

Transformative technologies and Slovakia's path towards an innovative economy

Accelerating innovation puts great demands on the private sector and its ability to adapt and to fully benefit from new technologies, as well as on political leadership striving to create an environment where innovative economy can flourish. We've decided to approach experts on the topic of innovation from the private as well as the public sphere, to find out which technology trends they perceive as most impactful for the near future and where do they see Slovakia's advantages and shortcomings in the digital era.

Q1 What technology changes have the biggest transformative potential to drive business, entrepreneurship and policies within the next few years?

Q2 What is Slovakia's greatest strength and greatest weakness compared to other European countries when it comes to digital and innovative economy?



NIMA MOTAZED
Swiss Re Management AG

Q1

Exponential growth of Machine learning/AI (this is where Swiss Re has huge expertise)

- The technology exists, however, the change comes from actually learning how to efficiently use it.
- Data science projects becoming the new normal and machine learning integration in all business processes.
- Experts in all areas will use data and ML/AI systems as they use Excel today.

Edge computing in conjunction with 5G, further cloud adoption and more powerful mobile devices & IoT – simplifying data transmission and lowering its costs and latency. It will change the architecture of business solutions and open the potential for more efficient and widespread usage of business-critical, real-time applications (also on mobile devices).

Nano Technology and self-driving cars, IoT - changing the overall risk landscape.

Quantum computing and its application in computationally heavy use cases – simulations,

cryptography, etc.
Upcoming potential/impacts

- Natural language processing/understanding (NLP/NLU), i.e. AI/ML systems that can extract information from non-structured texts.
- In many contexts accuracy of ML/AI systems is considered insufficient to make trustworthy decisions, e.g. 98% accuracy is not acceptable in big underwriting decisions. We need to learn to accept that AI is not perfect, but on par with human decision making if not better.

Q2

Education:

- Slovakia has a young, well-educated population that is hungry for success.
- The education system is not yet adapted to the needs of future ways of working, e.g. collaborative, connected, entrepreneurial.
- Education content brings in expert skills but is not agile enough to reflect the need for soft core skills, vital for the changing industry needs.

Industry:

- Transformation from heavy industry to IT/knowledge industry.
- Slovakia is fairly strong in IT & software development (vendor solutions), however the combination of IT & business expertise

needs to be grown & strengthened, i.e. from development to business solution architecture.

- Entrepreneurship (startups, innovation labs, etc.) is insufficiently encouraged from cultural and governmental perspective, which hinders speeding up of innovation.

Culture:

Slovak culture is sometimes holding back, e.g. trust in yourself, underestimate yourself.

- Being too shy in applying for positions that don't perfectly match the CV.
- Being humble in presenting success stories.



STEPHEN CAULFIELD
DELL

Q1

The rise of data being a company's most important asset after its people has transformed all companies into technology companies whether they realize it or not. Businesses that truly embrace this and look to leverage their data as a true differentiator in delivering business insights for the benefits of their customers are going to hold a big competitive advantage. The majority of successful start-ups are those

that have figured this out in their respective industries. This comes with challenges in how to legislate this as we have seen with numerous EU rulings in relation to data and how companies are using it in recent years. Policies in relation to data and data privacy are lagging behind the pace of transformation on the technology side.

Blockchain is a specific technology that clearly has the potential to disrupt, particularly in the traditional financial services industry.

Q2

Slovakia's greatest strength continues to be its highly skilled workforce and competitive labor costs continue to be advantageous for Slovakia. A natural aptitude for analytics lends itself very well as a baseline to acquiring in depth data science skills which are much sought after in the digital and innovative economy. There needs to be more support from government for the startup community if Slovakia is to truly compete around innovation with other European countries, I feel it is beginning to lag behind in this area. Embracing digitalization in the public sector i.e. walking the walk, would certainly help in this respect.



