CMDR COE PROCEEDINGS 2014–2015

CRISIS MANAGEMENT AND DISASTER RESPONSE CENTRE OF EXCELLENCE (CMDR COE)

Crisis Management and Disaster Response Centre of Excellence (CMDR COE), September 2015

Crisis Management and Disaster Response Centre of Excellence (CMDR COE)
34A Totleben Boulevard, Shipka Hotel, floor 2
1606 Sofia
BULGARIA
Phones: 359 29224700, 359 2 9224705
Fax: 359 2 9224755
www.cmdrcoe.org

Published in Bulgaria
ISSN 2367-766X
Published by Crisis Management and Disaster Response Centre of Excellence, CMDR COE

CMDR COE Proceedings accepts publications submission of papers in the crisis management and disaster relief domain. Any views or opinions presented in this book are solely those of the author/s and do not necessarily represent those of the CMDR COE. Authors are responsible for the content of their papers and for the quality of the English language, used in the paper. It is also the authors' responsibility to ensure that data have been collected in an ethical manner. Authors are responsible for disclosing potential conflicts of interest.

Ladies and Gentlemen,

Seeing the first issue of CMDR COE Proceeding I am pleased of our common effort. At times like these, it is important that we stand together with unity of purpose and unity of actions. I am confident that by working closely together, by coordinating precisely together, we reinforce our security environment. We live in a time when our security landscape is marked by persistent conflict, constant change, and enormous complexity as the future holds uncertainty of man-made crises – political, financial, and social, in addition to the increasing natural resource competition, demographic changes, violent extremism.

Living in a world in which disaster can strike from a number of fronts we have an obligation to be better prepared to face and overcome challenges. This is not a concrete agenda full of deadlines but includes activities and performances, which in reality determine the effectiveness and profitability of our long-term ambitions. It is recognized that peace, security, development and stability are more interconnected than ever, placing a premium on close interaction amongst all actors involved assuming their respective roles in crisis prevention and management. My organization, the Crisis Management and Disaster Response Centre of Excellence maintains the idea that no one alone is sufficient to prevent or manage crises. Success requires enhanced interaction amongst the whole spectrum of actors at all levels before and during engagement.

Based on our activities in the last 2 years the present issue of CMDR COE Proceeding 2014-2015 hereafter focus attention to factors that will largely shape, in my humble opinion, the implications to the complex of actions and interactions in response of disasters and management of crisis.

Vassil ROUSSINOV
CMDR COE Director
September 2015

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ABOUT THE CMDR COE SEMINARS

The CMDR Interagency Interaction Seminars are annual events which gather subject matter experts, researchers and educators, planners and developers, consultants and various actors working in the crisis management and disaster response domain in order to promote a lively debate on these issues.

Every year, a lot of representatives of different NATO and PfP nations take part in the CMDR COE annual seminars. The annual event aims to improve the common understanding of interagency cooperation in the area of CMDR and to contribute to the Comprehensive Approach in this field.

The latest CMDR COE annual Interagency Interaction Seminar was carried out in the period 8-9 JUN 2015 at Boyana Residence, Sofia, Bulgaria. This annual event, third in a row, enables SMEs from NATO and Partner nations to share their views and thoughts in perspectives on cooperation and collaboration issues of common interest. The CMDR COE intent is to facilitate the exchange of ideas regarding transformation throughout the transatlantic community by creating a common understanding in the sphere of crisis management and disaster response.

Contributions have been sought from people active in any relevant field, and the seminar was focused on key aspects, such as:

- *Crisis Management and Disaster Response Policies and Interactions;*
- *Future Operations In Urban Environment;*
- *Best Practices in CMDR Education and Training.*

As the CMDR COE Director Col Vassil Roussinov said in his address to the participants, the recurring keywords in all presentations which serve as a basis for further discussion are: interaction, cooperation and coordination.

CMDR COE would like to express sincere gratitude for the significant contributions of all participants toward the success of the Crisis Management and Disaster Response Interagency Interaction Seminar.

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EXECUTIVE SUMMARY

Conceptual Model of Information System for Expert Earthquake Risk Estimation for the Bulgarian Territory Using GIS Environment – Building Relevant Data Sets

The paper aims to call the publics' attention to the importance of the earthquake risk mitigation problems and to indicate once again the increasing necessity to improve sharing of information and collaborative multidisciplinary efforts to assess the available databases and their harmonization in accordance with national and European legislation. Major target of the authors has been to explore the possibility of using public data for the purpose of earthquake risk estimates. The acquired data sets and intermediate results are discussed related to general basic statements regarding earthquake hazard and risk assessments. Further plan for action and potential areas of collaboration with CMDR are also shared in brief.

The Syrian Crisis and Implications Worldwide 2011-2103 Review

This analysis was presented by a team from CMDR COE only for educational purposes for the period up to March 2014. All information was provided in the utmost good faith based upon the best information available to the training audience at the time, errors and omissions excepted.

A Summarized Analysis of the Current State of Areas Affected by the Snowfalls in the Republic of Bulgaria and a Forecast for the Development of the Situation

A summarized analysis presents a complicated hydro-meteorological situation and heavy snowfalls accompanied by rising river levels mainly in southern Bulgaria. The heavy wet snow caused power outages due to fallen trees, which cut off the power lines. Over 400 settlements in the districts of Kardzhali and Haskovo were left without electricity there have been landslides on the roads which were closed to traffic, impeding motor vehicle movement. This paper provides recommendations for appropriate disaster response measures.

The Disaster in the City of Varna on 19 June 2014 – Observation and Analysis

This paper is an analysis of the prevention measures, preparation and response of the local authorities to the disaster which stroke the city of Varna

(Asparuhovo quarter) on 19 June 2014 and provides valuable recommendations for improving of disaster prevention, preparedness and response. It submits lessons identified to that calamity and could be used by national, regional, and local authorities in their disaster management activities.

NATO Crisis Management

The report describes NATO Crisis Management as a fundamental security task of the Alliance. It provides an overview of its main elements - NATO Crisis Response System, NATO Crisis Management Process, and NATO Crisis Response Organization and related to them supportive elements. It gives ones-over of the current security environment and respected changes into NATO security posture.

Climate and Geographical Implications for Future Urban Operations

The paper presents an analysis of climate and geographical implications for urbanization to 2035, along with a series of factual recommendations, in order to support NATO experimentation on the future urban environment. Geographical implications include significant growth in the world's urban population, especially in developing countries (the so-called Global South), especially in Africa, East Asia and South Asia, in areas that are tropical or sub-tropical, and often lack the economic and governmental resources needed to cope with the pace and scale of urban change. Slower urban growth-in some cases, decline-will occur in developed countries in the same timeframe, while India, China and several African countries will experience a dramatic change from a predominantly rural today to a predominantly urban population by 2035. There will be a significant increase in the number of megacities and other large cities, mostly in Asia, but even faster, more dynamic and variable growth will occur at the level of small and medium cities, especially in Africa and Asia, making mid-sized cities an important category alongside megacities. Urban agglomerations will continue to expand into megalopolises, and cities (hence global population and assets) will continue to cluster in littoral zones. Expanding linkages will connect urban, peri-urban and rural environments in a networked system so that changes in one part of the rural-urban spectrum affect others. Climate implications of urbanization for NATO operations 2035 include albedo reduction, deforestation/vegetation change, urban heat sequestration, urban energy consumption, Urban Heat Island effects, urban aerosols and pollutants and rainfall effects of urbanization, along with the potential for sea level rise in Low-Elevation Coastal Zones (LECZs), vulnerability of ports and harbours, localized flooding, climate-induced migration, increased heat effects on urban areas, snowmelt, landslides and mudslides, earthquakes, volcanoes and tsunamis, disease effects and increasingly frequent and severe extreme weather events. Beside these

direct effects of climate change, indirect effects will occur through climate mitigation/adaptation efforts that may obstruct mobility, deny access, or close open space within and around urban environments. NATO's primary geography and climate concerns in 2035 will include urban overstretch, decay and fragility, internal secession, urban non-state armed actors, littoral urban vulnerability, climate-induced migration and conflict, and vulnerability of cities to climate change. Water, food and energy supplies will most likely be critically scarce commodities in the future urbanized environment. Capabilities to operate in the cluttered, disaggregated urban battle space of edgeless cities, and to seize and secure Sea/Air points of entry will be important, as will urban systems modelling, urban mapping, protected mobility, subterranean/subsurface warfare, water extraction and purification and rooftop manoeuvre systems.

The Conduct of Future Operations in the Urban Littoral and its Implications for NATO

This paper is one of a series in support of the Allied Command Transformation Urbanization Project. It examines coastal urbanisation, including increased electronic connectivity, in order to define the urban littoral, identify the key characteristics of urbanized littoral environments, explore their implications for future NATO joint expeditionary operations, and consider their impact on the Alliance more generally.

Use of the Military in Humanitarian Relief

In this report a presentation by Frederick C. Cuny to the International Peace Academy and the UN Peacekeeping Commanders is described. He was an American disaster relief specialist who was an active person in many humanitarian projects around the world from 1969 until his forced disappearance in Chechnya in 1995.

Development of Distributed Environment in Support of Security Capabilities in the Balkans Region

This paper addresses multinational and interagency cooperation in efforts to support regional defense and security cooperation through Establishment of Education and Training Network. The article tackles the question of using of simulation environment and conducting of CAX's as a complex combination of live, virtual, and constructive simulations in order to enhance the readiness and Joint Warfighting capabilities of the South Eastern European Countries. More deeply, involvement of the EU and NATO and their Member States should develop in multinational projects and deliver the permanent military capabilities they need and can use not only for military purposes but for emergency and crisis management also in defense support of civilian authorities. Finally it addresses the Balkan example of efforts to create

South Eastern Europe Education and Training Network by developing and inoculating interoperability, through linking systems, forces and headquarters at regional and national level. Work is currently underway in order to improve the synergy between the Nations in the region with EU and NATO in certain capabilities areas where both have pilot projects. SEEETN is a set which will bring exercise and training to those who need it anywhere at any time and will transform the Armed Forces intellectually, culturally and militarily.

Integrated Environment for Crisis Management and Disaster Response Training

The paper presents a vision for an Integrated Training Environment for Crisis Management and Disaster Response, based on the recent advances in simulation and gaming technologies. An Idea for an Integrated Training Environment adapted to the NATO Concept Development and Experimentation Policy and Processes is described. Some insides of the civilian perception for the crisis management training are described, a further consideration of which could increase the efficiency of the training and exercises in this domain.

Redefining the Role of Humanitarians in Taking Care of Civilians during Emergences

Article is dedicated to improvement of work of humanitarian organizations in the emergencies. Even though, humanitarian organizations play significant role in protection of civilians, it is important to emphasize certain points which must be better. In the organization and implementation of civil emergency relief, humanitarian organizations both national and international participate alongside the maximum engagement of governmental services and institutions in every emergency today. The consequences of emergencies include human losses, environmental destruction, and the inability to provide basic human needs (water, food, and shelter), and the destruction of infrastructure, all of which endanger the survival of civilians, and especially that of the most vulnerable: children, women, and the disabled, sick, and elderly. Also based on experience which we all witnessed in previous years and unfortunately today, it is obvious that in area of humanitarian work is much place for improvement of efficiency.

Anti-Terrorist System for Control, Announcement and Reaction (ASCAR)

The paper presents ASCAR system, based on innovative scientific and management solutions to bring a cost-effective, easily implementable, accurate new-age disaster management and prevention product. Information from the place of a terrorist act is transmitted in real time to all national services with corresponding action protocols, which allows for multi-level/stage management.

CONCEPTUAL MODEL OF INFORMATION SYSTEM FOR EXPERT EARTHQUAKE RISK ESTIMATION FOR THE BULGARIAN TERRITORY USING GIS ENVIRONMENT – BUILDING RELEVANT DATA SETS

Mihaela Kouteva, Lyubka Pashova, Temenoujka Bandrova, Silvia Marinova, Stefan Bonchev, Mariyan Markov

Abstract: *Major purpose of this study has been to explore the possibility of using public data for the purpose of earthquake risk estimates. The acquired data sets and some intermediate results are discussed related to general basic statements regarding earthquake hazard and risk assessments. Further plan for action and potential areas of collaboration with CMDR are also shared in brief.*

Keywords: *model, quake, risk, environment, data sets*

INTRODUCTION – THE EARTHQUAKES' LESSON

Among the different adverse events, resulting from natural hazard processes of the Earth, the earthquakes are associated with a chain of potential negative consequences like tsunami, liquefaction, fires, lifelines and communication interruptions, ecological emergency, etc. that might provoke extreme crisis situation. The recent statistics has indicated that more than 90% of the occurred natural disasters are weather-related disasters – meteorological (storms), hydrological (floods), and climatological (heat waves, cold waves, droughts, wildfires). According to the most comprehensive natural catastrophe loss database in the world, NatCatSERVICE (http://www.munichre.com/), the number of the registered 980 natural events in 2014 is much higher than the average one of the last 10 years. The overall losses from these natural disasters were US $110B. In comparison, in 2013 the NatCatSERVICE registered 890 loss natural events worldwide with overall losses of US $135B; 41% of all 980 loss events for 2014 fell into the category of meteorological natural disasters (42% – hydrological, 9% - climatological, and 8% – geophysical). The earthquakes, represented by the smallest percentage within this classification, are natural disasters characterized by relatively large return period, which can have disastrous consequences and leave lasting damage, requiring years to repair. Some of the devastating earthquakes of the past decade include: the 7.8 magnitude earthquake of April 25, 2015, which killed 8,452 and injured more than 19,000 people in Nepal, costing an estimated US $5B in property damage; the 9.0 magnitude March 11, 2011 Tōhoku earthquake and tsunami, which killed 15,889 and injured more than 6,000 people in Japan, costing US

$235B in property damage; the 8.8 magnitude February 27, 2010 Chile earthquake and tsunami, which killed 525 and injured more than 12,000 people in Chile, costing US $15B in property damage; the 7.0 magnitude January 12, 2010 Haiti earthquake, which killed 230,000 and injured more than 300,000 people in Haiti, costing US $14B in property damage; the 7.9 magnitude May 12, 2008 Sichuan earthquake, which killed 69,195 and injured more than 370,000 people in China, costing US $75B in property damage; the 6.9 magnitude October 8, 2005 Kashmir earthquake, which killed 86,000 and injured more than 69,000 people in Pakistan, costing US $5.2B in property damage (https://en.wikipedia.org/wiki/Natural_disaster). The recent mega-earthquakes that killed hundreds of thousands and shocked millions of people have shown our inadequate preparedness for such disasters. These extraordinary lessons have clearly demonstrated the necessity of revision of the thinking of all brain-workers, involved in seismological and earthquake engineering problems considering the severity and the consequences of these disasters (Wyss, 2014a).

South-Eastern European region is one of the major seismically active zones in Europe - the Mediterranean / Trans-Asian seismic belt in the Balkan region and the Vrancea seismic belt extend beyond any single country. Almost one earthquake event occurs every year in Turkey and one event occurs every eight years in Romania and Bulgaria. Not a single SEE country remained immune to earthquakes over the last century, which caused multi-billion dollar damages and heavy loss of life. Yet despite the growing economic losses from disasters caused by the impact of natural hazards in the region, so far most households and businesses remain uninsured against natural hazards, while governments remain fiscally ill-prepared to face economic losses from large disaster events. Total economic loss from a 250-year natural disaster (GDP%) for Bulgaria are evaluated to be 18% (Gurenko & Zakov, 2008). The six most significant earthquakes, as a result of which there are victims and affected people in Bulgaria, from 1900 till now are: the earthquake of April 14, 1928 with 107 casualties; the earthquake on March 4, 1977 (Vrancea, Romania) with 20 casualties and 165 injured; the earthquake on December 7, 1986 (Strazhitsa, Turnovo region) with 3 casualties, 60 injured and 3000 homeless; the earthquake on May 30, 1990 (Vrancea, Romania) with 1 casualty; the earthquake on February 20, 2006 (Murgovo area, Kardzhali) with 2 injured and 525 affected; the earthquake on May 22, 2012 (Pernik) with 70 injured and 140 affected (EM-DAT, 2015). Out of this formal statistics it worth to mention the Kresna earthquake of April 4, 1904 (M ~ 7.2) - one of the strongest events, occurred in Europe so far. Due to this quake, hundreds of houses are significantly damaged and remain uninhabitable. The available earthquake record indicates about 50 victims caused by the foreshock, M ~ 6.9, that stroke 20 minutes before the main shock. Thus, most of the people were already outside of the buildings, when the main shock occurred (Ambraseys, 2001). Regarding the capital of Bulgaria, where currently more than 20 % of Bulgarian population is

accommodated, the published historical documents prove the occurrence of destructive earthquakes during the 15th-18th centuries in Sofia zone (Watzof, 1902). The largest earthquakes are those occurred in 1818 with epicentral intensity Io=VIII-IX MSK-64 and 1858 with Io=IX-X (near Sofia, M ~ 7.0) and in 1905, M~6.5 (near the town of Tran in the western marginal part of Sofia zone). The epicentral macroseismic intensity, Io~X, summarising the heavy destruction in the town of Sofia in 1858, is firstly evaluated on the MSK64 scale (Petkov and Chistoskov, 1965) and updated later on the EMS98 scale (Paskaleva et al., 2007). Among the strongest earthquake, which have occurred in Sofia so far, is the earthquake of October 18, 1917 with magnitude M = 5.2 (Kirov, 1952; Petkov and Christoskov, 1965) and reported epicentral intensity Io ~ VIII, MSK-64 (Petkov, Christoskov, 1965), followed by the magnitude 4.0 quake of 15, November 2008 that hit Sofia without reported damage. The strongest recent earthquake, that occurred near Sofia is the Pernik quake of May 22, 2012, M= 5.8 (Hadjisky, 2012). In 1928 a series of three strong earthquakes, (M = 6.8, 7.1, 5.8) occurred in the Maritza river valley (Christoskov and Solakov, 2009). Last damaging shocks are the earthquakes in 1977, M = 5.3, and 1986, M =5.7, Strazhitsa (Christoskov and Solakov, 2009). The annual average economic losses from disasters caused by the impact of natural hazards in Bulgaria for the period 1974-2006 are evaluated of US $14.76M as those from the earthquakes are evaluated on US $5M. For example, the costs due to earthquakes on Dec. 06, 1986 are evaluated on US $50M, but no such economic evaluations for other events (e.g. Apr. 14, 1928, Mar.04, 1977, etc.) are available (Gurenko and Zakov, 2008). The newly-formed CATDAT (Daniel et al., 2010) of damaging earthquakes database contains economic damage and historical impact data on over 6500 earthquakes worldwide since 1900. The highest ranked earthquake losses with many economic loss values not reported in existing databases are given since 1900 in terms of percentage of nominal GDP (both unadjusted and purchasing power parity), including refinements of many historic earthquake economic losses from many sources and improvements in quality control, the CATDAT Damaging.

Earthquakes database shows an accurate representation of historical losses and there is no a significant increase in economic losses through time. In case of historic earthquake for the Bulgarian territory in 1928, the median cost at time of event is evaluated on US $16M or 3.85% of nominal GDP.

This paper aims to call the publics' attention to the importance of the earthquake risk mitigation problems. Some coupled multidisciplinary efforts of civil engineers, cartography and GIS experts, performed within the framework of the university UACEG-CNIP research project БН 164/14, dealing with a conceptual model for information system for expert express evaluation of the earthquake risk over the Bulgarian territory using GIS, are in

progress. Major purpose of this project has been to explore the possibility of using public data for the purpose of earthquake risk estimates. The acquired data sets are discussed in the aspect of general basic statements regarding earthquake hazard and risk assessments. These heterogeneous data have to be harmonized in standardized datasets according to the INSPIRE Directive recommendations (INSPIRE; http://inspire.ec.europa.eu/).

EARTHQUAKE RISK - GENERAL RISK CONCEPT

Earthquake Risk Sources

Damaging natural disasters cause social, psychological and economic damages due to life losses and property damages. The severity of these losses is closely related to the resilience of the affected population, including population's disaster preparedness culture and its ability to recover. Risk, in general, is an important concept for measurement of the uncertainty in our everyday life and dealing with these uncertainties in decision-making process.

Different risks are distinguished according to relevant risk sources and particular hazards, ranging from personal health, financial markets, to natural disasters. Although the terms "hazard" and "risk" have often been used interchangeably, they are fundamentally different. In general, hazard describes a natural or man-made phenomenon that could cause harm to the society – the earthquake hazard refers to the severity of the earthquake ground excitation within a given exposure of time, while risk is associated with the potential casualties and losses due to the exposure of different environmental elements to those hazards. Common risk definitions consider the risk as probable outcome from the interaction between a hazard, exposure and vulnerability RISK = HAZARD x EXPOSURE x VULNERABILITY.

Earthquake Risk and Vulnerability – Basic Data

The seismic risks are determined by three main factors: the level of seismic hazard, the number of people and amount of property that are exposed to seismic hazards and how vulnerable these people and property are to the hazards. Generalized conceptual scheme for seismic risk assessment is shown in Figure 1.

• Seismic hazards are sources of potential harm or loss during earthquakes, since the earthquake ground shaking is capable to generate different natural phenomena – e.g. landslides, tsunami, and liquefaction. The earthquakes could also trigger other types of induced hazards associated with provoked damage / collapses in different elements of the built environment such

as buildings, loose equipment, lifelines, infrastructure elements, etc. In general, stronger ground motions generate hazards that are potentially more dangerous or damaging, and for this reason usually seismic hazards are measured in terms of potential ground shaking. Seismic hazard levels differ significantly across the territory of interest. To be informed about the levels of earthquake hazard in a given region, we refer to the earthquake hazard maps, included in the Codes for Design and Construction in Earthquake Prone Regions. Similar information is available in specialized publications on the matter.

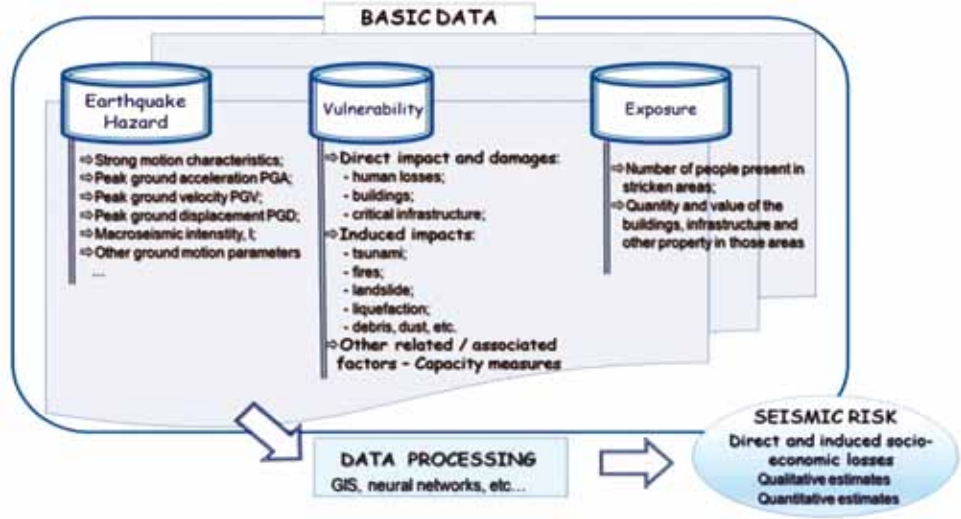

Figure 1. Generalized conceptual scheme of relevant datasets for seismic risk assessment

• The multiple vulnerability definitions and different conceptual frameworks that exist agree on the major general characteristics of the vulnerability, which is multi-dimensional, dynamic, scale dependent and site specific (Cees van Westen et al., 2011). Vulnerability encompasses exposure (at risk property and population), resistance (measures taken to prevent, avoid or reduce loss) and resilience (ability to recover prior state or achieve desired post-disaster state). The wide vulnerability concept provided by the ProVention Consortium, 2007, defines the vulnerability as the potential to suffer harm or loss, related to the capacity to anticipate a hazard, cope with it, resist it and recover from its impact. There are many aspects of vulnerability, arising from various physical, social, economic, and environmental factors (Birkman, 2006; INSPIRE, 2013). Physical vulnerability is related to the potential for physical impact on the built environment and population. Vulnerability is analysed per group of constructions (i.e. structural types) having similar damage performance; it is an intrinsic quality of a structure and does not

depend on location. Examples may include poor design and construction of buildings, inadequate protection of assets, lack of public information and awareness, limited official recognition of risks and preparedness measures, and disregard for wise environmental management. The economic vulnerability describes the potential impacts of hazards on economic assets and processes (i.e. business interruption, secondary effects such as increased poverty, and job loss). Social vulnerability is associated with the potential impacts of events on groups such as the poor, single parent households, pregnant or lactating women, the handicapped, children, and elderly; it considers public awareness of risk, ability of groups to selfcope with catastrophes, and status of institutional structures designed to help them cope. Environmental vulnerability is related to the potential impacts of events on the environment. Vulnerability varies significantly within a community and over time. It can be expressed at different scales from human to household to community to country resolution – each location might need specific approach for vulnerability definition and assessment. The vulnerability of property to seismic hazards is determined by the prevalence of earthquake-resistant construction. Buildings, lifelines and other elements of the built environment that have been constructed in compliance with the latest seismic building codes and standards will be more resistant to earthquake damage. Older structures that were built under earlier, less-effective codes and have not been retrofitted to meet later standards are likely to sustain more damage.

• Exposure concerns earthquake casualties that are limited by the number of people present in stricken areas and losses are constrained by the quantity and value of the buildings, infrastructure and other property in those areas. Seismic risk increases as earthquake-prone regions become more densely populated and urbanized. Although local planning and zoning activities can help shape regional growth over time, the additional development is generally (and understandably) promoted as a means of strengthening local economies. Levels of earthquake preparedness and disaster resilience determine how vulnerable the people are to the seismic hazards. Individuals, organizations and communities that have invested in assessing their seismic risks, and in formulating and implementing responsible preparedness and mitigation measures, are likely to experience fewer casualties, less damage and less disruption from earthquakes. Earthquake-resistant construction is a preeminent example of such measures (https://www.fema.gov/your-earthquake-risk).

Seismic Risk

Seismic risks are the harm or losses that are likely to result from exposure to the seismic hazards. These risks are usually measured in terms of expected casualties (fatalities and injuries), direct economic losses (repair and replacement costs) and indirect economic losses (income

lost during downtime resulting from damage to private property or public infrastructure). Seismic risk might be estimated using a wide range of techniques, characterized by different capability and effectiveness to deal with the uncertainties. The conventional methods are based on predicting probable losses to a given element at risk over a specified time frame; these methods target a limited audience. Some ideas for an earthquake insurance scheme for Bulgaria have been developed in 2008, after launching a fully probabilistic earthquake loss model for Bulgaria (http://www.businessinsurance.com/article/20080603/NEWS/200013103/benfield-launc-hes-bulga-ria.earthquake-model). The 250-year loss for residential risks for Bulgaria is estimated GAPQuake at about €1.7B (US $2.65 B). Holistic models are suggested to cover different range of applications - they are referred to the ways of describing risk as a product of multiple factors in a given indicator system. The holistic approach, in general, lies on modelling characterization of the risk sources through a multidisciplinary approach (Davidson and Shah, 1998; Vahdat and Smith, 2010 and references in). The risk estimation procedure starts with defining the scope of analysis and the corresponding indicators that may contribute for the risk's elements. Afterwards, a mathematical combination is employed for scaling different range of indicators and the relative importance of indicators contributing in risk is computed. The combination of scaled indicators could generate seismic risk indices which can be implemented in final stage of the procedure. A quantitative measure of the risk is not always possible due to a lack of data, in such cases a qualitative assessment can be applied based on expert opinion. Some attempts to perform deterministic quantitative risk estimation for Bulgaria were performed within the framework of the Radius Project (GRIP, 1999; Kaneva, 2015). Considering the new definitions of the seismic impact and the current state of the existing building stock, it worth to try some first order estimation of the earthquake risk to be performed using the available public data. The CNIP- UACEG – БН 164/14 project aims to adapt the holistic approach for seismic risk estimation for this purpose.

THE UACEG - CNIP - БН 164/14 PROJECT - BUILDING RELEVANT DATA SETS

Seismic Hazard and Seismic Action

This dataset includes available raster maps and digital reconstruction of some of these maps, using available discrete values. Raster maps, included in the current regulations in force in Bulgaria: (a) Ordinance № RD-02-20-2 from 27.01.2012 for design and construction in seismic areas (return period TR=1000 years) and (b) the Eurocodes system - EN 1998-1:2004 and BDS EN 1998-1:2005/NA: 2012, are available in the officially published documents. Raster maps of macroseismic intensity, MSK-64, based on the probabilistic seismic hazard assessment and PSHA approach, are published

in (Simeonova et al., 2006). These maps are also available through the GIS portal of the Bulgarian Ministry for Regional Development and Public Works: http://gis.mrrb.government.bg/MRRB/. Based on the available data, at this stage, comparative analysis can be run mainly at qualitative level. Despite the general requirements to the seismic hazard mapping for compatible acceleration levels (Hristoskov et al., 2006) these maps are plotted using different levels and intervals of ground acceleration. The provided discrete data appear to be insufficient for realistic reconstruction of the published raster maps (Kouteva, 2015; Pashova et al., 2015). Other raster maps of peak ground acceleration, velocities and displacements concerning the seismic hazard levels for the Bulgarian territory, based on the neo-deterministic SHA techniques are available in the Introduction (Panza and Vaccari; 2000) of the topical Pageoph volume titled Seismic Hazard of the Circum-Panonian Region. Revised macroseismic intensity map due to the strong Vrancea earthquakes become available as result of the CEI project 1202.136- 07, 2008-2009 (Panza et al., 2014). The current controversy concerning the method and results of estimating seismic hazard and risk is addressed in detail by different discussions (Panza et al., 2010; Wyss, 2014a). Although deterministic estimates of the hazard have its advantages, the insurers also have their justification of the need to calculate the hazard and risk probabilistically (Wyss, 2014a,b and ref. in). Raster maps of rather bad graphical quality are available through printed versions of elder Codes for Design and Construction in Earthquake Prone Regions in Bulgaria (1964, 1987).

To complete the information data sets associated with the seismic action definition following the legislation in force, it is necessary to have at disposal also information about the geological soil conditions, which involve data about the average shear-waves velocity in the superficial 30m, VS30. A lot of information on this parameter, which is not publically available, is acquired within the execution of different projects (e.g. the metropolitan in Sofia, the seismic microzonation studies of the Sofia city). Currently, the only possibility for public data access and mapping the VS30 is provided by the internet on-line USGS VS30 server - http://earthquake.usgs.gov/hazards/apps/vs30/ (Wald and Allen 2007, 2009). Using this server and the available data on a 3” x 3” grid cells, VS30 map was compiled for the needs of the UACGCNIP research project БН 164/14 (Pashova et al., 2015). The values of coefficients for deriving the VS30 map were chosen to be the mean values between those for active tectonic regions that possess dynamic topographic relief and for stable continental regions where changes in topography are more subdued. The coefficients choice is based on the geodynamical conditions in the South-European region (Shanov and Kostov, 2015). These maps must be used with great care, since mapping of local geological conditions in large scale can lead to significant error in the seismic action definition as basic input data for the seismic risk assessment, but on the other hand such information is

very useful for the first order risk estimates. Trying to gather as much as possible available information, we also found the rather raw map of the superficial engineering geological condition published in 2001 (Paskaleva et al., 2001) – it is prepared on a 12' x 12' grid cells, following the ground type classification provided by Trifunac and Brady (1975). Comparison of those maps is briefly discussed in the Progress report on CNIP – UACEG – БН 164/14 (2015 – in Bulgarian) and by Pashova et al. (2015). The data fit is acceptable with regard to the major ground categories – rock, intermediate soil and weaker alluvium soils. Another available raster map of some engineering-geological elements representing the rate of seismic waves is published by the Geological Institute at the Bulgarian Academy of Sciences in 1973 under the UNESCO project – Balkan seismicity project. Targeting to the overall hazard picture, it would be useful to combine the seismic hazard maps with maps of other geological hazards, particularly landslides, avalanches, liquefaction susceptibility, etc., but those data require particular permissions to be used.

Building Stock and Physical Vulnerability

The role of the existing buildings on disaster mitigation is paid attention after each significant earthquake. The buildings' data are classified as a key theme for environmental studies by the INSPIRE Directive. This data set contains data on typology of structures, capacity curves, vulnerability classes available from recent projects on seismic risk assessment, scientific publications and statistical published information.

The best data set would contain the two kinds of semantic profiles, specified by the TWG BU (INSPIRE, 2013): (i) the normative core profile based on data widely available whose harmonization is required at European level (such as height, number of floors, building use and building nature, date of construction and number of dwellings, among others), and (ii) an extended profile based on data that is widely required but that is rarely available (material of facade, roof and structure, floors below ground, material of structure, official area). These data provide information describing the attributes of the elements at risk, in particular buildings, necessary for determining their vulnerability and associated fragilities. The public data, available through the National Statistical Institute (NSI), are the data gathered about the residential buildings, which were subject to the census carried out in 2011 pursuant to the Law for Census of Population and Housing in the Republic of Bulgaria. The collected information on existing buildings contains: type, location, number of floors, material of which the building is constructed, the availability of solar panels, year of construction, availability of a lift and number of dwellings in the building. To our regret, these characteristics are considered independently, e.g. the number of floors is not related to the structural construction type or building material. The available statistical information shows that almost more than 50% of

the buildings in Bulgaria were built before 1987 (National Strategic Plan for Building Wastes Management and Demolishment for 2011-2014). They differ because of the heterogeneity of building structural systems, materials used, the construction period and number of floors. The enforcement of building codes is followed for buildings constructed during the last several decades. Their design complies with a certain level of seismic protection predefined by the building codes and standards in effect at the time of construction. A brief summary of these data according the vulnerability classes, set in EMS 1998, is shown in Figure 2.

Physical Vulnerability can be estimated either using the empirical approach (e.g. EMS-98) or using contemporary methods for modelling and analysis of the behavior and response of buildings' structures under seismic action. Unfortunately, there are not vulnerability curves as officially published results for Bulgarian structures.

Figure 2. Distribution of the residential buildings in Bulgaria, built before 2011 (Mihalevski.2013), according to building materiel and vulnerability classes according to EMS-98 - left; period of construction - in the middle and earthquake resistant requirements - right

The European Seismological Commission (1998) states the differentiation of buildings into vulnerability classes from A to F according to the type of building structure: masonry, reinforced concrete, steel and wood. The damages of the buildings under earthquake are associated with the type of the structure. The Classification of damage covers five grades, starting from Negligible to slight damage (Grade 1); Moderate damage (Grade 2); Substantial to heavy damage (Grade 3); Very heavy damage (Grade 4); ending with Destruction – Grade 5. For each intensity degree the effects on population and buildings are described. Thus, the vulnerability class, damage level and population are integrated in the integrated macro-intensity twelve degree scale. Suitable recent structure topology for the Balkan countries was provided by the RISK UE Project (Milotinovic and Trendafilosky, 2003), in which buildings are classified according to: (i) major

material and structural system (masonry, reinforced concrete, steel and wood); (ii) number of floors and overall height – 3 classes high, mid- and low-rise; and (iii) level of seismic code, used for design and construction of particular building – N → no code; L → low code; M → moderate-code, and H → high-code (comparable with Eurocode 8).

Other approach - first order estimation of the structures capacity regarding the seismic excitation - is the comparison of the capacity curves, obtained e.g. by push-over analysis with the Sa-Sd curve of the seismic action. So far, very few capacity curves for buildings structures in Bulgaria have been published. A very good set of such curves for representative buildings for the Balkan region is provided by the available documentation of the RISK-UE project (Milotinovic and Trendafilosky, 2003). Twenty four capacity curves, representing the capacity of buildings structures provided by UTCB-Bucharest, AUTH-Thessaloniki and IZIIS-Skopje are selected to be compared with the capacity Sa-Sd curve of the seismic action defined by the Bulgarian legislation. The performed comparison has shown that the structures, built in the times with low and medium earthquake resistant requirements need particular attention for more detailed structural analysis considering the last definitions of the seismic action. Such analysis must be performed using data about particular representative structures for the Bulgarian building stock. Regarding the social vulnerability, it would be useful to add data about occupancy rate of buildings - night or working days or weekend - data, which so far are not publically available.

Demographic and Social Statistics

Population and demographic processes, housing fund and information society are mapped in the newly prepared thematic maps (Marinova et al, 2015) based on the data available from the NSI (http://www.nsi.bg/). General trend of the populations in Bulgaria is characterized by a decrease with time, a downward trend in the population of working age is also observed. These maps confirm the currently ongoing process of urbanization. The population tends to gravitate to the urban centers, while the rural population decreases. Comparing one of the seismic hazard maps (Ordinance № RD-02-20-2; BDS EN 1998-1:2005/NA: 2012, TR = 475) with the map of the population density published in Appendix II: Population grid 2011 of Bulgaria (Ahmedov and Dudova, 2014) by overlapping, it is found that the areas of significant earthquake hazard coincide with those of population concentration (Pashova et al., 2015). The empirically acquired information due to field observations immediately after the recent earthquakes in Bulgaria (Strazhitsa 1986; Vrancea 1986, 1990; Pernik, 2012) has shown that the rural population is more vulnerable to earthquake disasters because of their comparatively weaker building stock. Generally, the cities contain more buildings that are resistant to strong shaking than the villages, despite of the legislation for earthquake resistant design and

construction is in force for all types of settlements. The world experience has shown that although it is understandable that earthquake risk mitigation has focused on megacities, the conclusion of this study is that the rural population needs more help in earthquake risk mitigation than the urban population (Wyss, 2014b).

The maps depicting new buildings with different construction for 2010 and 2013 (Marinova et al., 2015) have shown that in 2010 are built mainly concrete structures, while in 2013 are built mainly masonry structures. Considering the EMS 1998 vulnerability classes, currently the rate of lower vulnerability class structures (masonry) is covered by the new buildings. The highest rate of new construction is observed in the touristic regions along the Black Sea coast and in the biggest administrative regions - Sofia, Plovdiv, and Veliko Tarnovo. It is worth to mention that Plovdiv and Sofia are among the regions that are exposed to the highest seismic hazard in Bulgaria.

Infrastructure

The density, quality and time of construction of the road network are closely related to the overall earthquake risk estimation – e.g. in a more dense populated area it is expected more altered traffic demand after an earthquake strikes. Seismic vulnerability of the transportation networks is related with the serviceability of the conventional road network and the expected altered post-disaster demand. On the other hand, the irrational responses of some passengers have to be also taken into consideration. Raster maps of the transportation network are available from different atlases (e.g. Bandrova, 2008). For the purpose of the UACG-CNIP research project БН 164/14 digital data (Scale 1:250 000) with the state boundaries, lakes and dams, rivers, municipalities boundaries, settlements with population over 10000 people, classified road network and railroads are available with the kind collaboration of the Bulgarian Military Geographic Service. Raster maps of number of available beds in the hospitals per 1000 persons for 2002; density of the transportation network in Bulgaria for 2002; mining and quarrying; power generation and chemical industry enterprises are also available in the БН 164/14 project datasets (e.g. Bandrova et al., 2002).

Capacity Measures

Advances in early warning make it possible to shut down dangerous processes, to stop high speed railways, to shut down other particularly important and/or potentially danger equipment, while the high amplitude seismic waves are approaching (Wyss, 2014a, b and references in). The available raster maps of electrical power suppliers, chemical industries and other industrial activities, analyzed together with the seismic hazard maps and the available information for Early Warning System, can be used for vulnerability estimations by different decision makers. Recently was closed

the DACEA project, dealing with building Danube Cross-Border System for Earthquake Alert, related to the strong Vrancea earthquakes (www.quakeinfo.eu/en/). Once the alert in population centers is registered, the advanced seismology has at disposal tools for reasonable loss estimate of probable casualties within about an hour of the earthquake (Wyss, 2014b and references in), which enables first responders to mount rescue efforts commensurate with the extent of disaster. Thematic map using NSI data about the households' internet access in 2013 is recently prepared (Marinova et al., 2015). This information has analyzed in a set with the available information (preferably mapped) of available hospitals, beds and medicine qualified personnel in the particular region.

Disaster response management is a systematic process of using administrative decisions, organization, operational skills and capacities to implement policies, strategies and coping capacities of the society and communities to lessen the impacts of natural hazards and related natural and technological disasters. This comprises all forms of activities; including structural and non-structural measures to avoid (prevention) or to limit (mitigation and preparedness) adverse effects of hazards (UN/ISDR, 2004). Disaster response plans are usually available at the internet sites of municipalities in Bulgaria.

