CRISIS MANAGEMENT AND DISASTER RESPONSE

CENTRE OF EXCELLENCE

CMDR COE PROCEEDINGS 2020

6

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Dear Readers,

Welcome to the 2020 CMDR COE Proceedings. The issue provides a retrospect into a year marked by a global pandemic, which has altered and continues to challenge security paradigms simultaneously in several aspects.

The year of 2020 has introduced new requirements vis-à-vis the methods and means of the comprehensive approach. This publication also tries to look into the prospects for the year ahead while being fully cognizant of the challenges before us and standing well-prepared for calibrating our modus operandi.

The year of 2020 has shown that engaging with the complexity of the security environment requires cooperation and interaction at various levels and by diverse stakeholders. COVID-19 has brought enormous suffering, has strained already limited capacities, at places beyond the point of a bounce-back, and yet – has also shown that we need to bring about a new smarter and more inclusive normal.

During these difficult times of global pandemic, and while abiding by strict prevention and control protocols, the CMDR COE never forgot about the added value of engaging young people in its core work on supporting NATO's transformation and adaptation. Thus here we provide a venue for some articles delivered by our young colleagues during their internship in the Centre. I really hope the readers will appreciate their efforts and gain benefit from the present edition of our 2020 Proceedings.

Welcome once again and thanks for reading.

Orlin NIKOLOV,
CMDR COE Director

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THE COVID-19 YEAR OF 2020

CMDR COE

Abstract: The year of 2020 has been a game-changing year for the humankind as the coronavirus pandemic hit with a ferocity. In retrospect, we are looking back at a year in which a stalemate spread across the world and humans have had to adapt to new ways of meeting, working, securing, preserving, etc.

Key words: pandemic, coronavirus, resilience, complexity, societies, public health, security, crisis management.

Introduction

The 21st century is characterised by a much greater intensity of the spread of major pandemics that hit humanity. In the last 20 years, globalisation, urbanization, the extraordinary dynamics of moving of people and goods have been the basis for the faster spread of viruses and infections against which man is not immunised.

The Swine flu affects nearly 15% of the Earth's population. It is difficult to calculate the exact death toll, but it certainly exceeds 200,000. The severe acute respiratory syndrome (SARS) has been limited due to the universal mobilisation of the countries, despite the delay of the Chinese authorities in informing the global community of a new and deadly virus. Characterised by its high mortality rate, SARS kills every tenth of those infected.

The Middle Eastern Respiratory Syndrome (MERS) and Ebola, despite the low incidence rate, are characterised by extremely

high mortality rates of 30-40%. While a vaccine has been developed for Ebola, it has not yet been developed for the MERS, and the World Health Organization (WHO) is actively working to limit it through information campaigns, dissemination of up-to-date prevention and treatment information, risk assessment, etc.

All have shown us that an infection should never be underestimated, because it can have an impact on present and future, and a delayed reaction might be detrimental.

With the global pandemic announced on March 11, 2020, as a result of the spread of COVID-19, the world has launched unprecedented restrictions on human movement, production shutdowns and interruptions of global supplies – all elements of its present.

The Disease

At the beginning of the second week of January 2020, Chinese authorities made the first public announcement that a new type of virus was rampant in the city of Wuhan. Previous month (on December 31, 2019), the WHO country office in China was informed of 27 patients with pneumonia of unclear cause in Wuhan — a metropolis with 19 million inhabitants in Hubei province[1]. The reported information stated the start of infections

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[1] https://www.dw.com/en/new-strain-of-coronavirus-behind-lung-infections-in-china/a-51942489

could be allegedly attributed to the local fish market, which also sells live animals as bats.

In January 2020, the causative pathogen of the pneumonia was identified as a novel coronavirus, and genomic characterisation and test method development was set. Because the sequence identity between this coronavirus and severe acute respiratory syndrome (SARS)-like beta-coronavirus is about 87%, the WHO named this new coronavirus SARS-CoV-2. Popularly it became known as COVID-19.

The COVID-19 affects in different ways where most infected develop mild to moderate illness and recover without hospitalisation. Most common symptoms are fever, dry cough and tiredness. Besides less common symptoms are figured as aches and pains, sore throat, diarrhea, conjunctivitis, headache and loss of taste or smell. The life-threatening development of the disease is concomitant with serious symptoms as difficulty breathing or shortness of breath, chest pain or pressure even loss of speech or movement.[2]

At the end of 2020, there have been more than 80 million COVID-19 cases worldwide.

Present paper is a brief overview of what has been discovered about the virus to date (December 2020), and how far humankind has progressed in the fight against the novel coronavirus crisis as it affects daily routines worldwide.

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[2] WHO

The first infection of a human by a vertebrate animal had apparently already occurred several weeks earlier when WHO and Chinese authorities announced the virus. Initially, China seemed to have tried to suppress any evidence[3]. To this day, it is not exactly clear when and where the virus jumped from animal to human hosts. Transmission from a bat to humans is considered the likely origin of the pandemic that is still in full threat today.

Some science bodies have suggested that the virus had already spread worldwide in late summer 2019. It has since been found in samples taken in Italy in September'2020, which is consistent with an analysis of SARS-CoV genomes by British researchers.[4]

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[3] https://www.dw.com/en/did-chinas-authoritarianism-actually-help-the-coronavirus-spread/a-52268341

[4] https://journals.sagepub.com/doi/full/10.1177/0300891620974755
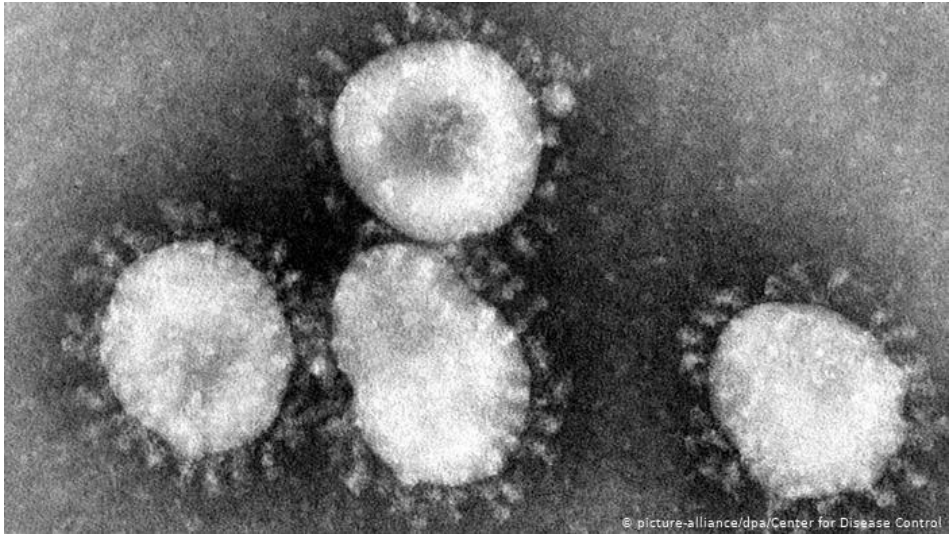
One of the first images of the novel coronavirus was taken in January 2020

Decoding the Virus

The virologists have deciphered the genetic information of the virus and published the genome structure, and later they released a detailed description of it. This enabled physicians and microbiologists worldwide to begin developing drugs and vaccines. A typical feature of the virus is the spike proteins (ACE-2) located on its surface. These are crucial for binding to the host cell. That is why a large part of drug and vaccine development has been focused on binding or blocking this protein, or rendering it ineffective in some other way.

For the period of 2020 year there have been implemented many different technologies for COVID-19 testing, some currently available and some still in development. Trackers of the development, regulatory status and commercial release of different types of COVID-19 test are being compiled by Johns

Hopkins University and the medical industry news website, 360Dx. Broadly, we can divide these different tests into two kinds:

- Those that test for the presence of the virus, aiming to establish whether an individual is currently infected. The most common way of performing a test of the first type is with a 'PCR' test.
- Those that test for the presence of antibodies, aiming to establish whether an individual has been infected at some point in the past.
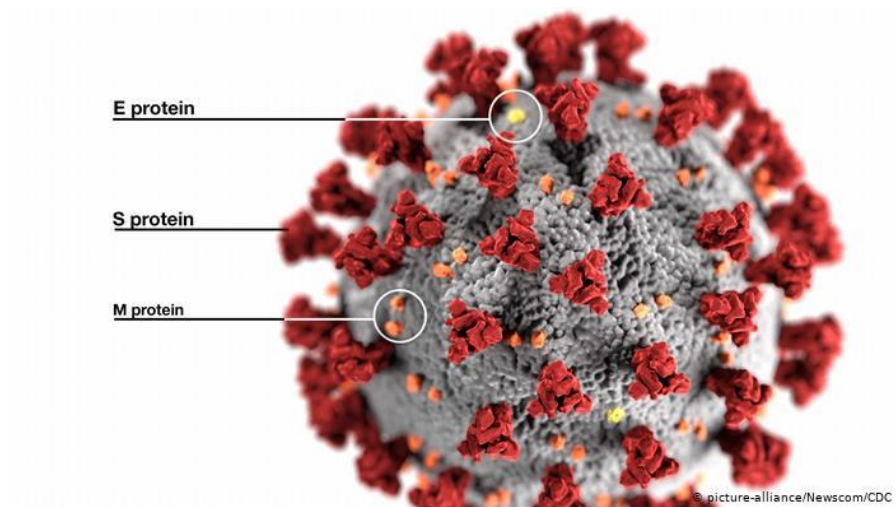
A model of the coronavirus: Most prominent is the spike protein (S) that gives the virus its crown-like appearance

In the meantime, a study[5] led by virologist Hendrik Streeck from the University of Bonn and carried out in the city of Heinsberg, Germany, has established that the virus is particularly prevalent in the throat and lungs. The greatest danger of infection — besides by coming into direct contact with an infected person or touching a contaminated surface, known as smear infections — is through aerosol transmission. The virus can spread particularly well through air-conditioning systems, such as those used widely in the meat industry[6]. Closed rooms with many people in them are very dangerous. That set the basement of the idea for lockdowns and social distance measures. The closure of entertainment establishments and the cancellation of major trade and sport events were very effective in containing the disease in 2020 as the largest chains of infection could be traced back to the big mass gathering events and places i.e. malls, airports, train stations etc.

The use of face masks (mouth-and-nose protection) has become established in almost all countries of the world, however, most important is for people to wash their hands, keep their distance from others and air rooms thoroughly. Initially, it was thought that the new virus was no more dangerous than the seasonal flu. Lately physicians realized better the disease – it poses a threat similar to that of the devastating Spanish flu of 1918. A virus causes the disease, although many can get a

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[5] https://www.medrxiv.org/content/10.1101/2020.05.04.20090076v1
[6] Idem

SARS-CoV-2 infection without symptoms, others become very ill with COVID-19. Some groups of people are more often affected than others. People with previous illnesses, elderly people, people with Blood Type 'A' and men are more at risk.

Pathologists who have examined COVID-19 victims have been able to confirm that high blood pressure, diabetes, cancer, kidney failure, liver cirrhosis, asthma and cardiovascular diseases are among the most dangerous preexisting conditions. In principle, however, a severe case of the disease can affect anybody, including young people.

Meanwhile it was described that animals, especially pets can become infected by humans, but they have not been found to play a significant role in infection chains. However, infections in mink farms in numerous countries have caused great concerns among veterinary bodies and authorities have subsequently ordered the culling of millions of animals[7].

In the course of the disease, mild forms of COVID-19 can present like a cold. Typical symptoms are a sore throat, breathing problems and a loss of sense of smell and taste. In severe cases, however, a life-threatening multi-organ disease can occur. This often leads to sepsis - a frequently fatal overreaction of the immune system that attacks the infected person's own tissue and organs[8]. The severity of the disease

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[7] https://www.dw.com/en/amid-danish-mink-cull-fur-remains-in-fashion/a-55570667
[8] https://jamanetwork.com/journals/jamacardiology/fullarticle/2763844

depends, to a large extent, on how strongly a person's immune system reacts to the pathogen.

At the beginning of the pandemic, many patients with severe courses of the disease received artificial respiration (intubation) at an early stage and died all the same. At the end of 2020, however, the physicians working in intensive care units have moved away from standard ventilation. This is because lung specialists have stressed that artificial respiration under positive pressure can do more damage than good to the lungs. As long as patients are able to breathe on their own, they now receive oxygen without being connected to a respirator. Intubation is used as an option only in an extreme emergency.

In many cases, when the kidneys are severely damaged by COVID-19, dialysis is also necessary. Intensive care units are now also taking other damaged organs into account. The healing process can be accelerated in specialised clinics by the administration of antibodies from the blood of cured COVID-19 patients. These antibodies take up the fight against the virus in the body of the patient who receives the donated blood.

As a rule, COVID-19 patients must undergo lengthy, individually tailored rehabilitation measures after their medical treatment. These must also take into account their specific previous illnesses and possible organ damage.

In 2020 the Remdesivir[9] was one of the few pharmaceutical drugs but became very popular in the battle versus the disease. It is originally developed to treat Ebola infections, but it also showed effectiveness against the previous large-scale pandemic (SARS and MERS coronaviruses) and came into focus as a potential cure immediately after the first COVID-19 cases were reported. The new SARS-CoV-2 has been strongly considered a variant of the 2002 SARS pathogen.

This is why it was hotly contested on the market. The WHO published a non-peer-reviewed preprint study[10] (on October 15, 2020) showing that Remdesivir barely reduces the mortality rate of COVID-19 patients. The study is a result of the so-called 'Solidarity Trial' in which the data of 11,266 patients was evaluated. It shortens the healing process by a few days in patients who receive oxygen, but it does not improve their chances of survival. That is the main reason to advise against it for hospitalised COVID-19 patients.

Other drugs that have been used to combat the coronavirus include the anti-inflammatory dexamethasone, the Ribonucleic acid (RNA) polymerase inhibitor Avigan and the malaria drug hydroxychloroquine, which lately has been shown to be ineffective and may even be dangerous.

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[9] The drug was developed by the US pharmaceutical company Gilead Sciences as GS-5734. At the outset of the pandemic, it was not approved by any country.
[10] https://www.medrxiv.org/content/10.1101/2020.10.15.20209817v1

On December 18, 2020 the WHO stated that "*corticosteroids (such as dexamethasone) are the only class of medicines to demonstrate some benefits*", adding that "*for patients with mild or moderate disease, finding effective, safe, affordable and accessible therapeutics to reduce mortality and morbidity remains an urgent priority.*"[11]

Thus, production and launching effective vaccination campaigns has become the main challenge for the health authorities and pharmaceutical industry worldwide. The efforts have concentrated to gene-based RNA vaccines, which can relatively quickly be produced.

According the WHO, the projects of 233 vaccines[12] have been launched across the world (data from end of December 2020). Essentially these can be divided into three vaccine types:

1. Attenuated vaccines.
2. Inactivated vaccines.
3. Gene-based RNA vaccines.

Presently most distributed ones in USA and EU are those of the BioNTech-Pfizer and the Moderna. Both are such RNA vaccines.

In Britain, local regulators approved a vaccine designed by scientists at the University of Oxford. It is not an mRNA vaccine, but an attenuated vector vaccine, in which a harmless

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[11] https://www.who.int/news/item/29-06-2020-covidtimeline
[12] https://www.who.int/publications/m/item/draft-landscape-of-covid-19-candidate-vaccines

chimpanzee cold-virus serves to transport parts of SARS-CoV-2 proteins, that trigger an immune response.

Besides, there is a tuberculosis vaccine approved. It does not directly target SARS-CoV-2 but strengthens basic innate immunity and researchers at the Max Planck Institute for Infection Biology (Germany) are currently trying to improve this vaccine genetically[13].

No matter of the vaccine type, the policy for initial vaccination campaigns has concord with developing allocation priorities and deployment plans since the very beginning of the year 2021. Through different policy-making processes and with different priorities, countries are trying to encompass large groups of population gradually. Some are prioritising those with high-risk conditions (so-called first line 'combatants') above those in older age groups, some are further segmenting within the initial priority groups, and some are treating special populations, like the incarcerated or the homeless, differently.

The EU countries announced plans that vary with respect to how they are treating different age groups, residents of long-term care facilities, and those with comorbidities. The UK has plans to roll out the vaccine by sharply defined age groups, while other countries are working out approaches that target those with medical vulnerabilities. In Asia (observation to China, Republic of Korea, Japan, and Singapore), where virus

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[13] https://www.mpg.de/14610776/immune-boost-corona-virus

transmission was in decreasing mode, those accepting risk during the pandemic received the first doses and people in industries, those interacting with imported goods, and overseas travelers are prioritised next.

The aim of all is to reach a herd immunity as soon as possible. However, with a population of 7.8 billion, the world is still a long way from achieving any effective degree of immunity to the disease. It is still unclear the length of protection the vaccine will offer and whether recovered patients remain permanently immune to the virus.

The Impact

The ongoing global pandemic of coronavirus disease (COVID-19) has a broad impact literally in every turn of humankind life trajectory, affecting societies in general, their social routines, economy, politics, even entertainment and culture.

The WHO declared COVID-19 a pandemic on March 11, 2020 referring the infection of a new type of coronavirus.

In an attempt to control the widespread occurrence of coronavirus in their societies, a large number of countries have tried to stabilise the situation by taking action as physical distance, widespread testing and quarantine. The pandemic has brought enormous burdens and trials to medical staff and authorities around the world. In 2020 the issues on the healthcare system mostly depended on the distribution of

cases, medical capacity and initial containment measures – isolation, quarantine, physical distance, mass testing, etc. These varied in size and scope in regions and countries. Nevertheless, the disproportionate impact (and often illogical spread) of the disease has created a vicious cycle that make it difficult to control the infection.

Generally, four basic approaches can be outlined if we trace back the plot of the 2020 year of COVID-19.

The first one was through the imposition of highly restrictive measures, such as the blocking of entire regions, significant public restrictions, accompanied by wide-ranging monitoring and control to ensure compliance with the restrictions. China gave the most prominent example of this method, lately followed by almost every European country. The authorities in New Zealand and Australia were most strictly adhere to this approach.

The second approach based on gradual control has relied on endorsing best practices in public health operations. It has engaged many resources, both human and financial and was surely beyond the capabilities of many countries during the year. This method has involved extensive testing, strict social contact observation focus on the safety, maintaining isolation to the so-called 'clusters' and integrated real-time case monitoring. Countries as South Korea, Singapore and Taiwan have implemented this and reached successful performance in combat against the virus.

The third approach was the total medical treatment and mass control over cases and vulnerable clusters. These have required highly intensive involvements and huge resources for the workload it generates in a healthcare system. In result there was a risk for overburning the system. Examples of this are became emblematic for countries as Italy and Spain at the very beginning of the situation in Europe.

The fourth approach, the so-called "herd immunity" initially had been advocated in UK, the Netherlands and Sweden but lately was abandoned by the former two. The "herd immunity" is based on a vision for a strategy of suppressing the virus through gradual restraints instead of tireless efforts to fight it everywhere. It is planned to achieve collective immunity, leaving everyone to become infected. The purpose here is no longer to protect people from infection, but rather to infect the majority in order to achieve the collective immunity. The collective immunity is achieved when a very large percentage of individuals have their own immunity against an infection and it becomes very difficult for an infectious pathogen to spread from person to person. For example, if an infected person is surrounded only by people who are resistant to the infection, then the virus cannot transmit until the patient has recovered and thus the transmission strand breaks.

In this way, the emergence of infectious people in a society where most have immune protection does not lead to the spread of the infection. Those who are not immune to infection

are protected by group immunity, even if they do not have their own, because they are surrounded by a "protective border" by "impermeable" to the infection people. What is special, however, is that the more infectious a pathogen is, the higher the percentage of individuals with established immunity must be in order to attain the herd immunity.

In order to achieve "herd immunity", in a virus with this infectivity level, such as COVID-19, it is necessary to infect over 60-65% of the population of a society. The mathematical model shows that 60% of the 68 million, roughly the UK population is, need to be infected with nearly 40 million people. With an average expectation of 2% average mortality (and it turns out to be much higher), it would mean nearly 800,000 people die, which is more than the casualties given by Britain during World War I. These calculations rejected the country's preliminary intention to follow the herd immunity approach

With a population of 10 million, Sweden is disproportionately dispersed over 450,000 square kilometers, which puts it 198th in the world in density and their assumption that they do not need rigid restrictive measures. Plausibly Sweden stuck to this approach almost entirely through the year of 2020.

The Aftermath

Within the year 2020, the world came to life in a completely unthinkable atmosphere – closed borders and schools, cancellation of events, Olympics, meetings, elections and plans

were postponed, tourism and flies stand still and harmful emissions even sharply reduced. This crisis radically shaped "a new reality" to daily lives worldwide. In other words, the COVID-19 somehow turned the world upside down. Until recently, especially in Europe, a very strong wave of nostalgia had risen: people were always sad about their past, rather than hoping for a future – and therefore did not think much about the future. It was this attitude that changed dramatically. The current crisis is turning everyone's eyes very radically to the future and asking questions that humanity did not expect, or at least did not worry about, waiting for. The stage is too early to outline even vaguely what lies ahead and how adequate the current efforts are to influence the coming state of the world. It is like trying to paint a post-war world before you know how the war will end. Increasingly it is widely believed that the coronavirus pandemic crisis will have a much greater impact globally than the recent two crises – the financial crisis (2008-2009) and the refugee crisis (2015-2016).

The pandemic slowdown has deeply affected businesses and jobs. Around the world, companies – especially micro, small, and medium enterprises (MSMEs) – are under intense strain, with more than half either in arrears or likely to fall into arrears shortly. To understand the impact that COVID-19 is having on business performance, the World Bank has been conducting

rapid COVID-19 Business Pulse Surveys[14] in partnership with some governments.

Surveys responses collected in 2020 show that many enterprises were retaining staff, hoping to keep them on board as they ride out the downturn. More than a third of companies have increased the use of digital technology to adapt to the crisis. The same data warned, however, that the firms' sales have dropped by half amid the crisis, forcing companies to reduce hours and wages, and most businesses – especially micro and small firms in low-income countries – are struggling to access public support.

The pandemic results in an unprecedented shock to the private life also, threatening to reduce seriously family incomes. As such, the shared prosperity made in recent decade globally is on verge of diminishing. Whether due to job loss, a stop in remittance payments, or a multitude of other COVID-19-related factors – will continue to put human capital at risk. With less money, families will be forced to make trade-offs and sacrifices that could harm health and learning outcomes for a generation.

Although it is very difficult to predict the overall economic fallout of the pandemic, it is expected to have serious economic consequences for the humans. The taken measures drive a sharp fall in consumer and business spending. According to a preliminary assessment by the International Labour

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[14] http://documents1.worldbank.org/curated/en/399751602248069405/pdf/Unmasking-the-Impact-of-COVID-19-on-Businesses-Firm-Level-Evidence-from-Across-the-World.pdf

Organization (ILO), the COVID-19 will have a significant effect on labor markets around the world, with unemployment rising by up to 24.7 million people. If a 2% decline in global GDP for 2020 will occur, the ILO expects global unemployment to increase by 5.3 million. A 4% drop in Gross Domestic Product would result in 13 million additional jobless people while in the most pessimistic projection which sees a global GDP 8% drop the increase in global unemployment will reach 24.7 million. It is overarching to consider the implications of such a steep increase in unemployment around the world. According to the ILO's estimates, workers could lose between $860 billion and $3.4 trillion in labor income for the year 2020[15].

Obviously, the pandemic has highlighted the need for effective, accessible and affordable health care. The costly spending caused financial hardship for the countries but this is just one way that is affecting their human capital. Moreover, even before the pandemic, the world faced an education crisis – with 53% of children in low- and middle-income countries unable to complete primary education level. Pandemic-led closures of schools and universities intensify these risks to spread widely. At the height of the COVID lockdown, more than 160 countries had mandated various forms of education system closures for at least 1.5 billion students[16]. The effects could be negative for

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[15] https://ilostat.ilo.org/
[16] https://en.unesco.org/covid19/educationresponse

decades with diminishing economic perspective and opportunities for the present generation of students.

In order to mitigate these circumstances and to sustain learning process amid the crisis, countries continue exploring options for remote classroom learning. The results are mixed as the key obstacle is the lack of a high quality, affordable broadband connectivity. Thus it rises another issue of the digital division where the so-called 'Internet Inequalities'[17] set radically different experience of home-based education. Around the world, the pandemic and associated lockdowns underline that digital connectivity is highly necessary. Literally, it is the gateway to many essential daily services, such as e-learning, e-health platforms, digital cash transfers and e-payments. In addition, while the pandemic demonstrates the need for greater connectivity, it could actually widen the digital divide, as private investments become constrained and public financing is diverted to urgent policy priorities like health and social protection.

The pandemic has affected the community and social relations – people forced to stay inactive for long periods increase a sense of scarcity (social deprivation) inevitably. It is a process in which individuals or social groups are isolated from socially acceptable values and in turn, it is accompanied by a stigmatization. Various disorders can be observed: fatigue

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[17] Massimo Ragnedda, Glenn W. Muschert, The Digital Divide - The Internet and Social Inequality in International Perspective, 2015

(sluggishness, drowsiness), loss of sense of reality, irritability or anxiety, which can even lead to panic. Lack of stimulation of active purposeful activity causes anatomical and biochemical changes in the brain, the correction of which sometimes takes a long time. On the other hand, marginalization of identity affecting social behavior can even include an increase in cases of domestic violence. Thus, as in a vicious cycle, social deprivation will very seriously persist among the victims' group, which is a significant social problem to overcome after the quarantine of the pandemic.

The pandemic poses a serious threat to other development margins. Notably, gender gaps could widen during and after the pandemic. This could reverse women's and girls' decades-long gains in human capital, economic empowerment and voice.

At the beginning of the year 2020, the Women, Business and the Law report[18] noted considerable progress in women's economic opportunity and equal remuneration for work of equal value over the past 50 years. The lockdowns of 2020 have exacerbated risks of inequity as women have lost jobs faster than men, due to the fact that they are predominantly employed in the hardest hit sectors such as education, public services, tourism and retail. Additionally, both men and women are vulnerable when employed in the grey sectors (informal

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[18] https://wbl.worldbank.org/en/reports

economy[19]), which often means they lack access to social protection and other safety nets. Their children may face increased expectations to take on care-related tasks and this could affect their ability to stay engaged in education process.

The Way Ahead

Bearing in mind the above mentioned, the most important in the current development of the crisis for each country is to create in its citizens the feeling of trust. Especially in times of vaccination campaign as the conspiracy theories are unleashed, circulating faster than scientific evidence. In duly manner to convince people that the authorities care about the general situation and know the way to solve the issues. It is known what has being done and where it is going. The situation is similar with that one of closing the borders in March-April 2020. The deprivation of the right to free movement was the only common solution in all countries, regardless of their different socio-cultural traditions and political systems. At present, neither international organizations, nor national governments, nor societies have a clear idea of what lies ahead, but the most important is to continue to maintain a mass sense that the crisis is responded to in a timely and adequate manner.

At the same time, however, mass approval and recognition should not be expected immediately. The most sought after item right now is information, but people are not just looking for

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[19] https://en.wikipedia.org/wiki/Informal_economy

statistics and assumptions. For them, the source of the publicly submitted information is more than important. They seek not only the expertise of virology specialists, but also information from the institutions responsible for decisions and actions. Interest in official sources of information flow has increased. In a situation where life is directly endangered, it is no longer important to discuss a case or problem calmly and freely. It is not enough to just say, it becomes very important that it is true.

There is still uncertainty about whether vaccinated people can still transmit the virus. If this was known for certain, we might prioritise essential workers or younger people to break chains of transmission faster. Likewise, we need to be cognisant that marginalised groups disproportionately affected by the virus might be more hesitant to be vaccinated. Informed by social science the innovative strategies should increase vaccine acceptance which is so needed. It is the experts, especially in the medical profession, who take the biggest risk because they cannot isolate themselves. This is the big difference with previous crises, when experts were not threatened at all, did not take any risk if their opinions and forecasts turned out to be wrong. The importance of the information provided by official sources is determined precisely because the state has a monopoly on expertise. In other words, all policies will need to continue drawing on the wells of flexibility and perseverance we have settled in 2020 if we hope to defeat this pandemic.

The authorities worldwide will need measures to deal with the 2020's legacy and it will take time as:

- A long quarantine may result in a high percentage of active people with advanced agoraphobia.

- Communities can build a sustainable reflex for living in isolation and getting used to scarcity and hardship.

- Attitude towards health can also change for the better.

- People, businesses and institutions can develop new strategies and practices for living, including working home office, video-teleconferences, flexible care arrangements for children and the elderly.

- Governments are likely to realize the importance of employment and mobility policies and a stable and proportionate health system.

- Attention on public health systems is to be the major focus. This change can protect the world from the next inevitable disease.

The full scale of the 2020 situation will be known probably after years to come, as science workers and scholars still collect and analyse the data, adapt and evolve countries' financing to meet population needs.

The impact of COVID-19 has drawn numerous comparisons – some to the Global Financial crisis of 2007–2008, others to World War II, and more still to crises we know only from history

books. While these may seem dramatic, the pandemic has had wide-ranging impact on nearly every aspect of development, like few crises before it.

One thing we have learned from this pandemic is that to fight it, we have to adapt to changing scientific knowledge and information about human behavior. In conclusion, on a global scale, the situation is very dynamic and must be taken seriously. It is evident it is a crisis with a vague end. The unprecedented global health crises combined with the financial crises and their economic impact lead to the conclusion that the impact on the human race is critical and the cyclicality of such viruses of uncertain nature will increasingly mutate more often over shorter intervals of time.

UNESCO, UN, national governmental pages, and online statistical databases.

This paper aims to provide a brief retrospect into the year marked by a disease, which has altered and continues to challenge security paradigms. With this publication CMDR COE also look into the prospects for the way ahead while being fully cognizant of the challenges for calibrating the future *modus operandi*.

