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Voices of Ukraine #5: Developing cyber resilience

Krzysztof Izdebski

Ukraine is held up as the model of a country that has approached the digital transition systemically. The decentralisation model was not limited to the local government reform; it was also used to build and implement technological solutions. Recently, Vasyl Zadvorny, responsible for creating the ProZorro public procurement system, has spoken about this repeatedly. This decentralization model is highly significant for the current situation with digitisation or technology in the context of Ukraine's resilience to Russian aggression. This approach determined the success of the Diia[1] app, not only in peacetime, but also

1 The name is an abbreviation of "Derzhava i ya", which means "the state and me", but the abbreviation itself also means: action, which is used to confirm identity. On the website, you can access almost 80 digital services: set up a company, register the birth of a child, and so on. The possibility of adding yourself to the register of residents is not insignificant. In 2021, it was estimated that around 30% of Ukrainians were permanently residing beyond their registered place of residence. Thanks to Diia, adding yourself to the register takes

The ***Voices of Ukraine*** series of debates organized by the Batory Foundation ideaForum and the weekly news magazine ***Polityka***.

Russian aggression and the war in Ukraine have dominated media coverage in recent weeks. With great suspense, we follow the news from the battlefield each day. We watch in horror as cities are bombed and civilians suffer. The news and the sight of people fleeing war arouse sympathy, resulting in gestures of unprecedented solidarity.

Given the abundance of news and information, the voices of the Ukrainian people often get lost. What makes the Ukrainian resistance so effective, and why is the Ukrainian society so resilient? What goals have the Ukrainians set for themselves in their armed resistance against the Russian aggression? What are the

during the war, which has forced digital services to develop rapidly and become a lasting element of managing the state. This is not a new phenomenon. In Ukraine, policies opening up public data have been implemented for years, both at the government – for example, the above-mentioned ProZorro system – and local government level.

Lviv is among the cities where many databases have been opened up, which has enabled better urban policies to be created. Technology has also improved the fight against corruption, as well as the engagement of citizens and social organisations. On this basis, widespread admiration for Ukrainians' engagement in support for the war effort, including online (for example, the famous IT Army), has emerged. However, the war is also having a negative impact on the openness of public data. Some databases have been closed, which was opposed by many activists.

Let us consider whether this is a passing trend or, rather, the risk of returning to a time before the digital transition. Are the Ukrainians themselves pleased with this transition? We know what cooperation between the various sectors introducing it looks like and appreciate that the changes were implemented with the involvement of many actors. Is this model proving viable in wartime? Many experts say that Ukraine has acquired digital resilience. What does that mean? Can we agree with these kinds of statements and deem it a digitally resilient country?

Mstyslav Banik

Firstly, the digital transition of services that we are introducing in Ukraine using the Diia app is geared towards individual needs. This digital solution helped many people at the start of the Russian invasion; for example, when crossing the border with countries such as Poland. Many

limitations of a peace agreement? What do the Ukrainians want with regard to the European Union, NATO, and other alliances? What is the reconstruction of the country following the war supposed to look like? What will the relations between Ukraine and its neighbouring countries be like?

These are just some of the questions we are going to ask Ukrainian experts, journalists, artists, and politicians. There is no doubt that the future is now being shaped in Ukraine, and, to a great extent, its final form will depend on the men and women of Ukraine. Let's hear what they have to say!

The main topic of the fifth discussion in the series was the question about the sources of Ukraine's digital resilience. Ukraine is seen as an example of a country that has systematically approached the digital transformation. The decentralization model was not only implemented in the context of local government reform, but was also used in the construction and implementation of technological solutions. This determined, among others things, the success of the Diia (Дія) application, not only in peacetime, but also in war. Technologies have also helped the Ukrainian state to increase its effectiveness in the fight against corruption and to involve citizens and social organizations in public life. They form the basis for the widely admired commitment of Ukrainians to supporting the war effort also on the Internet. Are Ukrainian citizens themselves satisfied with the digital transformation? What the cooperation of various sectors in its introduction looked like and how does this model work in wartime? The discussion took place on 15 June 2022 with the participation of Mstyslav Banik, Olena Hunko, Nadiia Babynska, Viktor Nestulia and Krzysztof Izdebski as the interviewer.

a few minutes; earlier, people had to spend many hours at administrative offices. Currently, around 18 million Ukrainians use electronic services via Diia.

people left their physical documents at home or lost them; in those cases, digital solutions helped them.

The second matter that I would like to mention concerns the digital transition at the government level. Diia is an app with documents and services; it is developing similarly to the Polish mObywatel app. Our app, Diia, displays documents that exist in the records, but we do not store this data ourselves. The app has a public and a non-public part. The public part is the one used by people to access copies of documents or application forms for various services. However, part of this iceberg is under water: this includes making state records work more efficiently, enhancing their security, data protection, and so on.

