IMPACT OF COVID 19 ON THE ACCELERATION OF DIGITIZATION AND THE INNOVATION ENVIRONMENT

EXECUTIVE SUMMARY

The analysis of the acceleration of digitization with an impact on the innovation environment due to the COVID 19 pandemic focuses on innovation activities and digitization directly or indirectly caused by the new coronavirus pandemic and the emergence of new life situations to which humanity has not been exposed to in its modern history.

Among EU Member States, Scandinavian countries are the leaders in innovation, followed by the Benelux countries. Slovakia ranked 21st out of 27 evaluated indicators in the European Innovation Scoreboard.

After the outbreak of the pandemic, millions of people found themselves in domestic isolation, traffic and travel was restricted, schools, offices and state borders closed. The newly created situation required immediate solutions, which did not exist until then, or existed only in a laboratory environment.

In the field of Innovation and Digitization, new solutions have rapidly emerged, spontaneously evoked by an acute need. We can also express this with an old, but still valid folk proverb "Necessity is the mother of invention". With each innovation, the subsequent ability to use and the value of efficiency and multiplication is always important for purposes other than those for which they were originally created.

Spontaneously, completely new solutions have emerged in areas such as: Smart cities, Autonomous, GPS, Applications using Blockchain (for C, B, G), Intelligent Wearable Devices with chips (IWD), Robotization, Entertainment industry, e-Government, e- Payment, e-Commerce, e-Health, e-Shop and many other innovative derivatives that are emerging as new and evolving entities such as start-ups, accelerators, incubators and, of course, in traditional manufacturing and scientific research institutions.

There is a large number of innovative solutions that have emerged during the recent pandemic. Face recognition technology is one of the fastest growing segments in the e-market. The solution and the importance of the topic of better face recognition at a distance and even when wearing masks also results from the large number of mentions from the 536 previous innovation reports that have been recorded in the last 10 months by the Slovak diplomacy in the territory.

Many technologies are supported by tamper proof system, which allows anyone to monitor the process while maintaining the transparency and immutability of records. There is also an opportunity for Slovakia to use Blockchain in the field of e-payments and other areas. An official China-Slovakia initiative for the introduction of Blockchain within the Center of Excellence of the 17 + 1 program was approved for Slovakia in Dubrovnik last year. There are also other, especially IT solutions, which are currently being developed dynamically at the level of complex applications for mobile devices that could be implemented in Slovakia.

The adoption of new, advanced technologies is inevitable. Technology giants clearly indicate that advanced technologies such as artificial intelligence, machine learning, autonomous vehicles and drones, 5G and others are here and will be used. Users will either adapt or they will not be able to benefit from the latest technologies.

The aim of this analysis is not to statistically qualify and numerically quantify all pandemic driven innovations. Its goal is to present, on a number of examples, the acceleration of innovative solutions and the impact of digitization, which has given these innovative solutions strong added value. The aim is to select and point out innovative solutions created in the pandemic period and, what is essential, to transfer to Slovakia such relevant solutions that we could advantageously implement in our country by Slovak companies as effectively as possible. From the point of view of Slovak diplomacy, excellent contacts and frameworks have been built in China to create conditions for such use. There is an opportunity to incorporate Slovak companies in the Chinese "Silicon Valley - Innoway", as many innovative companies from the EU countries already have. Of course, there are also other ways of cooperation at the state, private or public-private level.

In the presented analysis, individual innovation areas and digitization solutions are discussed in more detail, which outline the intersections of potential cooperation between Slovakia and China. Slovak diplomacy in China is preparing concrete proposals on how to benefit in this area. A number of solutions can be very operationally and readily included in the state innovation programs and thus use the potential of Slovak companies that are not only interested, but also experienced in the implementation of foreign innovations and in this particular case from China. From the point of view of Slovak diplomacy in China, excellent contacts and systems have been developed to create conditions for such use.

INTRODUCTION

The aim of the analysis is to search for benefits, or if you will, to find something positive in the evil that affected humanity in an unexpected pandemic period of several months with a focus on the innovation environment. This material presents the acceleration of innovations at present for specific innovation and digital areas in the global world with an emphasis on innovation development in China and indicates the possibilities of their use in Slovakia.