A SPREAD ACCELERATION-BASED MODEL OF COVID-19

CMDR COE

Abstract: The CMDR COE realizes from the very beginning of the crisis caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus that it is difficult to control and the consequences are difficult to predict. The study illustrates the CMDR COE's efforts to build a mathematical model examining the acceleration of virus spread. Through mathematical analysis and available statistics, is examined the acceleration of the spread of the virus and predicted future peaks. In the article are explained part of the achieved results by the statistical data analyses. The focus is on data farming and the interpretation of the gained information.

Key words: Covid-19, OpsLab, mathematical analyses, acceleration, correlation, coefficient, statistic data, virus spread.

The COVID-19 pandemic was recognized as an event fitting the CMDR COE's understanding of the crisis. A specific work related to the monitoring and examination was initiated. Almost with the start of the organized process, the CMDR COE's OpsLab started analyzation of the available data trying to build a model of the virus distribution. The mathematical analyses gave as a result of some coefficients and parameters. They are outcomes of the data farming process and were proven as useful and informative due to the crisis. In this article, some of the ideas will be elaborated and supported by the statistical data.

Firstly, staff from the OpsLab realized that the COVID – 19 distributions and its behaviour (defined by its characteristics) are dynamic. It means that the differential of the virus distribution in scaling order will give additional information about the process.

That's why the first generated graphics visualizing the crisis evolution were virus spread acceleration.

Graph 1
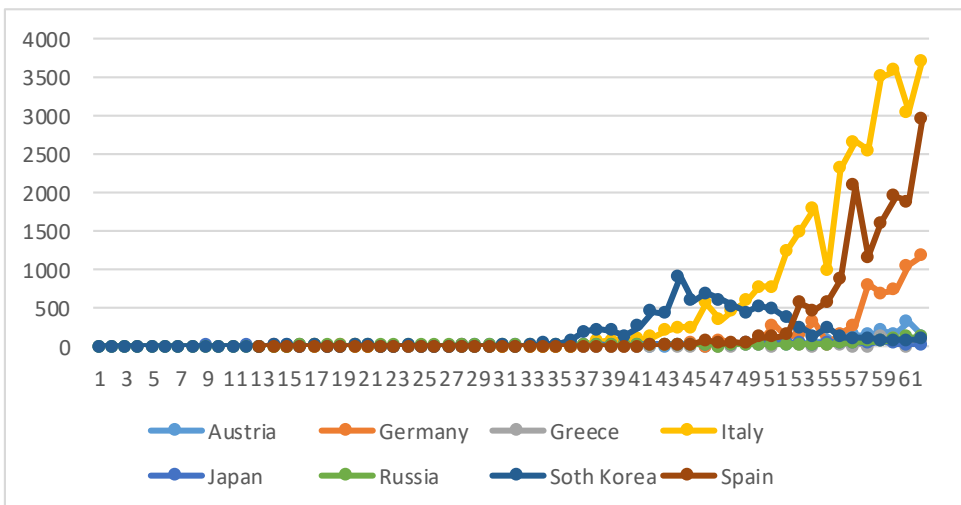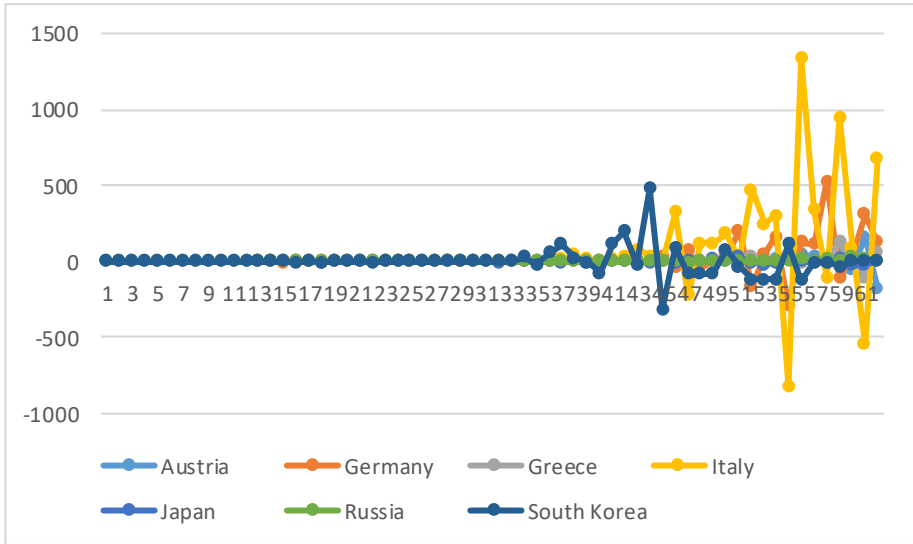
Graph 2

The second graph is informative because instead of the absolute value of the affected people, explains how fast accelerate the virus speed. It has also negative values and the cross of the abscissa gives additional information. It is useful because a change of the sign is easily recognizable by human or computer logic.

The graphs were toothed and it was related to the smaller number of the reported cases, lack of practice and procedures. It was obvious that some filters should be applied to remove the masking effect of the peaks over the searched virus distribution trend.

Such filters were applied with additional data transformation. To compare the performance of the virus across the different countries it was necessary to normalize the acceleration as a ratio to the specific country population. It is shown in Graph 3.
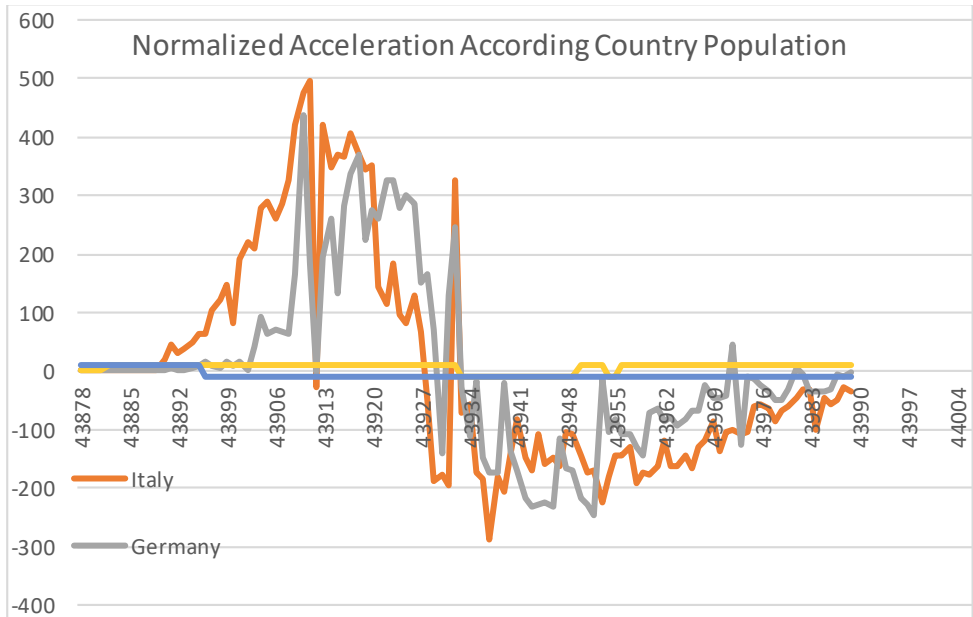
Graph 3

$$f(i) = \sum_{i-20}^{i} Vrep_i - Vrep_{i-1}$$

Further, the result is divided by the country population. It is obvious how different is the distribution of the virus. As it was reported, it depends on many variables like:

- V_0 - initiating speed of the virus distribution;
- Applied crisis management measures;
- The immune response of the nation;
- Reporting logic, standards and policy;
- Other factors.

We found that some of the countries follow different procedures and standards when reporting the statistical data globally. It made the analyses more difficult in the beginning, but later additional normalization on the data was applied.

Normalized Acceleration According Country Population
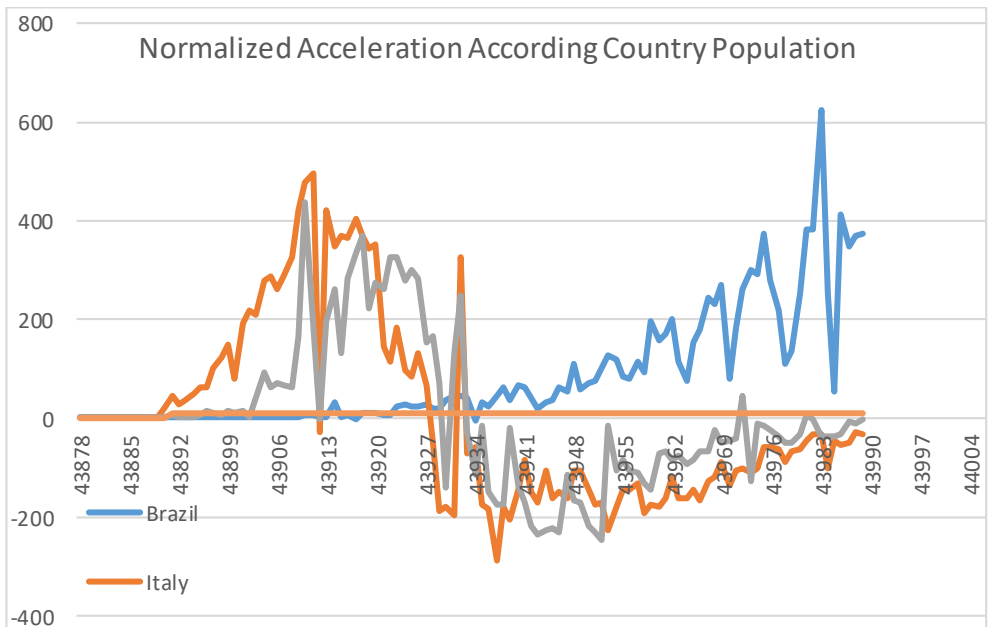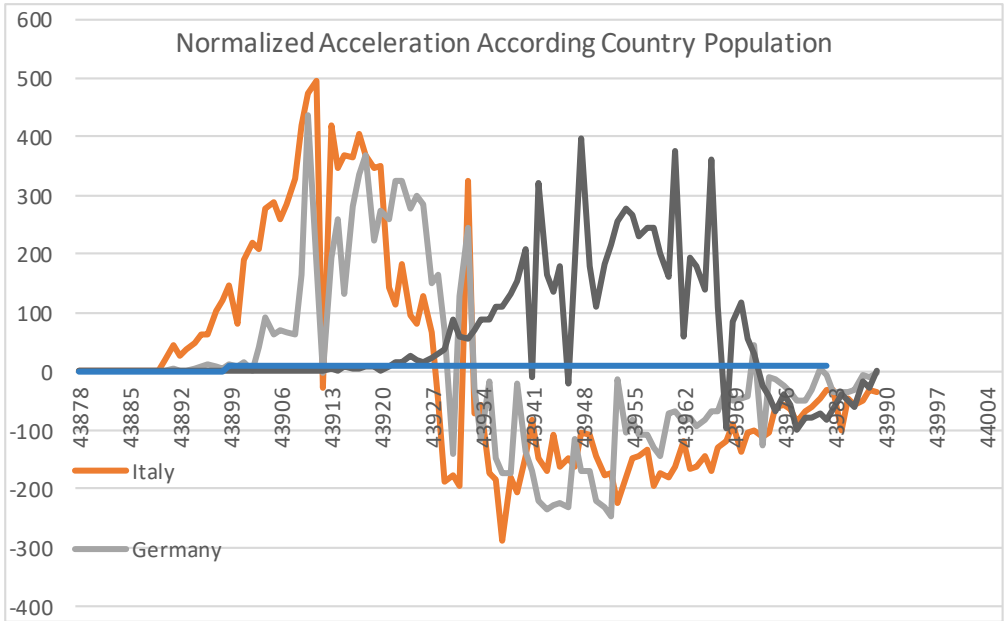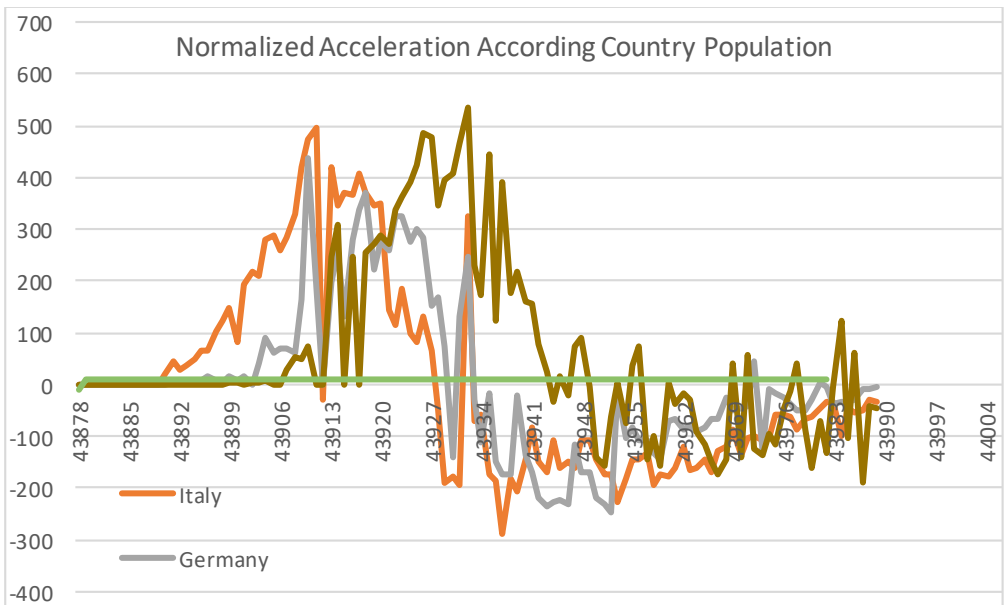
Graph 4

Graph 5

Graph 6

Looking at graphs 4-6 we can understand how useful is the normalization of the values and that the bigger absolute values of daily new cases are very close relative to what we observed in Italy and Germany.

We were able also to fix some crucial moments in the virus distribution. All this data was used not only to prognosticate the evolution for the next days and weeks but also to estimate the crisis management by the governments and the EU.

The start and the end of the cycle or wave could be found as integral of the positive and the negative surface of the acceleration graph. These two should be equal to have a full cycle.

$$\int_{t-k}^{t-l} A dt = \left| \int_{t-m}^{t-n} A dt \right|$$

where,

for the period t-k – t-l the acceleration has positive values and for the period t-m – t-n the acceleration has negative values.

The way of visualization also allowed us to follow the global distribution of the virus and its self-development.

For example, we can fix the delay in the virus distribution acceleration in the USA relatively the start in Europe. The same approach could be applied to other countries like Brazil, India, etc.

Such tracking draws the route of the virus.

On the graph 3 could be found visualized specific coefficient determined by OpsLab's staff. It is about the number of new cases relative to the death toll.

$$C_{NC/DT} = \frac{New\ Cases}{Death\ Toll}$$

We found that there is a hard correlation between the number of affected people and the death toll. This correlation is linear and could be expressed as a coefficient. There is also a delay in the correlation. It is because the virus needs time to affect seriously the health of the human being. The average time is estimated at 14 days. The calculated time delay by us in just 4.3 days.

We found that this is because of human behaviour. In many of the serious cases with a lethal end, the patient went to the hospital too late. Crucial time had lost, often more than 10 days.

Following these functions, we understood that the death toll could show us the phases of the cycle/wave.

In Italy this coefficient was

$$C_{NC/DT} \approx 10$$

during the positive acceleration of the virus distribution, and less when the acceleration trends to change the sign and direction.

It is because the death toll function catches up with the lagging function of the daily new cases.

For Germany, the threshold value of the coefficient was less and it is a function of several parameters.

The coefficient was unambiguously informative and easy to use. It was implemented in our model and the logic compared the calculated value with the stored in a table, relevant for each observed country.

The coefficient had different threshold value for Bulgaria and the Balkans countries and some theories are trying to explain it. One of them is the mandatory applied BCG vaccine.

When the ratio and coefficient are more than 10 it means that the acceleration will have a positive sign and the trend is up.
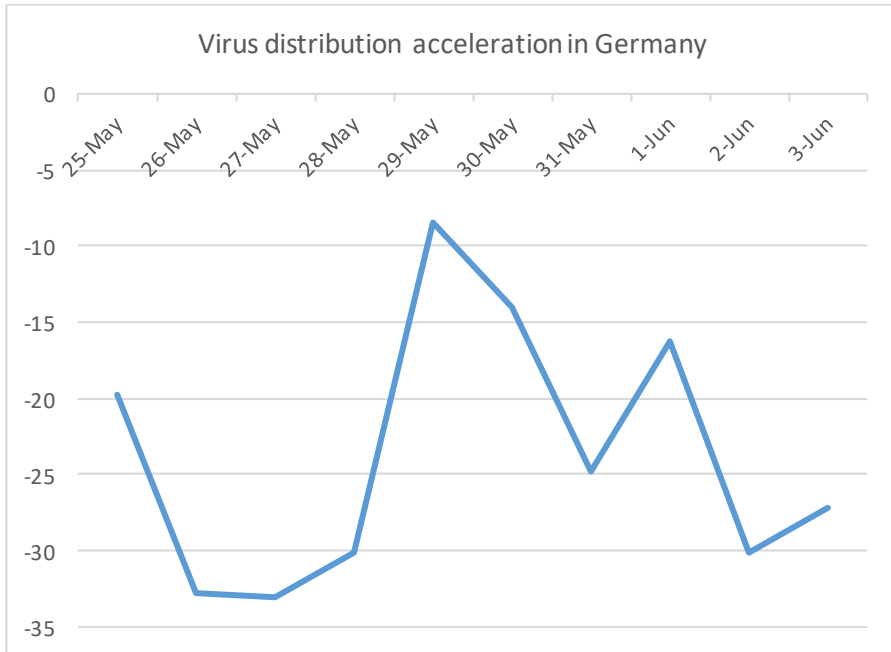
Graph 7
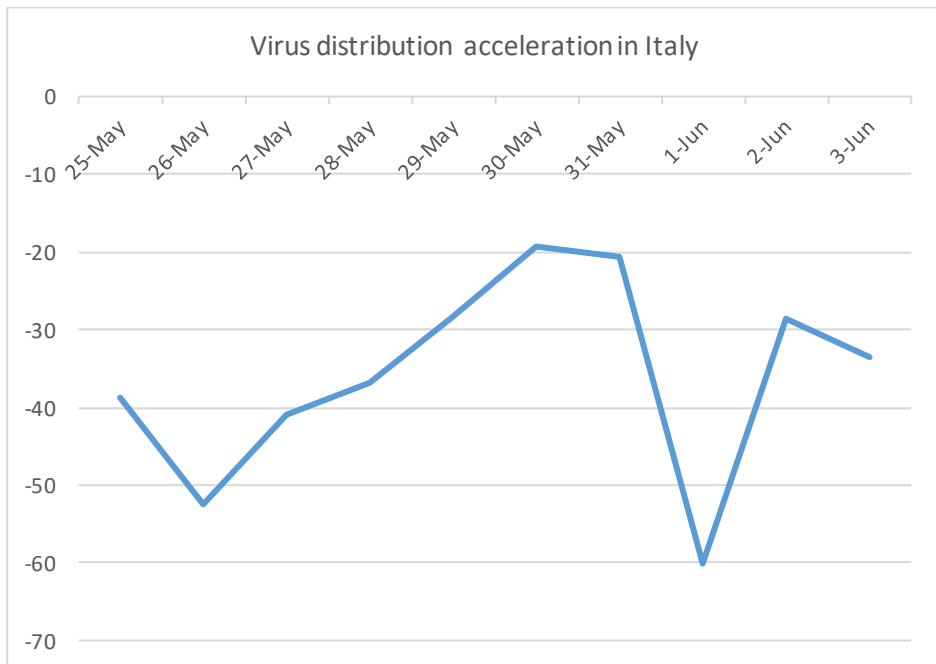
Graph 8

The OpsLab's staff used a lot a week virus distribution acceleration graphs to make short-term forecasts and to evaluate the situation. It started to be very precise with the tuning of the virus behaviour model.

The OpsLab's staff tried different modelling approaches forecasting the virus spread in short terms. The equations have third-order polynomial. It made them precise enough and a specific series of reports were generated. We made forecasts for one and two weeks. The prognoses were published and later compared with the reported statistical data.

Forecasted cases	New cases /Reported Data	Deviation [%]
179531	179713	-0,10155
179994	179986	0,004509
180412	180328	0,046488
180784	180789	-0,00296
181110	181288	-0,09842

Table 1

Table 1 contains data about virus spread in Germany, published in one of the CMDR COE's reports (report 10 of the OpsLab). There could be found the forecast a week before and the reported new cases later. The precision is enough for the adequate decision-making process. Some of the parameters of the model had to be modified to get the same precision for other countries. The second differential of the speed was crucial for the deviation scale.

It works well for visualization for short period, but for the long term, we decided to use another filter which is weekly based.

It was relevant, because of the noticed statistical stamp in the reported new cases. Later such filter was applied in many analyses and researches published in the global information space.

Virus Acceleration in Italy with applied 7-day filter

Graph 9

Virus Acceleration in Bulgaria with applied 7-day filter
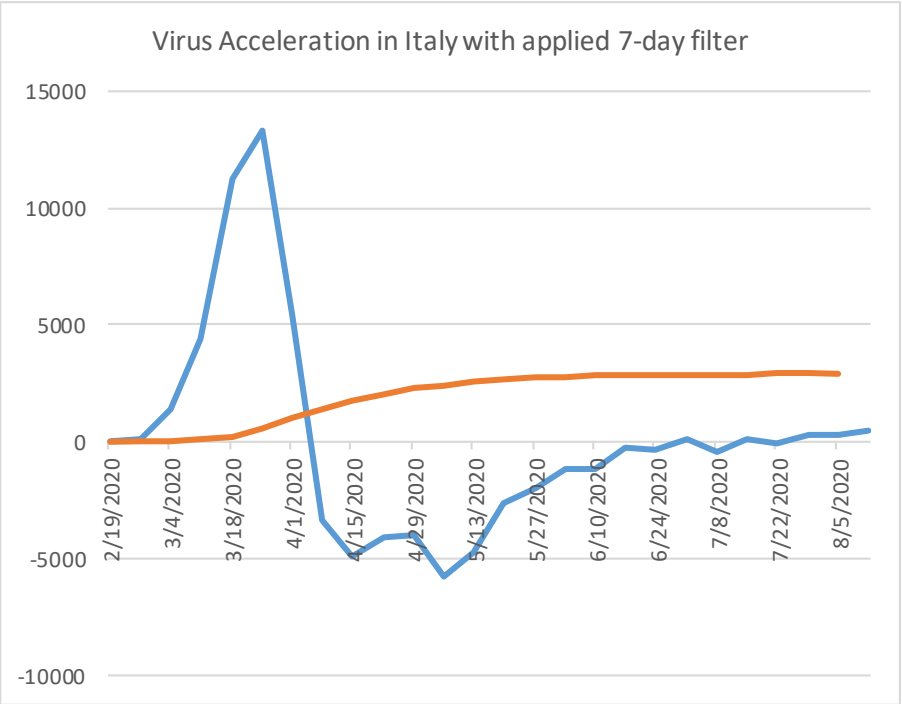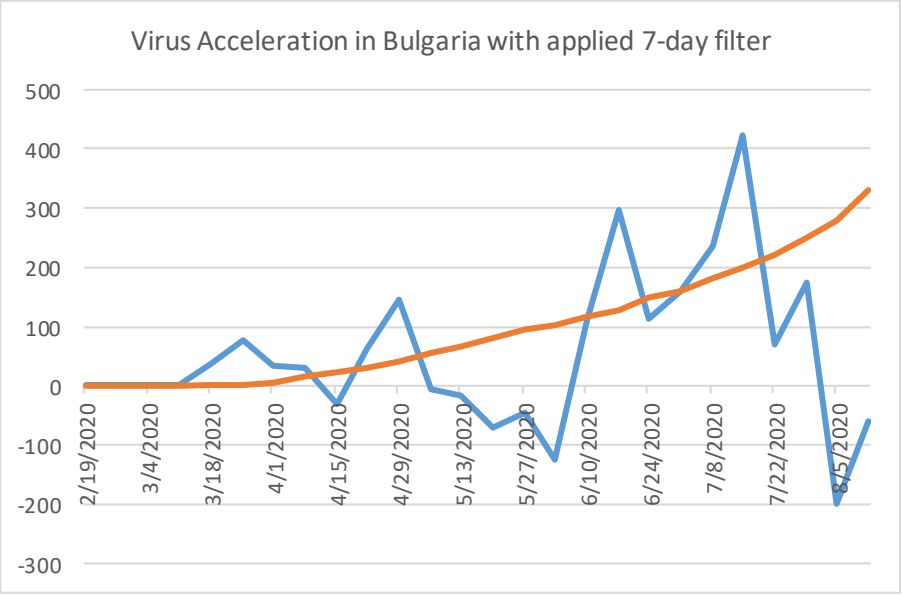
Graph 10

The development of correct logic and criteria for the phase transition was important. On the graph 10 is shown the virus acceleration in Bulgaria with applied 7-day filter. If we look at the graph later, we will see a slightly different picture:
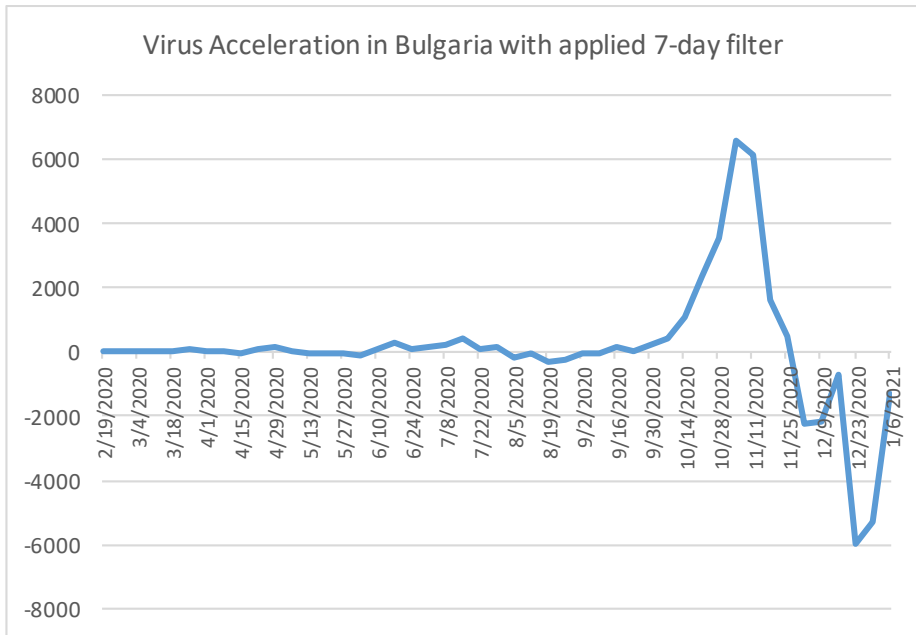
Graph 11

The data is the same, but now the first two waves/cycles are suppressed by the peak of the third and they are hardly noticeable.

CMDR COE detected three waves across Europe and some other countries around the globe. They are all related to the virus self-development or the new strains.
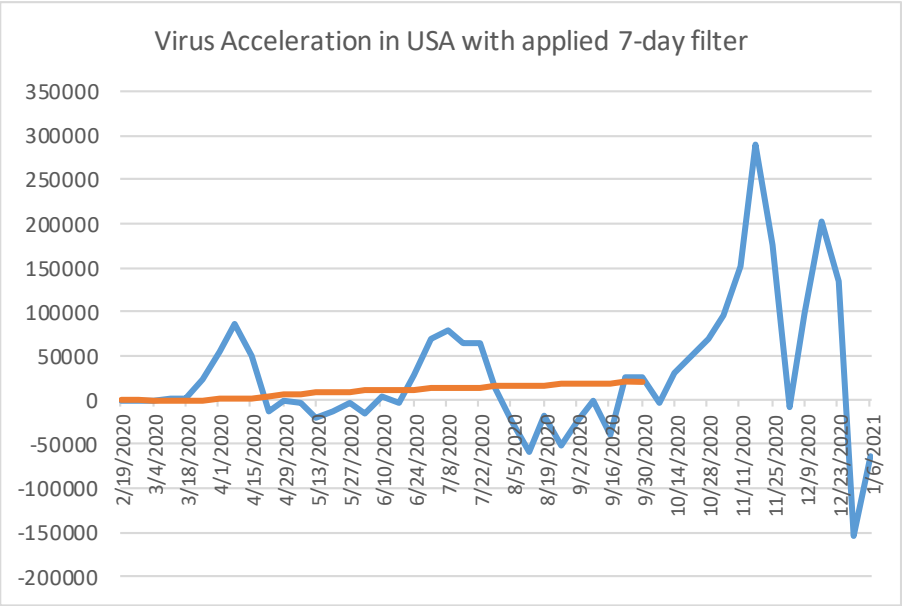
Graph 12
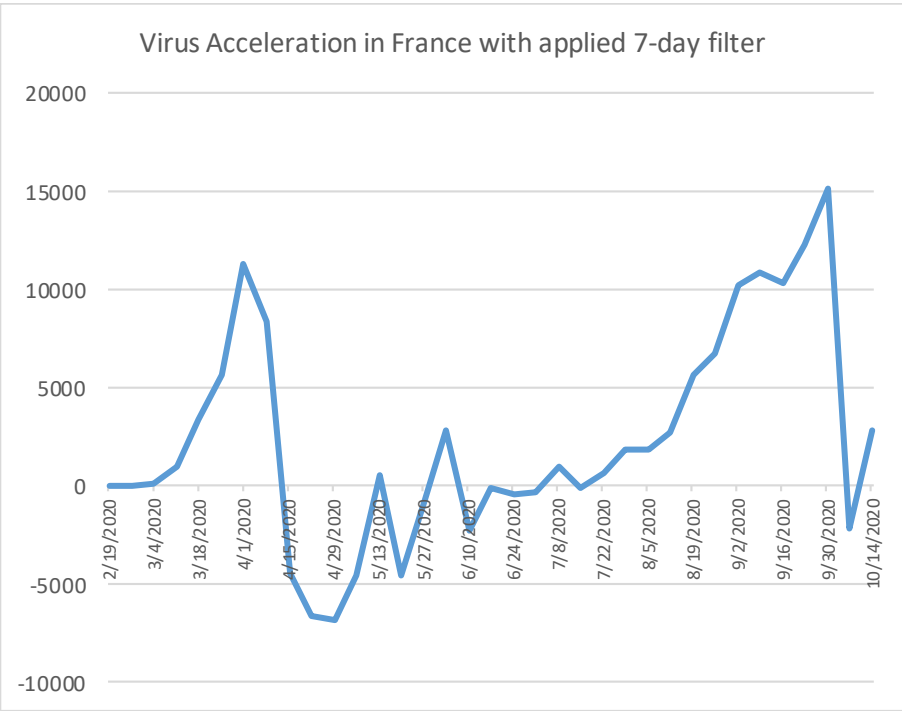
Graph 13

Till the moment we identified two different strains changing significantly the virus distribution and had been provoking the second and third waves.

