Publisher: IISI - International Institute for Socio-Informatics
ISSN 1861-4280

international reports on socio-informatics

volume 21 issue 1
2024

Civilian Engagement in Supporting the Armed Forces - An Enquiry into the First Five Months of the Ukrainian War in 2022

Volker Wulf
David W. Randall

Table of Content

The 'international reports on socio-informatics' are an online report series of the International Institute for Socio-Informatics, Bonn, Germany. They aim to contribute to current research discourses in the fields of 'Human-Computer-Interaction' and 'Computers and Society'. The 'international reports on socio-informatics' appear at least two times per year and are exclusively published on the website of the IISI.

Impressum

IISI - International Institute for Socio-Informatics
Stiftsgasse 25
53111 Bonn
Germany

fon: +49 228 6910-43
mail: iisi@iisi.de
web: http://www.iisi.de

Civilian Engagement in Supporting the Armed Forces: An Enquiry into the First Five Months of the Ukrainian War in 2022

Volker Wulf and David W. Randall
Int. Institute for Socio-Informatics, Bonn, Germany, and University of Siegen, Germany
wulf@iisi.de, dave.randall@uni-siegen.de

Abstract. Traditionally, armies are thought of as rather independent with regard to their infrastructure to conduct a war. The paper challenges this assumption. Studying first months of the Ukraine war in 2022, we argue that the functioning of the Ukrainian army was to quite some extend depended on its support by the civil society. We look at two NGOs and one software company to understand the intense cooperation between civilian actors and soldiers at the front line The civil actors provided essential supplies such as food, clothing, and care. They also procured technologies of dual use via their international networks.

1 Introduction

On February 24, 2022, the first day of the full-scale Russian invasion in Ukraine, the USA army wanted to fly out President Zelensky. He rejected this kind offer stating famously: “I do not need a ride; I need arms”. The rest is history. The Russian troops were not able to occupy the major population centers Kyiv, the capital, and Kharkiv, but made territorial gains in the South and the Donbas.

The fact that the Ukraine did not collapse under the massive pressure of the much bigger and better equipped Russian army has a wide variety of reasons, such as foreign training and weapons supply from NATO countries, specifically the US as well as combat experience in the long Russian aggression in the Donbas. In this paper, we want to look at an often-overlooked phenomenon: the fact that the civilian society was actively engaged in supporting the Ukrainian army – specifically in the first months of the war when foreign supply and equipment was not yet that prevalent.

The findings of this paper draw on earlier studies of the Russian aggression and Ukrainian resistance in the Donbas. Shklovski and Wulf (2018), for instance, had

found out that volunteers and soldiers on both sides of the demarcation line were wearing mobile phones because they suffered from a bad military supply and infrastructure. Carrying private mobile phones, though live-endangering, helped them to reach volunteers and civil support. In this paper, we will look at the first five months of the Russian-Ukrainian war, trying to understand cooperative practices at the fringes of the civil society and the Ukrainian army.

After a presentation of the state of the art and a discussion of research ethics, we will describe our research site, Western Ukraine and the city of Lviv in particular. In the following we present our empirical findings, how three different organizations, two NGOs and a software company, supported the Ukrainian war efforts during the first five months of the war. The paper ends by discussing the empirical findings with regard to their relevancy for research and practice.

2 State of the Art

Crisis Informatics

Crisis informatics has a long tradition in CSCW (Palen et al., 2009), studying "the use of ICT and social media before, during or after […] crisis and emergency" (Reuter & Kaufhold, 2018). Research has been looking into cooperation within emergency organizations (Denef et al., 2013; Ramirez et al., 2012; Reuter et al., 2014) as well as between emergency organizations and the public (Auferbauer & Tellioğlu, 2017; Ergun et al., 2014).

Depending on the role of the sender and receiver, Reuter et al. (2012) have categorized the communication forms into four areas: crisis communication, inter-organizational crisis management, self-help communities and integration of citizen-generated content. In prior studies on crisis informatics, the focus has particularly been on providing information to the public, i. e., classical crisis communication (Reuter et al., 2012). In contrast to this, a literature review by Tan et al. (2017) on mobile apps in crisis informatics research has revealed a shift towards a two-way communication and a need for a more user-driven approach when designing the communication applications and strategies.

Including citizens in crisis communication and relief has been named one of the most important points on the crisis informatics research agenda (Palen et al., 2010; Reuter & Kaufhold, 2018). Lack of preparation and awareness about ICT-supported crisis management also remains a problem (Kaufhold, Grinko, et al., 2019; Zhang et al., 2020). Particularly citizen self-coordination remains subject to further research (Reuter & Kaufhold, 2018). Citizens can be involved into crisis response via crowdsourcing, -sensing and -tasking (Auferbauer & Tellioğlu, 2017; Ludwig, Reuter, Siebigteroth, et al., 2015). Also, citizens' activities and self-organization in social media during emergencies have been analyzed (Gascó et al., 2017; Leong Mei Ling et al., 2014).

Social media in particular has the potential to empower communities on different levels, and ensure stability for crisis response (Leong Mei Ling et al., 2014). In the case of the recent global crisis, the COVID-19 pandemic, social media has played a key and vital role in disseminating information (Depoux et al., 2020; González-Padilla & Tortolero-Blanco, 2020; Islam et al., 2020; Laato et al., 2020; Obi-Ani et al., 2020; Puri et al., 2021). Several authors (Gascó et al., 2017; Kaufhold et al., 2019; Kaufhold et al., 2019; Ludwig et al. 2015; Zhang et al., 2022) have derived implications on how social media should be used by authorities and citizens alike. Social platforms are widely used for sensemaking as well, however, mis- and disinformation as well as quality assurance of user-generated content remains a challenge (Flores-Saviaga & Savage, 2021; Gascó et al., 2017; Gulati et al., 2021; Larson, 2020; Larson et al., 2014; Ludwig et al. 2015).

The war in Ukraine since 2014 is an example of IT appropriation in an armed conflict in which citizens and civil organizations played a major role (Shklovski & Wulf 2018). Therefore, we need to understand IT usage in (armed) political conflicts – a very specific form of crisis.

IT in Political Conflicts and War

There are studies which look at the role of IT, particularly social media, in political activism and uprisings, for example during the so-called Arab spring in Egypt (Al-Ani et al., 2012; Lotan et al., 2011) and Tunisia (Kavanaugh et al., 2013, 2016; Lotan et al., 2011; Wulf et al., 2013), in Syria (Rohde et al., 2016), the Republika Srpska (Tadic et al., 2016), Palestine (Wulf, et al., 2013a; Stickel et al 2015; Yerousis et al. 2015), and Iran (Grinko et al., 2022; Wulf et al., 2022). In such conflict situations, social media can be used for information, (de-) mobilization and coordinated political action. It can also provide a platform for a citizen "counter-narrative" (Al-Ani et al., 2012; Rohde et al. 2016) as opposed to government-controlled media and content. In their study of the civil war in Iraq, Mark et al. (2012) also observed the formation of collective identities in blog posts on military action.

Wulf et al (2013) and Aal et al. (2019) point to the importance of empirical studies "on the ground", looking into the connection between online and offline realities. From a citizen perspective, the influence of social media stays somehow limited when traditional sources are still crucial with regard to reliability (Kaufhold et al., 2019; Knight, 2014).

Concerning the situation in Ukraine, several authors have investigated into the Maidan protests (Gruzd & Tsyganova, 2015; Krasynska & Martin, 2017; Ronzhyn, 2016) confirming the connections between on-the-ground and social media activities, and pointing out that a strong civil society is required to support such a long-lasting protest movement. Experience with technology, however, is not limited to activities in the cyberspace: "IT professionals were familiar with project-based start-up work and had no problem adopting similar institutions in their civic engagement" (Krasynska & Martin, 2017).

IT becomes increasingly important in nowadays wars: not only with regard to cyber attacks, but also for information collection, propaganda and, on the battlefield, in the form of infrastructures for communication and coordination drones, and artificial intelligence. However, so far, few studies in HCI and CSCW have investigated cooperative practices and technologies at war, particularly those involving it. One example is a study by Shklovski and Wulf (2018) who researched the role of mobile phones in the war in the Donbas on both the Ukrainian and Russian side. They found that mobile phones are essential tools as they allowed them to access help from volunteers and civil organizations. The Ukrainian army even tolerated, to some extent, the soldiers' use of mobiles though their location can be easily tracked. However, these devices can threaten the soldiers' lives and that of their comrades. The significance of mobile devices in conflicts is also evident in Iran, where citizens have found ways to overcome the internet suppression by the government in 2019 (Grinko et al., 2022; Wulf et al., 2022).

In the case of Iran, like in the countries of the Arab Spring movement, the state authorities and militia were in an antagonistic relationship with the civil actors of the opposition movements. In other cases, such as the Ukraine, technology is used to enable and enhance cooperation between civil society and the military to fight a foreign aggression.

Civil-Military Cooperation

Research in the field of civil-military cooperation (CIMIC) takes typically a stance of military planning and is mostly concerned with formal mechanisms of coordination between civil organizations and the army in crisis situations, such as natural disasters, health crises, terrorist acts, or war (Franke, 2006; Strömberg, 2019; Tatham & Rietjens, 2016). In the context of war, civil-military cooperation has been investigated in Pakistan (Janjua, 2021; Rizvi, 1998; Wolf, 2020), in Israel (Gaub, 2016; Tiargan-Orr & Eran-Jona, 2016) and Kosovo (Studer, 2001) as well as in other countries (Burk, 2002; Matei et al., 2022).

