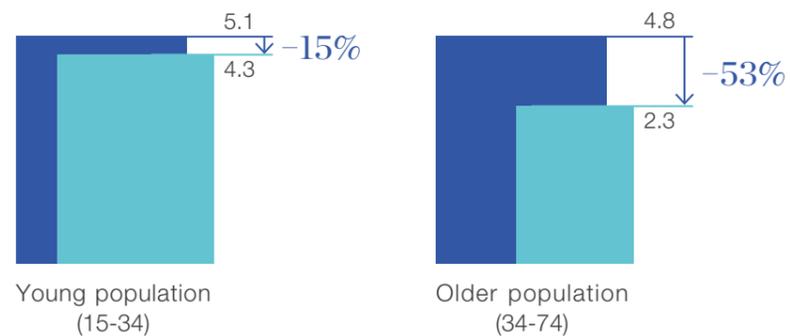
Having a large pool of information and communications technology (ICT) specialists enables the digitization of both private and public sectors. ICT specialists are the driving force behind the digitization and automation of back-end processes, developing next-generation customer experience solutions and building data-driven insights. Developers and engineers who are up-to-date with the latest technology trends also form the technological and creative backbone of startups.

SHARE OF ICT SPECIALISTS, 2016

% of employed population (avg.)



A large gap exists between Digital Challengers and Digital Frontrunners in terms of the share of the population employed in the ICT sector.



This difference is mainly driven by significant underrepresentation of ICT specialists in the older population in Digital Challenger countries.

SOURCE: Eurostat; Digital Economy and Society Index, 2017; UNESCO Institute for Statistics



IT for SHE in Poland

IT for SHE is a program launched in Poland that aims to increase the participation of women in the high-tech industry, by helping talented female students from IT faculties to enter the labor market.

In 2017, the program won the Digital Skills for Women and Girls category at the European Digital Skills Awards.



CodeCool in Hungary

CodeCool is a developer sourcing partner for large IT companies, operating in Hungary and Poland. It supports companies in need of ICT talent by offering 18 months full-time, postpaid, practice-oriented training with job guarantees for students and junior sourcing for companies.

The school, financed with angel investment, is currently running in three cities in Europe: Budapest (HUN), Miskolc (HUN), and Krakow (POL). It has currently a capacity of 500+ students per year and aims to scale up to 20 schools and 10,000 students per year.



Make IT Work in Netherlands

As in many other countries, employers in the Netherlands struggle to find employees with high-level IT skills.

At the same time, university graduates in non-IT subjects often find it difficult to pursue a career linked to their studies.

The Make IT Work program provides accelerated retraining to graduates who want to switch to an IT career. The program offers students an 11-month course to become cybersecurity experts, software engineers, software engineers for media, or business data analysts.

SOURCE: www.itforshe.pl/en; European Commission; www.codecool.cm; www.it-omscholing.nl

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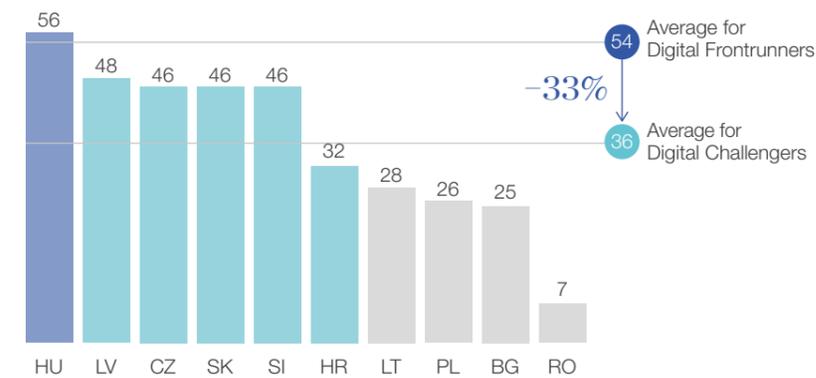
Increase participation in lifelong learning among individuals as well as the provision of formal digital training by companies in CEE

As we have explored in Chapter 2, with the progressive adoption of automation technologies, most industries will experience a growing shift in their demand for skills. Higher cognitive skills, social and emotional skills, and technology skills are the categories that will grow in importance. The labor market will have to adjust to meet this demand. In this context, reskilling efforts, including the promotion of lifelong learning and formal employee training provision by companies, will be key.

- Outliers above Digital Frontrunners average
- Markets close to Digital Challengers average
- Outliers below Digital Challengers average

ADULT PARTICIPATION RATE IN EDUCATION AND TRAINING IN THE LAST 12 MONTHS, 2016

% of 25–64 years old

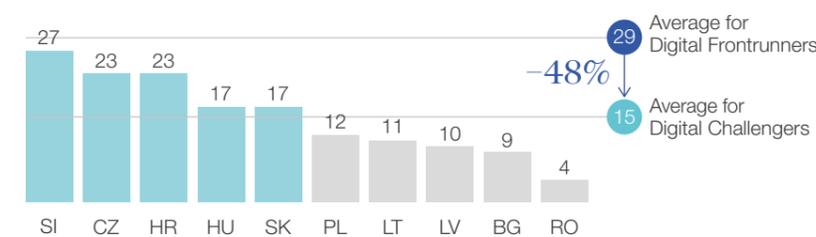


The degree to which Digital Challengers embrace training for adults is very varied.

With the exception of Hungary, all Digital Challengers have lower adult learning participation rates than Digital Frontrunners.

FIRMS PROVIDING TRAINING TO DEVELOP EMPLOYEES' ICT SKILLS, 2017

% of firms, 2017



When it comes to training in ICT skills for their employees, the gap is even bigger.

Almost twice as many firms, relatively, in Digital Frontrunner countries as in Digital Challengers provide training to employees to develop their ICT skills.



SKILLSfuture SG SkillsFuture in Singapore

In response to changes in the labor market, the government of Singapore has developed an initiative called SkillsFuture. The program aims to promote mastery and recognition of skills and foster a culture of lifelong learning.

All citizens over 25 years of age receive an opening credit of approximately €300 from the government to be spent on courses provided by recommended partners. One of the program areas targets citizens aged 40 and above.

Impact of SkillsFuture

268,000 Singaporeans took courses with SkillsFuture in 2017	18,000 Singaporeans can spend their credit on	4,600 Singaporeans participated in the SkillsFuture for Digital Workplace course in 2017
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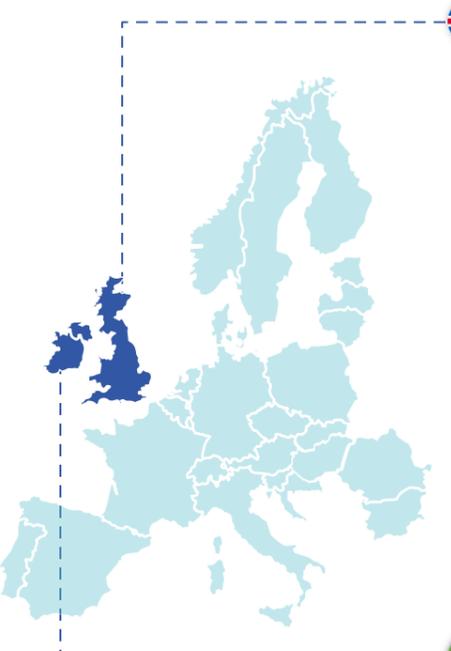
unionlearn with the TUC

Unionlearn in the United Kingdom

Unionlearn facilitates a network of “Union Learning Representatives” in firms across the United Kingdom. Union Learning Representatives are trained to identify the skills needed in their workplaces and to help their colleagues access relevant resources and training. To assess employees’ digital skills, Unionlearn also provides an online “Skillcheck” that helps identify potential gaps. Employees can then visit one of the 150 union-led learning centers and attend skills-training sessions as necessary.

Impact of Unionlearn

89,000 learners received training in skills between 2014 and 2017	£12.30 return on every £1 invested in Unionlearn training courses, thanks to increased productivity, etc.	77% of employers say that Unionlearn has had a positive effect on their workplace
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National Skills Strategy in Ireland

In 2015, the Department of Education and Skills in Ireland developed a new National Skills Strategy 2025: Ireland’s Future.

The strategy was developed in the context of significant reform in the education and training sector to ensure a more dynamic, responsive, and high-quality system that provides all learners with the knowledge and skills they need to participate fully in society and the economy.

SOURCE: www.skillsfuture.sg/;
www.unionlearn.org.uk/;
www.education.ie/en/Schools-Colleges/Services/National-Skills-Strategy

SOURCE: Eurostat; Digital Economy and Society Index, 2017

Foster entrepreneurship in CEE to stimulate the startup ecosystem

We analyze the state of the ecosystem for startups in Digital Challengers compared with Digital Frontrunners. Our focus is on five areas: the entrepreneurial talent base, the startup community, early-stage startups, growth-phase startups, and enterprises having achieved significant scale. Digital Challengers have a large entrepreneurial talent pool, but their entrepreneurial environment and capabilities could be improved and there are gaps in funding.

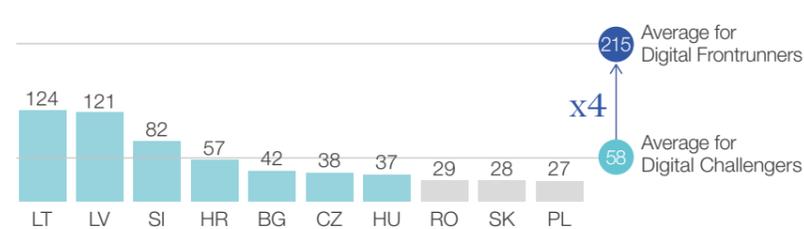
EARLY STAGE STARTUPS

- Outliers below Digital Challengers average
- Markets close to Digital Challengers average

Global Entrepreneurship Index⁷⁹

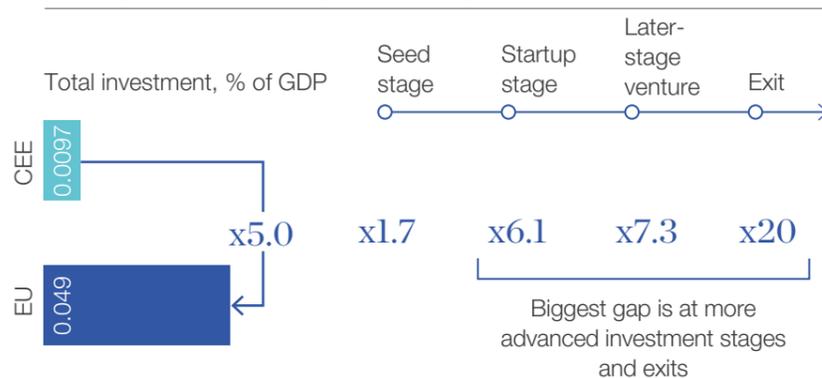


Number of startups per million citizens, 2018



STARTUPS FUNDING IN CEE VS. EU, 2017

Gap in VC investment as share of GDP, by stage (relative gaps between the CEE region to the EU average at each stage)



In 2013–2015, Digital Challengers produced nearly one million graduates in science, technology, engineering, and mathematics (STEM subjects) – double the number for Digital Frontrunners. In both regions, IT graduates make up around the same share of all graduates. Digital Challengers thus have access to a large technical talent pool.

Global Entrepreneurship Index scores in Digital Challengers are almost half those of Digital Frontrunners. This is partly driven by the lack of entrepreneurial tradition and the risk-averse cultures.

Digital Frontrunners have four times as many startups per capita as Digital Challengers. The startup ecosystem here lacks practical startup capabilities, with few successful ex-founders who could become serial entrepreneurs and fund new ventures.

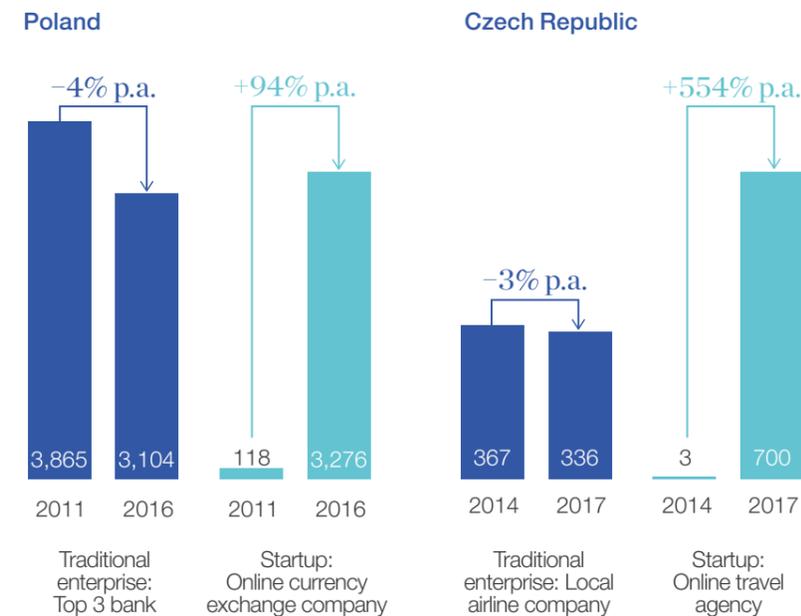
Although some early money is available, there are not enough attractive projects to fund. As a result, Digital Challengers see significantly less inflow of private capital. Average venture capital investment as a share of GDP is less than one-fifth of that for Digital Frontrunners.