The OpsLab's staff identified the change of the virus behaviour and parameters trying to calculate the overall number of people having contact with the virus.

Such calculations were useful to assess the effectiveness of the applied crisis measures. The non-so steep function of the virus distribution speed reduction is explained with the "shadowed" infection of the population. CMDR COE identified it as a phenomenon and tried to compute its actual value.
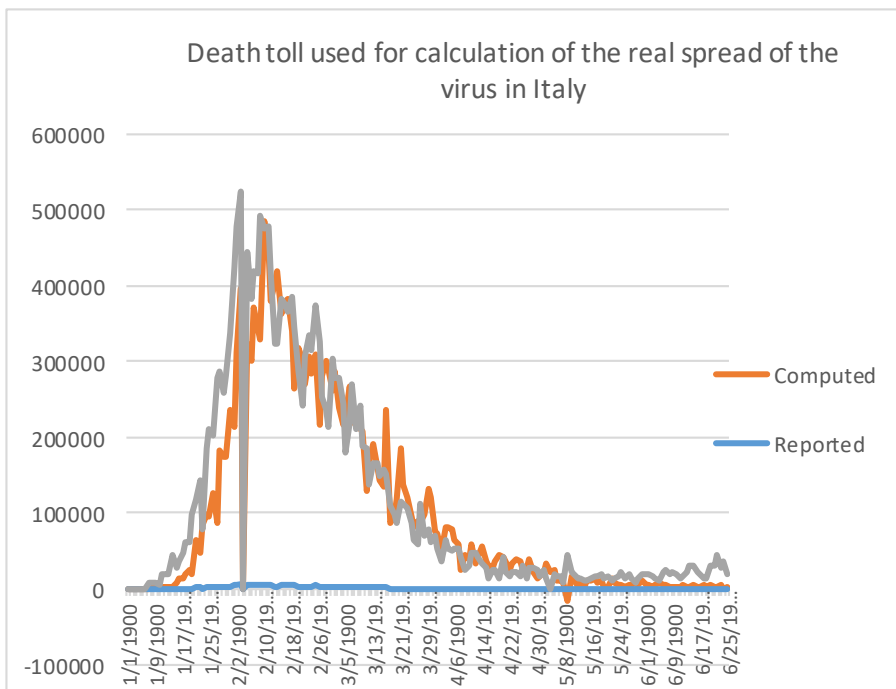
Graph 14

The graph represents the reported statistical data of the new cases, computed number of people having contact with the virus and the reported data multiplied by 80.

The computed number is a multiplication of the death toll and a coefficient. In the graph, both computed and the reported by 80 are multiplied 10 times more to fit the CMDR COE virus model interface. However, it is obvious how strong is the correlation between the functions. The conclusion was that the "real" distribution of the virus is almost eight times bigger than the reported. In this number are included all people with light symptoms or asymptomatic. On the graph could be seen also the delay between the functions with the already mentioned value of approximately four days.

Later, a significant deviation in the computed and the reported cases was identified and it provoked new research.

In report 23 the OpsLab wrote: "The start of the new virus spread acceleration increase was observed a month later comparing with other European countries and more than the USA. At the same time, the behaviour and characteristics of the pandemic are preserved. The relative number of the deaths from the virus is decreasing accompanied by a significant number of newly affected. The acceleration at the moment is with a positive sign and a value forming new exponential part of the total number function. The important question is "Why".

The conditions now for the virus spread are not so good as they were a few months ago. In the beginning, the restrictions were not applied, people hadn't necessary motivation and habits, lack of population with gained immunity.

Now the situation is better. The people are warned, part of them having contact with the virus and even though we can assess more rapid acceleration than a few months ago. One of the reason could be the possible mutation of the virus in the USA which CMDR COE mentioned earlier in its reports. The strong deviation of the calculated deaths to affected ratio was observed for the first time there in April.

The new virus came back to Europe causing the escalation of virus spread acceleration. It doesn't stop the spread of the previous deadlier strain but suppressed it slightly.

That explained the reports from the affected countries.

Certain distortion of the reported data is fixed comparing data for death causes in many countries. There is decreased in the cases of the dead people dying from other diseases like cancer, heart attack, etc. It seems that the coronavirus has some prioritization in the medical reports and it should be taken under consideration. The compensating coefficient is calculable giving the trend from the statistics of previous years and the deviation with the reports from 2020.

This coefficient means that the calculations for the death toll could be revised."

Later this was confirmed and it is visible on the graph 15-18.

Death toll used for calculation of the real spread of the virus in USA

Graph 15

Virus Acceleration in USA with applied 7-day filter
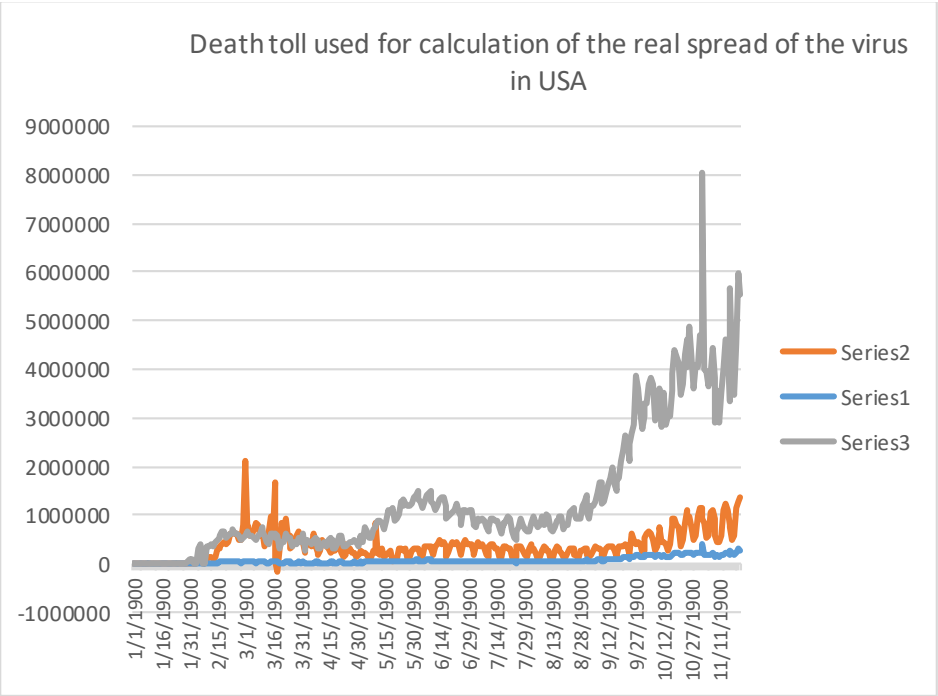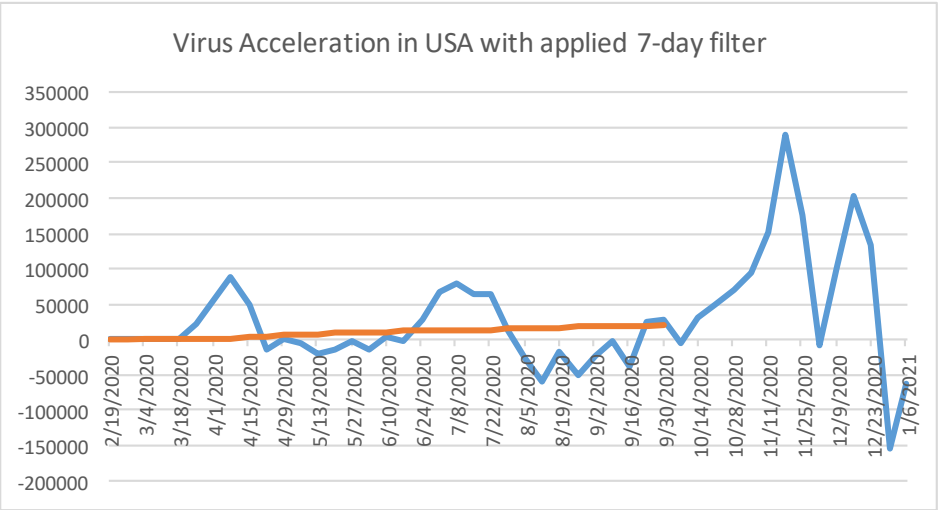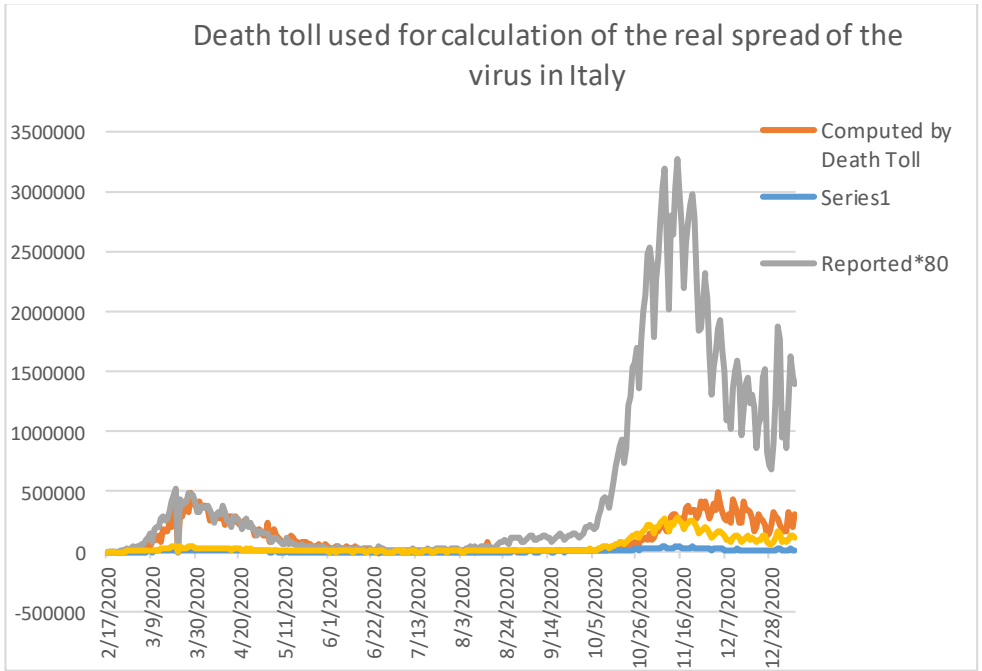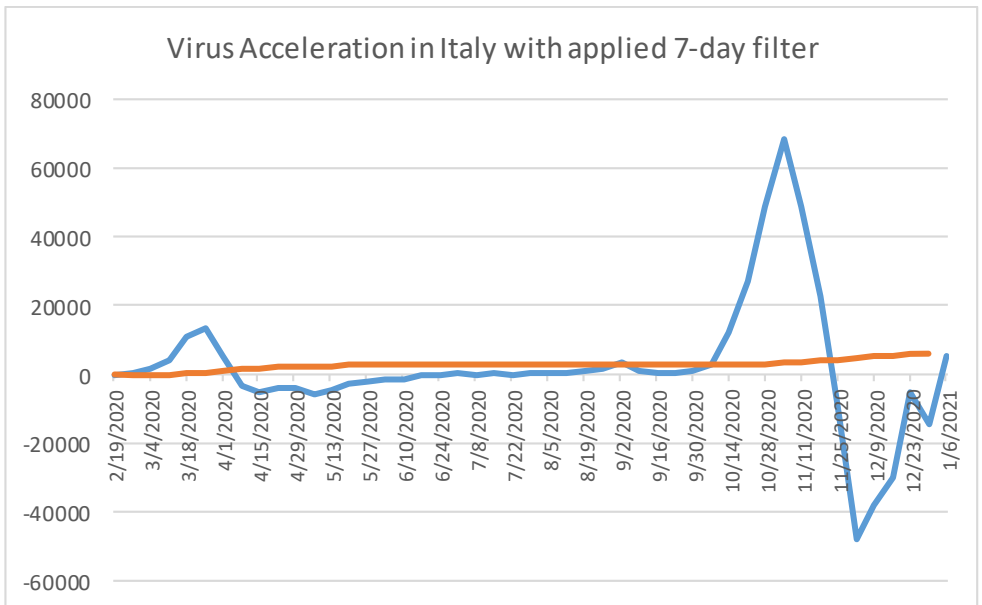
Graph 16

Graph 17

Graph 18

At that time in the press was circulating the opinion that the virus crossing many human-being immune systems has become less deadly and not so aggressive. The OpsLab's staff tried to tune the mathematical model according to this and the result was confusing. The observed deviation was reported also a few months ago and this was the beginning of the "second" wave. Probably, as it was reported, the transition was provoked by the mutation of the virus in the USA. What is very illogical is the following development of the crisis across the European countries. The environment for the virus spread was not so beneficial for the virus as it was at the beginning of the year. There is a significant percentage of people already immune to the virus. The mitigation measures and the population's behaviour are also more adequate.

In that period very high daily new cases rate and relatively low mortality were reported. For example, the ratio, in Italy, of the reported cases to the victims of the virus was 10:1 – high and stressing. The ratio during the second wave caused by the new strain was 200:1 which comparatively is much acceptable. Many experts said that the virus is not so dangerous because it had numerous contacts with the people. And according to the OpsLab analyses, it is not correct. The virus becomes more aggressive and hazardous.

During the first wave, the number of contacted people by the virus was almost 8 times bigger than reported. In that number are included the less and asymptomatic, people hadn't

searched for medical help. The delay in the virus acceleration for the first wave was observed reaching almost 15 per cent of people touched by the virus. Unfortunately, it is relevant for the previous strain of the virus. The OpsLab's staff found that the less aggressive virus is not sufficient explanation for the deviation of the mathematical model and the statistics. As it was described the virus now is more hazardous and it is explained with the theory that it affects a larger proportion of asymptomatic people. So the virus impacts more effectively.

In the last analyses, we assumed that it is more than two times more efficient compared with the first wave. To visualize, it is depicted the two function on the graph. The yellow one is with a corrected coefficient. That coefficient is not adequate for the first wave and previous strain of the virus. Very important is the death rate of the new virus strain. It seems that it is close to the previous one. The precise assessment is not easy because some inversely proportional parameters should be taken under account. For example, improved medical protocols and people awareness.

As it was described, the contacted people with the new strain are more 'visible' as the symptomatic people distribute much better the virus, especially during the first phase of the illness.

As a conclusion, t the virus spread acceleration is a useful and informative parameter to manage the pandemic. The additional coefficients, results of the data analyses are also helpful and give us the necessary thresholds.

CMDR COE BRIEF OBSERVATION ON COVID-19 FAKE NEWS SPREAD (8 March – 14 April 2020)

CMDR COE

Abstract: The hybrid warfare and current COVID-19 crisis situation have much in common, the concept of hybrid warfare could be used as an analytical framework to help better understand the parameters, mechanisms and dynamics of this complex multi-domain challenge, with shifting centres of gravity as well as its direct and indirect implications for security. The way in which different actors organize their comprehensive approach and crisis response mechanisms to counter the COVID-19 crisis should be analyzed and studied carefully, as there is a lot to learn about organizing the comprehensive approach, bridging interface challenges and optimizing crisis response mechanisms to counter hybrid challenges. The crisis situations provide an opportunity for deep, long-term and systematic learning from countering COVID-19 to countering hybrid threats, conflict and warfare.

Key words: fake news, information flow, media, hybrid, pandemic

The present political, technological, economic, and social transformation has impacted on how the information is spreading and exchanging. In recent years this correlation poses a threat to fact-based info flow and, particularly during the current pandemic, people's lives. It refers to the "contamination" caused by some orchestrated misinformation campaigns.

The current state of play is as a cat-and-mouse game between malicious actors, governments and the new media industry. As social media companies and other actors take action to counter abuse, malicious actors adapt to the new environment. This has led to, among other things, an increase in the sophistication of cyborgs and trolls. The methods and platforms used to disseminate disinformation are changing. Furthermore, malicious actors are more effective than before in covering their own tracks. Impersonation is commonly used both for the spread of disinformation and for social engineering attacks with different degrees of sophistication, sometimes attempting to create real-life events through online activity. Continued technological development in the field of artificial intelligence and frighteningly realistic 'deepfake' video[1] and audio techniques may allow impersonation attacks to become even more credible[2].

The falsehoods related to all aspects of coronavirus case have become common place. There seems to be barely an area left untouched by disinformation in relation to the COVID-19 crisis, ranging from the origin of the coronavirus, through to unproven prevention and 'cures', and encompassing responses by governments, companies, celebrities and others. In a time of high fears, uncertainties and unknowns, there is fertile ground

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[1] A synthetic media coverage where an existing image is replaced with someone's likeness, leverage artificial intelligence to generate content with a high potential to deceive.
[2] Jakob Willemo, Trends and Developments In The Malicious Use Of Social Media, 2019, NATO STRATCOM COE

for fabrications to flourish and grow. The big risk is that any single falsehood that gains traction can negate the significance of a body of true facts. When disinformation is repeated and amplified, including by influential people, the grave danger is that information which is based on truth, ends up having only marginal impact.

Because of the scale of the issue, several international organizations as UN, WHO, UNESCO, NATO, EU have added a "myth busters" section to their online coronavirus related webpages. The aim is to tackle and refutes a staggering array of myths, including claims that "coronavirus is a biological weapon deployed" alternatively by China or USA or even Russia (with the aim of destroying the counter side, vary and depends on narrative); the coronavirus is linked to 5G – "city of Wuhan was a 5G testing ground"; the EU has failed to handle the crisis – "the EU is a disaster for Europe", and etc.

An UNESCO official[3] pointed to a more harmful example of disinformation: encouraging the taking of medication, approved for other purposes, but not yet clinically proven as being effective against COVID-19. This shows that not everyone responsible for spreading untruths is doing so maliciously. Well-intentioned people are also uncritically circulating dubious content. Whatever the reasons is, the outcome is the same. These different motives require different responses, but

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[3] @guyberger twitter, Guy Berger is Director for Freedom of Expression and Media Development at UNESCO

however the effect of sharing falsehoods is to disempower the public.

Some have capitalized on the pandemic, to spread misleading information for the purposes of advancing their own either political or economic agendas. The motives for spreading disinformation are many, and include political aims, self-promotion, and attracting attention as part of a business model. Those who do so, play on emotions, fears, prejudices and ignorance, and claim to bring meaning and certainty to a reality that is complex, challenging and fast-changing.

From the beginning of 2020 the epicenter of hybrid warfare migrated to the field of public health systems following the epicenter of epidemic that has spread from China to Western-wise liberal democracies. With more deaths from coronavirus being recorded in Italy than China, the battle against the virus has come to represent a competition of political systems. Which system is more effective in such trying circumstances: authoritarian Eurasia or the liberal Euro-Atlantic's?

The authoritarian leaders are true believers in the alliances in need. Recent examples may be seen in the fight with terrorism and during the war against Daesh. Such alliances are based not on bringing their countries into line with Euro-Atlantic political pattern, but rather on the existence of an indisputable common enemy. Presently, that enemy is called COVID-19. For people that would like to see the existing world order revised in their favor, the pandemic is an opportunity to reform that order.

In fact there are no notable differences in the Kremlin's and Beijing's disinformation strategies towards international audiences.

Messages targeting domestic audiences describe the virus as a form of foreign aggression, for instance claiming that the coronavirus originates in secret US or Western laboratories and emphasising that challenges coping with the virus mainly affect foreign and democratic countries, while Russia is fighting the outbreak

Messages targeting international audiences (in foreign languages) follow a different approach. They focus primarily on conspiracy theories about "global elites" deliberately weaponising or exploiting the virus for their own ends. Here the aim is to induce distrust in national and European authorities and healthcare systems, international institutions, and scientific experts, among others. Narratives describing the virus as man-made is present in disinformation targeting all audiences.

In late December were reported the first cases of the coronavirus, linked by authorities to a seafood market in the city. Scientists in China and the West have said the virus is likely to have originated in bats and jumped to humans from an intermediate host -- just like its cousin that caused the SARS epidemic in 2002 and 2003. However, parts of Chinese social media and even the country's government appear to have launched a concerted campaign to question the origin of the virus. Chinese officials and state media have repeatedly

stressed that there has been no conclusion on the exact origin of the virus. A spokesperson of the Chinese Foreign Ministry, promoted a conspiracy on Twitter. He hinted that the virus had originated in the USA and was brought to China by Americans as hundreds of US military athletes were in Wuhan for the Military World Games in October 2019.
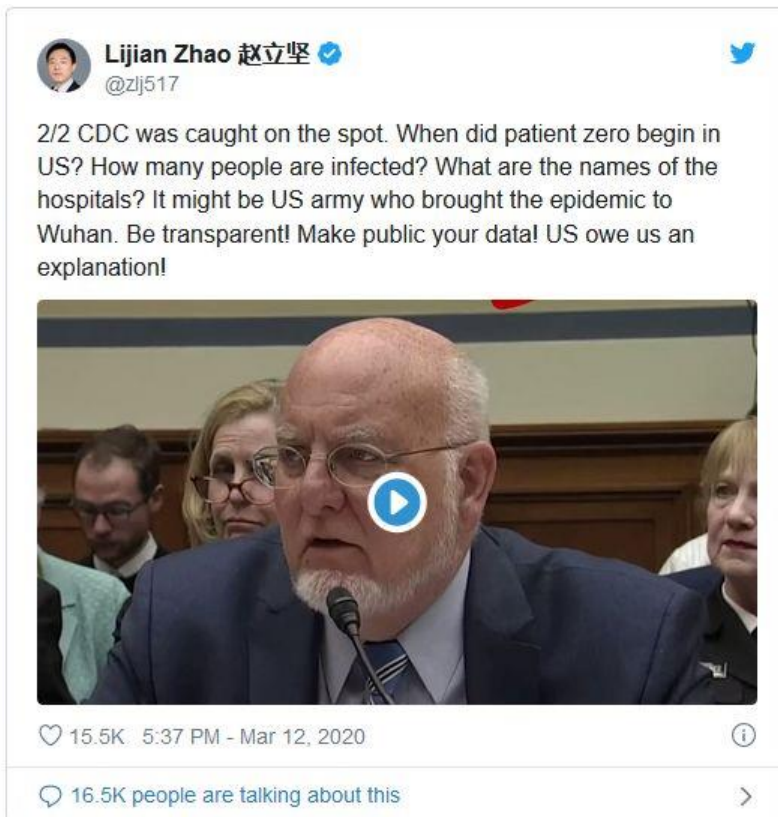
The origin of the coronavirus has become a politically sensitive topic in China and the government seeks to control related scientific research so that the findings do not challenge its own narrative on the origin of the virus and the government response

to the crisis. In China, research papers on the coronavirus have to go through an approval process for "major topics" and to be approved by three levels of organizations.[4]

In Bulgaria the coronavirus crisis has become a daily topic in pro-hybrid warfare media. As of 16 March, the CMDR COE has collected 2 corona-related disinformation mainstreams nationwide, basically through social media domains as BulgarianTimes, Bradva, Lenta, Skandalno etc. These messages are characteristic of the well-established strategy of using disinformation to amplify divisions, sow distrust and chaos, and exacerbate crisis situations and issues of public concern.

The first stream aimed at the government's efforts to restrict social daily routines and to keep the national health system at a level to meet adequately the coming uncertainty. The official policy stated on March 13 the idea that the national resources cannot afford mass testing, simultaneously all hybrid outlets (popularly called 'hibridki') commenced propaganda for 'reasonable solution' through a mass test campaign. Lately tide has aimed intensive reactions among auditorium against `irrational measures' of lockdown imposed by the government. Several science capacities were quoted randomly, some of

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[4] Steven Jiang and Alexandra Lin, CNN Contributed Report, cnn.com/2020/04/12/asia/china-coronavirus-research-restrictions-intl-hnk/index.htm

them mostly out of the scope of current situation to substantiate the narrative.

Hybrid warfare media have found prophesies of the Bulgarian sooth-sayer Vanga, where she saw an illness coming from China. Also they have found her prediction about a medicine against. It became known that Vanga predicted the invention of a cure in Russia. According to Vanga, it will be made out of Siberian cedar tree and Russian doctors will, according to her prophesy, produce a cure out of wood. The activists that have disclosed this prophesy are convinced that Vanga referred to COVID-19. The spread of suggestions of such "miracle" aimed to affect the trust in the European health care system.

On April 8, 2020, state-owned BNT broadcasted a China's state-run agency Xinhua's Under Quarantine – A Month in Wuhan film, released a coronavirus timeline to hit back at accusations that Beijing tried to cover up the full scale of the outbreak.

In the period mid-March to beginning of April the Bulgarian public has been flooded with topics on "No-EU presence in Italy against COVID-19" manifesting the only countries that helped Italy are Russia, China and Cuba, non-EU countries. The deliberated claims stated when the crisis is over, the EU will be held accountable and European Union will be dead because it has no reason to exist.

When on March 25, 2020, the Italian daily newspaper La Stampa published an article on the Russian equipment and personnel (100 mostly military specialists in bacteriological warfare) sent in fight against the coronavirus pandemic, the reaction was prompted in turn. Pro-Kremlin narrative migrated to that Russia has become a target of Russophobic campaigns.

In fact, the La Stampa's article posed a series of questions about the real motives behind Moscow's coronavirus assistance operation in Italy and reported that, in the opinion of unnamed highly placed Italian officials, the Russian aid was mostly of limited value to Italy's efforts in fighting the epidemic. Another Italian media later reported the concerns of some military and security experts that Russia's aid operation in Italy could be used for intelligence purposes by the GRU (Russian military intelligence).

The Russian Ministry of Defence subsequently issued a statement accusing Italian media of spreading Russophobic disinformation. The statement also contained thinly veiled threats against journalists. This narrative is consistent with the recurrent narrative aimed at discrediting mainstream Western media by claiming it is dominated by Russophobia and spreads fake news[5].

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[5] https://euvsdisinfo.eu/eeas-special-report-disinformation-on-the-coronavirus-short-assessment-of-the-information-environment/

In conclusion, hybrid warfare stands for a blend of truths, half-truths and pure lies with the aim to refer to assumptions or conclusions in an elaborated premise.

If you are new to a topic then you probably have a consideration in ordinary context that 'I don't know the truth validation of the claim I am making'. So it's an assumption. A premise is when I make a claim with confidence based on a value.

The premise is a statement which is assumed as true for the purpose of an argument, where the conclusion will be considered as following from the given premise. As such a premise may be actually true or actually false. In case of policy-oriented values, it doesn't matter for the purpose of the argument whether the premise is true or false. It just needs public to assume that it is true because it only interested in validation of its point of political view.

Acknowledgement

THE IMPACT OF COVID-19 ON THE DISTANCE LEARNING FOR MEDICAL PURPOSES

Dr. Teodora Valova[1], Dr. Boyka Petkova [2]

Abstract: The report presents the impact of COVID-19 in higher medical education and e-learning as a training solution in a new situation. The challenges and opportunities of distance learning are being made available here with their practical realization. The given examples illustrate the positive sides and the challenges of the effectively integrating technology into the second language teaching and learning for medical purposes in the conditions of a fully distance learning and global pandemic. The need for a large-scale scientific debate for systematizing the existing experience of using the e-platforms in foreign language training and to avoid the problems identified in future scenarios is emphasized.

Keywords: e-learning, remote learning, second language acquisition for medical purposes

Introduction

The state of emergency in Bulgaria, which has been announced in connection with the spread of the COVID-19 virus, puts into trial the whole country, the society and every single person. The social and the physical isolation apply enormous pressure on everyone's mental health and well-being, putting them in front of a huge challenge. With the closing of the schools worldwide due to the pandemic, the medical education and training are also

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[1] Dr. Teodora Valova is an associate professor at the Department of Language and Specialized Training, of the Pleven Medical University.
[2] Dr. Boyka Petkova is an assistant professor at the Department of Language Training and Sports of the Sofia Medical University.

confronted with dealing with various challenges and difficulties. They are caused by the specific features of the training of the higher medical schools, in which the lectures, classes and internships in the clinical disciplines are held in specially equipped auditoriums, laboratories, training centers, cabinets, salons, etc. Not all the lectures can be presented electronically and be taught in a distance way. Another serious challenge is the conducting of the laboratory and practical lectures and classes, which is not possible to occur remotely.

Although in the last decade the informational and communicational technologies (ICTs) have become an integral part of the electronic platforms of every modern higher school, the digital tools and resources implemented in them, have the potential to complement only the traditional attendance forms of training: lecture, exercise, colloquium, practice, test, exam. The closure of the universities due to COVID-19 is prolonged in many countries, making the technologies the only tool by which we can reach our students. This requires a revising of the approaches of how the training is conducted and in what way our methodological approach to be adapted for face-to-face training up to full-time distance learning.