The focus of recent years has often been the need to accelerate innovation and digitization. It should be noted that digitization is not the same in its content as innovation but is an accelerator of the whole innovation process. Paradoxically, the pandemic period brought, in addition to a strong negative impact on human health, the acceleration of many innovative solutions caused by the acute need to ensure a whole complex of human health challenges, not only in China, where the pandemic began to spread, but also in Europe and other countries. .

If we wanted to define the sequence of steps in the development of a person's inventive activity in terms of content, then we could help ourselves with the sum of the facts expressed by this comprehensive longer sentence:

"Inventions, formerly referred to and presented in particular as improvements, inventions or discoveries, including technologies, IT programs and their subsequently triggered digital technologies, in order to keys can be applied and also transmitted directly over the longest possible distances, currently they are smoothly moving to their final stage, from which one should benefit man by the correct use of artificial intelligence (AI) manifested in areas such as: Smart city, Autonomous , GPS, Blockchain Applications (for C, B, G), Smart Portable Chip Devices (INZ), Robotics, Entertainment, e-Government, e-Payment, e-Commerce, e-Health, e-Shop and a number of other innovative derivatives that are emerging as new and will be emerging in evolving entities, such as start-ups, accelerators, incubators and, of course, in classic v production and scientific research institutions ".

To summarize, we can state that individual inventions in the form of separate inventions acquire a higher added value only through their innovative interaction, which digitization significantly accelerates. There are, of course, many such and similar definitions. In principle, however, the development link can be characterized by three quantities that have a constant interaction with each other. These are: Inventions (in the form of patents, discoveries, etc.), Innovations and Digitization.

Innovation as a concept associated with science and industry was introduced especially in the nineteenth century. It corresponds in time to the advent of the industrial revolution, although the language of this period focused more on invention, especially on technical invention.

Standing of the European Union and Slovakia as a part of it

Unfortunately, the EU is lagging behind world leaders in innovation. Slovakia is ranked at the top of the European scoreboard. As a matter of priority, we lack a workforce with the required technical skills.

This assessment follows from the analysis of the state of digital skills of employees (SMP C2018 / 057). Especially in times of pandemic, the absence of these skills in Slovakia proved to be critical.

The current situation has highlighted Europe's dependence on large technology players from third countries in certain key value chains or technologies that are crucial to our economic development and security.

Aware of its unflattering situation, the EU took a number of new steps in the first months of 2020 to renew the strategy in three key areas: data, artificial intelligence (AI) and online platforms.

To this end, on 19 February 2020, the EC published a European Data Strategy, which plans to place a strong emphasis in the coming years on making as much data as possible available and used to build a European data economy to make Europe a global leader in this field. At the same time, a White Paper on Artificial Intelligence - AI - was presented for discussion. The White Paper summarizes the issue of AI in terms of the current EU regulatory environment but does not provide concrete solutions. Subsequently, on 21 April 2020, the Roadmap for Recovery was published, which set out the guidelines for EU Member States' progress towards post-COVID-19 recovery, reaffirming the key importance of green transition and digital transformation in economic recovery and modernization. strategic autonomy.

Finally, recently, on 27 May 2020, the EC published the Recovery Plan and also presented an updated draft EU budget, which includes the standard budgeted MFF 2021-2027 (€ 1850 billion), including additional € 750 billion. EUR for anti-crisis measures within the so-called NextGeneration EU.

In the case of Slovakia, apart from the pandemic period, the adoption of measures to refrain for innovation was slowed down to some extent by political changes, resp. election period. In the field of education and its connection with the needs of practice, according to a survey conducted by PWC from last year, up to 85% of small and medium-sized companies in Slovakia have a problem with employing a workforce with the required technical skills. However, in times of pandemic, the absence of these skills proved to be critical.