SOURCE: Eurostat, Global Entrepreneurship and Development Institute, Funderbeam, Dealroom, Angel.co, Invest Europe, Pitchbook

Startups contribute to the economy in three ways: they increase innovation, they lead to the development of large-scale enterprises, and they create jobs. Innovation is a major long-term driver of economic growth. For historical reasons, Digital Challengers have fewer large-scale private enterprises than Digital Frontrunners. However, this gap is closing, thanks to digitization.

STARTUPS VS. TRADITIONAL FIRMS

Annual revenue, € million



European startups are oriented toward international markets. On average, they generate 55% of their revenue outside their domestic markets. Digitization allows startups to replicate digital assets and reach a global consumer base (see examples of two fast growing startups from CEE that have become global in scale). Although only 34 of the 1,000 fastest-growing firms in Europe are from Digital Challenger countries, 90% of them are digital natives.⁸⁰

SHARE OF YOUNG SMEs IN TOTAL EMPLOYMENT



SHARE OF YOUNG SMEs IN NEW JOB CREATION



NOTE: Young SMEs: companies with less than 250 employees and operating for no longer than 5 years

Young small and medium-size enterprises (SMEs) contribute disproportionately to job creation: Across 17 OECD countries, they account for 16 percent of overall employment but create 40 percent of new jobs. Additionally, creating one high-tech job can lead to the creation of more than four additional non-high-tech jobs in the same region.

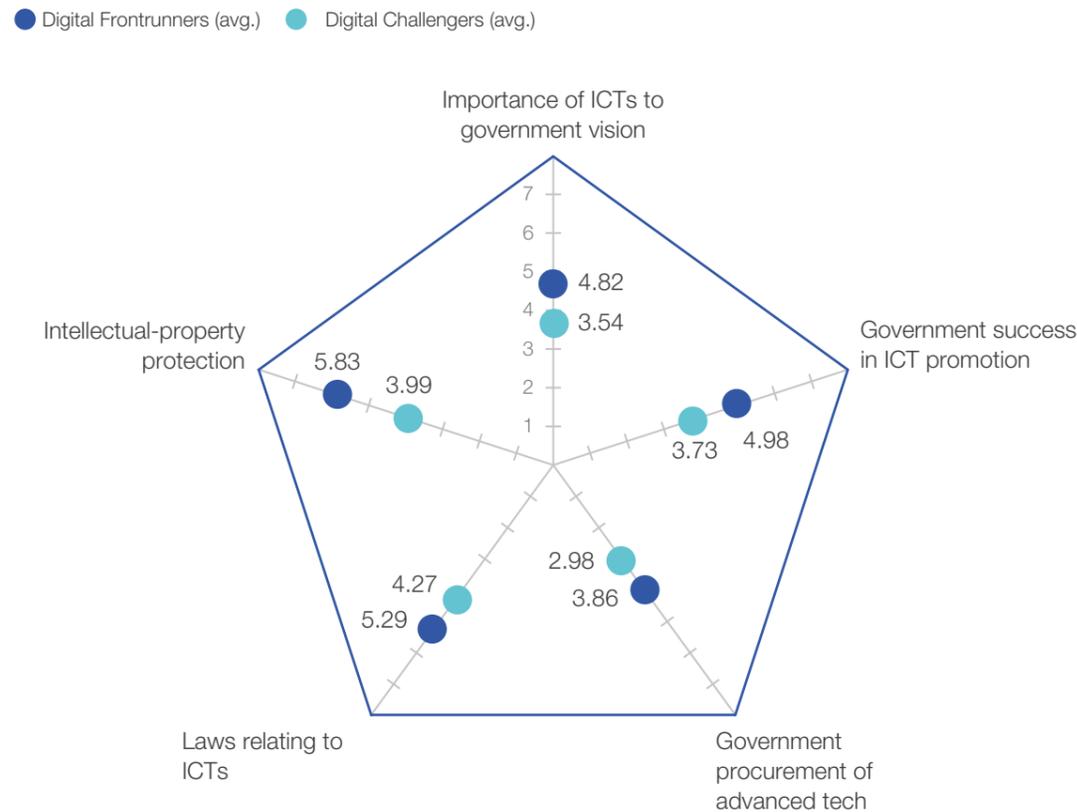
SOURCE: European Startup Monitor; European Commission; Financial Times

7 Improve and standardize CEE's ICT regulatory environment to ensure investment attractiveness and easy scalability across the region

The World Trade Organization (WTO) indicates that the digitization of trade can be expected to magnify the importance of formal and informal institutional factors for comparative advantage. The ability of countries to enforce contracts, ensure data privacy, and follow pro-ICT regulations will grow in importance. Robust protection of intellectual-property (IP) rights will be particularly important, since technology patents, a source of competitive strength, often represent a large portion of assets for technology enterprises.

WORLD ECONOMIC FORUM NETWORK READINESS INDEX

Synthetic score, 1-7 (where 1 corresponds to a very bad assessment, 7 corresponds to a very good assessment)



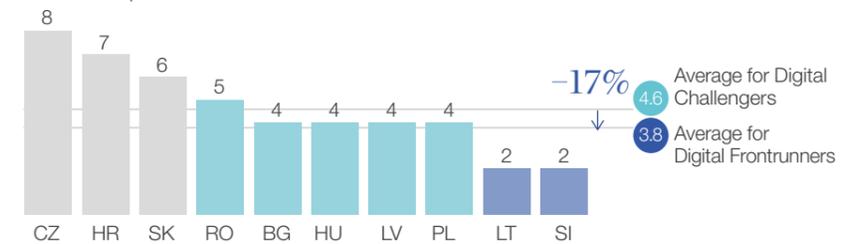
In investigating the friendliness of the regulatory regime toward ICT in CEE, we see gaps with Digital Frontrunners. On average, laws related to the use of ICTs (e.g., electronic commerce, digital signatures, consumer protection) are considered to be less well developed. In terms of a clear implementation plan for utilizing ICTs to their country's overall competitiveness (importance of ICTs to government vision), CEE also lags Digital Frontrunners. The same can be said of government purchasing decisions fostering innovation, as well as the promotion of the use of information and communication technologies. Finally, the protection of intellectual property is also deemed weaker in CEE.

SOURCE: World Bank, World Economic Forum

- Outliers better than the Digital Frontrunners average
- Markets close to Digital Challengers average
- Outliers worse than the Digital Challengers average

STARTING A BUSINESS, 2016

Number of procedures to start a business

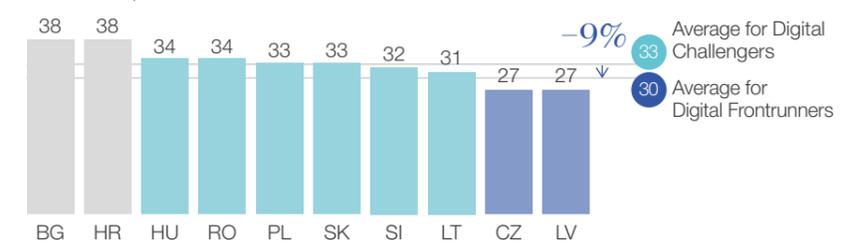


Number of days to start a business

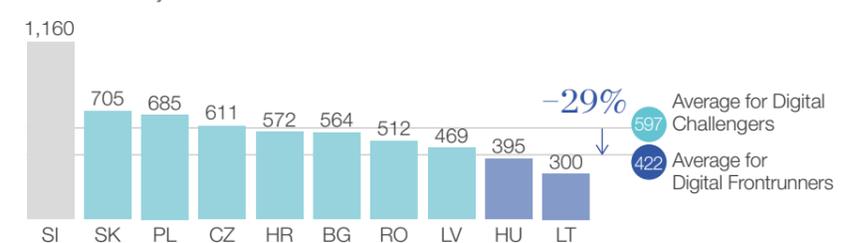


ENFORCING CONTRACTS, 2016

Number of procedures to enforce a contract



Number of days to enforce a contract



The overall attractiveness of the business environment in CEE indicates room for improvement compared with Digital Frontrunners. Looking at proxy metrics, such as the number of days and procedures needed to start a business or to enforce a contract, CEE markets underperform Digital Frontrunners.

SOURCE: World Bank, World Economic Forum

Collaboration across CEE is key

○ CEE countries need to reinvent their growth models for the future. A number of factors suggest that they could greatly benefit from cooperation in the area of digitization:

- Digital Challengers share a similar starting point in their overall economic and digital development.
- Capturing regional scale effects, not just within CEE but within the larger European digital economy, will be crucial for Digital Challengers to achieve their full digitization potential.
- Digital Challengers face common challenges such as a “brain drain” and the need to transform the skills of the workforce. These challenges may inhibit their digitization efforts if they are not addressed in a coordinated manner across the region.
- Different CEE countries have strengths in different areas of digitization, so the region would benefit from sharing best practices.

To maximize their potential in the area of the digital economy, we believe that CEE markets should work together as a group. In this chapter we examine the reasons why.

A SIMILAR STARTING POINT

As we saw in Chapter 1, despite progress in recent years, Digital Challengers still operate at a fraction of their full digital potential. However, the fact that they share a similar level of digitization suggests that they could learn from one another, for example with respect to regulatory policy and investing in digital.⁸¹

Digital Challengers share a number of other characteristics that, interestingly, are also shared by Digital Frontrunners. First, they are all relatively small economies. Thus, the average market in both groups is just 13–20 percent of the size of the average EU Big 5 market in terms of population, and 5–14 percent in terms of GDP.

Second, unlike the big Western EU economies with their large internal markets, both Digital Challengers and Digital Frontrunners rely heavily on trade and exhibit

a high degree of openness. The trade ratio to GDP in both groups is comparable (128 percent for Digital Frontrunners,⁸² 137 percent for Digital Challengers) and significantly higher than in the EU Big 5 (67 percent). This indicates that market openness is crucial for both Digital Challengers and Digital Frontrunners. Digitization can enable greater integration into international value chains, for example by creating incentives for investments in Industry 4.0, which will boost local manufacturing capabilities. It is therefore in their common interest to abolish restrictions on digital solutions that prevent these linkages from operating to their full extent.⁸³

Finally, Digital Frontrunners and Digital Challengers have fewer digital trade restrictions than the EU Big 5 (see Exhibit 17). This, combined with the already high level of market openness in the region, indicates that Digital Challengers are well positioned to boost their global competitiveness in the area of trade by increasing digitization.

CAPTURING REGIONAL SCALE EFFECTS

Given the combined size of the ten countries in CEE (representing 100 million people and the equivalent

of the 12th-largest economy globally),⁸⁴ all enterprises in the region, including small and medium-sized enterprises (SMEs) and startups, would benefit if they could scale up across the region quickly and cheaply. Online e-commerce platforms can go a long way to help companies expand beyond their domestic markets, as we explore in Chapter 5. But capturing regional scale effects by using digital channels remains an elusive goal – not just in CEE, but across the wider European region.

“Digital Challengers share a number of other characteristics that, interestingly, are also shared by Digital Frontrunners.”

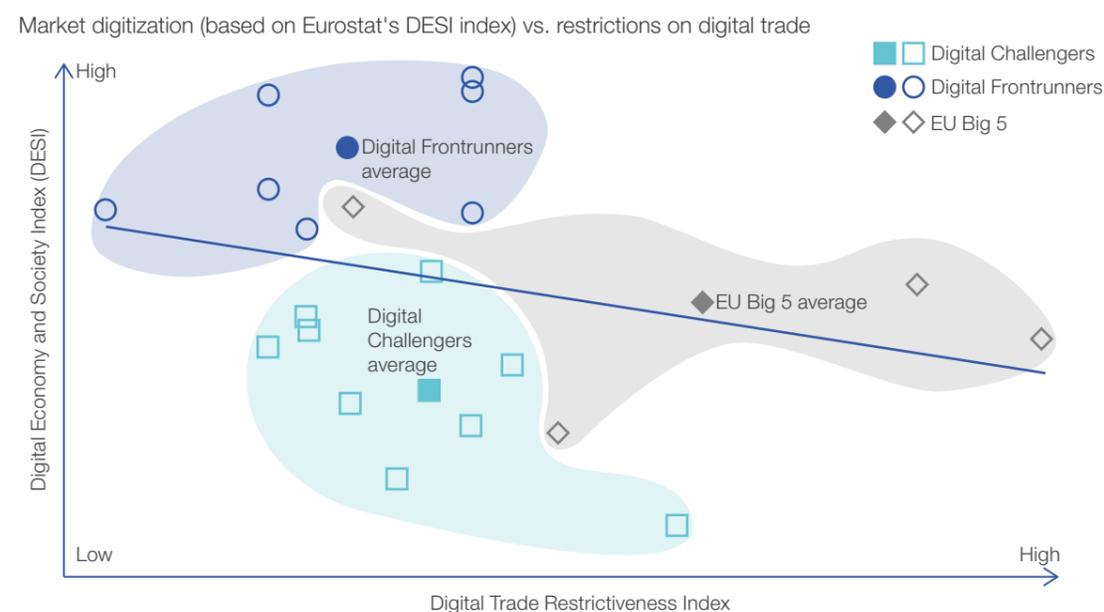
That Europe's digital economy has untapped scale effects is clear from the fact that, despite being one of the largest markets globally in terms of total online retailing, Europe is still relatively underdeveloped in terms of e-commerce spending per capita. The average European spends €310 online a year – just 30 percent of the average for US citizens.