In terms of resilience, the cyberattacks began long before the Russian invasion; we recorded exceptionally big attacks in January and February. In mid-February, roughly ten days before the invasion, there were attempts to destroy the entire Ukrainian banking system and obtain access to state records, and so on. Fortunately, I can assure you that all the Ukrainian systems held out, the security architecture was set up appropriately. These endless attacks further motivated the current Ministry of Digital Transformation and other institutions to increase the level of security measures available. We managed to survive, which supports the thesis about the state's resilience. If another state attacks in cyberspace, its aim is not to steal citizens' data – that is done by fraudsters who want to make money by accessing real estate, assets or other data. However, let us imagine a situation in which, while invading the country, some criminals obtain access to the ID card register and simply delete it. This would mean an absolute crash, in which people lose the ability to be in possession of documents. In that case, physical ones need to be verified. Continuing in this vein: if there is no document database, how can a given person travel abroad, for instance?

We managed to withstand and resist the attacks against Ukraine before February 24. From the morning of 24 February, almost all state records were disconnected due to additional security features. In March, they were gradually brought back online and access was reopened.

Olena Hunko

In terms of open data, the websites are unavailable. We cannot publish information in the format of source data, because there is sensitive information about critical infrastructure in there. We do not want the information to be used for the wrong purpose.

Since we are speaking about resilience, it is worth mentioning the services created based on open data. During the first days of the war, we restricted access to Lviv's open data website, but services based on these same open data continue to operate; for example, the "City Helper bot", where we created a section with information on the nearest bomb shelters. If you want to find out where to seek shelter when the air raid alarm sounds, this information can be obtained easily via a handy messenger. These services, built earlier on the basis of open data, are also an element of resilience provided in advance.

Viktor Nestulia

I would like us to speak about open and closed data – which services are currently functioning and in what way? In terms of resilience, in my opinion, our attitude to IT services has changed. I remember the year 2014, when we started creating the ProZorro system on Amazon. At the time, Dmytro

Shymkiv lobbied for a law on the use of external services in the cloud. Ultimately, nothing was adopted and ProZorro was required to move the data to a Ukrainian data centre. Then the war in Ukraine broke out and the risk linked to the missiles, which threatened to destroy Ukrainian data centres, meant that many services started migrating back to Amazon. Right now, everyone is required to have an external backup. PryvatBank, the largest state-owned bank in Ukraine, moved all its infrastructure abroad to minimise these risks.

We find ourselves at a new state, in which not only Ukraine, but most likely other countries – I assume that many of them are watching Ukraine – are wondering how to ensure resilience amid international threats. Not only in terms of cyberthreats – in our case, a missile can fall on an information storage centre... We have advanced considerably and I am proud of the level Ukraine is at: our Diia app and electronic systems concerning, say, healthcare or public procurement, are working. We still have a lot to learn. We must dive deeper into the subject of resilience, understood as stability and sustainability. In terms of sustainability, I have concerns when we discuss open data. I would like to find some preventive measures so that this data really remains open and so that we can remain leaders in this domain after the war. That will come later, though.

Mstyslav Banik

I will add a few words. I promise that the data will be open again; this is part of my department, too. This step was forced upon us, unfortunately. To help explain, I will add that there are different types of open data. Some do not contain personal data. Generally speaking, though, when criminals gain access to older databases, then, during the war, they can use the parsing method to fill in the data that was depersonalised earlier. It may turn out that the data becomes useful for the enemy; for example, for detecting volunteers or revealing who fought earlier as part of the anti-terrorist operation. For this reason, for additional security, this has been blocked. Yet we will definitely restore this access. Last year, we were in 6th place globally in terms of data openness and had a plan to make it into the top three countries for data transparency. Unfortunately, things have turned out differently due to the Russian attack on Ukraine.

Nadiia Babynska

I am not a state official or member of a civic organisation. I represent a horizontal community: people who are interested in open data, work with them and use them in their business or social activity; for example, the Civic Tech projects or journalists' projects. We have come together to promote open data at various levels; both the local and national level.

What is the situation now? On 24 February, in connection with the full-scale war – the war has really been going on for eight years already! – all the known records and data were closed. The open data portal was completely shut down, restrictions on ProZorro publications were introduced.

The question does not concern access to data; rather, it concerns what is published. As one of the participants of our initiative said: on 24 February, open data died or went into a coma. How will we emerge from this state? Do we have a plan? These are big questions, because how do we assess the situation in Ukraine at all without access to data? How will we rebuild our country, without access to data? I am not referring to the government, because the government probably has this access. I mean the civic sector, academics or anti-corruption activists. In the end, recovery is a huge undertaking that should be based on data. We need to control and analyse all of this. I will give you an example: friends

asked me to analyse how to lessen the damage to the mining industry caused by the war. This cannot be done now, not even with the biggest cuts. Unfortunately, mining industry websites and the official portal with data on the mining industry lack information that could also help the government analyse how to emerge from the crisis. The situation is similar in many other sectors.

As the previous speakers have said, open data was at quite a high level in Ukraine. Compared to other countries, we were trendsetters and fasttrackers,[2] despite accusations concerning what was published and how. The closing of data is often justified by saying that the enemy will find out something and do something. Let's be realists, though – the enemy has access to all the data it needs. The data from the common register of natural and legal persons, where there is information on addresses or telephone numbers, is open on a paid access basis. Companies – including ones with Russian origins – have access to a paid service provided by the Ministry of Justice.