Education, disaster response training and relevant communication are provided by responsible governmental and nongovernmental institutions for different target groups. One of the important measures in the context of disaster risk reduction is a capacity building, which can be achieved through disaster management training and education. A new initiative for establishing an Educational Disaster Centre "Save the children life" at the University of Architecture, Civil Engineering and Geodesy, Sofia has been recently proposed (Bandrova et al., 2015). The target groups are children from primary and secondary school. The main purposes of this Centre will be to provide an opportunity for children to acquire a basic knowledge of the natural and man-made hazards, to enhance the children' resilience and their ability for response in emergency situation, and to develop their spatial thinking taking advantage of educational materials, modern digital and simulation equipment and tools adapted to their age and needs.

Challenges and Obstacles in Gathering the БН 164/14 Datasets

Maps for disaster risk assessment in case of earthquake combine international, regional and local data provided by various services, agencies, and organizations. The data gathered from various numerous sources as geographic database; topographic maps; thematic maps; Disaster management plan; seismic hazard information; geological information; building stock information; demographic and social information; business / communications / industry information; infrastructure information; statistical data, etc. is heterogenic and its use for the disaster risk evaluation and

crisis management is not easy. Therefore, the data should be integrated and presented in the most appropriate way to assist specific tasks of participants in all stages of disaster risk management. In order all these data to be integrated and presented on the maps it should be standardized and managed according to the main aspects of data harmonization follows INSPIRE Directive recommendation:

- Georeferencing the information into a uniform reference system;
- Standardizing attribute structure;
- Standardizing object classification;
- Standardizing level of detail;
- Unifying cartographic visualization.

Earthquake risk evaluation encompasses rather heterogeneous information data sets. The integration of these data in a uniform data base requires a lot of multi- and inter-disciplinary efforts. Calibration and verification of the data sets and methods used is important to continue, since to proceed further with the comparative analysis of the available maps and the consequent risk evaluation in GIS environment, it is necessary to have at disposal compatible vector maps and/or digitized raster maps with proper spatial resolution. It would be useful and interesting to perform the risk evaluations with different available maps, thereby some beneficial inferences and recommendations in terms of sensitivity of the final risk evaluation with regard to different input data sets could be performed.

CONCLUSIVE REMARKS AND POSSIBILITIES FOR FURTHER COLLABORATION WITH CMDR COE

Earthquake risk mitigation obviously is drawn by the: (i) possibilities for hazard mitigation through reliable earthquake danger estimations and seismic forecasts; (ii) advanced seismic monitoring early warning systems; (iii) earthquake engineering measures, and (iv) building culture of preparedness through education and information systems. The recent extraordinary mega-earthquakes changed the thinking of the large public, including experts in the field. Strong earthquakes are often followed by negative co-seismic consequences, which can provoke social or humanitarian crisis. In such crisis and disaster response, NATO's role goes beyond military operations and includes crisis and disaster response operations to prevent and protect populations and lifesaving systems against natural, technological and humanitarian emergencies and disasters. Reliable seismic risk assessment is a very important and responsible task that requires the availability of vast set of harmonized data. Using public data might provide acceptable first order estimation, but the detailed prognostic earthquake risk appraisal requires reliable, detailed and accurate information about the building structures, soil conditions, etc.

It is important to use and enlarge the possibilities to apply new methods and tools to understand the earthquake hazard and thus to reduce the earthquakes' associated risks.

The latest disasters have clearly illustrated, more than ever a holistic approach to disaster risk management is needed to apply in order to enhance resilience and reducing vulnerability to disasters. These circumstances also imply scientific and applied studies to intensify developing new tools and models for all phases of a disaster. Some of possible fields of development are elaboration of hazard mitigation strategies and data collection systems that provide real-time data and high quality data for use in models for risk analysis, forecasting, and early warning. The collected data related to disasters can be effectively manage, visualize and analyse in GIS environment. Close cooperation in the crisis management and disaster response domain requires forming appropriate military and civilian capabilities. These capabilities should include information and intelligence sharing, developing and operating early warning systems (in support of building common situational awareness), as well as conducting crisis and disaster planning and response. The seismic instrumentation, monitoring and networking is another useful potential direction for further work. The contemporary space and aerial techniques provide tools for mapping of deformations of the Earth's surface with very high accuracy and resolution allowing the construction of detailed models of past seismic events as well as elaboration the maps of strain accumulation for future earthquakes. Satellite images greatly facilitate mapping the damage in the disasters' areas enabling an effective response on an informed base (Wyss 2014a, b, ref. in). Post-disasters vulnerability analysis of the transportation networks is very important for earthquake–prone territories, since the post-earthquake demand can be significantly altered compared to the usual daily demand and most probably the passengers' behavior and the response might not be rationally organized. Establishing CMDR COE relations with Contributing Partners (CPs), other COEs, academic and other national and international organisations lies in the base of the multidisciplinary research for building city models and performing different virtual scenarios as contemporary field open for innovative ideas and advanced research. Close cooperation in the crisis management and disaster response domain requires building appropriate military and civilian capabilities for information and intelligence sharing, for developing and operating early warning systems in support of building common situational awareness, as well as for conducting crisis and disaster planning and response. Disaster reduction measures should be based on continuous assessment of vulnerability and hazards, including a vulnerability / hazard analysis and monitoring. The geoinformation is essential for almost all disaster risk management cycle integrating all data sets in information system. Spatial data information, as a core subjects in disaster prevention and emergency management, should be reliable,

timely and in digital form to be processed in a powerful GIS. The use of GIS software for data analysis and representation alongside with different techniques for data processing can reduce the uncertainty and serve as a catalyzing agent for information acquisition and distribution. Advanced IT technologies, as base of a spatial data infrastructure, foster the process of spatial information analysis, which can be used as a valuable source in all phases of disaster risk management.

GLOSSARY

TERM	DEFINITION
Critical facilities	The primary physical structures, technical facilities and systems which are socially, economically or operationally essential to the functioning of a society or community, both in routine circumstances and in the extreme circumstances of an emergency. (1)
Critical infrastructure	An asset, system or part thereof located in Member States which is essential for the maintenance of vital societal functions, health, safety, security, economic or social well-being of people, and the disruption or destruction of which would have a significant impact in a Member State as a result of the failure to maintain those functions. (3)
Disaster	A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources. (1)
Disaster Recovery	The restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors. (1)
Disaster risk	The potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or a society over some specified future time period. (1)
Early warning system	The set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities and organizations threatened by a hazard to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss. (1)
Earthquake	A sudden release of energy in the earth's crust or upper mantle, usually caused by movement along a fault plane or by volcanic activity and resulting in the generation of seismic waves which can be destructive. (5)
Exposure	People, property, systems, or other elements present in hazard zones that are thereby subject to potential losses. (1)

Hazard	A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. (1)
Information system	An integrated set of components for collecting, storing, and processing data and for delivering information, knowledge, and digital products. (2)
Mitigation	The lessening or limitation of the adverse impacts of hazards and related disasters. (1)
Natural disaster	Natural process or phenomenon that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.(1)
Resilience	The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions. (1)
Risk	The combination of the probability of an event and its negative consequences(1)
Risk assessment	A methodology to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability that together could potentially harm exposed people, property, services, livelihoods and the environment on which they depend. (1)
Risk management	The systematic approach and practice of managing uncertainty to minimize potential harm and loss. (1)
Seismic hazard	A natural phenomenon such as ground shaking, fault rupture, or soil liquefaction that is generated by an earthquake. (4)
Seismic risk	The probability that humans will incur loss or damage to their built environment id they are exposed to a seismic hazard. (4)
Vulnerability	The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard. (4)

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Acknowledgements

Research project CNIP-UACG БН – 164/14 is kindly acknowledged.

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About the authors:

Mihaela Kouteva-Guentcheva is Associate Professor in the Department of Computer Aided Engineering at the University of Architecture, Civil Engineering and Geodesy, Sofia since 2013. She has worked for more than 20 years in the Central Laboratory for Seismic Mechanics and Earthquake Engineering at the Bulgarian Academy of Sciences (BAS), later Earthquake Engineering Department at National Institute of Geophysics, Geodesy and Geography - BAS. She holds M.Sc. degree in “Civil Engineering – Structural Engineer” and “Applied Mathematics and Informatics” and PhD in “Solid Mechanics” in field. She is junior associate at the Abdus Salam International Centre for Theoretical Physics – SAND Group, Trieste, Italy, 2001-2008. Her research and publications are focused mainly on topics associated to bridging engineering seismology with earthquake engineering, including strong motion data analysis, seismic wave propagation modelling, earthquake scenarios and seismic micro zoning, dynamic analysis of structures. She leads and participated in several projects in the field of engineering seismology and earthquake engineering at national and international level. E-mail: mkouteva@gmail.com

Lyubka Pashova, Ph.D. is an Associate Professor of Geodesy at the National Institute of Geophysics, Geodesy and Geography - Bulgarian Academy of Sciences. Her research interests and activities focuses on topics including statistical methods for geodetic data processing, coordinate reference systems, processing and analysis of geospatial information.

She is a member of the Bulgarian Cartographic Association and of the Association for Geospatial Information in South-East Europe; of Editor's group of two Journals: Geodesy and Micro, Macro & Mezzo Geo Information. She leads and participated in several projects in the field of geodesy and geodynamics at national and international level. Since October 2014 she is GEO Principal Alternate of Bulgaria in the Group on Earth Observations. E-mail: lpashova.niggg@gmail.com

Prof. Temenoujka Bandrova is the President of the Bulgarian Cartographic Association and head of the Laboratory on Cartography at the University of Architecture, Civil Engineering and Geodesy, Sofia. She is Co-chair of the ICA Commission of Cartography and Children (2007-2011), a member of the Council board and a chair of Young Scientific Commission of International Society of Digital Earth, a member of Commissions on Map Projections, on Cartography in Early Warning and Crises Management – International Cartographic Association; of the Association for Geospatial Information in South-East Europe; of Editor's group of the International Journal of Digital Earth, Cartographia and Geoinformatika, Croatia. She is Project manager in DataMap Ltd. where her school atlases and maps are published. She is an author of 30 school atlases and more than 80 wall maps in geography and history, approved by the Ministry of Education and Sciences for Bulgarian schools. She published more than 100 articles, reports, papers, book chapters and edited books published by Springer and ESRI Press. She is the organizer of series of 5 International Conferences on Cartography and GIS. E-mail: tbandrova@abv.bg

Silvia Marinova - Dr. Eng. Silvia Marinova is General Secretary of Bulgarian Cartographic Association and Assist. Prof. at the University of Architecture, Civil Engineering and Geodesy, Sofia. She is also a member of Bulgarian Chamber of Graduated Surveyors, International Society of Digital Earth and International Cartographic Association - Commission on Cartography in Early Warning and Crisis Management. She works at KartGeo Ltd. as a cartographer where her main activities are map design and editing. Her science interests are focused on thematic mapping for early warning and disaster management, cross-border mapping, mountain cartography. E-mail: silveto_marinova@yahoo.com

Stefan Bonchev - Eng. Stefan Bonchev is an engineer at the Laboratory on Cartography, University of Architecture, Civil Engineering and Geodesy, Sofia. He holds a Master's Degree in Geodesy and Cartography. His scientific and professional interests are focused on 3D cartographic modelling. He graduated a Training School "3D Geoinformation for Disaster Managment" in 2009 by COST Action TU0801 "Semantic enrichment of 3D city models for sustainable development" organized in Delft — Arnhem — Amsterdam, the Netherlands, 5-9 October 2009. E-mail: bonchev_st@abv.bg

Mariyan Markov - LtC Mariyan Markov, Ph.D is a head engineer of the Military Geographic Service (MGS) at the Ministry of Defence and an honoured member of the Bulgarian Cartographic Association. His scientific and professional interests are focused on creating, structuring and coding main geographical data bases of the MGS using GIS software's ArcGIS, Erdas Imagine, and Autodesk. LtC Markov's participates in projects: "Building a Geographic Information System of Bulgarian Armed Forces", EU project of the Ministry of Agriculture and Food for the creation of land parcels map (LPIS), and "Development of an information system to provide public access to spatial data of the Ministry of Defence. He has published more than 20 articles and reports in the field of GIS, digital cartography and remote sensing. E-mail: mmmarkov@gmail.com

THE SYRIAN CRISIS AND IMPLICATIONS WORLDWIDE 2011-2013 REVIEW

Boris Guenov, Stoyan Stoyanov, Kostadin Lazarov, Nikolay Nikolov, Orlin Nikolov (CMDR COE team)

Abstract: *The crisis in Syria was prompted by protests in mid-March 2011 calling for the release of political prisoners. National security forces responded to widespread, initially peaceful demonstrations with brutal violence. From summer 2011 onwards, Syrian President Bashar al-Assad refused to halt attacks and implement the meaningful reforms demanded by protestors. In July 2011, accounts emerged from witnesses, victims, the media, and civil society that government forces had subjected civilians to arbitrary detention, torture, and the deployment and use of heavy artillery.*

Keywords: *Syria, crisis, review, chronic.*

BRIEF CHRONIC

A protest movement against the Syrian government began to escalate, as simultaneous demonstrations took place in major cities across Syria – al-Hasakah, Daraa, Deir ez-Zor, and Hama. On 18 March, after various calls for a "Friday of Dignity", after regular prayers` speech in mosques, thousands of pilgrims chanted "God, Syria, Freedom" and slogans against the President Assad, demanding an end to alleged government corruption. The protesting mobs were met with a violent crackdown orchestrated by state security forces. Sporadic rampages continued for days while on 8 April, heavy clashes erupted in Daraa between protestors, the military and unknown groups of gunmen in which 23 protestors and 19 soldiers were killed. The military also stated that 75 soldiers were wounded by, what they called, terrorist gunmen. The Syrian uprising was only a month old in April 2011, when 72 protesters were killed by security forces firing on crowds. Many of the dead were in the southern village of Ezra, near Deraa and in a suburb of Damascus.

At this stage the EU expressed profound concern and called on the Syrian authorities to refrain from using violence and "*to listen to the legitimate aspirations of the people and address them through inclusive political dialogue and genuine reforms and not through repression*" [Declaration by Catherine Ashton, High Representative of the Union for Foreign Affairs and Security Policy and Vice President of the European Commission (HR/VP), on behalf of the EU on the violent crackdown on peaceful demonstrators in Syria, 22 March 2011]. On 27 April, the Security Council of the UN held a public debate on Syria and was briefed by the Under-Secretary-General

for Political Affairs while on 29 April, the Human Rights Council adopted a resolution requesting an investigative mission to Syria.

On Saturday 28 May, the Syrian military entered the towns of Rastan and Talbiseh, a day after their biggest demonstrations so far. On 30 May, it was reported that residents of Rastan and Talbiseh had fired at the army with assault rifles and rocket-propelled grenades. As a consequence the EU decided to respond by imposing restrictive measures against Syria and persons responsible for the violent repression against the civilian population in Syria. These measures included an embargo on arms and equipment that may be used for internal repression, as well as an asset freeze and a travel ban targeting a list of thirteen individuals. The aim of these measures was to achieve a change of policy by the Syrian leadership without further delay. The EU urged Syria to put an immediate end to violence and swiftly introduce genuine and comprehensive political reform, the only way to provide peace and stability for Syria in the long term. Failing that, the EU considered extending the restrictive measures in light of the developments, including at the highest level of leadership. Until the end of May the EU extended the visa ban and assets freeze imposed on 13 officials and associates of the Syrian regime to 10 more individuals, including President Bashar a-Assad, in view of the continuing repression against the civilian population [Council of the European Union, Press releases]. The Association Agreement and the cooperation with Syria, including under the European Neighborhood Policy Instrument were frozen. The EU expressed its grave concern about the situation unfolding in Syria and the deployment of military and security forces in a number of Syrian cities. The EU strongly condemned unacceptable violence against peaceful demonstrators, the increasing number of fatalities and called on the Syrian security forces to exercise restraint instead of repression [Declaration by the HR/VP Catherine Ashton on the unfolding situation in Syria, 18 May 2011].

On its behalf the Syrian government announced in the beginning of June that 120 security personnel had been killed in the northwestern town of Jisr al-Shughour. Meanwhile Turkish officials reported more than 4000 Syrians have crossed into Turkey. In view of the gravity of situation the EU extended the sanctions against Syria by imposing restrictive measures on seven additional persons and introducing such measures against four entities associated with the Syrian regime [Council of the European Union, Press releases]. On 8 June the UN Council members were briefed on current events by Assistant Secretary General Oscar Fernandez Taranco in closed consultations. Discussions followed on a draft resolution on the situation in Syria circulated on 25 of May 2011 by the UK, France, Germany and Portugal. Some members were uncomfortable with what they saw as possible action-oriented language which might lead to robust follow-up by the Council. Another issue raised by members like Brazil, South Africa,

India, China and Russia was that the Council should not be prescribing precisely how a country should reform itself politically. However, there was never a vote on this draft.

An armed blockade was imposed on the city of Hama on 3 of July. As Hama became one of the main opposition centers of the uprising, it turned into a focal point of the growing crisis. On July 6th, a surprising step was taken by the US ambassador, Robert Ford, when he visited Hama and declared that he will stay there till Friday. Syria reacted with anger with this visit. The French ambassador joined the US one on that day to show the French support to the victims. On July 8th, more tanks were deployed around the outskirts of Hama, as part of a strengthening blockade, following protests involving an estimated 500 000 people the previous weekend. It has been estimated that up to 350 000 of the city's 700 000 population have taken part in many of the protests. In a separate incident on the same day, political prisoners attempted to mutiny in Hama's central prison, to which security forces responded with live ammunition. The death toll in the prison is still unknown. The Syrian state news agency reported that eight policemen were killed in clashes in Hama. Up to that over 2200 protesters have been reported dead since 15 of March, 2011.

The EU urged Syria's leadership to call off such security operations immediately and refrain from the continued use of force against civilians. The EU called for a political process leading to rapid and concrete implementation of substantial reforms, addressing the legitimate demands of Syrian people on their way to a peaceful, genuine and irreversible transition to democracy. EU noted with extreme concern the deteriorating humanitarian situation of many Syrians. Thousands of people were displaced, including in the neighboring countries, as a result of the violence. Provision of basic goods and services had been interrupted repeatedly. The EU stressed that the Syrian authorities bear responsibility for the humanitarian situation of the Syrian people and strongly urged them to allow safe and unhindered access by humanitarian agencies to all affected areas. The situation continued to affect neighboring countries and constituted a threat to regional peace, security and stability. Therefore, the EU persisted in its efforts to ensure that the UN Security Council assumes its responsibility in this respect, including by condemning the ongoing violent repression. The EU acknowledged the efforts by Turkey and other regional partners on the different aspects of the crisis, in particular the humanitarian aspects, and declared that it would work with them to address the situation in Syria. The EU stated "*its readiness to assist in addressing the humanitarian implications of the crisis in the region*" [3106th Council meeting Foreign Affairs, July 18th, 2011, press release].

The UN's Security Council met to discuss the situation in Syria on 2nd of August. The US, UK and France wanted to formally condemn Syria, but Russia and China were afraid that "*it could be used as a pretext for military*

intervention in Syria". At the same day, Syrian dissident Radwan Ziadeh asked US President Barack Obama and US Secretary of State Hillary Clinton to demand President Bashar al-Assad to step down.

In view of the gravity of situation in Syria, the EU Council strengthened sanctions and added more Syrian individuals and entities to the list of those targeted by an asset freeze and travel ban twice in August. The Council further tightened the EU's sanctions against the country's regime and imposed a ban on the import of Syrian oil to the EU. The prohibition concerned purchase, import and transport of oil and other petroleum products from Syria and banned investment in key sectors of the Syrian oil industry. EU also banned the delivery of Syrian-denominated bank notes and coinage produced in the EU to the Syrian Central Bank.

On October 4th, China and Russia vetoed a draft resolution, sponsored by France, Germany, Portugal and the UK, which condemned the Syrian crackdown on protestors. Brazil, India, Lebanon and South Africa abstained. Several rounds of negotiations substantially altered the text. However, language on the Council's intent to consider further measures if the Syrian regime failed to implement the resolution's provisions remained. In addition, on 15 November UN issued a press statement condemning the attacks against several embassies and consular premises in Syria. During the Council's 9 November open debate on protection of civilians, the High Commissioner for Human Rights said there was a risk of civil war in Syria.

In early December, 2011, the Syrian government accepted an Arab League plan to send team of observers to monitor the situation on the ground and agreed to withdraw army equipment from cities. Nevertheless human rights activists have strongly criticized the head of the Arab League monitors, Omar Idilbi of the Local Coordination Committees, adding that there are fears he might not be neutral.

In light of the continued repression in Syria, the EU reinforced restrictive measures against the Syrian regime based on human rights activists' reports of some 200 people killed by Syrian security forces in the villages of the northwestern province of Idlib on December 19 and 20, 2011. Trade in Syrian public bonds and the provision of insurance and re-insurance to the Syrian government were prohibited in the EU. Syrian banks would no more be allowed to neither open new branches in the Union nor establish joint ventures or correspondent banking relations with European financial institutions. The European Council banned exports of key equipment and technology to the Syrian oil and gas sectors, i.e. refining, liquefaction of gas, exploration and production. Moreover, participation in the construction of new power plants in Syria was prohibited. Exports of equipment and software intended for use in the monitoring of internet and telephone communications by the Syrian regime was also banned. Finally, the Council added more and entities persons responsible for human rights violations

supporting the regime to the list of those targeted by an asset freeze and a visa ban [Council of the European Union, Press releases].

In a Speech on Syria on December, 13, 2011 HR/VP Catherine Ashton declared: "*Now all members of the UN Security Council must assume their responsibilities in relation to the situation in Syria…I have also met other leaders of the Syrian National Council and welcomed the ongoing efforts by the Syrian opposition to establish a united platform and to work for a shared vision for the future of Syria and the transition to a democratic system. … Further individuals and entities linked to the regime have been added to the assets freeze and travel ban: 86 individuals and 30 entities are now on the list. .. We have made it clear that we are ready to provide emergency assistance should humanitarian needs be confirmed. … We are also recognizing the vulnerability of the Syrian refugees hosted by neighbouring countries, notably Turkey, Jordan and Lebanon and we are ready to support these refugees if the host countries request our help and we have made that knowledge available to them. .. I call on the Syrian authorities to allow humanitarian access. ..I hope we'll see action in the Security Council: that all members will take their responsibilities, and respond to this and respond to what the UN Commissioner for Human Rights has said, with a great sense of urgency.*"

Furthermore, the President of the European Council Herman Van Rompuy asked for Russian support to the action by the UN Security Council and to the Arab League Plan at the 28th EU-Russia Summit [Remarks following the 28th EU-Russia Summit, 15 December 2011].

Notwithstanding international concerns President Assad's forces began using large-scale artillery operations in January 2012, against the insurgency, which led to the destruction of many civilian homes due to indiscriminate shelling. By early April, the estimated death toll of the conflict, according to activists, reached 10 000.

UN Security Council Resolution S/2012/77

On February 4th a Security Council draft resolution condemning the violence in Syria and supporting the Arab League's 22 January decision to facilitate a Syrian-led political transition was vetoed by China and Russia with all other Council members voting in favour. On 16 February the General Assembly adopted a similar resolution which additionally requested the Secretary-General to appoint a special envoy for Syria. During the monthly Middle East briefing on 28th of February, DPA briefed on the deteriorating situation in Syria saying there were credible reports of in excess of 7,500 dead. On February 29th, Kofi Annan was appointed as the UN-Arab League Joint Special Envoy for Syria. In other developments, the first meeting of the Friends of Syria was held on 24th of February in Tunis.

Security Council Resolution S/2012/77 demands that the Syrian government, in accordance with the Plan of Action of the League of Arab States of 2 November 2011 and its decision of 22 of January 2012, without delay:

a) cease all violence and protect its population;

b) release all persons detained arbitrarily due to the recent incidents;

c) withdraw all Syrian military and armed forces from cities and towns, and return them to their original home barracks;

d) guarantee the freedom of peaceful demonstrations;

e) allow full and unhindered access and movement for all relevant League of Arab States' institutions and Arab and international media in all parts of Syria to determine the truth about the situation on the ground and monitor the incidents taking place; and

f) allow full and unhindered access to the League of Arab States' observer mission.

The EU welcomed as well the League of Arab States' resolution of 22 January and its initiative to seek UNSC support for a political solution. Given the Syrian regime's continued use of violence against civilians, the EU designated further 22 individuals and 8 entities (total of 108 individuals and 38 entities) to be subject to restrictive measures. The EU urged all members of the UN Security Council to uphold their responsibilities to end the violence against the Syrian population and support the Syrian people [3142nd Council meeting, Foreign Affairs, 23 January 2012]. In a Speech on the situation in Russia on 01 February, 2012, HR/VP Catherine Ashton stated: "*with thousands of people killed and violence escalating across Syria, we strongly urge Russia to join the international consensus, and allow the Security Council to act on the basis of the Arab League proposals and the joint draft resolution*".

At the Council Foreign Affairs meeting in February, 2012 the EU expressed support for the Group of Friends of the Syrian people and Syrian opposition and recognized the Syrian National Council as a legitimate representative. The EU welcomed the resolution on Syria adopted by an overwhelming majority in the UN General Assembly, condemning Syrian regime's violations of human rights [3149th Council meeting, Foreign Affairs, 27 February 2012].

In March, 2012, responding to the continuous deterioration of the humanitarian situation in Syria and on its borders, the European Commission allocated an additional €7 million to finance life-saving assistance to those who have been wounded or forced to flee the ongoing violence in the country. This brought the overall contribution by the Commission at that moment to €10 million. The European Commission was fully mobilised to help meet the humanitarian needs of the Syrian people both inside and

outside the country (in Lebanon, Turkey, Jordan and Iraq) through the work of humanitarian organisations an in accordance to the humanitarian principles of neutrality and impartiality.

Situation in Syria have resulted in a flow of Syrian refugees into Turkey and refugee camps have been set up on the Turkish side of the Syrian border. As a result of it on 13 April 2012 the NATO Euro-Atlantic Disaster Response Coordination Centre (EADRCC) received an official request for assistance from Turkey.

Ceasefire attempt (April–May 2012)

The Ghanaian diplomat and former UN Secretary-General, Mr. Kofi Annan was appointed on 23 February 2012 as the UN-Arab League envoy to Syria, in an attempt to end the civil war taking place. He developed a six-point plan for peace:

1. *Commit to work with the Envoy in an inclusive Syrian-led political process to address the legitimate aspirations and concerns of the Syrian people, and, to this end, commit to appoint an empowered interlocutor when invited to do so by the Envoy*;
2. *Commit to stop the fighting and achieve urgently an effective United Nations supervised cessation of armed violence in all its forms by all parties*;

To this end, the Syrian government should immediately cease troop movements towards, and end the use of heavy weapons in, population centres, and begin pullback of military concentrations in and around population centres.

3. *Ensure timely provision of humanitarian assistance to all areas affected by the fighting, and to this end, as immediate steps, to accept and implement a daily two hour humanitarian pause and to coordinate exact time and modalities of the daily pause through an efficient mechanism, including at local level*;
4. *Intensify the pace and scale of release of arbitrarily detained persons, including especially vulnerable categories of persons, and persons involved in peaceful political activities, provide without delay through appropriate channels a list of all places in which such persons are being detained, immediately begin organizing access to such locations and through appropriate channels respond promptly to all written requests for information, access or release regarding such persons*;
5. *Ensure freedom of movement throughout the country for journalists and a non-discriminatory visa policy for them*;
6. *Respect freedom of association and the right to demonstrate peacefully as legally guaranteed*.

Terms of Resolutions S/RES/2042 (2012) authorizes an advance team of up to 30 unarmed military observers to liaise with the parties and to begin to report on the implementation of a full cessation of armed violence in all its forms.

Established by United Nations Security Council resolution 2043 of 21 April 2012, initially for a 90-day period, to monitor a cessation of armed violence in all its forms by all parties and to monitor and support the full implementation of the Joint Special Envoy's six-point plan to end the conflict in Syria. Resolution 2043 authorizes up to 300 unarmed military observers, plus an appropriate civilian component. As of 30 June 2012, United Nations Supervision Mission in Syria (UNSMIS) consisted of 278 military observers, 81 international civilian staff and 40 local civilian staff. After initial relative lull, hostilities in Syria resumed and on 15 June 2012, UNSMIS had to suspend its activities owing to an intensification of armed violence across the country. On 20 July 2012, the Security Council extended the mission for 30 days and said that any further extension could be possible only ''*in the event that the Secretary-General reports and the Security Council confirms the cessation of the use of heavy weapons and a reduction in the level of violence sufficient by all sides"* to allow the UNSMIS monitors to implement their mandate. As those conditions were not met, UNSMIS mandate came to an end at midnight on 19 August 2012.

Anand's peace plan provided for a ceasefire, but even as the negotiations for it were being conducted, Syrian armed forces attacked a number of towns and villages, and summarily executed scores of people. On 12 April, both sides, the Syrian Government and the Free Syrian Army (FSA) entered a UN mediated ceasefire period. It was a failure, with infractions of the ceasefire by both sides resulting in several dozen casualties. The peace plan practically collapsed by early June and the UN mission was withdrawn from Syria. Annan officially resigned in frustration on 2 August 2012.

In April, the Foreign Affairs Council called for an immediate and full implementation of the UNSC resolutions 2042 authorizing the immediate deployment of an advance team of up to 30 unarmed military observers and 2043 establishing the full UN supervision mission in Syria (UNSMIS) with an initial deployment of up to 300 unarmed military observers to monitor a cessation of armed violence. The Council adopted restrictive measures on export of further goods and technology which may be used for repression and banning the export to Syria of luxury goods [3159th Foreign Affairs Council meeting, 23 April 2012].

In a Speech on Syria (17 April 2012) HR/VP Catherine Ashton, defined UNSC resolution as a unified international community call to "*the urgent, comprehensive and immediate implementation by the Syrian government of all the elements of the Envoy's six-point proposal in their entirety*" and

stated that China and Russia must continue to play a key role in bringing a solution to the conflict. Together with Member States, the EU had put together a contribution of €29 million in humanitarian aid to Syria and affected neighbouring countries. HR/VP Ashton offered assistance of the EU to Turkey, as support to neighbouring countries is also essential, and promised sanctions and restrictive measures to continue as long as repression continues.

At the Foreign Affairs Council meeting in May the EU reiterated its call on the Syrian authorities to fully and immediately comply with the Joint UN-League of Arab States Special Envoy Kofi Annan's plan as endorsed by UNSC resolutions 2042 and 2043 and abide by all their commitments to the UN. The Council called on all sides to respect the safety of humanitarian workers and deplored the death of two humanitarian workers killed. The EU urged the UN Humanitarian Response Plan to be implemented immediately. The Council extended further restrictive measures to total of 128 individuals & 43 entities /3166th Foreign Affairs Council meeting, 14 May 2012/.

Renewed fighting

Following the Houla bloodshed of 25 May 2012 and the consequent FSA ultimatum to the Syrian government, the ceasefire practically collapsed, as the FSA began nationwide offensives against government troops. On 1 June, President Assad vowed to crush the anti-government uprising, after the FSA announced that it was resuming "*defensive operations*". On 6 June was reported 78 civilians killed in Al-Qubeir. The UN observers headed to Al-Qubeir in the hope of investigating the alleged massacre, but they were met with a roadblock and small arms fire before reaching the village and were forced to retreat.

On 22 June 2012 Syria Government forces shot down Turkish F-4 Phantom II military jet near the Turkish-Syrian border. United States research vessel EV Nautilus arrived three days later at the crash site to join the search and rescue operations. Her two remotely operated vehicles Hercules and Argus conducted search at the seabed in 1280 m (4200 ft) depth and located the debris of the aircraft, and brought parts of the downed jet up to the surface. The bodies of the pilots were elevated on 4 July 2012 with the help of a special constructed device in a 45-minute operation. Tensions between Syria and Turkey dramatically escalated following this incident, as both sides disputed whether the jet had been flying in Syrian or international airspace when it was shot down. Bashar al-Assad publicly apologized for the incident, and relations between the two countries cooled.

Four days after Syria shot down a Turkish war plane; on 26 June 2012 NATO has assembled for a special session. Following the NAC meeting NATO Secretary General Anders Fogh Rasmussen made the official

statement at the press point – "*The North Atlantic Council has just met at Turkey's request to hold consultations within the framework of article 4 of the Washington Treaty. This article states that Allies "will consult whenever, in the opinion of any of them, the territorial integrity, political independence, or security of any of them is threatened. We discussed the shooting down of a Turkish aircraft by Syria. All Allies have approved a statement setting out our firm position. We consider this act to be unacceptable and condemn it in the strongest terms. It is another example of the Syrian authorities' disregard for international norms, peace and security, and human life. Our thoughts at this difficult time are with the missing Turkish aircrew, their families and their loved ones. We continue to follow the situation closely and with great concern. NATO Allies will remain seized of developments on the southeastern border of NATO. And let me make this clear: The security of the Alliance is indivisible. We stand together with Turkey in the spirit of strong solidarity*...".

In June`2012 the European Commission announced increasing humanitarian aid by € 10 million that brought to € 43 million the total amount, to reach an estimated 700 000 people affected by the continuing violence inside Syria and in neighbouring countries. EU Member States provided €24.6 million in humanitarian aid. Between 1.5 and 3 million people were affected by the violence in Syria, over an estimated 87 000 people had already fled the country and were hosted by neighbouring countries.

European Commission also adopted special measure to support Syrian population and refugees that amounted to a total of €23 million. Given the circumstances and the operational constraints on the ground, the focus was put on projects implemented by partners with a solid track record in the country and in the region. In Syria itself, €12.6 million were made immediately available to assist the Syrian people in coping with the unrest and its consequences and preparing for a transition. In Lebanon, the overall objective of the special measure was to mitigate the impact of the influx of Syrian refugees. More precisely, a €5 million action were to support the medium and longer term needs of both the local Lebanese population and of Syrian refugees in the main host communities in Lebanon. In Jordan, the planned activities with the United Nations Children's Fund (UNICEF), for a total of €5.4 million, contributed to ensuring safe and appropriate services for Syrians living in Jordan [European Commission, press release].

By mid-July 2012, fighting had spread across the country. Acknowledging this, the International Committee of the Red Cross & Red Crescent declared the conflict as a civil war.

On 18 July, Syrian Defense Minister Dawoud Rajiha, former defense minister Hasan Turkmani, and the president's brother-in-law General Assef Shawkat were killed by a bomb attack in Damascus. The Syrian intelligence chief Hisham Ikhtiyar, who was injured in the same explosion,

later succumbed to his wounds. On the next day, 19 July, Iraqi officials reported that the FSA had gained control of all four border checkpoints between Syria and Iraq. Almost month later, on 19 September, rebel forces reported they seized a border crossing between Syria and Turkey in Ar-Raqqah Governorate. It was speculated that this crossing, along with several other border crossings into Turkey and one into Iraq, could provide opposition forces with strategic and logistical advantages, allowing them greater ease in transporting supplies into the country. In late September, the FSA moved its command headquarters from southern Turkey into rebel-controlled areas of northern Syria.

Also on 20 July, the UN Council adopted resolution 2059 renewing UNSMIS for a final period of thirty days and conditioning any further renewal on the cessation of the use of heavy weapons by the Syrian government and a reduction in violence by all sides. On 19 July a draft resolution under Chapter VII and co-sponsored by France, Germany, Portugal, the US and the UK was vetoed by China and Russia with Pakistan and South Africa abstaining.

On its side, the European Commission doubled its aid for emergency medical care, shelter, food and water to those Syrians most affected by the ever-worsening crisis, both inside and outside the country. An additional €20 million of relief aid brought the European Commission's total assistance in this crisis to €63 million (€40 million in humanitarian aid) at that time. The EU Member States had contributed to date € 27.5 million in humanitarian aid. The additional funding was provided to projects which provide food, water, sanitation, shelter, medical support and supplies, as well as psychological support for an estimated 1.5 million Syrians inside the country as well as to Syrian refugees. In addition, €23 million were allocated to assist the Syrian people to cope with the unrest and its consequences including medium-long term assistance to Internally Displaced People or people who have fled to neighbouring countries [European Commission, Press release]. Stefan Füle, European Commissioner for Enlargement and European Neighbourhood declared that in Syria, the EIDHR was currently supporting different actions for a total of around 4.5 million, such as a project that protects the internet freedom of independent bloggers, writers and journalists [Human rights and civil society in Syria: revealing the truth, preparing the transition, 12 July 2012].

In a statement on UN Security Council debate on Syria on 29 August 2012, the EU Commissioner Kristalina Georgieva announced that Europe has already provided over €146 million in humanitarian assistance and that Europe stands ready to increase this amount to match the massive evolving needs with massive funding.

Due to worsening crisis in Syria in September the European Commission increased its emergency aid with €50 million, bringing total contribution up

to €119 million, and to total of €200 million the assistance from European Commission and Member States – roughly half of all international humanitarian aid to the crisis. Target beneficiaries of the aid were more than 1.5 million people in Syria and a large proportion of the almost 200 000 Syrians who have fled to Jordan, Lebanon, Turkey and Iraq. Assistance was also provided to some 500 000 Palestinian refugees and another 87 000 Iraqi refugees who live in Syria. Breakdown of EU humanitarian funding: 61% inside Syria and the rest distributed between Turkey, Jordan and Lebanon. Additionally, EU increased assistance to Syrian Refugees in Jordan (more than 87 000 Syrians and 27 000 of them living in refugee camps). In the end of the month as a major donor in the Syrian crisis and a leading advocate on behalf of the affected civilians and aid organizations, the European Union jointly with the Hashemite Kingdom of Jordan brought together relevant stakeholders to discuss the most pressing challenges, coordinate activities and identify ways to bring relief to violence-hit communities. It was stated that the EU is the most generous donor with €222 million (over €84 million EU MS and more than €137 million EC; the latter figure includes €96 million in humanitarian aid) [European Commission, Press releases].

In a speech to European Union Heads of Delegation in September the President of the European Commission Barroso declared that inability to act will only discredit the UN.

In a press statement the President of the European Council, Herman Van Rompuy, expressed the hope that South Africa, as a non-permanent member, would help the UN Security Council uphold its responsibility: "*We have asked China, as permanent member of the Security Council, to redouble its efforts to ensure the United Nations Security Council can contribute effectively to the solution of the Syrian crisis*" [Press Statement by President of the European Council Herman Van Rompuy and President of the European Commission José Manuel Barroso following the 15th EU-China Summit].

EU sanctions against the Syrian regime were once more strengthened (19th round) including: prohibition of the import into the EU of arms from Syria; denied access to EU airports for flights operated by Syrian Arab Airlines. The Council added 28 persons & 2 entities to the list of those subject to a travel ban and an asset freeze [3191st Foreign Affairs Council meeting]. The Justice and Home Affairs Council in October endorsed the establishment of a Regional Protection Programme to support Syria and neighbours to deal with crisis.

International mediator Lakhdar Brahimi said on 24 October 2012 that the Syrian government has agreed to a ceasefire during the Muslim holiday of Eid al-Adha. After Brahimi's ceasefire agreement officially ended on 30 October, the Syrian military expanded its aerial bombing campaign in Damascus. A bombing of the Damascus district of Jobar was the first

instance of a fighter jet being used in Damascus airspace to attack targets in the city. The following day, Gen. Abdullah Mahmud al-Khalidi, a Syrian Air Force commander who was described by the state media as one of the country's top aviation experts, was assassinated by opposition gunmen in the Damascus district of Rukn al-Din. In early November 2012, rebels made significant gains in northern Syria. The rebel capture of Saraqib in Idlib governorate, which lies on the strategic M5 highway, further isolated Aleppo from government-controlled areas of the country. On 18 November, rebels took control of Base 46 in the Aleppo Governorate, one of the Syrian Army's largest bases in northern Syria, after weeks of intense fighting with government forces.

THE SYRIAN CRISIS AFFECTS

The civil war in Syria has polarized the Middle East between Sunni Muslim powers such as Turkey and the Gulf Arab states, who support the Sunni rebels, and Shi'i'te Iran and its Lebanese ally Hezbollah, who back Assad. The president belongs to the Alawite faith, an offshoot of Shi'ite Islam. As well as drawing Shi'ite and Sunni fighters into Syria from Lebanon, the conflict has raised sectarian tensions within the small Mediterranean state, as violence has spilled over the border and brought the country to political deadlock.

In November`2012 Sayyed Hassan Nasrallah, leader of Lebanon-based Shi'ite militants from Hezbollah vowed they will keep fighting in Syria's civil war alongside President Bashar Assad's forces as long as necessary. As a result in mid-December 2012, American officials expressed suspicions that their guerrillas firing Scud ballistic missiles at rebel fighters inside Syria. Reportedly, six Scud missiles were fired at the Sheikh Suleiman base north of Aleppo, which rebel forces had occupied.