MARTIN MAŠTÁLÍK
CISCO Slovakia

Q1

I see big opportunity in the "Internet for the future". I believe that with all the recent technology and business changes, current internet is reaching its limits. Digital transformation is taxing today's Internet infrastructure to its breaking point, and we're about to hit an innovation barrier. We need to develop an Internet for the future.

By 2023, there will be 49 billion devices connected to the internet. Over the next decade



we will see the emergence and development of a range of technologies, from virtual and augmented reality, to 16K streaming, AI, 5G, 10G, quantum computing, adaptive and predictive cybersecurity, autonomous vehicles and intelligent IoT. Perhaps just as important are the applications and technologies that haven't yet been thought of.

These future generations of applications will drive new business opportunities and will create new potential for entrepreneurs. But they will bring new requirements and complexity beyond the capabilities current internet infrastructure can viably support. As we move into this new decade we need to rethink and reinvent the infrastructure of the Internet. We need to make it faster, more scalable, more economical, and simpler to manage and secure.

Security is an important priority overall – in order to build a truly digital business, you have to be sure that its digital foundation is built on secure infrastructure. Cybercrime is now causing economies three times greater losses than natural disasters globally so the demands on security are constantly growing. Reactive security, largely addressing problems only as they begin impacting systems, is not enough anymore. Organizations need to live with the new reality around "Zero Trust" and get ahead of the threats.

The original Zero Trust model, conceived by Forrester, is based on the principle that organizations do not trust anything inside or outside their network perimeter. Access is only granted to authorized users, devices and workloads after establishing trust and preventing threats — all without a decline in the user experience. This approach may become almost ubiquitous in the coming years. To sum it up: internet for the future is a big opportunity to drive business. Cybersecurity is a "must

have" to make the business safe and secure.

Q2

Recently published Digital Readiness Index study reveals strengths which Slovakia can build on. Our biggest advantage (according to the report) is skilled labor force that is able to support digital innovation – we are rated 34th globally in this criterion. This is very important since you can buy new technology in weeks, adapt new business models in months but it takes years to train skilled IT professionals who are able to understand the business needs of their company or institution. And digital innovation always requires both technology skills and business understanding.

Slovakia is also number 36 in technology adoption and we have technology infrastructure available to enable digital activities and connected consumers, giving us a solid foundation to develop innovation economy.

On the other hand, there are areas to be improved. According to The World Bank "Doing Business 2020" study, you need seven different procedures and 21 days spent to start a new business in Slovakia, which ranks us number 118 globally. In Estonia, which is one of the examples of digitally-driven economies, you need just three procedures and 3.5 days. This is what we should aim for in my opinion.



MARTIN UHNAK
SAPIE

Q1

We are currently witnessing the biggest movement in artificial intelligence, edge computing processing power and 5G. Breakthroughs in these areas enable vast opportunities to disrupt healthcare, manufacturing and agriculture; practical deployment of internet of things and autonomous driving and more.

AI is already part of our lives, whether we realize it or not. But the true potential is yet to be set into practice. For example, cloud AI will decrease cost on scientific experiments or remove the language barriers. By 2025, it is expected that 97 % of businesses will use AI.

5G is just around the corner and will be disruptive to IoT, the healthcare industry as well as smart cities. More than 58% of the world population will benefit from 5G within five years.

Q2

Slovak talent is still our great advantage even though we see a great gap in our educational system in comparison to Western European countries or the United States. Strong heritage of mathematics and physics from the previous regime is a good bottom line and our STEM (Science, Technology, Engineering, Mathematics) students belong to the best in the world.

However, lack of governmental attention and investment into education and science in the past 20 years has grown the gap supply and demand for technical workforce. The market is lacking thousands of technical people and private initiatives such as Butterfly Effect, Openlab and Mini Tech MBA have emerged to fill the demand. I'm worried that without a major governmental effort the gap will only rise.

Similar action is lacking in research funding, state digital services and simplification of the business environment.

Cooperation and knowledge sharing are also underdeveloped among businesses. For us at SAPIE, it is a priority to bring all players in the field closer and support their cooperation and joint learning process as superior to competition and exclusion. Entrepreneurial networks are essential in building a supportive ecosystem. That's why we started such an initiative last year with monthly Meet & Learn sessions for

our members and we have been receiving great feedback.



