



Disruptive Tech Trends in Central & Eastern Europe: A Snapshot

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Publication date

June 2021

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Foreword



Veronika Remišová

Deputy Prime Minister for Investments and Informatization, Slovak Republic

The world has lived through a very volatile period as a result of the COVID-19 pandemic. One of the major consequences of following the measures and lockdowns has been an accelerated reliance on stable and high-performing internet connection and technology. The past months have proved to us that technology is an enabler of a wide array of personal and professional needs, opportunities and activities. From public administration services, education, healthcare, entrepreneurship, retail and mobility to fitness, food delivery and streaming, there is no longer a single industry that technology and digitisation does not impact. The surge of accessing all things online has been a major disruptor for governments and industries alike. The European Union has encouraged member states to reflect on the importance of tech and digitisation trends in their Recovery and Resilience Plans. Reinforcing its commitment to the twin transition, Slovakia has pledged itself to building a functioning digital economy and society ready to face the ongoing digital transformation.

Smart eGovernment services will need to be user-friendly, and adaptable to new legislation and the emerging demand for digital services.

The key prerequisites for achieving this goal in Slovakia are the further development of eGovernment services, support for the digital transformation of SMEs, advanced cybersecurity, the growth of digital skills and competences, and geographically balanced high-speed broadband infrastructure, as well as the development and application of cutting edge technological innovations, such as Artificial Intelligence, blockchain, high-performance computing and quantum communication infrastructure.

The first pillar of having an economy and society fit for the digital age is functioning eGovernment. Smart eGovernment services will need to be user-friendly, and adaptable to new legislation and the emerging demand for digital services. It will largely decrease the administrative burden upon citizens and enterprises, as well as administrators.

Past months have also underlined serious gaps in internet connectivity. Attention has shifted into building a modern and resilient internet infrastructure across regions. Given the overall trend of moving many spheres of life online, this infrastructure appears to be a basic precondition for the growth of the EU's competitiveness in several strategic areas. Recognising this urge, Slovakia is going to focus on cost reduction and in speeding up the construction of networks, as well as in the creation of an effective regulation which will support necessary private investments in this area.

Regarding technological skills, the Slovak workforce has more jobs in technology and in knowledge-intensive sectors than the EU average to some extent, but 85% of companies struggle to hire a technology-skilled employee.

In order to further boost the growth of a digital economy, Slovakia will require a well-educated and skilled workforce when it comes to IT and digitisation, as such. Regarding skills availability, 54% of Slovaks have basic or above basic skills. Regarding technological skills, the Slovak workforce has more jobs in technology and in knowledge-intensive sectors than the EU average to some extent, but 85% of companies struggle to hire a technology-skilled employee. Addressing this challenge, Slovakia plans to introduce reform and necessary investments to tackle digital skills at all levels.

An important initiative towards building a resilient digital economy is the support of the digitisation of

SMEs through establishing a network of European Digital Innovation Hubs. The EU is focused on building strategic digital capacities across the continent and facilitating a wide deployment of digital innovations to benefit Europe's businesses and citizens. These hubs should support digital capacity building in regional SMEs, ensuring an appropriate uptake of AI, HPC, cloud solutions, data sharing and cybersecurity by all industry and public sector organisations in order to strengthen the EU's strategic autonomy.

Our ambition is to launch a new pre-exascale supercomputer that will be one of Europe's fastest computer systems. Thanks to our close partnership with business and academia, we feel encouraged to aim at building a system with theoretical computing power up to 240 Petaflops and to offer this capacity to research institutions, small and medium sized enterprises and public administration. Our intention is to use European tech components, including microchips, and thus enforce European strategic autonomy in the technological area and decrease our dependency on imports from third countries.

An important initiative towards building a resilient digital economy is the support of the digitization of SMEs through establishing a network of European Digital Innovation Hubs.

Other disruptive technology shaping the current transformation is quantum communication infrastructure as a necessary element of providing secure communication. Slovakia is already engaged in the European cross-border project Quapital and has established the first functioning quantum connection between two capitals in the world, Bratislava and Vienna. The aim in the foreseeable future is to expand the quantum communication infrastructure between R&D institutions in Slovakia and consequently with neighbouring countries across the region.

Governments and societies need technology to verify the authenticity of information. Blockchain is the new key paradigm for making data trustworthy. Slovakia is a member of the European Blockchain Partnership (EBP) and a provider of one of the nodes for European Blockchain Services Infrastructure (EBSI). So far, flagship projects include diplomas, documentation, a European self-sovereign identity framework, notarisation, and trusted data sharing. However, it is expected that most of the cross-border European services will be provided via EBSI in the near future.

Global disruptive tech trends have the ability to greatly contribute to the development of economies and societies at large. It is important that the EU aims at

seizing the opportunities offered by AI, cybersecurity, robotics, blockchain, quantum communication, high-performance computing, and many other strategic digital areas. Only by understanding and grasping the potential of these digital instruments can we jointly catch-up with the global frontrunners.

Introduction



Alena Kudzko

Director, GLOBSEC Policy Institute

The Covid-19 pandemic has taught us numerous lessons, namely that our ideas about the future, including its shape and pace of change, and how we should respond to it are not up to task. Even though uncertainty and disruption have always been here with us, the pandemic is a reminder of the cost that is endured if societies fail to adequately account for and prepare for risks.

Technological progress, including its intended goals and unintended externalities, remains integral to governments, business executives and society generally. Central and Eastern Europe (CEE) is no exception.

“Central and Eastern Europe faces a dual challenge in envisioning its future and trying to shape it.”