We can summarize that the life in a pandemic rearrange the academic day of the medical universities. In this context, the new technologies empower us to communicate and to conduct training, which is of great importance in this moment. In

connection with the topic of this review, the following concepts is necessarily to be defined.

Materials and Methods

The Distance learning for medical purposes is based on the E-learning. But how can we define the E-learning? E-Learning, or electronic learning, is the delivery of learning and training through digital resources. Although it is based on formalized learning, it is provided through electronic devices such as computers, tablets and even cellular phones that are connected to the Internet. This makes it easy for the users to learn anytime, anywhere, with few, if any, restrictions. In the large-scale "Networked Learning in Higher Education" survey, Peter Goodyear introduces the term "network learning". The author emphasizes that ,Networked learning supports relatively high degrees of interaction between the learner and other learners, between the learner and tutor, and with on-line learning resources. In conventional forms of higher education, interaction with peers and tutors usually requires co-presence. Networked learning supports interactivity and flexibility over the time and place of learning (Goodyear, 2001, p. 13). Garrison and Anderson summarize that "e-learning is networked, on-line learning that takes place in a formal context and uses a range of multimedia technologies" (Garrison, Anderson, 2003).

Discussing the technology-based interactive learning, Grudeva et al. summarizes that it "requires the development of interactive programs (software products) and the use of modern technical

tools and technologies (computers, interactive whiteboards, "smart boards", multimedia, Internet and mobile technologies, etc). This requires high technological competence for selecting, developing and using of software products and contemporary teaching technical resources for this purpose" (Grudeva, 2016, p. 73). Considering the construct in a much narrower sense, D. Veselinov emphasizes on the following essential priorities in the situation of the contemporary foreign language learning environment: "introduction of the integrated approaches to teaching foreign languages; development of the information and communication technologies in the creative environment of the foreign language learning; teaching of the specific language content for professionals as a tool of improving mobility and employability" (Veselinov, 2012, p. 8). Discussing the benefits of the online distance learning platforms in higher medical schools, Valova points out that "the virtual classrooms are closest to the activities in multilingual audiences. Due to their characteristics: multimodality, multifunctional interface and dynamism, they practically ensure the union of the formal, non-formal and informal learning. The author summarizes that "The inclusion of "the new media" in foreign language acquisition is seen as an addition of new multimodal and network tools – with the specific characteristics, opportunities and advantages – to the methods already applied" (Valova, 2020, p. 129-150).

Impact of the pandemic COVID-19 on the effective integration of the technologies in foreign language teaching and learning for medical purposes.

With the closing of the schools due to the pandemic, the medical education and training are also confronted with dealing with various challenges and difficulties. They are caused by the specific features of the training of the higher medical schools, in which the lectures, classes and internships in the clinical disciplines are held in specially equipped auditoriums, laboratories, training centers, cabinets, salons, etc. Not all the lectures can be presented electronically and taught in a distance way. Another serious challenge is the conducting of the laboratory and practical lectures and classes, which is not possible to occur remotely.

But the main factors which influence the distance educational process can be differentiated in the following directions: *methodological, meaningful, communicative, technological, organizational, qualified.* Particular attention is paid to the organization, the communication and the educational content. These are three of the main directions in foreign language remote learning in higher medical schools, which in the conditions of sudden suspension of the educational process are subject of change and improvement. The analysis of the rest three factors gives us the reason to claim that they need a longer time both for development, implementation and real approbation (building of the pedagogical design of the entirely distance course in

Bulgarian and English for medical purposes), for increasing the quality of the preparation and qualification of the teachers and the optimization of the distance learning platforms.

The Advantages

The significant advantages of e-learning which receive their own confirmation in the practical experience of the authors in the entirely distance foreign language training for medical purposes are as follow:

I. Meaningful:

- allows quick and flexible transformation of the educational content and its presentation in a diverse and interactive way;
- provides quick and easy access to specific resources and shortens the time which is necessary for the comprehension of the information;
- when working on the assignments, they give the opportunity for creation of a new content, thus turning the student from a consumer of information into a co-author;
- integrated tools allow the students to learn with their own pace;
- a significant amount of the content can be delivered to a large number of learners from geographically dispersed locations;
- contribute for improving the effective listening and reading skills;
- electronic texts and audiovisual learning educational resources can be stored in platforms, which may facilitate the

simultaneous learning of the large group of students, if it is possible from their side.

II. Communicational:

- the interest and the activity of the learners is provoked and their motivation for learning is increased;
- a positive, supportive and stimulating microclimate and permanent feedback is maintained;
- at the same time the knowledge is acquired, the skills are formed, the attitudes are built, the independent thinking and the own language production are provoked;
- working in an inspiring and supportive learning environment;
- the communication between the trainees can continue after the end of the classes and they can work on the staged tasks at home;
- the lecturer is an equal participant in the group learning and development, as he is responsible, flexible, sensitive to the others, he is able to cope equally well with the academic challenges, as well as with the pedagogical and purely life aspects of the educational interaction and environment.

III. Organizational:

- existing complex software system for preparation and organization of the educational content;

- availability of tools for resource creation, for assessment, and for integrated learning environment such as Blackboard, chat, etc.

The Challenges of E-learning in the context of foreign language learning for medical purposes.

Obviously, e-learning has distinct advantages over an old-school approach, but that does not make it a perfect solution for every situation. It is an adaptable solution, so even those qualities that might be considered as a disadvantage can be overcome. For example, some people simply learn better in a traditional classroom setting rather than in an online, self-directed one. This brings to another possible drawback of e-learning: lack of interaction of the student with his classmates. Some of the students learn better when they can discuss their new knowledge with others. As with the point above, this can be achieved with an e-learning solution that offers lecturer-led classes or online community forums.

Pedagogical challenges

- providing a medical-specific linguistic content in a distance work-based learning or practical context;
- a lot of time for creating the materials, which support entirely the distance learning;
- different styles of studying of the learners;

- different time zones (the records give the opportunity only for passive participation – asynchronous and with a lack of parallel feedback).

Technical challenges

- technical problems with the connection and the loss of studying time;
- unequal level of the digital competences of the students and the academic staff;
- lack of Cyrillic keyboard on computers of learners for fulfillment of the assignments and the individual tasks;
- change of the regular program, which leads to problems in reporting for the teachers' employment.

Challenges, generated from the lack of interaction:

- lack of interaction of the student with his classmates;
- there is a danger of shifting the focus towards the communication at the expense of the
- linguistic knowledge.

Other challenges:

- exhaustion of lecturers from a long time of preparation;
- decreasing in the students' interest as a result of the uniform educational electronic environment in which all the lecture courses are conducted during the COVID-19 pandemic.

Conclusion

Based on the analysis of the studied literature, without pretending for completeness, on one hand, and the results from the pedagogical observation, in the other hand, we can make the following more important conclusions. The formation of the concrete knowledge, skills and competences in Bulgarian language and English as a second language for the medical purposes in a fully distance form of training may fulfill its goals, if the following conditions are fulfilled:

1. Availability of pre-structured basic electronic interactive resources and materials, in which there is a balance between the volume of the new linguistic and lexical information, the practical exercises and the forms of control and verification.
2. Identifying of goals, tasks and expected results for the specific training unit.
3. Preparation of additional materials, instructions for the students and current problematic questions that are tailored with the specific group of the trainees.
4. Choosing the activities, methods and resources for the realization of the particular sub-topics.
5. Testing of the virtual classroom and loading of the studying documentation, prediction of the alternative materials, tailored with the level of the group.
6. Structuring of an alternative virtual space in one of the free tools: zoom.us, meet.jit.si, Microsoft Teams, Schoology or Edmondo in case of occurrence of technical problems.

7. Record of the video lesson.

The authors' intention is to explore the peculiarities of the interactions teacher-student and student-student in the context of the communication in the virtual classroom. The idea is the existing electronic materials and recourses, based of the virtual learning environment, to approach it maximal to the face to face teaching process in the auditorium.

In conclusion it should be noted that within the frames of the educational electronic platforms is realized effective foreign language training, based on the technologies. In order to increase the efficiency and the quality, the structuring of the online language courses is necessary to be made. They guarantee the performance of the logically related productive activities in the foreign language. There is a need for a large-scale scientific debate for systematizing the existing experience of the usage of the electronic platforms in the foreign language training in order to avoid the problems identified in the future scenarios and to improve the success rate of the distance academic year.

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GAME OF DRONES? HOW NEW TECHNOLOGIES AFFECT DETERRENCE, DEFENCE AND SECURITY

Dr Antonio Missiroli

Abstract: Exponential technological progress, especially in the digital domain, is affecting all realms of life. Emerging mainly from the commercial sector, it has led to a democratisation of technologies that could also be weaponised. Technological developments are also generating new dilemmas about their use by the military. And, in the latest global crisis over COVID-19, there is additional growing evidence of the disruptive, even subversive effects of psychological and (dis)information operations conducted through social media – not to mention widespread espionage activities based on spear-phishing or even direct cyberattacks against medical care facilities. In short, at both national and multilateral levels, new and potentially disruptive technologies are dramatically challenging the way deterrence, defence, and more broadly security policies are conceived and carried out.
Keywords: adaption, deterrence, security, technology, risk, defence.

Introduction

Exponential technological progress, especially in the digital domain, is affecting all realms of life. Emerging mainly from the commercial sector, it has led to a democratisation of technologies that could also be weaponised. Technological developments are also generating new dilemmas about their use by the military.

In September 2017, in a speech to students in Moscow, President Vladimir Putin famously argued that whichever country

becomes the leader in artificial intelligence (AI) research – a goal that China has explicitly set itself for 2030 – "will become the ruler of the world".

A few months later, in his presidential address to the Duma, Putin announced that the testing of Russia's new hypersonic glide vehicle was complete and production was about to begin (this technology is capable of dramatically reducing the time required to reach a target and loadable with both conventional and nuclear warheads).

In September 2019, Houthi rebels from Yemen claimed the first known coordinated massive swarm drone strike, on two oil production facilities in Saudi Arabia, after defeating Saudi air defence systems.

And, in the latest global crisis over COVID-19, there is additional growing evidence of the disruptive, even subversive effects of psychological and (dis)information operations conducted through social media – not to mention widespread espionage activities based on spear-phishing or even direct cyberattacks against medical care facilities.

In short, at both national and multilateral levels, new and potentially disruptive technologies are dramatically challenging the way deterrence, defence, and more broadly security policies are conceived and carried out.

The machines in a drone swarm are able to make decisions among themselves. This new technology gives both state and non-state actors the ability to inflict damage and disruption, not only on the battlefield but also on civilian populations and critical infrastructure. © Medium.com

Technology and Warfare

From the Stone Age to Hiroshima, technology has deeply influenced (and sometimes contributed to revolutionising) warfare. In turn, warfare has often boosted technologies later applied to civilian life. Purposeful human manipulation of the material world has virtually always been dual-use – from hunting tools to boats, from explosives to combustion engines, from railroads to satellites – as have platforms like chariots, galleys, mechanised vehicles and aircraft. Science-based engineering has always supported warfare, from fortifications to artillery and from communications to surveillance. However, systematic state-funded research and development (R&D) for military purposes started only during the Second World War and arguably peaked during the Cold War.

Technology harnessed by skilled commanders has always acted as a force multiplier in war, allowing them to inflict more harm on the enemy or limit harm on their side. Throughout history, technological superiority has generally favoured victory but never guaranteed it: comparable adversaries have often managed to match and counter tactical advantages, even within the same conflict, whereas manifestly inferior adversaries have often (and sometimes successfully) adopted 'asymmetric' tactics in response. In other words, the value of technology in warfare is always relative to the adversary's capabilities[1].

However, what we are experiencing now, at least since the 1990s, is exponential technological progress that is affecting all realms of life – not only, or primarily, the military. In the deterrence and defence realm, the development and application of information communications and technology (ICT), resulting in precision-guided weapons and so-called 'net-centric' warfare, was initially conceptualised as another 'revolution in military affairs' (RMA). Previous RMAs include the advent of the chariot in antiquity, gunpowder at the dawn of the modern era, mechanised units after the industrial revolution, and nuclear weapons since the Second World War. Yet, it is now evident that 'net-centric' warfare, while developing at a fast pace, is probably more an evolutionary and incremental process of transformation than a revolution in its own right. Nevertheless, it still has largely

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[1] For an overview see Alex Roland, War and Technology: A Very Short Introduction, Oxford - New York, Oxford UP, 2016; and in more detail Wayne E. Lee, Waging War: Conflict, Culture and Innovation in World History, Oxford-New York, Oxford UP, 2016.

unpredictable implications for deterrence, defence and security at large.
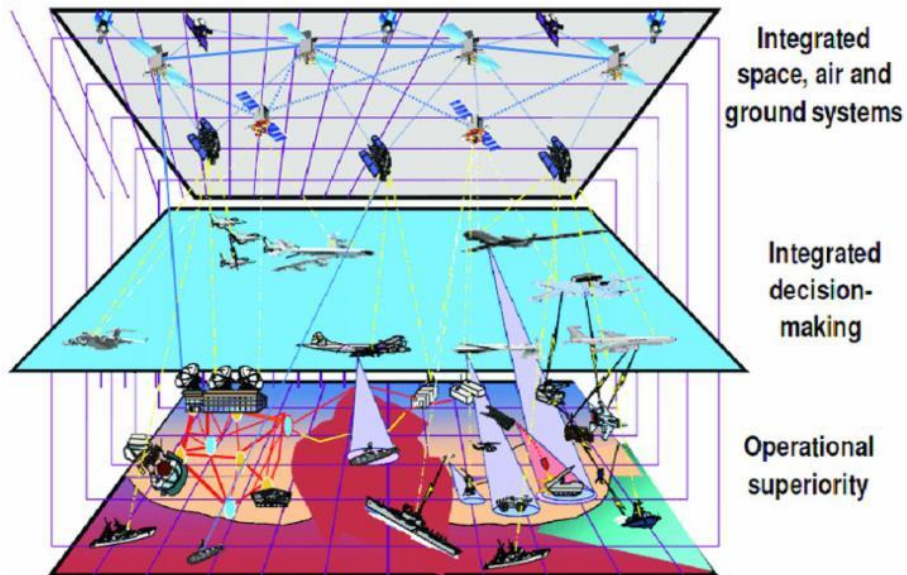
Net-centric warfare emerged from advances in the digital domain. Individual platforms are linked in a shared network, facilitating information exchange, improving situational awareness and enabling quick decision-making and response times. © Research Gate

Just like previous (r)evolutions, the current one is expected to alter dramatically the global balance(s) of power – not only between empires, city-states or nation-states, as in the past, but also within and across actors as, for instance, big tech companies begin to cultivate power and even status often associated with statehood. The 21st century has in fact seen a unique acceleration of technological development – thanks essentially to the commercial sector and especially in the digital domain – creating an increasingly dense network of almost real-time connectivity in all areas of social activity that is

unprecedented in scale and pace. As a result, new technologies that are readily available, cleverly employed and combined together offer both state and non-state actors a large spectrum of new tools to inflict damage and disruption above and beyond what was imaginable a few decades ago, not only on traditionally superior military forces on the battlefield, but also on civilian populations and critical infrastructure.

Moreover, most of these technologies – with the possible exception of stealth and hypersonic systems –emanate from an ecosystem fundamentally different from the traditional defence industrial model or 'complex', based on top-down long-term capability planning and development, oligopolistic supply (a small number of sellers given to non-price competition) and monopsonistic demand (a single buyer). Accordingly, in the past, military R&D resulted in technology – such as radars, jet engines or nuclear power – that was later adapted and commercialised for civilian use.[2] By contrast, these new technologies are being developed from the bottom up and with an extremely short time from development to market: only after hitting millions of consumers worldwide and creating network effects do they become dual-use, and thus 'weaponisable'.

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[2] The only partial exception to this model – now often turned into a model to emulate in its own right – has probably been the US Defense Advanced Research Projects Agency (DARPA). Created in response to Russia's Sputnik launch in 1958 to get America into space, it was later transformed into an independent federal agency to explore and foster disruptive technologies for possible military use. See Sharon Weinberger, The Imagineers of War: The Untold Story of DARPA, the Pentagon Agency That Changed the World, New York, Alfred Knopf, 2017.

The vector of dual-use innovation has significantly shifted, with spillover and spin-off effects stemming primarily from the civil realm. Investment in science and technology (S&T) is now mainly driven by commercial markets, both nationally and globally, and the scale of its expenditure dwarfs defence-specific S&T spending, giving rise to technology areas where defence relies completely on civil and market developments. The new superpowers (and 'super-influencers') are the private big tech consumer giants from the West Coast of the United States and mainland China.

Remote Control and Lack of Control

The latest technological breakthroughs have fostered in particular the development and democratisation of so-called 'standoff' weapons, that is, armed devices which may be launched at a distance sufficient to allow attacking personnel to evade defensive fire from the target area. Delegation and outsourcing of military functions to auxiliaries, mercenaries, privateers, insurgents or contractors – recently labeled as 'surrogate warfare' – is nothing new, of course. But these new technologies are challenging the underlying trade-offs between delegation and control, and generating new dilemmas by making it possible to operate unmanned platforms from a distance, first for reconnaissance and surveillance, then also for punishment and decapitation missions. While they do not represent the first application of a machine as a proxy in warfare (cruise missiles served a similar purpose), these new weapons are also providing

an incomparable degree of discretion (low visibility, also domestically) and deniability, especially before the international community[3].

Most importantly, some are now easily accessible on commercial markets and relatively simple to operate, further breaking the traditional monopoly of states over weaponry and the legitimate use of force and opening up new 'spaces' for new types of warfare. They have already been employed in (counter-)terrorism and (counter-)insurgency operations overseas but could easily be deployed in urban environments – and potentially loaded with chemical, biological or radiological agents. In fact, access and intent are crucial in all these cases, lowering the barrier for their use and widening their scope.

For their part, cyberspace-based weapons – when used for sabotage (cyberattacks) and subversion (disinformation and destabilisation campaigns) rather than espionage – go even further in coercing and disrupting while preserving discretion and deniability, as they operate in a purely man-made and poorly regulated environment that relies entirely on technology to work. Digital weapons can indeed achieve strategic effects comparable to warfare without resorting to direct physical violence, whereas most experts consider cyber 'war' in a narrow sense to be a far-fetched scenario. As opposed to nuclear weapons, digital weapons are not for deterrence but for actual and even constant

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[3] Andreas Krieg, Jean-Marc Rickli, Surrogate Warfare: The Transformation of War in the Twenty-First Century, Washington (D.C.), Georgetown UP, 2019.

use, and they can be operated by states as well as proxies and private organisations without geographic or jurisdictional constraints: attribution is difficult and retribution risky[4].

The media space has become an additional battlefield, constituting as it now does a transnational global public sphere where perceptions of right and wrong, victory and defeat (so-called 'audience effects')[5] are shaped and consolidated at lightning speed. Social media may not have been militarised – although servicemen do use them too, making them vulnerable to hostile campaigns – but have certainly been weaponised. 'Open source warfare' is the name of this new game,[6] in which individual citizens and consumers often act as more or less unwitting auxiliaries. In fact, while cyber-enabled sabotage requires high levels of know-how but relatively little manpower, cyber-enabled subversion is much simpler to design but requires a critical mass of users to spread narratives. The combination of all these technologies in a comprehensive strategy with tactical variations has been conceptualised as 'hybrid' warfare – or, when it remains below the level of armed conflict, just malicious activity[7].

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[4] Thomas Rid, Cyber War Will Not Take Place, London, Hurst & Co., 2013 and 2017. See also Antonio Missiroli, "The Dark Side of the Web: Cyber as a Threat", European Foreign Affairs Review, vol.24, no.2, 2019, 135-152.
[5] Emile Simpson, War from the Ground Up: Twenty-First Century Combat as Politics, New York, Columbia University Press, 2012.
[6] John Robb, Brave New War, Hoboken (N.J.), John Wiley & Sons, 2007. See also Peter W. Singer, Emerson T. Brooking, Like War: The Weaponization of Social Media, Boston-New York, Houghton Mifflin Harcourt, 2018.
[7] For an overview see Antonio Missiroli, "From Hybrid Warfare to 'Cybrid' Campaigns: The New Normal?", NDC Policy Brief, no. 19, September 2019.

Finally, at least so far, space proper has remained relatively immune from these trends, thanks both to the provisions of the 1967 Outer Space Treaty and to the risks intrinsically associated with the possible use of force, for example, debris. Technological developments up there have been focused on facilitating activity down here – mainly satellite communications for broadcasting and navigation – for both public and now increasingly also private actors, with all the resulting democratisation effects. The most capable states have indeed partially militarised space, and now ever more states (also thanks to technological change) are capable of entering the game. Yet while there are no well-tested protocols or rules of engagement for military activity up there, the weaponisation of space-based assets still seems an unlikely scenario[8].

Intelligent Machines and Their Scope

Enter artificial intelligence (AI), machine learning and autonomy (quantum computing may still lie a bit farther on the horizon, although it may prove no less disruptive). The concept of AI dates back to the early 1950s but technological progress was very slow until the past decade. Then three main changes occurred: the miniaturisation of processors boosted computing power; the spread of mobile and connected devices favoured the generation of an enormous amount of data; and, finally, the application of new types of algorithms exploiting leaps forward in machine

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[8] See the issue of The Economist, 20 July 2019, and Michael Peel, Christian Shepherd, Aime Williams, "The Emerging Arms Race in Space", Financial Times, 14 November 2019, 8.

learning (and in particular neural networks) increased the overall capabilities of machines[9].

The X-47B Unmanned Combat Air Vehicle, developed by Northrop Grumman in cooperation with the US Defense Advanced Research Projects Agency, is semi-autonomous. (Courtesy of Northrop Grumman)

In the domain of public health and diagnostics, such as cancer research, these technological developments are already proving their worth and their benefits are uncontested. In the field of security and defence, however, the jury is still out: the prospect of fully autonomous weapon systems, in particular, has raised a number of ethical, legal and operational concerns.

'Autonomy' in weapon systems is a contested concept at international level, subject to different interpretations of its levels of acceptability. The resulting debate triggered, among other

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[9] Erik Brynjolfsson, Andrew McAfee, The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies, New York-London, W.W. Norton & Co., 2014 (the 'first' age being the industrial revolution, which helped make labour and machine complementary).

things, the establishment of a group of governmental experts on Lethal Autonomous Weapon Systems (LAWS) at the United Nations in 2016. However, this group has not yet come to agreed conclusions. This is in part due to the current strategic landscape and the 'geopolitics' of technology, whereby some states developing these systems have no interest in putting regulations in place, while they believe they can still gain a comparative advantage over others. Yet it is also due to the fact that 'autonomy' is a relative concept.

Few analysts would contest that, in a compromised tactical environment, some level of autonomy is crucial for an unmanned platform to remain a viable operational tool. Moreover, automatic weapon systems have long existed (for example, landmines) and automated systems are already being used for civilian and force protection purposes, from Israel's Iron Dome missile defence system to sensor-based artillery on warships. With very few exceptions, current weapon systems are at best semi-autonomous. Moreover, they tend to be extremely expensive and thus hardly expendable.

Technological and operational factors still limit the possible use of LAWS: while engaging targets is getting ever easier, the risk of miscalculation, escalatory effects and lack of accountability – all potentially challenging established international norms and laws of armed conflict – seem to favour meaningful human control. Yet the temptation to exploit a temporary technological

advantage through a first strike also remains, and not all relevant actors may play by the same ethical and legal rules.

In addition, beyond the traditional military domain, recent spectacular breakthroughs in voice and face recognition (heavily reliant on AI) may further encourage subversion, while the design of ever more sophisticated adaptive malware may promote more sabotage. Those states who can determine the infrastructure and standards behind such activities will gain a strategic advantage.

However, mirroring what already happens in medical research, AI can also be used for detection, pattern recognition and simulation purposes – all potentially crucial in the domains of counter-terrorism, civil protection and disaster response as well as arms control (monitoring and verification). Tailored AI applications can indeed provide better intelligence, situational awareness, analysis and, arguably, decision-making. AI can also be used for practical applications already common in the business sector, like more efficient logistics or predictive maintenance for equipment, which all play a very important role in the military.
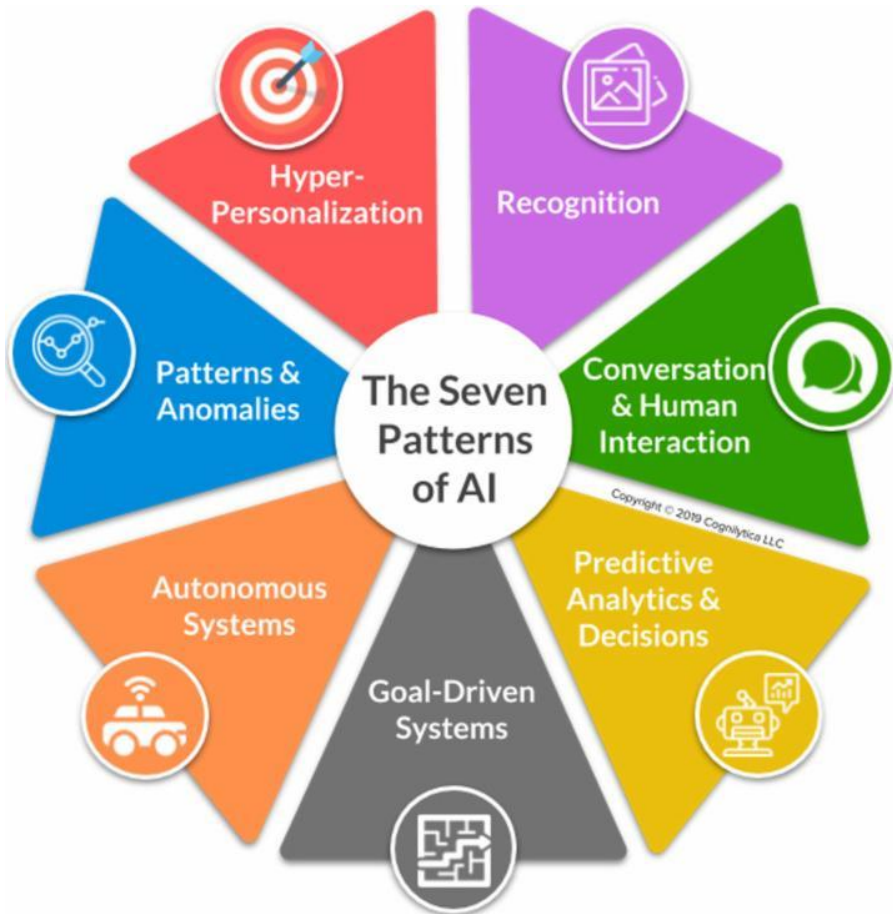
All applications of Artificial Intelligence fall into seven common patterns, shown in this diagram. © Cognilytica

Furthermore, most experts highlight an important distinction within the AI domain. Accordingly, narrow AI refers to single-purpose systems, that is, machines that may perform unique tasks extremely well in one realm but are almost useless in unfamiliar scenarios or for other applications. By contrast, general AI refers to the capability to conduct a plurality of multidimensional activities without being explicitly programmed

and trained to do so – a capability that is believed to be still a long way off.

For the foreseeable future, the range of potential military applications of 'narrow' AI appears quite attractive. However, investments will depend on the readiness to take financial risks with limited public budgets and will probably be weighed against other modernisation and operational priorities. Here, too, technology can be both a boon and a bane, and it is not unlikely that the historical pattern whereby labour-replacing technologies encounter more opposition than enabling ones will be replicated[10].

In the past, international efforts to control the proliferation, production, development or deployment of certain military technologies (from chemical, biological, radiological and nuclear agents to landmines, from blinding lasers to missile defence systems) were all, to various degrees, driven by four distinct but potentially overlapping rationales: ethics, legality, stability and safety. The possible military use of AI has raised concerns on all four grounds. In the past, again, apparently inevitable arms races in those new fields have been slowed or even halted through some institutionalisation of norms – mostly achieved after those technologies had reached a certain degree of maturity and often

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[10] Carl B. Frey, The Technology Trap: Capital, Labor, and Power in the Age of Automation, Princeton (N.J.), Princeton UP, 2019. See also Andrea Gilli (ed.), The Brain and the Processor: Unpacking the Challenges of Human-Machine Interaction, NDC Research Paper, no.6, December 2019.

advocated, inspired and even drafted by communities of relevant experts (from government and/or academia).

As a general-purpose technology, however, AI is quite peculiar, and so are the expert communities involved in its development and applications[11]. Yet it is encouraging to note that a significant number of countries (for instance, in the framework of the Organisation for Economic Co-operation and Development) and companies like IBM, Microsoft and Google have recently come forward to advocate a shared code of conduct for AI – or even publicly articulated own principles, as has the Pentagon, for example – especially regarding its military and ethical ramifications.

In other words, the risk of an arms race in these emerging technologies undeniably exists, along with a more general concern – expressed by the likes of Henry Kissinger, Stephen Hawking and Elon Musk – about possible unintended consequences of an indiscriminate use of AI. Yet so does the hope that such technologies may still be channelled into less disruptive applications and end up in the same category as poison gas or anti-satellite weapons – in which the most powerful states will abstain from attacking each other, at least militarily, while weaker states or non-state actors may still attack but to little effect.

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[11] Matthijs M. Maas, "How Viable Is International Arms Control for Military Artificial Intelligence? Three Lessons from Nuclear Weapons", Contemporary Security Policy, vol.40, no.3, 2019, 285-311.