The military is trained to deal with situations of crisis, controls access to important resources and is equipped to respond to urgent demands (Bollen & Kalkman, 2022). It is argued that a clear division of labor between military and civilian actors, as well as the effective design of coordination processes, can improve the military's effectiveness of humanitarian operations and increase citizen's trust in it (Franke, 2006; Studer, 2001; Tatham & Rietjens, 2016). A challenge for CIMIC is to ensure that the military, apart from protecting its country from external and internal threats, adheres to and sustains democratic values, principles and processes (Bland, 2001; Burk, 2002; Huntington, 1981; Bollen & Kalkman, 2022), especially in cases there is a tradition to instrumentalize the army for political purposes (Frič & Pernica, 2022).

Importantly, CIMIC studies argue that the role of the military in society and civil-military relations are embedded in socio-political contexts. Trust in the military correlates with the level of democracy (Bland, 2001; Burk, 2002; Gaub, 2016; Matei et al., 2022; Strömberg, 2019; Tiargan-Orr & Eran-Jona, 2016). Janjua

(2021) argued: *"Civil-Military relations in a country are an ideal barometer of the quality of democracy and institutional harmony".* In less established democracies, the military may serve as a mediator between conflict parties to preserve political order, and may have an influence on situations and changes (Rizvi, 1998; Wolf, 2020). Recent global crises such as COVID-19 and the Ukraine war highlight the role of the military and may enforce specific trends within CIMIC (Gibson-Fall, 2021; Marciano, 2021). In democratic states, the form of CIMIC depends on the current socio-political situation (Strömberg 2019).

Few CIMIC-studies have dealt with the case of Ukraine. Sherr (2001) and Popov (2019) have investigated into the transitional problems of shaping the Ukrainian national army out the heritage of the Soviet Union. In the Soviet times the army was under the strict civil control of the Politbuero but shielded from the scrutiny of other (civil) institutions. Under the new geopolitical conditions "*the staff of the National Security and Defence Council recognised that, even in conditions of limited democracy, security could not be provided without communication, transparency and trust between state and society, not to say between the armed forces and other bodies responsible for anticipating and responding to emergency and crisis*" (Sherr 2001, p.112). The papers discuss how to realize a civilian leadership structure in the Post-Soviet era and to integrate civilian and military personnel in the Ukrainian Ministry of Defense and other military institutions.

Popov (2019) also deals with civil voluntarism at EURO-Maidan and CIMIC in the following conflicts in the Donbas. From a military point of view, he mentioned the importance of civilian volunteering in procuring supplies as well as building IT applications for the army. Cusumano & Corbe (2018) investigate the importance of CIMIC in the context of hybrid wars. With regard to the Ukraine war, Röigas (2018) states that: "*CIMIC is a sine qua non of effective cyber security. The blurred line between civilian and military organizations' responsibility, the civilian nature of the objectives that are often targeted, the need for expertise that is often missing from the ranks and the importance of partnerships with firms operating in sectors as various as banking, transportation, energy and media, all suggest the importance of cooperation not only between civilian government agencies and military actors but also between the public and the private sector." (p. 250)*

While military planners get increasingly aware of the importance of civilian-military cooperation, there has been little research on how exactly this cooperation is happening in practice – specifically from the side of the civilian actors. By contrary, the CSCW community has not yet investigated into the cooperation between civilian and military actors.

3 Research Methods

Ethical considerations

Conducting research in a war zone is a risky endeavor. Not only for the researchers themselves, who, similar to the participants, have constantly been at risk in the field,

but also because in a hybrid war, any piece of data can be (mis)used by the opposing side. Therefore, we carefully took measures to ensure our participants' safety.

First of all, I informed participants of our academic background and the goal of our visit and study. We did not search for written informed consent for two reasons: (1) Signed sheets of informed consent could become harmful to participants in the case the documents were falling into the wrong hands. In that case the names of the participants were linked to this research and information from the paper could be used against participants. (2) Since we conducted some interviews in an informal and opportunistic manner (e. g., in public transport), we did not always have the opportunity to obtain written informed consent. Rather, we relied on spoken consent and all participants we cite here were ready to share their view and to see it reflected in a research paper. Also, we did not record the conversations to avoid voice tapes of the interviewees, taking into account some accuracy tradeoffs. When writing field notes, we documented all insights without recording real names of specific persons and using code words for the different organizations, thus anonymizing the data ad-hoc.

We took great care to securely store field notes on hard drives and ensure their anonymity. However, we are also aware that by focusing on a specific city, we could not exclude the possibility of certain participants being identified by someone who is well-informed about the research area. At this point, one also must take into account that the work done by most organizations is publicly visible: for example, they advertise their work and needs on social media to generate more support. So, we believe that the danger added by our investigation to the interviewees' security was limited.

Data collection

The data for this paper were collected during a ten-day visit to Ukraine in July 2022. The first author traveled with Olga, a Ukrainian citizen, and her younger son to Lviv. Olga and her son had lived in Eastern Ukraine, in a place of fierce fighting in the first phase of the war. After a dangerous escape within a month of the beginning of the full-scale invasion, they had passed Lviv on their way to Western Europe. Now they took the chance to visit her older son who had to stay behind in Lviv since martial law does not allow male adults to leave Ukraine. The son had, however, started to volunteer in Lviv.

The first author and his Ukrainian companions travelled by means of public transportation to Lviv, the biggest city in Western Ukraine. Together, they spent most of their time in Lviv and traveled back together. While in Lviv, they did a one-day trip to Sambir, a smaller town some 70 km south-west of Lviv.

The findings of this paper are mainly based on interview data and observations collected at various occasions in Lviv, Sambir, and while travelling back and forth. In Lviv, they stayed in a refugee accommodation offered by the software company *GServices*, a former meeting room turned into a dormitory, the floor covered with some 15 mattresses and blankets. Olga's elder son was staying in that accommodation, too, doing some low-paid volunteering. He introduced us to

different actors working in the company, many of them doing volunteer work in supplying soldiers and their units. Using the networks of the company's actors, we came in contract with two NGOs which were, at the time of research, supplying the armed forces. While moving around the town Olga met acquaintances who had also been fleeing from her city. While travelling, we met, by chance, two more interviewees who explained their work in supporting the Ukrainian armed forces.

The interviews were conducted mostly in English, but also in Ukrainian or Russian language. In the latter case, Olga translated during the interviews. Overall, 13 interviews were conducted which lasted between 30 minutes and three hours. The interviews were non-structured and open-ended. After some relationship and trust building between the interviewers and the interviewees, the local actors were typically asked to describe their personal background and how they were affected by and engaged in the war. We also asked them in which way they support the armed forces and how their related practices and IT use were.

Given the often-delicate content of our conversations, we felt it inappropriate to write field notes during the interviews. We also assumed that audio recording would have a negative impact on the interviewees' willingness to talk to us about these delicate issues. Still, in the course of the interviews, we took photos selectively with an iPhone. Given these circumstances, comprehensive summaries of the interviews, group discussions, and observations were written by the first author in the evenings after the daily fieldwork. The results emerging from the interviews were extended and triangulated by findings from social media channels covering the Ukraine war. The reliability of this information was also confirmed by an analysis of press reports and publications. For reasons of our informants' safety, we have changed their names. We also blur some features of the different volunteers and the organizations they work for in support of the Ukrainian army.

4 Research Site – State of the War

Our study took place in Lviv five months after Russia began its full-scale attack on Ukraine. Before the war, Lviv was the biggest city in Western Ukraine with some 730.000 inhabitants and relatively prosperous. Contrary to most part of Ukraine, Lviv was only for some 50 years part of a Russian-dominated political entity: the Soviet Union. Since the late Middle Age it had been the regional capital in the Kingdom of Poland. After the First Partition of Poland, in 1772, the city became part of the Habsburgian Empire. After the end of WWI, when the Habsburgian Empire disintegrated, Lviv was briefly the capital of the short-lived West Ukrainian People's Republic. After the Republic's dismantling, the city became part of the Second Polish Republic. As a result of the Hitler-Stalin pact, it was taken by the Soviet Union in 1939. The Nazis army captured Lviv in 1941 and murdered a big part of its thriving Jewish community, the Soviets took it back in 1944, integrated it into the Ukrainian Soviet Republic and expelled big parts of its Polish population. With the breaking-up of the Soviet Union, Lviv was a center of the Ukrainian independence movement and became a part of Ukraine in 1991.

In the beginning of the Russian invasion in 2022, chaotic conditions emerged in Lviv. People were taken by surprise. The city was bombed at its outskirts. There was fear and suspicion of pro-Russian sabotage. Long queues of people lined up at the border with Poland. However, at the time of research the situation had somehow calmed down. Lviv has rarely been attacked by Russian rockets and bombs. During our stay of ten days, we experienced two air alarms. Lviv was situated at a distance of 600 km from the closest frontline (Mykolaiv, in Ukraine's South), and some 1,200 km from the hottest frontline (the Luhansk and Donetsk regions, in Ukraine's East). So, Lviv was one of the safest cities in Ukraine.

However, Lviv had undergone a considerable population exchange. It was crowded with refugees from all different parts of Ukraine, quite some of them on their flight to Poland, Germany or beyond. According to their social status and networks, they had rented apartments or stayed with families or friends. With the help of volunteers, shelters emerged even in the most unlikely places and by early March, there was a more regulated system of reception and accommodation of refugees. However, in the bus station we also met refugees sleeping in waiting halls on matrasses and benches. On the other hand, people originally living in Lviv had already fled to Western countries.

In the first phase of the war, Russian troops tried to capture Kyiv, the capital, in vain, but made vast advances in the country's South and East. By July (before the Ukrainian counter-offensive) the frontlines were settling, and heavy fighting was concentrated in the Donbas region where Russia still made small advances. Over the first five months of war, the Ukrainian army was expanded quickly from some 200,000 in February towards 700,000 or even 1 m. soldiers (the exact number was kept secret).