People in Digital Frontrunner countries spend the most online in Europe, but this is still around 33 percent less than in the United States. People in Digital Challenger countries exhibit a particularly low propensity for online spending, at around 15 percent of the US level.⁸⁵

A significant factor behind these figures is the low degree of cross-border e-commerce in Europe. Less than ten percent of firms in the European Union engage in cross-border sales or purchases (Exhibit 18). On the consumer side, only one in five Europeans buy goods or services outside their home market – and one in ten, in the case of people in Digital Challenger countries.

What lies behind these low levels of cross-border e-commerce in Europe? One reason is the strong barriers that exist for consumers and businesses – barriers such as websites in foreign languages, longer delivery times, and higher delivery and return costs. All these elements tend to feed consumer insecurities. Digital solutions are available, such as online translation services, chatbots and

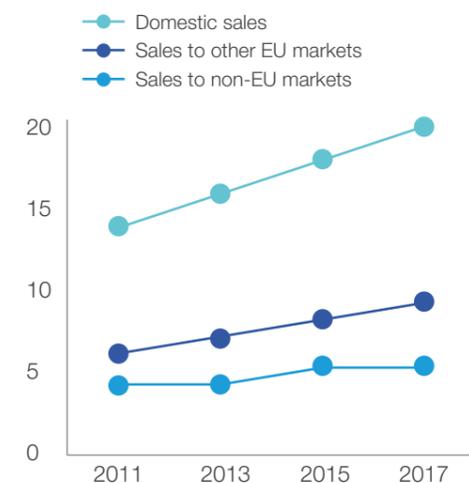
Exhibit 17. Digital Challengers, like Digital Frontrunners, are less restrictive in terms of digital trade than the EU Big 5.



SOURCE: European Centre for International Political Economy; Eurostat

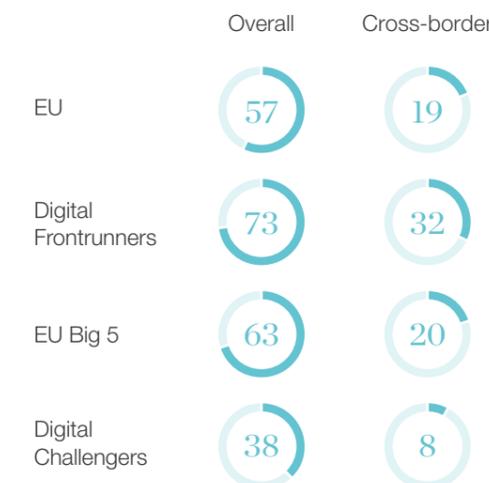
Exhibit 18. Cross-border e-commerce activity is low in Europe, particularly in Digital Challenger countries.

% of EU enterprises conducting domestic and cross-border sales online



SOURCE: Eurostat

% of population conducting e-commerce purchases by region, 2017



electronically streamlined customs procedures. But European firms still often need to navigate complex legal landscapes in different countries, resulting in higher administrative costs.

“Rather than developing solutions in isolation, Digital Challengers could replicate strategies already tested elsewhere.

In response to this challenge, European policy makers have rightly postulated the need for fewer regulatory barriers in the digital economy. According to a European Commission study, for a basket of 100 goods, consumers could save €745 (equal to 16 percent of their total expenditure) if they made their purchases in different countries around the European Union.⁸⁶ In most cases, barriers impede these transactions. The European Commission’s flagship digital policy initiative – the Digital Single Market (DSM) – aims to address this issue by ensuring that citizens and businesses are able to access online goods and services seamlessly, whatever their nationality and wherever they live.

Given CEE’s close economic integration with the European and global economies, Digital Challengers have a particular interest in unlocking these scale effects. Indeed, the similarities between Digital Challengers and Digital Frontrunners suggest that it might be advantageous for the two groups to form a common voice in support of corresponding policy measures.

COMMON CHALLENGES

Besides collaborating to ensure progress on digitization and unlock regional scale effects, Digital Challengers should work together to address other challenges impeding the digital economy’s growth. In the short term, Digital Challengers may want to explore further pro-digital regulatory reform and standardization. We saw above that CEE markets have fewer digital trade restrictions than some Western EU markets; however, room for improvement remains. Furthermore, according to the World Economic Forum’s Networked Readiness Index,

CEE is still trailing digitally more advanced economies in terms of the importance of ICT to government vision and the ICT-friendliness of regulatory regimes. The Index also indicates that intellectual property (IP) protection laws, crucial for foreign digital investment, are considered weaker in most CEE countries than elsewhere.⁸⁷ The shared interest of Digital Challengers in improved regulatory conditions for the digital economy is firmly rooted in trade and economic integration, especially where investors could have reason to worry about regulations restricting (or not protecting) the output of their investments. Moreover, regulatory standardization could play an important role in unlocking regional scale effects, enabling enterprises to scale up seamlessly across CEE markets.

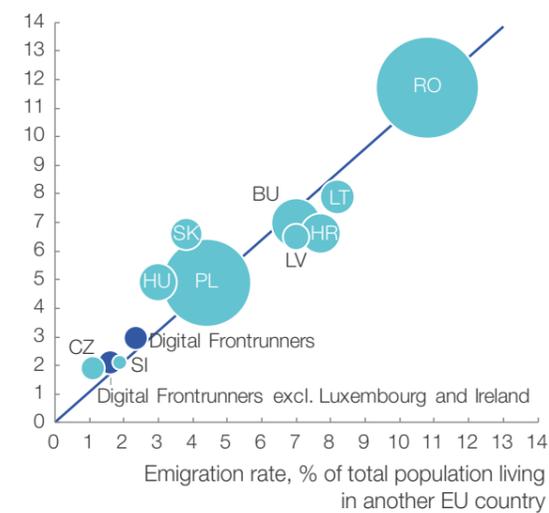
Another key issue affecting most Digital Challengers is the problem of the “brain drain,” or talent leakage, to Western Europe. If left unaddressed, this could form a major impediment to the development of the digital economy. As we saw in Chapters 2 and 3, although CEE countries have a similar proportion of STEM graduates to EU benchmarks, their labor markets suffer from high vacancy rates and low shares of ICT employment. CEE companies are experiencing more and more difficulty finding highly skilled workers. This is at least partially driven by the brain drain, which has affected most CEE markets throughout the last decade. As shown in Exhibit 19, overall emigration rates from Digital Challengers far outstrip emigration rates from Digital Frontrunners, and net emigration is increasing year on year over year. Furthermore, most Digital Challengers have higher emigration rates for the highly skilled population than for the overall population.⁸⁸

To ensure the right talent pool in the future labor market, countries would be well advised to address this issue. One country doing that effectively is China. The “Stimulating China” program is a comprehensive and particularly successful set of measures to encourage emigrants to return by introducing preferential policies for their families, providing job search support and encouraging local governments to compete for talented Chinese émigrés. Other countries employ measures such as lower

Exhibit 19:

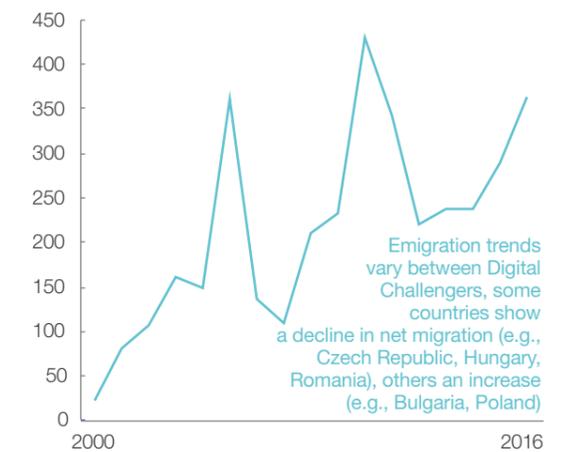
The brain drain is a problem for Digital Challengers – cooperation could benefit all countries.⁸⁹

% of population with higher education living in another EU country
Size of bubble = number of people, 2017



SOURCE: Eurostat; OECD

Annual net emigration from Digital Challengers, thousands of people¹



Emigration trends vary between Digital Challengers, some countries show a decline in net migration (e.g., Czech Republic, Hungary, Romania), others an increase (e.g., Bulgaria, Poland)

income tax rates and subsidized housing. In Chapter 5, we explore, with a number of case studies, some options for cooperation in this space among Digital Challengers.

A related problem is the need for the labor force to transition to new jobs. In the long run, all Digital Challengers will have to face this issue. As with the brain drain, there could be scope for cooperation between markets here. For instance, pooling resources to establish common job platforms could create network effects across the region in the form of improved worker-job matching. As we saw in Chapter 2, the magnitude and speed of labor-market transitions are likely to differ between Digital Challenger markets due to their varied sectoral composition, so the different countries could support one another by lessening the associated shocks. We explore this topic further in Chapter 5.

SHARING BEST PRACTICES

No single Digital Challenger stands out across all enablers of digitization (see Chapter 3). Most have advantages in specific fields, however, so it would

make sense for Digital Challengers to share best practices within the group. Leveraging the strengths of neighboring countries could limit the risk of harmful competition and help create centers of excellence. It would also encourage regional coordination and planning: Rather than developing solutions in isolation, Digital Challengers could replicate strategies already tested elsewhere. For instance, Slovenia and the Czech Republic are at the forefront of the adoption of digital tools among enterprises, while Lithuania and Latvia boast the highest number of startups per capita and have wide experience digitizing utilities.⁹⁰ Hungary, for its part, leads the way in terms of the share of workers with ICT skills in the labor market and the prevalence of adult training.

There is also a case to be made for collaboration between regions or cities. Given the high levels of digital inequality within Digital Challengers, the best-performing clusters, such as large metropolitan areas, could connect to exchange best practices. The same would be possible for regions on the other end of the scale, sharing experiences as they introduce measures promoting digitization.

Implications for policy makers, business leaders, and individuals

To capture the benefits of digitization, policy makers, business leaders, and individuals need to work together.

○ **Policy makers could do the following:**

- Build skill sets for the future, including updating youth education, promoting lifelong learning and counteracting the brain drain.
 - Support technology adoption by the public sector.
 - Support technology adoption by the private sector.
 - Strengthen regional cross-border digital collaboration.
 - Improve the ecosystem for startups.
- **Business leaders could do the following:**
- Adapt business models to meet the demands of the digital economy.
 - Leverage digital tools for revenue growth, including boosting export capabilities, as well as for optimizing the bottom line.
 - Prepare talent strategies for the future, including updating the approach to recruiting and actively driving “reskilling” and “upskilling.”
 - Leverage contractors and freelancers to fill talent gaps using digital platforms.
 - Embrace a pro-digital organizational culture.

○ **Individuals can prepare for the advent of the digital economy by investing in lifelong learning to improve their skill sets and take advantage of digital tools in all aspects of their lives.**

If CEE is to fully leverage its digital potential, policy makers, business leaders and individuals alike all could have a role to play in speeding up the digitization process and ensuring that it progresses smoothly. We look at the options for action by each of these stakeholder groups below.

IMPLICATIONS FOR POLICY MAKERS

Build skill sets for the future and capture the benefits of independent work platforms

We believe that one of the most important things for governments going forward will be to help prepare the labor market for challenges related to automation. This is driven by the risks stemming

from transitioning the labor force to new jobs and the need to improve workers' skills, as we saw in Chapter 2.

One solution to the challenges would be to create national reskilling programs. Such programs already exist in some countries, such as Singapore (see Chapter 3). Many governments in Europe have also developed national skill strategies in the context of the growing influence of the digital economy (see pages 66–67).⁹¹ In CEE, examples include Slovenia's "National Skills Strategy", developed in partnership with the OECD, and the Czech "Digital Education Strategy." The latter focuses on identifying steps for introducing new teaching methods

and techniques using digital technology, improving students' skills working with information and digital technology, and developing computational thinking among students.⁹²

“Policy makers could identify labor needs better by working with the private sector, for example by deploying targeted analytics and “digital matching” platforms.

Programs such as these must consider many different issues. The best programs diagnose the country's current position (the role of the education system in the skills and talent development process, the makeup of the labor market, domestic trends, global shifts), identify roles for education and training providers, employers, public bodies and individuals, and define priority actions for these players. It is also advisable to outline how the implementation will be monitored and assessed.

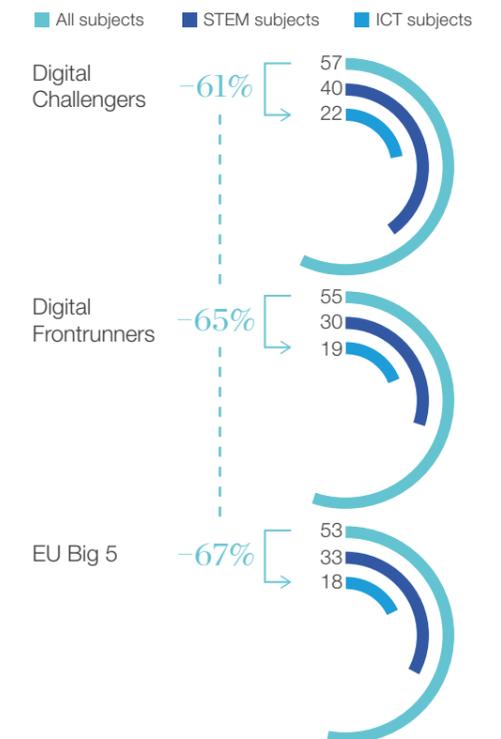
With technological advances rapidly affecting the way we work, education systems would have to be adjusted if they are to effectively prepare the next generation for the challenges of tomorrow's labor market. Ensuring standard digital infrastructure across educational institutions would be key, as would supporting teachers in this transformation process. Teachers can integrate digital tools into their teaching through online courses, virtual reality and gamification, for example. Using hybrid person-led but technology-intensive education models has been proven to improve pupil performance compared to traditional methods.⁹³

As we saw in Chapter 2, pre-university curricula may need to be adapted for the future, increasing their focus on those skills that will grow in importance in the labor market. Technical skills such as programming will be important, as will “social entrepreneurship” and communication skills. Schools could be encouraged to try incorporating new teaching methods and technology into the curriculum on a trial-and-error basis. On pages 66–67 we look at a number of examples of innovative programs in this area.