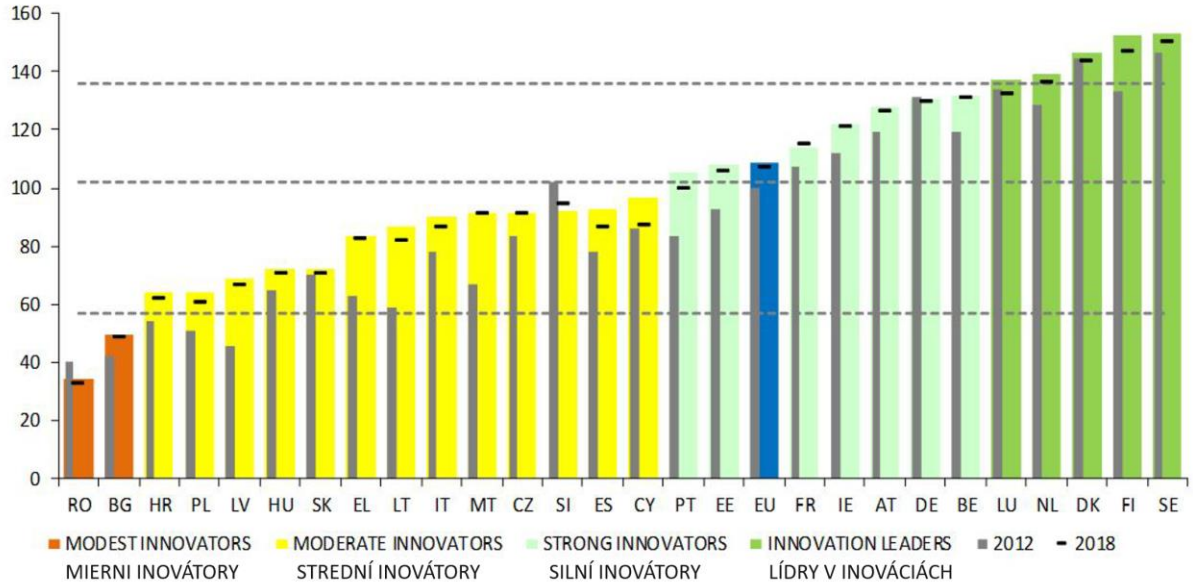
Regarding the use of digital technologies in the fight against COVID-19, Slovakia has (after several months of work) recently set up an active tracing call center and two mobile applications developed in connection with the pandemic (eKarantena and ZostanZdravy).

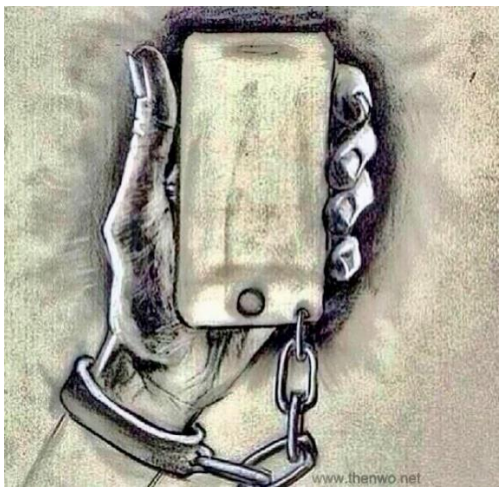
Accelerated development and deployment of mobile applications has been a major challenge, but despite best efforts, the full reliance on third-party technology giants, Google and Apple, has ultimately been crucial.

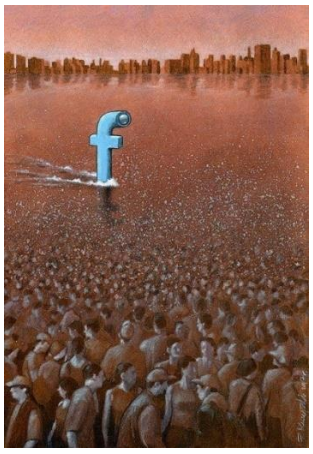
The establishment and activities of platforms for research and use of blockchain technology as well as testing of this technology in pilot projects within the public administration are also supported from the state level.

The evaluation within the European Innovation Scoreboard2020 (European Innovation Scoreboard) shows that Slovakia is still only a moderate innovator. It finished in 21st place out of 27 evaluated indicators. The results also show that the EU's innovation performance has increased by 8.9% since 2012. Performance has increased in 24 EU countries since 2012, with the largest increases in Lithuania, Malta, Latvia, Portugal and Greece.

Sweden remains the EU's leader in innovation, followed by Finland, Denmark and the Netherlands. This year, Luxembourg (formerly a strong innovator) will join the innovation leaders, while Portugal (formerly a mild innovator) will join the group of strong innovators.