The war, at that point, was very different from the one which had started in the Donbas in 2014 (Shklovski & Wulf, 2018). While the soldiers still get armed with AK 47 assault rifles, they almost never use them. The war has been driven by artillery and reconnaissance. Drones identify the targets on the ground which then were hit by artillery guns. Civil (hobbyist) small drones play an important role in the reconnaissance. Infantry was often operating the drones near the frontline (Österreichisches Bundesheer 2023).

Satellite networks also play an important role in the war efforts on both sides, both for communication and reconnaissance. *ViaSat* is a US military and civil satellite provider for broadband internet. On 24 February 2022, the day Russia fully invaded Ukraine, thousands of ViaSat modems got bricked by a "deliberate [...] cyber event". Thousands of customers in Europe have been without internet for a month since (Burgess, 2022). The cyber attack on the established satellite communication system affected the Ukrainian army considerably. In this situation, Elon Musk opened *StarLink*, his low earth-orbit satellite system, for Ukrainian military use. Due to its much lower orbit and its much lower latency, StarLink is specifically suitable for voice and video communication. However, the Ukrainian army did not yet have enough StarLink routers at the time of research.

As a consequence of the inefficiencies, the Ukrainian army was experienced in the fights following the 2014 Euro-Maidan movement, volunteer organizations were created to make the Ukrainian army better able to operatively react. *Save Ukrainian Life* (https://safeukrainian.life/), for example, is a rather large organization which collects donations to buy equipment for the Ukrainian army. It was founded by veterans of the 2014 war and buys army equipment on a large scale. While army support has been lower around 2019-20, initiatives, communities and events related to culture, tradition, sports, environment, etc. in Ukraine have been thriving, not least with the support of international grants. This has contributed to a more active civil society.

5 Empirical Findings

In the following, we will describe the different actors and organizations we have met during our stay in Lviv, and how they have been supporting the Ukrainian army.

5.1 NGO 1: Procuring Technologies of Dual Use

NGO 1 was created by a small group of military activists which were running an organization to support the Ukrainian armed forces in the Donbas starting in 2014. They reduced their NGO work in 2015/16 when the Donbas war got less intense. One of the founders then started working as a translator for British and US instructors on training missions for the Ukrainian army.

When the full-scale war started on February 24th, 2022, the activists restarted their NGO activities instantly.

While one of the founders was taken by surprise of the Russian attack, she was not surprised that the Ukrainian army was doing so well. Many Ukrainian soldiers were professionally trained by Western armies since 2014.

At the beginning of the war, there was instantly a big willingness to volunteer to join the army. Friends who were scientists, musicians, or cultural workers were serving in the army at the time of research. They also expressed her opinion that every person in Ukraine somehow feels being part of the army.

However, while the Ukrainian army was much better organized than in 2014, the main logistic challenge was the massive expansion of the armed forces. Obviously, the government did not have enough equipment, therefore NGOs like theirs need to help.

Their activities are purely focused on supplying the army and delivering to the frontline technical equipment of dual use. Devices such as night vision, civil drones, thermographic cameras, cars, or ambulances can be bought on the civilian market but are of high value in the current stage of the war. They also told us how important StarLink routers were. Having still three demands for such a router pending, they explained that StarLink routers ordered in Germany were working in Ukraine. They

do not, however, procure army boots or uniforms. They explained that these pieces of equipment could be bought, in the worst case, by the soldiers themselves.

The NGO organizers explained the need for their current work. They buy some of the technical equipment in Ukraine, for instance cars, and also do the technical maintenance and check-up of used cars. Other devices they order from outside of the country. They explained that for some devices the prices have tripled inside Ukraine after the war started, for instance for night vision. Drawing on their activities since 2014, they have built a network of contacts abroad which supports them in delivering the needed equipment to Ukraine, each requiring a specific way of procuration. They explained that there is not a single online shop which would allow to order these devices.

As an example, they showed us a big black suitcase in which a microdrone was stored. The drone was equipped with a thermo-sensing camera and cost the NGO some 6,000 US$ - mainly due to its sophisticated camera. But they also admitted that other Ukrainian support organizations can buy much bigger amounts of drones to considerably cheaper prices. The NGO had put an engraving on the drone which indicates that the drone is their donation and cannot be sold.

To finance their material, they have a network of international donors which they have built up since 2014. Individuals and organizations from Poland, Lithuania, US, Germany, and other countries sent donations to the NGO. Recently, they had organized an auction of Ukrainian art in a hotel in Lviv, where 100 contemporary artists had donated one piece of work for free. The auction raised around 1 m. UAH (some 27,000 US $).

They explained that their NGO only buys technical equipment when there is a need expressed by an army unit. Typically, they are contacted by people on the level of a commander of a company or a platoon. To be available, they always have an eye on their mobile phone. All the different messenger apps are crucial to their work. Being in the military services business since 2014, the NGO organizers know many soldiers and officers. Since one of them who translated for British military instructors, many Ukrainian soldiers “passed through their hands”. So, many army men at the Ukrainian frontlines know them personally. The soldiers tell them which type of equipment they need. However, they typically ask the person requesting equipment to get approval from a higher officer. This way, they want to avoid that soldiers or lower-ranked officers decide for strategically unimportant projects. However, they make sure that the equipment is delivered to the operation unit which has requested it. Therefore, the NGO bought a car and engaged a driver who delivers the ordered equipment very close to the frontline.

To deliver the technical devices to the fighting units, the NGO does not rely on the army’s official supply chain. One of the NGO activists explained that this decision resulted from their problematic experiences with the Ukrainian lines of command in the Donbas war. Therefore, the NGO had bought its own car which brings the devices very close to the frontline where they are needed. On their way back, the driver takes soldiers’ dead bodies home. When the first author looked at them full of questions, they replied: ‘Somebody has to do that!’

As another example of their activities, they showed us an ambulance standing in front of their place, a Lithuanian NGO had donated it to the Ukrainian army. They had changed the color of the van to camouflage it, equipping it with a bottle of oxygen and some other equipment. Then they would put some 100 packages of personal health equipment for soldiers into the van before driving it to the front line.

With regard to future perspectives, they hoped that the Ukrainian army would win back all the land now occupied by Russia, including Crimea. They hoped that this would happen before the winter came in 2022. However, they were not sure whether it would happen: "*Wars are hard to predict and always surprising*."

5.2 NGO 2: Humanitarian Aid for the Army and Refugees of War

Visiting a warehouse in the outskirts of Lviv, we learnt to know a second NGO which had moved in a new field of activities by starting to support the Ukrainian armed forces. NGO 2 was originally created by two actors some five years ago to professionalize their already existing social engagements. One of them was working with children suffering from cancer while the other tried to improve the conditions for patients in psychiatric hospitals.

While they had not dealt with the military in the years before, in February 2022, they instantly decided to support the Ukrainian army and refugees from the war zones. Both had an international network of donors who trusted them and had funded their earlier humanitarian activities. They had gained the reputation to work efficiently with foreign donors' money. Therefore, they explained, it was rather easy for them to get access to donations – even directly at the beginning of the war. Contrary to NGO 1, they do not have a network among lower-ranked soldiers but rather get requests from higher-ranked officers whom they know personally.

One of the founders explained that foreign donors who wanted to help in the suddenly emerging situation of war but did not have worked with their NGO before, often started to donate only a small amount of money or goods. In a next step, they expected the NGO to deliver on their promises: to reach refugees of war or soldiers at the frontline. In case their expectations were fulfilled, they donated much more goods or money the next time. So, reputation building is central to the acquisition of donations – specifically from foreign sources which cannot understand and analyse the situation on the ground in detail. Therefore, they document every hand-over of goods with photos which can be presented to the donors. They also keep a very strict regime on bookkeeping to secure and expand on the good reputation with their donors. Their professionalism in bookkeeping and their international network of donors, many from the Ukrainian diaspora, are their assets and comparative advantage in the current situation.

During the last five months, their activities increased very quickly. They had to expand their storage place, first from just an office towards a smaller warehouse and then they moved to the current location. They receive big trucks of humanitarian aid from Europe. Local groups of supporters buy or collect stuff in

Europe and send it in their own truck to Lviv. In case the NGO does not receive the requested goods which the army or the refugees need, they buy the stuff from their own funds.

At the time of research, they provided soldiers with special food which was easy to prepare and had a high level of calories, summer wear uniforms, sleeping bags, anti-allergy medicine, ointment against rheumatism, insect repellents, water-proof shoe polish, and different types of medicine. They also receive cars and jeeps from abroad to deliver to the army. We learnt that cars are in high demand since the average life span at the frontline was about one week. The NGO also helped to equip mobile (army) hospitals with medical equipment such as ultrasonic devices.

All the supply and materials which the NGO receive arrive at the warehouse. The army picks up its supply at the warehouse. The NGO does not deliver its donations directly to the frontlines. The organizers seem to believe in the integrity of the army's supply chain. This is probably because they work with higher officers whom they trust due to their personal relationships.

Few refugees come directly to the NGO's warehouse. The NGO un- and repacks the donated goods in the warehouse and sends them with vans or trucks to the refugee shelters in central or western Ukraine. These locations are not close to the frontline. Sometimes, they even send trucks which deliver goods from abroad (e. g. Germany) directly to orphanages and refugee shelters. Importantly, the NGO takes care that the handing over of donated goods is well documented via photos and videos to be communicated to the donors' organizations.

5.3 GServices: Three Modes to Support the Frontlines

GServices is a software company with some 250 employees. Beyond the headquarter in Lviv, *GServices* has more offices in central and western Ukraine. They offer software-related service for national and international customers, specifically in North America and Europe. Though their international customers had asked them, before the war started, to prepare emergency plans for their service delivery, the beginning of the war took them by surprise. Among the company employees, only two or three had become soldiers after the war started. We learned that the number was low because quite some employees still have a student status, and therefore did not get drafted. There were also rumors about an engagement in military software development and cyberwar activities.