Central and Eastern Europe faces a dual challenge in envisioning its future and trying to shape it. The core of the challenge it is not unique to the region: technology is generally increasingly critical to determining the relative economic and social progress of countries. Societies must decide whether technological innovation is to happen to them or come through their conscious efforts to steer the development and application of technologies aimed at optimizing benefits and mitigating risks.

In CEE, this ubiquitous challenge is additionally compounded by a local predicament: the region is already hard pressed in its mission to undergo an economic paradigm shift. For the past couple decades, a model based on manufacturing, cheap labour and embeddedness in global supply chains has delivered stable economic growth and contributed to the region's success. The excellence in supplying “hardware”, nevertheless, is no longer necessarily a pipeline to prosperity in a “software” world.

If the region is to succeed, it needs to upgrade its capacities to both integrate technologies developed elsewhere and innovate at home. GLOBSEC, against this backdrop, is launching a new initiative that will focus on shaping the region's technological vision, designing concrete actions needed to achieve these goals and bringing together a community of entrepreneurs, policy-makers, innovators and societal actors to begin making this vision a reality.

The initiative will encompass a two-pronged approach. One track of our work will explore the most consequential and influential tech trends and examine how they are reflected in and what they entail for the region and the challenges and opportunities they bring. We will analyse the ways in which CEE is performing well and developments that the region can benefit from including issues that it needs to be aware of even if it is not yet prepared to respond to them.

“The excellence in supplying “hardware”, nevertheless, is no longer necessarily a pipeline to prosperity in a “software” world.”

Analysing trends will help us better understand and imagine potential futures for the region. But as Warren Buffett quipped, “predicting the rain does not count... building arks does”. While a thorough understanding of patterns and a forecast of possible scenarios represents a necessary first step, this exercise will be incomplete without a set of actions targeted to minimizing risks and capitalizing on opportunities.

Another track of our work, therefore, will be tailored towards developing an innovative regional ecosystem. We will propose concrete solutions to governments, businesses and other stakeholders and jointly drive innovation-based growth in CEE.

This publication is an “appetizer” to the course of work that will be pursued over the next several months. We

surveyed stakeholders across the region who were invited to share their assessment of global trends and their ramifications for the region. The report, consequently, provides a glimpse into key trends that are already set to define technological progress and the extent to which they are (not) heeded in the region.

This report is by no means conclusive or definitive. To the contrary, we want to stir reflection and stimulate a broader discussion on phenomena that will subsequently contribute to a more comprehensive assessment.

“GLOBSEC is launching a new initiative that will focus on shaping the region's technological vision, designing concrete actions needed to achieve these goals, and bringing together a community of entrepreneurs, policy-makers, innovators and societal actors to begin making this vision a reality.”

Even this scratching of the surface showcases how rapidly technology is developing and the magnitude of the work ahead of us. This is no reason to despair but rather should provide impetus to identify opportunities and embrace them. CEE can benefit from the vast array of preconditions it has fulfilled in preparation for further tech-driven transformation. To bridge the gap between vision and reality, the region, however, needs to start taking advantage of global tech trends and become a trend setter itself.

Disruptive Tech Trends: What Are They?

#1 AI-Driven Future

Artificial Intelligence (AI) is the ability of a device to exhibit human-like abilities, such as thinking, learning, planning, and creativity. Thanks to AI, technical systems can recognise a given environment and solve what they identify as a problem, while acting to achieve a specific goal.

AI can be used across a wide range of areas including healthcare, transport, manufacturing, agriculture and farming and even public administration. However, AI also presents significant ethical and socio-political challenges, related to issues such as autonomous weapons, global security, and the negative impact on the labour market.

#2 5G: Made for Innovation

The ability of 5G to support high volumes of data traffic and large numbers of users makes it a powerful enabler of the Internet of Things (IoT).

5G can have a transformational impact on sectors, including mobility, healthcare, manufacturing, and retail. The use cases identified in these four commercial domains alone could boost global GDP by \$1.2 trillion to \$2 trillion by 2030. It will therefore be essential to fully utilise the potential of 5G beyond the coverage capabilities, so that it can become a major force for innovation.

#3 Robotic Process Automation

Robotic process automation (RPA) is a technology which emulates human behaviour when managing digital systems and software. Automated programs can execute tasks which are repetitive, such as filling out simple forms, copying, moving, removing files, logging into systems, and analysing reports.

On top of that, RPA can also chat and understand data.

This is one of the fastest growing IT areas with easily implementable solutions; however, for it to work, the problems we are trying to solve have to be defined correctly.

#4 FinTech Revolution

Fintech represents technologies that deal with financial services in any way. The recent progress in this area significantly undermines traditional banking with cheaper services, simplicity, and innovation. As a result, traditional banks are pushed to become innovators themselves, otherwise they risk lagging behind. One party who benefits from this competition is the customer, who has more freedom and flexibility than ever before and can now choose the financial services they need.

Some of the major disruptions in this area include the rise of cryptocurrencies, increased financial security, fast bank transfers and digital banks. Other anticipated trends are lightning transfers, a more massive introduction of AI into banking services and even higher security.

#5 Renewable Energy Systems

Renewable energy sources are those that are naturally renewed during their use. These are energy flows that occur naturally close to the earth's surface, with reserves that recover at least as fast as they are consumed. In connection with this trend, in today's modern world, smart energy, which is the process of using devices for energy-efficiency, is proving to be increasingly important, and companies with a prudent focus are making intelligent energy systems a top priority. This increased investment in intelligent energy systems brings many benefits to consumers and the environment, as well as energy providers.