On 18 January 2013, High Commissioner for Human Rights Navi Pillay and OCHA head Valerie Amos briefed Council members in consultations on humanitarian situations in Syria and the region. Amos reported that there were as many as 4 million in need within Syria, including 2 million internally displaced persons, and 650 000 Syrian refugees negatively impacting the economic and political situations in host countries. She also highlighted the indiscriminate nature of the violence, distressing reports of sexual violence and the need for unhindered humanitarian access. Pillay reiterated the findings of an independent study commissioned by her office that more than 60 000 people had died in the Syrian conflict and repeated her call for the Security Council to refer the situation in Syria to the ICC. On 29 January, Council members were briefed in consultations by the UN-Arab League Joint Special Representative for Syria, Lakhdar Brahimi, on his efforts towards a political solution to the Syrian conflict. Brahimi also suggested the Council might want to set up inquiries into war crimes and

crimes against humanity in Syria to complement the work being done by the Human Rights Council's Commission of Inquiry. As of 24 February, the office of the UN High Commissioner for Refugees had registered more than 740 000 Syrian refugees in neighboring countries, while elsewhere the UN has estimated that up to 70 000 people have died in the Syrian conflict. A draft press statement proposed by Russia on 21 February regarding a series of bombings in Damascus that killed at least 50 people failed to achieve consensus following objections from the US that the statement should also make reference to attacks on civilians conducted by the government of Syria. Similarly, Council members were also unable to agree to a draft press statement proposed by France on 1 February on the humanitarian situation, in particular a call for cross-border humanitarian access to areas under the opposition's control. Russia, while supportive of OCHA's efforts, appeared to have a problem with the Council making a public statement on the cross-border issue.

The President of the European Council Herman Van Rompuy after his meeting with president of Egypt Mohamed Morsi in January`2013 declared: "*the massacre in Syria has to stop. Assad must step aside, in order to facilitate an inclusive and democratic transition. It is tragic that the Syrian regime has again shown that it is not willing to commit to a credible political solution to the crisis. Tragic, when we know that (according to the UN) since the beginning of the uprising in March 2011 the crisis has caused the death of 60 000 people*".

In Speech on behalf of HR/VP Catherine Ashton on the situation in Syria it was noted that the EU had almost doubled all types of assistance in and outside Syria. Over €500 million (of which over €350 million is in humanitarian aid) targeted long-term actions on supporting refugees. It was also announced that EU was preparing preventive measures in case of a potential chemical weapon incident with focus more on the trans-border element of this threat on which we cooperate closely with Syria's neighbors such as Jordan and Turkey. The message of preparation for the "day after" and transition was conveyed.

In the period of 26-31 January 2013 NATO deployed six Patriot missile batteries to defend Turkey from possible attack from Syria went operational on Saturday. The United States, Germany and the Netherlands each sent two batteries to Turkey and up to 400 soldiers to operate them after Ankara asked NATO for help. A battery (under command of Lieutenant-Colonel Marcel Buis) from the Netherlands, consisting of 5 missile launchers, has been deployed next to an airport on the edge of Adana, a city of around 1.6 million and 120 km away from the Syrian border. Another battery of 7 launchers has been deployed at a US-Turkish air base east of the city. All batteries were being stationed around three southeastern Turkish cities and NATO declared they will protect 3.5 million Turks from missile attack. NATO strongly denied the Patriot missiles as a precursor to a no-fly zone

that Syrian rebels have been requesting to help them hold territory against a government with overwhelming firepower from the air.

In February 2013 in a European Commission MEMO dedicated to *EU's response to the "Arab Spring": The State-of-Play after Two Years* the following assessment was given:

"Outstanding security challenges remain, first and foremost the ongoing civil war in Syria with its evident risks of spill-over to neighbours, graphically illustrated by the hundreds of thousands of refugees who have flowed into neighbouring countries such as Iraq, Jordan, Lebanon and Turkey. The EU suspended bilateral cooperation with the Syrian government and froze the draft Association Agreement. The EU thereafter initiated and progressively expanded a policy of targeted restrictive measures, including i.a. an arms embargo, an asset freeze and travel ban on members of the Syrian regime and an oil import embargo.

The EU fully supports the Joint Special Representative of the UN Secretary-General and the League of Arab States, Lakhdar Brahimi, in his efforts to find a negotiated solution to the crisis. The EU has urged the UN Security Council to agree on UN action towards Syria. The EU Foreign Affairs Council of December 2012 declared the National Coalition for Syrian Revolutionary and Opposition Forces as legitimate representatives of the Syrian people.

The EU has so far allocated more than €400 million for humanitarian aid. Beyond humanitarian aid, €100 million has also been provided by the European Commission through the different EU instruments to complement humanitarian aid. The EU is the leading donor internationally. The EU has repeatedly urged the Syrian regime to allow humanitarian workers, agencies and organisations unhindered access to those in need".

On 20 February 2013, a car bomb exploded in the Mazraa neighborhood of Damascus near the Ba'ath Syrian Regional Branch headquarters, killing at least 53 people and injuring more than 235. None of the organized groups on either side in the conflict claimed responsibility. On 21 February, the FSA in Quasar began shelling Hezbollah positions in Lebanon. Prior to this, Hezbollah militants had been shelling villages near Quasar from within Lebanon. A 48-hour ultimatum was issued by a FSA commander on 20 February, warning the militant group to stop the attacks or face retaliation. In response, on 18 March 2013, the Syrian Air Force attacked rebel positions in Lebanon for the first time.

As a consequence of this NATO declared no intention of intervening militarily in Syria after a Syrian opposition leader claimed the Patriot missiles to protect rebel-held areas from President Bashar Assad's airpower. "*NATO has no intention to intervene militarily in Syria*", a NATO official said after opposition leader Moaz Alkhatib had asked US Secretary of State John Kerry to extend the umbrella of the Patriot missiles to cover the Syrian

north. The Sunni Muslim cleric took over Syria's vacant chair at the Arab League summit in Doha despite announcing on Sunday that he would step down as leader of the Syrian National Coalition.

Following the extremely spread of violence from both sides which results into an increased scale of internally displaced persons (IDP), the EU decided to boost its funding for Syria to keep up with increasing humanitarian needs. The European Commission was to provide additional humanitarian funding of €30 million to help people affected by the Syrian crisis, bringing its total contribution to over €126 million. The new aid targeted approximately 2 million people in Syria, and a considerable number of the more than 474 000 Syrians who had fled across the borders. Humanitarian assistance was also given to vulnerable host communities of the displaced inside Syria and in Jordan and Lebanon. The financial contributions covered health care for the wounded and others in need of emergency treatment, shelter, food, water, sanitation and household items. The surge of aid brought the humanitarian assistance from the European Commission and the Member States of the European Union at that time to over €310 million – more than half of all international humanitarian aid to the crisis. Prior to this new funding allocation, the European Commission had already budgeted €90 million in humanitarian assistance for Syria and neighbouring states, with an additional €6 million allocated to Iraqi refugees based in Syria. Other funding Instruments of the European Union had mobilised €85 million in response to the Syrian crisis. At that stage, the breakdown of EU humanitarian funding was 45% inside Syria and the rest distributed between Turkey, Jordan, Lebanon and Iraq. The European Union Member States (Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Lithuania, Luxembourg, Netherlands, Poland, Slovakia, Slovenia, Spain, Sweden, United Kingdom) had also mobilised humanitarian funding of over €184 million.

The European Commission adopted the second special measure for Syrian refugees, to step up its response to the needs of increasing numbers of displaced Syrians who fled to Lebanon and Jordan. To complement the humanitarian assistance already provided, the special measure, financed from the ENPI, worth almost €21 million helped to respond to the medium and long term needs of refugees and their host communities in the areas in Lebanon and Jordan most affected by the influx of refugees. €10 million were made available to Lebanon and €10.85 million to Jordan. That increased up to €41.5 million the EU funding allocated to Lebanon and up to €20.85 million to Jordan [European Commission, Press release].

In March 2013 Štefan Füle, Commissioner for Enlargement and Neighbourhood Policy announced additional support of €30 million to help Lebanon in managing the refugee crisis. This brought total help so far to €70 million. In a Statement on the deteriorating humanitarian situation in Syria Commissioner Kristalina Georgieva informed that estimated 4 million

were affected by the violence, at least 2 million internally displaced in Syria and more than 623 000 refugees. She mentioned that EC allocated almost €150 million in humanitarian assistance for Syria and neighbouring states, with an additional €6 million allocated to Iraqi refugees based in Syria and €3.3 million to Palestinians in Lebanon. Total EU contribution (EU plus MS) reached more than €358.5 million at that moment. Other funding instruments had mobilised €85 million and the Member States: €208 million. 45% of the funding was inside Syria and the rest was divided between Turkey, Jordan, Lebanon and Iraq. EU European Commission decided to pledge €100 million for 2013 at International Pledging Conference additional to the €100 million already contracted for the crisis in 2011/2012, bringing the Commission's humanitarian funding for the crisis to €200 million. "*The crisis in Syria is the one with the most dramatic spill-over risks that exists today and could have dramatic consequences for the region, and, therefore, Europe.*" [Speech by Commissioner Kristalina Georgieva, International Cooperation, Humanitarian Aid and Crisis Response: Syria: Time is running out, April 2013].

In April`2013 the EU decided to allocate another sum of €30 million additional financial support for refugee crisis, which brought the total amount of financial assistance to Lebanon to more than €90 million in humanitarian and non-humanitarian aid. At that moment Lebanon hosted the highest number of Syrian refugees: more than 400 000. In June 2013 EU provided new €50 million support to Jordan to deal with Syrian refugee crisis [European Commission, press releases]. Month later the EU responded to spiraling needs with more humanitarian aid: €65 million for more than 4 million people (1.4 million refugees). With more intense fighting in Syria and just three months after pledging € 100 million at the Kuwait donors' conference, the Commission stepped up its effort to fund aid agencies because of the scale of the emergency. The additional funding was allocated to Syria to assist the more than four million people who have been forced to flee their homes, and to neighbouring countries that have generously welcomed some 1.4 million refugees. According to the European Commission the economic costs of hosting Syrian refugees were estimated in 2013 at $ 700 million for Lebanon, $851 million for Jordan, €600 million to Turkey (foreseen to reach €1 billion by the end of the year) [European Commission, Press release].

At the Foreign Affairs Council meeting in May`2013 the EU remained deeply concerned by the spill-over of the Syrian crisis in neighbouring countries and supported their efforts to contain it. EU was seriously concerned with the involvement of extremist and foreign non-state actors in the fighting in Syria, which is further fuelling the conflict and posing a threat to regional stability. EU remained committed to the sovereignty, independence and the territorial integrity of Syria. EU expressed its great concern regarding the possible use of chemical weapons in Syria. EU reiterated the importance of

the role of the fact-finding mission established by the UNSG to investigate allegations of use of chemical weapons. The EU was deeply concerned with the rise of religiously or ethnically motivated violence. The EU reiterated the urgent need for a political solution of the conflict and welcomes the joint US-Russian call for a peace conference on Syria to promote a political process based on the principles included in the Geneva communiqué of 30 June 2012 [3241st Foreign Affairs Council meeting].

On 3 May 2013, the Shabiha, also known as Shabeeha or Shabbiha (groups of armed men in civilian clothing who act in support of the Ba'ath Party government of Syria, led by the Al-Assad family) reportedly committed a massacre of civilians near the city of Baniyas. The Syrian Observatory for Human Rights officially reported that at least 50 people – and possibly as many as 100 – were killed. Witnesses` reports said the dead were killed with knives or blunt objects and that dozens of villagers were still missing.

Lately in May, NATO Secretary General Anders Fogh Rasmussen claimed no direct military role in Syria for the alliance and warned against any stepped-up western military involvement. He made it clear NATO envisions no wider role in the Syrian conflict, despite NATO's previous military intervention – on humanitarian grounds – in the Balkans and Libya. "*It is absolutely outrageous what we're seeing in Syria,*" Rasmussen said. "*But there is a clear difference between Libya and Syria. We took responsibility for the operation in Libya based on a very clear United Nations mandate to protect the civilian population and we got active support from countries in the region. None of these conditions are fulfilled in Syria*". Moreover, Rasmussen said Patriot missiles in Turkey define the limits of alliance assistance in the region. "*Let me stress once again that NATO is engaged in defending and protecting our ally Turkey, but I do believe that the right way forward in Syria is a political solution*".

In June`2013 the EU adopted a joint communication that proposed a comprehensive EU approach for Syria and neighbouring countries: "*Towards a comprehensive EU approach to the Syrian crisis*". The communication envisages aims and tasks as: to support a political process that brings a sustainable solution to the crisis; support the political settlement; prevent regional destabilisation from the spill-over of the conflict in neighbouring countries; address the dramatic humanitarian situation and assist affected populations; prepare for the post-conflict reconstruction and rehabilitation phase; prevent the radicalisation of EU citizens and deal with EU 'foreign fighters' that have travelled to the conflict zone continue urging the United Nations to deal with claims of violations of human rights, international humanitarian law and fundamental freedoms.

The joint communication offers detailed report on the amount of assistance and the efforts do far in Syria and neighboring countries (Lebanon, Jordan, Turkey, and Iraq). The EU has mobilised all of its instruments in order to

contribute to a wider international response. To that date, €678 million in humanitarian assistance had been committed by Member States and from the EU budget. In addition, the EU had mobilised €175 million from other non-humanitarian budget instruments. In sum, the total response to the crisis has already reached over €850 million. The joint communication announces that the Commission will allocate an additional €400 million from this year's budget to humanitarian and economic and development needs in Syria and the neighbouring region, particularly Jordan and Lebanon, bringing the overall contribution of the EU to over €1.25 billion thus far.

The President of the European Council Herman Van Rompuy welcomed the joint Russian-US initiative for a Geneva II conference [Remarks by President of the European Council Herman Van Rompuy following the 31st EU-Russia Summit].

The Justice and Home Affairs Council issued the following statement: *The issue of foreign fighters, i.e. Europeans moving abroad (in particular to Syria) to join jihadists, is a worrying trend of the terrorist threat in Europe today. Addressing the challenge of individuals indoctrinated by violent extremism ideologies, requires a broad societal approach in terms of prevention. The European Radicalisation Awareness Network and the future EU programme on Countering Violent Extremism represent concrete measures to prevent and counter that threat.*

In a June Statement on Syria President Barroso pointed out the EU as largest humanitarian donor with assistance of more than €840 million and announced that the Commission would deploy additional €400 million for Syria and neighbouring countries in particular Lebanon and Jordan [Statement of President Barroso on Syria].

In a Joint statement after the G8 Summit in Lough Erne (UK) on 17-18 June 2013 European Council President Van Rompuy and European Commission President Barroso declared: "*The European Union is already contributing with almost € 1 billion to address the humanitarian crisis. And we recently announced an additional 400 million as a response to the deterioration of the situation in the country and in the region*". They stressed the need to press for a political solution via convening a Geneva II conference.

On 12 July FSA reported that one of its commanders, Kamal Hamami, had been killed at the hands of Islamists a day before. The rebels declared that the assassination, perpetrated by the Islamic State of Iraq and Levant, was tantamount to a declaration of war.

On 18 July, Kurdish PYD forces secured control of the northern town of Ras al-Ain, after days of fighting with the al-Nusra Front. In the following three months, continues fighting between Kurdish and mainly jihadist rebel forces, led to the capture of two dozen towns and villages in Hasakah

Governorate by Kurdish fighters, while the Jihadists made limited gains against the Kurds in Aleppo and Raqqah governorates. In Aleppo, Islamists were reportedly ethnically cleansing Kurds from towns in the countryside and massacring them; leading to a mass migration of civilians to the town of Afrin.

The "chemical issue"

On 19 March 2013, the Government of Syria and the opposition each accused the other of employing chemical weapons in an attack that killed dozens in Aleppo province. France raised the issue in the UN Council under "other matters" on 20 March. On 21 March the UN Secretary-General announced his intention. In a 22-March letter, the Secretary-General said he would establish a technical mission to investigate the Aleppo incident. On 22 March, the Council issued a press statement condemning a terrorist attack on a mosque in Damascus that killed more than 40 people, including a senior Muslim cleric.

Several months later, on 21 August 2013, the Ghouta suburbs of the Markaz Rif Dimashq district around Damascus, were struck by rockets containing the chemical agent SARIN (Figure 1). Hundreds were killed in the attack, which took place over a short span of time in the early morning. Different sources estimated the death toll range from 281 to 1729 fatalities. Many witnesses reported that none of the victims they saw displayed physical wounds.

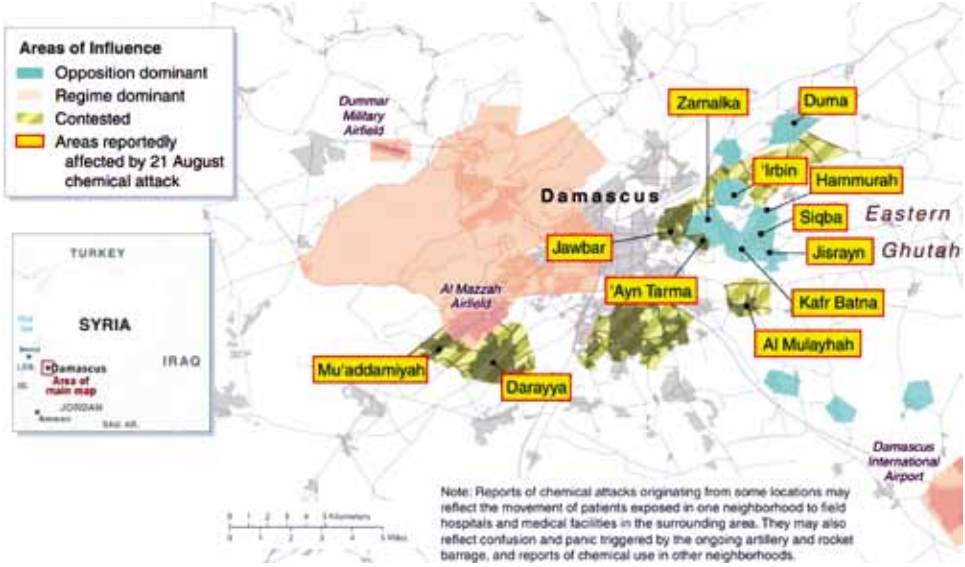


Figure 1. Areas reportedly affected by 21 August chemical attack in Damascus

In reaction UN Council members met in consultations on 21 August to receive a briefing from Deputy Secretary-General Jan Eliasson on attacks. Speaking at the stakeout after the meeting, Ambassador María Cristina Perceval (Argentina), Council President for August, said that "*all Council members agree that any use of chemical weapons by any side, under any circumstances, is a violation of international law"* and "*the members of the Security Council also welcomed the determination of the Secretary-General to ensure a thorough, impartial and prompt investigation*". After completing the investigation three weeks later, the UN reported that it had confirmed the use of sarin in the Ghouta attack – "*The Mission collected clear and convincing evidence that surface-to-surface rockets containing the nerve agent sarin were used in the Ein Tarma, Moadamiyah and Zalmalka in the Ghouta area of Damascus*". The report's lead author, Åke Sellström, said that the quality of the sarin used in the attack was higher than that used by Iraq in the Iran-Iraq war, implying purity higher than the Iraqi chemical weapons program's 45–60%. Based on analyses of the UN's evidence, Human Rights Watch concluded the rockets that delivered the sarin were launched from areas under government control. Specifically, the inspectors listed the precise compass directions of flight for two rocket strikes and these pointed to the government's elite center in Damascus, Mount Qasioun. The Syrian government rejected claims and called reports "*untrue story*".

While the government and opposition blamed each other for the attack. Many governments, mostly in the Western and Arab world, said the available evidence showed the attack was carried out by the forces of Syrian President Bashar al-Assad, a conclusion echoed by the Arab League and the European Union. The government of Russia sided with the government's characterization of the attack as a false flag operation by terrorists to draw foreign powers into the civil war on the rebels' side. The attack sparked debate in France, the United Kingdom, the United States, and other countries about whether to intervene militarily against government forces.

On 2 September 2013, the NATO Secretary-General Anders Fogh Rasmussen quoted information from a variety of sources pointed to President Bashar Assad's forces being responsible for the use of chemical weapons in Ghouta on a massive scale, killing over a thousand civilians and wounding thousands more. However Rasmussen claimed he saw no further role for NATO in the Syria crisis, beyond defending Turkey. "*If a response to what has happened in Syria were to be a military operation, I'd envisage a very short, measured, targeted operation, and you don't need the NATO command and control system to conduct such a short, measured, tailored, military operation*". Indeed, a NATO country took step into the conflict on 16 September 2013 when a Turkish warplane shot down a Syrian helicopter that had violated Turkish airspace. The Turkey's Armed Forces General staff reported that the Mi-17 attack helicopter had strayed into Turkish territory and was warned repeatedly before two Turkish warplanes scrambled and shot it down. The

helicopter crashed one kilometer, or just over half a mile inside Syria, it said. This event has marked the first direct action involvement of a North Atlantic Treaty Organization since Syria's civil war began.

On 2 October 2013, the UN Council adopted a presidential statement on humanitarian access in Syria. Members were briefed on its implementation on 25 October by OHCA head, Valerie Amos. She expressed deep disappointment that, despite the rapidly deteriorating humanitarian situation, access had not improved and there had been no major breakthrough in getting the Syrian government to lift bureaucratic impediments and other obstacles. On 10 October, Council members were briefed in consultations on the recommendations for the establishment of the OPCW-UN Joint Mission. The Council authorized the mission on 11 October to support, monitor and verify the destruction of the chemical weapons program by 30 June 2014.

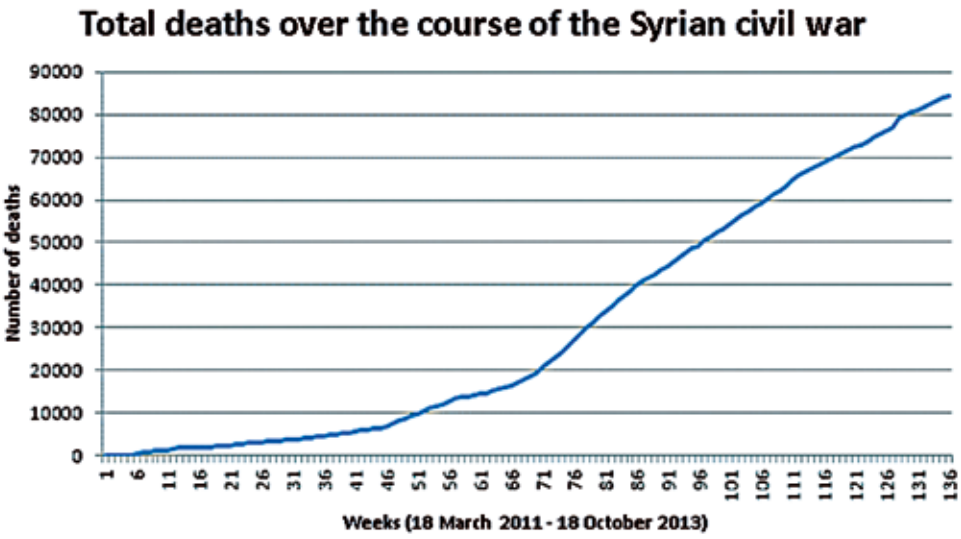


Figure 2. Total deaths over the course of the Syrian civil war in the period March 18, 2011 - October 18, 2013

Government and Hezbollah Offensives (October 2013 – December 2013)

On 18 September, members of the Islamic State of Iraq and the Levant (ISIS) overran the FSA-held town of Azaz in the north of the country. Lately same month, the Syrian government declared its intention to join the Chemical Weapons Convention.

On 9 October, rebels seized the Hajanar guard post on the Jordanian border near Daraa after a month of fierce fighting. Its fall meant rebels were currently in control of a swath of territory along the border from outside of

Daraa to the edge of Golan Heights. The same day, Hezbollah and Iraqi Shiite fighters, backed up by artillery, air-strikes and tanks, attacked and captured the town of Sheikh Omar, on the southern outskirts of Damascus. Two days later, the Lebanese and Iraqis also captured the towns of al-Thiabiya and Husseiniya on the southern approaches to Damascus. The capture of the three towns, located between the two main highways leading to Jordan, strengthened the government hold on major supply lines and put more pressure on rebels under siege in the Eastern Ghouta area.

On 17 October, the Syrian government's head of Military Intelligence in Deir ez-Zor Governorate, Major General Jameh Jameh, was assassinated by rebels in Deir ez-Zor city. The Syrian Observatory for Human Rights (SOHR) reported that he had been shot by a rebel sniper in the Rashdiya district of the city during a battle with rebel brigades. By 11 November, the military had captured a series of nearby positions, securing most of the area around Aleppo International Airport. A total of 17 cases of wild poliovirus type 1 (WPV1) have been confirmed on 26 November. In addition to 15 cases confirmed in Deir-ez-Zor province, two additional cases were confirmed, one in Rural Damascus and one in Aleppo, confirming widespread circulation of the virus.

In the end of November, Turkey and Iran, which support opposing sides within the crisis, jointly called for a ceasefire before the peace talks scheduled for January 22, 2014. As it was mention hereinbefore the ceasefires have been announced previously, notably around Muslim holidays, but none have ever been upheld, despite pledges of commitment by both sides. On 29 November, the United States offered to contribute towards neutralizing Syria's priority chemical weapons stock, by allowing for destruction to take place on a US vessel at sea. Under a September UN Security Council resolution, Syria agreed to destroy its stockpile of toxic nerve agents and munitions by mid-2014. However, until the US proposal, no country was willing to host the destruction of the weapons.

On 2 December 2013 the Syrian Observatory for Human Rights reported that an estimated 126 000 people have died during the conflict, more than a third of them civilians. The September figure estimated by the organization stood at 110 000.

International community efforts

In a Statement on latest figure of refugees fleeing from the Syrian crisis in September`2013 the EU commissioner Kristalina Georgieva, International Cooperation, Humanitarian Aid and Crisis Response declared: "*The European Commission has, since the end of 2011 and in direct response to the crisis, mobilised €515 million in humanitarian assistance for Syria and neighbouring countries. A further €328 million has also been mobilised through other EU instruments (i.e. for education, support to host communities*

and local societies), bringing the total funding from the EU budget to €843 million... At this stage, the breakdown of EU funding is: 47% inside Syria, 23.1% in Jordan, 24.3% in Lebanon and the rest distributed between Iraq & Turkey". She estimated the number of refugees arose to 2 million.

In September UNICEF and the European Union signed a new cooperation agreement that provided an additional €34.2 million to protect children affected by the Syria crisis and promote access to learning in Syria, Jordan and Lebanon. By the end of 2013, the EU contribution to UNICEF in Syria, Jordan, Lebanon and Turkey expected to reach more than €74 million [European Commission MEMO].

In the period October-November`2013 the EU has decided to fully meet the OPCW request and provide ten new armoured vehicles to support its mission in Syria and delivered on its pledges and mobilised another €85 million for Syria and Jordan. The allocation was aimed at providing assistance to the population inside Syria, Syrian refugees and host communities living in Jordan, as well as Syrian students in Europe.

In November at the 21st Japan-EU Summit leaders noted with great concern the deteriorating humanitarian situation in Syria and called for a swift destruction of the chemical weapons arsenal under the UN Security Council resolution [21st Japan-EU Summit Joint Press Statement].

Following the EU-US-Justice and Home Affairs Ministerial Meeting of 18 November 2013 in Washington, the Joint Press Statement focuses on the following issue: *"Of special note, we discussed the threat posed by foreign fighters going to third countries, in particular Syria, and the possible response to address it. We intend to promote close information sharing between our respective agencies, as well as coordinated initiatives in third countries. We also discussed efforts of the U.S. and the EU in countering violent extremism and agreed to intensify our cooperation*".

At the December 2013 Justice and Home Affairs Council meeting the phenomenon of Foreign Fighters was once again determined as a serious concern for European security. "*The increasing number of jihadist travelling from Europe to Syria and other hotspots pose a serious problem for both European internal security and to the stability and security of the region. The Commission welcomes the report presented by the EU Counter-Terrorism Coordinator and the contributions from Europol and Frontex. The Commission, within its competences, will contribute by mobilising all relevant instruments and policies*".

Humanitarian situation and needs

According to numerous international organizations the pace of the deterioration of the Syria conflict in recent months of 2013 was such that a humanitarian catastrophe is spreading throughout the whole region as

the conflict not only destroys the traditional fabric of Syrian society but also seriously endangering the stability of the neighbors. The originally peaceful protests in Syria have developed into an intensive large-scale armed conflict leading to the death of more than 60 000 Syrians, according to UN estimates, and causing extensive damage to infrastructure and harm to the whole civilian population.

The humanitarian disaster caused by the conflict in Syria has impacted millions of people. According to latest ECHO Factsheet on Syria Crisis (Facts & Figures as of 11 December 2013):

- Estimated number of people affected by the crisis in need of humanitarian assistance: 9 300 000;
- Estimated number of internally displaced: 6.5 million (UNOCHA);
- Number of refugees – registered & awaiting registration (UNHCR & GOT)

  Lebanon: 835 921; Jordan: 567 111; Turkey: 539 521; Iraq: 207 053; Egypt & North Africa: 146 546; in TOTAL: 2 296 152.

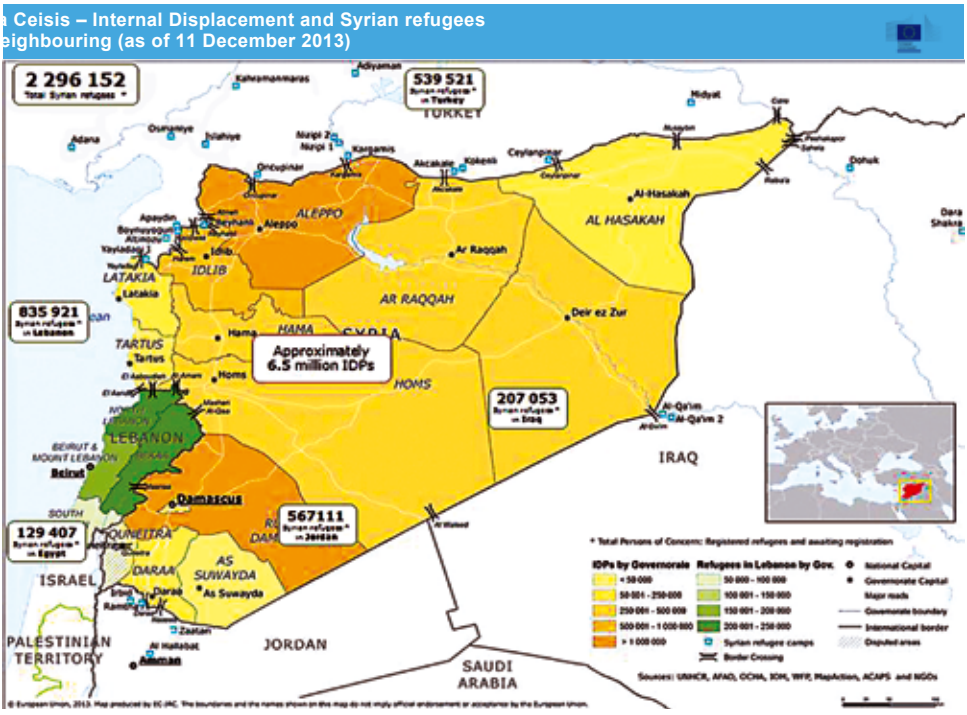


Figure 3. Syria Crisis internal displacement and refugees in neighboring countries as those of 11 December 2013

The humanitarian situation continues to deteriorate as violence intensifies and fighting continues throughout the country. The situation in parts of Rural Damascus, Aleppo, Hama and Homs is particularly dire where more than half a million people remain beyond the reach of basic assistance. According to the UN, the number of Syrians in need of humanitarian assistance has risen dramatically to 9.3 million people, up from 6.8 million in June. Similarly, the UN estimates that the previous figure of 4.25 million internally displaced persons is now more than 6.5 million. ECHO partners highlight the extremely vulnerable situation of large numbers of people in need in inaccessible areas under siege. There are now some 2.3 million refugees (registered and awaiting-registration) in Jordan, Lebanon, Turkey, Iraq, Egypt and North Africa.

There is also a growing concern for refugees living in Syria (Palestinian, Iraqi, Afghan, Somali and Sudanese), whose vulnerability is rising. The conflict increasingly implicates groups of the population such as Kurds and Palestinians. Palestinians are getting further drawn into the conflict and numerous fatalities have been reported. Many Palestinians are displaced inside Syria or have fled the country; UNRWA indicates that over 420 000 Palestine refugees in Syria urgently require basic assistance. Between 15 and 29 August 47 000 people of Kurdish origin fled into the Kurdish region of Iraq giving mainly the lack of basic services and difficulties in finding food as reasons to leave Syria.

THE INTERNATIONAL HUMANITARIAN RESPONSE

A pledging conference is scheduled for January 2014. This second High-Level meeting organised to financially respond to the humanitarian needs on the ground will also be held in Kuwait.

The United Nations has announced that an international peace conference – referred to as Geneva II – will be convened in Geneva on 22 January 2014. The United Nations states that the goal of Geneva II would be to achieve a political solution to the conflict. This would be done through a comprehensive agreement between the Government and the opposition for the full implementation of the Geneva communiqué, which was adopted after the conference on 30 June 2012.

On 7 June 2013, the United Nations launched the largest appeal in its history with the revised Syrian Government Response Plan and Syrian Regional Response Plan calling for $4.4 billion in total, to provide humanitarian aid to Syria and neighbouring countries. Both plans include unmet requirements from the previous versions:

• Revised Syria Humanitarian Assistance Response Plan: the fifth revision (publicly released 7 June 2013) appeals for $1.4 billion for the whole 2013 year (funded at 57.7%). New foreseen beneficiary figures are: 9.3 million people in need, including 6.5 million displaced.

• Revised Syrian Regional Response Plan (Lebanon, Jordan, Turkey, Iraq and Egypt): the fifth revision (released on 7 June) appeals for $2.9 billion (including Governments of Jordan and Lebanon appeals of, respectively: US$ 380 million and 449.6 million) (funded at 63.1%). Beneficiaries: up to 3.45 million Syrian refugees in the region by the end of 2013 (1 million in Jordan, 1 million in Lebanon, 1 million in Turkey, 350 000 Iraq and 100 000 in Egypt).

The EU with Member States is the largest donor in the region. With the pledges delivered after the donors' conference in Kuwait on 30 January and the adoption on 6 June of a major new package of EU assistance in response to the Syria crisis for the total amount of € 400 million, including € 250 million in humanitarian aid, the total committed EU humanitarian assistance now stands over € 1.5 billion (more than € 1.07 billion from Member States, and over € 515 million from the Commission's humanitarian aid budget). In-kind assistance has also been provided to Turkey and Jordan through the activation of the European Civil Protection Mechanism, which led to the delivery of ambulances, blankets, heaters and other items for a total value € 2.5 million. €461 million have been mobilised through other non-humanitarian EU instruments (i.e. for education, support to host communities and local societies) – bringing the total to over €2 billion to date.

The Council also established EU Common Messages on the humanitarian aspects of the Syria crisis which included: a call for the absolute and urgent necessity to respect IHL in full and the obligation to protect civilians; a call for all parties to ensure the safety and protection of all humanitarian workers and medical personnel, and to facilitate the free passage of medical supplies to all areas, as well as safeguarding all health facilities and ambulances; a call for Syria to provide the necessary authorisation to scale up humanitarian operations within the country and to all parties to facilitate unimpeded access for humanitarian; a plea for neighbouring countries to maintain or re-establish open borders in order to provide safe haven for, and equal treatment to refugees, including Palestinian refugees; a plea for all donor countries to ensure the fulfillment of pledges already made and to continue to provide financial support to enable host countries to respond to the growing humanitarian needs of refugees; an appeal for all parties to facilitate the delivery of aid based on a transparent, efficient and accommodating regulatory framework; a call for a regional strategy to be developed to strengthen linkages between humanitarian and development assistance across the region, in association with development actors and international financial institutions; a call for humanitarian aid to be channeled in a way which fully respects the humanitarian principles of neutrality, independence and impartiality.

Provision of humanitarian aid funded by the Commission is channeled through mandated and professional international organizations in accordance with the humanitarian principles; aid is provided to all those

in need, irrespective of their creed or political affiliation. The Commission continues to call on all parties to the conflict to commit publicly to respecting in full their obligations to protect civilians, to ensure in particular the protection of medical personnel and facilities against the effects of fighting, and to allow access for humanitarian workers.

MAJOR NEEDS AND RELATED PROBLEMS

The nature and magnitude of the humanitarian needs are critical in all parts of the country, be they in Government-, opposition- held or disputed areas. The focus is on life-saving activities. Treating and evacuating the wounded, as well as water, sanitation and hygiene, health, shelter and food assistance, are the main priorities. Protection remains central in the conflict, with very serious allegations of abuses reported against women and children, adding to the constant reports of indiscriminate killings and extra-judicial arrests and lately the use of chemical weapons. Food prices have risen dramatically. The availability of food stocks in many parts of Syria is becoming an increasing concern.

Humanitarian access in Syria has become ever more precarious, above all in disputed areas, exacerbated by security issues and cumbersome administrative and operational restrictions. Nevertheless, efforts continue to deliver humanitarian aid throughout the country, both in Government and opposition held areas, as well as in zones of active fighting.

EU HUMANITARIAN FUNDING FOR SYRIA 2011-2013

Donor	Commitments (in €, Total Cash + In-Kind)
Austria	7 875 000
Belgium	10 300 000
Bulgaria	295 874
Croatia	15 758
Czech Republic	1 936 915
Denmark	39 962 105
Estonia	704 785
France	30 590 595
Finland	13 988 201
Germany	229 887 735
Greece	200 000
Hungary	374 653
Ireland	13 700 000
Italy	24 428 428

Donor	Commitments (in €, Total Cash + In-Kind)
Latvia	43 000
Lithuania	34 754
Luxembourg	7 474 739
Malta	25 000
Netherlands	53 450 000
Poland	1 842 047
Portugal	50 000
Romania	306 456
Slovakia	190 000
Slovenia	90 000
Spain	9 477 533
Sweden	40 957 767
United Kingdom*	590 346 523
TOTAL MEMBER STATES	€ 1 078 548 868
EU**	€ 515 000 000
TOTAL EU	§€ 1 588 178 542

* This amount includes €269 566 502.98 which covers the period 13/9/2013 up to 12/3/2015

** This amount includes an allocation of €6 million for Iraqi refugees in Syria and €3.3 million for Palestinian refugees in Lebanon.

§ A further €461 million have also been mobilised through other non-humanitarian EU instruments for short term support (i.e. for education, support to host communities and local societies) – bringing the total to over €2 billion to date. [http://ec.europa.eu/echo/files/aid/countries/factsheets/syria_en.pdf]

The situation in rural Damascus, Northern and Southern Syria is particularly difficult. Cross-line deliveries organized by United Nations agencies (since 31 January) have reached on various occasions the areas of Aleppo, Homs, Hama, Deir-ez-Zor and Idlib; Daraa was recently reached by a UN joint convoy. However, big gaps remain and various cross-lines humanitarian operations had to be cancelled for security reasons.

Assaults on humanitarian workers have also continued unabated (so far, 33 SARC volunteers and 13 UN staff members have been killed and ambulances and UN vehicles are still being attacked and humanitarian workers are being kidnapped). 15 International Non-Governmental Organization (INGO) have now been validated by the Syrian authorities and are formally allowed to operate in the country.

In the neighbouring countries, the number of refugees more than doubled during the first three months of 2013 alone, and, as already mentioned, has now reached some 2.3 million. Countries bordering Syria are approaching

a dangerous saturation point and they need urgent support to continue keeping borders open and assisting refugees. Assessment of the conditions of refugees living outside the camps is needed as well as humanitarian aid (especially shelter and water, hygiene and sanitation).

To date (December 2013), 17 polio cases have been confirmed in Syria: 15 from Deir ez-Zor governorate, 1 from Aleppo governorate and 1 from Rural Damascus. The confirmation of additional cases outside the contamination centre of Deir ez-Zor indicates that this is a widespread outbreak. Syria had not had an onset of wild poliovirus since 1999. A regional response strategy has been launched, comprising a multi-country polio response across the Middle East. Under the coordination of the Ministries of Health, World Health Organization and UNICEF, synchronized vaccination campaigns – targeting 23 million children under five with an estimated total budget of $39 million– are being planned or are already underway in Syria, Egypt, Iraq, Jordan, Lebanon and Turkey.

Key messages ahead in 2014

- Advocacy is vital through all possible channels to call for increased access and a strengthened presence of international community on the ground.
- Advocacy efforts should give special attention to the safe and to ensure the necessary measures for the timely delivery of vaccines, vaccination equipment and supplies region wide.
- Respect for International Humanitarian Law (IHL), the protection of civilians, including humanitarian workers and especially medical personnel and facilities throughout need to be ensured.
- Keeping the humanitarian and political tracks separate to facilitate access to those in need remains a priority.
- Continuation of efforts in crisis management is vital and urgent.
- Acknowledge the generosity of neighbouring countries in hosting Syrian refugees and continue to call on countries neighbouring Syria to keep borders open in line with international humanitarian law principles for the passage of all civilians without distinction, and facilitate the work of humanitarian actors where necessary, including border areas to ensure rapid and timely provision of aid.