One might ask to what extent closing all this data is justified. Are we violating the principles of the transparency of the authorities' actions by deciding what to close and what not to close – without explanations? On 24 February, the decision was rapid, but the war has been ongoing for over five months, so in terms of digital resilience, we need to pay attention to how we emerge from the crisis and how we react to it, what action algorithms we have and what actions we are taking, and what instructions we are passing on to those who are stakeholders when it comes to open data. This is about government institutions, too. Local authorities reached out to me for advice. I asked them whether they knew what to do with open data, whether someone told them which services to close and which ones not to. There needs to be a comprehensive state policy. After a few months of war, we can start building digital resilience in terms of access to data – I am not only speaking about private data and digital security, but about open data. This is public information, so there should in principle not be anything there that damages national interests or territorial integrity. These are the principles of openness: things that are not harmful, and where the public interest outweighs the potential harm, are open. This is the case in Poland, too, and Poland is not far from Russia, either.

It is unclear what direction all this will go in. We need to think about how to build an open data area in conditions of crisis and danger. I am not commenting on digital resilience or, more narrowly, cybersecurity in the context of open data and other state IT solutions, because I am not an expert on this.

Krzysztof Izdebski

Olena Hunko was indirectly mentioned before as we were talking about local governments, whose actions are not limited to the digital transition. In many other aspects of this war, they are a model of what can be called resilience. I am especially pleased with Mstyslav Banik's declaration about how data will be made open after the war. Of course, we all hope this will happen as soon as possible; for Ukraine to win and for a return to normality, insofar as possible. This normality included the digital transition.

I would like to focus on society for a moment. In Poland, we were very much impressed by the government's and local governments' engagement, but we also saw society's engagement in a type of battle on social media, using technology. I got the sense that Ukrainian society opened its computers and became a keyboard warrior. The concept of an "IT Army" mentioned by me, which is dispersed, but gives the impression of being coordinated, came up earlier. What can we make of the engagement

2 That is, a country that implemented digital solutions rapidly and served as a model for other countries in this process.

of the Ukrainian society in the digital battle against the occupier? To what extent does it result from efforts over the years? We say that the war began in February 2022, but we know very well that it really began much earlier, in 2014. Digital efforts and ones engaging society were present even earlier. This is the result of consistent efforts. What does this social engagement result from? How can other countries take action – in the case of COVID-19, at least? How can society be prepared for this kind of engagement?

Viktor Nestulia

I am curious to hear the Ministry of Digital Transformation's opinion, as they coordinated the IT community very well; efforts were coordinated via Telegram and other communication platforms, among other things.

From the first days of the war, our DoZorro community,[3] which dealt with monitoring public procurement – quite a large community throughout Ukraine, made up of journalists and social activists – decided to obstruct the public procurement system in Russia. From those first days, we did everything so that their public procurement services would be floored and practically none of the platforms in Russia would work. We are aware that public procurement is an inseparable activity for every state or city; thanks to the excellent networks that worked together over the past eight years to streamline Ukrainian public procurement, we understood that we need to fight using all the means available, and we coordinated our efforts to make life complicated for our neighbour, the aggressor; that is, the Russian Federation. Earlier, in peacetime, we had seen what fantastic data we have and in how many ways this data helps fight corruption, money laundering and crime.

Now we are actively lobbying for information on people linked to the Kremlin who are doing business in Europe to be opened up. We are doing so in a petition on the matter, which is doing the rounds in EU countries. To establish which Russian companies are winning contracts via tenders organised by the EU institutions, we joined forces with YouControl, especially Serhiy Milman, and started looking for datasets in various countries. In terms of public procurement, there were no problems, but when the question of the actual beneficiaries arose, it turned out that there is a major gap here. Social activists mobilised very rapidly and established all the possible databases concerning public procurement in every possible country. Coordination is crucial – and here, I would like to ask our European friends, including the ones in Poland, for help. We are mobilising society to raise the standards of data sharing and to ensure access to the information needed to help us all fight the enemies of democracy. We are not only referring to the Russian Federation here. With all this concerning corruption and money laundering, we were able to organise rapid efforts to protect Ukraine, but now the question of defending the democratic world is timely. To do so, we need to minimise the influence of corrupt capital.

Ukrainian society mobilized very rapidly – it is very important for European society to mobilise, too, to raise the standards of data sharing, and minimise the scope for corruption, money laundering and abuse. I hope that this Ukrainian lesson will serve as inspiration to all Europeans, too.

3 People and organisations using the DoZorro tool used to identify irregularities related to the implementation of public procurement in Ukraine. The tool was developed by Transparency International Ukraine and contains gamification elements to encourage citizens to follow the public procurement process. Link: https://dozorro.org.

Mstyslav Banik

There is a lot to say about the IT Army. Most importantly: for the Ukrainians, this is a war for their fatherland. The IT Army or other forms of cyberactivity are manifestations of national resistance that correspond to the times we live in. In any war for the fatherland, when the occupier invaded another country and sought to capture territory, there were always people who became partisans, there was always national resistance at one level or another. This is the case now, too: as the world is digital in many areas, it is much easier for people to join forces with the help of digital tools.

We have a separate, new front, so far unknown from the perspective of war. Even before the IT Army appeared, there were various initiatives beyond the Ukrainian armed structures, security services or police. Various uncoordinated attempts to attack one or another of the enemy's resources appeared. Later, all this joined forces in the IT Army movement by volunteers. Since then, we have had global efforts to influence the state apparatus; for example, when it comes to public procurement in Russia, air and railway traffic, bringing down postal services, and so on. On the IT Army channel, we publish the targets and the effects. Another level of interest are the social media platforms used by Russian citizens: obstructing them or the discomfort prompted by their interruption is meant to get them to think. The Russians are meant to feel that it is their country that attacked Ukraine. Everyone knows the percentage of Russian society that supports the war, so we cannot separate the Russian state's actions from society; they are participants in this invasion, too, and should feel this themselves.