At the beginning of the war, the founders of the company spent money and time to support soldiers and refugees. At the time of research, the company had already donated some 450,000 US $ to these efforts. During the first three months, they even donated more money than they made profit. So, they even drew on the company's savings. After that they had changed this policy a bit – the founders explained that the company still needs to make some profits. They communicate their policy to support the Ukrainian war efforts towards their employees and ask them whether they would like to contribute 10% of their salary as well. However,

many of the employees organized their own support activities (see the sections below).

GServices gave about one third of their donations directly to the Ukrainian government, another third to the NGO *Save Ukrainian Life* which was procuring military supplies on a larger and more strategic level. Another third they spent on the company's own volunteer activities. One of the founders was heading these activities first by himself, but by the time of research his wife had taken over this task. By then, the founders had decided that they had to refocus more on their business, having restarted to travel already to their customers in the US, Canada, and Europe. At the time of research, the founder's wife spends the mornings at home and the afternoons in the office to conduct the company's volunteer work in supporting Ukrainian soldiers and refugees.

In the beginning of the war the situation for volunteering was very chaotic. Whenever a soldier called the company and asked the founders for some help, they tried to deliver what was needed. At the time of research, they still support fighting units to whose soldiers they had built a personal network of trust. However, they meanwhile rather prefer to deal with the first or second level of command. Procedurally similar to NGO 1, if a soldier now approaches them for something they ask him to get first an authorization by his superior. However, they still do not work with the army hierarchies. The founders believe say that their company is too small to do so. From their point of view, working with the army as an institution is rather the business of large NGOs – such as *Save Ukrainian Life*. They told us that the NGO is even asked by the US government how to supply the Ukrainian army. That way, the US authorities seem to want to get a second opinion when dealing with the Ukrainian government – probably still lacking full trust in its efficiency and reliability.

So, what does their NGO provide to the Ukrainian army and the refugees? *GServices* delivers uniform clothes and textiles for carrying ammunition. They explained that in the beginning of the war, they asked a local textile company to produce 10,000 pairs of socks for the army. Later, the soldiers wanted more specific protection wear and special clothes to carry ammunition. So, they took a US-made sample piece and looked for a local company to produce such pieces of textile equipment. They showed us photos of some of the textiles they produced for the army.

Regarding cars, they explained that they just recently had bought 12 jeeps for the army. The cars were purchased by former employees in Germany and friends of colleagues in the UK. They were driven by a network of actors to Lviv.

With regard to their humanitarian work, *GServices* focuses on civilians living close to the frontline. They supply those civilians still living there with food and medicine. At the time of research, they were specifically active in the Mykolaiv and Kharkiv region. To deliver their supply to the frontlines and also to places where refugees are sheltered, *GServices* has bought a van which the brother of one of the founders is driving. The brother even goes close to the frontline and distributes the goods directly to the units in need of them.

From the beginning of the war, *GServices* had opened parts of its office space to house refugees – originally dedicated to their employees and families arriving from other parts of Ukraine. When employees came in lesser numbers than expected and later returned to their homes in other parts of Ukraine, there was space left. It was offered to other refugees as well.

While *GServices* had a company policy of supporting the Ukrainian army and civilians in need, individual employees were active beyond that.

5.3.1 Software Developer

Yevgeni is a rather young software developer at *GServices*. During the first days of the war, he followed the situation at the different border post via specific Telegram channels. His wife had suggested to leave for Poland, but he finally decided to stay, and she stayed with him. Yevgeni explained that the Ukrainian army is still very bureaucratic and little digitalized. So in case soldiers need something, it goes via the military hierarchy and can easily take 10 days to be processed (signed, stamped, moved to the next level, etc.). This is too long for the soldiers to wait. Moreover, he hinted to the fact that within the military hierarchy could still be supporters of Russia who would disturb the supply process. Finally, Yevgeni pointed out that all Ukrainian states over the past 1,000 years were rid by corruption problems. Therefore, he argued, it is very important to take care that the donations reach the soldiers who really need it.

He does quite some volunteering work. From the very beginning of the war, he looked out on Telegram for things the army needed. He also has a friend who was very engaged in the Ukrainian boy scout movement. This friend had a lot of contacts to soldiers which requested help from him. Very early in the war he got a message that the Ukrainian army needed six batteries to run jeeps. He decided that he could maybe help. So, he called different shops in Lviv to buy the batteries. However, he could only find three batteries of the ones specified by the soldiers. So, he called them and asked them whether also a fourth smaller one would be fine for them. Some minutes later he got a call back which confirmed that a smaller one would work as well. So, he bought these four batteries and drove them to a warehouse. In the warehouse there was already a palette waiting to packetize the pieces of equipment which a truck would bring the next morning to the requesting army unit.

Yevgeni also had experience with buying jeeps for the army. The first jeep he bought was located near Berlin. A Ukrainian living in the Czech Republic had found the car online. Another Ukrainian, living near Berlin, inspected it. After buying it, it was brought to the Czech Republic where some repairs were carried out. The jeep was then driven to Lviv by a Czech friend. It was not that easy to get it through the border control. During all that time the requesting soldiers were waiting for the jeep and asked about the state of the affairs.

The jeep was checked again in Lviv and then Yevgeni and his friend drove it to the frontline near Kharkiv. His friend personally knew the soldiers who were demanding the car. It was a six-hour drive, starting early in the morning. When they

handed over the car, the soldiers were so grateful, Yevgeni recalled. The soldiers told them that they had not any vehicle before but now they could do their reconnaissance work much better. They also showed them videos of their recent fights and took them to the frontline, pointing to a place where a small battle happened during the last days. Yevgeni and his friend then took a night train back to Lviv.

However, the jeep lasted only two days before it was destroyed by the fire of a Russian tank which the troop had overlooked when pushing the Russian units back towards the border north of Kharkiv. The soldiers sent an uncut video of the event to Yevgeni and his friend. So, they could almost in real time see how their donation was used and what happened to it. Fortunately, the driver of the jeep was only lightly injured in the event. Yevgeni mentioned that these events lead to a strong bonding relationship with the soldiers.

When buying a second jeep, Yevgeni had already found a specialized repair place in Lviv which would prepare cars for the frontline and even added camouflage color to the car. The first jeep had not been repainted when delivered to the frontline since they did not know how to do. Yevgeni also followed online car market in Western Europe for used jeeps. He said that the prices are getting cheaper the more far away the jeep's location is from the war zone. At the time of research, he tried to buy a jeep in the UK. He said that there are already specialized Indian car dealers which offer specifically selected cars for the war zone – some advertisement even explicitly state that a certain car is suitable for Ukraine.

5.3.2 Software Manager

Ruslan is a manager in *GServices* – running two software projects with some 22 people. He also does his own support work rather independently from the activities of the company. He has a personal network inside the Ukrainian army, consisting of family members and friends. He is in rather constant contact with them. So, he has a good understanding of the soldiers' needs, and they trust him for help. He meets these soldiers when they rotate from the front line to Western Ukraine for some relaxation. His friends text or call him and ask for help, speaking about problems or making suggestions. Since he knows them and their way of conducting war very well over the long period of time, he can help or be creative in looking for solutions.

An international network of colleagues helps to buy equipment such as GPS tracker, thermal telescopes, night vision binocular, body armor, or helmets. Ruslan explained that these pieces of equipment were sold out in Ukraine already two days after the war started. So, they needed to be procured abroad – one needed to have international connections to find places where this equipment could be bought. After purchasing, this equipment was often flown to Poland and then taken across the border – either carried by private persons or driven with vans.

The transport to the frontline is not that easy either. He had to find individual solutions for each military unit in need of these parts of equipment – depending on where the unit was fighting. He sometimes sends it to a still operating post office or to a train station and then the local army people had to take care to pick it up

there. *GServices* also bought a van to deliver goods to the frontline which he uses as well.

Ruslan explained that Zelensky speaks about a 'total war' to defend Ukraine, meaning that everybody needs to contribute to the defense of the Ukrainian state. Ruslan says for him it is better to make use of his technological knowledge and his international network than being a soldier in the army. Somehow, he explained, that he acts like a civilian consultant as well as like a part of the logistic department of the Ukrainian army.

He provides technological components which are difficult to get via the Ukrainian army's normal supply chains and logistics. He explained this with the example of drones. The Ukrainian army is buying Turkish armed drones (Bayraktar TB2) via the normal supply channels. However, small, unarmed drones are not on the list of the army's procurements. Still, these drones are of crucial importance for reconnaissance missions and the identification of targets to strike at. They are equipped with cameras, and people like Ruslan have made the data stream emerging from these drones being integrated into the Ukrainian war machinery. He let us know that he knew all the technical details of this integration but did not want to speak about it.

Compared to the activities of the NGO *Save Ukrainian Life*, his activities are on a much smaller scale. He explained that they get also much better prizes, in case, for instance, they buy thousands of civilian (micro)drones instead of one or a handful of them.

Ruslan is financing his 'projects' in different ways. When the amount is small, he is paying it from his own pocket. In case of larger investments needed, he opens a 'jar' which is a specific funding instrument of a Ukrainian bank (MonoBank). To open a jar, he describes its goal and sets a minimum amount of money needed. Then he sends a message to the network of his friends and asking them to contribute with money to the bucket. They just need to click the link and donate an amount of money to be transferred from their bank account.

As an account of civilian resistance against the Russian army, he told us that some people in the villages were stealing Russian trucks or cars and even tanks. Sometimes they even destroyed them. He acknowledged that these civilians run a high risk.

5.4 Motivation to Resist

Having investigated into the intense cooperation between civilian and military actors, often on the operational level, we were interested why the civilian actors were getting so engaged. Olga, who had fled from an Eastern Ukrainian city, explained that most Ukrainians had accepted the situation before this war: having lost Crimea and a part of Donbas. However, they thought when the Russian attacked again on February 24: "This is enough!" She felt that they had accepted for too long what Putin did: "Putin demands too much! This is our land!"