THE REFUGEE IMPACT

One of the direct effects of the crisis in Syria in the region is the heavy influx of Syrian refugees to neighbouring countries. The vast number of Syrian refugees has serious security implications for host countries ranging from economic difficulties to social tensions. Turkey, Jordan, Lebanon, Iraq and

Egypt are the countries which have been most severely affected by the crisis. They have experienced serious difficulties in managing the refugee crisis on their territory which is confirmed by the appeal for funding to UNHCR, international financial organisations and governments worldwide. The financial burden on these countries is the most evident effect of the crisis and it has further aggravated the situation in countries like Iraq which has been struggling to recover from the devastation of war. Moreover, the discontent of refugees with living conditions in refugee camps sometimes leads to riots and creates complex security challenges for local authorities. The frustration of local populations with the increasing number of Syrian refugees also poses a serious challenge for host countries' governments.

Due to the escalation of violence in the Syrian Arab Republic, the number of Syrian refugees in neighbouring countries has been increasing rapidly since the beginning of 2012. Based on the number of refugees who have registered or are pending registration, Syria's neighbours are today hosting more than two million Syrian refugees, which is further aggravating the growing strains on these countries' infrastructures and economies.[1]

Lebanon has been the most seriously affected neighbouring country from the refugee crisis. The number of Syrian refugees in Lebanon in January 2012 was 6290 and it has been growing rapidly to reach 129 106 in December 2012 and 832 005 as of 28 November 2013. According to government estimates, the total number of Syrians in the country is 1 000 000 (Figure 4).[2]

The economic and social repercussions of having such a rapid increase of refugee inflow to Lebanon have been devastating and have created huge pressures on the local populations. The number of Syrians currently registered as refugees or pending registration is equal to more than 18 per cent of the country's population, with groups of refugees scattered across 1400 localities. The impact is alarming, especially on the demographic structures in those regions, and has serious security implications. Health, education, and water and sanitation systems have all exceeded their capacities. This creates further tensions in local communities and puts immense pressure on government authorities.[3]

According to UNHCR data, the number of registered Syrian refuges in Turkey was 8 000 in December 2011. Their number quickly reached 144 755 by December 2012. The UNHCR data as of 27 November 2013 shows that the number of Syrian refugees in Turkey is already 527 307. According to government estimates, the total number of Syrians in the country is 700 000 (Figure **5**4).[4] The Turkish government has responded to the Syrian

[1] http://data.unhcr.org/syrianrefugees/syria.php
[2] http://data.unhcr.org/syrianrefugees/country.php?id=122
[3] http://www.unhcr.org/522747799.html
[4] http://data.unhcr.org/syrianrefugees/country.php?id=224

refugee influx with $2 billion in support. Refugees are spread across 21 camps where they receive shelter, health care, security and other services. Almost a quarter of a million Syrians are already documented living outside of camps in urban locations, with many more pending registration.[5]

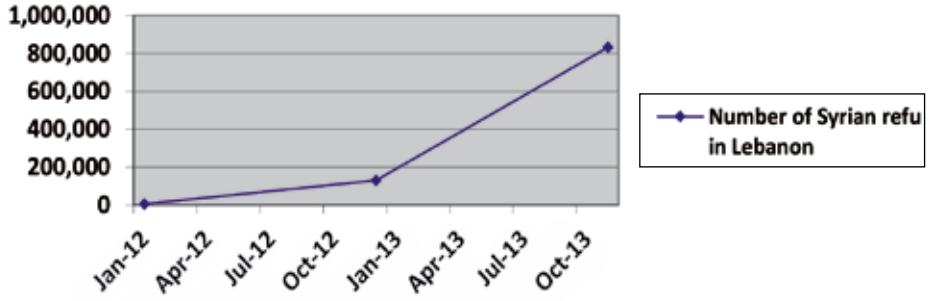


Figure 4. Number of Syrian refugees in Lebanon
from Jan 2012 to Oct 2013 (data source: UNHCR)

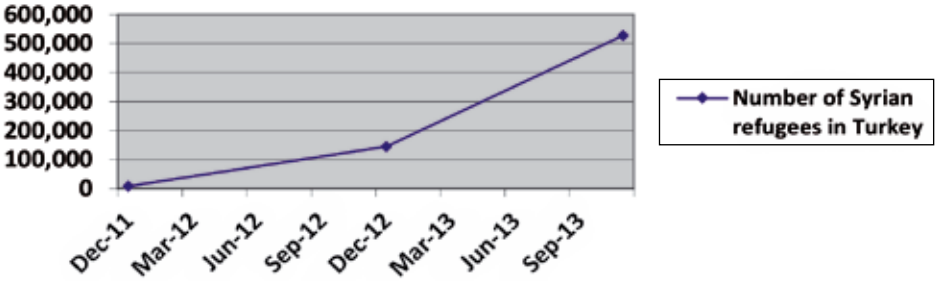


Figure 5: Number of Syrian refugees in Turkey
from Dec 2011 to Sep 2013 (data source: UNHCR)

In Jordan, the number of Syrian refugees in January 2012 was 2749 and reached 117 321 by the end of December 2012. The UNHCR data as of 28 November 2013 sets the number at 560 059[6]. The Syrian refugee influx has swollen the population size by 11 per cent, with 140 000 in camps. This increase has constituted an enormous pressure on Jordanian resources, services and infrastructure and it must be kept in mind that a sudden increase in a population by 11 per cent constitutes a serious security threat for any country. The cost of hosting refugees in 2013 solely in relation to electricity, water, education, health, municipalities, subsidised goods, and protection and reception, has now reached $2.016 billion.[7]

[5] http://www.unhcr.org/522747799.html
[6] http://data.unhcr.org/syrianrefugees/country.php?id=107
[7] http://www.unhcr.org/522747799.html

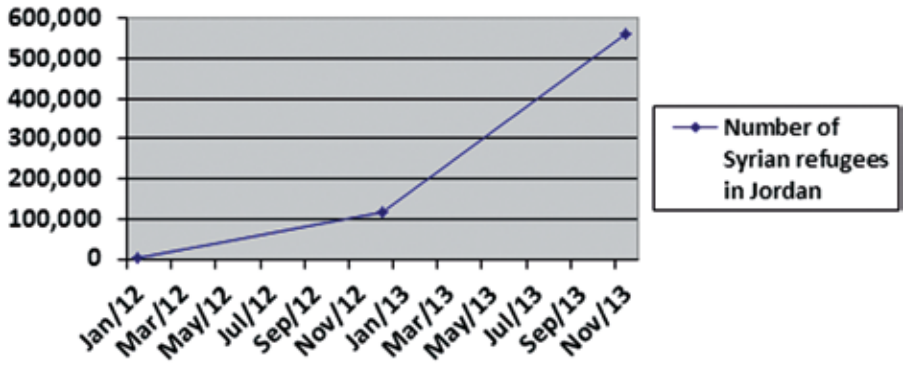


Figure 6. Number of Syrian refugees in Jordan
from Jan 2012 to Nov 2013 (data source: UNHCR)

According to UNHCR data, there were 8 Syrian refugees in Iraq in the beginning of 2012. The number of refugees at the end of 2012 was 67 625. The trend of dramatic increase in the number of refugees continued during 2013 to reach 208 054 as of 27 November 2013 (Figure 6).[8]

In Iraq, which is already struggling with serious security challenges and large-scale internal displacement of around one million people before the crisis in Syria began, the 160 000-strong Syrian refugee population has been swollen further by the recent influx of more than 40 000 people from areas of conflict in north and northeast Syria. As well as those in camps, thousands of these refugees are living among the local population in situations that will become economically unsustainable without more help.[9]

The impact of the refugee crisis has been especially troubling for this country, which was not long ago devastated by war and is now struggling to rebuild a large part of its infrastructure and trying go back to normal life. The Iraqi response to the Syrian refugee crisis has had very tangible financial dimensions and the country has had to reallocate additional resources from its national budget to respond to the needs of the Syrians in refugee camps. The Minister of Foreign Affairs of Iraq, H. E. Hoshyar Zebari, reported at the Ministerial Meeting of the Refugee-Hosting Countries Bordering the Syrian Arab Republic in September 2013 that the Iraqi government has spent more than $15 million during 2012 in response to the refugee crisis. In addition to that, the Kurdistan regional government allocated $25 million to secure the needs of refugees. And these are only part of the financial resources that the country had to reallocate in order to tackle with the refugee crisis on their territory.

[8] http://data.unhcr.org/syrianrefugees/country.php?id=103
[9] http://www.unhcr.org/522747799.html

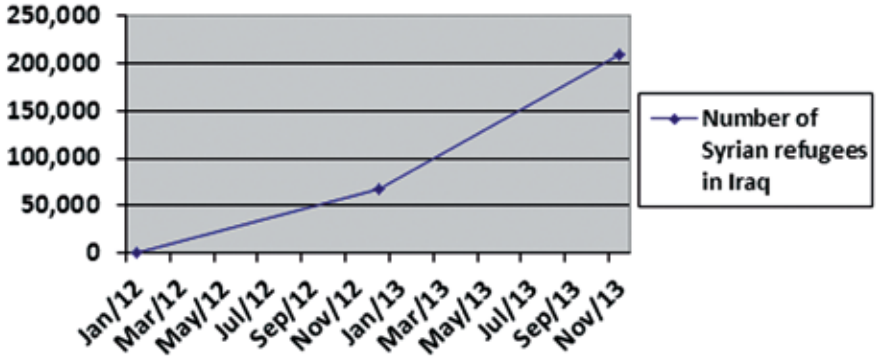


Figure7: Number of Syrian refugees in Iraq from Jan 2012 to Nov 2013 (data source: UNHCR)

In Egypt, the number of Syrian refugees in June 2012 was 924 and reached 13 001 by the end of December 2012. The data as of 26 November 2013 sets the number at 128 158. According to government estimates, the total number of Syrians in the country is 300 000 (Figure 7).[10]

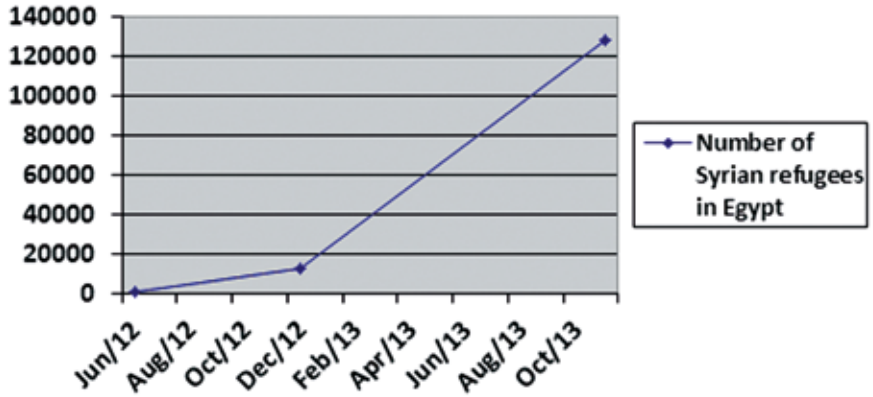


Figure 8. Number of Syrian refugees in Egypt from Jun 2012 to Oct 2013 (data source: UNHCR)

The UNHCR and USAID are just two of the organisations that have been supporting Syria neighbouring countries in their efforts to provide shelter and food to Syrian refugees and to process their documents as quickly as possible. The UNHCR has issued a funding appeal for $372,390,514 for Turkey alone. The appeal for Lebanon is $1,216,189,393; Egypt - $66,705,984; Iraq - $310,858,973; Jordan - $976,576,971. The total U.S. Government assistance for 2012 and 2013 for the Syrian crisis humanitarian

[10] http://data.unhcr.org/syrianrefugees/country.php?id=8

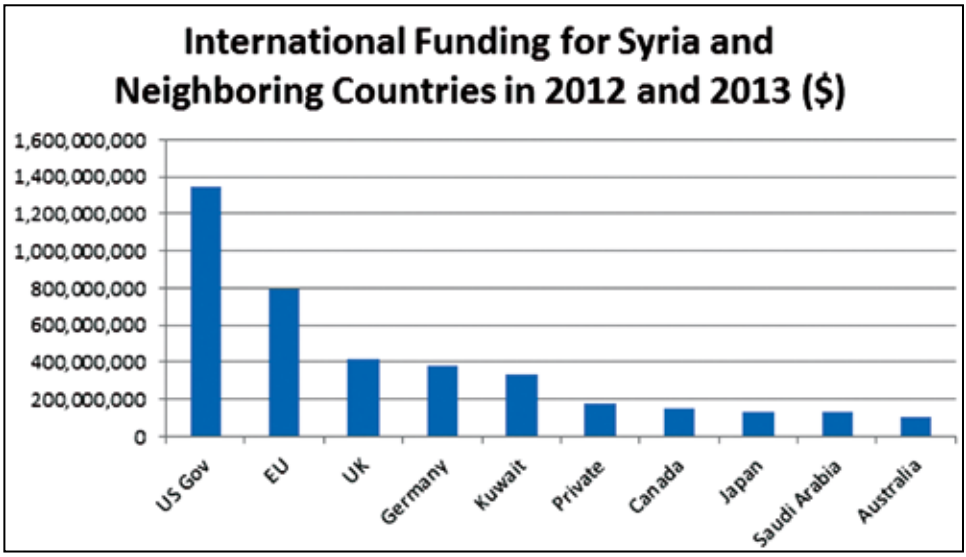
response is $1,349,779,031. Other countries have also provided significant financial support in 2012 and 2013 which is detailed in Table 1 and Table 2.

Table 1. USAID information on international funding for Syria and neighbouring countries in 2012 and 2013.[11]

Country	Funding in $
US Gov	1,349,779,031
EU	794,170,140
UK	420,152,326
Germany	379,468,400
Kuwait	332,220,977
Private	181,866,797
Canada	154,285,874
Japan	132,883,618
Saudi Arabia	128,173,182
Australia	102,796,612

According to UNHCR estimates, by the end of 2013 half of the population of Syria will be in need of aid. This includes an anticipated 3.45 million Syrian refugees and 6.8 million Syrians inside the country, many of whom will be displaced from their homes.

Table 2. USAID information on international funding for Syria and neighbouring countries in 2012 and 2013.[12]



[11] http://www.usaid.gov/sites/default/files/documents/1866/syria_ce_fs03_11-21-2013.pdf
[12] http://www.usaid.gov/sites/default/files/documents/1866/syria_ce_fs03_11-21-2013.pdf

The inability of host countries to respond to the needs of the Syrian refugees leads to a growing frustration and discontent among the refugee community which sometimes takes violent forms as for example the clashes in the Zaatari refugee camp in Jordan in October 2012. Dozens of Syrian refugees rioted over living conditions in the camp which led to clashes between the refugees and Jordanian security forces.[13]

The discontent however is not only on the side of refugees but also local populations show a growing frustration over the situation. A survey conducted by Jordan's leading research centre found large majorities of Jordanians in favour of closing the borders to Syrians altogether.[14]

The necessity to provide shelter, food and security to so many people puts enormous pressure on host countries' infrastructures and economies. However, the financial repercussions are only part of the problem. The social tensions in host countries are another serious concern for their governments and the international community since they might have serious security implications. Not only neighbouring countries however face serious challenges due to the increasing number of Syrian refugees. European Union member states like Italy and Bulgaria also struggle to alleviate the social and economic tensions that stem out of the influx of Syrian refugees. Although the impact on EU member states have not been as severe as on Syria neighbouring countries, it should be noted that the capacity of host countries to respond to the refugee crisis varies depending on preparedness and financial resources. Thus, even a smaller number of refugees may create a crisis situation in countries like Bulgaria which had not been prepared for such a sudden increase in refugee influx.

The aggravated security environment in host countries and the lack of enough financial resources to support the response of their governments to the crisis have clearly indicated the need for more effective burden-sharing practices among UN members as well as within the EU. Few states in the world are capable of handling a refugee crisis with the magnitude witnessed in Syria neighbouring countries and it is therefore necessary that the international community develops better mechanism to support countries which carry the main burden of such crises. The increased international support will result in improved security environment in host countries and in the region itself and will possibly prevent the further spill-over effects of the refugee crisis to other countries.

[13] http://www.unhcr.org/cgi-bin/texis/vtx/refdaily?pass=463ef21123&id=506a7f925
[14] http://www.unhcr.org/cgi-bin/texis/vtx/refdaily?pass=463ef21123&id=506a7f275

About the authors:

Colonel Orlin Nikolov graduated Military School in 1991; Defense Staff College in 2003; Junior Staff Officer Course in Slovakia in 2005; Joint Specialized Operation Course in Joint Specialized Operation University - USA – 2006. From 2005 to 2007 col. Nikolov was Deputy Chief of National Center for Modeling and Simulations "Charalitza". From 2007 to 2013 he was Assistant in "Doctrines and training programs" branch in Training Directorate in the Genera Staff of the Bulgarian Armed Forces; Chief Assistant in Exercise and Training Branch in Operation and Training Directorate in MoD. Since 2013 col. Nikolov has been appointed as Chief of Capabilities Branch in Crisis Management and Disaster Response Centre of Excellence. He is author of many articles and features on Air Defense and Modeling and Simulations thematic and Member of NATO Modeling and Simulation Group MSG-068/105/134. Col. Nikolov is Project Manager of projects such as Establishment and development of National Centre for Modeling and Simulation "Charalitza"; Integrated System for Modeling and Simulation in MoD; Crisis Management and Disaster Response Centre of Excellence; South Eastern Europe Education and Training Network. E-mail: orlin.nikolov@cmdrcoe.org

Colonel Nikolay Nikolov graduated Military School in 1990, Master degree in Finance in 1998, Defense Staff College in 2010 and also a number of qualification courses in the areas of Logistics, Defence Acquisition, NATO Codification System, NATO Resource Management, etc. From 1990 to 2003 col. Nikolov has been occupied several positions with growing r esponsibilities in the field of the aviation technical support in Bezmer Air Base. From 2003 to 2010 he was working as a senior expert in different logistical structures in Bulgarian Armed Forces. During that period he was appointed to conduct an ISAF mission in Kabul. From 2010 to 2013 he was working as Chief of Section in South Eastern Europe Brigade (SEEBRIG) in Istanbul (Turkey) and Larissa (Greece). Col. Nikolov became part of the CMDR COE staff in 2013. E-mail: nikolay.nikolov@cmdrcoe.org

Major Eng. Stoyan Stoyanov has worked as a Senior Expert at CMDR COE since 2013. He graduated from National Military University in 2000 and was working as a logistic officer until 2012. He graduate from National Defense College in 2013. He holds Master of Management from University of Economics – Varna. E-mail: stoyan.stoyanov@cmdrcoe.org

Major Kostadin Lazarov is senior expert in Crisis Management and Disaster Response Centre of Excellence. He graduated from National Defense College in 2013. He has published articles related with his doctoral studies on topic "Modeling of aerodynamic parameters of ultrasonic aircraft". Email: kostadin.lazarov@cmdrcoe.org

Boris Guenov is senior expert in Crisis Management and Disaster Response Centre of Excellence. He graduated "Sociology" in 2000. Previously, he has work for ten years in HQ Land Forces of Bulgarian army

A SUMMARIZED ANALYSIS OF THE CURRENT STATE OF AREAS AFFECTED BY THE SNOWFALLS IN THE REPUBLIC OF BULGARIA AND A FORECAST FOR THE DEVELOPMENT OF THE SITUATION

Aleksandar Georgiev, Stoyan Stoyanov, Kostadin Lazarov, Desislav Zmeev, Orlin Nikolov (CMDR COE team)

Abstract: *Over the past few days the hydrometeorological situation in the country became complicated due to the heavy snowfalls and the rising river levels mainly in southern Bulgaria. The heavy snows and snowdrifts disconnected part of the transport infrastructure in the country and some settlements were cut off from the world, which required the use of Red Cross teams in order to supply the destitute population with food and water. The heavy wet snow caused power outages due to fallen trees, which cut off the power lines. Over 400 settlements in the districts of Kardzhali and Haskovo were left without electricity there have been landslides on the roads which were closed to traffic, impeding motor vehicle movement. Due to the complicated situation in some areas there have been serious accidents. The blizzard interrupted the railway traffic in a number of railway sections due to damaged overhead lines. The fallen trees and rocks have also led to traffic disruption in some areas. Passenger transport is provided by buses.*

Keywords: *snowfalls, Bulgaria, situation, analysis*

DAY-BY-DAY EMERGENCY DEVELOPMENT

Following the snowfall, an intensive thawing has started as well as increasing of river levels. Ropotamo River has overflowed again flooding large areas in the Burgas municipality. About 200 cubic meters per second have been drained from the Studen Kladenets reservoir since 17:00 on 7/3/2015. The Ivaylovgrad reservoir is overflowing as it cannot contain the water influx from the Studen Kladenets reservoir. Discharging of large quantities of water can pose a risk of flooding vast areas in Northern Greece, bordering the region of Krumovgrad and Ivaylovgrad.

Critical Hydrometeorological Situation (6-8 March 2015)

Code Red for heavy snowfalls and strong winds was issued for Friday for the regions of Smolyan and Kardzhali. It is the highest level warning with a forecast for extreme meteorological phenomena and high risk of substantial damage to the infrastructure and the environment, as well as an increased risk of casualties.

Code Orange[1] for strong winds and significant amounts of rain and snow - up to 30-40 liters/sq.m - is in force for Pazardzhik, Plovdiv, Stara Zagora and Haskovo, where the forecast is for strong winds as well.[1]

Code Yellow has been issued for the rest of the country, with warnings of strong northern winds, intensive rainfalls up to 70 l/sq m, blizzards and snowdrifts.

Figure 1. Dangerous meteorological phenomena on Friday, 06/03/2015 – rain, snow and wind. Codes: YELLOW - Be aware. Severe weather is possible over the next few days and could affect you. Yellow means that you should plan ahead thinking about possible travel delays, or the disruption of your day to day activities. ORANGE - Be prepared. There is an increased likelihood of bad weather affecting you, which could potentially disrupt your plans and possibly cause travel delays, road and rail closures, interruption to power and the potential risk to life and property. RED – Take action. Extreme weather is expected. Red means you should take action now to keep yourself and others safe from the impact of the weather.

The weather across almost the entire country was cloudy with heavy snowfalls. In the districts of Smolyan, Kardzhali and Haskovo was declared the highest Code Red due to likely heavy rains and snow, mainly in the Fore Balkan and in the Rhodope region where amounts reached 60-80 l/sq m. Winds were light, and in the eastern part of the country moderate to strong from the northeast. Conditions for blizzards and snowdrifts have occured.

[1] Code orange means danger. The forecast is for dangerous and extremely dangerous meteorological phenomena. There is great risk of material damage and casualties. Be very careful, follow the detailed information of expected weather conditions and follow the recommendation of the authorities.

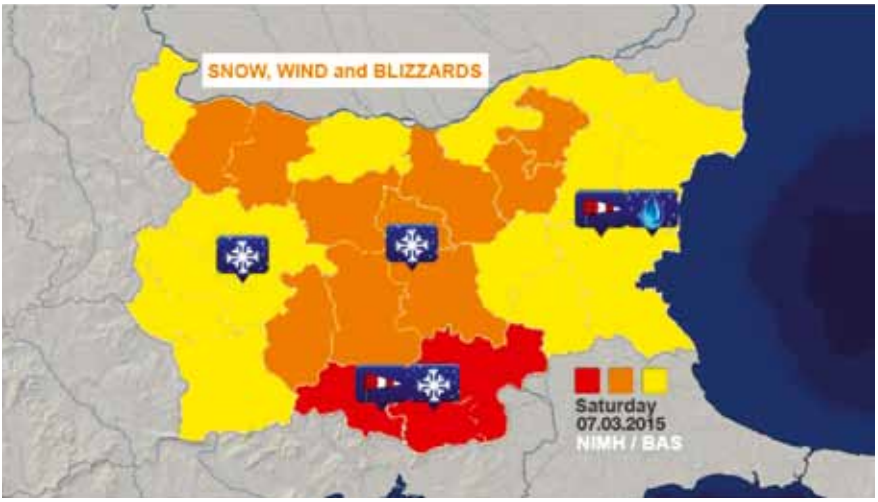


Figure 2. Dangerous meteorological phenomena on Friday, 07/03/2015 – rain, snow and wind

In ten districts in northern and central Bulgaria (Montana, Vratsa, Lovech, Gabrovo, Veliko Tarnovo, Targovishte, Razgrad, Pazardzhik, Plovdiv and Stara Zagora) a Code Orange was in force due to the expected heavy snowfalls. Code Yellow was issued for the rest of the country.

Code Yellow was declared in the Black Sea region and the district of Yambol, due to snowfalls and strong wind. There was moderate to strong northwestern wind reaching 20-22 m/sec.

The situation in the district of Kardzhali was extremely heavy. In some places the snow was over 1.50 m. in depth, which led to the interruption of transport communications to a number of villages and neighbourhoods. Teams of the Red Cross handed out food and water in the evening. Over 400 settlements in the region of Kardzhali and Haskovo were left without electricity. Many roads were closed. Crisis Headquarters worked in Kardzhali during the night.

Studen Kladenets reservoir has overflowed and the water levels of the rivers Arda and Varbitsa have risen.

About 200 cubic meters per second were drained from the reservoir Studen Kladenets from 17:00 on 7/3/2015, as two of the nine valves of the facility were open.

According to data by the Crisis Headquarters in Kardzhali, there is no risk for the people living in the river valley of Arda, however vast areas in Northern Greece bordering with the regions of Krumovgrad and Ivaylovgrad are in danger of being flooded.

Ivaylovgrad Reservoir has overflowed because it cannot contain the influx of the Studen Kladenets Reservoir.

The Ropotamo River overflowed again and flooded vast areas in the district of Burgas. Its waters spread over a huge territory. As a result, the road between Veselie and Yasna near Primorsko was closed for traffic.

Due to the complicated meteorological situation the traffic in the country was heavily obstructed. In some areas there were serious accidents. The blizzard interrupted the train traffic in six railway sections in the country. As a result of failure of the overhead lines trains were not moving between Pazardzhik and Stamboliyski and along the line Tulovo - Zmeyovo. Trees and rocks cut off the traffic on the lines Velingrad - Tsvetino and Razlog - Belitsa. Passengers were transported by bus.

Hydrometeorological situation on 8/3/2015

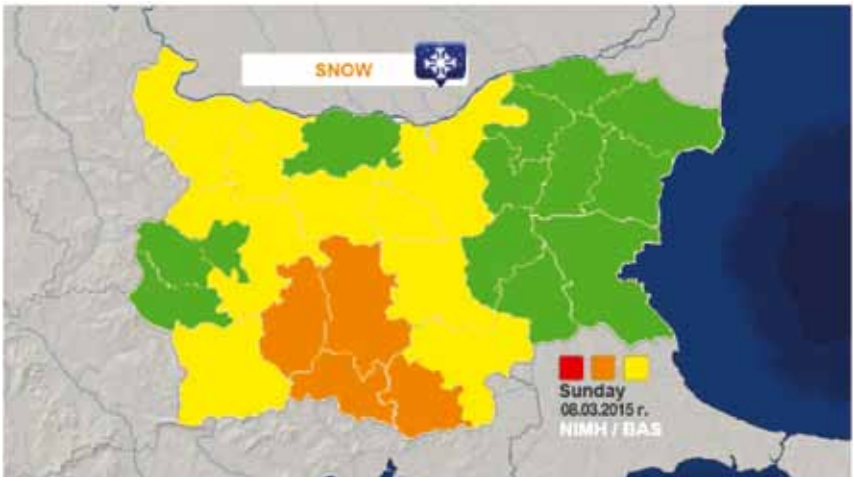


Fig. 3. Codes for dangerous meteorological phenomena for 8/3/2015

On 08/03/2015, the weather in Bulgaria was cloudy with rainfalls, and snowfalls in the mountain areas and high fields, mainly in the western part of the Upper Thracian Plain.

Code Orange was issued for the districts of Pazardzhik, Plovdiv, Smolyan and Kardzhali where it will continue to snow. In the mountains the snow cover will increase by 20-30 cm.

The situation in Kardzhali region remains heavy, the state of emergency is still in force. The District Governor of Kardzhali announced that so far about 380 settlements in the region were left without electricity. A number of teams from all over the country worked to fix the damages, however the failures

were very serious. There were fallen posts and the electric distribution system operator was not able to deliver electricity to the substations. Works were done in all areas where there were accidents. According to the experts, there have not been such accidents in the last 20 years.

Many roads are closed and equipment is expected to be dispatched in the hinterland in order to take part in the cleaning as snow in some places has reached more than 1.50 cm. “There are currently no destitute people in the district. Since this morning 8 teams of Regional Directorate “Fire Safety and Civil Protection” have been working to remedy the situation after the snowfall in the area. There are no destitute people at the time. Assistance to the firefighters from Kardzhali is provided by their colleagues from Plovdiv and Stara Zagora.

Drivers are advised to avoid taking trips due to the risk of accidents and emergencies. The Regional Directorate “Fire Safety and Civil Protection” in Kardzhali has received 37 emergency signals from yesterday afternoon to this morning. It took a rescue team nearly 5 hours to reach a woman in labor in the village of Orlitsa. The woman was transported to a health facility. Four more women in labor have been taken to hospital with the help of firefighters. Four patients on hemodialysis were also transported to the regional center. This morning the rescue team traveled to a diabetic who needed to be transported to the health center.

More than half of the signals yesterday were for fallen trees, and the Fire Safety teams responded promptly. All stranded cars were towed.

Snowdrifts 4 m high piled up in the town of Ardino. The situation there is the most critical throughout the region of Kardzhali. The continuous snowfall and the heavy snowdrifts have basically cut off the town from the outside world. Mobile cells in the area began to drop, threatening to entirely breakdown communications.

The road between Momchilgrad and Krumovgrad is still closed, the road to Ardino is being cleaned, and it is closed, too.

In the last day river levels in the country as a whole continued to rise. In some places in the upstream stretch of rivers there has been a decline and/or preservation of water levels:

Danube basin - rivers:

- Ogosta river with up to +15 cm;
- Iskar river - in the middle stretch there is a decrease, and there is an increase of up to +9 cm in the downstream stretch;
- Osam river with up to +36 cm;
- Yantra river with +40 cm;
- Rusenski Lom with up to +52 cm;

Black Sea basin:

- Vrana River at Nadarevo village – an increase by 54 cm;
- Provadiyska river – an increase with up to 40 cm;
- Aytoska river at the town of Kameno – a decrease of 2 cm;
- Fakiyska river at Zidarovo village – an increase of 2 cm;
- Ropotamo river at Veselie village – a decrease of 90 cm;

East Aegean Sea basin – rivers:

- Tundzha river with up to 16 cm;
- Maritsa river – main river with up to +54 cm at Svilengrad;
- Sazliyka river at Galabovo with 140 cm;
- Vacha river at Zabral – an increase of 32 cm;
- There is a drop in the water levels of the rest of the rivers.

West Aegean Sea basin – rivers:

- Mesta river – there is a drop in the water level;
- Struma river – main river – decrease;
- Strumeshnitsa river at the Strumeshnitsa village – an increase of 10 cm.

At present water levels throughout most of the country exceed the thresholds for high waters and the water quantity of the Sazliyka river at the town of Galabovo is above the attention threshold.

Hydrometeorological situation on 9/3/2015

Weather on the next day will still be cloudy. In some places there will be light precipitation, and in the mountain areas and high plains - snowfall. The northeast wind will weaken, in Eastern Bulgaria and the Rila-Rhodope region it will be moderate. The minimum temperatures will range between - 3°C and 2°C, at the seaside 2-3°C higher. The maximum temperature will be between 3°C and 8°C.

The atmospheric pressure will not change significantly and will remain slightly higher than the average for the month.

The weather over the mountains will be cloudy and snowy. The wind will be moderate, and in the high and open areas – there will be a temporary strong east wind. Temperatures will slightly increase and at 1200 meters height they will reach around 0°C, at 2000 meters - about - 4°C.

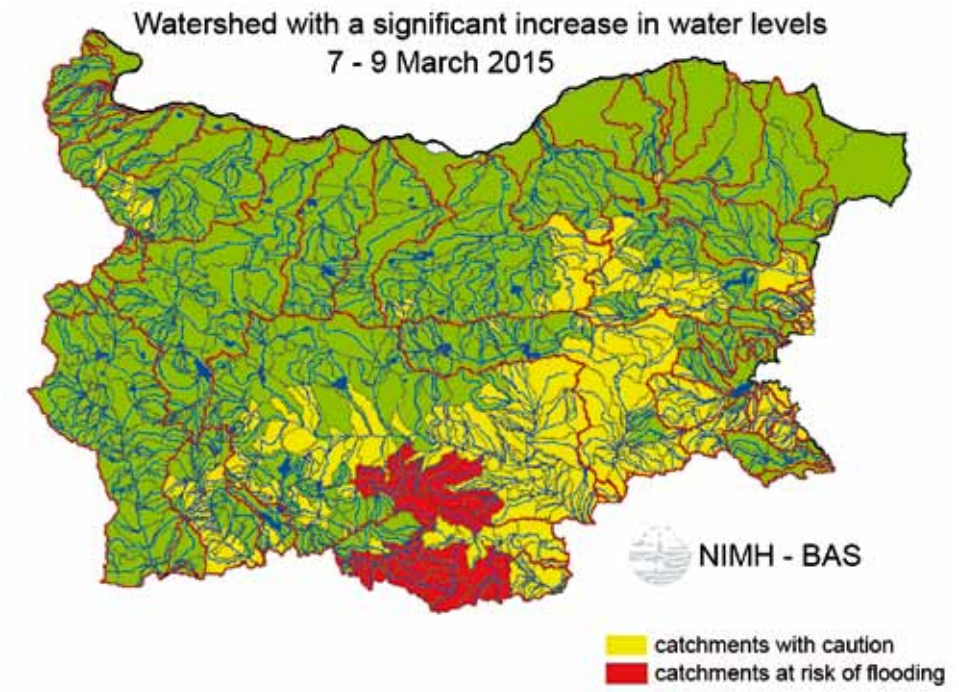


Figure. 4. Hydrometeorological situation on 09.03.2015

Cloudiness over the Black Sea region will be considerable, with broken clouds mainly over the northern coast. It will rain mainly on Monday night. There will be moderate northeast wind. The maximum temperatures will be 8-9°C. Sea water temperature will be 5-7°C. The sea wave height will be between 1.25 to 2.5 meters.

Forecast for the hydrological situation in the next 1-2 days

As a result of the registered rain and snow falls, the positive temperatures and the increased soil moisture, and the rivers drainage, increases in river levels are still possible in the next 1-2 days – mainly in the downstream stretches of rivers.

Danube basin: the downstream stretches of the rivers and their respective tributaries: Lom, Ogosta, Osam, Yantra, Rusenski Lom;

Black Sea basin: the downstream stretch of Provadiyska river, the middle and downstream stretch of Kamchia, as well as the downstream stretches of Dvoynitsa, Aytoska, Rusokastrenska, Sredetska, Fakiyska, Ropotamo, Veleka, Rezovska rivers.

East Aegean Sea basin:

- Tundzha river – its catchment after the Mochuritsa river flows into it near the town of Yambol;
- Maritsa river - its catchment and tributaries after the Sazliyka river flows into it;

The forecast of the early warning system for the tributaries of the rivers Maritsa and Tundzha at the National Institute of Meteorology and Hydrology (NIMH) of the Bulgarian Academy of Sciences is:

The water level of Sazliyka River at the town of Galabovo has passed the orange warning threshold and as of 8 March it will start to drop gradually, it will remain above the orange threshold until the late-night hours of 10 March.

The level of Maritsa River at Harmanli will reach its peak in the late-night hours of 8 March after which it will gradually decline in the next days and it will remain above the yellow threshold until the afternoon of 10 March.

The river level of Maritsa in Svilengrad began to decrease until the early hours of today after it reached its peak last night, then it resumed a gradual increase again, which is expected to continue until the morning of 9 March after which it will gradually decrease. It is possible that it reaches the orange warning threshold.

The river level of Mochuritsa in the village of Vodenichane passed the orange warning threshold, and is expected today to start gradually declining and will remain above it until the late hours of 10.03.2015.

The river level of Mochuritsa in the village of Charda has passed the orange threshold and today is expected to start gradually declining and it will remain above it until the late hours of 10.03.2015.

The river level of Tundzha at the town of Yambol reached its peak on 08.03 as it passed the orange warning threshold. It is expected to start gradually declining, and it will remain above the orange threshold until the early hours of 11.03.2015.

The river level of Tundzha near Elhovo is increasing gradually and according to the forecast it may reach the red warning threshold in the late hours of 09.03.

Utmost caution is needed regarding the catchments of the rivers Tundzha, Maritsa and Sazliyka in the downstream stretches!!!

ANALYSIS AND FORECAST OF THE YDROMETEOROLOGICAL SITUATION IN THE REPUBLIC OF BULGARIA FOR THE NEXT TWO WEEKS

1. SMOLYAN AREA

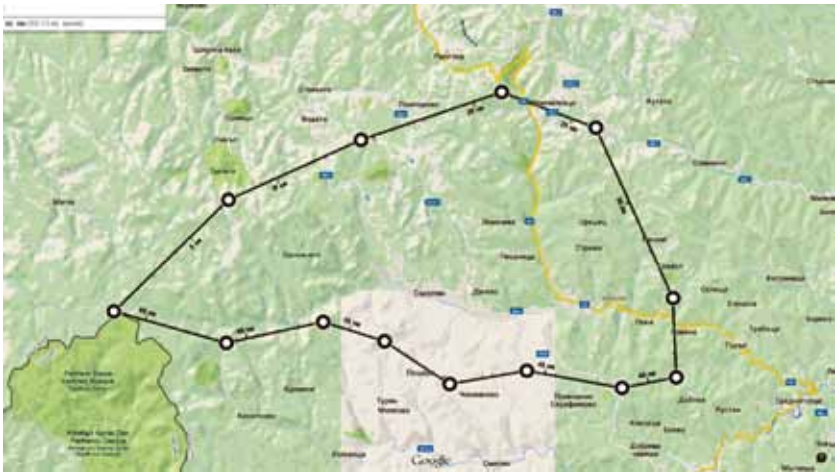


Figure 5. Catchment Smolyan area

- Catchment area in the region – 230 sq km;
- Average snow depth – 50 cm;
- Accumulated water supply – 38 million cubic meters.

Figure 6. Weather forecast 08 – 21 March 2015 (the maximum and minimum daily temperatures for Smolyan region). Source:*www.accuweather.com.*

There will be no significant changes in the weather in the region of Smolyan in the next two weeks. Precipitation will be light and without economic importance. At the end of the period a sharp increase in temperature is expected due to the transfer of warm air masses from the south.

1.1. Likely development of the hydrometeorological situation.[2]

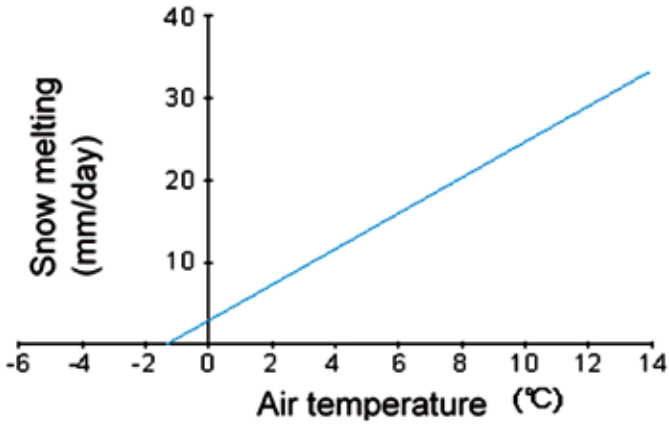


Figure 7. Model of the temperature index

Figure 7 shows a mathematical model of the dependence of the snow thawing on air temperature. The latter is obtained by calculation of the energy balance and is compared with a database of statistical measurements which verified it with sufficient accuracy for the practice.

To calculate the volume of the accumulated water supplied per square meter and given snow depth in the investigated area a coefficient **c**=0.29 has been considered.

Table 1. Prognostic estimations of hydro meteorological parameters for Smolyan Region, March 9 - 22.2015

Date	Maximum Tempera-ture Forecast (°C)	Depth of the thawing snow (mm)	Released Water Quantity (m^3)	Snow depth at the end of the day (mm)	Maximum speed of the water flow (m^3/sec)
9 March	1	7	466900	493	12,97
10 March	2	9	600300	484	16,68
11 March	2	9	600300	475	16,68

[2] Likely hydrometeorological situation is generated based on the topography of the area, estimated air temperature and snow cover.