FILIP DŘÍMALKA
Digiskills.cz

Q1

The most significant change is no longer technology, but the way companies use it. Today, technologies are available to almost any company and they are cheaper, more affordable, and simpler. The problem is the level of digital skills and the ability to use these technologies properly. How long have we been talking about a paperless office? And yet there are piles of documents in our offices. How long about big data? And yet everyone is still working in Excel. I believe the technologies are already available and affordable today - be it computing power, office applications, or mobile devices. The question is how we can use them in our business.

However, if I should mention the three most important ones, these would be:

1. The new generation of Office 365 office applications that can absolutely change the way you work.
2. Process automation in the form of so-called RPA (robotic process automation) but also many other applications - even with the use of Slovak startups like Minit.io.
3. Work with data across the enterprise - using applications like Power BI, Qlik, or Tableau.

Q2

It depends on what you mean by "Slovakia." If you mean the government and its support for the digital economy, I think you are in a very similar position to ours in the Czech Republic and other countries. But if you mean people, the answer is clear. You have a lot of smart and creative people who create great technology companies and startups with a global impact. Also, technology professionals are actively involved in public affairs

(see Slovakia.digital initiative), which is the best advertising for the entire technology industry. But Slovakia (like us and other countries) needs far more of these people. That is why you need to support digital talents, new startups, and initiatives that focus on education and new competencies, far more intensively than now.



MIRIAM LETAŠIOVÁ
Ministry of Economy of
the Slovak Republic

Q1 Currently few key technologies such as the internet of things (IoT), artificial intelligence (AI), advanced robotics and 3D printing, are transforming global production systems. They stand out by their broad applications and impact in countries, industries and value chain. These technologies will keep their growing potential also in the near future. They are in various stages of technical development what is impacting their actual adoption in different industries.

A further key technological advance with major implications for the technology, media and telecommunications sectors is the next generation 5G communication standards. The impact of 5G will extend to virtually every industry, from manufacturing to healthcare, from retail to transportation. In order to gain full benefit from these technologies, businesses and government leaders will have to help not only with the improvement of technical readiness of these technologies but also with the education.

Necessary skilled workforce, building of wide framework of research, technology, innovation should all address the issues of data governance and cybersecurity. We need the global dialogue to shape a vision of future production that promotes economic growth and innovation in an inclusive and sustainable manner. Unless mankind will lead the development of AI in certain dangerous ways, there is a huge potential in various fields of business. In general, we can claim that mankind and its future existence will be digital and we are entering the digital age, which in many ways will be connected to the smart approach of technologies influencing our everyday lives.

Q2 I would start with the weaknesses and problems Slovakia has been facing in recent years. Slovakia has invested a significant amount of resources, national as well as European, in an attempt to start the innovative economy and move from the period of "assembly line" to the

age of knowledge economy. Unfortunately, due to the fragmentation of the incentives, rather low participation of private funding, insufficient administrative capacity to manage EU funding, the transformative potential and support of innovation is limited. This trend is pointed out also by the European commission and various assessments, where Slovakia remains ranked as a moderate innovator.

The importance of investments in education, training, improving of peoples skills and social infrastructures in order to get the workforce "ready for tomorrow" is not yet fully understood, consolidated and tailored to our needs. These key factors are pushing us out of the front line of innovative countries. These countries are successfully adopting the benefits of digitalization and innovative technologies and improving their competitiveness and fast future growth.

In order not to remain on the periphery, we have to set our priorities and visions. What is most important is to rebuild the cooperation and partnership of the government, the private sector and the whole society based on trust and common goals. Our greatest strength and potential lies in our people. People, who in spite of all the barriers and problems are enthusiastic, active and are showing to others, that it is possible to be successful in business and to do good and perspective things, pushing the entire country ahead. There are many examples of successful startups, innovative platforms, hubs, co-working places, smart initiatives, which are creating a vibrating ecosystem not just in Bratislava, but also in the regions. We have to build on these success stories, provide our citizens with the skills and knowledge that will enable them to be ready and competent for the future market needs and build a stable, social, perspective state which stands for "Good Idea Slovakia". As a strong feature of Slovakia I perceive the great hope of young people who can easily collect their experiences not only locally, and can be easily connected to international communities.