The IT Army turned out to be an e-phenomenon, as a very well-functioning movement of around 300,000 volunteers. This is a remarkable number: it is not limited to citizens of Ukraine, there are people from all over the world who can join efforts on this front. Just like 55 countries are represented in the Ukrainian Armed Forces' foreign legion, efforts are coordinated in the case of the IT Army, too. The phenomenon partly consists in how we really do not know these people, we do not have their surnames or addresses, but are able to coordinate their efforts. All this is built on their initiative. Of course, their level of preparation varies; some are cybersecurity professionals. I know many examples of a person who, as a graphic designer and knowing that they have a powerful computer, can use it for this purpose. There are instructions and this person uses his or her computer for DDOS attacks, and so on.

In addition to the IT Army and this experience, which the entire global community will draw conclusions from after the war, there is our e-Enemy chat-bot. People can share information about the Russian occupiers' army's movements using chat-bots on the Telegram messenger app, which helps our armed forces detect and destroy the enemy. We have 250,000–270,000 notifications via this chat-bot. What makes it special? It can be reached directly via the Diia app, where it is located on the homepage. Why is this important? If you see an enemy tank, or group or column of Russian soldiers, you should not try to recall the chat-bot's address or look for it on Telegram – instead, you go straight to the Diia app. We have 17.5 million Diia app users. Before sharing information about enemy forces, you have to go through a short personal verification process on the Diia app – not in order to transfer data with the content of the report, but rather to confirm that a given person has the Diia app. In this way, we get rid of spam, because the Russians are trying to input Ukrainian soldiers' position and Ukrainian geolocation via the chat-bot on Telegram. Verifying the person helps us check the information, which our employees review and pass on to the armed forces.

These 250,000–270,000 reports are also national resistance. How does this differ from poisoned patties or other methods used by the older generation? In reality, there is no difference between them; they are simply additional tools, and this really works, as I can confirm after many conversations,

including with friends from abroad. The "old" part of Europe is hugely impressed by the participation of ordinary people and how the e-Enemy chat-bot works. Hundreds of thousands of people are taking part in this and it can be considered one more military force that has emerged in contemporary warfare. All this shows that, for us, this is a war for our country and our independence.

Olena Hunko

Our IT community's mobilization was not limited to the IT Army; it also created other apps, chat-bots or services that appeared during the first month of the war. It is incredible how quickly they were created and responded to needs at the time. One of the most popular is the Trvoha (Alarm) mobile app, which has probably overtaken the Diia app in terms of the number of downloads. This app will warn anyone, in any place and at any time, about the air raid alarm. It was produced over two days and constantly improved; initially, many people were dissatisfied, but now it is really helping them. The old notification system did not suit many people because it was ineffective. It is about informing anyone who is in the street, for instance, but also remains far from large clusters of people. Every city and every administration initially received many complaints that people could not hear the air raid alarm.

The hotline went wild: "Why can't we hear the bomb alarm? How should we react in this case?" First, a Telegram channel with the notifications was created, and then the app, which will really warn each person. Creating this app, companies joined forces and shared their technology, which made Trvoha even more useful. In addition to e-Enemy, there are other chat-bots, too, including local ones, volunteers' services, and all sorts of information systems that help manage humanitarian aid, create an inventory, and share it between regions and at the national level. Coordinating the community of people creating digital solutions, who very often did not know each other, has had incredible effects in all sorts of areas.

Krzysztof Izdebski

I would like to understand how people were prepared to get so involved. It did not happen all of a sudden, on 24 February. I have been following what is happening in Ukraine for years; for example, I know what the implementation of the ProZorro system looked like. A tradition of cooperation between various sectors had already emerged earlier. Mstyslav Banik came from the business sector, Olena Hunko was involved in social activity, Viktor Nestulia did both and was also a public official, and Nadiia Babynska works with officials. Is it remarkable that, in Ukraine, you managed to work out this form of cooperation between various sectors? Is this a new thing inspired by the war?

Nadiia Babynska

We simply have a very "good" neighbour that always holds us in a state of suspense and inclines us to be ready to get organised in one second.

We have the following behind us: the "Ukraine without Kuchma" campaign (2000–2001), the Orange Revolution (2004–2005; I was deputy head of the students' union and we had to get organised then, too), and the Euromaidan and the Revolution of Dignity (2013–2014).

Digital tools also became tools for coordinating, organising, obtaining funds and for other initiatives. Now we have chat-bots in various messenger apps; Telegram, Facebook, and so on. These are ordinary platforms that, in a crisis, become crucial communication and organisation channels, where we

can share our needs, coordinate, and get everything done. It is not strange that, before the war of 2022, we had a lightbulb moment and reminded ourselves: use what there is and create new things. This led to social disruption – when a crisis prompts creativity. As Mstyslav Banik said, we simply have no other choice. We have one country, Ukraine, and we are forced to do everything possible, based on our skills, knowledge, resources and money, or also by sharing information about what is happening here with public opinion abroad. This huge wave of social activity came about through volunteers' effort. I would like this to remain after victory, during the recovery.