12 March	2	9	600300	466	16,68
13 March	3	11	733700	455	20,38
14 March	4	13	867100	442	24,09
15 March	4	13	867100	429	24,09
16 March	3	11	733700	418	20,38
17 March	4	13	867100	405	24,09
18 March	4	13	867100	392	24,09
19 March	6	17	1133900	375	31,50
20 March	6	17	1133900	358	31,50
21 March	5	15	1000500	343	27,79
22 March	15	35	2334500	308	64,85

2. KARDZHALI AREA

Figure 8. Catchment Area Kardzhali

- Catchment area in the region – 3800 sq km;
- Average snow depth – 55 cm;
- Accumulated water supply – 606 million cubic meters.

Figure 9. Weather forecast 08 – 21 March 2015 (the maximum and minimum daily temperatures for Kardzhali region). Source:*www.accuweather.com.*

Gradual increase of the daily temperatures in the region of Kardzhali is expected in the next two weeks (March 8-21, 2015). Precipitation will be light and will have no economic importance. A significant temperature increase is expected at the end of the period.

2.1. Likely development of the hydrometeorological situation.

Table 2. Prognostic estimations of hydro meteorological parameters for Kardzhali Region,March 9 - 22.2015

Date	Maximum Temperature Forecast (°C)	Depth of the thawing snow (mm)	Released water quantity (m^3)	Snow Depth at the end of the day (mm)	Maximum Speed of the Water Flow (m^3/sec)
9 March	4	13	14326000	537	397,94
10 March	5	15	16530000	522	459,17
11 March	5	15	16530000	507	459,17
12 March	7	19	20938000	488	581,61
13 March	7	19	20938000	469	581,61
14 March	8	21	23142000	448	642,83
15 March	7	19	20938000	429	581,61
16 March	6	17	18734000	412	520,39
17 March	7	19	20938000	393	581,61
18 March	8	21	23142000	372	642,83
19 March	10	25	27550000	347	765,28

20 March	11	27	29754000	320	826,50
21 March	11	27	29754000	293	826,50
22 March	14	33	36366000	260	1010,17

3. HASKOVO AREA

Fig. 8. Catchment area Haskovo – map

- Catchment area in the region – 67 sq km;
- Average snow depth – 35 cm;
- Accumulated water supply – 6.8 million cubic meters.

Figure 10. Weather forecast 08 – 21 March 2015 (the maximum and minimum daily temperatures for Haskovo region). Source:www.accuweather.com

The expected flow rates of the thawing snow do not exceed the critical levels for the respective regions. In case of a planned and organized management of water basins, no emergency situations are expected to occur. Falling trees and electricity grid elements (caused by the heavy wet snow and strong wind gusts in some areas) pose a risk of infrastructure communication lines breaking off. In case of a sudden warm spell and a south wind (expected around 22 March) it is possible that certain areas along Cherna river in the region of Smolyan and Arda river near Kardzhali get flooded, and the areas at risk are mainly agricultural lands.

3.1. Likely development of the hydrometeorological situation

Table 3. Prognostic estimations of hydro meteorological parameters for Haskovo Region, March 9 - 22.2015

Date	Maximum Temperature Forecast (°C)	Depth of the thawing snow (mm)	Released Water Quantity (m^3)	Snow Depth at the end of the day (mm)	Maximum Speed of the Water Flow (m^3/sec)
9 March	4	13	252590	337	7,02
10 March	5	15	291450	322	8,10
11 March	5	15	291450	307	8,10
12 March	7	19	369170	288	10,25
13 March	7	19	369170	269	10,25
14 March	8	21	408030	248	11,33
15 March	7	19	369170	229	10,25
16 March	6	17	330310	212	9,18
17 March	7	19	369170	193	10,25
18 March	8	21	408030	172	11,33
19 March	10	25	485750	147	13,49
20 March	11	27	524610	120	14,57
21 March	11	27	524610	93	14,57
22 March	14	33	641190	60	17,81

ANALYSIS OF ROAD TRAFIC SITUATION RELATED TO CURRENT LANDSLIDES ACTIVATION PROCESSES

Landslides have been activated in certain regions of the country. Predicting the emergence of new landslides is impossible without the evaluation of the respective area. Risk remains high due to the increasing amount of

groundwaters, and their sustained supply from the thawing snow. The risk assessment is complex, but it is possible to create an algorithm for an approximate initial determination of the extent of the threat by the local authorities. This includes measuring and determining factors with non-specialized equipment. The national GIS can be of great assistance when identifying potential areas for the occurrence of landslides.

The fallen rocks, which the snow sweeps away on the roads, will be of great danger to the traffic. This is caused by the trend of accumulation of snow, alternation of frozen heavy snow and lighter one, and the emergence of micro avalanches in very steep sections along the national road network, especially in mountainous areas. Traffic in the country considering the objective factors (meteorological parameters) and the response of those responsible at national and municipal level is satisfactory. There are significant reserves for further growth of the forces involved in improving the road traffic. A number of military units have such resources:

- The Bulgarian Air Force - a significant number of specialized equipment for cleaning of the runway for takeoff and landing such as rotary snowplows, heavy road equipment and in some units – snow-blowing machines (“toploduh”),

- The Bulgarian Land Forces - heavy mechanized equipment adapted for snow removal.

The Business:

- Many agricultural entities in the country have the appropriate equipment for snow removal;

- Companies operating in the timber industry;

- Other.

The use of reserves from the private sector and/or MoD will lead to unplanned increase in public spending. For the moment the situation in the country does not require such actions. Local road network problems arose not because of the snow cover, but because of the short time for which it accumulated.

Once again there is a considerable lack of information from the national media in the form of measures and advice to the population of the country accompanying weather forecasts. Unlike many European countries, the population is isolated from the response on national and local level and does not contribute to the mitigation of consequences. This includes both the lack of volunteer organizations and units, and the unorganized measures for dealing with the consequences – building up reserves of certain essential goods, cleaning in front of private property, observing travel bans. The personal responsibility of the population living in areas at risk is particularly strong in developed countries such as Canada and the US, for example.

CONCLUSIONS AND PROPOSALS

1. The success of crisis management largely depends on previously developed response measures in case of a growth of the current crisis. The establishment of a single management process at the national level, of uniform methods of risk assessment in all directions based on future scenarios requires a clear legal regulation of responsibilities.

2. In the event of a disaster, the national system responds and takes concrete recovery measures, however in the majority of cases there are various cases of destitute citizens due to negligence, underestimation of the situation or lack of information. This greatly reduces the effect of the measures taken and diverts their purpose.

3. Although heavy snowfall and rains were forecast and announced, the necessary measures for warning of the population were not taken. Using national data and information from the EU and NATO for the hydrometeorological situation at an early stage plays a key role in the early warning of the population and the implementation of concrete measures to prevent material financial damage and casualties in the event of a disaster. Given their reduction and in case of sufficient information on the occurrence of the disaster it is needed:

- To adopt the best practices from other countries to minimize the travel and movement of people in case of an expected disaster as well as to use the mass media;
- To cancel scheduled concerts, sports and major events;
- To declare days off for students and workers for the time during which the disaster is expected to occur in order to minimize the movement of children and adolescents, especially between urban and rural areas;
- To block roads in order to prevent traffic to and from the areas at risk;
- To perform a mandatory evacuation of the population in dangerous, remote and inaccessible areas;
- To use the media not to cover the disaster and its consequences, thus creating mass panic, fear and negative attitude towards the managing bodies, but rather to alert the population and in the interest of the established crisis headquarters.

4. A fully functioning national system for crisis management needs an effective early warning system, which should be compatible and functionally related to the warning systems mainly of the neighboring countries, EU and NATO.

5. To create a free mobile application for use by the public for warning and action in case of disasters through its mandatory use by the mobile operators.

6. To integrate into a common system the sensors for collecting current meteorological information from different sources (automatic stations of the Air Force, NIMH, BAS, Chief Directorate for Fire Safety and Civil Protection, Aerospace Monitoring Centre and others).

7. To stop immediately the deforestation and to start planting already cut down areas.

8. To organize and use the capabilities of governmental and non-governmental organizations in support of the population for the supply of essential commodities in hard to reach areas and remote places.

9. To establish a National Guard to assist people in crises and disasters.

10. To establish a legal and regulatory basis for the organization and use of the capabilities of different volunteer units in support of the response and recovery of the consequences of disasters.

11. To use and create software for the calculation of spill area, snow thawing and others, which to be used permanently both in education and training of the managing bodies. To create a single software package working on a national and local level to assess the risks of disasters and accidents.

12. The successful operation of the national system for crisis management depends on the preparation of all its members to act jointly in the entire management process of decision making. This is especially true in the area of interagency communication and exchange of critical information in the part relating to the participation of other ministries and agencies in this process.

13. To set up an interagency working group of experts from all agencies involved in the Security Council to the Council of Ministers which based on in-depth expertise to develop a project of a crisis management system.

14. To synchronize the unified operation planning and the activities for crisis response, which to be applied in all agencies in the event of a crisis.

15. To adopt uniform standard procedures, unified communications and information environment and uniform criteria for assessing the readiness of the authorities and the forces involved in the crisis management measures.

16. To carry out a National Computer Assisted Exercise in 2016, developed by the Ministry of Defense and the Ministry of Interior, with which to experiment, test and validate the results of the work of the interagency working group and the adopted laws and regulations related to crisis management.

17. The results of the exercise to be presented to the Security Council to the Council of Ministers for analysis and proposals to amend the laws and regulations of the country related to crisis management.

About the authors:

Colonel Orlin Nikolov graduated Military School in 1991; Defense Staff College in 2003; Junior Staff Officer Course in Slovakia in 2005; Joint Specialized Operation Course in Joint Specialized Operation University - USA – 2006. From 2005 to 2007 col. Nikolov was Deputy Chief of National Center for Modeling and Simulations "Charalitza". From 2007 to 2013 he was Assistant in "Doctrines and training programs" branch in Training Directorate in the Genera Staff of the Bulgarian Armed Forces; Chief Assistant in Exercise and Training Branch in Operation and Training Directorate in MoD. Since 2013 col. Nikolov has been appointed as Chief of Capabilities Branch in Crisis Management and Disaster Response Centre of Excellence. He is author of many articles and features on Air Defense and Modeling and Simulations thematic and Member of NATO Modeling and Simulation Group MSG-068/105/134. Col. Nikolov is Project Manager of projects such as Establishment and development of National Centre for Modeling and Simulation "Charalitza"; Integrated System for Modeling and Simulation in MoD; Crisis Management and Disaster Response Centre of Excellence; South Eastern Europe Education and Training Network. E-mail: orlin.nikolov@cmdrcoe.org

Major Eng. Stoyan Stoyanov has worked as a Senior Expert at CMDR COE since 2013. He graduated from National Military University in 2000 and was working as a logistic officer until 2012. He graduate from National Defense College in 2013. He holds Master of Management from University of Economics – Varna. E-mail: stoyan.stoyanov@cmdrcoe.org

Colonel Aleksandar Georgiev admitted in the Military Academy in September 1983 and commissioned as Lieutenant in August 1987. Graduate from the „G. S. Rakovski" National Defence College in 1998 and Advanced Command and Staff Course, Joint Service, Command and Staff College, UK in July 2008.

In 2005 he completed six months as Deputy National Representative and Liaison Officer for Bulgarian Contingent for the NATO/EU Mission in Bosnia and Hercegovina. In 2007 he completed six months for the EU Battlegroup "HELBROC" as Deputy Section Head. From 2010 to 2011 he held the position of Deputy Chief of the Military Command Center and completed his tour as Staff Officer NATO CIS Training in Education and Individual Training Branch in Allied Command Transformation, Norfolk, USA. In December 2014 he completed the National Security and Defence Senior Officers Course at the National Defence College. Col. Georgievhas been part of the CMDR COE staff since 2014 and currently works as Branch Head Analysis and Lessons Learned Section in Crisis Management and Disaster Response Centre of Excellence. E-mail: aleksandar.georgiev@cmdrcoe.org

Lieutenant Colonel Desislav Zmeev (male) is a Planning and Project Management Section Head in the Crisis Management and Disaster Response Centre of Excellence, Sofia, Bulgaria. He received his first military promotion as lieutenant in 1994 after five-year education in the Artillery Military Academy in Shumen. In 2007 he graduated from the National Defense College in Sofia and was appointed a Deputy Artillery Battalion Commander. He has qualified on the United Nations Military Contingent Officers Course (UNMCOC-9) conducted at the Centre for United Nations Peacekeeping, New Delhi, India in 2009. He has completed the ACO Combat Readiness Evaluation (CREVAL) Course in the NATO School in Oberammergau, Germany – 2013. In 2010 LTC Zmeev joined an ISAF mission in Afghanistan as a Chief Information Operations Section in the ISAF Headquarters, Kabul. Soon afterwards, from 2010 to 2013 he was appointed in the NATO Rapid Deployable Corps in Italy (NRDC-ITA) as a Staff Officer in the Fire Coordination Branch. At the current position in the Crisis Management and Disaster Response Centre of Excellence LTC Zmeev was appointed in 2013. He is a Chief Expert in the domain of project

management and planning who has all-round qualities which make him a good leader, capable of making serious decisions and carrying out substantial responsibility. E-mail: desislav.zmeev@cmdrcoe.org

Major Kostadin Lazarov is senior expert in Crisis Management and Disaster Response Centre of Excellence. He graduated from National Defense College in 2013. He has published articles related with his doctoral studies on topic “Modeling of aerodynamic parameters of ultrasonic aircraft”. Email: kostadin.lazarov@cmdrcoe.org

THE DISASTER IN THE CITY OF VARNA ON 19 JUNE 2014 – OBSERVATION AND ANALYSIS

Stoyan Stoyanov, Philip Spassov

Abstract: *The annual precipitation in Varna is below the country's average but climate anomalies are not an exception and the last recorded anomaly dates back 20 August 1951. On 19 June 2014 heavy rainfall accompanied by thunderstorm poured over Varna and caused significant damage to one of its quarters. The paper analyzes the authorities' prevention measures, preparation and response to the disaster that stroke Asparuhovo quarter and provides valuable recommendations for improving of disaster prevention, preparedness and response.*

Keywords: *Disaster, heavy rainfall, flood.*

INTRODUCTION

On 19 June 2014 torrential rains caused severe flash flooding across northeastern Bulgaria. The storm was result of Mediterranean cyclone which left dozens of villages without electricity and submerged large parts of the region. The most affected cities were Dobrich, Shabla, and Varna in particular the suburb of Asparuhovo where 13 people were killed by the devastating tidal wave. Houses were swept away and the streets were unrecognizable due to piles of smashed cars and debris.

CLIMATE ASSESSMENT

The Varna's annual precipitation is below the county's average but climate anomalies are not an exception and the last recorded one dates back 20 August 1951. The precipitation also continued on 22 August when the Meteorological Station in Varna measured 292 l/m^2 rainfall for these two days. At the same time, at the Rain gauge station of "St. Konstantin and Elena" resort record-breaking amount of 389 l/m^2 rainfall was measured. In comparison, the average precipitation for the city of Varna in August is 32 l/m^2 (Figure 1). The meteorologists evaluated that about 150 million m^3 of water poured over the ground. Serious damages were caused in the city: a large number of buildings were flooded, the sewer system was shut and a great deal of the city's pavement was demolished.

SEVERE WEATHER CONDITIONS COLOR-CODES

Meteoalarm is European weather service that provides advice on exceptional weather. Pictograms and color-coded maps of Europe show where the weather in the next 24 till 48 hours might be, or soon become, dangerous.

The level of risk is color-coded, based on likely damage, disruption and/ or danger. Detailed information for severe weather conditions for 24 June 2014 all over Europe is shown at Figure 2.

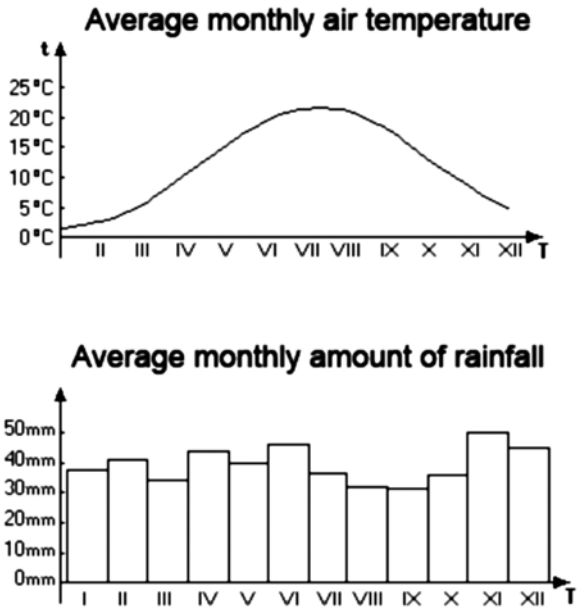


Figure 1. The average monthly air temperature (Source: NIMH)

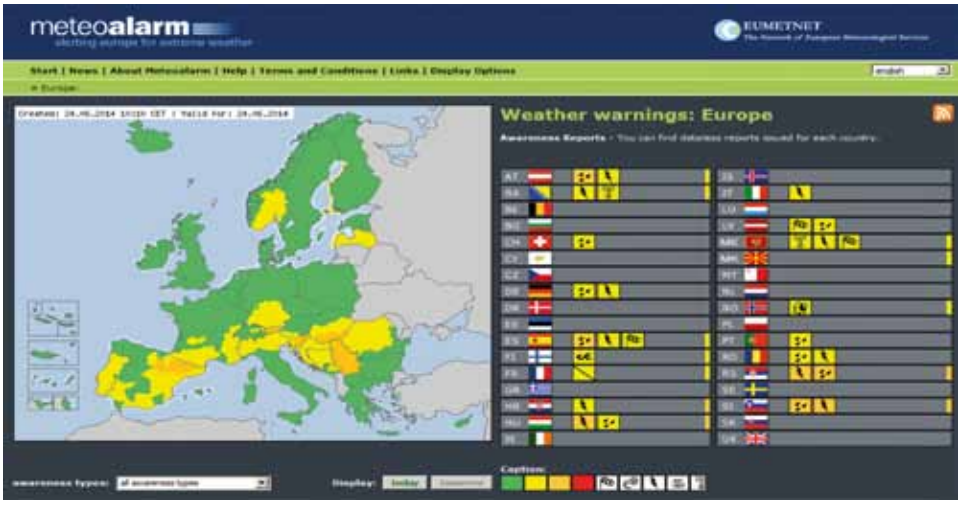


Figure 2. Meteoalarm weather forecast for June 24, 2014
(Source: www.meteoalarm.eu)

If a country/region is colored green, dangerous weather events are not expected. When the weather is unlikely to be extreme but care is called for in activities that are dependent on the weather, color-code is yellow. Orange code is used when severe weather that may cause damage or accidents is anticipated. Similarly, red code is used when major damage and accidents are likely.

METEOROLOGICAL DATA FOR THE PERIOD 18-20 JUNE 2014 – PROVIDED BY NIMH – BAS

For 18 June 2014 the forecast provided by BAS indicated that for the period 18-20 June 2014 heavy rainfall was expected over many areas in the country. The downpour was expected to reach around 25-30 l/m^2 in the northeast part of the country, but locally flash floods over 50 l/m^2 were anticipated. The regions for which such a significant amount of rainfall expected were Targovishte, Razgrad, and Shumen. In the rest of the northeastern part of Bulgaria the precipitation was envisaged from 15 to 30 l/m^2.

19 June 2014 – Yellow code (according to the Meteo-alarm system) for heavy rainfalls was announced for 17 regions of the country. The yellow code issued for Vidin, Montana, Vratsa, Pleven, Lovech, Gabrovo, Veliko Turnovo, Ruse, Razgrad, Silistra, Dobrich, Varna, Shumen, Burgas, Yambol, and Sliven regions.

June 20 – The heaviest precipitations for the last 24 hours were measured up to 120 l/m2 at Shabla, while in Dobrich and Kaliakra it was 107 l/m^2. In Varna the precipitations have reached the amount of 74 l/m2.

Figure 3. The city of Varna, Asparuhovo district and the water catchments (Source: Google maps)

THE STATE AGENCIES REACTION

Natural disasters and crisis are often unpredictable phenomena which are difficult to prevent. An immediate and adequate response to prevent disasters calls for an overall vision and policy on crisis management.

The scope and the speed of the sudden catastrophe that happened in Varna, especially in Asparuhovo district, indicated how important it is for the state agencies to be prepared for and to have the required capabilities to respond to disasters. The Law on Disaster Protection, Article 3 (1) states that: “Executive authority, legal entities and sole traders organize the disaster protection, in accordance with the assigned functions by that Law, and by the other legal acts that regulate their activity”.

(2) “The actions of the entities and persons, referred to in the first subparagraph, are coordinated within an integrated rescue system for disaster protection”.

The main components of the integrated rescue system are: General Directorate Fire Safety and Civil Protection at the Ministry of the Interior of the Republic of Bulgaria and the centers for urgent medical relief.

In addition to the above mentioned components of the integrated rescue system, the actions of other authorities such as local authorities, Armed Forces, Bulgarian Red Cross and non-governmental organizations, as well as volunteers’ assistance are also quite important.

According to the Deputy Prime Minister and Interior Minister Tsvetlin Yovchev, at 6 p.m. on 19 June 2014 a signal was received on the emergency number 112, informing about torrential downpour and tidal wave, swamping ‘Asparuhovo’ district and causing severe damages. All forces of the Civil Protection Service and the Fire brigade, as well as extra forces from Burgas, Dobrich and Shumen were sent. The Governor’s Crisis Plan was also triggered. Nine teams were sent immediately after the received signal about the disaster in Varna, and in half an hour another four were sent. Within an hour after the incoming signal there were 18 teams, including those from the adjacent settlements [1, 2].

At 8.00 p.m. crisis headquarters was summoned at the Ministry of Health, which had to maintain permanent connection with its local offices in the affected regions.

The Ministry of Transport, Information Technology and Communications’ offices were ordered to join the cleaning and restoring activities in the flood-hit areas. State Enterprise “Transport Construction and Rehabilitation” and the Executive Agency “Electronic communication networks and information systems” have declared full readiness to provide repair and restoration activities and assistance with equipment and manpower [3].

Varna Airport and the Port of Varna sent equipment and manpower at the affected Asparuhovo and Bulgarian Post Services expressed willingness to provide in their bases 25 beds for homeless people for one month period, while offering that aid can be transported for free to the flood-hit citizens [4].

Duty teams of the National Company "Railway Infrastructure" expressed readiness for immediate actions in the areas at risk. The potential threat of epidemics was also examined by the Regional Health Inspection (Varna) and proper preventive measures were taken. Municipal enterprise specialized in disinfection and deracination prepared private homes and public buildings (nurseries, kindergartens and schools) for disinfection [5].

The Minister of Defense Angel Naydenov stated for the Bulgarian National Television (BNT) that the Navy Forces were involved in the rescue operations with personnel, specialized equipment, boats and divers in Varna, as well as helicopters "Cougar" which had evacuated people near the resort "Albena" [6].

Still at the night of 19 to 20 June, servicemen from military units 38010 and 32140 joined the actions of evacuation support and cleanup of one of the most badly damaged streets in Varna - "Gorna Studena". On June 20, the military unit for dealing with floods from "Base point"- Varna was sent in the resort "Albena" [7].

The cleanup actions involved over 160 military from the Navy and The Naval Academy, in the flooded district Asparuhovo. Servicemen were dispatched at different sites to assist citizens in clearing houses, gullies and streets in the district. Their actions were led by the commander of the Navy - Admiral Rumen Nikolov [8].

According to the Municipality of Varna, about 200 damaged homes were drained by June 23. In the draining actions of Asparuhovo were used pumps from Varna and Burgas. Once the area was completely drained the fortification activities were launched.

The municipality headquarters reported that for the cleaning of Asparuhovo have been used 9 large and 6 small excavators, 6 loaders, 16 trucks for the transportation of mud, 15 chainsaws, boom lifts for cutting dangerous branches, 4 cranes, 1 machine for deepening of the land, 17 tip-lorries, and 3 dumpers with self-loading equipment. The Municipality of Burgas has dispatched several dump trucks to Varna.

Over 600 volunteers were involved in the relief activities for the rehabilitation of the area 50 of whom were members of an international Scout organization [9].

On June 24, the mayor of Varna Ivan Portnih announced for the Bulgarian Telegraph Agency that the Commission of experts from „Geoprotection" and the Bulgarian Academy of Sciences identified 11 dangerous buildings for

which a procedure for demolition has been launched. Orders were given to evacuate 80 administrative buildings in the area and a total of 453 people [10].

The Minister of Education and Science Aneliya Klisarova said that additional BGN 100 million were projected to be allocated to assist flood-affected schools in Varna and Dobrich in order to recover and prepare for the new school year (bTV).

Minister Hasan Ademov announced that the government would allocate a one-time financial aid to the relatives of the victims amounting BGN10,000 and offered support from the Ministry of Labor and Social Welfare to carry out rescue activities [11].

ANALYSIS OF THE OVERALL SITUATION AND AVAILABLE DATA

Several factors were recognized as reasons for the flooding of Asparuhovo that caused casualties and serious material damages. All of these factors are listed below:

Illegal Construction and Improper Infrastructure

A large number of residential and commercial buildings in the area were built without a building license, especially along the “Gorna Studena” street, as well as in the drainage gully that was parallel to that street. One of the illegally built houses was destroyed, killing seven people, was located exactly at the exit of the channel, where the rainwater from the gullies gathered. Consequently, the flux of water hit another similar building and the increase of its inrush became a prerequisite to escalate the tidal power and respectively its destructive force.

The drainage gully, located parallel to the “Gorna Studena” street, gradually flowed into a channel that narrowed. The channel passed closely to another building in an even narrower channel in which an illegal house had been build. There were a number of high buildings and concrete fences along the street where the water started flowing. The 3.5 m wide street through which the flux of water started its motion has become a natural channel. Another obstacle was the barrage formed by cars dragged down by the water flow.

According to the National Construction Control Directorate (NCSD), the reasons for the devastating consequences following the downpour in Asparuhovo district were related to pollution and jamming of the gullies with household and construction waste, illegal construction and to the improperly maintained drainage.

In terms of regulatory and legal view, there are a number of shortcomings in terms of infrastructure.

According to the current Regulation Plan of 1978, the area of Asparuhovo, between the streets “Gorna Studena” and “Grivitsa” was intended for landscaping. This section is the natural end of the western gully, called - Western Security Channel. It was not approved due to an appeal. The Regulation Plan of the neighborhood from 1992 provides alteration of the gully along the “Grivitsa” street and the surrounding zone for landscaping but also gives no complete solution for drainage of the Western Security Channel. Until the disaster happened the Channel had been used as a street, surrounded by illegal buildings.

Only in 2012 the Urban Development Master Plan of Varna was adopted. Its previous version dates from 1980s. The contract for developing a new Urban Development Master Plan of the city was signed back in 2005. Series of public discussions in the autumn of 2009 were followed by over 1,000 lodged proposals by Varna citizens, some of which accepted and reviewed by 26 agencies. The Council of Varna City adopted the final version of the Urban Development Master Plan in May 2012.

Most of the residential buildings in that district had no permits. According to the head of The National Construction Control Directorate (NCCD), architect Nikolay Hristov, the local administration has not taken measures to demolish the illegal buildings, due to the fact that they were the only housing of its residents. They could be demolished only in case the authorities accommodated the residents elsewhere. Otherwise, the state can be sued for human rights violations.

According to the Minister of Investment Projection, Ivan Danov, 10 properties located along the West Security Channel, were built illegally. In the other parts of Asparuhovo, along the so called Eastern Channel, further 40 properties were examined. Some of them are private properties and some are municipal owned. It was established that there was also a large number of buildings which were built illegally. According to the Minister, the NCCD had also reported about four pipes with a total section of 1.20 m and 6 m in length, installed into the narrowing of the channel, at its lower part. There was concrete, earth mound and also a construction of a bridge-like structure over the pipes, but none of the above mentioned have any documents legally proving their construction. It is assumed that exactly those pipes and the earth mound obstructed the water mass, as well as railing, in which there were accumulated wastes, tires and branches.

According to Article 233 of the Law on Spatial Planning (LSP), it is the mayors’ or the district mayors’ responsibility to cease the illegal constructions of the so-called 4, 5 and 6 category, which are the buildings of 15 meters height. They should lodge a signal to the National Construction Control Directorate. Art. 232 of the same Law provides sanctions against those who “do not execute their responsibilities, according to that Law; or fail, or untimely accomplish their obligations”. Further, sanctions are foreseen in

case of not taking “measures in time to prevent illegal construction”. By the time the flood happened, reports for illegal buildings had not been lodged to the Regional National Construction Control Directorate; neither NCCD had presented in its report for July 2014 any data about sanctions against Varna Municipality. Only after the disaster, the procedure for issuing Statements of Ascertainment for the illegal construction started. Some of the buildings were 30 years old.

During the NCCD inspection whether the constructions in the area were legal it was found that about 40 properties built are out of the scope of the district Asparuhovo Regulation Plan. They were municipal properties given as compensation in the 1970s for the construction of “Tsonevo” dam. The buildings had no permits or approved projects.

Inaccurate Weather Forecasts and Codes for Dangerous Phenomena

According to the National Institute of Meteorology and Hydrology (NIMH) forecast for 19 June 2014, Yellow Color-code for dangerous phenomena for the northeastern part of Bulgaria was announced. It was associated with countrywide short-term rainfalls, thunderstorms and hails. For the region of Varna where dangerous phenomena was expected to occur there was the same warning code. According to the meteorological standards, Yellow Color-code alerts for torrential rainfalls when the expected precipitation in a given area is up to 50 l/m^2. To announce higher risk level - Color-code Orange, the expected rainfall in a particular territory has to be above 50 l/m^2. The code for danger is confirmed if the expected amount is measured in at least two-thirds of the area. The precipitation measured at the Raingauge Station of the city of Varna was 74 l/m^2. The downpour over Varna and Asparuhovo quarter in particular, took pace in limited space and did not require announcement of Color-code Orange for dangerous phenomena.

On Varna Region territory there are one Meteorological Station, five Climate Condition Stations and eight Raingauge Stations (Figure 8). Information about precipitations from the other seven Raingauge Stations on the territory of Varna Region was not provided by NIMH official sources. The situation was similar in the neighboring region of Dobrich where in town of Shabla the rainfall was estimated over 120 l/m^2 while in Dobrich and Kaliakra was 107 l/m^2.

Based on this information, it is clear that weather forecasts are significantly different from subsequent amounts of rainfalls, measured at different locations in northeastern Bulgaria. Therefore, on 19 June 2014, the weather forecast for specific areas of the northeastern Bulgaria should have been Orange and Red.

Inadequate Reaction from the Local Authorities To The Warning Received From NIMH – Varna

More than 24 hours before the dangerous event, a warning for rains, thunderstorms and hails was received at Varna Municipality at 01:10 PM on 18 June 2014. The document was addressed to the Governor, the Mayor of Varna, "Civil Protection Operations" Department Head at the Varna Municipality, Varna Regional Office of the Ministry Interior, and the Regional Governance Fire Safety and Civil Protection. Despite the received warning, the local authorities did not take the necessary measures to protect the population.

Unused Early Warning System

According to the Regulation on conditions and procedures for the operation of the National System for Early Warning and Alert (NSEWA), approved March 2012, the purpose and procedures for alert are as follows:

Art. 2 *The purpose of the early warning and disclosure is to limit the risk of imminent or occurred disaster, or air threat, and to organize quick and effective handling of the situation, and to reduce its effects.*

Art. 3 (1) Early warning, disaster and air threat disclosure are managed through communication and information system called The National System for Early Warning and Alert (NSEWA).

Art. 17 (1) The National System for Early Warning and Alert intended to both warn and alert large groups of people in a given territory of impending or occurred disaster, or air threat, and transmitting instructions about the required measures and actions through acoustic signals and voice information.

(2) Acoustic signals and voice information are transmitted by acoustic devices (sirens).

Art. 22 (1) In case of a disaster threat or occurrence, in the whole or in part of the territory of a municipality, early warning and alert of the population are carried out by activation of sirens and broadcast voice messages from the corresponding duty personnel of the Regional Control Units (RCU).

(2) The mayor of a municipality could activate the sirens in the area of the municipal center via the Local Control Panels (LCP) or to require the activation through their respective RCU.

For this purpose, in Bulgaria there are 728 electronic sirens of the ECN1200 type located in 10 regional centers and 3700 electromechanical sirens type C-40.

The city of Varna possesses an acoustic sound system to alert in danger or occurrence of a disaster. The settlements of the Municipality are announced by central and local activated sirens [12].

According to the Disaster Protection Plan of Varna Municipality, in its part on Flood Protection, it is stated that when warning for heavy rains from NIMH – Varna, the Regional Directorate Fire Safety and Civil Protection or Black Sea Region Basin Directorate is received at the Municipality by the duty officer, he/she has to report it immediately to the Mayor's Office.

The Headquarters tasked with the implementation of the Disaster Protection Plan of the Municipality is informed and ready to respond to the Mayor's order. Informing Headquarters Staff Members has to be made by the Municipality duty officer.

Early Warning System was established on the territory of the Varna Municipality. It includes both types of siren alert and a preliminary organization of the system use to protect the population was created.

The warning of the population of an imminent threat or occurrence of flood could be done through voice announcement system that is triggered by the Operational communication and information center (OCIC) of the Regional Directorate of the Ministry of Interior [12].

Despite the opportunities that the Early Warning System provides at national, regional, and municipal levels, apart from its annual checks, the system was not used to alert the population for an impending or occurring hazard.

Incompleteness and Inaccurate Disaster Protection Plan of Varna Municipality

Under Article 9 (1) and (2) of the Disaster Protection Law, Varna Municipality has developed a Plan for civil protection in case of disaster. Implementing Article 9 (3) of the Disaster Protection Law, the section defining the civil protection against floods has been developed with some inconsistencies.

The Plan states that "after long, heavy rainfall, the poured water masses cannot be drained. Street pavement creates conditions for increasing the water speed, fast concentration, almost zero infiltration into the soil. The existing drainage, security channels and dry gullies in Varna function at a moderate amount of surface water and absorb them, if they are directed on their trays. Very often high water flows from intense rainfalls overflowing the sewage for surface water and it goes over streets curbs. In such cases the flooding of certain areas of the city and the settlements is possible. In such circumstances there are flooded basements, water rushes into cellars and other premises below the street level". The same document mentions that "flooding can occur in the central part of Varna, the area between Pimorski Blvd, Slaveykov Square, streets of Devnia and Rakovski, Peyachevich Blvd, Vladislav Varnenchik Blvd, Maria Louisa Blvd, and Tsar Osvoboditel Blvd, where the lowest points of the water catchment of the city's area are located. Flooding of this nature can occur in spring and autumn, when most

of the rain gullies and drains are blocked by the fallen leaves, and rainwater cannot be absorbed from the sewer system" [13].

Measures to prevent or reduce the risk of flooding listed in the Plan include maintenance of the facilities, which affect the prevention of the occurrence or reduction of the risk and consequences of flooding.

The reduction of the flood consequences depends on the condition of the developed infrastructure such as drain gullies, ditches and the sewerage system for surface water. These facilities are under constant monitoring by the Engineering Infrastructure and Development Directorate and Management of Security and Control of Public Order Directorate. The actions and measures for the maintenance of normal flow capability under the Plan are:

- continuous monitoring of flow capability of the security channels and gullies;
- system control to prevent pollution /disposal/ with household and construction
- catchment trash of the channels and water catchment gullies;
- timely collection and removal of dry leaves and grass;
- regular cleaning of storm water gullies and drainages;
- regular cleaning and providing conductivity of culverts, etc.;
- timely disposal of waste containers and cleaning the areas around them.

With regard to the procedure for informing, Varna Municipality has no system for early warning in flood situation however, there is no potentially dangerous infrastructure that poses risk for flooding.

According to the information provided so far, the Civil Protection Plan of Varna Municipality, some shortfalls and inaccuracies are observed and the most important of them are:

- The Plan was developed, based on the previous experience on the particular type of disaster and changes in urban infrastructure (e.g. illegal construction), and the impact of climate change which would be more visible in the coming years have not been taken in regard;

- The interaction between the components of the Integrated Rescue System is not specified in detail, as it is specified in Article 9 (3) of item 6 LDP, which creates prerequisites for the effective functioning of the various elements of the system as a whole.

Illegal Logging

According to the Minister of Agriculture, Mr. Dimitar Grekov, 30% of the logging near Asparuhovo area is illegal. After the majority of the trees had been cut the water could not be restrained and it gathered at the drainage point.

For the Bulgarian National Radio (BNR), the Varna municipality councilor Kostadin Kostadinov said that in the last two-three years in the "Dzhanavara" area of Asparuhovo district, illegal logging has taken place and despite the signals that he has submitted, there has been no reaction from the police or the Forest Management Agency. He reveled that the forest in that area does not exist anymore and trees were being cut and used by the Romani for heating during the winter [14].

The illegal logging leads to deforestation and creates conditions for landslides, which endanger the population, as well as it increases the risk of other similar crises.

The potential solution of resolving the problem in deforested areas, not only in Varna region but in other endangered areas, is the afforestation. There are different programs and projects for afforestation financed by the Agriculture State Fund. Illegal logging influences negatively in another way, it contributes to the obstruction of the drainage gullies. Trees, fallen branches, and bushes have been swept away by the onrush wave that struck Asparuhovo and gathered in the gullet that was in immediate proximity to the district [15].

According to the district mayor Yordan Nikolov the gullets in the Asparuhovo district are being cleaned in order to allow the water to withdraw in an eventual new heavy rainfall. The plans for the two gullets in the region are being updated and an option for the development of two drainage channels in the region will be sought.

Uncleaned drainage gullies repeatedly had been the cause of flooding and emergencies. Measures for the cleaning of the gullet close to Asparuhovo district were taken immediately after the flooding, when obviously more timely actions of the local authorities would have aided the prevention or the mitigation of the damages from the disaster. Planning and preparation for response in a subsequent disaster are needed in order to ensure utmost positive and quick reaction, which in turn, saves lives.

Coordination between the Responsible Institutions

The level of coordination between the local, regional and national administration was poor, mostly in terms of the Ministry of Interior and the local administration. Minister Naydenov announced that despite the efforts of the municipality representatives and the crisis center, the coordination was not good.

The Minister of Interior Tsvetlin Yovchev said that there was a lack of coordination between the local and central institutions in the beginning of the crisis, but clarified that the efforts have been synchronized subsequently.

It is of utmost importance is to develop, maintain and implement successful coordination between the responsible authorities at all levels – local, regional and national. Regular trainings and exercises must be conducted to ensure better preparedness and maximally rapid and adequate reaction of the disaster response teams. It is necessary to develop an electronic network for exchange of information, data and documents with the purpose of timely notifying all institutions in occurrence of crises.

The participation of the Bulgarian Red Cross, NGOs and volunteers, as well as their coordination is another significant factor that has large impact on the disaster relief and mitigation activities. According to Article 65 of the Disaster Protection Law, when a disaster occurs on the territory of the municipality the mayor: coordinates rescue activities and urgent emergency repair works (art. 2, para 1) and can introduce in the civil defence activities, the created volunteer units (art. 2, para 6) [16].

In Asparuhovo more than 800 volunteers have taken part, as the successful allocation of their tasks and duties has been a challenge. The director of Bulgarian Red Cross – Varna Ilko Raev shared in front of “Darik Radio” that he has seen cases in which people have claimed to be self-appointed coordinators of the volunteers and also mentioned the lack of coordination between the non-governmental structures.

CONCLUSIONS AND RECOMMENDATIONS

The causes of the disaster that occurred are complex and in order to prevent similar flooding in the future, complex measures are needed. After the careful analysis of the available information regarding the event, the following conclusions have been drawn.

1. It is necessary to take measures for restraining the illegal construction in the locations that are in regions of catchments, drainage gullets and channels, as well as in landslide regions;
2. It is necessary to develop infrastructure (ground and/or underground sewage for water withdrawal) comprising all relevant elements;
3. It is necessary to prepare a more precise weather forecast, related to the anticipated level of hazardous events (see fig.9). When sending an alert signal for hazardous events from the National Institute of Meteorology and Hydrology (NIMH) and their branches, it is necessary to precisely define the level and the region with increased probability for occurance of hazadous event;
4. It necessary to achieve closer cooperation and coordination of the work of the local authorities and the regional branch of NIMH, with the aim of improvement of the efficiency of cooperation between the two institutions;

5. It is necessary to use the early warning system in case of disaster to respond timely and adequately to the concrete environment;
6. It is necessary to apply stricter control for restraining the illegal logging, including through amendments in the legislation that foresee sanctions; planning of preventive actions for preserving the population during crises; regular cleaning of the drainage gullets, shafts and channels; measures for afforesting and preservation of the environment;
7. Effective and timely coordination of the responsible institutions and the volunteer work; conducting of trainings and exercises for maximally rapid and adequate reaction of the disaster response teams; development of an electronic network for exchange of information, data and documents with the purpose of timely notifying all institutions of the occurrence of crises; clearly defined distribution of efforts of the non-governmental organizations and volunteers under unified command;
8. It is necessary to update the 2013 Plan for Disaster Protection of the Population, part 1, "Protection from floods" of Varna municipality, as to increase the work effectiveness it is necessary to assign more experts from different fields, related to management of water resources. The update of the plan should not be based only on past events and facts, but also to reflect the changing environment conditions over the last years, both infrastructural and climate related, and to show flexibility in foreseeing future negative consequences related to flooding on the territory of Varna municipality.