Acknowledgement

THE ROLE OF THE JORDANIAN NATIONAL CENTER FOR SECURITY AND CRISES MANAGEMENT DURING COVID-19

Zuhair Tamimi

Abstract: Since the initial spark of the COVID-19 outbreak in December 2019, which was later declared by the World Health Organization (WHO) to be a global pandemic, all affected countries are implementing various preventive and control measures to mitigate the spread of the disease. The newly emerging virus brings with it uncertainty—not only regarding its behavior and transmission dynamics but also regarding the current lack of approved antiviral therapy or vaccines—and this represents a major challenge for decision makers at various levels and sectors (Al-Tammemi, 2020). On 12 January 2020, the World Health Organization (WHO) confirmed that a novel coronavirus was the cause of a respiratory illness in a cluster of people in Wuhan City, Hubei Province, China, which was reported to the WHO on 31 December 2019. The case fatality ratio for COVID-19 has been much lower than SARS of 2003, but the transmission has been significantly greater, with a significant total death till Now, COVID-19 is definitely an unprecedented international public health challenge now, and each country has its capacity and reacts according to its perception of threat, economy, healthcare policy and the structure of the healthcare system. The symptoms of COVID-19 mostly appear within 2–14 days of acquiring the virus, and a different range of symptoms and severity can affect patients, including fever, dry cough, dyspnea, sore throat, nausea, vomiting, diarrhea, myalgia, and fatigue (5, 7, 8). Although most COVID-19 patients develop a mild degree of symptoms and exhibit spontaneous recovery, there is still a proportion of patients, especially older age groups with underlying comorbidities, that are at higher risk of developing a more severe illness that is associated with complications (WHO, 2020).

Keywords: Jordan, Covid-19, pandemic, NCSCM, matrix, crisis.

Timeline

On 2nd of March, the Prime Ministry of Jordan reported the first case of coronavirus in Jordan, for a 30 years old Jordanian Male who, showed symptoms of the Virus 16 days after returning from Italy. There were no new reported cases of COVID-19 in the second week. Jordan remained coronavirus-free after the recovery of the first infection. Afterwards daily cases were reported to those whom arrived from abroad and others that had direct contact with the infected. On 28 March, the first death resulting from COVID-19 was confirmed in the kingdom, an 83-years-old woman who, was admitted to a private hospital suffering from various illnesses along with blood poisoning was transported from a private hospital to Government hospital upon discovery that she had contracted the disease (MOH, 2020).

NCSCM Activating at the Strategical Level

Upon analyzing the strategic environment and identifying the potential threats in the foreseen future for the Kingdom, National Contingency Plans (NCPs) were built to face such threats in coordination and cooperation between various state/national institutions and one of those NCPs is the NCP for Pandemics Prevention. Therefore, the National Center for Security and Crises Management has been activated at the national Level (Strategical Level) to follow this pandemic through activating the National Contingency Plan for Pandemics Prevention and the board of directors appointed the Minister of Health as the leader

for this crisis at the national level who, will be authorized to exploit the governmental assets to respond to the crisis, see Figure (1).

NCSCM functions as a National Command and Control Center now, thus the Crisis Cell and all NCSCM staff will be working as the crisis Leader's staff to serve response effort. Determine the potentiality of crisis developments and NCSCM staffs will perform also an early assessment of the consequences resulting from the crisis. Liaison Officers from all Ministries, institutions, and Security Agencies were attached to the Center, many of them were participated in different exercises and workshops held at the center within the Defensive Capacity Building Initiative (DCB) project which supported by NATO HQ and other projects as well, which had the greatest impact in dealing with this pandemic in a systematic and professional manner (NCSCM,2020).

Strategic

Operational

Tactical
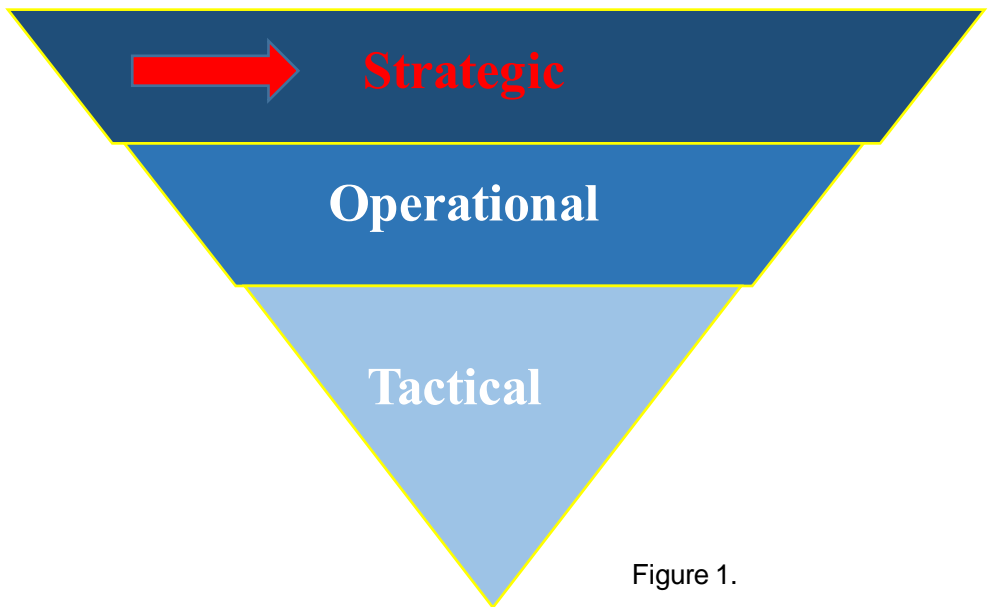
Figure 1.

National Contingency Plans

- Countering Terrorism.

- Dealing with the Influx of Refugees.

- Firefighting.

- Coping with Earthquakes.

- Responding to the Energy Crisis & its repercussions.

- Countering Strikes & Public disorders.

- Countering Environmental Pollution.

- Responding to Epidemic Diseases.

- Countering Drugs.
- Coping with drought Implications.

Actually, the above National Contingency Plans (NCPs) were prepared in cooperation with Liaison Officers from different Ministries and Security Agencies to face potential risks threatening the Kingdom, those plans have been distributed to the Ministries and Security Agencies, and they already prepared their executive plans that clarify their duties and SOPs that required from each entity during any Crisis. The NCPs are also being tested through conducting many exercises at different levels (TTX, CPX, FTX) with the participation of all state institutions in addition to the real operations and thus making any amendments and upgrades to these plans. Chart (1) below show the COVID-19 cases development in Jordan and Figure (2) show the Concept of Operations of NCSCM.

Declaring a State Of Emergency and Imposing Curfew

On 15th of March, His Majesty King Abdullah II chaired a meeting of the National Policy Council at the National Center for Security and Crises Management to discuss the implications of the Corona Crisis and to determine the extent of the Kingdom's preparations to confront this epidemic. The Jordanian government declared a state of emergency on 19th of March and imposed a curfew on 21st of March, therefore a Crisis Cell was formed at the Center from the Jordan Armed Forces / JAF and all the Correlated Authorities working in coordination with the staff of the National Center for Security and Crises Management in managing this crisis in order to set the restrictions and controls necessities for public life and closing the epidemic areas to facilitate the Epidemiological Investigation Team work (EIT) and prevent any movement or gatherings of people in order to contain the virus, actually all the ministries and Security Agencies even the Private Sector were fighting against this Pandemic as one team under the umbrella of NCSCM (Nation Faces Crisis).
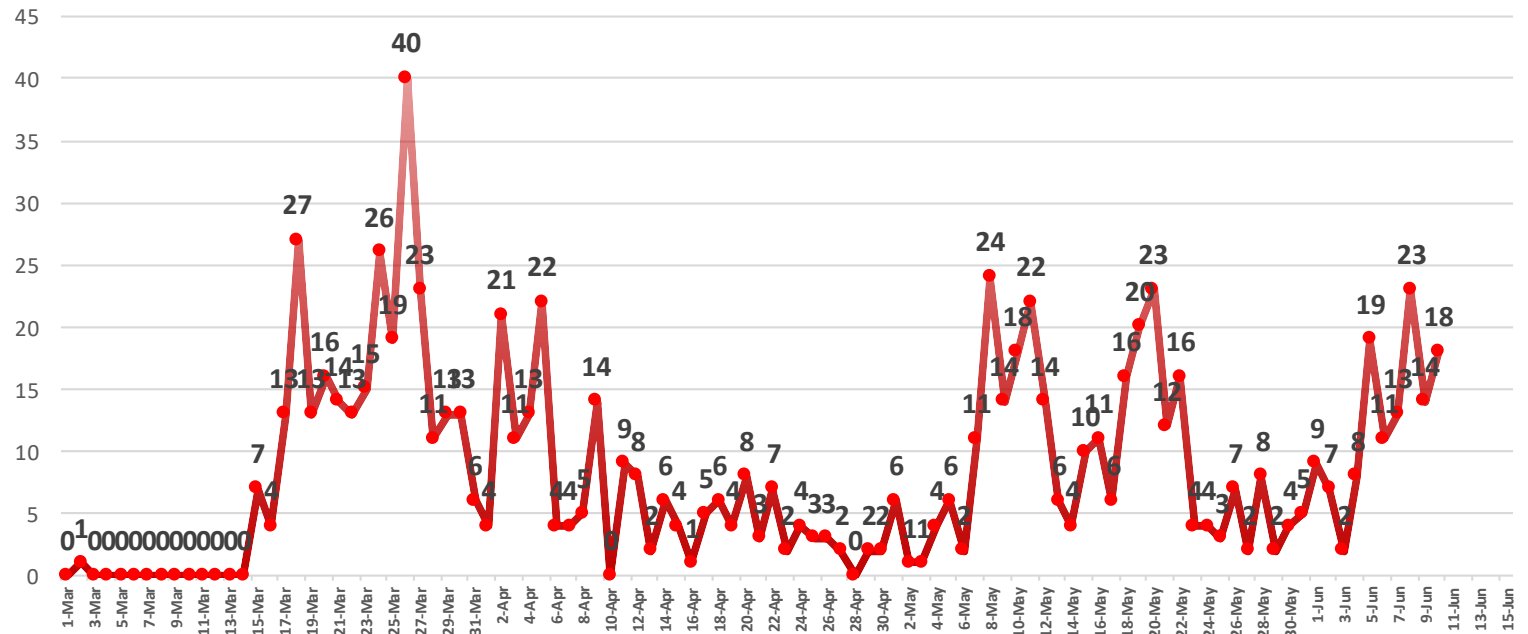
Chart 1. The number of daily confirmed cases of COVID-19 by notification date during the period between the 1st of March and the 15th of June 2020. Developed according to Directorate of Operations & Plans /NCSCM statistics on the NCSCM website (5).

NCSCM Concept of Operations
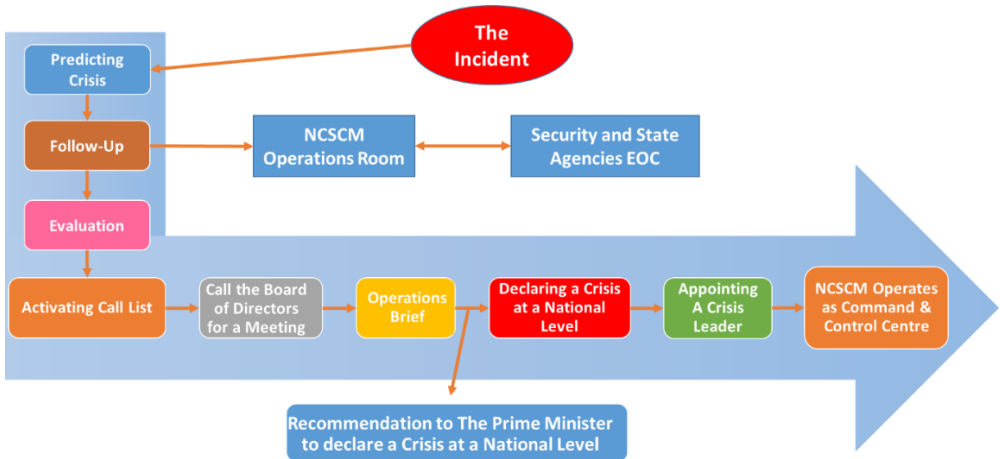
Figure 2. NCSCM Concept of Operations. Developed according to Directorate of Operations & Plans / NCSCM statistics on the NCSCM website.

His Majesty King Abdullah II has addressed a speech to the Jordanian people on 10th of April in the light of the Corona Pandemic in which he said:" Let me tell you, you are giants because you achieve great things in the toughest circumstances. For you, nothing is impossible. You are giants because you are a testament to true sacrifice and selflessness. You are giants because you live in a nation that places human dignity above all else. Indeed, these are the Jordanians I know and proudly speak of to the world, fully confident in my people".

His Majesty also said:" we shall, God willing, overcome all challenges. Yes, soon, prayers will be held in mosques and

churches, streets and markets will be bustling, workers will return to their factories, employees will return to their offices, and our sons and daughters, the students, will head to their schools and universities every morning. Soon, this will become a reality" (H.M King Abdullah,2020).

Quarantine and Isolation

During the first week of the spread of the coronavirus in Jordan (March 2020), the Jordanian authorities declared that all whom are required for isolation, will be quarantined in five-star hotels across the country, with the central government covering the costs. On March 18, 1,900 people who came into the country during the last week have been placed in the Dead Sea resorts, while 3,000 were placed in Amman resorts and hotels. the majority of these people have been placed in quarantine upon arrival to Jordan from abroad to wait out the virus's incubation period (14th days). Of course, all necessary measures have been taken in the hotels and resorts, such as necessary sanitation operations, and banning outside visits.

Media Building Trust

The media coverage for this epidemic where done from the center transparently in a regular basis from the first day by the Minister of State for Media Affairs and Government Spokesperson in coordination with Media Response Unit, the Minister of Health and the director of the Crisis Cell from JAF in addition to the competent minister when he is needed, in order to

prevent any fertile environment for rumors, therefore the news found great acceptance from the audience. Also, a press conference is being held weekly in a regular basis with a number of the media representatives to answer any questions about this pandemic.

Also, the Media Response Unit worked on awareness advertising images which distributed from the Center concerning this Pandemic, see Figure (3).

Stay Home

Figure 3.

Government Decisions

There were many efforts and decisions taken by the Government to deal with this crisis, some of them are:

-   Halting all air travel from/to the Kingdom from Tuesday 17th March 2020 until further notice, except for commercial cargo.

- All land/sea border crossings will be shut to passenger movement and only commercial cargo be allowed.
- The Ministry of Education commenced the Distant/Remote Learning Plan through the ministry's e-site, and through television stations.

The crisis cell is working 24 hrs. to follow-up on the developments relating to COVID-19, the following tasks force were established:

- Medical care task force.
- Border control, crossings and airport task force.
- Social protection task force.
- Strategic reserve task force (Food and drugs).
- Media follow-up task force.

On 11 March, the following measures were announced also:

- Preventing non-Jordanians from entering the Kingdom from the following countries: China, South Korea, Iran, Italy. Jordanians from the aforementioned will be quarantined on arrival.
- Banning vacations for expatriates working in Jordan.
- Halting new work permits for workers from abroad.
- Banning vacations for foreign students studying in Jordan wishing to travel to countries where the disease has spread.
- Banning school trips to foreign countries.
- Suspending all tourist travel between Jordan and Palestine/Israel.

- Halting all public events and gatherings and advising citizens from congregating at social events (weddings, funerals).

- Stressing on citizens the adherence to remain at home as much as possible and leave only if necessary.

- Under the advice of the Fatwa Council and Council of Churches, halting prayer in all the Kingdom's mosques and churches as a preventative measure.

- Halting of hospital and prison visits starting Sunday 15 March until further notice.

- Closing of all historic tourist sites for one week in order to execute disinfection campaigns at these site.

- Halting all sports events, closing of all cinemas, swimming facilities, sports clubs and youth centers until further notice.

Digital Platforms

Regarding, launching digital platforms the government also, through the National Center for Security and Crises Management, has started from the first day to plan to activate digital platforms so that the lives of citizens are not disrupted, with the continued social divergence and quarantine, as the private sector and the Ministry of Digital Economy and Entrepreneurship were used to this matter. The digital platforms are numerous in all fields such as health, education and delivery including:

- Ministry of Health dedicated website for the COVID-19 pandemic in Jordan besides a hotline 111: corona.moh.gov.jo

- Enrollment in the Aid Fund Supplemental and Support for Day Workers and Social Support: https://reg.takmeely.jo

- Social Security Corporation - In Kind Aid Service: https://service1.ssc.gov.jo/sscaid

- Requesting a permit to leave the house during the ban: https://www.stayhome.jo

- Distance education-lesson platform: https://darsak.gov.jo

- An online platform dedicated to the service of requiring monthly medications from a health facility that is audited by: https://emed.hakeem.jo/index.php/en

- Corona Virus Statistics: https://www.ncscm.gov.jo/corona-statistics

- Organizing the gradual transfer process for Jordanian students abroad to the Kingdom: safelyhome.gov.jo

- Mouneh platform, which is a guide for companies and licensed applications that provide goods delivery services to homes in all governorates of the Kingdom: mouneh.jo

- Protection platform, a protection service for worker and employer rights in the private sector:hemayeh.jo

- AMAN application to protect citizens from the spread of the Corona Epidemic: https://amanapp.jo/ar

Reopen Different Sectors

On 4th of June, the Prime Minister of Jordan declared the (CORONA Matrix of reopening different sectors) in the Kingdom in order to allow companies, services, economic and social activities to resume work systematically, and to avoid a new wave of epidemic that could overwhelm our health care system and delay the progress made so far, see Figure (4) below.

Government approach for reopening the economy used a framework that looked at public health risks and economic returns to reopen each of the closed sectors. In addition to this framework, the government has looked at what other countries are doing, including neighboring countries and those affected by the COVID-19 pandemic.

Five-Stage Response and Recovery Framework

Low Risk	Moderate Risk	Medium Risk	High Risk	Critical Risk
Sustainable Recovery	Full Operation	Protection	Response	Full Lockdown

now
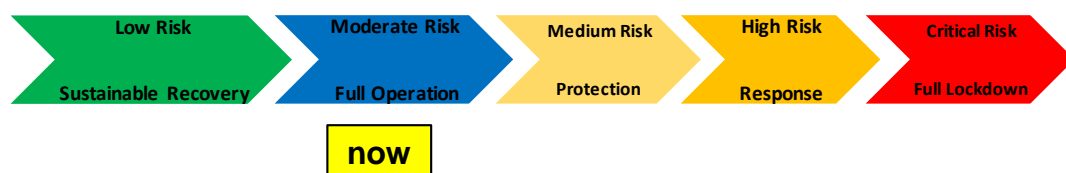
Figure 4. Five-Stage Response and Recovery Framework for CORONA Matrix. Developed according to Jordanian Ministry of Health.COVID-19 in Jordan. (2020). Together-to-Reopen. on the MOH website .

Critical Risk: Double the number of cases for 3 consecutive days (such as recording 20 then 40 and then 80 cases, respectively). The emergence of 3 unknown sources of infection. More than 140 cases appeared in one day, or 3% or more were recorded as positive test results.

High Risk: More than 20 local cases per day for 7 consecutive days or 2- 3% of test results are positive.

Medium Risk: Number of local cases between 10-20 for more than 7 consecutive days or 1-% 2% of test results are positive.

Moderate Risk: of local cases less than 10 for 7 consecutive days or 5.0% -1% of the results of the tests are positive.

Low Risk: No new local cases for 10 consecutive days.

Each stage will last at least from one to two weeks and can continue for a longer period before moving to the next stage. The government will work with industries to formulate sector-specific guidelines before future stages. If we all work together to defeat Coved 19, we can move forward in each stage, and succeed with our commitment.

The Prime Minister said: "The efforts of all institutions, under the leadership of His Majesty King Abdullah II, have worked together, in continuous coordination and fruitful cooperation". Also he pointed out that the management of the Corona Crisis and its consequences posed a challenge to all countries of the world, and Jordan was no exception, saying: "It is a complex dimensional pandemic that requires procedures and solutions

that intersect responsibility for its implementation with several parties within the state's work system." (P.M Razzaz,2020)

Health Risk Indicators

How did we reach Moderate Risk Stage? The Ministry of Health data indicates a significant decrease in the number of internal infections within 14 days, and also indicates that it is less than 10 cases per day. It was also found that the ratio of detected cases to the number of examinations is less than 5.0%, and therefore Jordan is considered to be in a moderate risk stage.

The following factors must be taken into consideration when deciding to open any sector:

- Health risks related to reopening.
- Economic benefits of reopening.
- Variable factors (such as blocking hours, size of gathering).

Response during this stage now will be limited close for most of the Sectors (focus on full operation).

Sectors and activities authorized to operate

- The Government Sector.
- Security Agencies.
- Mosques and Churches (with controls and restrictions).
- Administrative activities and Logistics support services.
- Restaurants and Cafes (with restrictions and restrictions).
- Hotels & Hospitality.

- Courts.

- Real Estate Sector.

- Tourist sites for local tourism.

- Quarries Sector.

- Information & Communications Technology Companies.

- The Media Sector (including paper publishing).

- Publishing Houses.

- Sports Clubs and events (without audiences with restrictions).

- Incubations (with controls and restrictions).

Exceptions (suspended activities)

- Schools and kindergartens.

- Wedding Halls.

- Mourning Houses.

- Universities and Colleges.

- Institutes and youth activities.

- Cinemas, parties, festivals, conferences, exhibitions, cultural events and festivals.

- Training and cultural centers.

- Public Parks.

- Game Cities and recreational places.

Also, the following categories are allowed to work and move: periodic medical examinations, permission to visit prisons and

nursing homes. Not allowed the movement for elderly (70 +), those suffering from chronic diseases.

How to implement ban and close regions?

- There are no comprehensive ban days.
- The movement is permitted for citizens from 6 am to 12 at night daily.
- For facilities from 6 am to 11 at night daily.
- Social events up to 20 people.
- Travel restrictions according to the standards of the Ministry of Health and Ministry of Tourism, the Epidemiology Committee, and the Crisis Cell.
- Movement by private cars are fully permitted.
- Transportation 50% permitted.
- Movement within regions and between governorates is permitted.
- Closed any infected region.

Procedure

- PCR screening with high momentum with 70% of the health sector capacity.
- Maintain contact tracking procedures at 100% of the capacity of Epidemiological Investigation Teams. (EIT)
- Expand awareness and verification campaigns.
- An extensive information flow towards citizens.
- Allowing internal flight.
- Activating and announcing emergency response plans for all ministries and institutions.

Of course, our success depending on our commitment, in case of changing of Health Risk Indicators, shifting to another stage will be necessary and it will be with its own response, sectors and activities authorized to operate, exceptions and suspended activities, how to implement ban and close regions and procedures should be taken at that stage, see Figure (5) below.

Health System
Monitor the overall situation to ensure the health system is able to meet needs

Individuals
Use Masks, hand washing, social distancing, monitoring of symptoms, reporting of injury

Government
Setting standards that support public health, investing to provide the necessary capabilities, continuous communication with citizens, raising awareness of cases, the epidemiological situation, and preparing reports and data for Covid 19

Employees
Compliance with mandatory safety standards and protocols followed by business sectord

Employer
Define mandatory practices and safety standards in the workplace and special protocols, each according to the nature of the sector

Figure 5.

AMAN Application

It's an application launched by the Ministry of Health to protect citizens and society from the spread of the Corona Epidemic in

order to preserve the health of citizens and society from infection with the Corona virus, the Ministry of Health launched a safety application, through alerts that reveal the possibility of exposure to the Corona virus, which leads to a halt of the chain of infections faster.

The aim of the security application to detect exposure to the virus by using geographical positioning system technology (GPS), and later Bluetooth, which makes tracing and isolation of cases of infection with Corona emerging faster and more efficient, leading to contain the virus and ensure the safety of its users, their families and their community.

How does the AMAN App work?

The security application works in two interconnected Methods:

The first method: the application works to save the site data exclusively on the user's phone to compare the movement of the user with the movement of users who can be diagnosed later with the new Corona virus by the Ministry of Health, and in the event of a meeting between the user and another person proving that he was infected with the virus later, the application sends an alert to the users who were present in the vicinity of the infected person, according to the place and time. The application also provides instructions and steps to be taken after receiving the alert.

The second method: The user diagnosed with the emerging virus of Corona, from this method he can easily retrieve his

whereabouts and movements over the last 14 days through the application, including the dates, times and places he was in. The primary goal of this level is to alert other users who happen to be near the personalized user, ultimately speeding up the diagnosis of infections and controlling the spread of the virus.

How important is the application?

AMAN application is to protect citizens and society. It alerts family members if they are exposed to the virus and mix with an infected person. It is a safety application that protects businesses and employees, it reduces the speed of infection among employees,

AMAN respects privacy, as downloading the application does not need to disclose any personal information and violates privacy see Figure (6) (Arabia Weather ,2020).

Using electronic bracelet

Jordan has launched a programme to use electronic bracelets to monitor confirmed or suspected coronavirus patients, the trial period, which started on 24th June, will be used for a limited number of people at the beginning since, the authorities are still working on the technicalities of the bracelet.

The aim of the bracelet is to ensure that the public commits to official coronavirus quarantine measures, including social distancing (The New Arab,2020).

Conclusion

Actually, the most successful decision taken by the Government was declaring a state of emergency and imposed a curfew on the Kingdom in a very early stage and halting all air travel from/to the Kingdom as well as all land/sea border crossings for passenger movement until further notice, so we were able to control the outbreak and minimize the spread of the corona virus cases in Jordan.

We can say that in Jordan there was a kind of sense making, in spite that it is very difficult to predict crises in a very early stages but, it was possible to detect an emerging crisis time to shift the course of events in the right direction beside using all available resources of the Country (Boin et al,2015, P15).

It's impossible for Jordan to remain empty of this pandemic in the light of its spread widely in the whole region and the world, and the zero situation besides low number of cases that passed through the past few weeks did not mean the end of this pandemic, but rather broke the chain of its infection and control its spread internally temporarily, and it is not possible for the Kingdom to continue closing on itself for an unknown period and we have to be ready also for the second wave of this epidemic. Coexistence and adaptation to this virus and its consequences is the inevitable way until the emergence of a global remedy, and adherence to the protocols of social distancing and the Public Safety Procedures are the only solution. Therefore, I have to deal with people as I'm infected

and to treat them as they are infected too, otherwise things remain in the circle of wishes. Most of the discovered cases now were reported to those staying on the quarantine whom, arrived from abroad besides the truck divers coming from some bordering countries, with limited cases cause of direct contact with the infected cases which, reflects the good control of the spread of the Virus in the country. Of course a plan for the Government to resume the Life gradually in all Sectors is already started according to (Five-Stage Response & Recovery Framework), taking in consideration the social distancing and the public safety procedures.

After taking the decision of reopening borders and allow traveling to and from the Kingdom the difficulty now is how to deal with the arrivals, since the number of infected cases in most of the countries is increasing. Therefore, instructions, controls and procedures for public protection and safety are being developed that must be implemented and adhered to, when reopening the borders.

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THE USAGE OF ARMED FORCES IN CURTAILING THE EFFECTS OF THE COVID-19 PANDEMIC

Ivan Dimitrov

Abstract: A disease which was first localized in the Chinese province of Hubei, caused by the novel coronavirus towards the end of 2019 turned into a worldwide pandemic, causing widespread and severe disruption of societal processes and life as it was known by that point. In an effort to combat the spread and negative impact of the pandemic nation-states around the world deployed substantial resources, including parts of the armed wings of the national security systems in order to help the local populations, medical services and all affected by COVID – 19. By concentrating personnel, equipment and deploying them in areas struck by the outbreak governments were able to partially turn the tide and "flatten the curve" in the growth of cases of infected.

Key words: pandemic, military, armed forces, emergency, CIMIC, legislation, curfew, martial law, disease.

The ongoing COVID – 19 pandemic that struck society in late 2019 – early 2020 proved to be a complex adversary to the security systems of all affected states throughout the continents. As a novel disease with no known cure and comprehensive traits, SARS-CoV-2 threatened the pillars of order and in some locations, especially the most affected countries, such as Spain and Italy, the national legislation enabled the deployment of military resources in combating the growing pandemic. By including components of the armed forces in the struggle these nations reaffirmed the importance of the military as a crucial

component in the national security systems. Throughout the world, units that were mobilized to curtail the negative impact of the COVID-19 pandemic were used in some of the following roles:

- Maintaining public order and security – by enacting legislative measures units of the armed forces were put in use for maintaining security in the worst affected societies such as Italy by patrolling the streets of quarantined municipalities, preventing crime and keeping social distancing measures in effect.
- Assisting the national healthcare systems – through the inclusion of military hospitals, medical personnel and materiel the countries swayed by the pandemic managed to ease the pressure upon the healthcare institutions serving the civilian population.
- Enacting preventive measures – due to the strain put on the internal security state institutions such as the police forces, the armed wings of states were included in transmission prevention measures. Deployment of armed servicemen acted decisively in enforcing curfews, putting cluster areas under lockdown and regulating movement between areas through the implementation of checkpoints in vital areas.
- Providing transportation services – the disruption in international traffic and intrastate travel led to an exponential number of stranded nationals and scarcity in medical supplies and other commodities. Employment of

the air force component by conducting aerial extraction and foreign supply delivery became a significant tool in maintaining the stability of the global and national healthcare systems.

- Bolstering the national and international efforts in the COVID – 19 cure research – inclusion of laboratories and research teams under the jurisdiction of the armed forces will substantially augment the progress in discovering by collaboration with civilian and non-state developers of treatment substances and vaccines[1].

With the universal spread of the novel coronavirus throughout the globe, governments, especially in Europe and Asia, mobilized a substantial part of their defense resources to assist the institutions in the fight against COVID-19. The current crisis showed the importance of CIMIC and investing resources in boosting the capabilities of armed forces such as their mobility, rapid deployment and implementing protective measures against biological threats. Military assistance to civilian authorities proved crucial to maintaining society from collapse and reducing the severity of the negative impact of the novel coronavirus on human civilization.