THE REAL IMPACT OF THE PANDEMIC ON INNOVATIONS AND SOME EXAMPLES

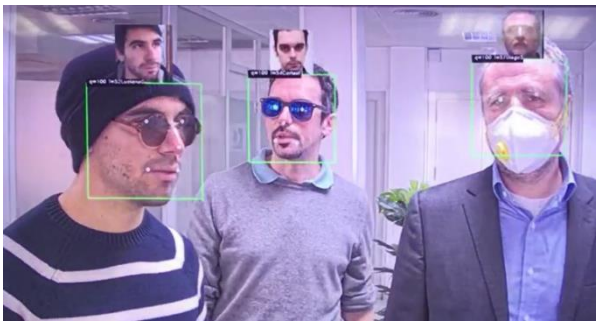
In addition to the innovation environment, the impact of the pandemic was, of course, negative, especially on human health, and in many cases it also affected the social environment. A higher percentage of divorce rates, domestic violence, etc. were recorded.

On the contrary, in many areas there was also a positive side, such as. social cohesion and collegiality, many cultural so-called balcony parties, charitable entities have been strongly activated in helping to provide food but also medical assistance, etc.

In the field of Innovation and Digitization, a new solution was created spontaneously caused by the acute need. We can also express this with the old, but still valid folk proverb "Emergency awakens reason."

The need to control the wearing of veils caused the need not only to control the face but also to supplement its relative veil and subsequent audible warning using drones and the like. Although this technology has not yet been massively implemented due to time and the need for numbers, programs have been created and are in the world. They were caused by a pandemic.

In any innovation, the subsequent ability to be usable, the value of efficiency and multiplication for other purposes than those originally created are always important. We know that many so-called pandemic solutions for more detailed face and motion recognition of people and objects in terms of accuracy and sensing the speed of movement of people and objects have also been applied to space research with immediate implementation. There are a large number of such solutions, spontaneously triggered during a pandemic. Face recognition technology is one of the fastest growing segments in the e-market. The solution and importance of the topic of better face recognition at a distance and even when wearing masks also results from the number of representations from 536 previous innovation reports that have been recorded in the last 10 months for Slovak diplomacy in the territory.



The use of Facial Recognition (FR) technology is most commonly used in prevention and digital healthcare during a pandemic. FR combines with other types of biometrics and temperature detection technologies. The needs caused by the pandemic are also changing the dynamics of research. Partial or completely veiled faces due to drapes or other protective devices have forced developments in this area to supplement the FR with iris scanning, which allows people to be identified and authenticated. Such equipment has found its application in hospitals, health centers, sensitive infrastructure and border control. These innovative solutions, created in the pandemic era for Healh Care, are now very quickly finding their application in other areas, especially in the field of security.

As an illustrative and good example of innovation caused directly by a pandemic with subsequent use, the need for fast transmission of mega data can be mentioned, with data being protected by security keys without intermediate support, ie without construction of relay stations, as time to transfer large amounts of data for test samples between individual laboratories and hospitals were more than a thousand kilometers away. Until the time of the pandemic, to such an air distance simply the transmission of keyed mega data was not possible. However, the need during the pandemic solved the problem. Usability, resp. the multiplicability of such a solution for the post-pandemic period is huge for many other industries.