#6 Augmented & Virtual Reality

Augmented Reality (AR) and Virtual Reality (VR) bridge the digital and physical worlds. They allow individuals to take in information and content visually, in the same way as they perceive the real world.

AR adds digital elements to a live view, often by using the camera on a smartphone. In comparison, VR implies a complete immersion experience that shuts out the physical world and lets us experience what it's like to go anywhere.

AR and VR are likely to have a massive impact on a wide range of industries ranging from education, healthcare and architecture to many others.

#7 Food Security

Climate change, the world's growing population, depletion of agricultural areas, urbanisation, and a growing demand for quality food all highlight the increasing importance of a progressive approach towards food security.

Technological advances in precision agriculture, improved seeds, irrigation systems and indoor farming will be needed to counterbalance the looming risk of food scarcity. These types of innovative solutions and many others are needed to push sustainable food production forward and end hunger in the world.

#1 AI-Driven Future



Vladimír Šucha

Senior Policy Advisor, UNESCO

extremely fast, and some of the elements of what we consider as being for the longer-term may already be with us in the next 5-10 years. If we wake up too late, there will be little room left for policymakers to influence the future with AI.

“If we wake up too late, there will be little room left for policymakers to influence the future with AI.”

We hereby propose a set of actions that could be implemented at an EU level (as suggested in our report [Humans and Societies in the Age of Artificial Intelligence](#)) and which may also serve as an inspiration for similar actions to be carried out at national or regional levels across Central and Eastern Europe. Begin to reflect on new ways of developing regulations where policymakers, with the support of regulatory scientists, could follow much more closely the development of new technologies and work in parallel in the elaboration of needed regulations. Feasibility studies and inter-institutional working groups should be established in this respect.

- Develop a new set of skills for public administrators to enable them to better use the opportunities to better address the challenges that will emerge with AI. The work on new skills should start as soon as possible, in close cooperation with EU Member states and international organisations such as the OECD and UNESCO.
- Launch pilot projects to test a more systematic use of AI systems for ex-ante policy impact assessments and ex-post evaluations. Under this framework, an experiment should also be carried out in close cooperation with video game developers to develop tools that would translate dry technical descriptions of the potential impacts of policy options and provide visual experiences of these impacts on countries, regions and communities to policymakers as well as to citizens in order to facilitate debate and decision-making.
- Countries should develop a new model for education based on a 'whole brain' approach and include a strong component of social and emotional learning. A strong attention should be paid to emotional and psychological resilience, creativity, and people's ability to adapt to change.



Jean-Philippe Gammel

Directorate for Talent Management and Diversity, European Commission

The potential impacts of AI on society are huge and difficult to predict, and they have without doubt become a hot topic for discussion. However, most of the ongoing debate is focused on the short and medium-term effects. At the same time, labs developing AI systems are moving

- Explore the feasibility and effectiveness of various measures, tools and methods that could ensure that nudging by AI systems, including nudging for good, would only be possible based on explicit consent and opt-in mechanisms.
- Examine the relevance and feasibility of supporting the development of 'customer defending entities' that would analyse customer behaviour with AI techniques to counterbalance the analytical power of corporations having access to the data of millions of customers.
- Launch policy experiments similar to Experimental Finland to test innovative policies in close cooperation with stakeholders and citizens.

These solutions should go hand-in-hand with promoting AI-based solutions for public good and launching foresight exercises to explore future scenarios to better inform policy-making. At the same time, governments should work on strengthening their AI knowledge base and assess the impacts of AI systems.

“Countries should develop a new model for education based on a 'whole brain' approach and include a strong component of social and emotional learning.”

We can shape a better future for CEE only if we take the development of AI seriously - and the time is ticking.



Mária Bielíková

Director General, KInIT

Artificial Intelligence (AI) brings a great opportunity, especially for disruptive innovation by means of products and services, that can add value to almost every area of our life. They create a new business model through which individuals can effectively share their assets. They optimise products using data from the environment or previous interactions. A machine can search patterns in data that humans do not notice due to the enormous volume of data and the way that human thinking is based on cognitive abbreviations. People, however, can come to interesting conclusions that a machine will not detect from data due to machines missing or misunderstanding context. A unique opportunity to improve our lives is therefore created by interconnecting humans and AI.

“A unique opportunity to improve our lives is created by interconnecting humans and AI.”

To develop AI we need good quality data: programmers who design machine learning algorithms, those who dream up innovation, and strong computing infrastructure for training machine learning models. Each of these elements is important, but perhaps the biggest challenge is finding the skilled workers – the enthusiastic experts willing to look for everyday opportunities to involve AI in improving the already existing situation or within new solutions.

There is a huge potential for the use of AI within Central and Eastern Europe. Workers in the region are very skilled - several indexes prove this, and so do the number of locations in the world where they have found employment. There is an excellent background of small

and medium-sized businesses and a well-developing start-up scene. The risk of change in professions due to automation is relatively high there - this is a problem on the one hand, but also an opportunity to accelerate new business on the other.

The power of AI to bring good is combined with the risks caused by poor transparency and robustness.

Stronger support from governments falls short - whether it is the support for the creation of data of good quality, access to computing infrastructure, or talented AI experts. There is also a great lack of support for entrepreneurs who are not afraid of failing and putting their own resources and knowhow into new products, as well as in support for the research and education of experts in AI. Members of the Visegrad Group in particular, have serious limitations in this area.

I do not think Central and Eastern Europe is somehow specific in applying AI: there are clear opportunities in B2B solutions, robotics, and industry. The most significant area is within healthcare, where the benefits of AI are very evident. Security is another topic of interest, as several major global companies operate in CEE. And given the particularities of some countries in the region, detecting corruption by means of AI is a topic that could be interesting and contribute towards the reinforcement of democracy in this part of Europe.