We spoke to one of the founders of NGO 1 about the surprising resilience of the Ukrainian army. While she was taken by surprise of the Russian attack, she was not surprised that the Ukrainian army was doing so well. Many Ukrainian soldiers were professionally trained since 2014. At the beginning of the war, there was instantly a big willingness to volunteer to join the army. Friends who were scientists, musicians, or cultural workers were serving in the army at the time of research. She also stated that every person in Ukraine somehow feels being part of the army. With regard to future perspectives, she hoped that the Ukrainian army would win back all the land now occupied by Russia, including Crimea. She hoped that this would happen before the winter came. Whether that would happen she was not sure. She said wars are hard to predict and always surprising.

Ruslan, the software manager, provided us with accounts of civilian resistance against the Russian army. He explained that some people in the villages were stealing Russian trucks or cars and even tanks. Sometimes they even destroyed them. He acknowledged that these civilians run a high risk.

We were also interested to understand why civilian actors supported the operational units directly and delivered the materials to the frontline. Yevgeni explained that the Ukrainian army is still very bureaucratic and little digitalized. So in case soldiers need something, it goes via the military hierarchy and can take easily take 10 days to be processed (signed, stamped, moved to the next level, etc.). This is too long for the soldiers to wait. Moreover, he hinted to the fact that within the military hierarchy could be still supporters of Russia who would disturb the supply process. Finally, Yevgeni pointed out that all 'Ukrainian' states over the past 1.000 years were rid by corruption problems. Therefore, he argued, it is very important to take care that the donations reach the soldiers who really need it.

The problem of corruption was also addressed by an interviewee who was working abroad and visiting her family in Western Ukraine. She told us that she was surprised that Ukrainian soldiers were so much demanding support on social media platforms. She had noticed that they asked for cars and drones. And after a week, when they had received it, they said "Thank you!" via social media! Having read about the high amounts of money the US and Europe were sending to Ukraine she was wondering why the soldiers at the frontline are missing equipment. She stated that corruption is one of the basic problems of the Ukrainian state. Therefore, she did not participate in these donations.

For some people from Western Ukraine there was a historical dimension to their resistance. An office manager at *GServices* explained that her grandfather was supporting the uprising of Ukrainian partisans which happened directly after World War II. These partisans, mostly from Western Ukraine, were fighting for an independent Ukraine, after partly, having sided with the Nazi occupation. Her grandfather was shot by the Soviet army. So, the resistance against Russian domination is deeply ingrained in her Lvivian family history.

She stated: "We will be fighting against the Russians to the end!" While almost none of her colleagues at *GServices* served as soldiers, her husband volunteered at the frontline. We asked her how there could be an end to this war. She said that one

needed to murder Putin. She stated that peace can only be reached when all Ukrainian territories, including Crimea, would be reoccupied. She also speculated that after a Russian defeat, parts of Russian Kuban and Kursk regions could be annexed by the Ukrainians. She also suggested that Russian territory ought to be bombed by artillery.

We also met the director of a provincial museum. She was on her job since the end of the Soviet Union and had turned parts of the museum into a reliquiae collection of the Ukrainian Insurgent Army (UPA) – the underground organization the office manager's grandfather was fighting for. The museum highlights the historical dimension of Ukraine's fight for independence. Glorifying this part of West-Ukrainian history, the director showed, however, little respect towards the many Polish and Jewish lives murdered by the UPA during WWII.

On our way back, in the train, we met a Ukrainian from Odesa, some 55 years old. He was on his way to Vienna to buy two ambulance cars for the territorial defense forces. Being ethnical Russian, he explained that he only started volunteering after the Russians were attacking his housing complex in Odesa with cruise missiles. His apartment was not fully destroyed but the electricity, elevator, water and, gas do not work anymore. When he spoke about his motivation to volunteer, he referred to Winston Churchill who had said: 'War is a bad thing, but living in slavery is worse!' He said that each Ukrainian soldier at the frontline needs ten people who do the logistics for him.

It was interesting to understand that almost none of our interviewees still had personal contact with family or friends in Russia. The Ukraine has been an integral part of the Soviet Union where population relocated and mixed quite regularly, and national identity had less of an importance. So, there had been historically very close ties. However, the interviewees had abandoned their relationships into Russia, even to close friends and family members, or at least, have stopped speaking about politics and the war. There was a feeling that the media coverage and the perception of the war was so different in the two countries that meaningful conversations were difficult to conduct. One of the organizers of an NGO explained that he had some Russian friends from his time in the Soviet army. However, the contacts were fading away after the Maidan protests in which he participated. According to him, there was almost not any common ground to talk about political issues anymore. Now, he does not at all even like to call them. The ethnical Russian interviewee from Odesa explained the fact as follows: "The ones [of his family and friends] in Russia cannot say anything negative about the war, the oppression and surveillance in Russia intimidates them."

5.5 Social Media, Mobiles, Drones, Satellites, and Cyberwar

The war in Ukraine is highly technical in nature. The support activities of our informants were strongly relying on technical infrastructures, some of them were even engaged in developing these infrastructures.

Social media running on private phones plays a key role in maintaining the linkage between the soldiers at the frontline and their civil supporters. We asked the activist in NGO 1 how they were contacted by the soldiers. They explained that they always have an eye on their mobile phone. All the different messenger apps are crucial to their work. Officers in the field mainly like to communicate with voice messages via Signal. Soldiers rather write text on Signal, WhatsApp, Telegram, Viber, or Facebook to reach out to them. Interestingly, the Ukrainian army only recommends the use of Signal and WhatsApp, the other messengers are not officially suggested. So, soldiers use wider range of messengers than officially recommended. It is also interesting that officers seem to communicate via different media with the supporting activists – maybe due to a more profound education with respect to the dangers involved.

Officers who are not positioned at the frontline can use computers, and again develop different patterns of communication with supporting activists. One of the actors of NGO 2 explained the way she receives orders for humanitarian support from officers who are not positioned at the frontline: 'They send me a letter' means that the officers either send her an email or a scan of a signed document.

Ruslan confirmed the findings that mobiles are still widely spread at the frontlines. He emphasized how important it is to network and communicate in this war. He explained that the danger to use mobile phones, in the sense that the localization can be identified and used to direct firearms at that position, depends on the situation in which a certain soldier is acting. In case the Russian side knows where the Ukrainian positions are – the additional information resulting from the localization of mobiles is small. In case of covered operations are carried out in secret, very different measures have to be taken. Ruslan explained that the Ukrainian army knows how to deal with such situations, but he did not want to talk about the details.

With regard to the danger to be localized when using mobile phones at the frontline, the founders of NGO 1 explained that the soldiers use sometimes the mobile phone network but very often StarLink routers. Ruslan confirmed that the StarLink satellite network is quite important for the Ukrainian army. In case the fighting units have a StarLink router the communication is WiFi-based with the router. If the soldiers follow some rules, it is quite difficult to localize a StarLink router. The communication between routers and satellites is fully encoded, so difficult for the Russian side to listen to the information exchanged.

We also spoke with Yevgeni about the StarLink network, its security and role in the current war situation. He believed that the advantage of StarLink is the fact that it is brand new at war. So, the Russian side was not yet able to corrupt the ground stations or satellites.

Being familiar with some of the recent IT developments, Yevgeni reported about drones and their role in the current artillery war. He explained that Ukrainian technologists were able to re-engineer the hardware of commercial drones to make them transfer their data to a specifically developed computer application. This application runs on the ground control station of the drone and connects typically

via WiFi to a portable computer. This computer is connected with the command-and-control system of the Ukrainian artillery. There, the video material from the drones is used to decide on the targets to attack and which type of artillery will be ordered to shoot. Via the command-and-control system the geographical data to select a specific target is sent to a specific artillery unit. In case the artillery is equipped with an automatic targeting device, the canon can shoot directly, else the gunners need to reposition the gun manually. So, technological innovation allowed integrating commercial drones into the Ukrainian artillery's command-and-control system.

According to Yevgeni, there are also a couple of problems involved with this technological solution. Firstly, outside of buildings WiFi signals can be measured at a quite far distance. So, the position of the drone pilot is easily to be detected – in case WiFi is used – instead of a cable – to bridge between the ground control station of the drone and the portable computer. Secondly, commercial drones can be quite well jammed in the sense of either taking them down or, at least, of disturbing the video channel.

The linkage between the reconnaissance units, mobile computer and the artillery's command-and-control system seems to be run via StarLink satellites as long as there are no telephone cables or a mobile network available. Yevgeni explained that the StarLink routers were easily portable, the antenna is not that big, either.

Two informants told us that they were involved in cyber-war activities – specifically in the early phase of the war. Olga's son, a student, remembered that in the first days of the war there were calls on his university's Telegram channel asking to participate with one's hardware in Ukrainian cyber-war activities. In the channel, there was a link to a website of the government. By downloading an app, one would give control to the Ukrainian government to use the computer for denial of access attacks on Russian WWW-sites. Yevgeni also participated in these activities, and he even conducted it in a bit more sophisticated manner. In the beginning, he did not understand the importance of having a Russian VPN running on his computer. Later on, he found that such a VPN channel makes it more difficult for the Russians to defend against these attacks. At the time of research, it had, however, become more difficult to find Russian VPNs on the internet. Obviously, the Russian state security had reacted to this type of cyber attacks.

Yevgeni also took the initiative to develop a bot. It posted pro-Ukrainian messages from a channel Yevgeni had created for this purpose into Telegram channels of pro-Russian nature. He explained that he selected these messages to make the Russian population aware of certain facts he believed they would not have easily access to.

6 Discussion

The Russian attack on Ukraine on February 24, 2022, did not achieve the military and political goals the Russian leadership had anticipated. While there is, of course, a wide variety of different reasons for this outcome, the data presented in this paper

points to the importance of the close cooperation between the army and a wide variety of civilian actors.