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About the authors:

Major Eng. Stoyan Stoyanov has worked as a Senior Expert at CMDR COE since 2013. He graduated from National Military University in 2000 and was working as a logistic officer until 2012. He graduate from National Defense College in 2013. He holds Master of Management from University of Economics – Varna.
E-mail: stoyan.stoyanov@cmdrcoe.org

Mr. Philip Spassov has been part of the CMDR COE staff since 2014 and currently works as a Senior Expert in Education and Training Branch. He holds a Bachelor Degree in International Relations from Southwestern University in Blagoevgrad, Bulgaria (2011) and a Master Degree in Global Political Studies from Malmo University, Sweden (2012).
E-mail: philip.spassov@cmdrcoe.org

NATO CRISIS MANAGEMENT

Vassil Roussinov, Stoyan Stoyanov

Abstract: *Crisis Management has become one of the buzzword/modern phrases of the recent two and a half decays. For better or for worse it has almost entirely replaced Deterrence as the key concept of Euro-Atlantic security policy and strategy.*

Keywords: *crisis, management, strategic, concept.*

ETYMOLOGY

The term *crisis* derives from Ancient Greek verb 'κρίσις' (to decide) and was originally used in a purely medicine context and described the turning point of a sickness – to the better or to the worse. Just as a successful therapy have to start long before the turning point is reached, successful crisis management is most appropriate if it is applied before.

It may surprise you to know that there is no NATO or internationally agreed definition of the term "crisis". The strategic concept quite deliberately avoided giving a clear-cut definition of the term, and that allows the North Atlantic Council (NAC) maximum flexibility in deciding when a situation becomes a crisis. On the other hand, here is a non-approved definition, a common understanding of a situation or condition that could be conceder as a crisis. According to it, a crisis can be "a national or international situation where there is a threat to priority values, interests or goals", that means that priority values, interest or goals of the Alliance are in danger or threatened [2].

According to NATO glossary of terms and definitions 'Crisis management is coordinated actions taken to defuse crises, prevent their escalation into an armed conflict and contain hostilities if they should result' [3]. As you see the definition encompasses only political-military conflicts and consequence crisis but it does not involve crises caused by disasters which generate humanitarian crises for instance.

NATO's STRATEGIC CONCEPTS

Crisis management is one of NATO's fundamental security tasks. It can involve military and non-military measures to address the full spectrum of crises – before, during and after conflicts – as outlined in the 2010 Strategic Concept.

Nowadays, NATO is able to deal with a wide range of crises in an increasingly complex security environment, employing an appropriate mix of political

and military tools to help manage emerging or ingoing crises, which pose a threat to the security of the Alliance's territory and populations [4].

NATO's role in crisis management goes beyond military operations aimed at deterring and defending against threats to Alliance territory and the safety and security of Allied populations. A crisis can be political, military or humanitarian and Allies decide, through North Atlantic Council (NAC), on a case-by-case basis and by consensus, to contribute to effective conflict prevention and to engage actively in crisis management, including non-Article 5 response operations. Some operations may also include partners, non-NATO countries and other international actors.

Provision for crisis management measures had already been made in the Alliance's 1991 Strategic Concept and it was reiterated in the 1999 Strategic Concept. The 2010 Strategic Concept broadened NATO's thinking on crisis management, envisaging NATO's involvement at all stages of a crisis: "NATO will therefore engage, where possible and when necessary, to prevent crises, manage crises, stabilise post-conflict situations and support reconstruction." It also recognised the imperative for a greater number of actors to participate and coordinate their efforts. More generally, it adopted a comprehensive, all-encompassing approach to crisis management [5].

CRISIS DECISION - MAKING AT NATO

In NATO, no decisions on planning, deployment or employment of military forces are taken without political authorisation. NATO has different mechanisms in place to deal with crises. NATO principal political decision-making body is the NAC and it takes decisions by consensus, as do all NATO committees. In the field of crisis management, the Council is supported by the Operations Policy Committee, the Political Committee, the Military Committee and the Civil Emergency Planning Committee.

The overarching NATO Crisis Response System (NCRS) is a set of measures within which a number of elements are geared to addressing different aspects of NATO's response to crises in a complementary manner. These include: the NATO Crisis Management Process (NCMP), the NATO Intelligence and Warning System (NIWS), NATO's Operations Planning Process and NATO Civil Emergency Planning Crisis Management Arrangements, which together underpin NATO's crisis management role and its ability to respond to crises.

NATO's ROLE IN CRISIS MANAGEMENT

The manner of dealing with a crisis depends on its nature, scale and seriousness. NATO has a holistic approach to crisis management, envisaging involvement at all stages of a crisis and considering a broad range of tools to be effective across the crisis management spectrum. In effect, NATO has had the capacity to deal with crisis management and, more specifically, collective defence and disaster relief operations for a long time. Since the 1990s, it has been involved in non-Article 5 operations, those that are mainly conducted in non-NATO member countries to prevent a conflict from spreading and destabilising the region.

PREPARED FOR ARTICLE 5 OPERATIONS

Since its creation in 1949, the primary role and the greatest responsibility of the Alliance is to protect and defend Allied territory and populations against attack. Collective defence is at the heart of the Washington Treaty and is enshrined in Article 5. It was invoked for the very first and only time following the *Al-Qaeda* terrorist attack on the United States on September 11, 2001.

ENGAGING IN NON-ARTICLE 5 CRISIS RESPONSE OPERATIONS

One of the first major conflicts following the end of the Cold War broke out in the former Yugoslavia in 1992. In that regard, NATO initially provided air- and sea-based support to the UN. In the summer of 1995, after violations of exclusion zones, NATO member countries agreed to take military action in support of UN efforts to bring an end to the war in Bosnia. Other non-Article 5 crisis management operations have followed - in Kosovo, the former Yugoslav Republic of Macedonia*, Afghanistan, the Mediterranean, off the Horn of Africa, over Libya and in support of the African Union.

NATO AND DISASTER RELIEF OPERATIONS

Crisis management is a broad concept that goes beyond military operations to include, for instance, the protection of populations in case of disaster no matter what caused by a natural or man-made hazard. NATO began developing civil protection measures in the event of a nuclear attack 60 years ago and NATO member countries soon realised that these capabilities could be used effectively against the effects of disasters. In 1953, the first disaster assistance scheme was implemented following

devastating flooding in northern Europe and, in 1958, NATO established detailed procedures for the co-ordination of assistance between NATO member countries in case of disasters. They were comprehensively reviewed in 1995 when they became applicable to partner countries in addition to NATO member countries. In addition, the Euro-Atlantic Disaster Response Co-ordination Centre (EADRCC) was established in 1998 to co-ordinate aid provided by different member and partner countries to a disaster-stricken country/area. Civil emergency planning has become a key facet of NATO involvement in crisis management [6].

A ''COMPREHENSIVE APPROACH'' TO CRISIS MANAGEMENT

NATO recognises that the military alone cannot resolve a crisis or conflict, and lessons learned from previous operations make it clear that a comprehensive political, civilian and military approach is necessary for effective crisis management. Military means, although essential, are not enough on their own to meet the many complex challenges to Euro-Atlantic and international security. Allied leaders agreed at the Lisbon Summit in November 2010 to enhance NATO's contribution to a comprehensive approach to crisis management as part of the international community's effort and to improve NATO's ability to contribute to stabilization and reconstruction. The effective implementation of a comprehensive approach requires all actors to contribute in a concerted effort, based on a shared sense of responsibility, openness and determination, taking into account their respective strengths, mandates and roles, as well as their decision-making autonomy. In particular, NATO is building closer partnerships with the United Nations (UN), the European Union (EU), the Organization for Security and Co-operation in Europe (OSCE), the African Union (AU), the World Bank and some non-governmental organisations.

In March 2011, NATO agreed on an updated list of tasks to update its Comprehensive Approach Action Plan. NATO is working to make improvements in several key areas of work including:

- planning and conduct of operations;
- lessons learned, training, education and exercises;
- cooperation with external actors;
- public messaging [7].

NATO's READINESS ACTION PLAN

"The Readiness Action Plan is the biggest reinforcement of our collective defence since the end of the Cold War. And it is my top priority to implement this plan in full and on time." – NATO Secretary General Jens Stoltenberg, 20 November 2014.

At NATO's Wales Summit in September 2014, Allied leaders approved a Readiness Action Plan to ensure the Alliance is ready to respond swiftly and firmly to new security challenges posed by Russia, Middle East and North Africa. These measures are defensive, proportionate, and fully in line with NATO's international obligations. The Readiness Action Plan contains two pillars: [8].

Assurance Measures – enhanced presence of NATO forces on the territory of eastern Allies, on a rotational basis. As part of the Assurance Measures NATO has:

• Increased the number of aircraft on air-policing patrols over the Baltics and the number of bases for Baltic Air Policing.

• Deployed aircraft to Bulgaria, Poland and Romania for training and exercises.

• Commenced AWACS surveillance flights over the territory of our eastern Allies.

• Commenced Maritime Patrol Aircraft flights along NATO's eastern periphery.

• Sent more ships to patrol the Baltic Sea, the Black Sea and the Mediterranean.

• Deployed ground troops to the eastern parts of the Alliance for training and exercises, on a rotational basis

• Conducted over 200 NATO and national exercises in Europe in 2014.

• Several Allies have also sent ground and air forces to Eastern Europe for training and exercises on a bilateral basis.

Adaptation Measures – changes to the Alliance's long-term military posture and capabilities and include:

• Enhancing the NATO Response Force (NRF) to make it more responsive and capable. Currently, this is a joint force of around 13,000 troops. At their meeting in February 2015, Allied Defence Ministers decided that the NRF will become a highly flexible and capable division-size joint force.

• A new Spearhead Force (Very High Readiness Joint Task Force), as the flagship element of the enhanced NRF. This will comprise a multinational brigade (approximately 5,000 troops), with up to five battalions, supported by air, maritime and special forces. Some troops will be ready to move within two to three days. NATO is working to stand up the new force in 2016. In the meantime, Germany, the Netherlands and Norway are leading an interim Spearhead Force, which is already training and exercising.

• The establishment of a multinational NATO command and control presence on the territories of eastern Allies. At their meeting in February 2015, Allied Defence Ministers decided on the immediate establishment of the first six multinational command and control elements – the NATO Force Integration Units (NFIUs) – on the territories of Bulgaria, Estonia, Latvia, Lithuania, Poland, and Romania initially. These elements will facilitate the rapid deployment of NATO forces to the region, if required. They will also act as a liaison between national and NATO forces and assist with defence planning and multinational training and exercises.

• Raising the readiness and capabilities of the Headquarters Multinational Corps Northeast in Szczecin, Poland. This headquarters will be able to command forces deployed to the Baltic States and Poland, if so required, and will become a hub for regional cooperation. Denmark, Germany and Poland are leading this work. Romania has also expressed an intention to make available a new deployable Multinational Divisional Headquarters as Multinational Division Southeast.

• Enhancing NATO's Standing Naval Forces with more ships and more types of ships.

• The improvement of NATO's ability to reinforce its eastern Allies through preparation of national infrastructure, such as airfields and ports.

• More exercises focused on crisis management and collective defence [9, 10,11,12].

CONCLUSION

As a fundamental security task of NATO, Crisis Management places great challenges to it as a military alliance. In that regard, NATO puts a lot of efforts in development of appropriate, suitable, and adequate set of crisis management arrangements, military capabilities and civil emergency planning procedures in order to be able to meet and manage every different kind of emerging crisis. NATO constantly updates its arrangements, capabilities, and procedures according to changing security environment and it will continue to do that as a result of all Allies endeavour in maintenance of Euro-Atlantic area security and stability.

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About the authors:

Colonel Vassil Roussinov is the current director of Crisis Management and Disaster Response Centre of Excellence. Previously, colonel Roussinov was appointed as DCOS, Artillery Brigade Ops Section Chief; Deputy Artillery Brigade Commander; General Staff Chief of Department Assistant; Staff Officer FCOORD Ops (A), Solbiate Olona, Italy; General Staff Senior Chief of Department Assistant; Defense Staff State Expert, NATO Defense College Faculty Advisor and Academic Policy Branch, Rome, Italy; In addition, Colonel Vassil Roussinov has participated in three missions abroad: UNVEM-III, UN Military Observer, Angola, 1997 for 1 year; SFOR, SNR, Bosnia and Herzegovina, 2002 for 6 months; and Iraqi Freedom, Deputy SNR, Iraq, 2004 for 6 months. He graduated Military School in 1985; National Defense Staff College in 1994; UN Military Observers Course in 1996; Specialized English Course, Lackland, Texas, USA and High level Intelligence Officers' Course, Fort Huachuca, Arizona, USA in 2000; NATO Staff Orientation Course, Brunssum, The Netherlands in 2004 and SC114 Senior Course, NATO Defense College, Rome, Italy in 2009. E-mail: vassil.roussinov@cmdrcoe.org

Major Eng. Stoyan Stoyanov has worked as a Senior Expert at CMDR COE since 2013. He graduated from National Military University in 2000 and was working as a logistic officer until 2012. He graduate from National Defense College in 2013. He holds Master of Management from University of Economics – Varna. E-mail: stoyan.stoyanov@cmdrcoe.org

CLIMATE AND GEOGRAPHICAL IMPLICATIONS FOR FUTURE URBAN OPERATIONS –*ALLIED COMMAND TRANSFORMATION URBANIZATION PROJECT*

David J. Kilcullen

Project 75_01_31 (New Concept 1)

Abstract: *This Project supports the Allied Command Transformation Urbanization Project, and associated NATO concept papers. The goal is to derive DOTMLPFI recommendations for future military capabilities to meet the demands of the NATO Defence Planning Process out to 2035. This review presents trends and impacts on urbanization that will gain importance on NATO urban operations in 2035, and a summary of key findings and conclusions. What are the expected geography and climate implications for NATO urban operations out to 2035, based on sound academic evidence and modelling, including expected rates of growth in major urban areas?*

Keywords: *littoral, urban, operations, cities, coast*

DEFINITIONS AND SOURCES

To understand geographical and climate impacts on urbanization, analysts must first define a city, and understand sources of data on urban areas. Different institutions define urban areas differently, and these definitions vary over time. Further, cities are dynamic, changing continuously across virtually every parameter of size, density, population and economic activity, thereby complicating comparison across countries and time periods.

"The criteria for classifying an area as urban may be based on one or a combination of characteristics, such as: a minimum population threshold; population density; proportion employed in non-agricultural sectors; the presence of infrastructure such as paved roads, electricity, piped water or sewers; and the presence of education or health services." [United Nations, Department of Economic and Social Affairs, Population Division (2014), *World Urbanization Prospects: The 2014 Revision, Highlights,* New York, pp. 1-7]. The United Nations uses the concept of *urban agglomeration*, defined as a concentration of population in a given urbanized area (similar to the geographical "metropolitan area" as distinct from "city limits"). This is more useful for analysts considering urban operations than the more restrictive political-administrative construct of the "city". For example, Washington DC metropolitan area (population 5.95 million) covers portions of Northern Virginia and Maryland in a contiguous urbanized zone encapsulating the much smaller District of Columbia the "city" of Washington with a population of only 659,000 in 2014 [Washington D.C.

Government (2014), Press Release, Tuesday, December 23, 2014]. This area, though comprising several political units known as “cities”, is a single urban agglomeration. Likewise, Metro Manila is a polycentric agglomeration incorporating the City of Manila plus fifteen satellite cities. Metro Manila had a population of 11.8 million in 2010, within a Greater Manila Metropolitan Area of 25.5 million, which in turn nested in a larger city cluster (“Mega Manila”) with a population of 35.6 million. The City of Manila (just one government unit in this massive agglomeration) had a population of only 1.65 million.

Thus cities are urban units nesting within larger urban agglomerations, which themselves may nest in conurbations of several linked cities, or megalopolises city clusters linking many conurbations. This construct follows the “demographic” definition of cities suggested in 1938 by Louis Wirth, who defined a city as a human settlement with four characteristics: *permanence*, large *population size*, high *population density* and *social heterogeneity* [Wirth, Louis (1938) “Urbanism as a Way of Life” in American Journal of Sociology, Vol. 44, pp1-24]. Wirth’s definition is useful in that it is measurable using observable indicators, but has been critiqued by advocates of “geographical-functional” definitions, which define a city as a settlement that performs *urban functions* beyond its own boundaries as an economic center serving a wider hinterland, as the seat of government for a larger political entity, or through a religious/cultural role. In this sense, a city exercises urban functions with regional, national or global impact [For discussion of geographic-functional definitions of the city, see Fox, Richard G, (1977), *Urban Anthropology: Cities in their Cultural Settings*, Prentice-Hall, Englewood Cliffs; Smith, Michael E. (1989), “Cities, Towns, and Urbanism: Comment on Sanders and Webster” in *American Anthropologist*, Volume 91, pp. 454-461 and Smith, Michael E. (2008), *Aztec City-State Capitals*, University Press of Florida, Gainesville]. Using the Manila example, the City of Manila performs urban functions for Metro Manila, which anchors Mega Manila, which in turn (with 37.8 per cent of the nation’s population and much of its industry and economic activity) is the urban heart of the Republic of the Philippines.

A simpler definition, used by the Economist Intelligence Unit (EIU), defines an urban area in spatial terms as “a continuously built-up urban development that has no rural land.” Similarly, military doctrine defines cities as contiguous zones of urbanized terrain or “built-up areas”. U.S. Joint Doctrine, JP 3-06 *Joint Urban Operations* (2013) describes cities as “an urban triad consisting of *complex man-made physical terrain*, a *population of significant size and density and varying sociocultural groupings*, and an *infrastructure*.” [United States Department of Defense (2013), JP 3-06 *Joint Urban Operations,* p. vii] This combines elements of Wirth’s classic definition, while recognizing that socio-cultural groupings vary within agglomerations, and adding the element of human-made (anthropogenic) terrain and infrastructure. U.S.

Army doctrine, FM 3-06 *Urban Operations* (2006) discusses both *urban areas* and *urban environments*:

When conceptualizing urban operations, commanders must understand two important terms: urban area and urban environment. The first is a subset of the second. An urban area is a topographical complex where man-made construction or high population density is the dominant feature. Focusing on urban areas means concentrating on the physical aspects of the area and their effects on weapons, equipment, line-of-sight, and tactics, techniques, and procedures. The urban environment includes the physical aspects of the urban area as well as the complex and dynamic interaction and relationships between its key components the terrain (natural and man-made), the society, and the supporting infrastructure as an overlapping and interdependent system of systems.

Recent military studies have broadened this analysis, considering cities as a subset of a wider geographic category of *complex terrain*: a patchwork of open and restricted areas, where *open terrain* consists of areas where sight lines are longer than weapon ranges, and *restricted terrain* consists of areas where sight lines are shorter than weapon ranges [Bowley, Dean K, Taryn D. Castles and Alex Ryan (2004), *Attrition and Suppression: Defining the Nature of Close Combat*, Defence Science and Technology Organisation, Salisbury, South Australia, p. 3] The author's work on the "city as a system" takes a systems-modelling approach, adding connectedness (especially electronic connectivity, which is far greater in urban than in rural areas, enabling urban agglomerations to develop a dense, complex *informational terrain* alongside their *physical* and *human terrain*), and treating urban centers as subsystems within broader complex adaptive systems that behave like biological systems. Urban agglomerations nest in a networked pattern of flows, interactions and interdependencies across a rural, peri-urban and urban continuum [Kilcullen, David J. (2012) "The City as a System: Future Conflict and Urban Resilience" in *The Fletcher Forum of International Affairs,* Vol. 36 No. 2, Summer 2012, pp. 19-39]. Urbanization, in this context, is a process where population, land use, and economic activity in a given area become increasingly urban based within, or dependent on, urban agglomerations. With this background, we can examine geographical and climate implications of urbanization.

PRIMARY GEOGRAPHY AND CLIMATE CONCERNS IMPACTING ON NATO IN 2035

Based on the analysis, the primary geography and climate concerns impacting on NATO in 2035, as related to urbanization, are likely to include the following issues:

Urban overstretch, decay and fragility. Massive growth of urban populations, principally in lesser-developed countries and regions that lack

the governmental, financial and infrastructure capacity to deal with the pace and scale of that growth, will prompt overstretch the inability of city and national governments to cope with urbanization in some cities. In some cases this may result in out-of-control slum growth, in others (perhaps established cities that are economically or demographically declining) it may manifest as urban decay and feral urban spaces. Resilience the adaptive capacity to deal with urban fragility will be an increasingly important concern for NATO analysts and planners by the 2030s.

Internal secession and the rise of urban non-state armed actors. Citizens at the top of the socio-economic and political ladder will increasingly opt out of city governance and infrastructure, establishing privatized, "gated community" enclaves, avoiding interaction with the mass population, and thus attempting "urban internal secession". At the bottom of the ladder, marginalized and excluded populations often in slums on the urban fringe– will be excluded from or unable to access government systems, and community-based, private groups will emerge to meet the population's needs. Poor and affluent communities alike will employ armed groups (private military corporations, private security, community-based police forces, militias, gangs) to protect these enclaves. In some cases criminals will gain control of areas against the population's will, and may establish alliances with business and political leaders, including government officials and local military or police commanders. As a consequence, for NATO in 2035, non-state armed groups and hybrid operators in urban enclaves will emerge as potentially powerful adversaries (or allies) in operations to secure, stabilize or provide humanitarian assistance in such cities.

Littoral urban vulnerability. As noted (and discussed in a forthcoming research paper) there is a tendency for urban populations to cluster in littoral areas including coastlines, low-elevation coastal zones, and broader littoral (coastal, swamp, riverine or estuarine) environments. Even leaving aside any climate change, this tendency will place increasing numbers of people, as well as a vastly increased value of commercial property and national economic assets, at risk from coastal weather events. Floods, storm surges, tsunamis and localized inundations are already the most common and widespread natural disasters, and as more and more people crowd into dense urban settlements in littoral zones by the 2030s, the vulnerability of cities to such events as well as efforts to mitigate them will become an increasingly important concern for NATO.

Climate-induced migration and conflict. Assuming a degree of climate change commensurate with the conservative estimates discussed earlier, by the 2030s there is likely to be increasing concern among NATO governments about climate-induced migration, whether internal (as rural populations move to cities to avoid rural environmental problems such as drought and desertification) or international (as populations move into, or

among, NATO countries). Potential for unrest and conflict including both irregular and state-on-state warfare arising from climate-induced migration is hard to quantify, but by 2035 more will be known about this phenomenon, which is likely to remain a key concern for the alliance.

Vulnerability of cities to climate change. On more aggressive climate projections, changes in average temperature, modified rainfall, and an increased number and severity of extreme weather events and natural disasters will be detectable by the 2030s, prompting sustained concern from governments worldwide including NATO countries. Rising risk from pandemic and epidemic disease, and critical resource shortages including water, food and energy (discussed in more detail below) are likely to mean that climate change vulnerabilities in large and medium-sized cities remain key concerns for the Alliance in 2035. Some richer countries (including several in NATO) are already engaged in significant mitigation and adaptation efforts, and may suffer comparatively little disruption from climate change. Other countries may come late to the problem, prompting them indulge in panicked or ill-considered catch-up efforts (from the 2020s onward) hat may damage or disrupt key cities, while the majority of rapidly urbanizing countries in the Global South simply lack the resources to effectively adapt.

IMPACT OF GEOGRAPHY AND CLIMATE ON NATO IN 2035

Summarizing previous sections, and applying them to urban operations in 2035, allows us to identify the following specific capability implications for NATO:

Cluttered battlespace. The presence of vastly larger numbers of people, vehicles, aircraft (including UAVs) and offshore vessels and installations in urban spaces by 2035 will contribute to a densely cluttered battlespace, both in the physical/spatial sense and in terms of the electromagnetic spectrum. This will complicate targeting and hamper mobility for a NATO force attempting to identify and prosecute targets, move through cluttered sea and airspace, and operate in or around dense urban environments. Capabilities to understand, analyse and plan for operations in these environments will be critical.

Disaggregated battlespace. Urbanized environments create disaggregated battlespaces that break up a larger force into small units, while fragmenting combat action into numerous small, fleeting, close-range engagements. Improvements in weapons and communications technology by 2035 (analysed elsewhere) will enable adversaries to exploit this disaggregated battlespace to soak up large numbers of troops and dissipate the effects of NATO combat power. Mitigating this will require a modularized force with capabilities allowing it to disaggregate fires, forces and information to the lowest level in order to operate in the urbanized

space, then rapidly re-aggregate them for targets of opportunity or decisive engagements.

Edgeless cities. As discussed above, the emergence of city clusters (in which the edges of existing cities merge and the space between them fills with slums, light industry or post-industrial wasteland) and urban infill (in which open spaces within existing cities are filled in by new settlement) by 2035 will mean that some urbanized spaces will lack open areas or edges that enable manoeuvre by a NATO force using current operational doctrine. For example, clear beach landing sites, beach exits, airdrop DZs and lodgement areas for airmobile and airlanded forces may be extremely difficult to identify in edgeless cities. At the same time, NATO joint urban operations doctrine which emphasizes the need to isolate an urban objective by interdicting access to it from surrounding areas, often by manoeuvre in land or sea space outside the urban objective will be extremely difficult to apply effectively in large, contiguous, edgeless city battlespaces of 2035.

Sea/Air Points of entry. Because of the changing nature of the environment, and the encroachment of urban environments into previously open space, the seizure of air and sea points of entry (APOE/SPOE) for NATO forces operating in urban space will become extremely important, posing operational and tactical risk for mission achievement if such points of entry cannot be seized, held, defended and operated for extended periods of time. This will make the entry phase of an operation more critical, and in many cases achieving and maintaining a successful operational foothold in a contested city may be the decisive point in a campaign. Ports, airfields, terminal facilities and dockyards will become increasingly important strategic objectives, due to the fact that they will be some of the few remaining areas of open and accessible space across large urban areas, and because of their critical importance to the functioning of cities. The need to secure these sites will make NATO forces' movement somewhat predictable to an adversary, and enable opponents to deny access or defeat lodgement attempts using the advanced anti-access/area denial (A2AD) technologies and methods.

Urban systems modelling. One key impact of the process of urbanization and rapid change by 2035 will be the need for NATO forces to allocate attention, and resources to dynamic urban intelligence preparation of the environment (IPOE) through modelling of urban systems both before and during conflict, using historical and live data, and with the ability to produce graphical targeting overlays, dynamic flow animations, and key node analysis to enable a force to identify where and how to operate in order to achieve desired effects (protect, control or disrupt) within an urban space. Capabilities to do this already exist within some nations' engineering or intelligence structures, but will need to be integrated and developed further to be effective in the projected 2035 environment.

Urban mapping. A related capability implication will be the need for NATO to enable rapid, crowd-sourced, self-synchronized mapping capabilities for urban spaces, to include fluid (rapidly-changing), modular, and informal settlements. These capabilities would focus less on mapping the locations of particular buildings and infrastructure (which is already relatively straightforward) and more on identifying the purpose, ownership, and social-political-economic orientation of key locations in urban areas where the force might seek to operate.

Urban protected mobility. Capabilities will be needed to allow NATO forces to manoeuvre in a cluttered, constricted urban environment while achieving sufficient firepower, protection and mobility to enable adequate force protection. The narrow streets/alleys and constricted mobility corridors of informal urban settlements will require smaller, narrower, lighter platforms, which will need 360-degree protection against blast, fragmentation and penetration. These platforms may employ active sensors and active defence systems, but such systems must take into account the collateral risk to dismounted forces and civil population in the environment. This applies both to ground and air mobility platforms, and (in the case of littoral urbanized environments) may apply also to maritime and riverine platforms.

Subterranean/Subsurface Warfare. NATO forces in 2035 will require the capability to undertake subterranean warfare in sewers, tunnel systems and under buildings, as well as underwater beneath the surface of canals, waterways and harbours. These capabilities will include significantly enhanced doctrine, education, training and simulation, as well as breathing apparatus, sensors, motion and heat detectors, weapon systems capable of being operated safely in confined spaces, and systems for logistic support, casualty evacuation and unmanned surveillance and reconnaissance. Indeed, given the importance of the subsurface domain in urban operations, this may need to be a separate integrated development effort in its own right.

Water extraction and purification. For NATO forces operating in the 2035 urban environment of urban decay, feral cities and urban overstretch, capabilities to enable the force to extract and purify atmospheric, ground and surface water while conducting operations in urban environments where water sources may be lacking, polluted, enemy-controlled or essential to the survival of a civil population and therefore unavailable to the force will be essential to ensure sustainability and mobility.

Rooftop manoeuvre systems. Like the subsurface environment, the super-surface (rooftop and high-rise) domain will be increasingly important for future urban operations. Capabilities to include the ability to map and model rooftop terrain, training and simulation capabilities, new doctrine and concepts for elevated warfare, as well as capabilities including ladder

systems, high wires, bridging, nets and face-climbing equipment to allow a force to operate in rooftop environments (including high-rise roofs and tower systems) and to manoeuvre from elevated positions within the "urban canyon" of dense urban areas will need further development.

Scarce Commodities and Markets. Currently available data do not allow for a region-by-region breakdown of scarce commodities and markets by the 2030s. That said, it is possible to identify water, food and energy supplies as critically scarce commodities in the future urbanized environment.

Water Scarcity. As noted earlier, climate projections for the 2030s suggest drought, on approximately the level of the Dust Bowl of the 1930s, across much of sub-tropical North America, becoming permanent by mid-century, with severe effects on urban water stress. South Asia, as a result of shifts in the monsoon noted earlier, is also expected to become drier, further stressing megacities such as Delhi, Mumbai, Dhaka and Karachi that are already experiencing serious water shortage. China, through overuse of groundwater for industrial and household purposes driven by urbanization and a growing middle class, is likely to experience severe water stress by 2030 it already has 23 per cent of the world's population but only 11 per cent of its fresh water while global water demand is projected to increase 30 per cent by 2030.

Like sea-level rise, water stress is extremely likely to occur, even independently of climate change, simply due to rapid population growth and urbanization, so that water shortage is a virtual certainty for major cities in 2035, even in the most benign future climate scenario. For example, an integrated assessment published by the Massachusetts Institute of Technology in 2014 suggests that "for many developing nations water-demand increases due to population growth and economic activity have a much stronger effect on water stress than climate change. By 2050, economic growth and population change alone can lead to an additional 1.8 billion people living in regions with at least moderate water stress. Of this additional 1.8 billion people, 80% are found in developing countries. Uncertain regional climate change can play a secondary role to either exacerbate or dampen the increase in water stress due to socioeconomic growth. The strongest climate impacts on relative changes in water stress are seen over many areas in Africa, but strong impacts also occur over Europe, Southeast Asia and North America. The combined effects of socioeconomic growth and uncertain climate change lead to a 1.0 to 1.3 billion increase of the world's 2050 projected population living in regions with overly exploited water conditions where total potential water requirements will consistently exceed surface-water supply."

Even Europe, where drought is likely to be milder, water stress is expected by 2030 for Mediterranean littoral countrie s, and urbanized and industrialized areas in northwest Europe.

Food shortages. Climate and geographical factors associated with urbanization suggest significant likelihood of food scarcity in the 2035 timeframe. This derives from several inter-related factors:

Nutritional transition in urbanizing countries. Countries that are rapidly urbanizing tend to go through what is known as a "nutritional transition", where diet and nutrition change significantly, moving away from largely plant-based, low-nutrient diets typical of agricultural populations, to more calorie-dense, animal-based, imported foods [World Health Organization (2004) *Diet, nutrition and the prevention of chronic diseases*: *Report of the joint WHO/FAO expert consultation*, WHO Technical Report Series, No. 916 (TRS 916), online at http://www.who.int/dietphysicalactivity/publications/trs916/en/]. These in turn require significantly greater energy, water and animal feed expenditure in order to serve the changed dietary preferences of a growing (and urbanizing) population, placing further stress on food supplies. The World Health Organization projects that, by 2030, per capita calorie consumption will have risen by roughly 3.6 per cent from current consumption (as of 2015), while specific regions will see much greater rise in demand for food per capita as a result of urbanization, with demand rising by 7.1 per cent in Sub-Saharan Africa and 6.9 per cent in South Asia between now and 2030, for example. Note that these are *per capita* requirements when the multiplying effect of very significant population growth in these areas (discussed earlier) is factored in, these data suggest major food production challenges for these regions in the next 15 years.

Climate and urbanization change induced food shortages. Food shortages arising from the effect on agriculture of the persistent drought and "dust-bowl" conditions described earlier are a possibility by the 2030s, rising to a significant probability as drought conditions become permanent in some regions toward the 2050s on some future climate-change scenarios. Combined with urban encroachment into pastoral and agricultural land, as discussed above, this will both reduce the amount of food available in rapidly urbanizing environments. Overall, as a 2010 study demonstrated, the declining ratio of food producers to food consumers globally as a result of large-scale urbanization is likely to prompt increasing food scarcity, and food insecurity, in urban centres. [David Satterthwaite, Gordon McGranahan and Cecilia Tacoli (2010) "*Urbanization and its implications for food and farming*" in Philosophical Transactions of the Royal Society B, Vol. 365 pp.2809–2820]

Megalopolises and food distribution challenges. Besides the overall potential for food scarcity, the expansion of cities (in both population and spatial terms) and the emergence of megacities and megalopolises (city clusters) discussed above will increasingly separate urban populations from sources of supply, insert greater supply line distances between urban centres and sources of food production, and thus make urban populations increasingly vulnerable to interdiction of supply routes, disruption at

source, or disruption of distribution points within cities. This may not result in widespread hunger in cities, but could still significantly increase urban fragility by making large cities increasingly dependent on tenuous food supply lines. It may also exacerbate existing urban food deserts locations, even within otherwise relatively well-resourced cities, where it is difficult or impossible for local populations to obtain food.

Food scarcity and violence. Several studies have shown that food density maps can be used to predict the emergence of security hotspots in urban environments, suggesting a strong correlation (and perhaps causative link) between food scarcity and violence within cities. In addition, a comprehensive study by the World Food Programme in 2011 concluded that "food insecurity especially when caused by a rise in food price is a threat and impact multiplier for violent conflict. It might not be a direct cause and rarely the only cause, but combined with other factors, for example in the political or economic spheres, it could be the factor that determines whether and when violent conflicts will erupt. Changes in food security, rather than levels of food insecurity, are probably most influential." This in turn suggests that adaptive capacity the ability for cities to regulate and ensure a reliable supply of food to key populations is a key component of urban fragility in this respect.

Energy Scarcity. A final factor, related to production and distribution of both food and water (since both these require significant energy use) is energy scarcity in the future urban environment. As the Chief Scientific Adviser to the British Government, Professor Sir John Beddington, argued in 2009, the world faces a "perfect storm" in the 2030s as global demand for food, energy and water peak, and as urbanization and industrialization increase demand for these commodities even as population also grows very significantly [Beddington (2009)]. Electricity demand is forecast to grow by 30 per cent by 2035 as a result of this combination of factors, while demand for oil, coal and gas will increase significantly in the same timeframe. The same distribution, production and supply line vulnerabilities, noted above for food supply, will affect urban populations reliant on energy supply and will form part of an increased pattern of urban fragility by 2035, while some projections suggest that global demand for energy will double by 2050 [Mike Hightower and Suzanne A. Pierce (2008) "The energy challenge" in *Nature* Vol. 452, pp. 285-286 (20 March 2008)].

CONCLUSION

Finally, given the operational and strategic issues, along with the tactical implications and capability impacts noted in this paper, it seems clear that geography and climate matter to NATO and will continue to matter indeed, they will increase in importance as urbanization continues to affect every aspect of the Alliance's operating environment between now and 2035.

Taking the large-scale trends together, as analyzed in this paper, a clear pattern emerges. Rapid urban growth in coastal, underdeveloped areas is overloading economic, social and governance systems, straining city infrastructure, and overburdening the carrying capacity of cities designed for much smaller populations. This is likely to make the most vulnerable cities less and less able to meet the challenges of population growth, coastal urbanization, and connectedness. The implications for future conflict are profound, with more people competing for scarcer resources in crowded, under-serviced and under-governed urban areas. For the NATO alliance, this will have very major implications for urban operations out to 2035. These can be summarized as follows:

Geographical implications for NATO urban operations out to 2035 include:

a) Very significant growth in the world's urban population, most of which will occur in the Global South, especially in Africa, East Asia and South Asia, in areas that are tropical or sub-tropical, and often lack the economic and governmental resources needed to cope with the pace and scale of urban change.
b) Slower urban growth in some cases, decline in developed countries.
c) Dynamic changes in India, China and several African countries due to a rapid reversal from a predominantly rural to a predominantly urban population.
d) Significant increase in the number of megacities, alongside growth of almost all the largest cities, with most of the growth in megacities happening in Asia.
e) Faster, more dynamic and variable growth at the level of small and medium cities, especially in Africa and Asia, so that mid-sized cities represent an important category for consideration alongside megacities.
f) A continuing tendency for urban agglomerations to expand into "city clusters" that merge with each other, forming megalopolises.
g) A continuing tendency for cities (and thus for an increasing proportion of the world's population and assets) to cluster in littoral zones.
h) Expanding linkages among urban, peri-urban and rural environments, connecting them in a networked system where changes in one part of the rural-urban spectrum affect others.

Climate implications of urbanization for NATO operations to 2035 include:

a) Effects of Urbanization on Local and Regional Climate, to include albedo reduction, deforestation/vegetation change, urban heat sequestration, urban energy consumption, Urban Heat Island effects, urban aerosols and pollutants and rainfall effects of urbanization.
b) Effects of Climate Change on Urban Environments, to include sea level rise in Low-Elevation Coastal Zones (LECZs), vulnerability of

ports and harbours, localized flooding, climate-induced migration, increased heat effects on urban areas, snowmelt, landslides and mudslides, earthquakes, volcanoes and tsunamis, disease effects and increasingly frequent and severe extreme weather events.

c) Effects of climate mitigation/adaptation efforts in obstructing mobility, denying access, or closing open space within and around urban environments are likely to be at least as disruptive out to 2035 as climate change effects themselves.

The primary geography and climate concerns impacting on NATO in 2035, as related to urbanization, are likely to include urban overstretch, urban decay and fragility, internal secession and the rise of urban non-state armed actors, littoral urban vulnerability, climate-induced migration and conflict, and vulnerability of cities to climate change.

Capability implications for the alliance include (but are not limited to) capabilities to operate in the cluttered, disaggregated urban battlespace of edgeless cities, along with the critical strategic importance of Sea/Air points of entry. Urban systems modelling, urban mapping, protected mobility, subterranean/subsurface warfare, water extraction and purification and rooftop manoeuvre systems will all be important capability requirements.

Finally, while currently available data do not allow for a region-by-region breakdown of scarce commodities and markets by the 2030s. That said, it is possible to identify water, food and energy supplies as critically scarce commodities in the future urbanized environment.

About the author:

Dr. David Kilcullen is Founder and Chairman of Caerus Global Solutions (www.caerusassociates.com) and Dr. Kilcullen is also the Founder and Chairman of First Mile Geo (www.firstmilegeo.com), a tech startup that pioneers open, online cloud-based platforms for collecting, analyzing, sharing, and visualizing social and spatial data. In addition to his corporate roles, Dr. Kilcullen also serves as a personal strategic advisor to the U.S. Government, the North Atlantic Treaty Organisation (NATO), the Australian Customs and Border Protection Service, the Canadian Department of National Defence, the Ministry of Defense of the Government of Colombia, and several multi-national corporations and international charitable foundations, assisting with crisis support, executive-level training, strategic futures analysis, and discrete research and advisory services. Before joining private industry, Dr. Kilcullen served 25 years as an army officer, diplomat and policy advisor for the Australian and United States governments. After serving in command and operational missions (including peacekeeping, counterinsurgency and foreign internal defense) across the Middle East, Southeast Asia and Europe, he retired as a Lieutenant Colonel of light Infantry, then served as a senior analyst in Australia's central intelligence agency, the Office of National Assessments, focused on Southeast Asian terrorism. He was a member of the writing team for Australia's national counterterrorism strategy in 2004. In the United States he served on the writing team for the 2006 Quadrennial Defence Review, then as Chief Strategist in the State Department's Counterterrorism Bureau, where he designed the Regional Security Initiative (the U.S. Government's strategy for international counterterrorism

cooperation) and served in Afghanistan, Pakistan, Iraq, Southeast Asia and the Horn of Africa. He served in Iraq as a member of the Joint Strategic Assessment Team, and as Senior Counterinsurgency Advisor to General David Petraeus, commander of Multinational Force Iraq through 2007, before becoming Special Advisor for Counterinsurgency to Secretary of State Condoleezza Rice in 2008-2009. He was the U.S. State Department's representative on the 2008 Lute Review of Afghanistan-Pakistan Strategy, was lead author for the U.S. Government Counterinsurgency Handbook, and founded the ISAF Counterinsurgency Advisory Assistance Team in 2009 in Afghanistan, where he served as a strategic advisor to Lieutenant General Stanley McChrystal (commander of ISAF) and to the Defense Advanced Research Projects Agency's Afghanistan country program.