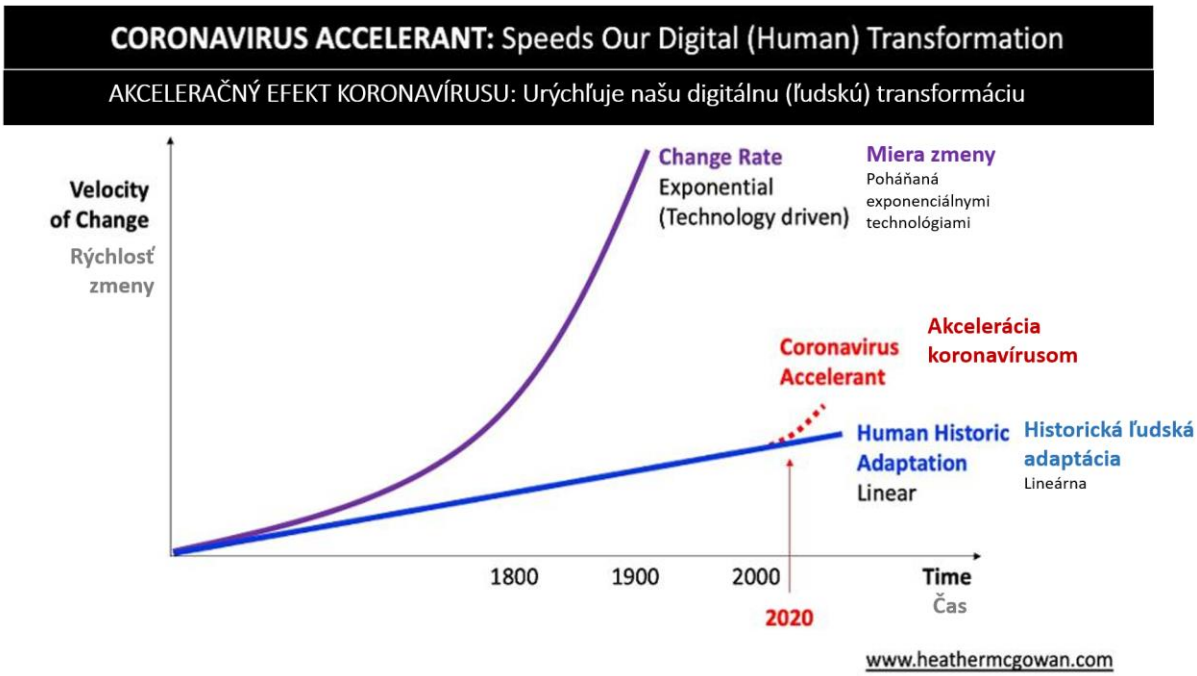
New solutions in the field of contactless contacts have experienced a huge boom. The degree of hygiene has also been increased by eliminating the need to use touch buttons. For example, when shopping in vending machines, where the scanned face is connected to a credit card and after addressing the vending machine for the desired product, the vending machine will deliver the goods, the consumer leaves without touching, except for picking up the goods. Contactless operation has become a matter of course for new elevators.

Many types of vending machines functioned similarly before the pandemic, but there were significant program improvements and, in particular, massive expansion for customers and the range. Similarly, robots in restaurants serve customers with a more comprehensive ability of individual operations, from ordering food to paying, all without contact with the staff.

A large number of improved solutions for contactless applications have emerged. This increased hygiene, speed, independence of purchases in stone sales and, importantly, reduced the cost of the sales chain and thus the price for the client or. customer.

The pandemic forced organizations and workers in almost all sectors to reassess the need for personal contact while maintaining productivity and thus adapt to one of the most challenging changes, resp. disruption of our daily lives since World War II. Although the economic impact of this pandemic is staggering, technology has enabled hundreds of millions of people in the affected countries to stay connected, to remain productive and healthy. Now it will be important how we use it in Slovakia. Given that the activities of Slovak diplomacy in China have a very good professional relationship with innovative entities in the territory, it will strongly assist in this process.

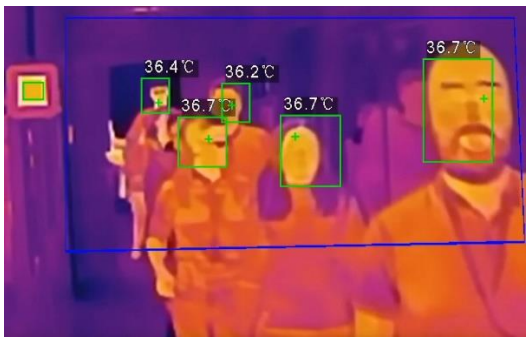
Digital transformation is the main driver of organizational change. Transition from native IT to cloud computing; expansion of retail and banking into mobile space; the rise of machine learning, artificial intelligence and intelligent automation; and the growth of the Internet of Things was, among other massive transformational technologies, at the center of a generational shift forward. It is therefore not surprising that it is these technologies that have enabled businesses, governments, health systems, students and employees to adapt to the threat of disruption to their daily lives caused by a pandemic and sudden and often drastic efforts to mitigate it.