In higher education even more could be done to promote STEM subjects, especially given the relatively low share of ICT professionals in the labor market (see Chapter 3). Closing the gender gap may also be an area of focus. Overall, female students outnumber male students across Europe, but not in STEM subjects. The gender gap is even more pronounced for ICT (Exhibit 20). Closing this gap would be a big step towards strengthening the pool of ICT specialists in the labor market.

Exhibit 20.
The gender gap in STEM subjects is substantial for Digital Challengers, but lower than for Digital Frontrunners.⁹⁴

Share of female graduates by region and degree, 2016, % of total graduates

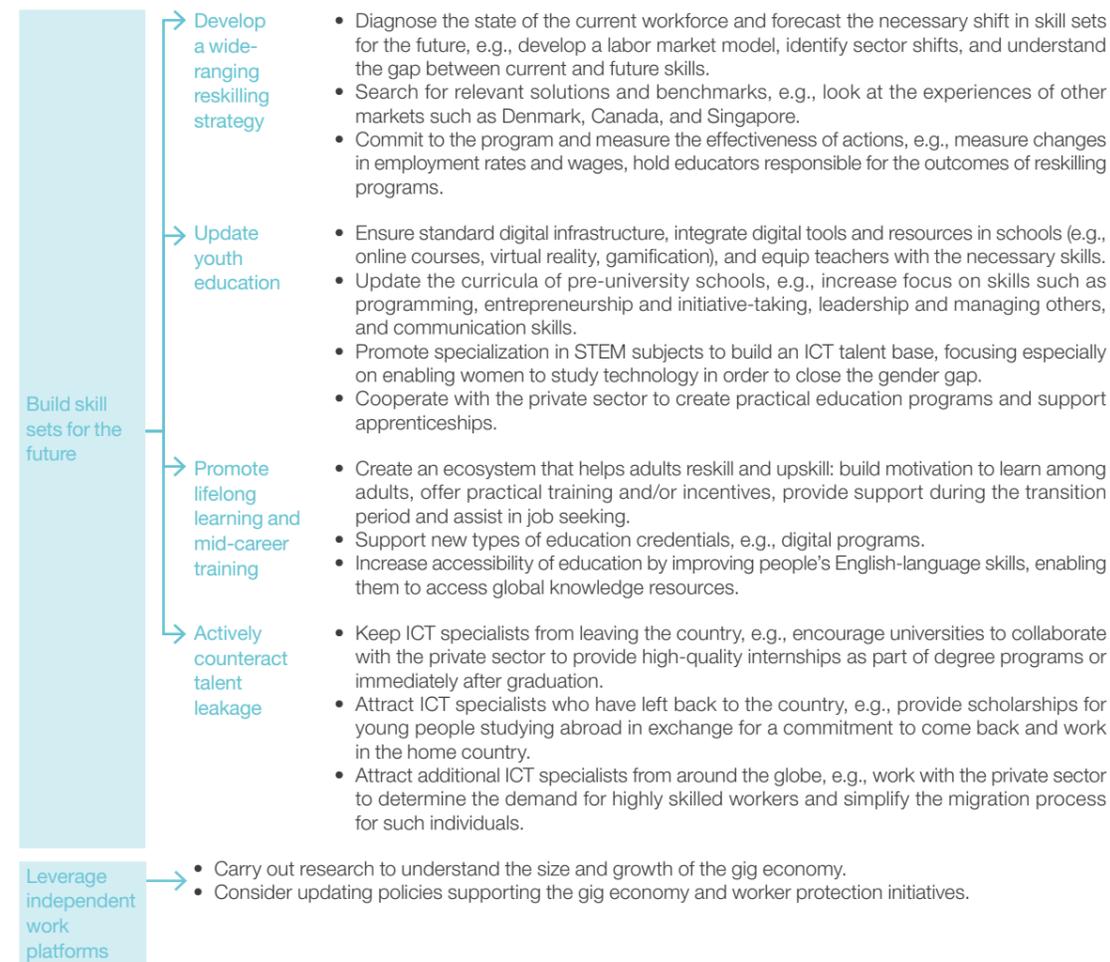


SOURCE: Eurostat; McKinsey analysis

Having said that, it is worth noting that Digital Challengers actually perform better than Digital Frontrunners on gender. Countries such as Poland have made significant strides in this area with

Box 4.

Options for policy makers: Build skill set for the future (potential actions).



Build skill sets for the future: Selected case studies

DEVELOP A WIDE-RANGING RESKILLING STRATEGY



Germany
"Re-imagining
work white-paper,
Work 4.0"



National
skills strategy
Slovenia – devel-
oped in partnership
with the OECD



Czech Republic
Digital Education
Strategy 2020



United Kingdom
Digital skills and
inclusion strategy

PROMOTE LIFELONG LEARNING AND MID-CAREER TRAINING



Slovakia
Aj Ty v IT

Aj Ty v IT's aim is to educate more girls in ICT and to acquaint them with the career possibilities for women in the ICT sector. The portal informs girls, their parents, and the public about the importance and positive impact of having women in IT. Girls can also find information and sign up for events and workshops that are happening in their region.



Bulgaria
Rails Girls Sofia

As part of the eSkills for Jobs Bulgaria pilot, all labor offices throughout Bulgaria provide information about all current training sessions and courses in the field of information and communication technologies, conducted by the leading companies in the sector.



Romania
Opening
Opportunities
mentor program

Opening Opportunities is a mentor program, in which IT experts mentor teams of high school pupils in computer science, product development, and team work in less-developed regions in Romania. The project includes training for mentors as well as students and showcasing technology in public spaces such as libraries. At the end of the mentoring period, seven teams are selected by a jury and the finalists pitch their computer science projects in Bucharest.



Romania
Just Learn IT

The northern branch of Medidia municipal library and the nongovernmental organization BiblioVoluntarii run several programs to increase the digital literacy of people with disadvantaged backgrounds in the region. This included projects for job seekers to reintegrate into the labor market by acquiring new skills and abilities; juniors learning basic computer skills; and youth, adults, seniors, and female oncology patients learning to access the internet, use modern devices, and make electronic transactions.



Norway
Skills Norway –
Digidel program

Skills Norway is a national agency focusing on (among other things) improving basic skills in the adult population in the areas of literacy, numeracy, oral communication, and the use of ICT. As part of its Digidel 2017 program, it supported groups that do not use ICT as part of their everyday life and helped them acquire the skills needed to master these technologies. The main target groups are people older than 65 and immigrants from non-Western countries.



Czech Republic
Czechitas – Digital
Academy

The Digital Academy is a project that educates and inspires women and girls to pursue opportunities in tech and computing fields such as programming, web development, graphic design, digital marketing, and data analytics and IT security. It is a requalification course and a mentoring program for future data analysts (20% of them mothers after maternity leave, 20% fresh university graduates) with no requirements on previous experience/knowledge. The goal is to find jobs for the participants in cooperation with local companies.

SOURCE: European Commission – Digital Single Market model projects (see more at <https://ec.europa.eu/digital-single-market/en/projects/>); McKinsey research

ACTIVELY COUNTERACT BRAIN DRAIN



Canada
Simplified migration
process

The Canadian government has linked up with the private sector to both determine the demand for highly skilled workers and, at the same time, radically simplify the migration processes for incomers. Work permits can be granted in just two weeks.



Hungary
Lendulet funding
scheme

The Hungarian Academy of Sciences launched the Lendület funding scheme for 2018–2023, aiming to attract internationally acclaimed scientists and highly talented young researchers by either hiring them from abroad or keeping them in Hungary.



Kazakhstan
Bolashak
Scholarship

Kazakhstan's Bolashak Scholarship has already helped more than 13,000 Kazakhstani students graduate from universities abroad, mainly (more than 86%) institutions in the United States, Canada, the United Kingdom and Ireland, and Continental Europe. In exchange, the students commit to returning to the Kazakhstani labor market to work in their degree field for a period of five years – in the process, spreading the knowhow they have gained abroad.

UPDATE YOUTH EDUCATION FOR THE FUTURE



International
MOOCs – Udacity
Nanodegrees

Udacity offers massive online open courses (MOOCs), including its "Nanodegree" program, designed to teach programming skills (with a certification scheme) needed to qualify for an entry-level IT position.



Poland
"Zwolnieni z Teorii"
competition

As part of the "Released from Theory" competition, high-school participants engage in social project work meant to teach them practical skills for the workplace, such as teamwork and effective communication.



Hungary
Skool

A flagship project of the Technology in Education Foundation, "Skool," provides free technology training for 10- to 16-year-old girls, focusing on topics such as robotics, development of mobile applications, computer graphics and animation, and web design.



Spain
Augmented Class

Augmented Class! – Augmented Reality in Education universalizes access to augmented-reality technology, allowing teachers and pupils to leverage this fun medium in presentations and projects. This allows them to exercise their imaginations and build their own augmented-reality content.



Ireland
Digital Schools of
Distinction

The Irish Digital Schools of Distinction program is an award and benchmarking system for Irish primary schools, coordinated by Dublin West Education Centre. The DSoD scheme was formally launched by the Minister for Education and Skills in September 2013, and by 2017 approximately 60% of Irish primary schools have registered for inclusion in the scheme. The scheme offers (among others):

- A clear and structured road map by which to assess progress in integrating the use of digital tools in schools;
- A national benchmarking system to enable the government to assess and monitor the progress of schools in this area;
- A network of excellence, enabling the dissemination and sharing of good practice between schools at all stages of development.

SOURCE: European Commission – Digital Single Market model projects (see more at <https://ec.europa.eu/digital-single-market/en/projects/>); McKinsey research

initiatives such as “Girls at Polytechnics,” a large-scale project encouraging female high-school students to study STEM subjects. Poland boasts a very high female share of graduates in STEM subjects: 44 percent, significantly higher than the OECD average of 31 percent.⁹⁵ On pages 66–67 we look at a number of other, similar programs taking place in CEE.

“Pre-university curricula may need to be adapted for the future, increasing their focus on those skills that will grow in importance in the labor market.”

Tomorrow’s labor market will require more flexibility from the education system. This may mean shorter periods of study, potentially combined with work, in the form of training courses or “microdegrees.” In addition to full degrees, or even instead of them, it might be possible for people to take intensive courses in one or two selected components – for example, programming in one or two specific languages. Technology itself could play a role here, with solutions such as “massive open online courses” (MOOCs): courses or subjects from various fields of

study, available via Internet platforms, incorporating videos, notes, and interactive quizzes and tests.⁹⁶ Leading universities around the globe have begun offering courses of this type as part of a general move towards “blended learning,” combining digital media with traditional, campus-based teaching. For these institutions, MOOCs represent new revenue streams, with certificates with the university’s brand on them being highly valued.⁹⁷ Higher education institutions in CEE could explore the possibility of introducing such courses, too.

To help adults adjust to the new demands of the digital economy, policy makers could consider creating an ecosystem that supports reskilling and upskilling. It is important to build motivation for learning among adults, for instance through campaigns and peer support groups. Extra focus could be placed on motivating those groups in most need and those with the biggest skills gaps, namely workers with below-median income, employees of SMEs, the silver workforce and workers in sectors most prone to automation. Structural measures could be implemented, such as further support in cooperation with employers and labor unions – childcare, transportation, funding/tuition scholarships and the like.

Box 5. Implications for policy makers: Support technology adoption.



Additionally, policy makers could identify labor needs better by working with the private sector, for example by deploying targeted analytics and “digital matching” platforms. We explore a number of such programs on pages 66–67.

Finally, Digital Challengers should try to stem the outflow of talent to Western Europe. Rather than fighting the trend for young people to pursue higher education abroad, CEE governments could encourage them to come back again after graduation. Another way of encouraging people to remain in their home markets, especially those who tend to emigrate at very early stages of their careers, is to provide high-quality internships with a guarantee of employment on graduation. We explore some examples from around the world of programs fighting talent leakage on pages 66–67. Digital Challengers can also leverage their inherent assets, such as lower living costs and vibrant labor markets.

Emphasizing these advantages could attract foreign ICT specialists to come and work in CEE and in this way expand the talent pool.

Support technology adoption by the public sector

Digitizing public services is a win-win strategy: It has the potential for significant cost savings for the government combined with increased convenience for citizens and businesses thanks to reduced bureaucracy. When setting out on this journey, governments may want to set up a dedicated taskforce with a strong mandate to push forward the digital agenda both in the public sector and the wider economy. Although many CEE countries already have such units in place, there is still potential across the region to draw inspiration from other markets.

A possible priority initiative when digitizing the public sector is for policy makers to provide digital tools

Box 6. Implications for policy makers: Strengthen cross-border digital collaboration.