The networks which turn instantly into support structures for the Ukrainian army have been built over time. The Maidan protests, the following Russian aggression in the Donbas region and the full-scale war have contributed to a Ukrainian national unity and a collective identity (Mark et al., 2012) – even among considerable parts of the ethnic Russian population in Ukraine's South and East. One reason for this readiness to volunteer may have been the development of a strong civil society in post-Soviet countries (Krasynska & Martin, 2017), though this fact is often not recognized even within these countries.

In many studies on CIMIC, the authors take the position of military strategists or planners. The military is seen as formally distinct from civil actors and society organization (Franke, 2006; Strömberg, 2019; Tatham & Rietjens, 2016). Taking a CSCW perspective on this cooperation, our study shows how intensely intertwined military and civilian actors work together on the Ukraine side of the war. It describes the cooperative practices and motivations of the actors of the civilian organization. In that sense our study adds innovative findings as well as innovative methods to the CIMIC field. The findings may well contribute to explain why Ukraine survived the first 6 months of this war.

Many of the soldiers on the Ukrainian side are not trained professionals but volunteers who have a wide social network and therefore can easily access support from civil society. The fact that suddenly a considerable part of the male population became soldier implied that almost everyone had family and friends fighting at one of the different frontlines. Since 2014, the Donbas conflict has already created some cooperative structures between the military and the civil society (Shklovski & Wulf 2018; Popov 2019).

Given the lacking trust in the Ukrainian army's logistical capabilities, civilians jumped in helping. This tradition of non-governmental support for armed forces resulted from the structural disorganization of the Ukrainian army (Sherr, 2001; Shklovski & Wulf, 2018). While the needs and support structures emerged in a new manner, they could draw on years of civilian support for the military and organizational structures (Krasynska & Martin, 2017). Civilians have been supporting the army in many ways, including (1) material supply, (2) information supply, (3) medical help, (4) moral support, (5) public relations, and (6) counteracting Russian information warfare, and (7) cyber war. Activism has shifted from social media (Gruzd & Tsyganova, 2015; Ronzhyn, 2016) to on-the-ground activities, where Telegram and Instagram have been playing a large role in organizing and advertising military support.

When looking at our informants, we can identify two different sources how the civilian got acquainted with soldiers in the operating units of the army: (a) close personal relationships with drafted family members and friends, (b) past work relationship with members of the armed forces. The support activities were often driven by needs expressed by the soldiers at the frontlines and a feeling of responsibility on the sides of civilians. These activities were often grounded in long-

term personal or family relationships. However, actors like the founder of *GServices* supported soldiers he (almost) did not know.

The civil society also supported the official army structures: *GServices* donated money to the government, and NGO 2 was drawing on its personal contacts with higher officers and provided supply at their request via the official chains of command. In an attempt to organize donations and strengthen links between the government and civil society, the president and his cabinet of ministers have established an international fundraising platform (UNITED24, 2023). However, work of individual volunteers remains mainly independent of government structures. Larger organizations support government structures as well.

Most of the civilian actors who supported the army were also well connected abroad. Many of the supply the army needed had to be procured in other countries – mainly in Western Europe. This is specifically true for equipment of dual use. Obviously, the war demands had increased the prizes massively inside Ukraine and in the areas close-by. Due to the differences in prices, jeeps were, for instance, even procured from the UK rather than from neighboring countries. To be able to find these products of dual use, the civilian actors used their personal networks in Western Europe and beyond. These networks were often existing before the war and were either reshaped or reactivated. Reshaping happened when professional contacts, such as former colleagues or business partners, were activated to help in the procurement and the transport towards the Ukrainian borders. NGO 1 and 2 both have historically grown networks of donors from abroad – partly also within the Ukrainian exile community, which plays a large role in fostering the capabilities to defend. NGO 1 could draw on its already militarily affine networks derived from the earlier Donbas war. NGO 2 also reactivated its foreign networks resulting from their earlier activities in social domains. Drawing on these networks and its good reputation with its donors, NGO 2 was even able to change its focus towards the support of the Ukrainian army and refugees of war. It was even able to expand its base of donors.

Due to the nature of the war, requested supply was often technological in nature, e.g., cars, drones, cameras, or routers. This fact is different from Shklovski and Wulf's (2018) findings concerning the war in the Donbas in which soldiers were asking civilians for more basic support such as food or clothes. In that sense the supplies requested from the civil society mirrored a somehow improved basic logistics and the changing nature of this war.

To be efficient dual use technologies needed to fit within the military infrastructures. So, the civilian actors needed to understand enough about the technologies and the military requirements to buy appropriately. This requires trustful relationships and an intense exchange of knowledge. Additionally, the civilian help was crucially important to integrate the technologies of dual use into the military infrastructure, e. g. link civil drones and cameras with the command-and-control system of the Ukrainian artillery. Both support dimensions were critical and civilian actors played a major role in enabling military success. In traditional wars such a close cooperation even at the frontlines would have been considered to

be a security risk, enabling espionage. So, a new collaborative practice of warfare is emerging.

With regard to the sources of money to support the military, we found three patterns. Quite some actors used their private money to support friends in the army. Ruslan and Yevgeni both donated from their own funds. In Lviv, we met an artist couple which had opened their house to refugees from the war zones. The war situation created a high willingness to share their private resources with those who were fighting for their country. For purchases which went beyond the budget of a single actor, Ruslan uses a funding mechanism of a Ukrainian bank to collect money among his network of friends.

Under the threat of the Russian attack, even commercial enterprises feel obliged to donate considerable parts of their profits and savings. *GServices* gave away more than its complete profits during the first months of the war. While *GServices* had also made plans to move all its business abroad, they had decided to stay in Ukraine – some days into the war. Making Ukraine survive seems to be as much a moral duty as also a business strategy. The man from Odesa who was on his way to buy two ambulance cars had collected the money from local businesses. He stated that private households in Ukraine are too poor to collect enough money to pay for this type of equipment.

As already studied in the Donbas war (Shklovski & Wulf, 2018), civil society and soldiers in the field did not trust and could not rely on the capabilities of the army's official supply chains. There were still allegations of bureaucratic hurdles, dysfunctionalities, corruption, and treason. To get the supply they needed, soldiers were, therefore, in close contact with their family and friends – typically mediated via social media platforms on private mobiles. So, the personal networks between soldiers and civilians played still a crucial role in the efficiency of the Ukrainian army. Also institutionalized donors relied mostly on their personal networks to deliver aid to those who needed it at the frontline. This is even the case for *NGO 2* which used the official hierarchies to supply the army – but worked with high officers whom one of their founders knew personally. While *GServices* assigned one third of their donations directly to the Ukrainian government, two thirds went explicitly different ways. Like *NGO 1* they had built their own logistics to deliver goods to the operational army units. While the war had become much more professionalized and high-tech, the Ukrainian army structure was still perceived to be somehow inefficient. Under these conditions, the high engagement of the civil society and existing personal networks made the soldiers fully operational.

There is a continuity of the importance of private mobiles at the frontlines. They are dangerous to use since their location can be detected when connecting to a mobile phone network (Shklovski & Wulf, 2018). We found that nowadays soldiers may connect their mobile phone via WiFi and a router to the StarLink satellite network rather than via mobile phone networks. StarLink routers seem to be better protected than traditional satellite phones when it comes to technical opportunities to localize them (Rohde et al. 2016). However, WiFi signals have a rather long reach-out in uninhabited spaces. While StarLink offers a new and from certain

perspectives better protected infrastructure for private communication at the frontline, the personal security of soldiers using their private mobiles is still a challenge in this high-tech warfare.

Due to a successful cyber attack, the ViaSat satellite network was dysfunctional for months (Burgess, 2022). Therefore, StarLink plays an important role as a communication infrastructure on the Ukrainian side. The newly applied nature of the StarLink technology may had prevented its routers at the time of research from being easily attacked or localized by Russian counter measures. So, the novelty of a technological infrastructure may an important dimension in IT security on battle fields.

7 Conclusion

We explored the cooperation between the Ukrainian army and actors of the civil society during the first six months of the Russian invasion. These patterns of civil-military cooperation have not yet been reported from the point of view of the civil actors, their importance should not be underestimated in the success of the Ukrainian army. While high-tech warfare required the integration of technologies of dual use, the inefficiencies of the army's supply chair required decentralized action of the civil society. So, the dedication of the Ukrainian soldiers at the frontline was enabled by tide networks towards the civil society and their international reach outs.

Our study was methodologically difficult to conduct. We needed to protect the anonymity of those people who spoke to us. As a result of our investigation, we argue that their activities are rather important to the success of the Ukrainian army. Their relevancy towards Ukrainian defense efforts may make them a goal for Russian retaliation. Therefore, it is critically important to protect their anonymity, So, we changed their names and suppressed some of the context which could ease to expose their identity.

Our study has several limitations. We just investigated the support work of a limited number of actors during a rather short period of time (one week) in the early phase of the war. The study was conducted in Lviv – the most important city in Western Ukraine with a history of at least one century towards national independence. Some civilian actors even perceived themselves in the highly problematic tradition of the Ukrainian Insurgents Army. So, the dedication to resist and the pattern of cooperation between civilian actors and the army may have been quite different in other parts of Ukraine and at different points in time of the conflict.

The phenomena described in this paper are very interesting in understanding how a highly motivated population could successfully resist a larger and better equipped army. They follow the underlying assumption of the CSCW community that well-supported and specifically informal ways of cooperation make human endeavors more successful. The importance of informal modes of cooperation is obviously even true for war settings which are still under-investigated in the CSCW

community. However, the close cooperation between civilian and military actors can also become problematic when military experiences and rationality dominates the life practices of an entire population. While efficient in defending a nation, it may well become a hurdle when seeking compromises for peaceful solutions. Abandoned personal relationships with the opposing side may increase this challenge.