Technologies related to AI, in the main machine learning, have overtaken science, even though scientific knowledge was the impulse. The decades-long approach based on the explicit knowledge representation which follows human logic was replaced or combined with a data-driven approach based on the contribution of millions of small interactions that produce a result. In many cases, data-driven solutions work surprisingly well, although we do not quite understand why it is so. As a consequence, the robustness and transparency and associated explainability and communication of the capabilities and limitations of AI systems show the principal challenge to the trustworthiness of AI.

We need to transfer ethical values into AI projects so that we capture our moral principles within them.

AI is a huge opportunity. The power of AI to bring good is combined with the risks caused by poor transparency and robustness in particular. The solution would be to transfer ethical values into projects so that we capture our moral principles within them, i.e., the voice of conscience, that one which every researcher and innovator should listen to.

#2 5G: Made for Innovation



Roland Jakab

Head of Strategy for Central Europe, Ericsson

The unprecedented events of 2020 have made the critical role that connectivity plays in our lives more apparent than ever before. Networks have become lifelines not only for each of us as individuals but also for countless enterprises around the globe. Though the sudden, dramatic changes in our behaviour these past few months have resulted in rapidly shifting capacity needs, new peak hours, and so on, networks have proven to be highly resilient. Looking ahead, 5G pushes the frontier of the digital transformation of industries and the public sector, and has the potential to unlock a new wealth of innovation and to decarbonise Europe's economy. As an open innovation platform, 5G provides the critical digital infrastructure needed to help countries achieve a sustainable, resilient, and inclusive economic recovery

As an open innovation platform, 5G provides the critical digital infrastructure needed to help countries achieve a sustainable, resilient, and inclusive economic recovery.

At Ericsson, we are leading by example. Last year, we opened our most advanced factory yet, this time in Lewisville, Texas, demonstrating the potential of 5G in leveraging real time operational data and enabling intelligent automation. We invested in high-efficiency

mechanical and electrical systems that are designed to enable the factory to operate with up to 24 percent less energy use than comparable buildings, lowering the operational carbon emissions of the factory. It is also important to note that the combination of on-site solar and green e-certified renewable electricity procured from the utility grid means the facility is powered 100 percent by renewable electricity. We are also driving the industry momentum toward cognitive networks by developing proof of concepts to demonstrate the value add of AI in network operations. To realise the full potential of AI, trust needs to be established in the development, deployment and use of AI.

'Imagine networks that run themselves, optimise themselves, solve problems autonomously. That's where we are heading, and we are going there with speed.'

One of the key opportunities driven by 5G is the infrastructure development that governments in CEE could motivate and incentivize.

Taking into account all of the above, we can clearly see that as 5G, IoT, AI and Edge Computing gain traction, the shift that transforms industries and enterprises becomes a reality. Around the world, government efforts to regulate the ICT sector are broadening, as issues related to network regulation, spectrum allocations, data flows, cybersecurity, AI, privacy and trade continue to drive policy in markets around the world. The COVID-19 epidemic has shown that countries that consciously use digital technologies will be able to stand up and keep up the pace in international competition.

One of the key opportunities driven by 5G is the infrastructure development that governments in CEE could motivate and incentivise. A good network quality creates the conditions for the spread of modern technologies and contributes to the growth of investment. In order to spread 5G and realise its full potential, it is recommended to support and encourage the deployment of 5G Fixed Wireless Access solutions in rural areas in order to develop broadband coverage and make rural areas more attractive for investment. Europe needs the 5G mid-band deployments now that are required for full 5G performance. This is the way that leading markets are deploying 5G today.

Incentives for further deployment can be the following:

- Supporting the construction of 5G private networks in university areas, industrial parks, logistics centres, factories
- Supporting the deployment of 5G private networks specifically for SMEs
- Supporting the creation of 5G Innovation Hubs, where SMEs can get advice and view concrete solutions and demos on the potential of 5G

This goes hand in hand with competence development. By continuously improving citizens' digital competences and increasing user awareness, as well as the digital skills of employees, it is necessary to increase the proportion of digitally trained employees and the number of IT professionals, and to reduce the number of those digitally disadvantaged.

Europe needs the 5G mid-band deployments now that are required for full 5G performance. This is the way that leading markets are deploying 5G today.

Digitisation of the economy is another key factor. The aim is to increase the digital preparedness of enterprises, the integration of digital technology, encourage the development and spread of innovative digital solutions in all sectors, and improve the performance of domestic SMEs operating in the ICT sector, especially startups. This would result in an accelerated support for the data economy.

Last but not least, the digitisation of public services will be a cornerstone for success. Governments need to expand the range of customer-friendly digital public services among the population and businesses, as well as increase the efficiency of administrative back-office processes by supporting automation and creating a network of interoperable data connections required for data-based operation.

#3 Robotic Process Automation



Razvan Atim

General Manager, UiPath

The pandemic has accelerated the appetite for digitalisation and has increased the adoption of Artificial Intelligence (AI) across Central and Eastern Europe. This is because companies and their employees are increasingly relying on automation to optimise business processes, speed up transactions and increase the accuracy of operations, while handling large volumes of tasks. Equally important, automation helps relieve overburdened office workers and boosts productivity and job satisfaction. The UiPath platform supports the creation and use of software robots that can take on those repetitive, time-consuming, rule-based tasks, and allows employees to focus on the creative part of their jobs and spend more time with customers or tend to patients, instead of doing admin work.