Artificial intelligence has played an important role in combating the spread of the new coronavirus and has been widely used in various sectors with huge potential, making it one of the driving forces behind scientific and technological development.

AI applications have also found their place in means of public transport, travel hubs and everywhere where a large number of people move. Chinese universities have developed a robot to detect elevated temperatures in crowds, which has been put into production and put into operation in places with a large number of people. Mei Xuesong, a professor at Xi'an Jiaotong University in Northwest China's Shaanxi Province, said that manual temperature measurement can only measure one person at a time, while a body temperature screening robot developed by his team can measure the body temperature of a large number of people. Of course, it is also equipped with face recognition technology for people with high temperatures.

Innovative IT companies have developed a system to facilitate travel and commuting in large cities. A system for remote measurement of body temperature with automatic warning when it is exceeded has been developed.



Megvii, a Beijing-based AI company, has implemented a temperature control system that allows remote screening with an accuracy of 0.3 degrees Celsius. The system also allows 15 people to be checked at a time per second, even if their faces are covered by masks or other protective equipment. Another interesting example is the system of mass retrieval of information from residents through

automatic telephone calls. Such a system powered by artificial intelligence can make an average of 800,000 calls during the day.

China, as the country where the new coronavirus first appeared, uses AI to fight the epidemic throughout its healthcare system, including health management and the diagnosis, treatment and regeneration, and management of AI-supported hospitals.

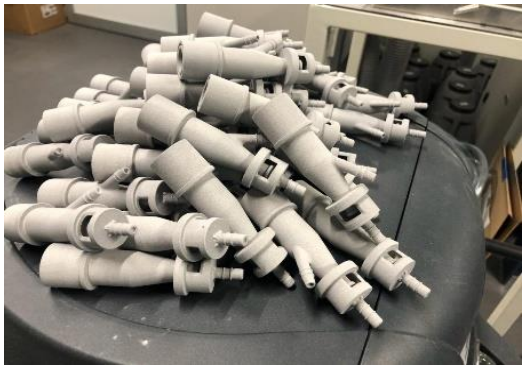
Left-Handed Doctors has launched three products for mobile phones. These are: testing and recording symptoms, online counseling and a home quarantine system. Its products allow users to diagnose home with a preset manual before patients leave for hospital. This reduces the number of hospital visits, significantly reducing the risk of cross-infection and speeding up the patient's examination process.

The Big Data area experienced a huge boom with the outbreak of a pandemic. Telecom operators are using big data analysis to help fight the spread of the virus by using a wealth of data on millions of smartphone users. Data from telecom operators provide an overview of human movements and traffic screening between provinces and cities, which can help local governments predict the spread of the virus and implement targeted measures to prevent further outbreaks. At the beginning of the pandemic, China faced enormous challenges in monitoring the health of its people. The application, which the residents downloaded to their mobile phone, shows the places where the phone owners were and the risk of their close contact with COVID-19 patients, thus reducing the risk of further spread in the population. Similar applications have been developed in Slovakia.

Cloud computing technology was introduced in connection with the outbreak of a pandemic for the purpose of research and development of new drugs and vaccines in the fight against the virus. The Chinese company SenseTime is using its enormous computer power to help scientists research a new coronavirus. Upon receipt of an application from the National Supercomputing Center in Shenzhen, Guangdong Province, SenseTime has allocated 20 GPU server nodes free of charge to assist scientists at the Faculty of Pharmaceutical Sciences. Researchers are conducting extensive research into screening for drugs against new coronaviruses and predicting viral mutations.

The coronavirus pandemic has accelerated the implementation of solutions based on Blockchain technology. With encrypted data and transaction tracking records, Blockchain is helping the Chinese government and health agencies fight the new coronavirus without compromising the privacy of individual actors.

The Alipay payment service has introduced an information platform in its mobile application, which enables cooperation between individual actors while maintaining transparency and efficiency. The platform based on blockchain technology enables the viewing, recording and tracking of inquiries, deliveries and logistics of materials to prevent the epidemic. The whole process of recording and verification by each party is resistant to unauthorized interference, which allows everyone to monitor this process while maintaining the transparency and immutability of records. There is also an opportunity for Slovakia to use Blockchain in the field of e-payments and other areas.