Support technology adoption in the public and private sector: Selected case studies

PUBLIC SECTOR DIGITIZATION (SEE ALSO PAGE 47 IN CHAPTER 3)



Transport for London, the government body responsible for the transportation system in the UK capital, installed 50 innovative self-service ticket machines, replacing traditional ticket offices, and simultaneously embarked on a three-year learning program to reskill and train 5,000 employees and managers in new customer service skills, such as operating tablet computers as part of on-platform customer interactions.



NGO Online is the first digital school for NGOs in Romania. Implemented by Asociatia Techsoup Romania, it consists of webinars and online and offline free learning activities for NGO employees and volunteers. NGO Online offers the most complex curriculum of its type to date and was the first step in building a sustainable learning environment for Romanian NGOs, reaching an extensive audience of more than 2,600 NGOs in Romania. The project was implemented in 13 months in 2015–2016.



Konto Bariery, a nonprofit organization in the Czech Republic, and the Ministry of Regional Development of the Czech Republic, are using building accessibility data to create a web application, called mapybezbarier.cz. This web application provides users with a map containing information on the accessibility of various buildings in the Czech Republic. This can create a better user experience and social benefit for disabled people.



The US government uses the website Challenge.gov to stage problem-solving contests on issues such as accelerating the deployment of solar energy.

PUBLIC SECTOR-LED INITIATIVES PROMOTING PRIVATE SECTOR DIGITIZATION



The project is implemented by the Latvian Information and Communication Technology Association (LIKTA) in cooperation with the Latvian Central Finance and Contracting Agency and the Ministry of Economy of Latvia. The project provides digital-skills training for managers and employees of small and medium-size enterprises (SMEs) in Latvia, as well as well individual entrepreneurs. The aim is to have higher productivity and competitiveness in the SME sector and contribute to the goals of the Digital Single Market in Latvia. The project started in December 2016, and by the end of October 2017, over 400 companies had been already involved in the project, with more than 900 training programs organized.



As an example of an effective public-private partnership, the Italian government cooperated with Google, leveraging EU funding in its Crescere in Digitale initiative. The program offers free training on digital skills to SMEs and young people not working or studying. The most promising participants are then sponsored during a six-month paid internship as “digitizers,” that is, people in charge of implementing digital tools within an organization. This is a win-win situation, empowering young people to kick-start their careers and SMEs to become more digital, at little cost.



Digiboost was a funding campaign, launched by the Finnish Funding Agency for Innovation, targeting Finnish SMEs and midcaps in any industry sector. The main purpose was to provide an easy way to take the first step into the world of digital by employing digitization experts. The agency covered half of the digital experts' salary for one year. The Digiboost campaign was launched in late 2015, and due to popularity exceeded its original budget of €10 million by more than 10%. Since then it has been incorporated as part of the Kiito funding service and helps SMEs and midcaps enter international markets.



The Swedish government has launched the Digilyft initiative, a program that aims to motivate SMEs in the manufacturing industry to adopt digital processes.



In Slovenia, e-invoicing has been mandatory since 2015 for business-to-public-sector transactions. Croatia's Ministry of Economy, Entrepreneurship, and Crafts also recently embarked on introducing e-invoicing to the country on a national scale.

SOURCE: European Commission – Digital Single Market model projects (see more at <https://ec.europa.eu/digital-single-market/en/projects/>); McKinsey research

SOURCE: European Commission – Digital Single Market model projects (see more at <https://ec.europa.eu/digital-single-market/en/projects/>); McKinsey research

such as online signatures and online public-service platforms. Globally, solutions such as these have proven to increase user satisfaction with interactions with the government.⁹⁸ Once the technology is in place, government can encourage uptake by means of broad promotional campaigns, including offline sessions on the benefits of switching to e-services.

Government would be also well advised to digitize their behind-the-scenes processes, as the potential for productivity gains here is significant. Training public-sector employees in digital skills so as to ensure a smooth transition to the new ways of working would also be important. On pages 70–71 we explore a number of related case studies from CEE and elsewhere.

One of the biggest levers for digitizing the public sector is the Internet of Things (IoT). A number of IoT verticals, such as smart cities and human health, need to leverage public data and resources to unlock the full value of solutions. Areas such as defense, social welfare, public safety, healthcare, and fraud prevention can make use of predictive and advanced analytics based on big data. Internal teams, universities, businesses, and other institutions should work together to create data-based solutions (see pages 70–71). Increasing the standardization and transparency of data across multiple layers of administration will be key to ensuring scale effects for these solutions.

Support technology adoption by the private sector

As we saw in Chapter 3, the adoption of digital tools by both large companies and SMEs in Digital Challenger countries shows significant room for improvement compared to Digital Frontrunners. Policy makers would therefore be well advised to support the digital transformation of the private sector as well as the public sector. Areas such as retail and manufacturing, which make large contributions to GDP but trail global digitization benchmarks, should be the priority here. There are many ways in which government could support enterprises in these sectors along their digitization journey. In addition to targeted programs

aimed at promoting the adoption of technology, policy makers could create incentives for companies (especially SMEs) to embrace digitization by making interactions with public administration digital by default. Digital Challengers could also look for external funds, potentially from the European Union, for supporting digitization within the region. On pages 70–71 we explore a number of examples of public sector-led initiatives promoting private sector digitization.

Strengthen cross-border digital collaboration

While established political and business collaboration platforms already exist in CEE – the “Three Seas Initiative,” for example – they often lack working groups at relevant levels developing a pipeline of priority collaboration initiatives. Given that such exercises are in place in other policy areas, such as defense, digital matters could follow suit and play a more central role going forward.⁹⁹

A strong “digital pillar” within collaboration platforms could also lead to a better understanding of the common needs and goals of Digital Challengers. Initiatives involving multiple countries can be a better motivator for engaging in policy discussions that might otherwise be omitted from the region’s agenda. They can also act as a catalyst for strengthening the voice of members of the platform within the European Union or European Economic Area. This is particularly true for legislative decisions at the EU level, which will ensure consistent implementation of Digital Single Market proposals and shape the digital agenda of the European Union over the coming decades.

Finally, a digital pillar within collaboration platforms could facilitate the sharing of best practices between member states, exploiting the advantages of specific countries. This would also increase the efficiency of cooperation with Digital Frontrunners, which have begun forming their own cross-border collaboration platforms – with some Digital Challengers already following in their footsteps (see page 73).

Box 7.
Digital cross-border collaboration in Europe – example initiative.

Digital Frontrunners: Example of collaboration platforms

Nordic Council – Digital North initiative

The initiative establishes cooperation between member states across three digital priorities:

Increase digitization in both government and society;

Improve the competitiveness of enterprises through initiatives on innovation;

Enhance digital surface models (DSMs) in the region.

Digital 9 Initiative

The Digital 9 initiative has so far focused its discussions on the free flow of data, geo-blocking, and business taxes.

Another focus of the group is the possibility of creating a separate digital single market for member countries, so as to be better able to take advantage of their advances and facilitate cooperation.

First steps toward digital collaboration in CEE

In 2016, at the Budapest Regional Digital Summit, the V4 signed the Memorandum of Understanding for Regional Cooperation in the Areas of Innovation and Startups, establishing cooperation with regard to promoting the expansion of startups. One of its main projects includes We4Startups, a platform to connect startups with investors and policy makers.

Memorandum of Understanding at 2016 Regional Digital Summit in Budapest

The Warsaw declaration at the Central Eastern Europe Innovators Summit in March 2017 was another related initiative. The declaration expressed the V4’s desire to cooperate in the following areas: cybersecurity, innovation, 5G mobile services, supporting SMEs, increasing ICT and digital skills at all levels of education, supporting regional Industry 4.0 projects, acting against unjustified barriers to the free flow of data, and improving data privacy and protection.

Warsaw declaration at 2017 CEE Innovators Summit

Digital Challengers could also use a strong digital-collaboration pillar to remove obstacles to the full functioning of the Digital Single Market at a national level, tackling issues such as geo-blocking, unjustified data localization practices and other regulatory barriers. Policy makers in CEE could enhance the potential scale effects for e-commerce players and IoT solutions by supporting standardization and the free flow of cross-border non-personal data in the public sector. They could likewise ensure the technological interoperability of digital infrastructures such as 5G networks. With the rise of global cyber-threats, there is also a strong argument for common security models and cybersecurity standards to ensure that there are no weak links in the region.¹⁰⁰

As we have seen in previous chapters, Digital Challengers boast a relatively good ICT infrastructure. However, governments could close the gaps that exist across the region by facilitating cross-border digital infrastructure projects in areas such as fiber optics, 5G technology, strategic e-commerce logistics centers, and complementary energy infrastructures. Another area for collaboration might be establishing common platforms for cross-border public-sector services, including cross-border integration of e-ID systems, increasing the effectiveness of such systems, enhancing public procurement practices, and lightening the administrative burden on companies. A good example of such a collaboration effort can be found in Finland and Estonia, which initiated an automated inter-government electronic information exchange process, providing information about citizens moving from one country to the other, deaths, marriages, name changes and so on. This helped both governments by lowering the reporting burden on consulates, developing communication links and improving encryption solutions.¹⁰¹ Similarly, in CEE, Slovenia, Croatia and Slovakia established “TendersForAll,” an e-procurement tool featuring automatic translations (see Chapter 3).

As we saw in Chapter 1, countries around the world are busy drawing up artificial intelligence (AI) strategies and investing resources in developing capabilities in this area. The United States and

China have taken the lead, although a number of EU markets follow close behind. Cross-border scientific research and educational partnerships have emerged, such as the recent Franco-German alliance in AI, which aims to establish a new institute of AI. Small countries would struggle to achieve this on their own; pooling resources makes it possible. Digital Challengers could come together to support joint technology initiatives in areas such as autonomous transportation, smart cities and healthcare. Significantly, in April 2018 a number of CEE markets signed the European Declaration on Cooperation on Artificial Intelligence – a promising platform for identifying concrete initiatives in the future.

Finally, to help manage the transition of workers to different labor pools, Digital Challengers should improve cross-border freedom of movement by setting up joint job-seeking platforms, improving skills accreditation and ensuring procedures that safeguard workers. They could also launch joint efforts to market the region as a digital hub, combating the brain drain and at the same time attracting new talent and investments.

Improve the ecosystem for startups

Improve the entrepreneurial talent pool

As we saw in Chapter 3, Digital Challengers score low in the Global Entrepreneurship Index. This is mainly due to the lack of an entrepreneurial tradition and the fact that local cultures are generally risk-averse. To address this challenge, policy makers should strive to develop an entrepreneurial talent pool by embedding entrepreneurship firmly in formal education. For high-school students, for example, this could take the form of short projects or boot camps. To take an example from Western Europe, the French “Option Startup” is a two- to four-day event at which students can interact with startups, incubators, and accelerators and participate in workshops on entrepreneurship in different sectors.¹⁰²

In higher education, policy makers should strive to build closer links between STEM and business degree students, or incorporate the subject of

Box 8.

Implications for policy makers: Improve the ecosystem for startups.



entrepreneurship into such degrees. The curriculum could include practical knowledge about setting up a company, accounting, business model design, marketing, pitching ideas to investors, and so on. This would be even more effective if closely linked to business incubators, business angels, serial entrepreneurs and accelerators. In the United States, for example, “MIT Startup Exchange” is a program promoting partnerships between startups and industry. The program also includes workshops and facilitates networking between startups and executives.¹⁰³

Policy makers can also expand the entrepreneurial talent pool by attracting creative, entrepreneurial individuals from abroad, as discussed earlier in this chapter. Some countries are already doing this – for example, Canada, with its “Startup Visa Program.” Under the Program people from all around the world can immigrate to Canada if their business idea is supported by one of the designated organizations (venture capital funds, angel investor groups, and business incubators).¹⁰⁴ In Europe, the Netherlands has a similar scheme.¹⁰⁵ Digital Challengers could consider implementing similar schemes, especially targeting entrepreneurial talent from neighboring non-EU countries.

Strengthen major cities as startup hubs

Entrepreneurial talent would be more willing to

remain in Digital Challenger countries, and investors more willing to invest there, if major cities in the region had a reputation for supporting entrepreneurship. Digital Challengers could build on the example of Berlin, one of the top global startup hubs despite not being an international business or financial center.¹⁰⁶

Another simple step would be to provide entrepreneurs with locations where they can work and interact with other entrepreneurs and investors. Examples of such initiatives include BLK71 in Singapore (a former industrial quarter), Station F in Paris (a refurbished railroad station) and the Google Campuses in several European countries, including Warsaw. These sites house hundreds of startups, accelerators and early-stage funds, and allow entrepreneurs to meet, exchange ideas, and cooperate.

Creating testing grounds for new business models would also boost the attractiveness of Digital Challengers for digital entrepreneurs. This could be done by means of “regulatory sandboxes,” for example, enabling entrepreneurs to try out their innovations in real-life market conditions. Some CEE countries are already doing this; for example, the Bank of Lithuania is introducing a regulatory and technological sandbox platform for blockchain solutions.¹⁰⁷



Poland's Financial Oversight Commission has also recently announced the launch of a virtual regulatory sandbox as an intermediary pilot solution for fintech players in the country.¹⁰⁸

“Companies would be well advised to investigate the potential for forming strategic alliances with innovative organizations changing the face of their markets.

Improve access to capital

Improved access to early-stage venture capital would help create a more robust ecosystem for startups in CEE. Venture capital funds focusing on CEE say that the availability of funding for existing startups is not an issue, but they simply do not see enough investment opportunities there. Angel investing and seed capital, combined with the actions mentioned above, could increase the number of startups in the ecosystem.