Viktor Nestulia

I share this desire for us to continue working at the same pace after victory. Ukrainians unite very well "against something" – when some kind of threat appears, we can coordinate rapidly. This was shown by the revolution of 2004 and the Euromaidan (2013–2014). Volunteer efforts focused on supplying our army during the "special operation". When the issue of fighting for Ukraine's future appears, many conflicts and differences in opinion emerge here, and it is difficult to consolidate. May we find a common point of fighting "for something" after victory. May we work together. There are many ways to cooperate, plenty of wonderful initiatives and organisations ready to help, take action and invest their resources as volunteers to defeat the enemy and ensure that Ukraine wins. Later, we will have to build our own bright future.

This is not a unique characteristic of the Ukrainians; we see that global trends are similar. Technology helps mobilise people and makes life easier. For example, the Robin Hood[4] investment platform. An ordinary citizen can influence the markets, and modern technology enables us to approach complex matters in a different way. It is important to find the opportunity provided by modern technology and not lose it in the future, during the recovery.

Mstyslav Banik

In our society, we have a huge drive towards democracy. When there is no need to combine efforts to fight a common enemy, we are free people; everyone has their own opinion and vision. We simply need to learn to act together a bit more.

In response to your question about how we managed to launch the IT tools: Ukraine is one of the largest exporters of IT products globally. Many Ukrainian IT companies are involved in outsourcing from western Europe and the US; the Ukrainian IT community is huge. It may be somewhat hidden, as there are few unicorns,[5] it might seem from abroad. Products such as Reface or Ajax (which is also a technology company) have managed to stand out. Regardless of the tasks they carry out in at work, all these people use their skills as part of the IT Army.

There are companies that operate in Ukraine but focus on foreign markets. One of my friends works at a company that I thought was American, but it turned out that the entire office and all the IT professionals are in Ukraine. This company decided that it would not use Key Performance Indicators (KPIs) during the war. Everyone can do something useful for the state as part of the IT Army, as a volunteer, or working with humanitarian or military aid. The company still pays them their full salaries and will simply be pleased if an employee manages to continue performing his or her duties. There are various

4 Link: https://robinhood.com.

5 The most financially successful startups are referred to as "unicorns".

examples of how a company can get involved in supporting the state; developing some kind of product, allocating part of its funds to support for the army, or buying equipment. If a company continues to pay all its staff in full and can simultaneously sacrifice these people's efforts to help others during the war, this is an excellent example of how different aims can be combined. All this because we have a huge community and developed IT products.

Nadiia Babynska

During the first months, I spoke to IT specialists who came to us and asked how they can help. Here, I see a psychological basis. On 24 February, everyone froze. We did not know what would happen next and how long it would last. Later, there were queues at military recruitment points, for the territorial defence forces. Yet there came a time when everyone understood that each person can help in the area that he or she knows best, with what he or she is best at. IT specialists mobilised in the following way: we might not be good at fighting or even hold weapons properly, but we can develop an app that will help people fight. This has a psychological basis; it is a way to not go mad in this difficult situation, while simultaneously helping through our ordinary, everyday work, here and now; for example, as part of outsourcing.

Mstyslav Banik

In 2019–2020, the first version of the Diia app, which contained a person's driver's licence, registration card, passport and ID card, was created by Ukrainian company EPAM. They did it for free; it was their social contribution.

Viktor Nastulia

Over the past few years, civil society has become very active and there has been huge progress in digitisation and in developing various websites. Of course, the state is the leader here. Yet with a big community of volunteers and IT specialist activists, support from sponsors, which was very flexible, was a positive. At the start of the war, many international partners stressed their readiness, and even allowed many projects that had focused on other tasks earlier, to use funding for various websites – adapted to wartime needs, and partly to humanitarian aid – and developing the necessary software security. The presence of the community, plus some small financial resources and a group of volunteers; people ready to get involved, who understood the value that they are creating.

Here, the partnership between the authorities and civil society built over the years played a role. In many areas, we have a high level of trust and cooperation; in this, Ukraine stands out from many countries in the region. State institutions and social organisations in neighbouring countries lack mutual trust. Our cooperation and partnership fostered the rapid development of similar websites.

Krzysztof Izdebski

We have discussed society and cooperation between various groups. People are creating technology that saves lives, like the above-mentioned alarm system. What is the situation in infrastructure? It seems that a decentralisation model was adopted here, too. We heard about it in Poland, in part because one of the bigger state-owned companies helped bring over Starlink, the high-tech Internet created and donated by Elon Musk's company. You built this infrastructure with resilience and durability in mind.

Mstyslav Banik

Of course – connectivity: not just the Internet, but also mobile phone coverage in the areas occupied by the enemy, where the Russians tried to deprive people of Internet and television access. Significantly, there was considerable help from sponsors and the purchase of Starlinks in Europe, so that Ukraine would have Internet access. There are regions that have not been hit by the war, but because of the large number of guests, of internally displaced people (IDPs), challenges with communication occur, but in reality, the missiles flew everywhere in the country, too...