8 Acknowledgements

The authors would like to thank their colleague Margarita Grinko for her support in exploring certain aspects of the state of the art and in discussing the empirical findings. While Margarita had deserved to be one of the co-authors, we could not agree on some details in the presentation of the data. Margarita, therefore, kindly renounced her co-authorship. We would also like to thank Olga and her family in supporting this piece of research. For sake of her and her family's safety we keep her name anonymous. We are also deeply indebted to those Ukrainians who openly spoke with us about their work to making the army work.

9 References

Aal, K., Krüger, M., Rohde, M., Tadic, B., & Wulf, V. (2019). Social Media and ICT Usage in Conflicts Areas. In C. Reuter (Ed.), *Information Technology for Peace and Security* (pp. 383–401). Springer Vieweg. https://doi.org/10.1007/978-3-658-25652-4

Al-Ani, B., Mark, G., Chung, J., & Jones, J. (2012). The Egyptian blogosphere: A counter-narrative of the revolution. *Proceedings of the ACM Conference on Computer Supported Cooperative Work, CSCW*, 17–26. https://doi.org/10.1145/2145204.2145213

Auferbauer, D., & Tellioğlu, H. (2017). Centralized crowdsourcing in disaster management: Findings and implications. *ACM International Conference Proceeding Series*, *Part F1285*, 173–182. https://doi.org/10.1145/3083671.3083689

Bland, D. L. (2001). Patterns in liberal democratic civil-military relations. In *Armed Forces and Society* (Vol. 27, Issue 4, pp. 525–540). https://doi.org/10.1177/0095327X0102700402

Bollen, M., & Kalkman, J. P. (2022). Civil-Military Cooperation in Disaster and Emergency Response Practices, Challenges, and Opportunities. *Journal of Advanced Military Studies*, *13*(1), 79–91. https://doi.org/10.21140/mcuj.20221301004

Bukar, U. A., Jabar, M. A., Sidi, F., Nor, R. N. H. B., Abdullah, S., & Othman, M. (2020). Crisis informatics in the context of social media crisis communication: Theoretical models, taxonomy, and open issues. *IEEE*

Access, *8*, 185842–185869. https://doi.org/10.1109/ACCESS.2020.3030184
Burgess, M. (2022). *A Mysterious Satellite Hack Has Victims Far Beyond Ukraine*. Wired. https://www.wired.com/story/viasat-internet-hack-ukraine-russia/
Burk, J. (2002). Theories of democratic civil-military relations. In *Armed Forces and Society* (Vol. 29, Issue 1). https://doi.org/10.1177/0095327X0202900102
Cusumano, E., & Corbe, M. eds (2018). *A Civil-Military Response to Hybrid Threats*. Springer. https://doi.org/10.1007/978-3-319-60798-6
Denef, S., Bayerl, P. S., & Kaptein, N. (2013). Social media and the police-tweeting practices of British police forces during the August 2011 riots. *Conference on Human Factors in Computing Systems - Proceedings*, *August 2011*, 3471–3480. https://doi.org/10.1145/2470654.2466477
Depoux, A., Martin, S., Karafillakis, E., Preet, R., Wilder-Smith, A., & Larson, H. (2020). The pandemic of social media panic travels faster than the COVID-19 outbreak. *Journal of Travel Medicine*, *27*(3), 1–2. https://doi.org/10.1093/jtm/taaa031
Ergun, Ö., Gui, L., Heier Stamm, J. L., Keskinocak, P., & Swann, J. (2014). Improving humanitarian operations through technology-enabled collaboration. *Production and Operations Management*, *23*(6), 1002–1014. https://doi.org/10.1111/poms.12107
Flores-Saviaga, C., & Savage, S. (2021). Fighting disaster misinformation in Latin America: the #19S Mexican earthquake case study. *Personal and Ubiquitous Computing*, *25*(2), 353–373. https://doi.org/10.1007/s00779-020-01411-5
Franke, V. (2006). the Peacebuilding Dilemma: Civil-Military Cooperation in Stability Operations. *International Peace Research Association International Journal of Peace Studies International Peace Research Association (IPRA) International Journal of Peace Studies*, *11*(2), 5–25. http://www.jstor.org/stable/41852944%5Cnhttp://about.jstor.org/terms%5Cnhttp://www.jstor.org/stable/41852944%0Ahttp://about.jstor.org/terms
Frič, P., & Pernica, B. (2022). Civil–Military Relations in the Season of Military Populism: Czechia. *Armed Forces and Society*, 1–29. https://doi.org/10.1177/0095327X221131917
Gascó, M., Bayerl, P. S., Denef, S., & Akhgar, B. (2017). What do citizens communicate about during crises? Analyzing twitter use during the 2011 UK riots. *Government Information Quarterly*, *34*(4), 635–645. https://doi.org/10.1016/j.giq.2017.11.005
Gaub, F. (2016). *Civil-military relations in the MENA: between fragility and resilience*. EU Institute for Security Studies.
Gibson-Fall, F. (2021). Military responses to COVID-19, emerging trends in global civil-military engagements. *Review of International Studies*, *47*(2), 155–170. https://doi.org/10.1017/S0260210521000048
González-Padilla, D. A., & Tortolero-Blanco, L. (2020). Social media influence in the COVID-19 pandemic. *International Braz J Urol*, *46*(Suppl 1), 120–124.

https://doi.org/10.1590/S1677-5538.IBJU.2020.S121
Grinko, M., Qalandar, S., Randall, D., & Wulf, V. (2022). Nationalizing the Internet to Break a Protest Movement: Internet Shutdown and Counter-Appropriation in Iran of Late 2019. *Proceedings of the ACM on Human-Computer Interaction*, *6*(November). https://doi.org/10.1145/3555205
Gruzd, A., & Tsyganova, K. (2015). Information wars and online activism during the 2013/2014 crisis in Ukraine: Examining the social structures of Pro- and Anti-Maidan groups. *Policy and Internet*, *7*(2), 121–158. https://doi.org/10.1002/poi3.91
Gulati, P., O., A. A., & Ramkumar, S. (2021). Automatic Identification and Filtration of COVID-19 Misinformation. *Computer and Information Science*, *14*(4), 57. https://doi.org/10.5539/cis.v14n4p57
Huntington, S. P. (1981). *The soldier and the state: The theory and politics of civil–military relations*. Harvard University Press.
Islam, A. K. M. N., Laato, S., Talukder, S., & Sutinen, E. (2020). Misinformation sharing and social media fatigue during COVID-19: An affordance and cognitive load perspective. *Technological Forecasting and Social Change*, *159*(June 2022). https://doi.org/10.1016/j.techfore.2020.120201
Janjua, B. R. W. (2021). Civil Military Relations in Pakistan--Quest for an Ideal Balance. *IPRI Journal*, *21*(01), 1–26. https://doi.org/10.31945/iprij.210101
Kaufhold, M.-A., Gizikis, A., Reuter, C., Habdank, M., & Grinko, M. (2019). Avoiding chaotic use of social media before, during, and after emergencies: Design and evaluation of citizens' guidelines. *Journal of Contingencies and Crisis Management*, *27*(3), 198–213. https://doi.org/10.1111/1468-5973.12249
Kaufhold, M.-A., Grinko, M., Reuter, C., Schorch, M., Langer, A., Skudelny, S., & Hollick, M. (2019). Potentiale von IKT beim Ausfall kritischer Infrastrukturen: Erwartungen, Informationsgewinnung und Mediennutzung der Zivilbevölkerung in Deutschland. *Proceedings of the International Conference on Wirtschaftsinformatik*, 1054–1068.
Kavanaugh, A., Sheetz, S. D., Hassan, R., Yang, S., Elmongui, H. G., Fox, E. A., Magdy, M., & Shoemaker, D. J. (2013). Between a Rock and a Cell Phone: Communication and Information Technology Use during the 2011 Uprisings in Tunisia and Egypt. *International Journal of Information Systems for Crisis Response and Management*, *5*(1), 1–21. https://doi.org/10.4018/jiscrm.2013010101
Kavanaugh, A., Tedesco, J. C., Sheetz, S. D., Sun, Y., Skandrani, H., & Fox, E. A. (2016). The Use and Impact of Social Media during the 2011 Tunisian Revolution. *ACM International Conference Proceeding Series*, *08-10-June*, 20–30. https://doi.org/10.1145/2912160.2912175
Knight, M. (2014). Journalism as usual: The use of social media as a newsgathering tool in the coverage of the Iranian elections in 2009. *Journal of Media Practice*, *13*(1), 61–74. https://doi.org/10.1386/jmpr.13.1.61

Krasynska, S., & Martin, E. (2017). The Formality of Informal Civil Society: Ukraine's EuroMaidan. *Voluntas*, *28*(1), 420–449. https://doi.org/10.1007/s11266-016-9819-8

Laato, S., Islam, A. K. M. N., Islam, M. N., & Whelan, E. (2020). *Why do People Share Misinformation during the COVID-19 Pandemic?* 1–20. http://arxiv.org/abs/2004.09600

Larson, H. J. (2020). *Stuck: How Vaccine Rumors Start - and Why They Don't Go Away*. Oxford University Press.

Larson, H. J., Jarrett, C., Eckersberger, E., Smith, D. M. D., & Paterson, P. (2014). Understanding vaccine hesitancy around vaccines and vaccination from a global perspective: A systematic review of published literature, 2007-2012. *Vaccine*, *32*(19), 2150–2159. https://doi.org/10.1016/j.vaccine.2014.01.081

Leong Mei Ling, C., Pan, S. L., Ractham, P., & Kaewkitipong, L. (2014). ICT-Enabled Community Empowerment in Crisis Response : Social Media in Thailand Flooding 2011 ICT-Enabled Community Empowerment in Crisis Response : Social Media in Thailand Flooding 2011. *Journal of the Association for Information Systems*, *16*(3), 174–212.