RADOSLAV REPA
Office of the Deputy Prime
Minister of SR for Investments
and Informatization

Q1 In the light of the preparations for the Slovakia's Digital Transformation Strategy up to 2030, we have relied, among others, on European strategic documents stating that the greatest transformative potential for economy can be expected from the development of fifth generation (5G)

telecommunication networks and very high capacity (VHC) broadband, from the pervasive spread of artificial intelligence (AI) to all factors of society, from the reuse of data that is all around us, but so far its benefits have remained untapped (e.g. big data mining).

Adding to this, we can name an ubiquitous increase of Internet of Things applications, as a broad myriad of sensors can be generating the enormous volumes of data sent over the 5G networks. To embrace such an unprecedented development, a new approach to high-performance computing will be needed, so supercomputers will no longer be the exclusive domain of research centers, but will also be needed for the technological uptake of small businesses, for example by developing artificial intelligence training algorithms or by allowing a testbed for product prototypes. There is also a high potential for our Government to take full use of big data analyses in order to improve policy making processes before an eventual decision is made. All these puzzle pieces contribute to the transformation of industrial society into information society. I am certain that all these technologies will become a new engine for economic growth and strengthening of Slovakia's competitiveness, which is the main goal of our Digital Transformation Strategy.

Q2 Slovak economy is very open, dependent on developments in some of the European countries, especially in Germany and, depending on the number of employees working in individual sectors, also on the automotive industry. On the other hand, although the ICT industry employs not so many people, their contribution to the economy is much more vivid, as create an undoubted high added value. Not to mention the fact that while we calculate the return on investment in the classic industry in years, in ICT we talk in months. That is why we consider the clear support for the digital transformation initiative at all governmental levels to be of the highest importance. Our Digital Transformation Strategy is currently being pursued through the 2019-2022 Action Plan, with the involvement of both public authorities and private actors. The ultimate goal is to achieve the most efficient transformation, which is ready for new challenges and making more attractive conditions for living and working in Slovakia, while also motivating people to develop their own businesses and activities at home.



PETER GAŽÍK
O2 Slovakia

Q1 The business community is quite well aware of the power smart solutions, big data or AI have or could have on their processes and consequently their competitiveness. The digital transformation has already started and most of the breakthrough technologies are already available. But everything keeps advancing and the question is, how fast and how effectively will we be able to implement them in Slovakia and allow the society to benefit from it. Our industry stands at the beginning of great investments into the 5G network which will constitute the essential part of the digital upgrade for the entire economy. That means, the network will be ready and actually, it already is. We hope the entrepreneurs will be ready to make use of it along with the public administration in its role of the client as well as the regulator.

Q2 Slovakia will always be a small country with a great location that can react to external trends easier. But in order to be able to profit from it, skilled and talented people must be here to make it happen. That seems to be harder and harder as our universities keep losing the race for talents and companies have limited resources to attract them back. Therefore we must implement changes across the field to make Slovakia a place worth investing in and worth studying and living in. That is a role the state administration has to do in close cooperation with the private sector and the academia. If we succeed, Slovakia can grow, if not, we can be left behind.



FRIDRICH MATEJÍK
IBM Slovakia

Q1 Quantum computers and the research of new materials, drugs, further research of the human genome, or support for business analytics. Multi cloud management – the increase in the number of providers of cloud services translates into a higher need for the management of cloud computing products and services and the automatization of data transfer between them. Blockchain – data layer for information storage.

Q2 I perceive Slovakia's skilled people as its greatest strength and the fact that they don't have enough space for their self-realization as its greatest weakness.