When the enemy gave way and the Chernihiv region was freed, many localities were left without any access to communications; even without mobile phone coverage. We realise that ensuring communication with the world and access to information is a matter of life, because when ambulances arrive, when people's lives are saved, they need to know whether there are beds available at a given hospital or whether they should go elsewhere. People were moving within Ukraine and many do not have contact with one another, as is the case in wartime. We used to see it in films and read about it in books – when people lose touch and then try to find each other.

The Starlinks very much helped with solving these kinds of problems. The Starlink is not a street antenna and everyone walking near this antenna has Internet. The Starlink works through satellite connectivity. The satellite gives a signal, there is a dish that receives it, and a router that distributes the Internet like Wi-Fi. There have been many hybrid adaptations where, for example, a mobile operator or even a landline operator could install Starlink on their equipment and provide Internet access so that people could use it. Of course, a lot of equipment was transferred to social facilities: schools, hospitals and kindergartens.

By destroying our communication infrastructure facilities, the enemy – apart from the obvious goals it achieves in this way – also deprives people of information about what is actually happening in the country. We have also seen footage of the shelling of television towers and heard about the takeover of studios in order to tell lies about how the Ukrainian army has capitulated and President Zelensky surrendered, and so on. The Russians wanted to manipulate and create a different picture of the world for people on the occupied territories. For this reason, practically from the start, we launched television and radio in the Diia app. Before the war, we had not planned to have television and radio in the app with documents and public services, but now we realised that, if someone has at least some access to mobile Internet, he or she can watch or listen to the news in the Diia app.

The fact that most of the key Ukrainian channels broadcast together, so that people obtain the same information, is an excellent solution. Many websites that enable people to watch livestreams and so on. All this has enabled access to television channels. The MEGOGO website, where people can watch films and television, operates in Ukraine. For a person to watch television channels or other things on MEGOGO for free, he or she must have any kind of experience of how it works. This also applies to transmission on channels such as YouTube. It seems to everyone that anyone knows how to use it, but many people ae still discovering YouTube for themselves.

The possibility to watch these kinds of channels in the Diia app increases the chances, as people do not have to make additional effort to obtain access to recent news on television or radio. Since we started operating in this way, it has brought major benefits and a great number of people have received access. With time, we decided to only maintain television channels; for example, we broadcast a transmission of Eurovision in the Diia app, which was watched by over a million people. A phenomenal result – but, more importantly, it triggered positive emotions. Ukrainians are proud of the Diia app,

especially those who have gone abroad, where they deal with offline services after having already gotten used to online solutions. I have seen many posts on Twitter saying: "The Diia app contains your digital ID card and digital driving license, you can watch Eurovision. What will come next?"

On the one hand, broadcasting Eurovision during the war seems inconsistent with the app's profile. On the other hand, people's emotional state matters to us and, without much effort, we can improve their mood, add motivation, patriotism and the right spirit, at least for a while. Everyone is truly in a difficult situation. Here, we have managed to do something indirect and not so obvious.

Viktor Nestulia

I was one of the million viewers who watched Ukraine win Eurovision on the Diia app. I would like to thank the Ministry of Digital Transformation for this. It really was an excellent idea. I how that this app really helps save people's lives and ensures access to information for people with limited possibilities.

In the first days of the war, the awareness that connectivity can disappear, leaving no Internet or television, was terrifying. We all understood what information the aggressor might share with us and how inhabitants' emotional state could change the course of the war. Thanks to the heroism and professionalism of the people who were and still are responsible for this domain, most Ukrainians did not lose contact, not even for a second. Of course, on the occupied territories, the Russians are physically doing everything so to put a stop to this connectivity. In the case of missile attacks, there were interruptions in energy supplies. Prescient people had power banks, but many people spent whole weeks without access to electricity, unable to charge their phones.

I know a story from private houses that have solar panels. There is a lot of talk about the Green Deal, the sustainable transition and how Ukraine should not only rebuild itself, but also modernise. The whole infrastructure is meant to fit green requirements. We should think again about private households' role in this domain, so that houses equipped with solar panels during bomb attacks and during the occupation could help others charge their phones and maintain connectivity. Perhaps this will become an element of the state's policy, too.

In terms of local governments – they must face the challenge of providing renewable energy sources not at the central level and not based on oil, because fuel for diesel engines can run out rapidly, too. How to take this into account for the future, because this fuel, at the current price, there not enough of this product in Ukraine now. Europeans might struggle to understand this.

Nadiia Babynska

In Ukraine, not every household has Internet access, and digital skills are not at a very high level, either. We must remember this and remember to maintain an inclusive approach to introducing a variety of technologies, including ones that serve to transmit information. We must remember that not everyone can use a smartphone. We must think about how not to exclude those who do not have access to, do not want to, cannot or do not know how to use these technologies. This concerns crisis situations in particular. If we look at the situation of the people whose homes were destroyed, a simple and understandable algorithm for what that kind of person should do is set to be created. A database that the government is working on has appeared. Talks are already underway on concentrating everything and having all the processes take place in the Diia app, but we understand that it

boils down to not discriminating against anyone. There need to be different options for people who use smartphones or the Internet portal.