Simplifying investments by business angels would increase the number of this type of investor. Business angels form a critical part of the ecosystem: Often, they not only provide the initial source of funding but also act as coaches and mentors to inexperienced entrepreneurs. Creating standardized, easily-available forms (such as term sheets) and enabling low-capital corporations would improve the situation significantly.

Another important step would be to create incentives for investment and re-investment in the startup ecosystem. Today, for many CEE-based startups, reaching Series A, B, or later funding stages often means leaving the region to improve their access to foreign investors. Investors (business angels, venture capital funds, large corporations) need to be attracted to the region, building trust and interest abroad. This could be achieved by means of tax incentive schemes, such as the United Kingdom's Enterprise Investment Scheme (EIS) and Seed Enterprise Investment Scheme (SEIS). These schemes provide for income tax relief on investments and exemption on capital gains that are reinvested.¹⁰⁹ The Entrepreneurs' Relief

scheme in the United Kingdom is another example, providing for less capital gain tax when the entrepreneur sells their business.¹¹⁰

IMPLICATIONS FOR BUSINESS LEADERS

Adopt business models to meet the demands of the digital economy

CEE is still just starting out on its digitization journey. The majority of executives in the region were trained in the running of business models based upon physical assets, which require significant resources to build and then scale up. Now, digitization is poised to change the rules of the game, introducing a world in which value creation is driven primarily by intangible assets and digital networks able to achieve exponential growth shortly after creation. With the dawning of this new era, companies should adapt their existing business models, assess why and how a market might be disrupted through digitization and then decide whether they can take advantage of it – or, alternatively, consider withdrawing. Thinking about digital disruption in the context of a supply-and-demand framework can be helpful, as laid out in the McKinsey Quarterly article “The economic essentials of digital strategy.”¹¹¹

On the demand side, digitization can disrupt the way in which products and services are consumed. Companies may want to think about unbundling or re-bundling products and services in new ways, much as streaming services have done with music. On the supply side, e-commerce can make domestic markets accessible to foreign players and reveal sources of supply that were previously unknown or uneconomical to draw upon. The dynamics of both sides creates an opportunity for companies to play the role of “market maker,” especially if a company can find a way to connect consumers and customers by lowering transaction costs while reducing information asymmetry. Headline-making companies of this type that have emerged in recent years include TransferWise and Airbnb.

Beside these newcomers, established organizations are also beginning to find ways to adjust their business models to capture new growth opportunities.

Taking advantage of digital platforms providing access to millions of users gives established players the ability to cross-sell and add new business lines at almost negligible marginal costs. Banks in CEE have started expanding into services such as accounts-receivable management, factoring, accounting and cash-flow analysis for SMEs. Other ventures include joining forces with healthcare providers and health insurance companies to provide a consolidated billing platform that makes it easier for consumers to pay for medical expenses. On page 80–81 we explore some examples.

Companies would be well advised to investigate the potential for forming strategic alliances with innovative organizations changing the face of their markets. In this way they can create new competencies within their own organizations. Many examples can be seen in CEE, such as the recent partnership between mBank and the transaction platform Allegro in Poland. The cooperation has resulted in a new creditworthiness assessment model for the platform's merchants; using data such as the merchant's revenues, the bank is able to assess their financial potential and draw up a loan offer.

Box 9. Implications for business leaders.

Adapt your business model to meet the demands of the digital economy

- Anticipate and, if necessary, prepare for digital disruption to demand for your product, e.g., unbundle and tailor your product or turn it into a service.
- Anticipate and, if necessary, prepare for how digital disruption will change supply in your market, e.g., analyze the possibility of new, online players and anticipate changes in the value-chain structure caused by automation.
- Investigate the potential for forming strategic alliances with innovative organizations and enterprises changing the face of the market (e.g. startups) to create new competencies in your organization.

Actively adopt technology and innovation to close the gap to digital leaders

- Use digital tools for revenue growth, including boosting your export capabilities
- Use digital tools to optimize your bottom line

- Connect in real time with your customers, leveraging social media and online advertising in a targeted way to enable appropriate performance measurements.
- Use the internet to increase your revenue growth capabilities by utilizing e-commerce, e.g., build an online presence for your organization, develop your own e-commerce platform or make use of multi-vendor e-commerce platform.
- Leverage own or external e-commerce platforms to boost your export capabilities and tap into global demand pools for your products and services.
- Streamline and automate internal operations where possible, e.g., implementing e-invoicing suitable for automated processing, adopting resource management software tools, focusing on the most labor-intensive, expensive processes first.
- Leverage the power of big data and cloud computing for improved decision making and process optimization.
- Build cybersecurity capabilities to ensure competitive dynamics and customer trust.

Invest in human capital

- Update your approach to recruiting future employees
- Create reskilling and upskilling opportunities for current employees

- Put more focus on assessing candidates' skills, e.g., through open competitions, games, hackathons.
- Develop a talent pipeline to shift from reactive to proactive recruiting, e.g., offer workshops and apprenticeships to help candidates build the desired skills.
- Leverage contractors or freelancers to fill talent gaps, using digital platforms to optimize the search effort.
- Enable reskilling and upskilling opportunities, e.g., provide practical in-house training, offer financial support, create opportunities for formal and informal knowledge sharing.

Embrace a pro-digital culture

- Start the change from the top, fostering understanding and conviction among employees on the benefits of digital: ensure the leadership and middle management act as role models in terms of their use of digital tools.
- Support employees in developing their skills and knowledge, e.g., encourage employees to cultivate their curiosity about creating opportunities in combining emerging technologies with innovative services, implement reinforcement mechanisms.
- Prioritize agility and learning over forecasting and planning.
- Form strong digital collaborations within trade associations, focusing particularly on SMEs.



Use digital tools for revenue growth, including boosting your export capabilities

Companies should incorporate new digital solutions into their operations on an ongoing basis in order to maximize revenue growth. In Chapter 3 we explored the degree to which CEE firms engage with customers directly and in real time via the internet, enabling them to learn more about their customers and so shape their offering for specific target segments. We found that a gap existed between Digital Challengers and Digital Frontrunners. An effective, mobile-ready online presence is one of the most important assets for engaging with customers in today's market. Here, SMEs in Digital Challenger markets especially have ground to make up: While the majority (68 percent) already have some form of online presence, they still lag behind their Digital Fronrunner counterparts, 85 percent of which have a website. A passive company webpage is no longer sufficient, either – companies need a responsive social media presence and perhaps even their own e-commerce platform. We also saw that a significantly smaller share of CEE firms leverage social media for branding and marketing, and a smaller share pay for online advertising. Companies in Digital Challenger markets would be well advised

to leverage such tools for reaching their customers online in a targeted and measurable way.

Having established an effective online presence, companies should then leverage e-commerce solutions for additional revenue generation. Again, we saw in Chapter 3 that both large and small companies in CEE lag behind their Digital Fronrunner peers here. The gaps are particularly large for SMEs, with only one in seven SMEs in the CEE region selling their products or services online in 2017, compared to one in five SMEs in Digital Fronrunner markets.

Digitization has removed many of the barriers that once prevented enterprises, especially SMEs, from reaching customers abroad. New technologies are poised to decrease the importance of distance. Solutions such as AI applications for optimized route planning, 3D printing and cross-border payment systems will likely lead to a decline in logistics and customs costs. Moreover, the benefits arising from these solutions could be disproportionately large for SMEs.¹¹² Since small firms trade in smaller quantities, fixed trade costs such as logistics tend to weigh more heavily on them, as they make up a larger share of the unit cost of the goods sold. Companies

previously had to grow to a substantial size before they could afford the resources needed to export their goods or services. Now, digitization has dramatically reduced the minimum scale required to do business across borders. Small businesses or “micro-multinationals” are able to sell their products globally without the need for investments in a substantial physical presence abroad, either through their own website or by joining major e-commerce marketplaces to connect with customers and suppliers anywhere in the world.¹¹³

It is worth noting that the vast majority of CEE enterprises engaged in online sales do so primarily through their own website or application. And while e-commerce marketplaces are in general used less often by companies in CEE, such platforms are more important for SMEs than for large enterprises (see Exhibit 22).

In Chapter 3 we saw that the share of CEE companies participating in cross-border e-commerce sales is still very low. To demonstrate the potential benefits, we look at a number of SMEs from the region successfully expanding into global markets through online channels on pages 80–81.

“Automating and streamlining core business processes drives down costs, but it also gives companies greater flexibility to respond to and anticipate customer demand.”

Already, we can see that e-commerce solutions enable increased exports for small companies in CEE. The share of small firms engaged in export tends to be above-average among companies with online sales. Interestingly, this tendency does not hold for medium and large enterprises (see Exhibit 21).

Use digital tools to improve your bottom line

In Chapter 3 we also identified gaps between Digital Challengers and Digital Frontrunners in the degree to which they leverage digital solutions to optimize operating efficiency. Automating and streamlining core business processes drives down costs, but it also gives companies greater flexibility to respond to and anticipate customer demand. Automation can deliver significant value not associated with labor substitution, helping companies improve their industrial operations, optimize

Exhibit 21. Online platforms enable small enterprises in CEE to achieve above-average export participation.

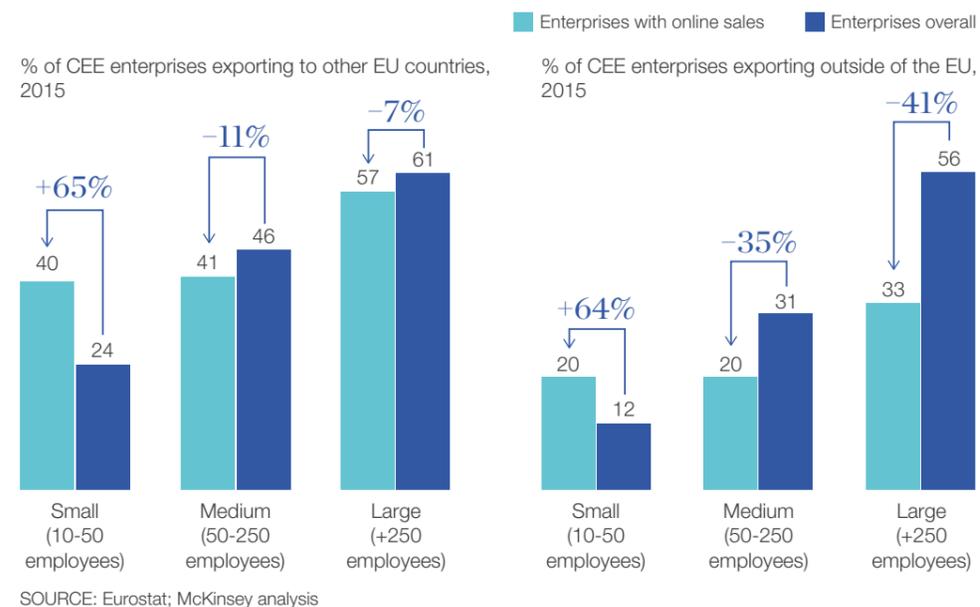
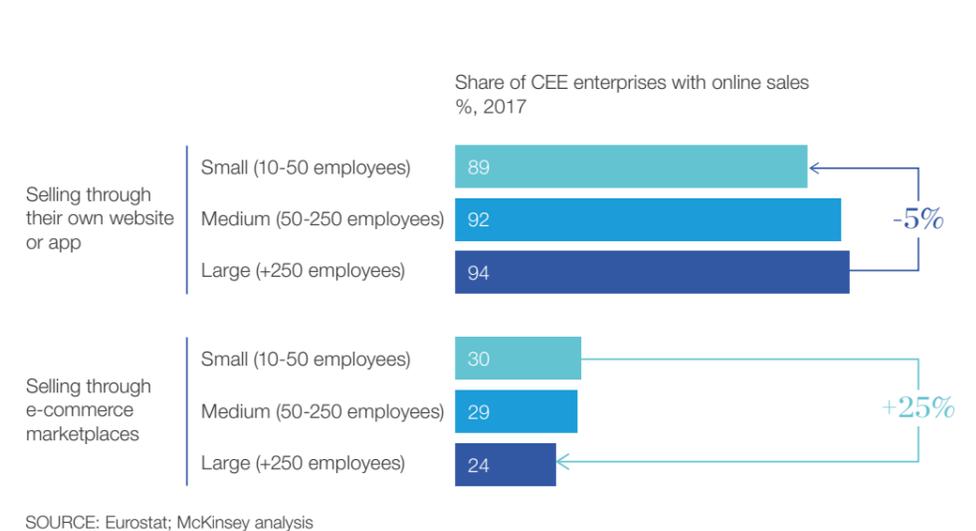


Exhibit 22. While company websites and apps are the primary online sales channel for all companies in CEE, SMEs use e-commerce marketplaces more often than large companies.



Actively adopt technology and innovation to close the gap to digital leaders: Selected case studies

BUSINESS MODEL EXPANSION USING DIGITAL TECHNOLOGIES

Scania: complementary truck services and products

Scania has launched a number of complementary services around trucks, using digital solutions, leveraging the increasing availability of sensor data.

Offerings of digital services include (among others):

- Scania Tachograph Services: complete digitization of tachograph, online access, automatic evaluation
- Scania Watch: smart watch allowing live access to various driving parameters
- Driver Coaching: online access to driving parameters, allowing telephone-based coaching of drivers, e.g., regarding fuel-efficient driving

John Deere: They make tractors, right?