Dr Kilcullen is a distinguished graduate of the Australian Defence Force Academy, where he was awarded the 1986 Chief of Defence Force Prize for the top Army graduate, and of the Australian Command and Staff College, where won the 2001 Commander-in-Chief's Sword for the top graduate from any service, and the Commander Australian Theatre Award for excellence in Joint Operations. He holds a Bachelor of Arts (Honours) degree in Politics and English from the University of New South Wales, a Masters of Management in Strategic Studies from the University of Canberra, a Graduate Diploma in Applied Linguistics from the Australian Defence Force School of Languages, and a Ph.D. from the University of New South Wales in the politics of insurgency, with a focus on the political anthropology of non-state social systems under conditions of guerrilla warfare. He was awarded the 1995 Sir Edward "Weary" Dunlop Fellowship for his work in Southeast Asia, and was elected a Fellow of the Royal Geographical Society in 1996. He teaches at higher educational institutions in the United States and internationally, and has published numerous scholarly papers, academic monographs and book chapters.

Dr. Kilcullen was named one of the *Foreign Policy* Top 100 Global Thinkers in 2009. His bestselling books, *The Accidental Guerrilla: Fighting Small Wars in the Midst of a Big One* and *Counterinsurgency*, are used in several universities, as well as by policy-makers, the military, intelligence services and development agencies worldwide. His third book, *Out of the Mountains*, which examines conflict in the connected, coastal cities of the future, was awarded the 2013 American Publishers' Association Prize for Professional and Scholarly Excellence (PROSE Award) in Government and Politics. His critically acclaimed 2015 *Quarterly Essay,* "Blood Year: Terror and the Islamic State" is being developed into a full-length book to be published in early 2016.

THE CONDUCT OF FUTURE OPERATIONS IN THE URBAN LITTORAL AND ITS IMPLICATIONS FOR NATO

David J. Kilcullen

Abstracts: *This paper is one of a series in support of the Allied Command Transformation Urbanization Project. It examines coastal urbanisation, including increased electronic connectivity, in order to define the urban littoral, identify the key characteristics of urbanized littoral environments, explore their implications for future NATO joint expeditionary operations, and consider their impact on the Alliance more generally.*

Keywords: *littoral, urban, operations, cities, coast*

DEFINING THE URBAN LITTORAL

A first step in understanding the urbanised, networked, littoral environment is to define what is meant by "the littoral" in and around the urbanised environment. This is not a precise endeavour, because definitions of urban environments are changeable, because they vary among organizations and over time, and because the extent of a littoral environment depends (as discussed in detail below) on the capability of weapons and mobility platforms in a given force, and thus differs markedly among military organizations [David J. Kilcullen, 2014][1] Nevertheless, it is possible to derive a functionally adequate definition of the urban littoral environment by combining current research with existing doctrine.

Defining Urbanised Environments

U.S. Joint Doctrine, JP 3-06 *Joint Urban Operations* (2013), describes cities as "an urban triad consisting of complex man-made physical terrain, a population of significant size and density and varying sociocultural groupings, and an infrastructure."[2] This notion of the urban triad features in several Allied definitions, and is a long-standing element of NATO's understanding of urban operations. That said, the explosion in electronic connectivity over the past decade (affecting all regions, but much more pronounced in the developing world) suggests that the concept of "infrastructure" needs to be broadened beyond physical structures to include information systems, and

[1] See David J. Kilcullen (2014), Geographical and Climate Implications for Future Urban Operations, Norfolk, VA: NATO Allied Command Transformation Research Paper, December 2014, for a more comprehensive discussion of definitional issues surrounding the concepts of city, urban area, urban agglomeration and urban environment.
[2] United States Department of Defense (2013), JP 3-06 Joint Urban Operations, p. vii

that the notion of the urbanised environment as a physical location should be expanded to include cyberspace as a manoeuvre space in its own right noting that urban environments often display denser connectivity (greater access to cyberspace) than equivalent rural environments. The best definition for the current purpose, however, derives from U.S. Army FM 3-06 *Urban Operations* (2006), which distinguishes urban *areas* from urban *environments*:

> *When conceptualizing urban operations, commanders must understand two important terms: urban area and urban environment. The first is a subset of the second. An urban area is a topographical complex where man-made construction or high population density is the dominant feature. Focusing on urban areas means concentrating on the physical aspects of the area and their effects on weapons, equipment, line-of-sight, and tactics, techniques, and procedures. The urban environment includes the physical aspects of the urban area as well as the complex and dynamic interaction and relationships between its key components the terrain (natural and man-made), the society, and the supporting infrastructure as an overlapping and interdependent system of systems.*[3]

This understanding of the urbanised environment as a system of systems is a useful start point, though it is worth re-emphasizing that both definitions consider "infrastructure" in physical terms, and neither views cyberspace as a manoeuvre space both aspects of 21st century urban combat that recent conflicts have shown to be important.[4] Further, as noted in an earlier paper, "recent military studies have broadened this analysis, considering cities as a subset of a wider geographic category of *complex terrain*: a patchwork of open and restricted areas, where *open terrain* consists of areas where sight lines are longer than weapon ranges, and *restricted t errain* consists of areas where sight lines are shorter than weapon ranges.[5] The author's work on the "city as a system" takes a systems-modelling approach that adds connectedness (especially electronic connectivity, which is greater in urban than rural areas, giving urban agglomerations dense, complex *informational terrain* alongside their *physical* and *human terrain*), and treating urban centres as subsystems of broader complex adaptive systems that behave [in certain important respects] like biological systems. Urban agglomerations nest in a networked pattern of flows,

[3] United States Army (2006), FM 3-06 *Urban Operations*, p. 1-2

[4] In part, this is because U.S. doctrine considers information operations a separate category in their own right and U.S. concepts and capabilities for cyberwarfare are not captured in current urban doctrine (though they are of huge operational relevance. In part, it may be because of the explosion in electronic connectivity that has taken place in just the last decade across much of the developing world, with cities in the Global South seeing huge increases in the number of cellphone users, access to Internet services, penetration of satellite and cable television and satellite telephony.

[5] See Bowley, Dean K, Taryn D. Castles and Alex Ryan (2004), *Attrition and Suppression: Defining the Nature of Close Combat*, Defence Science and Technology Organisation, Salisbury, South Australia, p. 3

interactions and interdependencies across a rural, peri-urban and urban continuum.[6]"

Just as a city has a temperature field that affects surrounding settlements, it has a wider field of political, military, economic, social (including demographic) infrastructural and informational influence over surrounding centres.[7] Hence, in the same way as the climate of a rural settlement or peri-urban district may be affected by its location within the urban heat island of one or more nearby cities, its political, economic and security conditions may be affected by its placement in the area of influence of one or more nearby or distant but virtually connected urban centres. More broadly, and critical to the analysis of megacities and conurbations too large for a NATO force to secure by occupation, urban areas have a wider area of influence (and their populations and economies a wider footprint) than the zone of urban settlement, and *networked* (connected) urban environments have even wider and deeper fields of influence. This works both ways: urban centres influence rural or peri-urban terrain, while events and conditions in surrounding areas (in the "network footprint" or "area of influence" of the city) affect the city itself.

A map shows Baghdad as a system, with the city (shown by the Tigris river in mid-sketch) surrounded by peri-urban zones known as "belts" during the battle for the city. The belts lie outside Baghdad's city limits, but are integral to the city-system because they supply commodities the city needs to survive, because key parts of the city's workforce are drawn from these areas, and because they dominate chokepoints, mobility corridors, and main supply routes (MSRs) connecting Baghdad to the outside world. Note that the map identifies sectors, access points, and flows into and out of the city. In developing this understanding of the city and its field of influence, insurgents recognized they had neither the force size nor combat power to capture Baghdad through conventional assault, nor could they control it by seizing each part of the city (an approach we might describe as "control by occupation"). Rather, analysing the city's relationship with its wider *urban system* the city at the centre of an influence field extending across much of central and western Iraq the insurgents identified locations, installations and populations they could target to compel compliance without occupying the city directly (an approach we might call "control by interdiction").

This enabled AQI, a tiny force with limited combat power, to exert outsize influence, using leverage over Baghdad to push the city into increasingly violent chaos, so that by February 2007 more than fifty per cent of combat

[6] Kilcullen, David J. (2012) "The City as a System: Future Conflict and Urban Resilience" in *The Fletcher Forum of International Affairs*, Vol. 36 No. 2, Summer 2012, pp. 19-39. See also Kilcullen, David J. (2013), Out of the Mountains: The Coming Age of the Urban Guerrilla, New York: Oxford University Press, Chapter 1 and Appendix A.
[7] Kilcullen (2014) op. cit.

action in Iraq was occurring within the Baghdad region as a result of AQI's control of the "belts". These became the focus of combat during the Surge, as U.S. and Iraqi forces recognized the need to control them. After the U.S. withdrew in 2011, the belts again became a centre of AQI (later ISIS/ Islamic State) activity as insurgents sought to regain control over them, even as they remained too weak to directly confront the Iraqi government.

A final point is that, because armies are generally assigned the lead in land warfare, and cities (like most settlements) are on land, concepts for urban operations including definitions of urban environments tend to be land-centric. This is appropriate, since close combat the capability to project and sustain a force with sufficient firepower and protected mobility to survive and dominate a given area is a ground force activity. But landward approaches may not represent the only, or the best, strategy for control of littoral cities. As noted previously, cities increasingly cluster in littoral terrain, where land, sea, aerospace and cyberspace effects overlap, making maritime, aerospace and information approaches to the control of urbanized environments increasingly important.[8]

Defining the Littoral

Defining littoral environments is as complex as for urban environments. In general, a littoral zone is the area astride a coastline, including onshore and offshore areas affected by the sea-land interface. More specifically, a seaside littoral zone lies between the spring high tide splash zone (the highest onshore area that is splashed with seawater but never inundated) and the spring low tide zone (the lowest onshore area that is never *not* inundated) and may include undersea zones to the edge of the continental shelf to a water depth of 60 meters (200 feet). For a fluvial or lakeside area along a freshwater lake or river that may not be tidal a littoral zone includes fringing wetlands, mangroves, dunes or swamps, the river or lake edge itself, and an underwater area out to approximately 4.5 metres (15 feet) in depth. Coastal waters represent restricted seaspace because of complex coastal landforms, shallow-water hydrography and seabed topography, and weather effects including some or all of the following: Terrain-Forced Thunderstorms, Offshore Wind; Onshore Wind; Terrain-Forced Wind; River Discharge; Reefs, Bars & Channels; Shipwrecks; Bioluminescence; Internal Waves; Littoral Marine Life; Beach Profile; Coastal Currents; Land-Fast Ice.

To these general points, we should add the existence of Ports and Harbours in littoral areas, which present complex, crowded and cluttered environments that bring together large amounts of coastal shipping traffic at sea, with flows of containers, cargo vehicles and passenger

[8] See David J. Kilcullen (2013) *Out of the Mountains: The Coming Age of the Urban Guerrilla*, London: Oxford University Press, Ch. 1

vehicles on land, and movement of goods and passengers through key transportation hubs.

The Urbanized Littoral

The relevance of this capabilities-based definition of the littoral becomes obvious when we consider that more than 50 per cent of the world's population is urbanised as of 2015, with a projected increase to 70 per cent by mid century, and 80 per cent of the global population already lives within 50 miles (80 km) of the sea. As populations urbanise through organic growth of cities and rural-to-urban migration an increasing proportion of the world's population, economic activity and military capability will be centred in coastal cities. This is especially true for the North Sea, Baltic and Mediterranean Basin, all areas of strategic interest to NATO. In the Mediterranean, for example, "between 1970 and 2000, the urban coastal population grew by 40 million people, with three quarters of that growth occurring in North Africa and the Middle East. This led to the 'progressive creation of megacities on a European scale (Barcelona, Marseilles, Rome, Athens, Genoa, Naples) or a world scale (Cairo [with] 15-16 million inhabitants, Istanbul [with] 13-14 million inhabitants)... the Mediterranean coast also harbors eighty-five cities with a population of between 300,000 and 1 million inhabitants."[9]

Likewise, population growth in the Baltic has created an urbanized, networked littoral comprising sixteen major cities and more than 32 ports, a coastal population of 15 million, one of the world's most sea-dependent regional economies and most congested and threatened sea environments. The Baltic is increasingly contested through competition among military and commercial vessels (surface and subsurface) of NATO nations and other countries, has seen a significant upsurge in military incidents since 2012, and includes an increasingly complex and congested airspace.[10]

Further afield, approximately forty "mega-regions" clusters of linked cities and megalopolises with populations of 100 million of more have emerged worldwide. According to a United Nations report released in 2010, "the biggest mega-regions, which are at the forefront of the rapid urbanisation sweeping the world, include Hong Kong-Shenzhen-Guangzhou, China, home to about 120 million people; Nagoya-Osaka-Kyoto-Kobe, Japan, expected to grow to 60 million people by 2015; [and] Rio de Janeiro-São Paulo region with 43 million people in Brazil. The same trend on an even

[9] David J. Kilcullen, "The City as a System: Future Conflict and Urban Resilience" in *The Fletcher Forum*, Vol. 26 No. 2, June 2012, p. 24

[10] For a list of urban settlements by population and location around the Baltic Sea, see Wikipedia article at http://en.wikipedia.org/wiki/List_of_cities_and_towns_around_the_Baltic_Sea, and for an analysis of anthropogenic effects on the Baltic ecosystem as a result of increased urbanization see Candida Savage, Peter R. Leavitt, and Ragnar Elmgren, "Effects of land use, urbanization, and climate variability on coastal eutrophication in the Baltic Sea" in *Journal of Limnology and Oceanography*, Vol. 55 No. 3, 2010, pp. 1033-1046

larger scale is seen in fast-growing "urban corridors" [including] West Africa: 600 km of urbanisation linking Nigeria, Benin, Togo and Ghana, and driving the entire region's economy; India: From Mumbai to Delhi; [and] East Asia: Four connected megalopolises and 77 separate cities of over 200,000 people each from Beijing to Tokyo via Pyongyang and Seoul."[11]

As populations move from rural to urban environments this "coastal tendency" is amplified. But centralisation of populations and economies in the urban littoral brings risks as well as benefits. As cities grow, they experience stresses from rapid unplanned urbanisation, economic marginalisation and political exclusion of new immigrants to the city, overstretch of urban infrastructure, and increased crime. Urban "no-go" areas emerge on the outskirts of cities, in peri-urban spaces between urban centres, or in islands of older or slum settlement surrounded by growing cities. In extreme cases these may become "feral" districts or cities where rule of law and government have broken down but economic and social life continues under the control of non-state actors.[12] In feral areas the state has little presence and provides minimal services and infrastructure. Non-state groups step into the vacuum to offer goods and services the government cannot or will not provide; over time (as a result of conflict) unarmed groups disappear or lose influence and those that remain therefore tend to be non-state *armed* groups. As a consequence, parts of some cities may fall under the control of non-state armed groups gangs, criminal networks, militias or community self-defence groups. Whatever the negative externalities of these groups' activities (e.g. drug trafficking), for local populations they may represent a legitimate source of services, rule of law, dispute resolution and mediation, and economic support therefore filling the role of government-like entities. Military planners tend to regard such groups as potential enemies, but in the future urbanised littoral they may be allies as well as adversaries.

In terms of environmental risks, a larger number of people (and economic, political and technological assets) in low-elevation coastal zones (LECZs) including littoral urban centres, shore installations, and offshore assets such as power, oil and gas platforms puts an increasing proportion of the global population and economy at risk of littoral weather events including storms, tidal surges, tsunamis and coastal flooding. Just as crime and conflict may draw a NATO force into peace enforcement, non-combatant evacuation (NEO), or stabilisation operations in cities, weather events may draw a force into humanitarian assistance/disaster relief (HADR), or military

[11] John Vidal, "UN report: World's biggest cities merging into 'mega-regions'" in *The Guardian,* 22nd March 2010, online at http://www.theguardian.com/world/2010/mar/22/un-cities-mega-regions

[12] The term "feral cities" was coined by Richard J. Norton in 2003. See Norton, Richard J., "Feral Cities" in *Naval War College Review,* Autumn 2003, Vol. LVI No. 4 pp. 97-106. See also Kilcullen, David, *Out of the Mountains: The Coming Age of the Urban Guerrilla,* Oxford University Press, 2013 p. 67 ff.

assistance missions that in turn expose it to threats (discussed below) from adversaries in the urbanised littoral.

The Networked Littoral

What is new, however, is the massive increase in electronic connectivity that began to be felt particularly in the Global South around the year 2000, through penetration of satellite and mobile telephone (cell phone) networks, the Internet, cable and satellite television, and expansion of consumer electronics into the developing world. The following table illustrates the difference between developing and developed countries in this regard. It depicts mobile phone subscriptions per 100 people in selected countries. For the UK and USA, the increase in 2000-2012 was 77 per cent and 153 per cent respectively, off a high base (i.e. as for most NATO countries, mobile phone ownership was well established by the end of last century). In absolute terms, this is a significant increase in mobile ownership. But it pales in comparison with the 20,000 per cent increase over the same timeframe in India and Libya, let alone the 280,000 per cent increase in Nigeria, which had 30,000 mobile phones in 2000 but 113 million by 2012.

This unprecedented explosion in connectivity represents the most significant development in the urbanised littoral since the turn of the century, and a truly new element that has emerged since the development of concepts like OMFTS and MOLE in the 1990s. NATO operations since 2001, however, have been focused on the landlocked, low-connectivity environment of Afghanistan, where combat is diffused across small towns and villages rather than concentrated in cities (which, for most of the conflict to date, have been comparatively safe). The implications of enhanced connectivity in the urban littoral are explored in detail below, but for the moment it is sufficient to note that connectivity changes the options open to combatants (state or non-state) and non-combatants both within an immediate urban theatre and further a field.

IMPACT OF THE URBAN NETWORKED LITTORAL

Drawing together these threads the changing extent of the littoral, the effect of urbanisation (in particular, the emergence of mega-regions with heavily populated, dense strips of continuously urbanised coastal terrain) and the impact of enhanced electronic connectivity in the urban littoral, we can identify a series of key littoral issues and calculate their potential geospatial impacts on NATO, and in particular urban environments, between now and 2035. These include the following:

- **Crowds and Clutter.** The urban networked littoral of 2035 will be far more crowded than in 2015, with dense foot and vehicle traffic onshore, complex patterns of coastal shipping and fixed or mobile installations offshore, air traffic (including piloted and remotely

piloted platforms, as well as truly autonomous air systems) in and above urban airspace, heavy commercial and government use of electromagnetic spectrum, increasing presence of orbital debris and geostationary satellites above cities, and pervasive mobile telephone and Internet systems.

- **Constricted sea approaches.** Littoral waters are shallow, with complex hydrography, coastal landforms and seabed topography. By 2035 they will be further constricted, as noted above, with expanded slum settlements and other habitations astride the coastline, as well as denser patterns of offshore installations, tidal and harbour defences, shipwrecks, flood debris and (depending on future sea level rise) sunken or partially submerged towns and villages.
- **Congested land approaches.** Urban environments are surrounded by peri-urban settlements which, while less dense (in terms of inhabitants per square meter) than high-rise city centres, may be extremely congested due to lack of urban planning, narrow and winding access roads, poor lighting, improvised infrastructure, chaotic construction of informal settlements (slums), and mixed land-use patterns creating a mosaic of residential and commercial areas, light and heavy industry, transport and terminal installations, power generation and water treatment plants.
- **Crowded airspace.** Urban airspace will be increasingly crowded by 2035, with proliferation of drones and remotely piloted systems, aerostats and other lighter-than-air craft for communications, surveillance and possibly cargo and passenger transportation, private helicopter pads and rooftop landing points, non-towered airports, and encroachment of urban settlement on airport runways and approaches. High buildings and a congested electromagnetic spectrum can be expected to interfere with radio signals for air traffic control and positional guidance, and airspace below Class A (i.e. lower than 18000 feet AGL) in littoral cities will exhibit coastal atmospheric effects as noted above. Increased urbanisation may also result in reduced visibility due to air pollution and terrain-induced thunderstorm activity.
- **Industrial Hazards.** Ports, airports, terminals, factories and storage facilities all of which cluster in or on the edges of littoral cities pose hazards both to populations and to NATO expeditionary forces. By 2035, urbanisation will bring greater numbers of people into closer proximity to desalination plants, nuclear and coal-fired power plants, oil and gas terminals, and bulk storage terminals. A NATO force will face the same threats as the local population, may need to assist populations in the event of an industrial accident, and must

consider the possibility that an adversary may sabotage or destroy an installation in order to disrupt the operation.

- **Coastal inundation**. In cities that are failing to cope with the pace and scale of their own urban growth including in NATO's area of strategic interest coastal inundation may cause governance breakdown, population movement, failure of infrastructure and services, and inter-communal conflict. All these factors may draw in, and bog down, a NATO joint force.
- **Overlapping network footprints**. One of the most significant impacts of the urbanised, networked littoral is that access to cyberspace (via the explosion of connectivity described earlier) decouples physical proximity from social, political and economic networks, so that the network footprint of a city may now extend globally.
- **Mix of Licit and Illicit Actors**. The littoral environment is home to complex patterns of both licit and illicit activity. Fishing fleets and coastal shipping traffic mingle with smugglers, people traffickers, drug traffickers and pirate vessels offshore and it may be easier for nefarious actors to hide in this environment through mimicry (appearing to be a different type of actor) rather than by evading surveillance completely.

All these factors combine to render the urbanised networked littoral of 2035 a complex, dynamic and threatening environment in its impact on NATO in general, and for NATO joint expeditionary operations in particular. Indeed, rather than the traditional three domains (land, sea, air), this urbanised networked littoral represents a *nine-domain challenge* that includes surface, super-surface (i.e. rooftop) and subterranean manoeuvre space on land, sea surface, seabed, and subsurface (underwater) space offshore, cyberspace and aerospace domains. Each domain is complex in its own right, and their overlap creates mutually reinforcing effects that make urban littoral operations especially demanding, even as coastal urbanisation makes such operations more likely. This environment will force a future NATO expeditionary force to contend with dynamic complexity across all domains simultaneously. This dynamic complexity will require a highly adaptive approach to combat and battlespace management.

JOINT NATO URBAN LITTORAL OPERATIONS

The foregoing discussion illustrates key features of potential future NATO joint expeditionary operations in a connected littoral city. Such operations may arise in response to natural disaster, as part of NEO or peacekeeping operations (PKO), or in limited or general war. It may occur out-of-area or under Article V, for example in the urbanised littoral of the Baltic or Mediterranean. Requirements for such operations can be analysed in chronological sequence not to be confused with doctrinal phases to illustrate their challenges.

- **Pre-conflict sensing.** Prior to any crisis or conflict, there is a requirement for mapping, modelling, information collection and analysis of likely areas of operation. This may include (but go further than) classical Intelligence Preparation of the Environment and Cyberspace, Logistics and Operational Preparation of the Environment.[13] The expansion of connectivity in the urban littoral creates a "self-revealing environment" where it is now possible to gather, collate and validate vast amounts of open-source data, as well as to communicate directly with inhabitants, aggregate patterns and trends based on social media, and evaluate developments via "remote observables" which in turn can be validated by specialist field teams-primarily but not solely indigenous-in denied areas. This self-revealing environment is yet to fully emerge in many cities, but by 2035 opportunities for pre-conflict sensing will be significantly greater, in turn enabling better crisis management and conflict prevention.
- **Shaping.** Shaping covers the entire set of activities a force (or supporting national or NATO assets) may conduct prior to entry operations. The goal of shaping is to establish conditions conducive to mission success. Shaping may include theatre security cooperation activities and engagements such as ship visits, joint and combined exercises, bilateral and multilateral diplomacy, military assistance missions, foreign assistance, information operations, and special operations including civil affairs. Closer to a crisis, shaping may include deception, repositioning (or poising) of forces afloat, focused ISR, psychological operations, covert and clandestine operations, and the use of fires and forces to divide and disrupt adversaries or protect at-risk populations. Immediately prior to entry, advanced forces may secure chokepoints, narrows, staging areas or access points in the littoral influence zone (both offshore and inland) to disable or destroy adversary A2AD or power projection capabilities, disrupt network connectivity, or hamper enemy C4ISR. In the urbanised littoral the ability to blend with the background across all aspects of signature management (including the potential use of indigenous shipping and other special craft) will be critical for success. Further, since the environment will be more familiar to an adversary permanently based in a given city than to a NATO force, shaping may seek to draw out an enemy reserve, force adversary commanders to show their hand ahead of the main entry, or create a "bandwidth" problem through simultaneous actions to divide the enemy's forces, fires, ISR and command focus.

[13] For further discussion of this aspect of joint entry operations see U.S. Chairman of the Joint Chiefs of Staff, *Joint Concept for Entry Operations,* April 2014, p. 11-13

- **Entry**. The entry phase of a NATO joint operation in the urbanised littoral will be mission-critical, though not necessarily decisive-i.e. the mission will fail if entry operations do not succeed, but successful entry alone will not translate into mission success. The goal of entry is to achieve a lodgement, defined as "a designated area in a hostile or potentially hostile operational area that, when seized and held, makes the continuous landing of troops and materiel possible and provides maneuver space for subsequent operations." This definition comes from U.S. JP 3-18 *Joint Forcible Entry Operations*, and a joint forcible entry (JFE)-otherwise known as multi-domain entry, multi-dimensional manoeuvre or Entry from Air and Sea, is one option for this phase. Given the nature of the urbanised networked littoral by 2035, JFE is more likely to succeed than a classical amphibious operation, though it would almost certainly incorporate amphibious operations as a constituent part. This is particular so given the still unrivalled capability of parachute, tactical air landing, and heavy-drop aircraft to deliver large numbers of troops and equipment rapidly onto an objective, essential to the rapid build-up of forces to secure a lodgement. The key problem by 2035, however, will be the emergence of large contiguous areas of urbanised terrain through the process of "urban in-fill", where settlements encroach upon open terrain that previously lay between urban centres. This reduces or eliminates suitable lodgements and landing sites (for amphibious or airborne insertion), drop zones, and assembly areas near urban objectives. In addition, sea walls and flood defences may limit the availability of beach landing sites, while urbanisation may block beach exits. By 2035, in some cities, the only open areas may be parking lots, airport runways and aprons, sports fields and highway intersections. At the same time, the emergence of endless (or edge-less) cities will make traditional urban doctrine which seeks to isolate an objective prior to break-in-harder to apply in a direct physical sense.
- **Control**. Establishing control of a lodgement area and, by extension, an urban centre will pose significant challenges in 2035. The critical problem will be that of scale. Counterinsurgency (COIN) and Stabilisation Operations doctrine prescribes a high ratio of troops to local population-20 counterinsurgents per 1000 inhabitants for COIN, or 100 troops per 5000 inhabitants.[14] In a rural environment this force level (which translates into roughly one rifle company

[14] U.S. Army/U.S. Marine Corps FM 3-24 / MCWP 3-33.5 *Counterinsurgency,* December 2006, p. 1-13. Note that this figure (though un-sourced in the doctrine) is drawn from RAND studies of postwar occupation force ratios in Germany and Japan, i.e. not from actual examples of Counterinsurgency warfare. Note that the force ratio suggested in the 2006 manual was *not* repeated in the updated (2014) version of FM 3-24, *Insurgencies and Countering Insurgencies,* or in the (2013) joint doctrine JP 3-24 *Counterinsurgency Operations.*

per village) might be sustainable, but in an urban apartment block, slum settlement or dense residential area such force-to-population density is extraordinarily difficult to sustain. When troop rest cycles and deployment rotations are taken into account, the sustainability of such high force ratios is even more questionable. Larger cities and mega-regions as described earlier could therefore soak up an entire expeditionary force in security and protection tasks with extremely limited effect on security in the wider urban area. To give an extreme (and completely hypothetical example) a littoral megacity such as Karachi or Mumbai-with a population of more than 20 million people-would require a permanent garrison of 400,000 troops (beyond the capability of even the most powerful military forces) to generate this force ratio. Even triaging (creating enclaves to be occupied, seizing key MSRs and defended localities only, and operating in economy-of-force mode elsewhere) would likewise have limited effect on large urban centres, spreading the force too thinly and thereby creating gaps and no-go areas adversaries can exploit. Further, urban combat traditionally imposes the requirement for a force to secure each building (and sometimes each corridor and room in a building) as it moves through an area, so that troops become bogged down in flank and rear security, or are forced to accept greater risk of enemy re-infiltration into cleared areas. Technology-including robotics, autonomous ground and air systems, and wide-area surveillance technologies, all discussed below-may offer a partial solution by 2035, but a different operational approach is also likely to be needed.

- **Interdiction versus Occupation.** As noted in the Baghdad example earlier, one alternative methodology is control by interdiction rather than occupation. This avoids the problem of scale just mentioned, and can take one of two basic forms. In one approach, the force seeks to control access points, MSRs, commodity sources, mobility corridors and infrastructure nodes around the peri-urban or ex-urban outskirts of a city only, in order to shut the city down (in the case of an offensive operation) or protect and preserve the city's systems and population (in a protective or stabilisation operation.) The force does not attempt to seize or occupy large areas of urban terrain on a permanent basis, merely to create a selective and partial blockade of limited areas. This approach potentially involves deployments into lodgements some distance from the objective-say, in outlying districts, villages or towns linked to the city (via virtual connectivity or through social, physical or economic ties) or offshore islands and chokepoints dominating seaward approaches. In the 2035 timeframe this may involve operations in locations (such as nodes in a diaspora network) that are physically remote from the objective-perhaps in a different country. The goal would be to

establish leverage over the city without seeking to directly occupy urban terrain. This approach is unlikely to be decisive if adopted as the sole method of control-rather, it is better used in conjunction with conventional urban operations by a joint force seeking to occupy and secure key infrastructure or directly protect at-risk populations. However, employing up to one-third of the initial rotation of a NATO joint expeditionary force in this manner-securing a large urban area by interdiction-may increase the chance of mission success for the remainder of the force while creating more permissive conditions for subsequent troop rotations.

- **Urban Unconventional Warfare (UW).** An alternative approach to control-by-interdiction would be the use of UW teams (drawn from special operations forces, SOF) during shaping and JFE, to exploit the presence of opposition groups and no-go areas within an urban objective or its wider influence field. SOF would seek to partner and cooperate with local non-state armed groups that already control key mobility corridors, chokepoints, commodities or districts. Applying some or all of the classical seven stages of UW (Preparation, Initial Contact, Infiltration, Organisation, Buildup, Combat Employment, Demobilisation), SOF would organize, train, support, advise, assist and (potentially) accompany local forces to deny adversary control over urban areas, while overcoming-through the addition of local forces-the scale limitations of security by occupation.[15] These forces could also operate against the flanks and rear of an enemy force during the landing phase of an amphibious or JFE operation. In a networked environment, at least the first four stages of UW could be accomplished virtually without need for teams on the ground, using electronic connectivity and existing diaspora networks. The diaspora might also be used to insert teams in remote locations-say, rural villages-of-origin hundreds of miles from an objective, where relatives of a key leader or population group still reside-in order to build relationships with populations controlling critical urban nodes without ever having to occupy those nodes. A seaborne variant of this approach might use coastal shipping networks, fishing fleets and merchant vessels as a way to insert naval special warfare (NSW) teams into offshore networks of a littoral city, generating leverage over ports, harbours, docks and terminal facilities and improving situational awareness.
- **Sustainment**. A further challenge is sustainment during JFE, lodgement, and extended operations. Concepts for Sea Basing, as noted earlier, have been developed over the past decade, but extended A2AD and urbanised, networked littoral environments pose

[15] See U.S. Army, FM 3-05.201, *Special Forces Unconventional Warfare Operations*, April 2003, for further discussion of UW doctrine.

new issues. First, sea-basing requires selective-offload supply ships, and these remain in relatively short supply for a division-sized landing force or above, the size of force that would be required for all but short-duration operations in small cities. Second, replenishment (whether afloat or in advanced bases) would be harder in the face of extended A2AD that an adversary could use to target the sea base. Finally and most importantly, airports and ports will be some of the few areas of open terrain in a 2035 urbanised littoral scenario, so that-merely to establish a lodgement-the force may need to seize air or sea ports of debarkation (APOD/SPOD) during JFE. In some ways this defeats the purpose of a sea base, which is to avoid bringing capital ships close inshore where they may be exposed to threats-if an APOD/SPOD is required anyway, it may make more sense to use it for sustainment than to maintain the sea base. A further consideration is the need for a force to be logistically self-sufficient-given that an urban centre under stress may lack resources to provide the force's needs, and conflict over resources may have prompted the operation in the first place. In addition, as during the Indian Ocean tsunami in 2004, a joint force structured to be self-sufficient for contingency operations may use a significant proportion of its sustainment assets assisting local populations.

- **Transition**. A final issue for control of urban littorals is transition-in the sense of transition from initial lodgement to steady-state deployment, as well as transition to follow-on civil or military authority. As recent history demonstrates, hard though it is to successfully execute JFE and stabilisation operations, it is even harder and more time-consuming to transition to a follow-on authority. In an urbanised environment, with troops deeply embedded in a cluttered, dense and crowded environment almost from the moment of landing, transition is even more critical and difficult. Likewise, urban environments under stress-with multiple competing claims of political authority, no-go areas controlled by non-state armed groups, and large groups of the population opting out of, or excluded from, governance and economic systems, attempting to stabilize an urban environment before transition may be difficult, resource-intensive and protracted. Given the scale of resources needed to control even small urban areas, planners may prefer limited-duration, limited-objective operations that avoid long-term occupation or reconstruction. However, as with all aspects of planning, political decisions are likely to trump operational considerations so that it behoves NATO to consider transition capabilities-including military assistance, foreign internal defence, military and civil policing, economic and governance assistance, and institution-building capabilities-in detail from the outset.

This point highlights a general observation. While NATO may have capabilities for the types of urban littoral operations envisaged here, the *capacity* to do so-having enough resources, correctly arrayed and pre-positioned, to conduct an extended control operation on a large scale (or several simultaneous smaller operations) is more doubtful. This suggests that light-footprint approaches-to include virtual (i.e. cyber) engagement, UW, control by interdiction and conflict prevention measures-are worth further study.

TECHNOLOGY IN THE URBAN LITTORAL

Between now and 2035, technologies associated with the littoral will be developed in urbanised environments and are likely to affect NATO littoral operations. These were discussed in detail in a previous paper in this series but, briefly, they include:

- **Robotics**. Although anthropomorphic robots are unlikely to be in widespread military use by 2035, fully autonomous systems including autonomous combat air vehicles, autonomous underwater vehicles (AUVs, essentially undersea drones), advanced non-autonomous remotely-operated underwater vehicles (ROVs), self-targeting mobile sea mines, autonomous ground platforms and miniaturised (potentially nanoscale) robots may be present in some NATO forces and adversary organisations. In the urban littoral, through ready access to technically skilled populations, greater prosperity, Internet connectivity and manufacturing facilities, the density of autonomous systems is likely to be greater than elsewhere. Properly applied, this technology may allow a NATO force to overcome the tyrannies of scale mentioned above-the inability of a force to secure a large urban environment in an enduring and sustainable manner.
- **Offshore energy platforms**. Technologies for wind, tidal and wave power, geothermal energy and (more traditionally) oil and gas extraction are likely to develop in the next two decades, with potential for significant proliferation of offshore energy infrastructure that may further constrict sea approaches to urbanised environments while slowing and hampering operations. At the same time, it may create a target array that a force can destroy or control in order to compel compliance from an adversary who depends on such energy supplies.
- **Desalination technology.** Many cities worldwide will be running out of fresh water, or experiencing significant water restrictions by 2035. In littoral urban environments one means to address this problem is desalination of seawater. Desalination technology (using reverse osmosis, freezing and other techniques) is currently quite advanced but extremely expensive and electricity-intensive, making

it less widely used than would otherwise be the case. As water shortages continue to intensify, we can expect enhanced research and development, potentially leading to significant advances in affordable large-scale desalination technology over the next 20 years, and thus-at least in middle- and high-income countries-harbours, ports and coastal areas close to cities are likely to see an increase in the number, size and scale of desalination plants.

- **Tidal and flood defences**. Adaptation of cities (again, primarily in the developed world) to the risk of climate-change induced sea level rise has not been militarily significant in littoral cities to date. However, as noted, the increased concentration of people and assets in LECZs as a result of littoral urbanisation is likely to prompt at least some cities to improve tidal and flood defences, as well as early-warning systems and automated flood and storm warning systems. These may affect mobility in littoral waters, hamper beach landing sites and beach exits, and (depending on the warning systems adopted) interfere with submarines, swimmers and beach reconnaissance.
- **Internet of things.** The emerging Internet of Things (IoT) is likely to have a major impact on operations in the urban littoral by 2035. IoT technologies include proliferation of industrial microcontrollers, distributed operating systems and networked objects and buildings, all of which will contribute to an emerging "cyber-kinetic" domain in which cyber-operations may increasingly have physical kinetic (including potentially lethal) effects, and vice versa. In the urban littoral this may translate into increased individual lethality on the part of irregular adversaries, increased ability for urban populations to repurpose industrial and commercial micro-technology for military use, and increased opportunity for sabotage of industrial and household systems by an irregular adversary.

THREATS IN THE FUTURE URBANISED, NETWORKED LITORAL

NATO operations in the urbanised littoral in 2035 will face threats from both the environment itself and from enemy action. Connectedness in urban environments will exacerbate these in new ways between now and 2035. Main threats are as follows:

- **Disease**. As the 2014-15 Ebolavirus outbreak in West Africa demonstrated, and as an outbreak of cholera in 2012 in some of the same countries also showed, the combination of dense urban settlement, cross-border traffic using modern transportation systems, cross-border interaction among coastal shipping vessels and their crews, urban no-go areas and governance breakdown can exacerbate the impact of infectious diseases, increase

mortality, and prompt unrest and violence. At the same time, countries experiencing or recovering from internal conflict may be less able to deal with disease threats.[16] A NATO force in an urbanised littoral environment in 2035-after another two decades of rapid, unplanned, poorly resourced urban growth in key areas of the world-will contend with disease itself as well as associated violence and unrest. Forces may be subject to quarantine before returning to countries of origin, with impacts on morale, tour length, and troop rotation, while equipment and supplies may need to be destroyed or abandoned in place, affecting sustainability. On the other hand, deployment of external military forces into an urban crisis may result-as with the introduction of cholera by a United Nations peacekeeping contingent in Haiti in 2010-in the spreading of diseases into conflict- and disaster-affected areas.[17]

- **Urban Riverine Operations.** Securing littoral cities will involve NATO in urban riverine operations. These may involve coastal constabulary, commerce policing, safety enforcement, patrolling, customs and excise enforcement, raiding, and security of critical infrastructure. Urban riverine operations pose different challenges from rural riverine operations in that adversaries may be behind hard cover in elevated positions overlooking waterways, while rooftop vantage points provide early warning and shallow water creates opportunities for underwater IEDs or fast-rising mines. This threat may therefore require different capabilities including shallow-draft platforms with armoured decks and hatch covers, shallow-water riverine mine countermeasures (including autonomous systems), guns mounted for high-elevation fire, wider availability of boat-launched UAVs, and new tactics, techniques and procedures. Most of these capabilities are already present in advanced NSW organisations, but they may need to be proliferated more widely within the Alliance.
- **Operations in inter-tidal zones.** Littoral slums often extend across the entire inter-tidal zone, while some (such as Makoko, in the harbour of Lagos, Nigeria) are built on stilts over estuarine mudflats. Lagos has a tidal range of only 1.38 metres (4.5 feet)

[16] For a detailed discussion of the relationship between civil war, conflict, urban unrest and the Ebolavirus outbreak see United Nations, *Assessing the socio-economic impacts of Ebola Virus Disease in Guinea, Liberia and Sierra Leone: The Road to Recovery,* UNDP Africa, December 2014, p. 3-8, online at http://www.africa.undp.org/content/dam/rba/docs/Reports/EVD%20Synthesis%20Report%2023Dec2014.pdf and for a discussion of the 2012 cholera outbreak in the same countries see Kilcullen, *Out of the Mountains,* p. 236.