Various needs need to be met, because one must understand that both the Diia app and other digital services are simply an envelope for various internal processes. Regardless of whether this is in Poland or in Ukraine, even the best envelope cannot hide the mess that we have within. When building new tools in Diia, the business processes within need to be changed. This applies to both constructing new buildings and changing one's place of residence. The place of residence should not be such a Soviet resentment (when citizens were obliged to have registered place of residence). We are trying to "thread" Diia's modern tool on the remnants of the old system. We need to change our approach. We need to think through and change the construction of business processes, and only then place modern, digital solutions on top of that.

Mstyslav Banik

Since the Ministry of Digital Transformation was founded, we have set four goals. Number one: covering Ukraine with high-speed Internet, so that people have access to online platforms – we were heading in this direction quite effectively. Number two: improving the digital skills of Ukraine's inhabitants. Number three: access in every case. Most of the online platforms that exist in Ukraine function offline, too. There are various solutions; for example, in the above-mentioned system for submitting notifications on damaged places of residence. This also works at the local government level; there is the relevant form. We are cooperating on this with local governments in certain regions.

Diia is the envelope, but this app does not provide services that act as a replacement for other organs of state. No digital service appears in the app without some system or other being improved on the side of the organs of state. Indeed, there are both outdated architecture and frequent security concerns. Of the 17 million people with paper ID cards, before passports came out, fewer than a thousand people used to work with the online registry. This data speaks of the completely different work system of the registry system, security and bandwidth.

Krzysztof Izdebski

I will repeat the following caveat: one cannot maintain the impression that digitisation alone makes the state work better. I often say that digitisation that consists in digitising the bureaucracy will not succeed. It must be combined with the idea of transforming the state. I know that this idea was present in Ukraine. Things probably could have been better, but they probably were not that bad, either. It is worth emphasising that local governments played a leading role here.

Olena Hunko

When it comes to electronic services, including ones for registering your place of residence, we are cooperating very closely with the Ministry of Digital Transformation. This service is provided by the local government, but at the same time we understand that we need to react to general tendencies. Although we have our own register, we keep cooperating with the national registers and, though the use of electronic tools, we ensure that inhabitants have access to public services. Before the war, we were conducting talks on enabling people to obtain a copy of their residence certificate from a given municipality from beyond their place of residence and registration, so that they would not have to travel to get it. This service is being developed and I hope that soon even residents who are unable

to order it via the Diia app will be able to come to a public service centre where they can access this service. Now we are synchronising our registers and developing a set of rules on providing these types of services.

In terms of Internet in bomb shelters, it really was said repeatedly, still at the start of the war, that there are no safe places in Ukraine. Of course, compared to the east and south, the situation in the west is much safer, but in Ukraine there are no fully safe places. Everyone in western Ukraine knows what a bomb shelter is; they spend many hours in shelters, too. Internet service providers, including here in Lviv, offered to connect the shelters to high-speed Internet. This went ahead and many shelters were connected to it so that people in a safe place – a shelter or cellar – could access information and know what is happening around them; what the current situation is. Of course, there is a ban everywhere on sharing unnecessary information, so that the enemy cannot access it. Nevertheless, people need to have access to official information, to statements by the city mayor or regional authorities: indeed, something has happened, but the situation is under control, everything will calm down, stay safe, do not leave the shelter… Here, cooperation with Internet service providers is essential.

Starlink taught us how to use satellite Internet in a difficult situation. We were prepared for a situation in which normal connectivity would disappear, because the war has taught us to prepare for anything.

Krzysztof Izdebski

Crises teach us many things, including in the context of technology: which technologies work and which ones do not catch on. Our perspective in Western Europe is obviously different, probably more linked to the pandemic, but Ukraine experienced COVID-19, too. This was a problem that the state had to adapt and react to.

What have you learnt that will help you better develop yourselves, services and digitisation in the future? What is the lesson here?

Mstyslav Banik

Above all: speed. We have always worked very rapidly at the ministry and products were developed quickly, but with the war there is less time than in peacetime. In reality, the products being created are meant to meet people's immediate needs, here and now. Many things are happening much more rapidly. Indeed, the COVID-19 pandemic was an earlier experience that increased the scope of remote work. We are no longer so physically tied to where we work. When the invasion began in February, we used this experience; we did not cease to be productive or effective. Many administrative offices used to work in an office, at one's computer, were completely disoriented during the first period of the pandemic, when there were efforts to establish a new system of work. This experience confirmed that people need to be mobile and able to work from anywhere. Of course, when working for people, your work schedule cannot be set in stone.

Viktor Nestulia

What have we learnt? Firstly: invest in trust and partnership. I think that no Ukrainian hesitated for a second before starting to volunteer or help the army. According to polls, over the past ten years, these two institutions have had the highest level of trust in society. In terms of state institutions, state offices and businesses that invested in partnership and trust with key stakeholders – both

international ones and civic organisations – were much faster, flexible and able to react during the first days. Others joined in later.

Secondly: invest in communities. Wherever we had communities that had lasting horizontal contacts, we were able to cooperate and move forward much more quickly and easily, based on trust.