John Deere developed an extended product environment for fleet optimization based on the use of sensors tracking various machine parameters.

The information is combined with historical and real-time data regarding weather prediction, soil conditions, crop features, and many other data sets.

The information is presented on an online platform as well as a mobile app in order to help farmers figure out which crops to plant where and when, when and where to plow, where the best return will be made with the crops, and even which path to follow when plowing.

Ping An: Ecosystem orchestrator

Ping An, a giant Chinese insurer with more than one million employees and agents, has expanded its reach to offer healthcare consultations, auto sales, real estate listings, and banking services to more than 350 million online customers through a single customer portal called the One Account. This new activity also generates customer traffic for Ping An's core services.

CEE SMES AND MIDCAPS LEVERAGING DIGITAL TECHNOLOGIES TO ACCESS GLOBAL MARKETS

Bulgaria
Allterco Robotics

Allterco Robotics is a Bulgarian manufacturer of Home Automation and Wearable devices, such as the GPS/GSM watch tracker for kids, MyKi, as well as a device helping pet owners monitor their pets' location at all times. The company has utilized its own online sales platform to expand internationally, including markets such as Romania, Serbia, Macedonia, Croatia.

Lithuania
Deeper

Deeper is a Lithuania-based SME providing smart sonar devices for anglers. The company has utilized its own online shopping platform, as well as major external e-commerce platforms to reach clients in more than 50 countries, enabling avid anglers from Sydney to Singapore, Michigan to Manchester to experience a completely new way of fishing.

Poland
Funtronic

Funtronic is a Polish company that started its business operations in 2014. It is a producer and distributor of the Funtronic Floor, an interactive projection system aimed to be an innovative teaching aid and rehabilitation tool. Utilizing a distributor network, locally tailored websites, and large e-commerce platforms, the company is providing its product to Poland and over 20 foreign markets, including Germany, the Netherlands, the United Arab Emirates, United Kingdom, and the United States.

Poland
E-obuwie

E-obuwie.pl is an example of a traditional business idea (footwear sales) achieving significant scale thanks to global expansion by means of online platforms. The company, launched in 2006 with the intent on operating as a network of stationary footwear stores in Zielona Gora, has since become one of the largest platforms in the region for online sales of shoes, handbags, and other accessories. The company today operates in multiple markets, including (among others) the Czech Republic, Germany, Hungary, Italy, Poland, Sweden, Ukraine, and the United Kingdom.

SOURCE: McKinsey research; company websites

SOURCE: European Commission – Digital Single Market model projects (see more at <https://ec.europa.eu/digital-single-market/en/projects/>); McKinsey research, company websites

knowledge work, better understand forces of nature, and increase the scale and speed of discovery in areas such as R&D.¹¹⁴

One of the first applications of digitization, implemented by many businesses at the end of the last century, was the digitization of paper documents. Today, invoices can not only be digitized but also processed electronically, streamlining the administrative and accounting processes. Digital Challengers trail behind Digital Frontrunners in terms of the share of companies sending e-invoices for automatic processing to their business partners (not individual customers) and the government. Slovenia is a positive outlier in CEE and indeed one of the leaders in Europe as a whole, with 78 percent of its large enterprises and 56 percent of its SMEs sending e-invoices. This is the result of policies encouraging e-invoicing, such as those explored earlier in this chapter.

Automation and streamlining can also be achieved by leveraging enterprise resource planning (ERP) and customer relationship management (CRM) software. Take-up for such programs is lower for Digital Challengers than for Digital Frontrunners.

The McKinsey Global Institute report *A future that works: automation, employment, and productivity* examines many other cases of automation driving performance gains in workplace settings. Examples include inventory tracking, no-stop checkouts and automated shopping carts. These solutions lead to an improved customer experience, greater space productivity and lower working capital needs – resulting in a return on investment (ROI) estimated at 14 percent on average.¹¹⁵

To assess where the greatest potential for automation lies within their organizations, business leaders can consider conducting a thorough examination of their company's activities and drawing up a "heat map" of areas with potential. Once these areas have been identified, they can then be re-imagined taking full advantage of automation technology, rather than simply automating individual activities within current processes. This could be followed by a benefits and

feasibility assessment of an automation-enabled process transformation. We see numerous successful cases of automation already being deployed today around the world, such as Rio Tinto's automated haul trucks¹¹⁶ and Google's DeepMind machine-learning solution, which cuts data-center energy consumption by 40 percent.¹¹⁷

Finally, companies in CEE would be well advised to explore the potential for leveraging big data for improved decision-making. A wide range of areas of application exist, from internal processes (production, maintenance) and pricing to analyzing customer interactions. In Chapter 3 we saw that Digital Challengers are not yet fully leveraging this opportunity.¹¹⁸

Prepare talent strategies for the future

To remain competitive in an era of automation, companies will need qualified experts to help them implement technological innovations. This will not be possible without the help of interdisciplinary employees who, thanks to their combination of hard and soft skills, can ensure the organization's success in a rapidly changing business environment.¹¹⁹ The book *Talent Wins*, coauthored by Dominic Barton, former Global Managing Partner of McKinsey & Company, argues that businesses should elevate human resources to the same level as finance.¹²⁰ Implementing new ways to manage talent can help companies stay competitive and create value by various means, as we discuss below.

In a survey of companies carried out by McKinsey in late 2017, 76 percent of managers in Europe felt that their workforce had skill gaps related to automation and digitization; addressing this gap was considered at least a "top-ten priority" for management.¹²¹ The first step for ensuring competitiveness in an era of automation is to identify the types of skills needed and the future employment structure. The second step should be to map the current skills of employees against future needs, so as to identify any gaps. It will be important for firms to draw up information about which positions will require which skills, and to establish a talent management system within the company.¹²²

Update your approach to recruiting

Recruiting – a core element of any talent strategy – is a high-stakes game. Most companies review an average of 250 résumés for each position they fill.¹²³ Hiring executive search firms is expensive. Moreover, up to 80 percent of employee turnover is the result of bad hiring decisions.¹²⁴

These facts, combined with the projected shifts in the labor market, paint a challenging picture for recruiters. Companies can unlock significant value by taking advantage of digital tools that enable more effective identification of their desired skill sets, such as online talent portals, social media tools, and sophisticated algorithms to reduce human biases in the hiring process. Many companies still rely on traditional data when assessing prospective employees, such as the candidate's school, academic record and previous employers. But these can be crude indicators of actual performance. For example, Catalyte, which evaluated hundreds of thousands of IT systems managers, found that there was no statistically significant correlation between a candidate's college degree and their success in the position.¹²⁵ Using sophisticated algorithms to assess innate skills and IT knowledge, the company now hires a wide range of people, regardless of their educational credentials.

“Companies can unlock significant value by taking advantage of digital tools that enable more effective identification of their desired skill sets.”

Reskill and upskill your employees

Organizations could consider building motivation for reskilling among their employees. For example, they can offer career planning support programs, development guidance systems and training on work performance assessment and promotion mechanisms. Firms can create opportunities both in-house and externally, for instance partnering with universities and educators to build skills that are directly applicable in the workplace. Trade associations and labor unions have traditionally played a central role in

training efforts in some European countries, and both these groups have potentially important roles to play in addressing shortages of skills and retraining workers. In Sweden, for example, "job security boards" funded by companies and unions coach people who lose their jobs and can also provide them with temporary financial support, transition services, and retraining so they can quickly find a new job. We explore a number of approaches taken by companies on pages 84–85.

Leverage contractors and freelancers to fill talent gaps

With the advent of a "gig economy,"¹²⁶ companies become more agile, efficient and productive by focusing on hiring the best talent exactly when it is needed. Digitization fits in well with this as it tends to break down jobs into discrete tasks that are then easier to outsource. One solution for businesses is to create mix-and-match project teams that combine traditional full-time workers in the office, part-time workers working remotely, and temporary workers who can help meet spikes in demand or perform specialized functions.¹²⁷

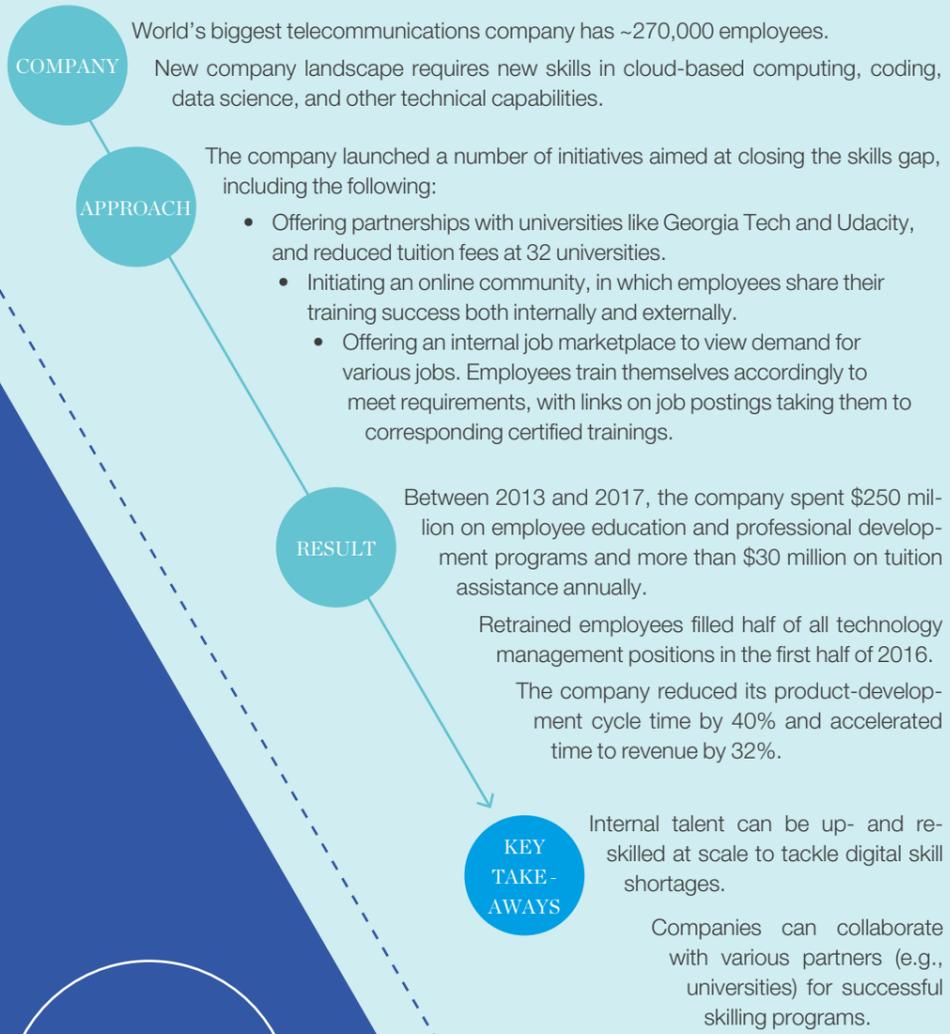
Small businesses and startups stand to gain the most from the ability to call in specialized help on an as-needed basis. The availability of freelance labor has vastly reduced the cost and lowered the barriers to starting a business.¹²⁸ With the help of platforms such as Freelancer.pl, companies can quickly find any external experts they need.

Earlier in this chapter we saw examples of how companies, especially SMEs, can invest in contractors who can support their digital transformation efforts, be it by helping them establish an online presence or build online marketing and e-commerce capabilities. Companies in CEE would be well advised to identify actors in the overall digitization support ecosystem, such as public-sector or NGO-driven programs. Importantly, however, they should carry out a cost-benefit analysis in each case to check whether it is more economical to keep jobs in-house or outsource them, taking into account the institutional knowledge and experience that long-term workers provide.¹²⁹



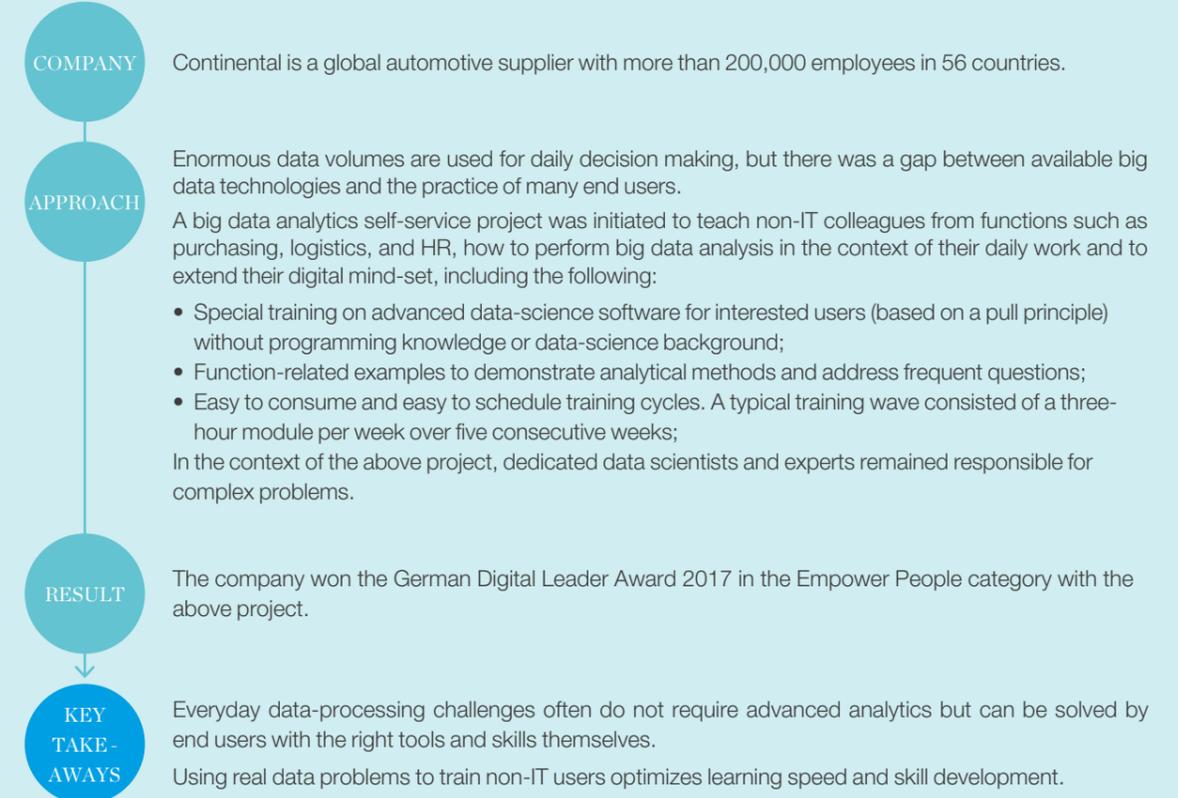
Invest in human capital: Selected case studies