The global supply chain for personal protective equipment has been disrupted by widespread restrictions on movement, travel and transport following the outbreak of the pandemic. Their acute deficiency was at least partially compensated by the use of 3D printing and new production methods. One of the first examples of the use of 3D printing for pandemic-related purposes was recorded in mid-February, when a Chinese manufacturer in Wuhan produced 3D printed goggles for doctors. With fifty 3D printers running 24 hours a day, it was able to produce approximately 300 pairs per day.

After the new coronavirus spread to the rest of the world, designers, engineers, students, manufacturers, doctors and charities were able to use existing designs and 3D printing to make a variety of devices, including face shields, masks, ventilator components, and hand-free door openers. and so on.

Similar activities were recorded in Slovakia. It is a challenge for Slovakia and thus Slovak companies to place them according to the model of EU countries in acceleration programs, e.g. in Beijing to China's "Silicon Valley" Innoway and enable them to incubate innovations in order to accelerate their innovative solutions.

5G technology plays an important role in suppressing the spread of the new coronavirus. Super fast wireless communication technology provides quality and stable mobile services for hospitals, emergency command centers, railway stations and bus terminals. It is also the basis for robot control, remote work and analysis of large amounts of real-time data. Diversified 5G terminals bring new means of epidemiological monitoring and surveillance in public places. In densely populated areas, 5G infrared thermal technology can remotely identify individuals with elevated temperatures. 5G-enabled drones can transmit high-resolution images in real time.



The pandemic has also contributed to a number of innovations in robotics. From disinfection and street patrols to the supply of food and medicine in quarantine departments. The robots were deployed to the front line to prevent the virus from spreading.

Disinfection robots have been set up in isolation wards, intensive care units, operating theaters, and hospitals, including Wuchan Central Hospital, to provide a continuous disinfection service. Thanks to advanced technologies such as laser positioning, intelligent navigation and human-computer interaction, medical service robots can help healthcare professionals apply disinfectants and distribute medicines to patients until they are cleaned.

In some places, including the city of Hebei, robots are used to patrol public spaces to identify people who do not comply with the obligation to wear veils, and they are encouraged to use them through built-in speakers. People were able to be identified even though they had a mask.

At a hospital in Hubei Province, an intelligent service robot has become commonly used in wards with infected patients to deliver food, medicine and daily necessities, to alleviate the workload of nurses, and to prevent cross-infection between doctors and patients.

The "OrionStar" intelligent robots are currently operating at Shougang Hospital in Beijing. They help patients with orientation, answers to various questions and remote diagnosis and treatment. Robots also help pass on reports of laboratory tests and drugs. Their introduction has led to a reduction in the workload of medical staff and the prevention of human-to-human transmission of the virus.

The pandemic was also more pronounced in the acceleration of trends in the digitalisation of trade and electronic payments. Digital tools in retail are becoming more widespread. Between January and May, online retail sales grew 11.5% faster than in the same period last year, accounting for almost 25% of total consumer sales. In the area of electronic payments and digital currencies, the digital currency of the Central Bank of China, called DCEP, was launched on 1 May. It was created in collaboration with giants WeChat Pay, Alipay and large banks and was piloted in Suzhou and several other cities.

As a result of the pandemic, China has decided to increase spending on new, high-tech infrastructure as one of the key steps to mitigate the impact of the pandemic and is in line with the government's ambitions to move from an export-oriented commodity manufacturing economy to high-tech and innovation-based hi-tech. The move further aims to increase domestic consumption, maintain economic stability, restructure the economy and further strengthen China's competitiveness.

Pandemic-induced innovation growth in the context of China in numbers.

According to the latest data published by the National Statistical Office, from January to April this year, investments in the manufacture of computers and office equipment increased by 15.4%, investments in technological services of a transformation nature by 28.0% and investments in professional technological services increased by 12.5 %. As a result of the epidemic, investments related to "new infrastructure" are offsetting the decline in other areas and productivity in digital technologies is becoming one of the important drivers of economic recovery. The figures show that more than 20 provinces have announced plans for investment in "new infrastructure" spanning several trillion CNY.