'More Time to Focus on What Matters'

Automation can make a difference everywhere where there are people who spend their time in the office processing data manually, under pressure to perform under tight deadlines and dealing with large backlogs of tasks. While some sectors have been at the forefront of automation adoption, such as finance and banking, insurance, telecom, manufacturing and more, virtually all sectors can benefit from automation. Public sector

organisations that have implemented automation solutions and healthcare institutions, such as The Mater Misericordiae University Hospital in Dublin, Ireland, have soon discovered that the technology allows overworked staff to focus on providing care and making a difference in the lives of citizens and patients.

While some sectors have been at the forefront of automation adoption, such as finance and banking, insurance, telecom, manufacturing and more, virtually all sectors can benefit from automation.

However, if we are to name the biggest gain for people, businesses and governments, that would be 'more time to focus on what matters.' Automation makes for happier employees who can use their time on those tasks that bring them a feeling of fulfilment, be they creative or customer-facing ones, increasing the competitiveness of the companies they work for. Very often that translates into better services for the end customer or citizens. When robots take over repetitive tasks, speed of delivery increases, enabling employees to offer fast resolutions to urgent requests, even amid peaks in activity. Equally important, a drop in errors means less investment going in to fixing those problems, saving businesses and organisations money, and making them more competitive.

Software robots can be used to reduce bureaucracy, ensure the transparency of data and manage the end-to-end RPA that spans departments, streamlining operations.

Not least, when employees have access to a low-code automation platform they can both create and consume automation, using their expertise to improve processes and build automations that they know will make their work more enjoyable. When supporting robotic process automation (RPA) training programmes, businesses and public sector organisations are making a sound investment in the future of their employees, while future-proofing their operations. This, in turn, creates an environment that prizes innovation and rewards creativity and an entrepreneurial spirit, bringing new opportunities for technology adoption.

Opportunities & Risks in CEE

Demand for digitalisation is very consistent from both businesses and public sector organisations, due both to the benefits to customers and citizens, as well as to a need to compete at a global level. Making automation a core part of their digitalisation strategy is the biggest opportunity, and one that can have a lasting impact. Software robots can be used to reduce bureaucracy, ensure the transparency of data and manage the end-to-end RPA that spans departments, streamlining operations.

The only risk associated with automation adoption would be to fail to notice its huge transformative power as a technology; and miss out on the chance to create an impact sooner.

Preparing for the Future of Workforce

Firstly, both businesses and governments need to start by making a thorough assessment of the pain points of their employees, customers and citizens. Then, they should make an audit of the costs involved in fixing those and compare that with those of employing an automated solution, which would provide unparalleled speed, accuracy, and run 24/7.

The only risk associated with automation adoption would be to fail to notice its huge transformative power as a technology; and miss out on the chance to create an impact sooner.

Secondly, stakeholders should become fully aware of the huge competitive advantage brought to businesses and public sector organisations by automation. Next, they should know that the sooner they begin with automation and become early adopters, the bigger their say will be in the future of work, which is being irreversibly shaped by automation and supporting technologies, such as AI and Machine Learning (ML) and more. But, most importantly, that by supporting RPA education via short courses, traineeships and certified courses, businesses and governments are helping the workforce of the future to become better prepared for change, more diverse and more inclusive.

#4 FinTech Revolution



Katarína Kakalíková

Government Engagement Director, Mastercard

Grasping the Opportunity for Fintechs to Flourish in Central and Eastern Europe

Around the world, we have witnessed the use of financial technology and its contribution to employment and economic output rise, with consumers, businesses and governments embracing digital technology. Efficiency gains, increased transparency, and improved financial access and inclusion while providing exceptional user experience are among the key motivators for this development. Driven by the need for remote commerce and contactless interactions, this trajectory has been further accelerated by the COVID-19 pandemic. 79% of respondents told us in a recent Mastercard study that they were using contactless payments, citing safety and cleanliness as key drivers.

FinTechs need investment to ensure they can access capital to grow. This applies to both small and medium-sized enterprises looking to digitise, but also to larger organisations looking to scale.

Consumers in Central and Eastern Europe (CEE), and beyond, have confirmed their intention to continue using technology. For example, almost 7 out of 10 consumers say the shift to digital payments will likely be permanent, and nearly half of consumers plan to use cash less, even after the pandemic subsidies. This is a trend that is expected to stick. It presents an opportunity for FinTechs to capitalise on the demand for digital services both domestically and further afield, and is a chance for the region to shift away from its economic reliance on car manufacturing/assembly to becoming a regional hub for FinTechs.

FinTechs are contributing to the rapid digital transformation that makes consumers' lives more convenient, simpler, and rewarding. In CEE, there is a growing group of FinTechs which have proved to be responsive to these changes. As an experience-centric company, Mastercard is supporting this creative disruption and has become the partner of choice for 97% of top FinTech brands in Europe and North America. We have done this by opening the door to our considerable industry expertise, technology, global standards and connections to help FinTechs rise to the next level, quickly. Together, we are shaping the future of commerce and delivering frictionless experiences that bring value to consumers, businesses large and small, and customers across different industries.

More open, adaptable and flexible regulations can help create a more favourable environment for FinTechs, while continuing to safeguard the necessary security of the financial sector.

For FinTechs and digital technology to flourish, a strategic approach is needed to overcome the barriers they face. FinTechs need investment to ensure they can access capital to grow. This applies to both small and medium-sized enterprises looking to digitise, but also to larger organisations looking to scale. There is also the matter of talent: ensuring that digital skills are core to education, that retraining opportunities are created and that citizens are provided with capability training to create an inclusive digital economy.