After the virus hopped out of the Chinese borders and began its spread in early 2020, Europe became the epicenter of the pandemic with Italy, Spain, Great Britain and France among the

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[1] The armed forces and COVID-19, https://www.iiss.org/blogs/analysis/2020/04/easia-armed-forces-and-covid-19 , examined: 05.05.2020;

worst hit by the plague, with initial skyrocketing number of cases and a continuously mounting death toll, which left the abovementioned nations on the brink of nearly disastrous emergency. As the toll on the national abilities to combat the virus increased the military was utilized in various ways to support society. Through implementation of NATO, EU and national guidelines and regulations in responding to the threat the military resources were activated accordingly to the pandemic development and scope in the European states[2]. Several anti-COVID-19 military operations began, such as the British operations, named Broadshare and Rescript, which aimed at supporting the Crown in tackling the disease on British soil and in the overseas territories. From their launch on the 23rd of March, the UK Armed forces performed a wide array of activities in connection to the current needs and pleas of civilian authorities. These included converting existing facilities into field hospitals, airlifting COVID-19 patients, distribution of protective equipment, assisting the institutions in testing the population and providing medical and emergency – related training to individuals[34].

In late March 2020, Italy deployed its armed forces as a measure to enforce lockdowns and curfews in Lombardy, which was the worst affected region of the state. Italian Armed Forces made

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[2] NATO response to COVID-19, https://www.nato.int/cps/en/natohq/news_174271.htm , examined:08.03.2020.

[3] Coronavirus: Pictures Show Military Personnel Helping To Build NHS Nightingalep, https://www.forces.net/news/coronavirus-pictures-show-military-personnel-helping-build-nhs-nightingale , Examined:28.03.2020.

[4] "Coronavirus: Armed forces rapidly expand their response to COVID-19", https://news.sky.com/story/coronavirus-armed-forces-rapidly-expand-their-response-to-covid-19-11970136, examined: 08.04.2020.

6600 more beds available for the national healthcare system by April and participated in building reception structures and field hospitals over the country's territory. IAF aircraft were utilized in transporting masks into regions under quarantine[5].

Similarly to the UK, France also gave a green light to anti-COVID operation, named Résilience, which had a set goal to reinforce the local state establishments. French naval assets such as the PHA Tonnere were mobilized in order to perform evacuation missions in the Provence– Alpes region. The General Directorate for Armaments took a leading role in testing contemporary personal protection equipment as an alternative to the existing masks. Through the allocation of funds and resources a number of medical facilities were established. The first military resuscitation element was set up at Mulhouse Hospital on the 21st of March. Ground troops were ordered to enforce abidance to the social measures set by the French government to restrict the escalation of the illness[67].

Apart from the efforts of Western European states the countries in Eastern and Southeastern Europe also showed active participation of their military forces into negating the effects of COVID – 19. In the Republic of Bulgaria through a legislative change made by the National Assembly the armed forces were

[5] As.So.Di.Pro. NATIONAL REPORT APRIL 2020" http://euromil.org/wp-content/uploads/2019/11/2004_National-report_ASSODIPRO.pdf , examined:06.05.2020
[6] Operation Resilience: France Offers More Military Aid Against Virus, https://defense.info/global-dynamics/2020/03/operation-resilience-france-offers-more-military-aid-against-virus/
[7] Opération Résilience, https://www.defense.gouv.fr/english/actualites/operations/operation-resilience , Examined: 28.04.2020

allowed to take part in prevention efforts, thus putting the military on standby if needed. Bulgarian Air Force C-27J Spartan aircraft participated in evacuating Bulgarian citizens and military personnel from abroad[8]. The military educational system in the state conducted exercises with its members as cadets constructed a field hospital in the premises of the Vasil Levski National Military University. Similar exercise was conducted in the capitol of Bulgaria by turning the Arena Armeec Sport Hall into a medical facility to contain hundreds of hospital beds, intensive care equipment and supporting apparatuses[9].

In addition, measures were enacted by the command of the Bulgarian Armed Forces in order to combat the effects of the pandemic. By the 2nd of May 1000 quick tests and 500 PCR tests were conducted on personnel for detection of COVID-19, with four individuals testing positive and recovered by early May. Personal protective equipment was supplied to cadets in the faculties of the National Military University. Anti-viral measures such as daily desinfectation of the campus, body temperature checks through the entrance checkpoints and placing desinfectant dispensers inside of the facilities helped in the maintenance of adequate hygiene levels. As for the reduction of the psychological effects of isolation sport games were organised for the future officers in the weekdays. Holidays such as Easter

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[8] https://dnes.dir.bg/obshtestvo/varnaha-sas-spartan-a-21-nashi-kursanti-i-studenti-ot-latviya-i-polsha, Examined: 19.03.2020
[9] https://sofiaglobe.com/2020/03/20/covid-19-bulgaria-restricts-intercity-travel-closes-parks/, Examined: 25.03.2020

and St.George's Day were observed with festivities inside the campus.

Field hospital deployed by cadets from the Military University, Source: author

East Asia was one of the world's regions where the inclusion of the armed forces in curtailing the pandemic was crucial to the curbing of the disease and lowering the initial surge in cases with the governments of South Korea and the People's Republic of China in the spotlight. In China at least ten thousand troops of the military medical branch supplemented the state action in Hubei province alone. People's Liberation Army units participated in humanitarian relief efforts aimed at the local population like delivering food and medical supplies to the clinics and hospitals in the local realm and disinfecting urban areas. The

PLA also constructed field hospitals in Wuhan to ease the pressure on the local medical services. As a leading global power in the fight against the modern peril, China provided aid abroad by donating considerable amount of protective equipment, testing material and ventilators to sovereign nations in need. As the world united in the vaccine research fields, Chinese military scientists began cooperating with their counterparts from Europe and North America by contributing firsthand experience[10][11][12].

First and foremost, the impact of the armed forces in the fight against the global pandemic showed that the inclusion of military resources gradually bolsters the resilence of society in a state of international emergency different from armed conflict. The infrastructure, services and resources granted to civilian authorities by the armed forces gave relief to the strained capabilities of healthcare, security and social institutions battling COVID-19. Efforts made by servicemen contributed to the reduction of the spread of the disease, keeping the healthcare systems of nations functioning without excessive overstretching and complete breakdown[13].

On the other hand it should also be noted that personnel deployed in combating the virus are succeptible to higher risk of infection by SARS-CoV-2 and an increased levels of

[10] http://www.china.org.cn/china/2020-03/02/content_75764424.htm
[11] https://www.iiss.org/blogs/military-balance/2020/05/china-armed-forces-covid-19-pla, Examined: 07.05.2020
[12] https://www.abc.net.au/news/2020-05-08/the-coronavirus-came-from-china-but-so-might-the-vaccine/12223120, Examined: 07.05.2020
[13] https://www.forces.net/news/coronavirus-military-praised-government-hits-daily-test-target, Examined: 02.05.2020

psychological and physical stress. Working hazards, heightened tensions in society and the duress instilled by work/rest disharmony can lead to short and long-term health problems, development of PTSD – related conditions. It is of upmost importance for the Armed Forces to take precautions and active measures in ensuring the safety and mental health of individuals under arms[14].

Another negative effect of the military involvement in the fight against the novel coronavirus is the disruption of the training process in the armed forces, which in turn decreases the operational capabilities of armies around the world with overseas deployments, combat missions and exercises being either postponed, cancelled or temporary recalled[15]. The impact on ongoing military operations decreased the level of effectiveness of carrying the orders given to units and created a quagmire for the armed forces' leadership in the spheres of readiness, logistics and combat preparedness due to the quarantining of bases, naval vessels and whole units. Destabilization of hotspots throughout the world and the power vacuum left due to crippled military activities led to resurgence of hostilities in areas where peacekeeping was ongoing and a growth in terrorism – related incidents in places like the Sahel and the Middle East[16][17].

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[14] https://www.bbc.com/news/uk-northern-ireland-52245997, Examined: 07.05.2020
[15] https://www.policycenter.ma/opinion/covid-19-and-military-preparedness#.XrUEcMBS_Dc, Examined: 22.04.2020
[16] https://www.reuters.com/article/us-health-coronavirus-eu-security/militants-fringe-groups-exploiting-covid-19-warns-eu-anti-terrorism-chief-idUSKBN22C2HG, Examined: 01.05.2020
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In conclusion, the examples of deployment and utilization of armed forces assets in curtailing the virus made an impact on the survival and the recovery from an invisible enemy which humankind is yet to understand completely. As the threat will possibly take much time to be eliminated completely, armed forces will continue to play a pivotal role in guarding the pillars of society in the upcoming years. Global security will continue to be at an increased risk as the pandemic still rages on. In order to effectively employ the military in the struggle the following conundrums should be taken into consideration:

- Enacting efficient safety regulations on personnel dealing with the pandemic in order to prevent infection.
- Supplying the armed forces with state-of-the-art protective personal equipment.
- Effective management of work in quarantined areas and the recuperation of the servicemen deployed afterward.
- Psychological assistance for service members showing signs of PTSD or related psychological traumas due to prolonged isolation, deployments and serving under hazardous conditions induced by COVID-19.
- Employing CIMIC procedures in order to better civilian-military cooperation[18].

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[18] http://euromil.org/armed-forces-and-covid-19/, Examined: 05.05.2020.

IMPLICATIONS OF CLIMATE CHANGE OVER THE DEFENCE LOGISTICS

Siyana Mircheva, Svetozar Bosilkov, Sasho Aleksandrov

Abstract: Climate change is an integral part of past decades, nowadays and also a challenge for the future. Understanding how climate change implications are likely to affect defence logistics, and more specifically, components of the logistics, will help the HQs plan in advance sustainment, train and equip forces for realistic future scenarios of military Humanitarian Assistance and Disaster Relief Humanitarian (HADR) assistance, disaster relief operations and provide Military Aid to the Civil Authorities (MACA). There is a growing need for concepts, doctrine, and planning to reflect environmental considerations. Given ongoing climate-related developments, there is likely to be a requirement for the MOD to conduct periodic reviews of assumptions in strategy setting, operating concepts, and doctrines.

Key words: NATO, logistics, climate change, NATO's logistics evolution, Humanitarian Assistance and Disaster Relief Humanitarian (HADR) assistance, Military Aid to the Civil Authorities (MACA), Design and development, Acquisition, Storage, Movement, Distribution, Maintenance, Evacuation and Disposal of materiel, Medical and health service support and Command and Control (C2).

Introduction

Living in a dynamic and interconnected world, although under the limits imposed by the COVID-19, the stress over the militaries is expected to be unprecedented in terms of the new and non-traditional threats, technological rivalry, new operational domains and hybrid-wise warfare. For the sake of sustaining security supremacy, NATO allies are dependent not only on the issues concerning budget matter, but also on wider partnership,

accurate decision-making and last but not least logistics in its full spectrum and adjusted to the "new reality"[1].

Logistics in Conjunction with Climate Change

It is important to start with the most common perception for logistics. It encompasses doing the right thing, in the right place, at the right time. But making the things more professional and looking from military perspective, the logistics is planning and carrying out the movement and maintenance of forces. Nevertheless, if transporting the personnel, or storage, transport, distribution of materiel, or providing services and medical support, logistics is that bridge between deployed forces and the industrial base, militaries need to accomplish their mission.

NATO's Strategic Concept[2] describe Climate change as a factor that will shape the security environment and for that reason those changes put additional questions about right things, place and time (from the common perception). The impact of global warming can already be seen in the melting of polar ice caps leading to rising sea levels, the growth of inhospitable desert environments, and more extreme weather and geological events, including stronger and more frequent storms and hurricanes. All changes in weather system influence over the environmental transformation which leads to effects over all the operational domains.

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[1] https://www.bcg.com/featured-insights/leading-in-new-reality/overview
[2] 2010 Strategic Concept 'Active Engagement, Modern Defence'

If transportation as an essential part of logistics services is on focus, the road and air transportation have the largest carbon footprint (the biggest reason for global warming). Those kind of transportation are the most environmentally harmful compare with train. For example, in Europe more than 26% of greenhouse gas emission are emitted by transport means. Within the means of transport, railways and maritime transport are the most efficient as their CO_2 emissions per tonne and kilometre of load are lower than that of road or air mode. Surely, we don't have to load our military soldiers and equipment on the trains every time, but we have to reconsider what kind of energy sources we use and to plan gradually transferring from petrol engines to batteries or hybrid modes.

There is a lot to be done in the domain of Standardization. Currently NATO defines 3 levels of standardization:

- *Compatibility*. The suitability of products, processes or services for use together under specific conditions to fulfil relevant requirements without causing unacceptable interactions.

- Interchangeability. The ability of one product, process or service to be used in place of another to fulfil the same requirements, and

- Commonality. The state achieved when the same doctrine, procedures, or equipment are used.

And in current climate influenced security environment, the most we reach commonality, the better chance we will have to reach the desired end states.

The future military operations will be conducted in more complex physical environment and climate change will affect demand for and delivery of logistics support in different dimensions. Disasters as a consequence of changing in climate are more severe, more frequent and more devastating. For that reason, time3 will be the logistical component which will have extremely vital role. And if would like to act in Proactive mode (not in Reactive mode) "Right time" will be something less predictable and that would influence over the mission or campaign.

Having a look in transportation to a "right place", in the large majority of cases, transport activities are based on the use of energy derived from fossil fuel and, therefore, the increase in logistics activities and greenhouse gas emissions have a direct relationship. Despite this correlation, NATO seeks to remove somehow obstacles to military movement into and across Europe and the North Atlantic, and to sustain its forces in a theatre of operations. To this end, work is being conducted in four areas:

- Authorities and legislation to facilitate border crossing;
- Command and control to direct the logistic moves;
- Adequate lift capabilities that can transport troops and their equipment and

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[3] The common perception for Logistics "Doing the right thing, at the right place, at the right time"

- An infrastructure that can cope with large quantities of heavy military transport[4].

But this is related predominantly to military operations. But if we put aside the rifles, in one HADR operation, militaries will be doing different tasks and will have different role. The border crossing and C2 wouldn't be such a challenge, but adequate lift capabilities and infrastructure will not be the element over to which the militaries would have direct control.

In this regard cooperation and coordination with other actors – state and non-state actors, NGOs, International organization is from the first priorities. At political and practical levels, the logistic challenge is complex and requires working together with stakeholders at national and multinational levels to ensure that all power is at the Operation leader's disposal at the right place and time, no matter their point of origin.

We wouldn't forget the training and exercises as a base component to sustain adequate force readiness. NATO recognises that logistics can be military, civil or commercial in nature. And all contributing elements need to train and exercise together. This training needs to be adapted to the new circumstances, because climate change leads to non-traditional threats, so this requires non-traditional preparation.

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[4] https://www.nato.int/docu/review/articles/2018/10/09/flexible-logistics-in-a-fluid-modern-security-environment/index.html

Another essential point is linked with the country's capacity. The capacity represents the ability of an institutions or organizations to do something in particular. Each state must have the capacity in completing its core goals. Sustaining military operations in environment where we have more rains, more drought and higher possibility for natural disasters put the logistics in more hardships to hold its role of a bridge between deployed forces and the industrial base, which produces the material and weapons[5]. Extreme weather phenomena worldwide, are expected to have significant impacts over the security environment. The higher severity undermines the state's and NATO capacity to react in a proper extent in order to be efficient enough. It is important to touch upon this point, because CAPACITY and LOGISTICS are in very close relation. The capacity depends on the ability of using of the technics, infrastructure condition and recourse's availability, and defines the state's or organization's capability to react simultaneously on more than a single disaster or crisis.

A domain where military logistics and climate change are specifically related is humanitarian assistance and disaster response (HADR) operations. Unfortunately, increased frequencies and intensities of extreme weather events influence the most those in the poorest communities. The example from Freetown in Sierra Leone in 2017 came as a devastating

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[5]https://www.nato.int/cps/en/natolive/topics_61741.htm#:~:text=Logistics%20can%20be%20seen%20as, need%20to%20accomplish%20their%20mission.

landslide and flooding disaster. The World Bank and The European Union studied the disaster and geology of surrounding areas. While there was no single cause for the landslide, there were many contributing factors. A common threat to Freetown was high level of urbanization, alongside with the increased rate of deforestation. In fact, the area where the landslide occurred was within a protected forestry reserve. However, over time, development of large houses had occurred legally and illegally. And because of these two factors - housing development and deforestation – soil integrity was weakened and the ability to absorb rain during high rainfall and increased the risk of disaster.

Local organizations, military personnel, and the Red Cross contributed to immediate excavation and recovery efforts, working amid rainfall. But the continued downpours and damaged passageways disrupted relief efforts and they were unable to give support to local population and to continue alone. This come to approve that the host nation support as an element of the logistics will be hard to be sustained in the future HADR or MACA[6] operations. The success in those kind of operations will be higher if NATO's logistical plan cover the sustainment cycle in order to lower the level of any dependency.

Moreover, the new security challenges required the Alliance to be able to logistically sustain and operate in non-Article 5 crisis response operations, potentially at far distances from the

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[6] Military aid to the civil authorities

supporting national logistic and industrial bases and on non-NATO territory, with no supportive or functioning host nation.

NATO logistics evolution.

NATO have changed its perspective over security since its creation. The logistics has changed alongside. During The Cold War logistics focused on the North Atlantic Area and more specifically on Central Europe and was national responsibility following the overall requirements.

After 1990 Partnership for Peace and other cooperation programmes with Central and Eastern Europe led to change in overall perception for crisis. In the Western Balkans conflicts the logistic footprint was very large, featuring redundant and inefficient national logistic structures. This was starting point for development of greater multinational logistics.

NATO focused its attention on 'out of area' operations. How, where and when operations were launched was for the North Atlantic Council to decide. Military planning was initiated when such a decision was made, rather than executing an existing defence plan with troops being employed immediately, as was the case during the Cold War era. Logistics during that period was in a RE-active mode, which had an effect over the efficiency and efficacy for the military operations.

The 1999 NATO Strategic Concept set a vision for NATO logistics aimed at addressing the challenge of developing collective responsibility in logistics between NATO and the states

involved. All of that is a mix of a close coordination and cooperation between national and NATO authorities during both planning and execution and including greater consideration of the efficient use of civil resources.

The Ukrainian Crisis of 2014 heightened Allied concerns about a resurgent and assertive Russia. It underlined the need to be able to rapidly and confidently reinforce a threatened Ally on the periphery of NATO territory, to deter a potential threat and, should deterrence fail, to defend an Ally from an attack. Added to this, conflict in Syria and the upsurge in terrorism, cyberattacks and other forms of hybrid warfare against Allies have underlined the potential for conflict across the full domestic and international spectrum and the need for increased coordination to ensure readiness and resilience.[7]

Now we have accelerated changes in climate. As we know even if today meet the Paris Agreement's level of CO_2 emissions requirement, the World will feel this after more than 30 years. So, in this time frame climate change will have huge impact over the security environment and the way we prepare for and conduct of operations. The success in those operations is inextricable linked with logistics and how fast, resilient and reliable it is.

Since September 2019, NATO is restructuring AJP-4 Series. As a result, there is a simplified structure for the whole series, but the keystone document is renamed to AJP-4 "Allied Joint

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[7] https://www.nato.int/docu/review/articles/2018/10/09/flexible-logistics-in-a-fluid-modern-security-environment/index.html

Doctrine for Sustainment". Subordinate documents to this new one will be AJP's for Logistics, for Host Nation support, for Movement, for Medical support, etc. Obviously this is a part of transformation process in the area and it will predetermine next 5 or 10-year period. Alongside there is a need to make a deep learning of all the lessons from past operations.

In a 15-years period NATO have to know how to obtain more self-reliance in order to be more independent from civil and private sector in order to be more agile, effective and efficient conducting its operations.

In 30 years we will have very different security environment where logistics have to sustain military operations in the completely new security context. Whether the Arctic, or Asia-Pacific region it is sure that current logistics means and principals will be the basis for the new developed ones.

No doubt that NATO is transforming constantly in order to be on the military and technological edge. The changed geopolitical order leads to NATO to change its perspective, interests and its means and approaches to them. In that process only with adequate logistics can be sustained doing the right thing, in the right place, at the right time.

Climate Change Implication on Defence Logistics' Components

Design and development process of defence equipment and materiel which are resilient to impacts of climate change could impede the manufacturing of such ones. As far as opportunities in manufacturing are concerned, market-based manufacturing mechanisms, as well as military ones, may stimulate the investments in renewable energy and energy efficiency projects or the demand for biofuels and renewable energy sources in the energy sector. Air pollution regulations and carbon emissions reduction targets could stimulate the demand for non-emitting (at point of use) products such as electric vehicles. Market leaders of the materiel' sector may take advantage of rigid regulating emission schemes to deploy lower carbon intensity operating practices compared to their rivals and, of course, to gain bigger market shares. As a result of regulatory requirements, related to climate change, the Industrials sector will experience new commercial opportunities for products and services (e.g. products that track GHG emissions and energy consumption, and products with suitable durability to extreme increases/decreases in temperature)[8].

Climate change stresses add also uncertainty to the acquisition, procurement, and distribution, in general, to supply chain network. According to analysis, the centralization of materiel and equipment experienced during the past 30 years has increased

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[8] Rand corporation, 2020

the vulnerability of supply chains to extreme weather patterns. Therefore, climate change hazards should be taken into consideration during the design phase of supply chain networks to protect them from disruptions and vulnerabilities to both physical and regulatory risks.

Although the configuration of acquisition and procurement may not change at a great scale as a result of climate change, adjustments should be made which could reduce vulnerabilities while offering a competitive advantage. Climate change and its impacts force manufacturing and acquisition to compete in an environment even more volatile than until recently. Governments are already seeking high-quality military products and services at low prices which embed environmental concerns[9].

Equipment storage temperature requirements and associated storage costs could increase due to extreme weather conditions in the Area of Operation (AOO). As a result of climate-related events, the Armed Forces may experience increasing logistical delays – in the delivery of assets, transportation issues, and challenges regarding the storage of supplies. Climate change is likely to have adverse effects on most forms of transport, affecting flight duration, creating a need for alternative routings, and having a significant impact on fuel consumption and the requirement to store greater quantities of fuel in theatre. An increase in HADR operations could also result in rising logistics costs and a growing requirement for airlift, water supply,

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[9] Rand , 2020

engineering equipment for debris removal, medical care, communications, and port and traffic control. Ensuring that military personnel continues to have sufficient access to water and medicine in theatre will be particularly important for the survivability of personnel. Changing weather patterns and saltwater intrusion into coastal operating areas could reduce freshwater supplies in theatre and, as temperatures around areas of deployment increase, service personnel may have higher hydration requirements. The latter would increase the amount of water required which could, in turn, lead to a greater logistical burden for service personnel. Beyond the provision of water and other essential supplies, hotter temperatures could also affect energy requirements and associated costs for keeping service personnel insufficiently cool conditions that do not hinder operational performance. Further to this, climate-related developments may increase the need for surface vessels to access flooded areas, helicopters for rapid access to degraded areas, mobile communication kits, and observation drones to gather intelligence on inaccessible areas.

Climate effects lead to increased maintenance/repair requirements for equipment, vehicles, training areas and associated infrastructure and equipment (e.g., roads, PODs, buildings). Climate change is likely to have adverse effects on modes of transportation, affecting flight duration, creating a need for alternative routings, and having a significant impact on fuel consumption and the requirement to store greater quantities of fuel in destinations.

Military units and installations generate a large variety and volume of waste. The practice of sanitary waste disposal is necessary to prevent climate change effects, to reduce carbon emissions. It is incumbent upon the military establishment to dispose of all waste products in a sanitary and efficient manner to safeguard the environment and aesthetically keep the pleasing working environment. Nearly every military installation today is surrounded by a civilian community of which it is a part. The pattern of consumption on the installation is largely the same as that of the civilian community, resulting in similar problems of waste disposal. As the world shrinks in size and increased productivity leads to an increase in waste and by-products, protection of the environment becomes imperative--not only from a health standpoint but also from aesthetic considerations. The foundation is establishing waste management, resource recovery and recycling programs, and waste disposal programs following the standards outlined in regulations.

Climate change is likely to damage transportation infrastructure through higher temperatures, more severe storms and flooding, and higher storm surges, affecting the reliability and capacity of transportation systems. Coastal roads, railways, ports, tunnels, and airports are vulnerable to sea-level rise, which could lead to delays as well as temporary and permanent closures. Climate change impacts will likely increase the cost of the nation's transportation systems. Climate change is projected to increase the frequency and intensity of some extreme weather events. Specifically, heat waves will likely be more severe, sea-level rise

could amplify storm surges in coastal areas, and precipitation will likely be more intense. These changes could increase the risk of delays, disruptions, damage, and failure across land-based, air, and marine transportation systems. Most transportation infrastructure being built now is expected to last for 50 years or longer. Therefore, it is important to understand how future climate might affect these investments in the coming decades[10].

Higher temperatures can cause the pavement to soften and expand. This can create rutting and potholes, particularly in high-traffic areas and can place stress on bridge joints. Heatwaves can also limit construction activities, particularly in areas with high humidity. With these changes, it could become more costly to build and maintain roads and highways. On the other hand, certain areas may experience cost savings and improved mobility from reduced snowfall and less-frequent winter storms since warmer winters may lead to reductions in snow and ice removal, as well as salting requirements.

Freezing temperatures are required for ice roads in the northern regions. These are frozen routes used to connect northern communities. The tundra beneath these frozen roads is fragile, so transportation is limited to periods when the ground is frozen. Warming temperatures would reduce the number of days when ice roads are open, limiting transportation access to these areas. High temperatures cause rail tracks to expand and buckle. More frequent and severe heat waves may require track repairs or

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[10] United States Environmental Protection Agency, 2017

speed restrictions to avoid derailments. Heavy precipitation could also lead to delays and disruption, and tropical storms and hurricanes can also flood or leave debris on railways, disrupting rail travel and freight transport. For example, the June 2008 Midwest floods closed major east-west rail lines for several days. Like roadways, coastal railways and subways are subject to inundation from sea level rise and storm surges. This is particularly true in underground pathways and tunnels, which are often already below sea level. Damages from flooding may require rail lines and subway infrastructure to be rebuilt or raised in future expansion projects. Besides, flooding may damage air facilities, causing closures or delays of flights. Many airstrips in Alaska are built on permafrost (perennially frozen soils). Warmer temperatures will thaw permafrost and cause the ground to settle, potentially damaging the foundation and structure of key infrastructure. Runways and airports may require rebuilding, relocation, or increased maintenance[11].

Concerning impacts on seaports, coastal infrastructure, harbour facilities, including docks and bridges, may have to be raised and fortified to accommodate higher tides and storm surges as sea levels rise. The combination of relative sea-level rise, land subsidence, and more intense hurricanes and tropical storms could lead to significant disruptions and damage.

Climate change has an impact also on procuring and supporting the wide range of products, systems and services used by the

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[11] United States Environmental Protection Agency, 2017

armed forces. The defence logistics must consider environmental requirements within, fit for purpose to maximise the capabilities of forces. Materiel and equipment must also be safe for the front line to use, maintain and be environmentally safe. To that end, there is a need for measures to ensure its projects achieve and maintain full compliance with safety and environmental requirements throughout a project's life. This is achieved through the safety management of the environmental requirements. Ultimately, acquisition adapted to climate changes may include policy, strategy, process and assurance.

Climate change leads to worsening air quality, adverse impacts on food and water supply and quality, and more frequent and extreme weather events, which all have profound impacts on human health. It could negatively affect human health and food and water security.

These health impacts vary depending on geographical region. In general climate change harms medical and health military service support. Extreme weather events can disrupt infrastructure critical to maintaining access to emergency services and health care. Hospital supply chains may also be disrupted, leading to shortages of essential pharmaceuticals and medical devices.

Transition to clean, renewable energy sources, can reduce the severity of climate change and its associated health impacts. It improves air quality and leads to immediate health benefits for patients and communities. According to The Lancet, "Tackling

climate change could be the greatest global health opportunity of the 21st century."

Mostly, HADR operations focus on providing logistical support. Primary relief needs for HADR include fresh and clean water, food, sanitary facilities, and shelter. The earlier the relief is provided, the better the effect. Highly desired capabilities include both strategic airlift to stage supplies in-theatre and helicopters to move the supplies locally, runway repair to facilitate the arrival of supplies, and command and control systems for communications and maintaining situational awareness. Each service provides a set of appropriate capabilities, with significant overlap among them. Moreover, each also has particular strengths that are relevant in different ways to the HADR requirements[12].

Humanitarian Assistance and Disaster Relief Humanitarian assistance and disaster relief operations are already an important component of defence policy. In the future, it may well take on a more strategic significance in support of either regional stability and security institutions or alliances. With more intense and frequent storms, floods, droughts, and other weather events, resources and capabilities for supporting HADR missions are likely to be increased. A regional future may include scenarios where one or more complex HADR operations (i.e., a HADR operation during an armed conflict or insurgency operations) are required. Such operations could last for months or longer. If so,

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[12] Climate change and Policy, 2016

concurrent HADR operations would likely be required. Adding further difficulty, these complex and potentially multiple operations would have to be conducted without compromising any capabilities to support high priority missions.

The support of the armed forces to civil authorities, Military Aid to the Civil Authorities (MACA) could be in specific areas identified as a shortfall of materiel or services. The idea is the Armed forces standing ready to support the civil authorities when their capacity is overwhelmed, without affecting core MOD objectives.

MACA may include assistance provided by the armed forces to other government departments for urgent work of national importance, responding to emergencies or in maintaining supplies and essential services.

Military support may be provided to civil law enforcement agencies, such as the police or Border Force, in the maintenance of law, order and public safety using specialist capabilities or equipment beyond that of civil powers.

Training may be provided to civil authorities, through the provision of the defence estate or facilities for either training or operational support to other agencies carrying out their duties. For example, allowing the police to use an army training centre to assemble and brief a large number of police officers, even though military personnel or equipment might not be involved.