Jiangsu Province has formulated policy positions to accelerate the development of new digital infrastructure to increase data and information to support the development of 5G networks, Fujian Province announced key projects for the digital economy in 2020, including 52 new digital infrastructure projects with a total investment of 72.9 billion CNY, Shanghai has issued a new action plan for the development of several trillion CNY infrastructure. High technology and industrial engineering projects account for 60% of all investments.

Analyses predict that by 2025, investment in new infrastructure projects, such as 5G and the industrial Internet, will reach CNY 10 trillion and, together with associated investments, will exceed CNY 17 trillion. Investment in infrastructure, especially in its new forms, will be the most effective means of strengthening the counter-cyclical effect while slowing down the economy. In the short term, increased investment will offset the economic slowdown. In the long term, they will support the transformation and modernization of traditional industries, create innovative business models, increase digital-driven domestic consumption, maintain stable employment and promote a high level of development.

CONCLUSION

The advent of new, advanced technologies is inevitable. Technology giants clearly indicate that advanced technologies such as artificial intelligence, machine learning, autonomous vehicles and drones, 5G and others want and will use them. Users will either adapt or will not be able to take advantage of all the state-of-the-art features that these technologies bring. The pandemic has ultimately only accelerated the process of their implementation and the pace of innovation. The following monthly will certainly gradually generate benefits for individual industries. What will be very important, however, is that they have shown guidelines on how to accelerate innovation and move the digital age forward, on the other hand, they will also point to the safety of new solutions, as they may not meet standards in all details due to some stress.

The aim of this analysis is not to statistically qualify and numerically quantify all the so-called pandemic innovations, as the total number and their description with a structured division into individual areas is not relevant for this purpose. The aim is to present, on a number of examples, the acceleration of innovative solutions and the impact of digitization, which has given these innovative solutions strong added value. The aim is to select and point out innovative solutions created in the pandemic period and, what is essential, to transfer to Slovakia such relevant solutions that we could advantageously transform in our country, respectively. adopt by Slovak companies as effectively as possible.

The launched program for the introduction of Blockchain within the Center of Excellence for the 17 + 1 program approved for Slovakia in Dubrovnik last year, resp. others, especially IT solutions, which are currently being developed dynamically at the level of complex applications for mobile devices. Unfortunately, single-applications are being created in Slovakia and their correlation is a user problem. There is room for Slovak developers on how to systematize and resolve connectivity with user benefits. In applications, China has been at the highest level for a long time in terms of user use for the general public. Slovak diplomacy in China is preparing concrete proposals on how to use this area.

A number of solutions can be very operationally and as soon as possible included in state innovation programs and thus use the potential of Slovak companies that are not only interested, but also experienced in the implementation of foreign innovations and in this particular case from China. From the point of view of Slovak diplomacy in China, excellent contacts and systems have been built to create conditions for such use.

The crucial question for the end user of the benefits we are pursuing, so the question for man is whether the advent of artificial intelligence and other advanced technologies will be a benefit or a loss? For a person with a naturally clean and negatively unencumbered view, the answer is very but very simple and is definitely positive. Yes, the creation, manifestation and use of inventions is only beneficial to man, but on the condition that it is used only in moderation and only for the benefit of man.

On the other hand, the answer may be more complex, but from a philosophical point of view, it is no longer a question of whether artificial intelligence and new technologies are beneficial or not. Here, a related question arises from anthropological understanding, will artificial intelligence be used in moderation only and only for the good of man? If so, we have the answer: “yes, it is good.” It goes without saying, and we have witnessed from history that a number of new technologies have been misused against humans and are still happening today, but this area is no longer the subject of this analysis.

All the technological innovations presented in this report have been largely driven by the need for a new coronavirus pandemic and new life situations to which humanity has not been exposed for a long time. It is said that every crisis has many opportunities, and in this case it is more true than ever. Without global cooperation and the extremely rapid introduction of new technological solutions that have not yet existed or only existed in the laboratory, the effects of a pandemic would be much more tragic and very tragic. difficult to control. A unique example is China, where without the immediate deployment of innovative solutions, managing a pandemic would be almost impossible given its population and population density. All these pandemic-accelerated solutions are gradually finding application in other areas of the economy and are expected to contribute to the most significant technological progress we have seen so far, in recent history.

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