AT&T: UP- AND RESKILLING AT SCALE WITH A BLENDED APPROACH

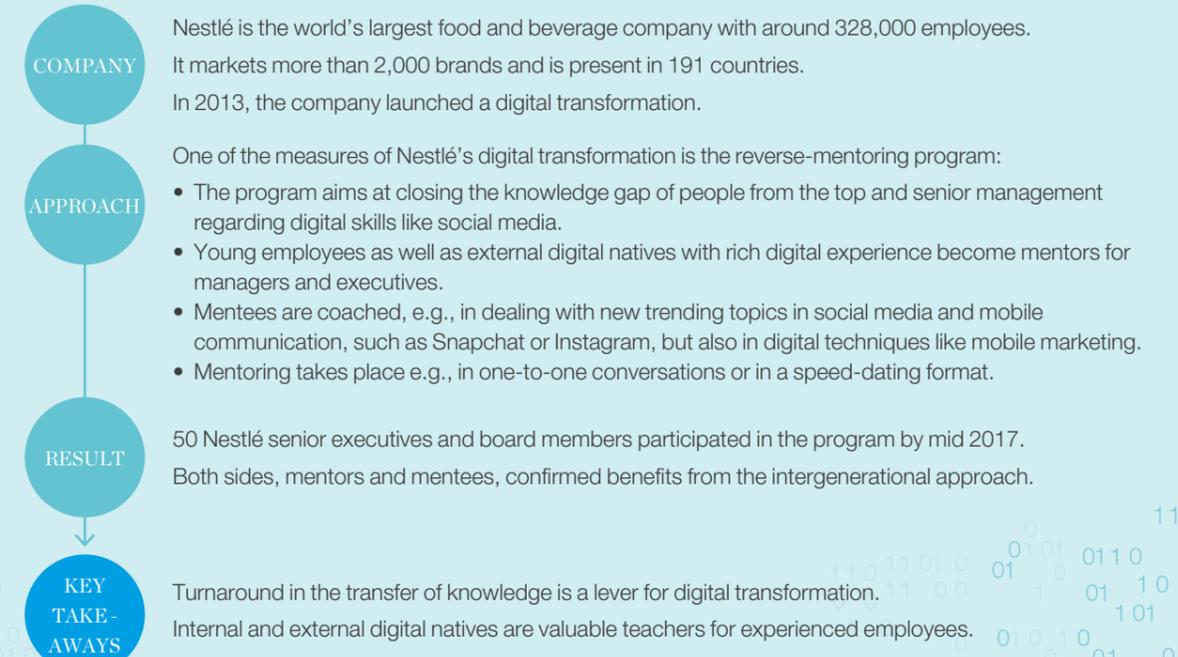


Reskill and upskill your employees

CONTINENTAL LAUNCHED A BIG DATA SELF-SERVICE PROJECT TO QUALIFY NON-IT EMPLOYEES



REVERSE-MENTORING PROGRAM AT NESTLE TO TEACH EXECUTIVES AND MANAGERS MILLENNIAL THINKING



SOURCE: McKinsey research; company websites

Embrace a pro-digital culture

Companies are by and large aware that digital transformation needs active support from management. This must go beyond the CEO. Indeed, companies might consider appointing a Chief Digital Officer (CDO) to drive the digital agenda within the organization from the outset.

“Small businesses and startups stand to gain the most from the ability to call in specialized help on an as-needed basis.

Top managers are well advised to also promote understanding of the transformation process. They need to help their employees develop new skills and digital knowledge. At the same time, they should implement reinforcement mechanisms, such as rewarding employees who lead the way in adopting digital solutions.

In addition, top managers could emphasize agility and learning over forecasting and planning. A McKinsey study that looked at capital expenditure allocations between business units at more than 1,600 companies found that the current year's allocations were 90 percent correlated with the previous year's allocations. Firms that allocated capital more flexibly, however, grew faster and achieved higher returns to shareholders.¹³⁰ Just as “lean management” was the major trend in the 1970s, “agility” has become the core management topic in recent years as companies have sought to transition from

mechanical to organic set-ups. “Agility” has acquired a specific meaning in management terms: It refers to the ability of an organization to adapt quickly in order to succeed in a changing, ambiguous, and often turbulent environment.¹³¹ In the management literature, this has come to include different types of teams and organizational units, known as “chapters,” “guilds,” “squads,” and “tribes,” and also different modes of working, such as “sprints.” In place of silo-like departments governed by hierarchies, organizations now see themselves shifting toward a more flexible system in which individuals move fluidly between different teams and projects.¹³²

IMPLICATIONS FOR INDIVIDUALS

As we saw in Chapter 4, digitization is already affecting the lives of individuals in a variety of ways. Consumers first felt its impact in the form of broader product and service offerings, increased ability to take advantage of consumer surplus opportunities and other benefits (see Box 10). Workers, on the other hand, are feeling its impact on the labor market. They will need to invest in lifelong learning, acquiring the digital skills required to respond to the changes. They will also need to be more flexible: The traditional career path of joining a company, rising up through the ranks and staying with the firm for decades may soon be a thing of the past. Workers will face more uncertainty and more frequent transitions between jobs. However, those who successfully adapt to these new conditions will enjoy a greater range of options and flexible forms of employment.

Box 10.

Implications for individuals in the labor market and in everyday life.



Closing remarks

After almost three decades of outstanding economic growth, CEE has reached a critical stage in its development. The region is still only halfway along the road to success. If the countries of the region want to be as prosperous as the most advanced economies, they need to take full advantage of the digital revolution.

We believe that Digital Challengers can only capture the full potential of the digital transformation by cooperating closely with one another. Together they represent more than one hundred million people, and their total GDP of €1.4 trillion make them the equivalent of the twelfth-largest economy in the world. Moreover, they find themselves in similar economic situations and facing similar challenges, such as the brain drain.

Digital Challengers should work together to develop digital policies and cross-border projects. The region's states, together with other countries interested in digitization, could form a coalition at a European level to ensure that their digital interests are heard and the Digital Single Market implemented.

Digitization is poised to become the new engine of economic growth. For Digital Challengers, we estimate that it could mean an additional €200 billion in GDP. CEE countries are uniquely positioned to capture this opportunity. However, they need to act, they need to act together, and they need to act now.

Why this sense of urgency? First, the economies of the Digital Challengers are currently booming.

In 2017 they recorded their highest levels of GDP growth in more than a decade.¹³³ At the same time, their private sectors are thriving.¹³⁴ This positive environment gives new digital initiatives a head-start. And history shows that booms do not last forever.

Second, we stand on the eve of a Fourth Industrial Revolution, driven by automation, robotics, and AI. New technology will fundamentally transform the economy and the labor market. It will boost productivity and growth, but it will also present serious challenges. Our analysis shows that up to 51 percent of workplace activities in CEE today – the equivalent of around 21 million jobs – could potentially be automated by 2030 (depending on the economy, regulation, and the labor market) using technology that already exists today. Immediate action is needed to capture the productivity opportunity and address the challenges that it creates.

Third, we have arrived at a point in history where the global rules of the digital game are rapidly crystallizing and new ecosystems are being created. Companies, countries, and regions have realized this and are busy shaping their long-term digital strategies. Digital Challengers cannot risk missing the boat. They need to work together to develop a clear digital agenda and a toolkit for navigating the digital transformation that lies ahead. We believe that this is the only way for CEE to develop its digital economy effectively, safeguard its digital interests, and ensure continued prosperity growth for the region's population over the coming decades.

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The authors of the report would like to thank to dozens of McKinsey colleagues who greatly contributed to this report, among them (in alphabetical order): Graham Ackerman, Maria Ballaun, Tim Beacom, Norbert Biedrzycki, Ola Bojarowska, Tomislav Brezinscak, Adam Chrzanowski, Mateusz Falkowski, Adrian Grad, Jerzy Gut-Mostowy, András Havas, Joanna Iszkowska, Levente Jánoskúti, András Kadocsa, Daniel Kafuza, Tomas Karakolev, Viktor Kozma, Krzysztof Kwiatkowski, Lucie Markova, Márta Matécsa, Małgorzata Leśniewska, Joanna Ostrowska, Péter Puskás, Helena Sarkanova, Dan Svoboda, Michal Skalsky, Daniel Spiridon, Jakub Stefański, Anna Szucs, Milena Tkaczyk, Katarzyna Tłuścik, Daniela Tudor, Roxana Turcanu, Robert Wielogórski, Mateusz Zawisza, Jan Zieliński and Arkadiusz Żarowski.

Methodology appendix

All calculations were performed using real values for GDP, e-commerce, and consumer offline spending on digital equipment. We used a fixed exchange rate from 2016 for all the years analyzed.

Digitization Index

One of the goals of the Digitization Index is to find the level of digital penetration across sectors by calculating the gap between the “digital frontier” (the world’s most advanced digital sector, which we consider to be represented by the ICT sector in the United States) and other parts of the economy. The Digitization Index presents a view across sectors of how corporations invest in ICT (a proxy for ICT spending, calculated as the value of the ICT sector less consumer spending on communication services and equipment) and how they digitize their internal processes. It uses eight indicators to capture different ways in which companies are digitizing. For instance, digital assets include spending on computers, software and telecommunications equipment, and the stock of ICT assets. Workforce, on the other hand, is calculated on a per-worker spending basis. We measure this by aggregating digitization scores across sectors, which can easily be compared between European countries and the United States.

To calculate digitization scores, we weight the Digitization Index for the economic size of the sector. This enables us to measure the distance of each sector from the global digital frontier, namely the ICT sector in the United States. This sector was chosen as the global digital frontier as previous MGI research¹³⁹ shows that it is the most digitized sector in the world across comparable groups of metrics.

The digital economy

Definitions of the size of the digital economy vary significantly. At one end of the spectrum, it is often defined simply as the value of the ICT sector.¹³⁹ At the other extreme, institutions such as the IMF use studies¹⁴⁰ define it as all digital activities in all sectors of the economy. In our report we use the latter definition, ensuring that the digital economy in our definition is quantifiable and comparable between countries.

Impact scenarios

We postulate three sources of digital economy growth:

- Baseline growth. In this basic scenario for 2025, we assume that the digital economy continues growing at the historical growth rate for 2012–2016.
- E-commerce and offline spending. In this acceleration scenario for 2025, we assume fixed growth of e-commerce and consumer offline spending based on the historical weighted-average growth trend for the CEE region between 2012 and 2016.
- Digitization potential in the public and private sectors. In the final impact scenario, we assume that the Digitization Index in CEE will reach the level found in the Digital Frontrunner Sweden. We use Sweden as a benchmark because of its digital maturity and its inspiring digital growth in recent years. To assess the potential impact, we first analyze productivity and digitization levels in CEE. We then calculate the digitization potential in CEE based on the Swedish sectors’ productivity rates, incorporating digitization multipliers. Finally, we estimate the potential productivity growth in the CEE economy caused by traditional ICT growth compared to the productivity baseline for each country.

Internet of Things, big data and AI use cases

We assess how the Internet of Things (IoT) can create value by analyzing more than 150 IoT use cases across the global economy. Based on our prioritization, we examine the 57 of these use cases that promise to deliver the greatest value. We use bottom-up modeling to assess the potential benefits that these use cases can generate, including productivity improvements, time savings, and improved asset utilization. We also include an approximate economic value for reduced disease, accidents, and deaths.

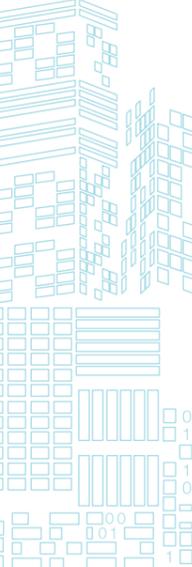
Automation potential

To understand the impact of automation on the labor market, the McKinsey Global Institute analyzed around 800 different occupations and more than 2,000 work activities. Each of the activities was assigned a combination of 18 predefined performance capabilities (for example, fine motor skills, sensory perception, natural language understanding). Its automation potential based on technologies available today was then estimated. By aggregating the automation potential of activities and their share in total working hours, we can estimate the potential for each occupation and industry.

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