The armed forces can be brought in to deal with a range of situations including, but not limited to:

- natural disasters, helping people in severe weather situations, such as flooding, where there is a need to protect human life, property and alleviate distress;

- network failure or disruption; animal disease outbreaks or public health epidemics; and public service related industrial disputes that affect our safety or security, or disrupt transport or communications links;

- •criminal or terrorist activity, providing specialist expertise in specific circumstances;

- after a terrorist attack where armed military personnel may be deployed to locations usually guarded by armed police officers, to enable those officers to undertake other duties;

- bomb disposal: known officially as 'explosive ordnance disposal'; this can be related to terrorism, or involve unearthing a bomb from the Second World War;

- mountain rescue, involving the Air Force rescue service, to support the civil authorities by helping people in danger;

- waters: protecting our territorial waters, ports, ships and energy installations from terrorist attack, protecting fisheries, preventing drug or people smuggling;

- airspace: detecting and deterring aircraft approaching a sovereign airspace and protecting local and NATO monitored air.

Ultimately, providing logistic support and strategic airlift in HADR and MACA operations, do not require additional training of military personnel.

The Command and Control (C2) system play a vital role in disaster management. When a disaster strikes, it may damage the existing communication system even across the terrestrial border. The proper flow of information from the incident site to authority and simultaneously command or response direction from authority to incident site must be well communicated. However, for this, we need a communication system, which may not be damaged by a disaster. There are two methods possible for that purpose. First one is one need to restore the existing communication network, which may take a long period. The alternate method is to be deployed a reserved network rapidly, one can send information from the core incidental site to the authority. The information then flows from there to some higher authority and finally reaches an emergency operation centre by any means. The more information from the incident site reaches to the authority, the more accurately authority can visualize the situation, and then analyses those information and take the better decision immediately. Since disaster is unstructured in scope, the Command and control system may be adapted for disaster management. The adaptation of a C2 system is a long term planning process based on human and tech factors.

UK case-study

In the United Kingdom, climate change is a government priority and the MOD, like all UK government departments, must play its part in helping the UK government deliver its climate change programme.

For the MOD, the effects of climate change pose real threats to defence's ability to meet its strategic objectives. Priorities for consideration include:

- the type, frequency and location of operations that the MOD might be involved in as a result of climate change;
- availability and cost of energy, products and services the MOD requires in order to operate in the future;
- the role of the MOD in co-operating with other government departments to identify and understand the global impact of climate change and its impact on the UK;
- increasing the resilience of the defence estate to cope with local effects of climate change such as flooding or subsidence;
- compliance: reduction of the MOD's greenhouse gas emissions in line with government targets while maintaining or preferably improving operational capability;
- utilising the emergence of low carbon technologies to reduce dependency on fossil fuels.

The question, how might increase investment in green technologies (e.g. improved renewable energy generation/storage, recycling and low-waste manufacturing)

enable a reduced logistics burden for future operations, and commensurate reduction in force protection requirements, should be asked.

With fuel and electricity needed to power equipment necessary to any military mission, energy generation, storage and usage constitutes a large part of today's logistical effort. Between the Second World War and the First Gulf War, energy consumption per sol- dier quadrupled in consequence of operating more platforms fitted with electrical devices and defence electronics such as radios and computers, as well as equipment like air conditioning systems to keep electronics operational. Research and Development (R&D) of 'green' technologies has flourished as means to reduce fuel consumption. Solar cells, hybrid electric vehicles are already tested by or in use with the German Bundeswehr, Belgian Special Forces, French security agencies and the UK Ministry of Defence. Methanol-based fuel cells are used to reduce fuel usage, for example by establishing microgrids for forward operating bases, and to lower costs, keeping electronics powered for twice as long as offered with battery life.

Such green technologies should not be seen as substitutable goods for existing energy sources. Their proven operational benefits are threefold. First, with fuel cells weighing on average one-quarter of the weight of batteries and charging equipment for electronics they replace, the lighter load translates to greater mobility. Second, they last longer in the field and recharge faster

than other charging devices, al- lowing forces to stay in the field longer and decreasing turnaround time between missions. Third, their low acoustic and thermal signatures make it harder for adversaries to detect forces and operating bases, thereby enhancing troop safety. Similar operational benefits may be offered by other green technologies, including photovoltaic (e.g. solar) energy or hybrid electric drive. With the potential to decrease demand for polluting resources and cumbersome batteries, taking up green technologies could allow militaries to enhance effectiveness through cost savings and additional operational benefits.

Other ways to generate energy could also 'kill two birds with one stone' down the road. For example, piezoelectricity, generating energy from motion, could include smart armour for personnel and vehicles that not only generates electricity through motion and/or when hit, but also instantly analyses the direction of an attack and sends information about enemy locations back to others in the unit. Waste generation, often a burden in bases, may eventually be used to generate energy itself. Generating water as a by-product, hydrogen energy would also lower heavy transportation requirements of much-needed water. Although these power generation alternatives are significantly more expensive to research, develop and produce than some of the other promising green technology solutions, their feedback loops render them attractive for future forces.

Climate actions have often fallen into one of two strategies: mitigation efforts to lower or remove greenhouse gas emissions from the atmosphere, and adaptation efforts to adjust systems and societies to withstand the impacts of climate change. The separation has led to the misinformed view that addressing climate change means pursuing either mitigation or adaptation.

This divide is counterproductive and dangerous. The reality is that adaptation and mitigation are two sides of the same coin. In fact, methods and technologies that both curb climate change and cope with its impacts already exist.

It is not always possible or practical to work solely on actions that are both adaptive and mitigating. Nor are these actions a silver bullet to solving the climate crisis. Simply put, where they make sense, governments and communities should pursue such actions. Below are some solutions that can both curb climate change and help us cope with its impacts at the same time:

Protect Coastal Wetlands

Salt marshes, mangroves and seagrasses are unique coastal ecosystems that serve as natural water filtration systems and marine habitats. They defend coasts against sea level rise by buffering storm surges and floodwaters, and store tons of carbon in their roots and soils. Mangrove forests currently hold the equivalent of more than two years of global emissions, which would be released into the atmosphere and worsen the effects of climate change if these forests are destroyed.

Increasing protected coastal wetlands and recovering about 40% of the ecosystem's global coverage by 2050 could mitigate one gigaton of CO_2 per year — over three years of emissions. Efforts to maintain coastal wetlands must include local communities that rely on these ecosystems for their homes and livelihoods.

Decentralize Energy Distribution

Climate variability will negatively impact countries' electricity transmission and distribution infrastructure. At the same time, development and population growth are increasing energy demand and usage. Centralized energy systems – with large power plants and infrastructure connected over long distances – are more vulnerable to climate change since disruptions at one point in the system can affect the entire network.

Decentralized systems — often powered by renewable energy, with shorter transmission lines and smaller distribution areas — are more climate-resilient. In the event of a disaster, a community with its own decentralized energy supply isn't affected by power outages in other areas. Smaller, more manageable power sources can also recover from disasters more rapidly. Low-carbon technologies such as solar panels and batteries can also provide reliable, clean energy to critical services, like hospitals in remote areas that aren't already connected to the grid or experience frequent power outages.

Improve Mass Transit

Road transport accounts for 72% of global transportation-related emissions, a percentage which will continue to grow unless more low-carbon transportation options become available and accessible. Transportation infrastructure is also extremely vulnerable to climate change impacts like storms and extreme heat. Disruptions to the network due to extreme weather will disproportionately affect low-income people and other vulnerable urban populations who have fewer mobility options. Resilient, low-carbon mass transit addresses both challenges.

Expanding urban public transportation by 40% by 2050 could decrease the projected number of cars on the road and avoid 6.6 gigatons of carbon emissions. Retrofitting and designing mass transit to withstand climate risks such as natural disasters, sea level rise or extreme heat ensures these transport options are safe and reliable in the long-term. These improvements can influence usage and better accommodate future growth.

Conclusion

As we already understood the Logistics is converting into Sustainment in order to ensure continuity of doing the right thing, in the right place, at the right time. And finally in this complex new reality we have to ensure paying more attention that with the growing of the environment's complexity, in the same time is growing also the need for more precision time, more precision planning and deeper partnership.

CIVIL-MILITARY INTERACTION IN HUMANITARIAN CRISIS RESOLUTION

Kristiyan Leyarski

Abstract: Since the fall of communism and the end of the Cold War, the world changed a lot. The danger of a nuclear war between the two military blocks – the Organization of the Warsaw treaty and NATO, disappeared and all hopes and expectations were for a safer world. A new beginning was bound to happen and all actors in the international relations were supposed to act together and to cooperate with each other in order to prevent a new, no matter of what kind crises in the world. Unfortunately, that expectations were not justified – or at least not entirely. The constant danger of war during those 45 years may have rested in the past, but a large variety of new threats and challenges came into sight. The genocide in Rwanda and the war in Yugoslavia in the 90s showed that the evil does not sleep and that the cooperation of all actors in the international field is essential in order to cope with these challenges. The humanitarian crises caused by these conflicts also proved the crucial importance of the civil-military interaction and of the mutual efforts of the United Nations and other organizations as a key factor in finding a solution and easing of the sufferings of the affected ones. A strong leadership, well organized coordination and mutual understanding of the responsibilities are essential for the effective cooperation between the civil and military actors. The humanitarian operations in South Sudan and Haiti clearly demonstrated the positive, as well as the negative aspects of the civil-military cooperation.

Key words: NATO, South Sudan, Haiti, humanitarian crisis, civil-military, interaction, cooperation, United Nations

Introduction

The civil-military cooperation needed to pass through a lot of humanitarian crises of different types since the beginning of the new century. It was clearly demonstrated that in the current

globalized world no one of them is able to act and to solve problems alone, so for a greater efficiency they are obliged to work together. No matter how difficult and controversial this interaction is sometimes, both civilian and military actors should remember their common purpose – to deliver the most effective assistance to the affected populations through a constructive dialogue and organized joint actions. This rule applies as much for the crisis caused by an armed conflict, as much for those ones provoked by natural or other disasters. The contemporary crisis situations require various forms of civil-military coordination for humanitarian operations.

As there is no singular solution to any one humanitarian crisis, that coordination could be sometimes really challenging and depending on the context. It's a serious mistake to act the same way and with the same means in all situations, as each crisis is different and a case-by-case evaluation is necessary to safeguard the humanitarian space and ensure that humanitarian aid remains independent and neutral. One of the main actors here are the United Nations – through UN Office for the Coordination of Humanitarian Affairs (OCHA), and the humanitarian-civil coordination conducted by them (UN-CMCoord) is of great importance for protection and promotion of the humanitarian principles, avoiding competition, minimising inconsistency and pursuing common goals.

Of course, the efficiency of this coordination cannot be achieved without internationally accepted guidelines and regulatory

framework. The five instruments, so called "five keys", of the international community for guidance programming, research, and funding for disaster preparedness capacity-building are UN Office for the Coordination of Humanitarian Affairs (OCHA); UN Office for Disaster Risk Reduction – implements the United Nations International Strategy for Disaster Reduction (UNISDR); International Federation of Red Cross and Red Crescent Societies (IFRC) – they help to the affected nations to prepare for, respond to, and recover from natural and man-made disasters in non-conflict situations; Inter-Agency Standing Committee (IASC) – forum for both UN-affiliated and non-UN-affiliated organizations to coordinate action regarding humanitarian policies, advocacy, and response evaluation and improvement; and the Global Clusters – they are groups of humanitarian organizations with explicit responsibilities for coordinating action within each humanitarian sector. In addition, there are a large variety of other entities which could be engaged in humanitarian crises.

Definitely, one of the most important questions here is when the military assets are acceptable and when they are not recommendable. There are no doubts that military assets and capabilities must only be used in humanitarian response in exceptional circumstances, and only if no other suitable civilian capability is available. The disagreement arises when it comes to the question "When precisely these conditions apply?". While guidelines are important as a framework, the context in the

specific situation in which they are supposed being applied defines to what degree it is appropriate to use military assets. For instance, using military assets of a party to a conflict is clearly more problematic than using them during a natural disaster. Furthermore, both civil and military actors operate in extremely fluid environment and a high degree of flexibility is required. Often, the cause for a certain humanitarian crisis is interconnected with several other factors which can lead to unpredictable consequences. For these reasons the well-organized and clear interaction between civil and military actors is of vital importance, so when that is ensured, the results are significantly better and a lot of lives could be saved.

There are many examples of civil-military interaction at a high level, as well as cases where this interaction is poor or almost misses. In order to demonstrate how important is this cooperation, we are going to consider two cases of good and bad civil-military interactions – the operation in South Sudan after its separation from Sudan (the period between 2011 and 2016) and this one in Haiti after the earthquake in 2010. We will examine some of the most important aspects crucial for that interaction – coordination, leadership, and mutual understanding of the responsibilities.

South Sudan – Tough Lessons

Environment

The humanitarian crisis in South Sudan is probably one of the heaviest ones in the new century and it is a suitable example of a complex and protracted humanitarian crisis resulting from years of armed conflict, recurring natural disasters and severe economic crisis. It started with the independence of South Sudan from Sudan announced in 2011 followed by a civil war in 2013 between government forces loyal to the president Salva Kiir and the opposition leader and ex vice president Riek Machar. After spreading of the fighting in the summer of 2016, the economy plummeted and the humanitarian crisis deepened. It provoked the intervention of the United Nations through the United Nations Mission in South Sudan (UNMISS) - a UN peacekeeping mission, as well those of many NGO's.

Often described as one of the most challenging operating environments in the world, due to security concerns and logistic issues, the humanitarian mission in South Sudan is also one of the most expensive humanitarian interventions to date. Looting of aid supplies, attacks and harassment of aid workers were common. International Humanitarian Law was not upheld, and impunity was widespread. People there have been systematically targeted by the warring parties and have lost their homes and livelihoods, basic infrastructure has been badly damaged. All parties in conflict are reported to have carried out direct attacks on humanitarian missions.

Of the country's estimated population of almost 12 million people, nearly 7.5 million are in need of humanitarian assistance and protection in 2020. Almost 4 million people remain displaced by the humanitarian crisis – 1.5 million internally and some 2.3 million in six neighboring countries. The conflict is estimated to have led to nearly 400 000 excess deaths in South Sudan´s population between late 2013 and 2018, with about half of the lives lost estimated to be through violence.

UNMISS was established in July 2011 by UN Security Council Resolution 1996 to 'consolidate peace and security and to help establish conditions for development' in South Sudan. UNMISS has an authorised strength of military personnel, police and appropriate civilian support, including human rights investigators. Its main priority is providing assistance and support to the government of South Sudan (GoSS) to to strengthen its institutions and to consolidate peace, democracy and the rule of law. Above anything else, UNMISS is expected to act independently and impartially to provide protection, including, if necessary, through the use of force. It is also supposed to monitor and report on human rights violations, regardless of the perpetrator, even though the perpetrators are often members of the government's own security forces.

A serious proof of the inability of UNMISS to cope with that task is the fact that no UNMISS peacekeeper ever has shot an SPLA (Sudan People's Liberation Army) soldier to protect a civilian being abused by that soldier. In accordance with the UNMISS

Rules of Engagement, such action would only be taken as a last resort. Such decisions are to be taken by the leadership of the mission on a case-by-case basis.

Leadership

Exactly the strong leadership is one of the weakest components here. As one informant has emphasized, 'the mission's engagement in civil– military relations begins and ends with the leadership'. Unfortunately, it seems that UNMISS often lacks the political will and leadership required to implement its PoC duties.

Undoubtedly, a good working relationship between the GoSS and the mission leadership is essential for UNMISS in order to be able to do its job. However, at the same time it is vital that UNMISS retains its independence of action. In general, relations between both peacekeeping missions and humanitarian actors have varied over time and have largely been dependent upon the willingness of the mission's leadership to consult, share information, respect humanitarian space and engage in constructive dialogue. According to most NGOs and UNCT representatives UNMISS was largely irrelevant to their work, and had little if any regular engagement with it.

Strong leadership is crucial to ensuring that military and humanitarian actors work together to enhance the protection of civilians and protect humanitarian space. Equally clear is the need for that leadership – especially the DSRSG/RC/HC and UNMISS military – to build trust across the wider humanitarian

community by demonstrating through both words and actions respect for humanitarian principles, for example by ensuring that soldiers refrain from engaging in relief activities in support of military or political objectives.

Of course, the leadership among humanitarian actors is just as important. They should realize the necessity of agreeing on basic principles and adhering to them, instead of speaking with one voice, which could only be an obstacle for them. The use of armed escorts is illustrative of the divergent approaches among humanitarian actors, rendering a coherent and consistent dialogue with military actors difficult.

Coordination

Directly related to the leadership issue, the coordination is another one of the challenges met by the civil and military actors in this mission. On the humanitarian side, coordination was provided through the Cluster System, which had three main priorities: enhancing the physical security of people in border areas and in areas with high levels of violence; reducing gender based violence and providing support to survivors; and addressing specific threats affecting children, such as abduction, recruitment and family separation. The Inter-Cluster Working Group (ICWG), which comprises UN and NGO cluster leads, advises the HCT on operational priorities, concerns and gaps in humanitarian operations and formulates cluster strategy and response plans. The clusters coordinate their response at central and state levels, where coordinators are expected to ensure that

technical information from the field is shared in a 'timely and efficient manner'.

Coordination structures between UNMISS and humanitarian actors were intentionally separate which, from the view of today, was proved to be a mistake. Civil–military coordination guidelines for South Sudan stipulate that, apart from the UN Mine Action Service (UNMAS) and the Office of the High Commissioner for Human Rights (OHCHR), UNMISS units or personnel were not able to be members of humanitarian clusters because they were not humanitarian actors. However, UNMISS personnel could attend meetings by invitation, and cluster leads and co-leads were expected to liaise closely with UNMISS civilian sections.

Strategic coordination between the humanitarian community and the peacekeeping mission was addressed through a triple-hatted DRSRSG (Special Representative of the Secretary-General for South Sudan)/ RC(Resident Coordinator)/ HC (Humanitarian Coordinator). However, in this way there was no structural integration and OCHA retained an independent presence in line with the 'one foot in, one foot out' model of integration adopted by the UN in South Sudan. Also, in this way the decision-taking and planning were slowed down which in numerous cases had heavy consequences.

A significant factor which negatively affected the coordination is the frequency of the common civil-military meetings chaired. For example, OCHA used to chair monthly meetings of the Civil–Military Advisory Group (CMAG), which were attended by

humanitarian actors (including relevant cluster leads, such as protection and logistics) and relevant sections of UNMISS. It is necessary to point out that one meeting per month is extremely insufficient for a conduction of adequate coordination and for the appropriate operations-planning, so it is not surprising that the results were not satisfying.

Responsibilities

Another problem in that operation comes from the unawareness of the limits of the responsibilities of the both civil and military sides included, which often provoked mutual accusations. On one hand, UNMISS has been criticised by humanitarian actors for its failure to respect a number of fundamental civil–military policies, especially with regard to promoting the distinction between military and humanitarian activities. Humanitarian actors believe that the mission supports the idea for consultation, coordination and engagement only by words, but not by actions. The mission's failure to support the GoSS Ministry of Gender, Child and Social Welfare to develop a National Action Plan is a case in point.

For its part, the military component of UNMISS perceive their civilian counterparts as misjudging 'existing political and capacity constraints' and consequently having 'unrealistic expectations of what the military can do', and some military personnel found it difficult to work under civilian leadership.

This mistrust made effective civil–military coordination difficult, weakening the PoC capacity of the mission. As one CMAG survey of civil–military relations highlighted: 60% of humanitarian actors felt that UNMISS military have a low awareness of humanitarian principles, and 46% felt that it was difficult to access an appropriate interlocutor; 75% of military respondents felt that humanitarians have a low awareness of how the military works, which some attributed to a 'misalignment' of respective mandates, and 25% found it difficult to access an appropriate interlocutor.

General assessments and recommendations

This clearly illustrates that while humanitarian actors mainly look to humanitarian principles and global standards for guidance, military actors are mainly guided by DPKO on their interaction with humanitarians.

According to many mission members, the humanitarian community has become over-reliant on military escorts, including state security forces, in part because of the same culture of risk aversion that contributed to more stringent security procedures and a broader erosion of the principle of distinction between civilian and military.

On the civilian side, UNMISS needed to clarify roles and priorities and support its personnel to engage in more robust advocacy with the GoSS, especially on PoC and human rights issues.

Currently, UNMISS' engagement with the humanitarian sector could be described as sporadic, selective and not substantive.

A particular problem is that the current PoC strategy of UNMISS provides no guidance on how to respond in situations where the security forces of South Sudan represent a threat to the population. As a consequence, some observers argue that the civilian population does not see UNMISS as a neutral actor and a force for change. Among humanitarian actors and other observers there is a widespread perception that UNMISS is unable or unwilling to challenge the GoSS and the SPLA on key issues related to their mandate, such as the rule of law and human rights. This fact definitely does not work for the image of the mission and could seriously damage the trust in it.

In addition to its relations with the wider humanitarian community of actors, UNMISS also faced challenges in improving dialogue and coordination between civilian and military components within the mission itself. Ensuring that staff receive appropriate training to familiarise themselves with the roles and responsibilities of both civilian and military UN actors is vital.

Obviously, there was a significant gap in understanding between military and humanitarian actors in South Sudan. The mandate of UNMISS has been broad and ambiguous, with highly ambitious PoC objectives. However, the mission does not seem to have a clear and mission-wide understanding of what was expected in terms of providing PoC, and to a large extent the military component (particularly in UNMIS) has lacked the skills,

capacity and willingness to protect civilians in any substantive way. Personnel were frequently outnumbered by the armed groups they encounter, and less well-armed. Whether this is an issue of resources, or more about how these resources are deployed and used, is another question. Definitely, UNMISS could do more with what it has to improve PoC.

Last but not least, it is the seemingly unwillingness or inability of the military actors to intervene against the SPLA when they attack the civilian population. According to many observers, the SPLA was the main perpetrator of abuses against. There is mounting public pressure on both UNMISS and the GoSS to hold state perpetrators of violence against civilians accountable. In a confidential note submitted to the UN Security Council just before UNMISS' mandate was renewed, a group of aid agencies in South Sudan provided specific examples of UNMISS' failure to provide a deterrent presence and confront the SPLA regarding attacks against civilians. UN Security Council Resolution 2109, which renewed UNMISS' mandate, stated that UNMISS should address PoC regardless of the source of the threat or attack and deploy the majority of personnel and assets to areas where civilians are at greatest risk.

Haiti – Best Practices

In contrast to the humanitarian intervention in South Sudan, the cooperation between civil and military actors in Haiti humanitarian crisis after the earthquakes in January 2010 is usually highly appreciated. It is regarded as one of the examples

of successful civil-military interaction, which managed to achieve its purposes and to contribute to the stabilization of the country.

Environment

According to the official documents, the earthquakes that hit Haiti caused major damage with an estimated more than 300,000 of dead, 300,000 injured and more than 1 million homeless. A lot of educational establishments and hospitals and health centres collapsed or were designated as unusable. Part of the country's main port was not operational, most of the public administration and other institutions' buildings were also all destroyed.

In addition to existing military and police forces operating as part of the UN Stabilisation Mission in Haiti (MINUSTAH), large-scale foreign military forces were deployed in response to the earthquake, with contingents from the United States, Canada and a number of Latin American and European countries.

Lightning Response

Humanitarian actors there had the opportunity to utilise military capacities in the immediate aftermath of a disaster, unlike the civilian capacities which are typically not readily available. The resumption of operations at the airport in Port-au-Prince is a clear example of what the military can achieve in the early phase of an emergency response. According to US government figures, the airport'enormously increased the number of the flights for the period after the intervention of the US' staff help. US forces also dedicated considerable resources to the repair of the seaport and

deployed airlift, emergency medical support and logistics. Furthermore, the foreign troops played a key role in ensuring a secure environment for aid delivery and the protection of IDP camps. All these actions are of the sector of military capabilities, which demonstrates the vast need of the military forces help.

Coordination and Dialogue

At the same time, however, the presence of substantial military forces, in the midst of an equally massive humanitarian response, means that all parties needed to coordinate their efforts, to ensure that resources are used in the most effective way and that action is coherent and cohesive. The United Nations Humanitarian Civil–Military Coordination (UN-CMCoord) function had a key role to play in facilitating this interaction.

As the greatest amount of damage occurred in Port-au-Prince, and much of the humanitarian and military activity was centred there, UN-CMCoord officers were likewise concentrated mainly in the capital, as well as in several other locations with hard damages.

At the strategic level the liaison took place in New York with the Department of Peacekeeping Operations (DPKO) and in Washington and Miami. This proved very beneficial to the overall humanitarian effort. Information exchange and facilitation of access to decision-makers on the ground were two areas that benefited directly from this interaction and liaison. At the field level, however, the UN-CMCoord team in Port-au-Prince (later

evolved into a Civil–Military Coordination Cell (CMCC) within the overall OCHA structure) struggled to keep pace with the various military units and humanitarian agencies on the ground. As is standard practice in UN-CMCoord deployments, the team organised a weekly Civil–Military Coordination Network Meeting to create a forum and dedicated location for discussing humanitarian civil military issues and for resolving operational and coordination problems. These were some of the key factors which contributed later to the successful results of the mission. Opposing to the rare monthly meetings in South Sudan's case, without any doubts, that coordination here could be an example for the future cases where the interaction between civil and military actors is needed.

The team also worked with other civil-military platforms, including the Joint Operations and Tasking Centre (JOTC), established by MINUSTAH, OCHA and other key partners. Through the JOTC, humanitarian organisations in Haiti could place requests for military or police assistance in support of their relief activities. In effect, the JOTC acted as MINUSTAH's 'clearing house' for requests for military assistance. OCHA and the UN-CMCoord team also issued guidance to ensure that military actors participated constructively in cluster meetings. This guidance served a dual purpose: for the humanitarian community, it outlined why and how military actors should be involved in cluster meetings, to allay suspicions about the military's role among some humanitarian organisations; for military personnel, it

outlined how they could contribute to cluster arrangements, whilst not overwhelming the meetings.

Structure and awareness of the responsibilities

From an early stage, the UN-CMCoord team also recognised the need for a sustainable structure in place that could correspond with the broader humanitarian coordination framework. One of the primary reasons why the UN-CMCoord structure worked well, when it reached full capacity, was that key liaison staff from many military and humanitarian organisations which were graduates of UN-CMCoord courses run by OCHA's Civil–Military Coordination Section (CMCS), based in Geneva.

Throughout the various stages of the response, around 20-30 graduates were present in the country at any one time. These graduates represented their respective organisations in the coordination of their activities with other actors within the relevant clusters, as well as bilaterally with other organisations. Their presence highlighted the benefits that the UN-CMCoord training programme can have at an operational level in times of emergency. Numerous graduates also provided staff support to headquarters functions in DPKO and OCHA in New York, USAID and OFDA in Washington and at HQ SouthCom in Miami.

In the interest of making the humanitarian emergency response more effective and predictable, the involvement of military forces needs to be taken into account and appropriately planned for by all parties in such situations. One of the most obvious

conclusions that can be drawn from the operation in Haiti and one which reinforces current practice –is the need to engage with the military before a disaster strikes, so that humanitarian agencies have the opportunity to shape military planning, rather than simply reacting to it.

Conclusion

Every humanitarian mission is different and it is caused by varied reasons. Despite the differences between the humanitarian crisis in South Sudan and in Haiti and the factors which caused them, one is universal for both humanitarian interventions – the purpose to protect the civilian population and to improve their situation. For that purpose always are essential the good coordination, the leadership and the preparedness of the staff. While in South Sudan's case these elements were of serious shortage and in a border sense they were not applied adequately, in Haiti there was a lack of constructive dialogue, organized mutual decisions and strong leadership. And this is what makes the difference between the two cases.

When it comes to the coordination, leadership and preparedness of the staff, the best practices in the civil-military interaction in Haiti could be taken into account and they should serve as an example for the future humanitarian operations. As observed there, the interaction between humanitarians and the military took place in a structured way, in two stages. The first stage involved setting up a CMCC within the OCHA office; the second

stage involved longer-term work at the cluster level, the principal operational coordination platform in response operations.

As a final we can conclude that all emergencies are different and it is impossible to find a perfect, fully resourced, fully coordinated response. The reality is totally different and what we can do is to implement the best possible solution rather than to procrastinate and to wait for a perfect'one. Key to this is the ability to adapt and to constantly seek out ways to improve, in order to remain responsive to the challenging and dynamic needs of emergency situations.

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THE POLITICO-MILITARY CRISIS IN NAGORNO-KARABAKH

Mehmed Nedzhib

Abstract: The conflict in Nagorno-Karabakh has its roots in the early 19th century when the region of the Lower Caucasus became a crossroad of empires in an area that has a multi-ethnic diversity with a mix of varying religious affiliations. Thus, the trend of "Divide and Conquer" had continued into the 20th century and the region of Karabakh had become the "Apple of discord" for the Caucasus, drawing parallels with definite parts of the Western Balkans in Europe. With an intricately drawn border and clear intentions of local division, the Nagorno-Karabakh oblast in Azerbaijan is one of many where conflict has erupted in the Post-Soviet era with similar clashes occurring in the Republic of Georgia, Moldova and Ukraine. An interesting characteristic of this conflict is the presence of paramilitary affiliated organizations and use of mercenaries which is so definitive of present conflicts. The aim of this analysis is to examine the belligerents namely Armenians and Azerbaijanis, and explore the conflict in the light of politics, civil and international opinion and military actions from its origins to the present.

Key words: Nagorno-Karabakh, Caucasus, Armenia, Azerbaijan, Orthodox, Shia, Russia, Soviet Union

The Geography and Ethno-Religious Identities

Nagorno-Karabakh meaning Upper-Karabakh is situated in the region of Karabakh/Artsakh (Black Garden) in the South Caucasus. Karabakh is consisted of a population with a majority of Azeris in Lower-Karabakh and a majority of Armenians in Upper-Karabakh. Armenians settle the South Caucasus since ancient times having their own unique language and alphabet, and are the first people to adopt Christianity as a state religion,

practicing Orthodox Christianity like their Georgian neighbors to the North and the Russians. Azerbaijanis on the other hand, are of Turkic origin with a similar language to that of Turkish but practice the Shia branch of Islam like Iran, where the predominant Azeri population is located in the province of Tabriz. The region is mountainous and very enclosed, being far from major seaports of developed regions because of the lack of infrastructure, making it easy to blockade the population within or enforce an embargo on trade and vital supplies which are crucial in a mountainous region.