Enabling a legal and regulatory framework is also important to foster innovation. Regulatory ambiguity and challenging regulatory hurdles are often too large an obstacle for FinTechs to grow. More open, adaptable and flexible regulators can help create a more favourable

environment for FinTechs, while continuing to safeguard the necessary security of the financial sector. Active communication between regulators and innovators is vital to increase understanding of the dynamic developments of the sector, and ultimately supports the implementation of modern technologies in the market. The National Bank of Slovakia with its innovation hub provides a good example of such practice. FinTech Hub Slovakia, co-founded by Mastercard, Vacuum Labs and Slovak Fintech Association, strives to closely cooperate with the National Bank and create an ecosystem that would support Slovakia as a gateway for FinTechs in the region and potentially in wider Europe.

Many governments have recognised that they have a role to play if they are to capitalise on the opportunity financial technology presents to create economic growth. We know from our experience of working with governments in over 200 countries that national digital strategies and public private partnerships will be major drivers of success. Focusing in on CEE, Czechia was the first government to sign a Digital Country Partnership with Mastercard, taking a strategic approach to technology, and ensuring it plays a key role in supporting inclusive growth in the country.

There is inspiring work happening across CEE, but for the region to truly grasp this opportunity, cooperation and collaboration from all players in the ecosystem is necessary. From governments to central banks, from corporations to start-ups, and from financial institutions to regulators, this opportunity is upon us now and we must move forward together if we are to succeed.



Oscar Sanz-Paris

Managing Principal, Castille Capital

The Future of Fintech is Already Here

The pandemic has accelerated the inevitable transition to a digital economy. Like in any industrial revolution, machines increase productivity commodifying certain business areas and opening new ones. The survival of any organisation depends on its ability to outperform competitors and marketplaces in attracting and rewarding talent, ideas and capital. In the end everything comes down to EFFICIENCY: increased productivity of resources and lower costs. Furthermore, technological advances facilitate exciting ways of doing new things – and here is where the true challenge and opportunity lies; to allow unhinged creativity's multiplier effect to flourish. These innovations will explode economic growth in those jurisdictions that allow it, bringing huge competitive advantages for those economies.

“The finance sector has been an early adopter of digital innovation, and nowadays there is a myriad of specialised sub-sectors: RegTech, InsurTech, PropTech, Decentralised Finance (DeFi).”

The finance sector has been an early adopter of digital innovation, and nowadays there is a myriad of specialised sub-sectors: RegTech, InsurTech, PropTech, Decentralised Finance (DeFi)... the list keeps growing. Technology is already maturing in certain segments: data is efficiently harvested, shared (open Banking and APIs)

and processed via AI algorithms; more and more tasks are being automated: client-facing bots, documentation processing using natural language processing (NLP), web scraping for compliance searches, and so on. The industry is increasingly complementing humans with Artificial Intelligence (rather than replacing it).

New technology and a lack of legacy systems has allowed new entrants to gain market share from traditional banks, developing faster and more efficient payment systems, expanded into credit and asset management. After the 2008 financial crisis which damaged banks' image, portraying them as inherently unstable institutions, banks understood their desperate need for metamorphosis with only minimal disruption to their existing business. Their answer to arms-length innovation has been setting up 'innovation hubs'.

Why Has EU Innovation Not Taken-off?

The growing importance and market share of these new participants has attracted regulators' attention. The UK regulators led the way with the introduction of SandBox and open banking regulations. Although these have now largely been copied in other jurisdictions, the UK's early mover advantage is reflected in its large and vibrant FinTech ecosystem.

The U.S. is taking a laissez-faire approach, allowing self-regulation and competition. This approach works particularly well in fostering rapid innovation. It requires a degree of loss acceptance, however, given the tech gamification mentality of 'try first, say sorry later'.

“CBDCs have the potential to cut global financial industry operating expenses, achieve greater financial inclusion, and much more.”

The EU is consistently leading the way in legislation and regulatory efforts addressing data privacy concerns (GDPR), and crypto-assets (EC's Digital Finance Strategy, September 2020). In an interconnected and global digital world, these have become the global benchmarks. Despite these efforts, and the high quality of human capital, to date the EU remains the laggard in fintech innovation and investment, well behind both the U.S. and China. Whilst clear rules are a competitive advantage, attracting mature players who want to scale up, perhaps this approach suppresses the playfulness required in early innovation.

The End of Banking as We Know It

The greatest innovation development we are witnessing is Decentralised Finance (DeFi), with more efficient proof protocols (staking), smart contracts and automated market makers. Entrepreneurs are building an experimental world of Decentralised Finance (DeFi) in a playful/gamified manner: an autonomous financial ecosystem free of established layers of costs or the red tape/bureaucracy of central authorities, and yet open; transparent but maintaining privacy, all within a robust cybersecurity framework. Under this third wave of technological change, intermediaries will still be able to add value to transactions, but the nature of intermediation has fundamentally changed.

DeFi feels like the wild west at the moment, and governments and central banks are moving in, partly to reign in bad actors, and partly due to fear of losing control of the monetary system. Whatever the motivation, it marks the epoch for govcoins (or CBDCs) and the ultimate demise of traditional commercial banks.

“A world without banks is visible on the horizon, with tech companies, capital markets and decentralised exchanges taking over banks' last remaining *raison d'être*.”

CBDCs have the potential to cut global financial industry operating expenses, achieve greater financial inclusion, and much more. Their true power (and danger) - expanding governments' monetary toolkit - lie in e-money's programmability: its ability to constrain uses, to add an expiry date, to target a specific behaviour with rewards.