Lotan, G., Graeff, E., Ananny, M., Gaffney, D., Pearce, I., & Boyd, D. (2011). The Revolutions Were Tweeted: Information Flows during the 2011 Tunisian and Egyptian Revolutions. *International Journal of Communication*, *5*, 31. http://ijoc.org/index.php/ijoc/article/view/1246

Ludwig, T., Reuter, C., & Pipek, V. (2015). Social haystack: Dynamic quality assessment of citizen-generated content during emergencies. *ACM Transactions on Computer-Human Interaction*, *22*(4), 1–27. https://doi.org/10.1145/2749461

Ludwig, T., Reuter, C., Siebigteroth, T., & Pipek, V. (2015). Crowdmonitor: Mobile crowd sensing for assessing physical and digital activities of citizens during emergencies. *Conference on Human Factors in Computing Systems - Proceedings*, *2015-April*, 4083–4092. https://doi.org/10.1145/2702123.2702265

Marciano, A. (2021). Israel's mass surveillance during COVID-19: A missed opportunity. *Surveillance and Society*, *19*(1), 85–88. https://doi.org/10.24908/ss.v19i1.14543

Mark, G., Bagdouri, M., Palen, L., Martin, J., Al-Ani, B., & Anderson, K. (2012). Blogs as a collective war diary. *Proceedings of the ACM Conference on Computer Supported Cooperative Work, CSCW*, 37–46. https://doi.org/10.1145/2145204.2145215

Matei, F. C., Halladay, C., & Bruneau, T. C. (Eds.). (2022). *The Routledge Handbook of Civil-Military Relations* (2nd ed.). Routledge.

Obi-Ani, N. A., Anikwenze, C., & Isiani, M. C. (2020). Social media and the Covid-19 pandemic: Observations from Nigeria. *Cogent Arts and Humanities*, *7*(1). https://doi.org/10.1080/23311983.2020.1799483

Österreichisches Bundesheer: Krieg in der Ukraine - Die Erfolgsgeschichte der ukrainischen Artillerie, https://www.youtube.com/watch?v=pzAl29Gl9MA

(accessed 10.04.1923)
Palen, L., Anderson, K. M., Mark, G., Martin, J., Sicker, D., Palmer, M., & Grunwald, D. (2010). *A Vision for Technology-Mediated Support for Public Participation & Assistance in Mass Emergencies & Disasters*. 1–12. https://doi.org/10.14236/ewic/vocs2010.8
Palen, L., Vieweg, S., Liu, S. B., & Hughes, A. L. (2009). Crisis in a Networked World. *Social Science Computer Review*, *27*(4), 467–480. https://doi.org/10.1177/0894439309332302
Popov, V. (2019). *ROBUST CIVIL-MILITARY RELATIONS—ONE OF THE MOST POWERFUL TOOLS TO COUNTERACT RUSSIAN HYBRID WARFARE: THE CASE OF UKRAINE*. https://apps.dtic.mil/sti/pdfs/AD1046101.pdf
Puri, M., Dau, Z., & Varde, A. S. (2021). COVID and social media. *ACM SIGWEB Newsletter*, *Autumn*, 1–20. https://doi.org/10.1145/3494825.3494830
Ramirez, L., Dyrks, T., Gerwinski, J., Betz, M., Scholz, M., & Wulf, V. (2012). Landmarke: An ad hoc deployable ubicomp infrastructure to support indoor navigation of firefighters. *Personal and Ubiquitous Computing*, *16*(8), 1025–1038. https://doi.org/10.1007/s00779-011-0462-5
Reuter, C., & Kaufhold, M.-A. (2018). Fifteen years of social media in emergencies: A retrospective review and future directions for crisis Informatics. *Journal of Contingencies and Crisis Management*, *26*(1), 41–57. https://doi.org/10.1111/1468-5973.12196
Reuter, C., Ludwig, T., & Pipek, V. (2014). Ad Hoc participation in situation assessment: Supporting mobile collaboration in emergencies. *ACM Transactions on Computer-Human Interaction*, *21*(5). https://doi.org/10.1145/2651365
Reuter, C., Marx, A., & Pipek, V. (2012). Crisis Management 2.0: Towards a Systematization of Social Software Use in Crisis Situations. *International Journal of Information Systems for Crisis Response and Management (IJISCRAM)*, *4*(1), 1–16. https://doi.org/10.4018/jiscrm.2012010101
Rizvi, H.-A. (1998). Civil-military relations in contemporary Pakistan. *Survival*, *40*(2), 96–113. https://doi.org/10.1080/00396338.1998.10107841
Rõigas, H.: Cyber War in Perspective: Lessons from the Conflict in Ukraine, in: Cusumano, E., & Corbe, M. eds (2018). *A Civil-Military Response to Hybrid Threats*. Springer, pp 233–257
Rohde, M., Aal, K., Misaki, K., Randall, D., Weibert, A., & Wulf, V. (2016). Out of Syria: Mobile Media in Use at the Time of Civil War. *International Journal of Human-Computer Interaction*, *32*(7), 515–531. https://doi.org/10.1080/10447318.2016.1177300
Ronzhyn, A. (2016). Social media activism in post-euromaidan Ukrainian politics and civil society. *Proceedings of the 6th International Conference for E-Democracy and Open Government, CeDEM 2016*, *May*, 96–101. https://doi.org/10.1109/CeDEM.2016.17
Sherr, J. (2001). Civil-democratic control of Ukraine's Armed Forces: To what end? By what means? *Journal of Communist Studies and Transition Politics*,

17(1), 65–77. https://doi.org/10.1080/714003557
Shklovski, I., & Wulf, V. (2018). The use of private mobile phones at war: Accounts from the Donbas conflict. *Conference on Human Factors in Computing Systems - Proceedings*, 1–13. https://doi.org/10.1145/3173574.3173960
Stickel, O., Hornung, D., Aal, K., Rohde, M., Wulf, V. (2015): 3D Printing with marginalized children—an exploration in a Palestinian refugee camp, in: ECSCW 2015: Proceedings of the 14th European Conference on Computer Supported Cooperative Work, 19-23 September 2015, Oslo, Norway, 83-102
Strömberg, D. (2019). *The role of the military - A study in how civil-military cooperation is formed during CBRN*. Umea University.
Studer, M. (2001). The ICRC and civil-military relations in armed conflict. *International Review of the Red Cross*, *83*(842), 367–392. https://doi.org/10.1017/s1560775500105723
Tadic, B., Rohde, M., Wulf, V., & Randall, D. (2016). ICT use by prominent activists in Republika Srpska. *Conference on Human Factors in Computing Systems - Proceedings*, 3364–3377. https://doi.org/10.1145/2858036.2858153
Tan, M. L., Prasanna, R., Stock, K., Hudson-Doyle, E., Leonard, G., & Johnston, D. (2017). Mobile applications in crisis informatics literature: A systematic review. *International Journal of Disaster Risk Reduction*, *24*, 297–311. https://doi.org/https://doi.org/10.1016/j.ijdrr.2017.06.009
Tatham, P., & Rietjens, S. B. (2016). Integrated disaster relief logistics: A stepping stone towards viable civil-military networks? *Disasters*, *40*(1), 7–25. https://doi.org/10.1111/disa.12131
Tiargan-Orr, R., & Eran-Jona, M. (2016). The Israeli Public's Perception of the IDF: Stability and Change. *Armed Forces and Society*, *42*(2), 324–343. https://doi.org/10.1177/0095327X15592214
UNITED24. (2023). *UNITED24*. https://u24.gov.ua/
Wolf, S. O. (2020). Development Versus Democracy? The CPEC and Civil-Military Relations in Pakistan. In *The China-Pakistan Economic Corridor of the Belt and Road Initiative* (pp. 281–306). http://link.springer.com/10.1007/978-3-030-16198-9
Wulf, V., Aal, K., Abu Kteish, I., Atam, M., Schubert, K., Yerousis, G. P., Randall, D., & Rohde, M. (2013). Fighting against the wall: Social media use by political activists in a Palestinian village. *Conference on Human Factors in Computing Systems - Proceedings*, 1979–1988. https://doi.org/10.1145/2470654.2466262
Wulf, V., Misaki, K., Atam, M., Randall, D., & Rohde, M. (2013). "On the ground" in Sidi Bouzid: Investigating Social Media Use during the Tunisian Revolution. *Proceedings of the 2013 ACM Conference on Computer Supported Cooperative Work and Social Computing - CSCW '13*, 1–10. https://doi.org/10.1145/2441776.2441935
Wulf, V., Randall, D., Aal, K., & Rohde, M. (2022). The Personal is the Political:

Internet Filtering and Counter Appropriation in the Islamic Republic of Iran. *Journal of Computer Supported Cooperative Work (JCSCW)*, *31*, 373–409.

Yerousis, G., Aal, K., von Rekowski, T., Randall, D., Rohde, M., Wulf, V.: Computer-Enabled Project Spaces: Connecting with Palestinian Refugees across Camp Boundaries, in: *Conference on Human Factors in Computing Systems - Proceedings (*CHI 2015): 3749-3758

Zhang, Y., Suhaimi, N., Azghandi, R., Joseph, M. A., Kim, M., Griffin, J., & Parker, A. G. (2020). Understanding the Use of Crisis Informatics Technology among Older Adults. *Conference on Human Factors in Computing Systems - Proceedings*, 1–13. https://doi.org/10.1145/3313831.3376862

Zhang, Y., Suhaimi, N., Yongsatianchot, N., Gaggiano, J. D., Kim, M., Patel, S. A., Sun, Y., Marsella, S., Griffin, J., & Parker, A. G. (2022). Shifting Trust: Examining How Trust and Distrust Emerge, Transform, and Collapse in COVID-19 Information Seeking. *Conference on Human Factors in Computing Systems - Proceedings*. https://doi.org/10.1145/3491102.3501889