Crossroads of Empires and Soviet rule

Nagorno-Karabakh was long contested by the Ottoman, Persian, and Russian Empires as part of the Caucasus Mountains, which formed a formidable natural barrier between those rivals. Nagorno-Karabakh is of particular interest as it represents an overlap in the declared homelands of two different peoples: the Christian Armenians and the Muslim Azerbaijanis. Under the nearly perpetual conquest of the area, one of these two groups was generally favored by whichever side was in power at the time. This helped build a centuries-old animosity between the two geographically intertwined peoples. Tension between the two populations grew under Russian rule as increasing numbers of Armenians migrated to urban areas in the lowlands. This tension erupted into open ethnic conflict in the chaos of the 1905 Russian Revolution, as thousands of Azerbaijanis and Armenians were killed in pogroms in the region's major cities. The violence was

renewed on a much larger scale following the collapse of the Russian Empire in 1917. The communities of Georgians, Armenians and Azerbaijanis united under the Transcaucasian Democratic Federative Republic, but this was a loose federation with a weak military force which led the way for Ottoman invasion from the South and Soviet invasion from the North, aimed at the Baku oil fields. By 1921 the entirety of the South Caucasus was under Soviet control. With the exit of the British after WWI there was some indication that Nagorno-Karabakh would be transferred to the Armenian state, but the geopolitical situation changed in 1921 with the normalization of relations between the USSR and Turkey. As a concession to Turkey, Nagorno-Karabakh was incorporated as an autonomous province into the Azerbaijani Soviet Socialist Republic. At first, it was decided that Karabakh would be part of the Armenian Soviet Socialist Republic (S.S.R.). The initial incorporation of Karabakh into Armenia is thought to have been a plan to ensure Armenian support of Soviet rule. But the Soviets' new Commissar of Nationalities, Joseph Stalin, reversed the decision. In 1923 Nagorno-Karabakh became an autonomous administrative region of the Azerbaijan S.S.R., even though 94% of its population at the time was ethnic Armenian. This was a result of Gerrymandering internal borders in the U.S.S.R. Though ethnic Armenians complained that Azerbaijan restricted their autonomy and claimed Azerbaijan discriminated against them, the Soviet Union was intolerant of ethnic nationalism and ignored a variety of protests against the status quo.

Prelude to the Conflict

For most of the time of the Soviet rule in the region the communities of Armenians and Azerbaijanis had lived peacefully and coexisted at times with a high level of friendship. But during the late 1980s thanks to the Glasnost and Perestroika policies enacted at that time by General Secretary Mikhail Gorbachev, old feuds arose from the heavily censored past of Karabakh and the communities turned to seek their rights. In the late 1987 the Caucasus region was experiencing a surge in political turmoil with large and near constant demonstrations being held in the capital of Yerevan beginning in February 1988. Up to hundreds of thousands of protesters, represented by the Karabakh Committee, were demanding both democracy and the unification of Nagorno-Karabakh (administered by Soviet Azerbaijan but disputed autonomous territory with an 80% Armenian majority and the Azerbaijani minority) in the mountains of the Karabakh region. The unrest and the opposition movement began in September 1988 with negotiations between the Karabakh Committee and Gorbachev taking place throughout most of 1989. The situation worsened after the 1988 Armenian earthquake in Spitak where the Metsamor Nuclear Power Plant is located which almost ended becoming a second Chernobyl disaster. The response to the earthquake was slow. Red tape inevitably held up some of the rescue efforts and criticism perceived. Another adverse effect of the disaster was that the Armenians were already distrustful of Gorbachev's dismissal of

their claims to the disputed territory of Nagorno-Karabakh, which the Armenians had been contesting with neighboring Azerbaijan. The relationship between the Soviet authorities and the Armenian society took a turn for the worse in March and the developments climaxed in November when a state of emergency was declared, along with a nighttime curfew, and a mass movement of up to 50,000 Armenians fleeing ethnic violence arrived from Azerbaijan. As the Armenians felt their situation worsen, the Armenian birthrate dropped and many left the region for work in larger cities. The area's rural population again took on an increasingly Azerbaijani character, assisted by programs from Baku that encouraged Azerbaijani settlement of the area. By 1988, Nagorno-Karabakh was roughly 25% Azerbaijani. This led to escalated rhetoric by local political leaders. Armenian and Azerbaijani historians at this time also began to propagate radically divergent views on the region's history and culture, setting the stage for the coming conflict.

The Nagorno-Karabakh War

In 1988 the Sumgait pogroms upon Armenians in Azerbaijan S.S.R. sparked the beginning of the conflict, from where many Armenians fled to Nagorno-Karabakh autonomous oblast, where the Armenians have a majority. After the collapse of the Soviet Union in 1991, both Armenia and Azerbaijan declared independence. With the immediate change in the political landscape, both parties started gathering means to for an upper hand in Nagorno-Karabakh by gaining international support and

military build-up. First attempts at mediating were made in the Zheleznovodsk Communiqué by Russian President, Boris Yeltsin and Kazakh President, Nursultan Nazarbayev on September 23, 1991 with an intention to end the three-year-long hostilities between Armenia and Azerbaijan over the Nagorno-Karabakh region, which ultimately failed. By 10 December 1991 Nagorno-Karabakh declared independence as the Republic of Artsakh and by 1992 all-out war broke out between Armenia and Azerbaijan. Azerbaijan had oil and gas revenue from which they can afford better equipment, but these resources were not exploited to their best at that time. Armenia on the other hand had a worldwide diaspora which supported them in the times to come and their armed forces had higher morale and an experienced officer's corps which was a big percentage per capita in the Soviet armed forces. Azerbaijan enjoyed Turkish support, with a few hundred Grey Wolves included, and initial Russian support which switched to the Armenian side. Chechen militants have also participated on the Azeri side with the prominent Islamic terrorist Shamil Basayev with an addition of Afghan mujaheddin (Hezb-e-Islami). This therefore turned the conflict into a religious one with a similar organization being created on the Armenian side called the "Crusaders" founded by Garo Kahkejian from the diaspora. While Azerbaijan was in political turmoil and there was a lack of leadership, Armenian armed forces made rapid advances and achieved significant gains by occupying most of Karabakh, including the lowlands which were populated by a majority of ethnic Azerbaijanis.

Further attempts at mediating peace were made in the Tehran Communiqué, where an agreement was signed by Mammadov, Ter-Petrosian and Rafsanjani following the agreement of the parties to international legal norms, stability of borders and to deal with the refugee crisis. This effort failed on the next day. Massacres were committed by both sides, namely the Khojaly massacre by Armenians and the Shusha massacre by Azerbaijanis. Since 1992, the Organization for Security and Cooperation in Europe (OSCE) has been the primary forum for mediation efforts, led by a subset of OSCE members called the Minsk Group. Unfortunately, little progress has been made by the OSCE, as each side has insisted on incompatible conditions that the other will not accept. With the coming to power of President Haydar Aliyev the political situation in in Azerbaijan had stabilized and a ceasefire agreement was reached in 1994 based on the Bishkek Protocol. The conflict became frozen one with minor skirmishes occurring in 2008 and 2016.

Current Situation

Since 2009 the main focal point of peace mediation has become the so called "Madrid principles" by OSCE.

The principles are:

1. Return of the territories surrounding Nagorno-Karabakh to Azerbaijani control;
2. An interim status for Nagorno-Karabakh providing guarantees for security and self-governance;

3. A corridor linking Armenia to Nagorno-Karabakh;

4. Future determination of the final legal status of Nagorno-Karabakh through a legally binding expression of will;

5. The right of all internally displaced persons and refugees to return to their former places of residence; and

6. International security guarantees that would include a peacekeeping operation.

The four-day war which occurred in 2016 had been a testing ground for new types of conventional armaments. Both sides had amassed artillery which proved to be vital in the area of the conflict and modernized their equipment. Azerbaijan had a combat trial of their new drones and experimented on cooperating them with helicopter gunships. This unfortunately was not successful. In 27 September 2020 the conflict heated up again with allegations of shootings from both sides. A significant element was the use of mercenaries, which is a common practice in similar conflicts worldwide, from the Syrian Rebels namely the Hamza division and Sultan Murad division made of Turkmen people from northern Syria. War crimes took place, not in the way of local massacres like in the first war, but long-range bombardments by Armenian ballistic missiles fired on Ganja and Azerbaijani cluster bombing of Stepanakert. Azerbaijani forces now armed with modern state of art Turkish drones and Israeli arms made significant gains in the conflict, first cutting off the Karabakh border with the Islamic Republic of Iran and then advancing on the town of Shusha, eventually cutting off

Stapanakert - the capital of Nagorno-Karabakh from the Lachin corridor which is its main link to the Republic of Armenia. This prompted Russia to intervene and negotiate a ceasefire.

Ceasefire

A Ceasefire agreement was signed on 10 November 2020 putting an end to hostilities, exchanging POWs and hostages, agreeing to the return of districts around Nagorno-Karabakh to Azerbaijan and southern Nagorno-Karabakh with the Town of Shusha also remaining in Azerbaijani hands. The Lachin corridor will be guarded by Russian peacekeepers and a new corridor will be opened from mainland Azerbaijan through Armenia to the Nakhchivan Autonomous Republic, giving Azerbaijan a clear link with Turkey. Azerbaijan has also stated that Turkish peacekeepers will participate in Karabakh.

Conclusions

Through a century of power play between empires, cold war politics and a 30 year animosity between Armenians and Azerbaijanis, the prospects seem to be on the stable side for Karabakh. If Turkish troops are committed on peacekeeping, a NATO state will be partaking in the South Caucasus. But imperial ambitions are still lurking in the shadows and Nagorno-Karabakh may yet find itself in a world of proxy wars, keeping the conflict still frozen, like the modern Cold War relic it is.

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Military Analysis of the Nagorno-Karabakh conflict by GlobalSecurity.org

EMERGENCY PLANNING AND OPTIMIZATIONS BASED ON DAM BREAK FLOOD RISK MAPS VISUALIZED WITH OPEN SOURCE WEB-GIS TOOL

Ara Barseghyan, Nina Dobrinkova, Susan Mnatsakanian, Alexander Arakelyan, Alen Amirkhanian, Christos Evangelidis, George Drakatos, George Boustras, Stefan Stefanov, Stefan Hadjitodorov, Vangelis Katsaros

Abstract: Nowadays technologies are changing every day and with them all services and tools in cases of disaster situations increase. However some sectors such as emergency planning and response are still having difficulties to implement the new technologies. In our paper we will present an idea on how new technologies in flood risk mapping visualization can give more options to the first responders and optimize their time for reaction. The test area is located in Armenia, where a special dam constructed for mining purposes exists. It is built in an earthquake vulnerable area and we evaluate the risk of a dam break at that location. The final results which are flood risk maps are implemented in a specially developed open source web- GIS tool. This tool is applicable for decision making in an operational room or any other first responder facilities.

Key words: GIS, flood, decision-making, autonomous systems, technology, risk mapping, emergency planning.

Introduction

The Alliance for Disaster Risk Reduction project (ALTER project) has been designed in the framework of DG ECHO external line call. These types of projects have as a main goal to address cooperation between EU and third party countries. The main idea is best practices to be transferred from EU to external

neighboring country. In ALTER project that selected country is Armenia. The project has as a main objective to create public private partnerships to increase resilience in areas of Armenia that face risks from floods originating in earthquakes. Methods, tools, know-how and experience from Bulgaria, Cyprus and Greece, have been shared with Armenian partners. The partnership of the Armenian government and local stakeholders gave an opportunity to the consortia to work on larger scale at the selected test areas. The project is focused on three pilot areas in Armenia where dams and other activities such as mining processes are presenting risks to local communities. The areas are Akhtala and Teghut areas of Lori Marz along the Shamlugh River, the Vorotan Cascade and it associated dams in the Syunik region, and the Voghji river basin of Syunik region. In the paper information about the Armenian study area will be presented data that has been collected for dams at this study area, calculations about potential dam failure and possible flood risk maps. As a final section a specifically developed open source webGIS tool and its main functionalities will be summarized. The purpose of the web tool is to support a decision making on the field and to optimize resources allocation.

Study Area

One of the activities of the project ALTER was to identify the most suitable best practices on risks related to dams in earthquake zones available within and outside the consortia. The study area selected for Armenia was Kapan and the Voghji River Basin. This

area is located about 300 km southeast of Yerevan and has a population of about 45,000. It contains some of Armenia's most intensive mining activities and two of Armenia's largest tailing dams - Artsvanik and Geghanush. Additionally, the Geghi Reservoir upstream of Kapan was also included. The villages Kavchut, Andiokavan, Hamletavan, Shgharjik, Syunik and the Kapan Town are located in the immediate floodplain of the Geghi and Voghji Rivers. The village of Verin Giratagh and Nerkin Giratagh are not in the floodplain; however, the only road access to these villages is through the floodplain below the Geghi dam. The two tailing dams also pose a risk to Kapan's airport which would be needed in case of an emergency and the main highway connecting Armenia and Iran.

The Geghi reservoir is located in Syunik, the southernmost province of Armenia (Figure 1). The reservoir is situated on the Geghi River, the left-bank tributary of the river Voghji. The maximum water level discharge occurs during the spring. Due to the high altitude nature of the area, snowmelt increases gradually as does the level of the river and the reservoir. Snowmelt typically occurs from March to August (Armenian State Hydrometeorological and Monitoring Service).
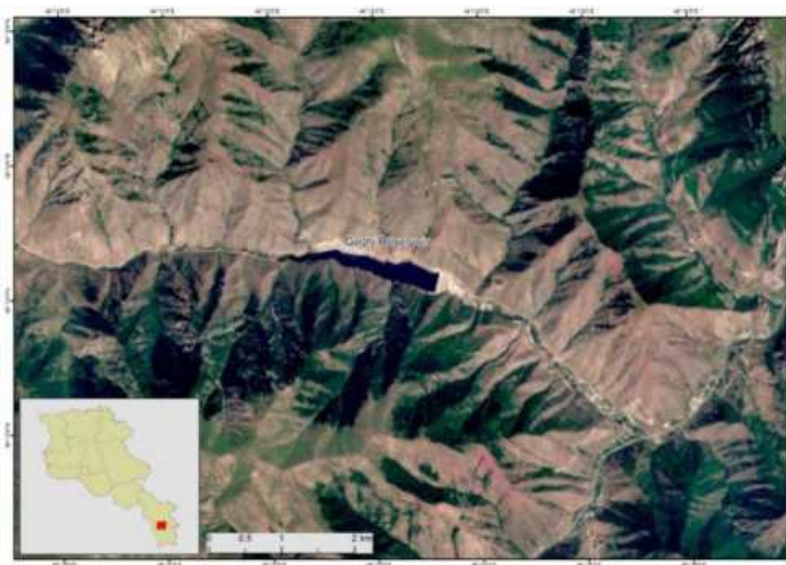
Figure 1. The location of Geghi reservoir.
The inset is its location within Armenia.
Background image: Sentinel-2, RGB composite.

The surface of the Geghi reservoir is 50 ha and the elevation above sea level is nearly 1400 m. The height of the dam is 70 m and the length along the crest is 270 m. The total volume of the reservoir is 15 million m^3, but the effective volume is about 12 million m^3 [1]. Nearly 4,300 people would be affected by a dam break of the reservoir[2]. Geghanoush Tailing Storage Facility (TSF)

Geghanoush TSF is located in the gorge of the Geghanoush River, in the southern part of Kapan (Figure 2). The difference of relative heights between the tailing dam, on the one hand, and city buildings and transport infrastructure, on the other hand, is

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[1] Georisk CJSC (2017) Assessment of the Multi-Component Risk Determined by the Maximum Seismic Impact on the Kapan City (Multi-Hazard City Scenario). Project # ARM 10-0000005849, Final Report.
[2] Gevorgyan A., Minasyan R., Khondkaryan V., Antonyan A. (2014) The Prediction of Possible Flooding of the Territory as a Result of the Accident of the Geghi Reservoir Dam

75 meters. In case the reservoir dam is broken due to an earthquake, the sliding mass could cover industrial and residential buildings and, as a result of barrage, the polluted water could flood central quarters of the city.

Figure 2. The location of Geghanush Tailing Dam.
The inset shows its location within Armenia.
Background image: Sentinel-2, RGB composite.

The existing Geghanoush Tailings Repository was designed in early 1960's and was operated between 1962 and 1983, when the Kajaran Tailings Repository at Artsvanik was commissioned. The Geghanoush tailings repository was re-commissioned in 2006 after the completion of the diversion works and continues to be used today along with an upstream extension currently under construction. The volume of the tailing is 5.4 million m3 and the dam height is 21.5 m[3].

Tailing and water dams in the appointed pilot area are hazardous

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[3] Georisk CJSC (2017) Assessment of the Multi-Component Risk Determined by the Maximum Seismic Impact on the Kapan City (Multi-Hazard City Scenario). Project # ARM 10-0000005849, Final Report.

hydro-technical structures because of their location in an earthquake prone zone. In addition, a dam break could occur due to the technical condition of the dams and improper exploitation. Catastrophic flood is possible in this place caused by a dam failure. Therefore, the assessment of dam break consequences has a crucial meaning for emergency management and development of measures and action plans for stakeholders and respective authorities in Armenia.

Methodology and Data Used

Methodology

Flood modeling basics refer to 1D and 2D models which provide steady and unsteady flows, including the necessity of Manning N values usage. There are many event types and phenomena that can lead to dam failure:

- Flood event

- Landslide

- Earthquake

- Foundation failure

- Structural failure

- Piping/seepage (internal and underneath the dam)

- Rapid drawdown of pool

- Planned removal

- Terrorism act

Given the different mechanisms that cause dam failures, there can be several possible ways dam may fail for a given driving force/mechanism. In 1985 and in 2002 a list of dam types [4] [5] versus possible modes of failure was analyzed.

The reports from 1985 noticed that of all dam failures - 34% were caused by overtopping, 30% due to foundation defects, 28% by piping and seepage and 8% by other modes of failure. In the same report of dam failures earth/embankment dams are included, for which 35% failed due to overtopping, 38% by piping and seepage, 21% by foundation defects and 6% by other failure modes.

In our work we are doing analysis of a potential dam failure. The prediction of the reservoir outflow hydrograph and the routing of that hydrograph through the downstream valley are evaluated to determine dam failure consequences. There are calculated results about the risk to the population located close to the dam, it is important to accurately predict the breach outflow hydrograph and its timing relative to events in the failure process that could trigger the start of evacuation efforts[6].

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[4] Costa, John E., 1985. Floods from Dam Failures. United States Department of the Interior, Geological Survey, Open-File Report 85-560, Denver, CO.
[5] Atallah, Tony A., 2002. A Review on Dams and Breach Parameters Estimation. Master of Science in Hydrosystems Engineering, Virginia Polytechnic Institute & State University, Blacksburg, VA, January 2002.
[6] Wahl, Tony L., "Dam Breach Modeling - an Overview of Analysis Methods". Joint Federal Interagency Conference on Sedimentation and Hydrologic Modeling. June 27 - July 1, 2010, Las Vegas, NV.

Hydro-meteorological Observation Data

Hydro-meteorological Observation Data Flood formation and its behavior is highly dependent on hydro-meteorological conditions of the territory. Rainfall intensity and duration, snowmelt, air temperature and other meteorological factors are key drivers in flood development process. Hydro-meteorological monitoring within the territory of Armenia is conducted by the Hydromet Service of the Ministry of Emergency Situations of Armenia.

There are 2 operational meteorological stations within the Voghji River Basin Kajaran and Kapan, that provide information. Their location is presented in table 1.

№	Name of Station	Latitude	Longitude	H, m	Observation Period
1	Kajaran	39° 09' 10"	46° 09' 33"	1843	1975 – present
2	Kapan	39° 12' 15"	46° 27' 44"	705	1936 – present

Table 1. Operational Monitoring Stations within the Voghji River Basin

Thermal conditions normally decrease in the Voghji Basin as altitude increases. Multiyear annual average air temperature in Kajaran is 6.8°C and in Kapan 12.3°C (Table 2).

Meteorological Station	Absolute Altitude (m)	Month												Year
		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
Kajaran	1980	-3.4	-3.0	0.5	5.7	10.2	14.2	17.1	16.6	13.3	8.2	3.2	-1.0	6.8
Kapan	704	0.8	2.4	6.3	12.3	16.1	20.4	23.7	23.1	19.0	13.0	7.5	2.9	12.3

Table 2. Annual and monthly average air t° in the Voghji River Basin, oC

Rainfall generally increases by altitude in the basin (table 3).

Meteorological station	Absolute Altitude (m)	Month												Year
		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
Kajaran	1980	44	51	74	84	85	49	23	21	31	52	49	41	605
Kapan	704	25	31	59	75	94	66	31	28	41	49	40	25	565

Table 3. Intra-annual distribution of atmospheric precipitation in the Voghji River Basin, mm

The average annual relative humidity is 50-60%, and less than 30% at low altitudes (up to 1000 m). Frost-free days vary by altitude - annually from 260 (at the altitude of 700 m) to 50 days (higher than 3000 m). The annual average relative humidity is 60-80% (over 2600 m), and at lower altitudes - up to 30% (up to 1000 m).

Permanent snow cover starts at altitudes of 1200 m and lasts for 35-165 days. The snow depth is 15-180 cm. It lasts 1-1.5 months at altitudes of up to 1500 m and 6.5-7 months at altitudes of 3000 m and higher. The depth of snow cover is 15-20 cm at altitudes of 1300-1500 m and 120-180 cm at altitudes of 3000 m and higher (from place to place a 300 cm thick snow cover is formed, due to winds occurring in concavities).

Evaporation drops to 482-220 mm as altitude increases in the Voghji River Basin. The highest value of evaporation, 500¬480 mm,. is observed at altitudes up to 800 m.

There are 3 operational hydrological monitoring posts within the Voghji River Basin – Voghji-Kajaran, Voghji-Kapan and Geghi-Kavchut. Data of closed monitoring posts of Geghi- Geghi and

Geghanoush-Geghanoush were analyzed as well due to their importance for the Geghi reservoir and Geghanoush tailings dam break modeling (tables 4 and 5).

№	Water Object Name	Name of station	Coordinates	
			Latitude	Longitude
1	Voghji River	Kajaran	39° 08' 59"	46 09' 16"
2	Voghji River	Kapan	39° 12' 18"	46 24' 43"
3	Geghi River	Kavchut	39° 12' 23"	46 14' 50"
4	Geghi River	Geghi	39° 13' 21"	46 9' 36"
5	Geghanoush River	Geghanoush	39° 10' 35"	46 25' 24"

Table 4. Hydrological Monitoring Posts within the Voghji River Basin

River-Post	Discharge, m³/s												Annual Average	Maximum
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII		
Geghi-Geghi	1.5	1.5	1.9	5.5	12.7	12.9	6.9	3.3	2.3	2.0	1.8	1.6	4.5	37.7
Geghi-Kavchut	1.4	1.5	2.3	5.9	12.5	12.0	6.3	3.0	2.1	1.9	1.7	1.5	4.4	87.5
Geghanoush-Geghanoush	0.2	0.2	0.7	1.9	1.8	0.9	0.4	0.3	0.3	0.3	0.3	0.2	0.6	21.3
Voghji-Kajaran	0.5	0.5	0.8	3.0	7.7	11.5	7.2	2.5	1.0	0.7	0.6	0.5	3.0	43.9
Voghji-Kapan	2.4	2.6	4.6	14.5	28.7	28.5	15.6	6.4	3.9	3.6	3.2	2.7	9.7	270.0

Table 5. Flow Characteristics in the Hydrological Monitoring Posts within the Geghi River Basin

Elevation Data

Elevation data has a crucial meaning in each flood modeling process. There are various free digital elevation models (DEMs) available online (SRTM, ASTER, ALOS), the spatial resolution of which is ~30 m. This resolution is not enough for detailed flood mapping in mountainous areas. Georisk CJSC provided linear shapefile of elevation isolines of 1:10,000 scale. From this shapefile, 5 m resolution DEM of the studied area was calculated using Topo to Raster interpolation tool of ArcGIS Spatial Analyst toolbox (Figure 3): '

Figure 3. 5m DEM of Studied Area

Geomorphometric parameters (slope, aspect and shaded relief) were derived from DEM and by using ArcHydro Tools. Raster layers were calculated from the DEM (Filled DEM (hydrologically-corrected); Flow Direction; Flow Accumulation; Streams (defined and segmented); Catchments GRID).

Catchment polygon has been created based on the layers created and drainage line vector layers were obtained. A detailed land-cover and land-use maps have been created using the European Space Agency (ESA) and the European Commission services[7]. For open water (including the Geghi reservoir) and tailing ponds Sentinel-1 (SAR) data was used. After obtaining the results of the open water and tailing ponds then they were superimposed on the other classes. The final map is shown in the Figure 4.

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[7] Schlaffer S., Harutyunyan A. (2018) Working Paper: LCLU Voghji River Basin AUA Acopian Center for the Environment, AUA GIS and Remote Sensing Lab.
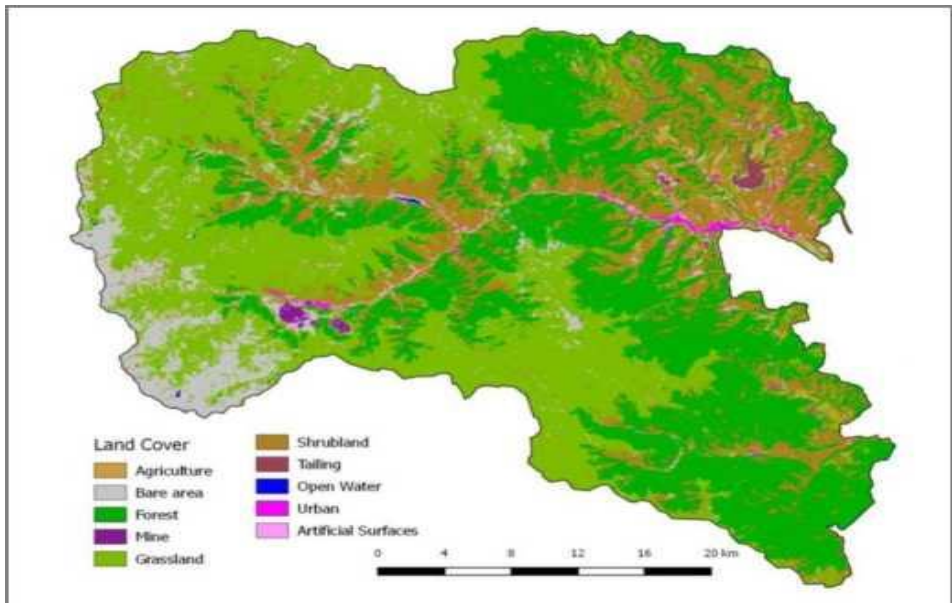
Figure 4. Land-cover and land-use map of the Voghji basin

Desktop Application for Flood Hazard and Risk in Armenia

Based on the flood maps presenting different scenarios of water spill from the dam break a specially developed open source desktop tool has been created. Its architecture is based on a model designed within the ALTER consortia with no use of commercial software. The application is mainly based on open source GIS software; server part for the dynamic events, JavaScript and its libraries and frameworks. The tools implemented are open source software solutions such as

- Geoserver, Qgis, Web App Builder, Boundless WEBSDK, OpenLayers. Geoserver allows the user to display spatial information to the world;

- newline QGIS is a professional GIS (Geographic Information System) cross-platform application that is Free and Open Source Software (FOSS);
- Web App Builder is a plugin for QGIS that allows easy creation of web applications;
- Boundless WEBSDK which provides tools for easy-to-build JavaScript-based web mapping applications;
- newline OpenLayers is an open-source JavaScript library for displaying map data in web browsers.

It includes different features and tools that may lead to a faster response and an easier way of making decisions in flood event cases.

The application has the function to visualize the most vulnerable buildings (Figure 5). It includes different scenarios that can be analyzed in operational room and by its tools can support a better management of the current and future situation in cases of flood events. It is focused on visualization of high waves coming after a dam break in cases of failure.

Figure 5. Application main screen

The application has the ability of switching the predefined layers and the base map layers. The predefined layers have a very rich data by turning them off or on. Users can easily make analysis of the risks in cases of flood events. It includes different scenarios of the water spread in support of better decision making and faster resource allocation. Layers can be downloaded as geojson files. Geolocation of team members on the field is available for the users.

The base map layers include Street map, Satellite map, Shaded relief map and NatGeo map which can be used in operational room analysis.

Figure 6. Layers list

Draw feature tool can mark the zone of interest (Figure 6) by polygon or line which will be visualized and be seen in the operational room in real time.

The Popup feature visualizes information about the vulnerable buildings such as schools, kindergartens and others (Figure 7).

The export feature can save maps with new data as picture format files. This feature can be used in future data analysis.

Figure 7. Application Popup

Measure and distance options can be used to measure the distances and also the size of the focused area.

The application provides connection to the current weather forecast via openweather with detailed information about the current or future weather conditions. It is connected to EFAS emergency management service which provides extra satellite data about current conditions.

Conclusion

GIS raster layers of flood inundation zones and depths, as well as tables of simulated dam break characteristics for Geghi Reservoir and Geghanoush TSF Dams were developed for three failure scenarios – full failure, half failure and 10% failure. Maximum depth of the flooding, maximum absolute altitude, flooding time, maximum flow discharge and velocity in a given cross-section and other parameters were calculated. Based on the analysis and discussions of these results open source web-GIS visualization tool has been developed and implemented for testing the areas of the research work. 2

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