There are genuine and valid concerns regarding the potential of CBDC as a panopticon for the state to control its citizens (imagine Orwell's Oceania granting instant e-fines for bad behaviour, reducing your ledger), and for banking system destabilisation (absorbing liquidity and creating a centralised capital allocation). The former raises vast social-political considerations well beyond the technological realm; the latter is very addressable as the financial services ecosystem becomes more varied and independent from an oligopoly of big banks.

A world without banks is visible on the horizon, with tech companies, capital markets and decentralised exchanges taking over banks' last remaining *raison d'être*. Legislators and regulators can support this inevitable transition by beefing up privacy laws, reforming how central banks are run and preparing retail banks for a more peripheral role.

#5 Renewable Energy Systems



Nad'a Hartmann

Chairman of the Board & CEO, ESCO Slovensko, a. s., JV of CEZ ESCO and SPP

When discussing disruptive technology trends in CEE, it is important to be aware of their inevitable connection with the energy sector. Any technical, software or legislative measures will be ineffective in the event of a power outage. Terms such as “smart metering” and “smart grids” have come to the fore. In the following text, I will focus on the opportunities and benefits of photovoltaic power plants as one of the most promising trends revolutionising the energy sector.

Why Photovoltaic Systems?

We see photovoltaic power plants as a logical choice because, when properly combined with a backup source, they can cover short-term power outages, while serving the operator even in periods outside of potential outages. Photovoltaic systems installed on the roofs of buildings, especially on industrial sites, which have a high energy demand, bring significant energy savings and, most importantly, mean a long-term reduction in the site's carbon footprint. Carbon neutrality, set for 2050, clearly requires measures in every sector and especially in energy. Even though we still have almost 30 years ahead of us, it is high time for CEE, which is lagging behind Western Europe in this respect, to implement and put into

practice real changes to reduce CO2 emissions directly or indirectly.

Photovoltaic systems and their installation as a local source of electricity belong among the relatively most available technologies in CEE which have a significant impact on carbon footprints and, moreover, reduce costs. The elimination of short-term power outages or surges in electricity consumption is already provided today by a sufficiently powerful battery installed as part of the entire PV system. The delivery of technology financed from energy savings in a specified time horizon might be an additional advantage. It is this path which should be an innovative trend in CEE in the coming years.

The Future of Renewable Solar Energy in CEE

Photovoltaic systems using renewable solar energy can be installed in the geographical latitudes of CEE practically in any appropriate place. It is the most promising and easily accessible renewable energy system. The flexible scalability of photovoltaic panels combined with the possibility of using battery systems allows us to choose the power of the entire facility that is both needed and consumable. In addition, the prices of PV panels have dropped significantly over the last decade and their lifetime has increased, which means that we are approaching an average 10-year payback period on these investments.

“ It is high time for CEE to implement and put into practice real changes to reduce CO2 emissions directly or indirectly. ”

Recognising these advantages, and under the pressure caused by the necessary reduction of our carbon footprint, the energy sector in Slovakia and also in CEE demonstrates the objectives of carbon neutrality policies rather easily. All solutions and technological systems obviously have their own risks and negative impacts on the environment. In this case, it is necessary to solve the low-carbon recycling of PV panels and ideally the so-called second life battery systems.

How Can Businesses and Governments Support This Trend

In Slovakia, due to the long-term technical problems caused by distribution networks and the so-called stop-state of connecting new sources to the grid, the development of the use of such photovoltaic systems for companies was subdued. The situation has only recently begun to ease, but it is still necessary to adapt the relevant legislation to new trends. In the Czech Republic, they are more flexible in this matter and the legislation is more favourable.

“ Photovoltaic systems installed on the roofs of buildings can bring significant energy savings and, most importantly, mean a long-term reduction in the site's carbon footprint. ”

I think that companies, given the right financing and, of course, the availability of suitable technical and legislative conditions for installation, will welcome such trends and will be ready to use them.

#6 Augmented & Virtual Reality



Ján Hrončák

Co-founder & CEO, Akular

Why focus on the AR/VR industry in the CEE region? Why focus on AR/VR in general? Ask yourself a question. Would you invest in the automotive industry and its infrastructure a hundred years ago? AR/VR has moved from geeky innovation in university laboratories to millions of end users in the last decade, attracting interest from the biggest players in the technology industry, and yet we are still at the very beginning of its journey. Seeing the first cars on the road was clearly a sign of fundamental change in how our society and business would operate, and AR/VR technology will have an even more profound impact, because it allows us to travel not by 100km/h but by the speed of light already today.

Cities are already engaging citizens through geo-located AR experiences, such as the city of Kežmarok with their AR gallery available to anybody with a mobile phone walking through the city centre.

AR/VR has touched and will have a massive impact on every single industry and aspect of our lives, from education, manufacturing, banking, architecture, construction, defence and healthcare, to entertainment, tourism, art and design, and even religion. Being able to be present anywhere in any given time within a blink of an eye, or having all relevant information available

within the context of the real world provides us with unprecedented opportunity. State representatives, city officials and business leaders should pay strong attention to this industry as it is one of the foundations of the new metaverse of tomorrow in which digital and real-world realms will seamlessly blend and where modern society and next generations will live. The pandemic has certainly sped up this transition.

Europe and CEE have to catch up with the rest of the world on the technology side, but the region has a rich tradition in academic VR/AR research and is also the place where niche and high-precision technologies are developed. This valuable mix of diverse languages and cultures also inspires creative content creation. 3D modellers and 3D artists are essential for virtual experiences, and in a way, they have become modern day craftsmen. Thanks to many successful 3D visual studios present in the region, there is no shortage of this technology.