Thirdly: open data. I would like to emphasise that we believe that data will be open again after the war. We would like this "after" to come as quickly as possible, and here Ukraine really can become an example for the whole world. We are fighting now, but are already starting to rebuild and modernise our country. It is very important for modernization and recovery to take into account three key lessons. Number one: trust and partnership between the authorities, businesses and society. Number two: engaging specialist, professional circles – one person is responsible for urbanism, another for accessibility or sustainable development. Number three: the recovery should be digital. From the register of wartime losses being created now in digital form, once projects are launched, we want everything to take place in comprehensible electronic systems with a clear division of competences in decision making. We are already cooperating on this with the Ministry of Digital Transformation and the Ministry of Infrastructure. During the recovery, we are counting on the principle of "everyone knows everything" being in force and on the publication of open data at every stage to obtain trust not only within Ukraine, but also outside it, in the international community. The world will help Ukraine during its recovery and we want citizens abroad to know how effectively their money is being spent, too.

Nadiia Babynska

I would like to add that data should be open now, rather than after the war. We need it now. I know that the Ministry is working on this. We need to develop solutions; how data is disseminated, how an open data policy is implemented under martial law. It is important to understand how we will do this. We need to decide on what we publish because certain platforms have a huge amount of data, including personal data. Of course, after victory, we need to open even further and more rapidly.

When it comes to lessons: in my opinion, the first one is that we should not abandon any scenarios, because the mind works in the following way: we do not wish to know about bad things. We need to create algorithms and work according to all the scenarios. For example, the state has an algorithm: we have a war and take further steps in a given area. There will then be fewer chaotic moves and more trust from Ukrainian society. It is worth investing not only in communities, but also in education and in fighting disinformation, which we feel acutely. Already now, we should think about how we can build digital resilience, knowing that this is a permanent threat. I am convinced that, with this kind of neighbour, it is not worth waiting for lasting rest. Resilience should be built knowing about all the risks. Over the past eight years, we have not worked well enough in this area and I would like us to do this better in the future.

Mstyslav Banik

For everyone, a very big discovery – in the positive sense – was the Polish nation's support. I would not say that it was unexpected; I mean the scale at both the government level and among ordinary people. The support we received from the Poles is a major discovery. This needs to be appreciated and increased after the war ends, after Ukraine's victory. I think that each of us is very grateful to every Pole. The speed and force with which the entire Polish nation mobilised, supporting Ukraine, deserves a separate discussion, great respect and considerable warmth towards one another.

Olena Hunko

We are likely to reminisce about this repeatedly; thank repeatedly, because each of us, at the level of personal, social and family relations, obtained support and help on Polish territory. There is no doubt about that. We were taught to make decisions rapidly, act rapidly and be prepared for anything. The final lesson: we should invest resources in our security, including cybersecurity. Not only material resources, but also intellectual ones. This needs to be learnt. Earlier, the security of our resources and infrastructure was not discussed so much or so timely. These internal processes are not done for the media attention; they are not for show. We cannot always say what lies where and what tools we are using. Earlier, securing our infrastructure did not receive publicity and the necessary attention, but it is definitely one of the priorities now. We need to be ready for anything.

Krzysztof Izdebski

Thank you for these words. We are the ones who owe gratitude for your labour, effort and sacrifice in our name, too. We are sure to return to these themes: we need to delve deeper into cybersecurity or the disinformation by Russia or China that Europe is exposed to. As Poland and the nations of Western Europe, we have much to learn from Ukraine.

Mstyslav Banik (**Мстислав Банік**) – for three years, he has been working at Ukraine's Ministry of Digital Transformation. He is currently a director responsible for the development of digital services for the population; previously, he was an adviser to the minister. He is one of the initiators and creators of the Diia system – that is, "the state and I" – which Ukrainians can use in place of paper documents and allows them to use public services. Diia has taken on a particular importance during the war, enabling citizens to remain in contact with administrative offices, among other things. Before his career at the Ministry, he worked in the private sector, specialising in marketing and online communication.

Olena Hunko (**Олена Гунько**) – director of the IT Office at the Lviv City Council. In 2017–2019, she headed the "Lviv's Open Data" project at the Urban IT Centre. In 2010–2016, she worked as an analyst on the Urban Institute's research and analytical programme. Since 2017, she has been a member of the Ukrainian Open Data Leaders Network.

Nadiia Babynska (**Надія Бабинська**) – expert on open data and project coordination from Ukraine. She designs and coordinates projects relating to civic technology, govtech and open data. She founded one of the largest open data communities in Ukraine, "OpenUp" and has worked as a consultant on open data and open government for international organisations. She was named one of nine women who have changed civic technology and IT in Ukraine, according to the civictechwomen list created by Inkubator 1991. She was a finalist of the Open Data Leaders Award in Ukraine in 2018.

Krzysztof Izdebski – expert at the Stefan Batory Foundation and the Open Spending EU Coalition. He is a member of the Osiatyński Archive's programme council. He has received the following scholarships and fellowships: Marshall Memorial, Marcin Król Fellowship and Recharge Advocacy Rights in Europe. A lawyer by training, he specializes in access to public information, the reuse of public sector information and the impact of technology on democracy. He is the author of publications on transparency, technology, public administration, corruption and social participation.

Viktor Nestulia (**Віктор Нестуля**) – before joining the Open Contracting Partnership, he served as acting director at state-owned company Medical Tenders in Ukraine, the central unit responsible for medical procurement established by Ukraine's Ministry of Health. In 2015–2018, he served as programme director at Transparency International Ukraine. He was involved in the preparation of five significant initiatives: the development of the ProZorro and ProZorro.Sale systems, building the DOZORRO community, and developing the e-Health system in Ukraine.

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