Immersive education provides a strong stimulus and helps us learn much faster. Great local examples with global reach are Virtual Medicine and Lifeliqe. Digital skills are already as needed as reading and writing, and VR/AR are their natural extension. This type of education will be essential to keep up with the rest of the world. Businesses already harvest great added value from VR trainings; the automotive industry, strongly present in our region, has started to embrace this opportunity and will continue to do so. Higher safety, less errors, and faster design iteration gives competitive edge to all businesses.

The forecast global growth rate of the AR/VR industry for the next decade is for growth at over a 30% compound annual growth rate.

Telling stories cannot be more immersive and captivating, and with such rich cultural and natural heritage, AR/VR enhanced tourism will flourish. Cities are already engaging citizens through geo-located AR experiences, such as the city of Kežmarok with their AR gallery available to anybody with a mobile phone walking through the city centre.

Increasingly important public involvement in urban development and real estate projects are greatly enhanced by the Akular AR platform, which helps to engage the public and improves the design, build and operations of real estate by visualising buildings at their actual size before they are built on their future location.

Soon you won't be able to build without visualising your project to the public beforehand.

Though AR/VR space is dominated by tech giants, diverse demands from business customers provide opportunities for emerging players. The CEE region has created some of the world's greatest VR successes, and many young, talented individuals are keen on and look forward to developing AR/VR solutions. It is a cool thing to code. Beat Saber (the most popular VR title in the world, acquired by Facebook and which has its origins in the High Tatras) and the recent acquisition of Capturing Reality by Epic are proving this point.

A fast-growing global demand for AR/VR, a highly qualified workforce, skilled professionals, passionate entrepreneurs and lower costs compared to other European countries create ideal conditions for AR/VR investments in the CEE.

The forecast global growth rate of the AR/VR industry for the next decade is for growth at over a 30% compound annual growth rate. A fast growing global demand for AR/VR, a highly qualified workforce, skilled professionals, passionate entrepreneurs and lower costs compared to other European countries create ideal conditions for AR/VR investments in the CEE.

So would you rather drive a car or fly virtually anywhere?

#7 Food Security



Joerg Bauer

CEO & President, Tungsram Group

Closed-system farming helps tackle the biggest challenges in global food supply security. Climate change, causing extreme weather conditions in certain areas, overpopulation, soil contamination, the depletion of areas suitable for agricultural production, urbanisation, and the growing demand for quality food all point toward the increasing importance of local indoor farming and urban vertical farms. The world's population is predicted to reach 9.7 billion by 2050 (2 billion more than today), with most of the growth set to take place in Africa and developing countries where climate change hits the hardest. In just 10 years, humanity will need 50% more food than today (calculated with a current annual growth rate of 5%).

“Closed-system farming helps tackle the biggest challenges in global food supply security.”

We are convinced that outdoor farming alone will not be able to meet these challenges. The much needed technological advances of precision agriculture, improved seeds and irrigation will be needed to counterbalance the adverse impact of climate change alone: and innovative solutions designed to ensure food security must complement this huge undertaking. Indoor farming stands out as one of the best-suited solutions. Indoor farms are highly water-efficient installations that take up considerably less space, and are independent from

weather conditions and the change of seasons. Paired with other technology-driven solutions, these farms can be the guarantees of basic human well-being for billions of people, where basic well-being is defined by 2,200 calories of healthy, balanced food intake and 10 litres of water for drinking, basic hygiene and cooking per person a day.

However, for this exciting disruptive technology that is balanced on the thin line between agriculture, industry 4.0 and digital technology to provide real global solutions and to be able to produce staple food for the masses, including integrated ecosystems that can feed animals in a sustainable way, a lot of innovation and investment is necessary. Humanity will have to embrace sources of food that go beyond the traditional approach, such as algae, bacteria or insects, which often have a much higher conversion rate of feed intake to edible food. By smartly combining different elements such as vertical farms, animal husbandry, insects, and fish, we can get very close to a zero-waste cluster with optimal productivity – allowing strategic autonomy even in countries with adverse climatic conditions.

“In just 10 years, humanity will need 50% more food than today.”

Although Central and Eastern Europe does not typically bear the brunt of the most severe consequences of climate change and food scarcity, an increasing number of European initiatives focus, for example, on the impact of the 24% decline in water sources on the continent in the last few years.

The CEE region could, however, play a much larger role than simply making the necessary investments to solve its own looming climate problems. I have always looked at the CEE region as a historically well-established bridge connecting Europe with developing countries in need and working closely with North Africa and the Middle East. It is up to the nations of this region - to us - to understand what happens to geopolitical stability if we fail to help these developing countries to deal with all the negative, sometimes catastrophic consequences of climate change and fast population growth. In addition to being our basic social responsibility and humanitarian obligation to offset these effects, it is also in our very own interest to act. Innovation is needed to propel sustainable food production forward and end hunger in the world.

Central and Eastern Europe's commitment therefore should be to become a global food security powerhouse that develops and starts scaling the solutions which will allow the citizens of developing countries to live a sustainable and worthwhile life in their home regions.

“Technological advances in precision agriculture, improved seeds and irrigation will be needed to counterbalance the adverse impact of climate change.”

What should governments and businesses in the region do to achieve this? They should acknowledge that the CEE region could potentially play a significant role in these solutions and provide funding for research and innovation to scale food security. This investment represents a tiny fraction of the financial burden we would have to shoulder if we don't do it now – and this can be done by leveraging existing EU funding. By doing so, we would all be working to make the world more liveable, and would be physically sowing the seeds of future human happiness.

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