[17] See R. R. Frerichs, P.S. Keim, R. Barrais and R. Piarroux, "Nepalese origin of cholera epidemic in Haiti" in *Clinical Microbiology and Infection,* Vol. 18, Issue 6, June 2012, pp. E158-E163

but similar settlements-such as Piedras Canten in Buenaventura in Colombia, with a range of 5.08 metres (16.7 feet), or Cox's Bazaar, Bangladesh, with 4.26 metres (14 feet), experience severe variability through the tidal cycle.[18] This complicates operations enormously-in June 2014, for example, the author accompanied Colombian Marine SOF and Navy personnel on small boat, vehicle and foot patrols in Piedras Canten, where houses are awash at high tide, while at low tide troops pursue guerrillas, traffickers and paramilitary militia through waist-deep mud and mangrove roots sixteen feet below, underneath the houses. This daily pattern of operations requires stamina, commitment, and extremely detailed knowledge of terrain and weather patterns.[19]

- **Irregular, hybrid and niche actors.** In addition to threats generated by the environment itself, a NATO force can expect to encounter irregular and hybrid actors in the urbanised, networked littoral. Irregular combatants are not formally enlisted members of the regular armed forces of a nation-state or other recognised entity, or adopt methods outside international norms for armed conflict, while hybrid actors include state actors who operate like, or in cooperation with, irregulars. In addition, threats may arise from so-called "niche players" who cannot confront NATO across the full range of capabilities but instead field specific advanced systems to disrupt, or render irrelevant, NATO's superiority. Such niche threats (depicted below) include weapons of mass destruction, ultra-quiet diesel submarines (or varying types of submersible and semi-submersible platforms, AUVs and ROVs), advanced sea mines, shore-, ship- and land-launched ASMs, swarms of small fast attack boats, capable surface-to-air and air-to-surface missiles, land-attack cruise missiles, cyber-weapons and commercial C4ISR system. All these threats-irregular, hybrid or niche-represent attempts by adversaries to achieve asymmetry across the spectrum of conflict, side-stepping NATO's conventional superiority. In urban environments adversaries will also engage in "lawfare", exploiting legal loopholes and manipulating their status as combatants, criminals or non-combatants, for tactical gain.
- **Self-synchronisation.** The massive increase in urban connectivity changes the threat picture in several ways, including the rise of self-synchronised swarms and (by 2035) the potential for "swarm weapons." Self-synchronisation involves individuals and small teams pooling information to generate shared situational awareness,

[18] Tide data from *Tide Forecast* at http://www.tide-forecast.com
[19] Author's participant observation and discussion with patrol members while accompanying a Colombian Navy and Marine patrols, Buenaventura, Colombia, 26-28 June 2014.

and acting independently toward a common purpose-perhaps in accordance with simple rule-sets-to generate combined effects that overwhelm an enemy. Small boat swarms, drone swarms (including use of hacked commercial UAVs as missiles) and swarm-based ground force tactics are all examples of swarm approaches that may be enhanced by the ability to share position, speed and heading data, pool target data, and adapt operations in mid-course to deal with adversary reactions. The same data density will enable hyper-accurate indirect fire, with remote observers using GPS and crowd-sourced mapping (such as Google Earth or Open Street Map) to adjust fire remotely and rapidly move to fire for effect, or even to achieve first-round hits on targets.

- **Diaspora threats and counterattacks ("boomerang effects").** A final category of threat to consider is that of diaspora retaliation. For irregular or hybrid adversaries (or certain classes of state actors) confronting a NATO expeditionary force in an urbanised networked environment, the most effective retaliation may not be to attempt to directly oppose the force, but to leverage cyberspace, diaspora networks and virtual connectivity to mount attacks directly in the force's homeland-or in its home station against families or critical infrastructure-as a means to compel disengagement. This will be a particular risk for NATO countries engaged in expeditionary operations in countries or regions from which they draw substantial immigrant populations, such as parts of the Mediterranean, North Africa and South Asia. This would, of course, represent the ultimate expansion of "littoral" theatres into truly global networks of virtual battlespace.

IMPLICATIONS AND CAPABILITY GAPS

Many of the military and technological implications of littoral operations in an urban environment have already been addressed above, including the capabilities needed to maintain Alliance operations in a future urbanised environment between now and 2035. To summarise, however, developing littoral issues will affect short and long run Alliance capability and procurement decisions as follows:

Cities as a primary unit of analysis. The Alliance (and nations themselves) typically conducts military planning, intelligence analysis and diplomatic engagement at the country level, through embassies, country desks and country teams that tend to take a one-size-fits-all approach. This often results in a capital-centric view of a country's concerns, which may not be appropriate-specific individual cities (or districts within cities) in the same country may be extremely different from each other. For example Lagos, Abuja, Port Harcourt and Benin City are all in Nigeria, but are so different from each other that no single analysis fits all of them. The Alliance may

need to invest in city-level analysis, modelling and planning tools in order to generate sufficiently granular and dynamic information to be useable in a future urban littoral operation.

Resilience not stability. Much traditional expeditionary doctrine assumes that the goal of an operation is to return conditions to "normal', on the assumption that normality is stable and acceptable for most inhabitants. This may not be the case in growing coastal cities experiencing urban overstretch and failing to meet the needs of some or all of their population. As a consequence, attempts to stabilise cities in crisis may not be as viable as efforts to build resilience-helping populations and governments cope with continued instability-rather than seeking to impose external stability at scale on a dynamic and complex environment.

Disaggregated battle space. Urban environments break up combat into larger numbers of smaller, fleeting engagements rather than big set-piece battles. Likewise, littoral seaspace and A2AD systems may disrupt large naval task groups, channelling combat into narrow coastal waters where small action groups and flotillas may have greater survivability and effectiveness. Conversely, should an adversary present an opportunity for a decisive blow, this opportunity would most likely be fleeting and transitory. As a result, the Alliance and its component Joint Task Forces may need to optimise for flexibility and modularity in order to rapidly disaggregate and aggregate fires and forces, allowing the force to move dispersed but fight concentrated in time and space within the urban littoral.

Centrality of Combat Capability. Although civil affairs, HADR and advisory capabilities will be essential to many or all future joint expeditionary operations in the urbanised network littoral, the ability to selectively deliver these effects will depend on the joint force's ability to maintain its combat dominance, in a survivable manner, over the city system in which it operates. To do this, combat capability-in the air, on and under land and sea, in space and in cyberspace-will be essential. This suggests that sufficient combat power must always be present in a joint force (whatever its mission at any given movement) to allow it to deal with all conceivable threats in the environment. This is especially so because, in an era of persistent conflict and violent extremism, any deployment of NATO forces (even for entirely humanitarian purposes) creates a target array that is highly likely to be challenged or directly attacked by adversaries.

Protected, networked mobility and fires. For land, sea and air platforms in this environment, the ability to absorb damage while holding a dominating position and maintaining situational awareness will be critical. This implies armour, counter-IED, counter-mine, ASW, air defence (including counter-drone) counter-sniper, air superiority and networked situational awareness and fire coordination capabilities. These would ideally be organised, as mentioned above, around modular joint task groups of all arms, incorporating

land, sea and air mobility and fires to enable multi-domain manoeuvre in contested environments. Such modularity may have to extend much lower-down to individual platforms, small teams and individual operators-than envisaged in current operational concepts.

Special Operations. Capabilities for integrated, joint and multinational maritime, littoral, riverine and land-based special operations in urbanized terrain-including multi-domain insertion and extraction, direct action, special recovery and UW operations-will be critical to a joint expeditionary force's capability in future operations. The ability to conduct UW and surrogate operations (including cyber-kinetic special operations) both in an immediate objective area and further afield will be critical to managing the problem of scale in future urban operations, by applying small-footprint approaches that leverage local allies and combinations of forces. This may require long-term persistent engagement by SOF in urban littoral areas, as well as use of urban splinter teams (joint, multinational and multi-dimensional) capable of long-duration, low profile operations in denied areas.

Virtual persistent presence. A final key capability is the need for the Alliance, and for subordinate JTF commanders, to achieve persistent presence (pre, during and post-conflict) to shape the operational environment and maintain situational awareness. This will not be possible in a physical sense except for a very limited number of operational areas and thus, while physical presence is clearly desirable if possible, virtual presence-via social media, engagement with local communities, remote observation, organisation and communication with potential allies, and collection and analysis of relevant operational data-may perform a valuable cueing and triaging function, as well as building up support networks to ensure that no future joint expeditionary operation should have to deploy "blind".

KEY FINDINGS AND CONCLUSIONS

In summary, this paper has analysed the implications of an emerging urbanised, networked littoral for NATO joint expeditions in the 2035 timeframe. Key findings and conclusions are as follows:

- The explosion in electronic connectivity over the past decade (affecting all regions, but especially the developing world) suggests that the concept of "infrastructure" in urban operations needs to be broadened beyond physical structures to include information systems, and that the notion of the urbanised environment as a physical location should be expanded to include cyberspace as a manoeuvre space in its own right.

- A capabilities-based definition (rather than a terrain-based definition) of littoral influence zones may be more useful for future operations. As weapon and platforms increase in range and

capability, areas once considered continental may become littoral, because they can be engaged with sea-based weapons or reached by sea-based manoeuvre forces.

• Centralisation of global populations, assets and economies in the urban littoral brings risks as well as benefits, arising from both the nature of the rapidly urbanising coastal environment itself, and from the emergence of threat actors within it. In terms of environmental risks, a larger number of people (and economic, political and technological assets) in LECZs puts an increasing proportion of the global population and economy at risk of littoral weather events including storms, tidal surges, tsunamis and coastal flooding

• No-go areas and feral districts (or even whole feral cities) have emerged in some urban littorals. These districts are often controlled by non-state armed groups, which fill vacuums left by absent governments. Military planners tend to regard such groups as potential enemies, but in the future urbanised littoral they may be allies as well as adversaries.

• The Alliance has long understood the challenge of urban littorals. What is new, however, is the massive increase in electronic connectivity-particularly in the Global South-since the year 2000, creating a networked urban littoral with new characteristics and enhanced threats.

• The impact of these developments for NATO littoral operations by 2035 will include increased crowds and clutter, constricted sea approaches, congested land approaches, crowded airspace, industrial hazards, coastal inundation and overlapping network footprints making the urbanised, networked littoral an increasingly complex and difficult operating environment.

• Dealing with this environment will require NATO joint expeditionary operations to engage in extensive pre-conflict sensing, shaping, Joint Forcible Entry and amphibious operations in “edgeless” cities that may lack open space for lodgement areas, and will pose problems of scale that may push NATO in the direction of small-footprint “control by interdiction” rather than “control by occupation” and will also pose severe challenges for sustainment (whether sea-based or otherwise) and for transition.

• Technological developments in the urbanised, networked littoral by 2035 will include advances in robotics, offshore energy platforms, desalination technology, tidal and flood defences, and the emerging Internet of things, all of which may create opportunities for NATO but also enhance potential threats.

• These threats may arise both from the environment itself and from actors within it, and include disease, urban riverine and inter-tidal challenges, irregular, hybrid and niche actors employing self-synchronisation and swarm tactics as well as (potentially) true swarm weapons by 2035, along with diaspora threats and counterattacks.

• Dealing with this overall environmental and threat picture will require the Alliance to invest in capabilities for treating cities as a primary unit of analysis in their own right, focusing on resiliency not just stability in complex urban areas, dealing with disaggregated battlespace, preserving the centrality of combat capability regardless of immediate mission sets, developing enhanced capabilities for protected, networked mobility and fires, special operations and virtual persistent presence.

• All of these developments will be sufficiently dynamic and unpredictable that the Alliance may wish to consider a focused program to keep abreast of them, including a studies and observation group for the urban littoral, a littoral working group seminar series within CJOS, an analytic effort to rank-order urbanised littoral influence zones of concern to the Alliance, continued monitoring of technical research and publications and an effort to develop a shared understanding of the potential future effects of climate change on the urbanised, networked littoral.

USE OF THE MILITARY IN HUMANITARIAN RELIEF

Frederick C. Cuny

Abstract: *Civilian authorities turn to the military for help in DRO (humanitarian operations) for several reasons, among which the most obvious may be their physical assets. The military is often regarded as a cornucopia of assistance. Among the most sought-after assets are transport (land, sea and air); fuel; communications; commodities including food, building supplies and medicines; tools and equipment; manpower; technical assistance (especially logistics and communications) and facilities. Requests can run the gamut from the arcane, like delousing equipment, to the mundane, like maps; from cheap items like soap, to highly-sophisticated items like bulldozers; from off-the-shelf items like tents, to items that must be specially produced such as aerial photographs. Relief authorities know the military has the capability of providing these on requests and, in a resource-poor post-disaster environment; it is not unreasonable for authorities to request them. Since many of the items are commonly stockpiled and since civil disaster agencies have few stockpiles of their own, especially in the developing countries, demands can be quite extensive.*

Keywords: *relief, disaster, military, civilian, authorities*

INTRODUCTION

Use of military forces for humanitarian purposes is a long- established tradition in all corners of the world. In the public mind, there is an association between disaster relief and military involvement; indeed, there is often an expectation that military units will assist the civilian population in the immediate aftermath of wars and large-scale emergencies. The earliest recorded instances predate Alexander the Great. The assistance of armies to the populations they had conquered was seen as a humane gesture to the vanquished -- and, not inconsequentially, a means of winning some degree of loyalty to the new regime.

Initially, humanitarian assistance was simply logistical. Soldiers provided an interim administration to ensure that food and other vital supplies reached the population. There was an element of self-interest involved; if the people were producing food and goods, the army's own logistics were simpler.

By the Napoleonic period, this use of military forces had become so well-established that it was seen as an adjunct to military science. The concept of establishing martial law over civil populations was developed as a means of structuring this involvement in a post-conquest period. While most European armies of the period pursued only a limited security objective with martial law, Napoleon and the French revolutionary armies saw it as a means of changing the social structure and bringing the benefits and new

social order of the French Revolution to the occupied territories. (That they failed is a lesson to be learned.)

Post-World War II Europe witnessed what was perhaps the most extensive use of the military in civil affairs. It is important to recognize the influence this had both on military doctrines of civil involvement and on development of the international relief system and the approaches that relief agencies have used since that time. The task that faced the Allies in the aftermath of the war was enormous. Virtually an entire continent had to be administered. Civil government and the rule of law had to be reestablished and entire civil administrations restructured.

The role of the military was expanded as never before. The public administrative function was perceived as so important by the Allies that special attention was given to recruiting civil administrators, city planners, urban development specialists, and hundreds of persons skilled in operating the systems of modern cities and their governments.

From the beginning, the objective was to establish martial law in the occupied territories, then quickly rebuild indigenous capacity to manage the cities, the provinces and, ultimately, the national governments. In Germany, the process took longer but the goal was the same -- the military role was to shift from security and management to strictly security as quickly as possible.

At the time this was happening, the international relief system as we know it today was in the process of being established. Prior to the war, there were few non-governmental agencies (NGOs). The humanitarian agencies of the old League of Nations had generally been very limited in scope and had not survived the war. The United Nations was just getting underway; agencies such as UNICEF and the World Food Programme were just starting and others such as UNHCR were only in the talking stages.

As the new system was being put together, the military was still very much involved in civil affairs and therefore played a major role in humanitarian operations. The military had the resources and controlled the logistics, so that a natural association developed between humanitarian assistance and military involvement. Many of the strategies and approaches that have been used since that time evolved from this post-war association.

Let’s examine the nature of the problem that they faced. Not only were many people homeless, but millions had been moved far from their homes. Large camps were set up to provide temporary assistance until people could be relocated or until their homes and jobs had been reestablished. Due to the transitory nature of the situation, the disruptions in local markets, chaos in the transportation systems and many basic shortages, relief efforts relied heavily on temporary measures and goods supplied from outside the affected region. Food, blankets, tents and clothing all were needed and were useful to the refugees and displaced persons.

The Allied armies were in the process of demobilizing and many of the needed materials were conveniently on hand. General Lucien Clay once remarked that, to a large degree, the civilian relief agencies were in the business of military surplus disposal. The goods were on hand, they were cheap and little additional effort was needed to transport them to the people in need. Thus, an entire set of relief approaches became fixed in both doctrine and public perception. Think for a moment of some typical relief measures: construction of refugee camps; distribution of food, blankets and cots; massive inoculation of people against typhus, typhoid and cholera -- these were all approaches employed by the occupation forces to assist the civilian population. To a large extent, they were dictated by the nature of the problem and by the resources that were on hand.

There was one other event seared in public memory that stimulated military involvement in humanitarian relief, literally in another dimension. The Berlin Airlift of 1947 was an incredible feat wherein an entire city was totally supplied from the air. Probably in no other case has the military played so vital a humanitarian role. More than any other event, the images of those planes delivering everything from food to coal fostered acceptance of the link between air forces and humanitarian assistance and, more importantly, acceptance of the costs incurred. No matter that airlift is the most expensive means of delivering a commodity; in emergencies, planes have become almost mandatory means of delivering emergency assistance.

In the late 1940s, the relief system began to expand to other areas of the world: the trouble spots of decolonialization (India, Palestine, et al), then the flash points of the Cold War (Korea, Greece and others). Military involvement continued and a new form was added, the international peacekeeping forces of the United Nations and regional organizations. Peacekeeping commanders found that relief agencies still turned to them for assistance from materials to logistics support.

In the 1950s, the relief system began to expand into the newly- emerging nations, focusing first on the displaced persons that so often resulted from liberation struggles and then on natural disaster relief. For the most part, the system continued to use the techniques used in post-war Europe, adapting them to needs in the developing countries.

Or so they thought. The problem was that these responses were often inappropriate and counterproductive. There were many differences between displaced people in Europe and civil war and famine victims of the Third World. Provision of tents to victims of an earthquake or hurricane often delayed reconstruction and failed to address critical land issues. Construction of refugee camps for famine victims drew people away from their land, making agricultural recovery nearly impossible and creating an even larger relief requirement. Massive inoculations were not only inappropriate but, when applied incompletely, they often broke down the people’s natural immunities, actually increasing their risk to disease.

The military forces committed to these operations also continued to use the same modes and doctrines. Planes are used in ever-increasing instances to deliver food and supplies; engineers are still committed to build refugee camps. Yet there is increasing concern that these uses are not without costs. For example, a number of specialists have pointed out that the use of military aircraft to deliver food in Sudan in 1985 delayed vital decisions on alternative methods and obscured the fact that there was no onward delivery system from the airports out to the rural populations. When the rains came in the middle of the operation, it was necessary to bring in helicopters to shuttle the food outward. With proper planning, the food could have been far more effectively delivered and distributed by land.

The inappropriate use of military resources is part of a broader problem as well: the scarcity of humanitarian assistance funds. The public perception is that the costs of military participation in humanitarian operations are borne by the respective military establishment; but in most countries, the defense ministry is reimbursed by the foreign ministry/overseas aid department. Even in those countries where the military is not reimbursed, the usual practice is to develop an overall assistance program for the operation and allocate funds among emergency, rehabilitation and reconstruction activities. Within the program, military operations and humanitarian assistance compete for the same funds.

Military commanders might respond to these criticisms by reminding us that the decisions are usually in the hands of civilian authorities but, in reality, it goes far beyond this. Few civilians are knowledgeable about military capabilities and many harbor unrealistic expectations about what the military can and cannot do effectively. Furthermore, the nature of the relief system itself is such that there are few professional relief managers and many relief workers are first-timers -- to them, an army colonel with a helicopter, a jeep and an efficient staff with radios and other equipment looks heaven-sent.

Today the military is more heavily engaged in humanitarian operations than before. In the past five years, military aircraft have air-dropped food into Ethiopia, helicoptered aid into remote villages in Sudan, rescued flood victims (and often their animals) in Bangladesh, rushed pharmaceutical to earthquake sites, and delivered medical teams to hundreds of major and minor disasters. Engineers have helped rebuild roads and bridges (in some countries, to the point where there are more Bailey bridges than normal bridges!) and have supervised the construction of major flood control works in some regions.

In many cases this involvement is vital, but in others it may be at a hidden cost and more counterproductive than is generally realized. A key objective must be to define workable doctrines for this involvement and to make commanding officers aware of the social, political and economic impact they

may have with different modalities of commitment. Among the questions that must be resolved are:

- How are military forces and their assets deployed in humanitarian operations?

  What models of deployment are commonly used and what doctrines need to be developed for each?

- Are the current roles effective and, if not, what roles are effective?

- How can military units be committed to peacekeeping or humanitarian operations without violating their neutrality?

- How can foreign military commander's best coordinate with civil relief authorities?

To help answer these questions, we will look at reasons for military involvement in humanitarian operations, scenarios under which the military may be deployed, and configurations or models of deployment. We will then examine several cases to identify some of the key lessons and issues. To help understand the complexities of the relief environment and the constraints it presents, the nature of disasters in the Third World will be explored. Finally, the dilemmas facing military commanders in humanitarian operations will be identified and discussed, and specific recommendations for overcoming or avoiding the pitfalls will be presented.

REASONS FOR INVOLVEMENT

Civilian authorities turn to the military for help in DRO (humanitarian operations) for several reasons, among which the most obvious may be their physical assets. The military is often regarded as a cornucopia of assistance. Among the most sought-after assets are transport (land, sea and air); fuel; communications; commodities including food, building supplies and medicines; tools and equipment; manpower; technical assistance (especially logistics and communications) and facilities. Requests can run the gamut from the arcane, like delousing equipment, to the mundane, like maps; from cheap items like soap, to highly-sophisticated items like bulldozers; from off-the-shelf items like tents, to items that must be specially produced such as aerial photographs. Relief authorities know the military has the capability of providing these on request and, in a resource-poor post-disaster environment, it is not unreasonable for authorities to request them. Since many of the items are commonly stockpiled and since civil disaster agencies have few stockpiles of their own, especially in the developing countries, demands can be quite extensive.

Of these assets, several are particularly attractive to emergency managers. For example, communication is critical in emergencies but in most countries there are severe restrictions that limit civilian access to radio/telephonic

systems. Thus, in the aftermath of a disaster, it is not unreasonable for civilians to turn to the military for these services.

The vast, disciplined and generally self-supporting manpower of the military is the other key asset coveted by civil disaster authorities. Most disaster victims will be looking after their own needs at a time when civil works and repairs may require large commitments of personnel. Again, it is not unreasonable for civilian authorities to want to put the army to work clearing rubble, patching roads, etc.

These last two assets help to explain the second reason why civil authorities often seek military assistance: communications and discipline -- what the military refers to as chain-of-command -- are important elements in managing the post-disaster environment. For the most part, civil administration will be severely limited; their communications are likely to be affected and staff members may be among the victims requiring assistance. On the other hand, few indigenous military organizations will be affected to any great extent; military facilities usually weather storms and earthquakes well and personnel are unlikely to be affected by famines or food shortages. In cases where local forces have been affected or have been ordered back to their barracks while an international peacekeeping force guarantees disengagement, the internal communications and command-and-control systems of the outside force are likely to be even more sophisticated and secure. To a civil relief official in the midst of post-disaster chaos, a disciplined, ordered system is just what is needed to get things out to the affected population.

Finally, there is the element of history and past experience. As mentioned earlier, there is a long association of the military with relief operations and an expectation of some degree of involvement on both sides. After the 1985 Mexico City earthquake, the government was severely criticized by the public for not bringing in the army for more than routine security, despite President de la Madrid's stated reason that he wanted to employ large numbers of the victims in civil works projects rather than use the army to restore services and clear the rubble.

DEPLOYMENT SCENARIOS

Five distinct types of deployment can be identified for foreign military forces, each with its own set of prerequisites, operational modalities, and problems.

1. Deployment after natural disasters: In this scenario, foreign military forces may be deployed as the result of a request from their own foreign disaster assistance agency or from the affected country. The usual intent is to provide logistics support for rapid delivery of relief supplies or to provide technical support to the host government, often complementing the host country's own forces and capabilities.

2. Deployment at the conclusion of a conflict: In this case, the deployed force is either a component of the victorious armies now turned into occupation/martial law forces (e.g., the Allied Forces in Europe 1945-50), or a close ally that is supporting the outcome of the conflict (e.g., the Caribbean forces that took part in the post- invasion administration of Grenada, 1983). Its principal role is as a police force, with a public administration/martial law role equally as important. Logistics and technical support play lesser, but still important, parts in the overall operation.

3. Peacekeeping: The primary role of a peacekeeping force is to intervene between two opposing sides. The prerequisite is a formal cease-fire or disengagement agreement and concurrence that the peacekeeping force will be permitted to enforce the disengagement (although enforcement may not necessarily mean use of force). In many, if not most, cases, both sides will remain armed but inactive. The principal role of the peacekeepers is disengagement verification. There may also be agreement that the forces may play a limited police role.

It is as peacekeeper that a military commander will face a new humanitarian assistance role, that is, as guarantor of access to relief and reconstruction assistance. To meet this task, the force may be required to use its military capabilities to ensure that people are able to secure their entitlements. For example, it would not be unusual for relief agencies to request escorts for relief supplies in the initial phases of the relief operation, especially to areas that have just been opened as a result of the cease-fire. Logistics and technical support may also be requested but, if a cease-fire is in effect and humanitarian agencies have the right of passage throughout the conflict zone, requests for use of the force's logistics and other assets should be minimal.

One key role that should be mentioned is bomb and mine disposal. Presumably, the terms of the disengagement will permit increased access to the conflict zone. As humanitarian agencies begin to undertake expanded relief efforts, there may be a request for minesweeping and other munitions removal. If the opposing sides are only disengaged and have not laid down their arms, it will be necessary to negotiate safe passage routes for relief agencies and the terms and conditions under which they may operate.

4. Point relief (during active conflict): In this scenario, the two warring factions have not agreed to total disengagement or to a general cease-fire that will permit relief operations, but they have agreed, usually through diplomatic back channels, to permit neutrals to deliver humanitarian relief supplies to an affected civilian population (usually threatened by famine) at designated points in the conflict zone -- thus the term "point relief". This scenario is becoming more common, especially in Africa (e.g., the Ethiopian famine in 1985-6 and currently southern Sudan). To date, the most common deployment of military units has been in an air support and logistics role, with military assets (usually planes, crews, and fueling

and maintenance support) being placed under the command of a neutral international relief organization such as the International Committee of the Red Cross (ICRC) or the United Nations.

Point relief requires that both sides agree that the delivery sites are off-limits to military action. This is the key prerequisite for the commitment of military units. Without this concurrence, the participating forces and the operation itself can be placed in jeopardy.

In most cases, agreements have been observed. However, recent violations have led to calls for an expanded role for foreign military forces operating under this scenario, that is, as guarantors of the neutrality of the relief points. It is argued that, when the sites are agreed upon, an international military detachment would travel to the site (by the same route or method to be used by the relief column or aircraft), sweep the site for mines, and verify that the locale and access routes are safe for civilians. The theory is that the opposing forces would not risk killing neutrals, especially representatives of a major donor or military power. This mode of deployment is receiving more attention and has the advantage of forcing contacts between the opposing forces which could lead to a broader dialogue.

5. Humanitarian interventions and cross-border operations: In recent years, the relative success of many cross-border relief operations has led to suggestions for a more interventionist approach to humanitarian relief during conflicts. Some groups have spoken of disaster victims' "right to assistance" and some have advocated that military forces representing the world community be committed under extraordinary circumstances to guarantee safe passage for relief commodities. Cross-border operations have supplied food and medical supplies to rebel provinces in northern Ethiopia for years, airlifts are currently underway in southern Sudan, and humanitarian supplies have routinely been slipped across the border into rebel-held areas of Afghanistan. Probably the most dramatic operation was the Biafran airlift of 1968-70. To date, no multilateral humanitarian intervention has actually been carried out by regular military forces representing neutral nations. However, in 1987, the Indian Air Force executed an air drop of relief supplies to the Jaffna peninsula of Sri Lanka where Tamil minorities were under siege by the Sri Lankan forces. While the Government of India claimed the drop was humanitarian in nature, the mission was seen more as a warning to Sri Lanka that India was prepared to intervene militarily on the side of the Tamil rebels.

The Sri Lankan incident demonstrates the problems related to an intervention; no matter what the motives, the perception will be that the intervenor has chosen sides and is prepared to use force. For this reason, it is highly unlikely that military forces will be called upon to join a multilateral force for a humanitarian intervention. However, it is not unlikely that military assets (such as logistics capacity, commodities and perhaps

technical assistance) would be requested to support a civilian cross-border operation up to the point where supplies or services cross the border.

DEPLOYMENT MODELS

The manner in which military forces are deployed in a humanitarian role can affect overall success and performance. Several distinct models can be identified.

1. Detached deployment of military assets: This is the most common model -- the military establishment simply donates commodities or lends equipment and the necessary personnel to man them. Civilian control over deployment is inherent in this model and the most successful applications of military assets usually follow.

2. Use of military units to augment civil manpower: Use of military units to provide additional manpower usually occurs during or immediately after a disaster. Popular roles are flood and firefighting, debris clearance, post-disaster security and control. The guiding principle here is that military personnel should be used only to provide extraordinary services during the emergency and/or to supplement civil work brigades if there is a manpower shortage. The military should never be used to do work that large numbers of disaster victims could be paid to do. Survivors, especially low-income families, need alternative work opportunities and large-scale public works programs are a major source of post-disaster employment.

3. Use of military units as a substitute for civilian workers: In crises, it is often proposed that the military takeover certain functions from civil authorities, ranging from operating municipal water systems to delivering mail. As a general rule, this is an unsuitable role for the military, especially for foreign forces. Few officers have the proper training and military take-over may only delay a return to normalcy.

4. Use of the military in security and police roles: Perhaps the most common role for national military units in civil emergencies is as an extension of local police forces. With proper training and subordination to civilian authority, this is an effective role for national units. The keys are training and subordination. Undisciplined and overly-threatening forces can inadvertently create their own sets of problems. Foreign forces should never be used to augment local forces in this role; the local population will see this as a provocation.

As peacekeepers, foreign military forces play a number of other roles that may become critical to the overall success of the intervention. As mentioned, they may become guarantors of the peoples' right and access to relief assistance. This may involve keeping roads open, ensuring public order around distribution sites, or guaranteeing that forces have disengaged to permit people to reach distribution sites in safety.

The police function in peacekeeping is highly-debated. The peacekeepers must walk a fine line between guaranteeing order and taking over routine criminal and civil police work. Many people imagine the military serving in the role of a “London bobby”, gently restoring law and order to a violence-torn area. In some cases, this may work, especially if the population has been effectively disarmed. However, if the warring parties have only disengaged but remain armed, many experts believe that a foreign force should not be placed in the position of having to arrest and detain civilians other than when exercising their peacekeeping functions (although in practice it has often happened). Taking over routine police work may alienate the population and may give the impression that the peacekeepers favor the government. In most civil conflicts in the Third World, policemen in any uniform represent repression to the opposition. It should be remembered that the primary role of peacekeeping troops is to separate or disarm combatants, not to conduct routine criminal suppression. A better way may be to support the police effort indirectly by taking over security and guard duties normally performed by local police in order to release them for other duties.

5. Secondment or release of personnel to special relief units: In the late 1970s, the government of Sweden created a special Standby Force for Disaster Relief, as a civilian branch within the Defense Ministry. It was composed of military personnel temporarily released from active duty in order to perform duties in disaster relief without loss of rank or pay, and a cadre of civilians who volunteered for a period of twelve months. The Standby Force was organized along military lines, drawing most of its equipment from military materiel. In short, the Force was an attempt to build an organization with military-like capabilities, but avoiding direct military involvement and its connotations.

Several observers have noted that the makeup of the Force and its military orientation reduced its effectiveness. With large numbers of personnel being sent to a disaster area, all trying to find an appropriate role for “militarized civilians”, the Force has had difficulties in providing meaningful and appropriate assistance. There have been some notable successes, especially in projects dealing with refugees; in 1985, their engineers built and maintained a refugee camp in eastern Sudan that was considered a model for its layout and systems. But overall, the unit has been characterized as an “over- response”, and some feel that the Swedes have only managed to transfer the limitations of the military to civilian clothes. It is the military doctrines that are inappropriate, not the people. In other words, they have developed a response before defining the problem.

CASE STUDIES

With all these assets, and the ability to command and direct them, there is still much concern about the commitment of military forces to humanitarian affairs. To understand these concerns, we will look briefly at some recent operations.

The Ethiopian Airlift and Airdrops (1985-6)

Operational scenario: Point relief

Commitment modalities: Logistics support, technical assistance

It was hailed as the greatest humanitarian airlift of modern times. In 1985, responding to international concern about the plight of starving people in Ethiopia's northern provinces of Eritrea and Tigray, an international airlift – composed of C-130s from Sweden, Britain and Belgium (and later Canada); C-160's Transall from the Federal Republic of Germany; and Antonov An-12's from the USSR, combined with helicopters from Poland – began delivering food to remote areas of the famine zone. Ostensibly, the operation was to supplement the capabilities of the Ethiopian air force (which also operates An-12s).

Technically, the operation was a huge success. At the high point of the operation, 10,000 metric tons of food were delivered per month. Most of the food was airlifted to remote airstrips, then trucked to distribution points in nearby communities. To reach the more remote villages, and to permit people to stay in place and not migrate to relief camps in search of food, RAF and Luftwaffe planes airdropped grains using free-drop delivery. The effort was remarkable, for only minimal food losses resulted.

Yet there are haunting questions, cost concerns being among the most obvious. Even the mighty Hercules, which often carried 15-ton loads during the operation, can only carry a load equivalent to half that of a grain lorry (some grain trucks could carry up to 65 MT). The average cost of one flight equalled the cost to purchase a grain truck and fuel it for 6 months. Surely an investment in land transportation would have been of more lasting benefit in transport-poor Ethiopia.

Some have justified the airlift on the basis of a need for speed -- an argument that does not stand up. It took two Hercs operating 6 days to deliver what one convoy could deliver within the same period. Remember, the big planes were used to shuttle cargoes that were already in-country, not to deliver them to Ethiopia.

Another reason given was that many airstrips were inaccessible by road. This argument begins to get at the heart of the matter. A civil war was being waged throughout the air support effort. Two things should be pointed out about the situation. First, many of the airstrips used in the shuttle portion of the operation could be and were being reached by lorries at the same time that the airlift was underway. Second, the planes operated from government-held areas in full cooperation with Ethiopian authorities.(1) This had several results. The airlift was viewed with some suspicion by the two principal insurgent fronts: the Eritrean People's Liberation Front (EPLF) and the Tigrayan People's Liberation Front (TPLF). In their minds, the international community had taken sides. Thus, the mantle of neutrality was lost.

An even more important issue was that vital negotiations between the rebels and the government over safe passage for relief convoys were lost because the government had an “out” with the airlift. The negotiations could have opened more roads and made the food relief effort far more effective; in the case of Eritrea, a cease-fire for relief would have had even more benefits and possibly led to further peace discussions. So long as the planes were there, they did not feel as much pressure to negotiate. (2)

Another concern was the scale of the airlift and the fact that it was carried out during various offensives by the Ethiopian forces. It has been pointed out that the airlift permitted the Ethiopian Air Force to continue to use its own resources for the war effort (and even a controversial forced resettlement program). Critics point out that the Ethiopians (and the Soviets) had the transport capacity to undertake the operation, but again the pressure to do so was alleviated by the international effort.

For the international relief community, the airlift was also the easy way out of a major dilemma. They had been experiencing great difficulty negotiating with the Ethiopian government on relief in the war zone. When the government failed to negotiate a safe passage agreement with the rebels, it was easier to ask for air support than to continue to badger the government. Again, a move towards peace was lost. This was not a failure of the military; it was a failure of civilian relief authorities and diplomatic missions. But the mere availability of the airlift capacity reduced the necessity of taking a hard line with the Ethiopians. (It is interesting that the fund-raising media used by the agencies during the period rarely mentioned the fact that a war was going on.)

It has been claimed that the air drop effort had some impact on reducing population migration during the famine. (Migration is one of the worst results of famine and significantly prolongs relief efforts.) Unfortunately, there is little evidence to support this claim one way or the other. By the time the air drops were regularly delivering supplies, migration was beginning to taper off. (Indeed, by the time the overall air operation got into full swing, death rates among the affected populations had already begun to decline, a sign that the most of vulnerable people in the population had already died.) However, it is likely that the operation did have some effect on both migration and what is called residual mortality, helping to save malnourished people who could not go to the relief centers. It is doubtful that the Ethiopian forces would have been able to accomplish this feat (air drop) with their own air assets even had a cease-fire been in effect. While more attention should have been devoted to developing a better distribution system in Ethiopia prior to the famine, it was not; and the remarkable efforts of the airdrop crews are to be commended.

One thing that contributed to the success of the air drops was a tacit agreement between the relief authorities and the rebels that the insurgents would not shoot at the aircraft. Without this, the Hercs and Transalls would

have not been able to operate, and it is doubtful whether their respective air ministries would have committed them.

Lessons learned:

- Aircraft should only be used for operations that cannot be carried out by other means, i.e., they should not be seen as an end in themselves.
- Military forces should not be committed without a clear agreement from both sides of the conflict.
- Commanders should ascertain whether the commitment of assets will help or undermine negotiations between warring parties.
- Equal access to relief supplies should be guaranteed before the relief effort commences.
- Military detachments should operate under neutral humanitarian aid authorities (and, where possible, from neutral bases).

Deployment of Medical Teams to Sudan (1988)

Operational scenario: Deployment after a natural disaster, in support of local military humanitarian assistance operations

Commitment modalities: Medical support, technical assistance

In the aftermath of heavy rains and flooding in Sudan in August 1988, the U.S. Army sent a team of medical personnel to assist the Sudanese army working with the civilian population. It was feared that the floods, which had inundated hundreds of thousands of latrines in the slums of Khartoum, would spread disease throughout the population. That concern was mirrored by civil disaster relief authorities; the World Health Organization and the U.S. Centers for Disease Control, among others, had sent teams of experts to assist the Sudanese authorities.

In such a situation, the doctrine of the military is straight- forward: immunize everyone at risk against all possible health threats. Therefore, the Army team began an extensive campaign to inoculate the population of their assigned areas. The problem with the doctrine is that, while it works well for a controlled population (like soldiers or citizens of an educated, medically-sophisticated society), in the Third World where people have little previous contact with modern medicine, other approaches are needed. Few people understand the nature of the health threat, few will return for their booster shoots (if they even understand they need them), and in many cases the medicines cannot be given effectively for myriad reasons. In short, the doctrines applied were not only ineffective; in many cases they were counter-productive and, in some situations, dangerous. Again, this is not to take anything away from the hard work and dedication of the military medical personnel. They were just inappropriately trained for the situation. Their medical doctrines were appropriate for the people they normally serve, but not for civilians under these circumstances.

Lessons learned:

Military medical teams operating in the fields of public health, preventive medicine or primary health care need to observe health protocols and doctrines developed for civilian populations after disasters.

Local military medical units may not be any more aware of civilian health needs than are foreign detachments. For this reason, foreign military health personnel should operate in close coordination with local health ministry and World Health Organization experts.

Construction of Refugee Camps in India (1971)

Operational scenario: Deployment during a civil emergency, in support of civilian authorities

Commitment modalities: Technical assistance, manpower

To escape the Pakistani civil war in 1971, an estimated 8 million refugees flooded into India from what would become Bangladesh. Indian army engineers were called upon to help construct refugee camps as temporary places for these people to live in the region around Calcutta. For the most part, the engineers concentrated on provision of water and sanitation, but in one instance they were assigned to design and build a large refugee camp on a sandy tidal flat and landfill known as Salt Lake.

The engineers began the work in June 1971. The original design was for 35,000 refugees. Construction teams laid out the camp, dug drainage ditches, installed batteries of latrines and began sinking tubewells. As soon as the basic infrastructure was complete, building materials for self-help shelters were brought in and the camp was opened. On the first day, over 100,000 people arrived!

The camp and its systems quickly broke down. Overcrowding was partly to blame; by the time the authorities were able to control access, 700,000 refugees had entered. But the designs of the camp and many of its systems were also at fault. The camp had been laid out in a grid following lines similar to that of a military installation. From the air, it resembled a division base camp. Administrative and medical facilities were highly centralized and, as the camp grew, the people at the edge were farther and farther away from clinics, food stores, etc. In practice, the greater the distance, the less people avail themselves of services no matter how great the need. Shelters resembled squad tents; they were all multi-family and were placed in long, orderly grids. Experience has shown that this is the worst possible arrangement for shelters. People are isolated and left visually unprotected. The result is depression, a lack of the social bonding needed for people to cope in such a situation, and an increase in social problems in the camp such as theft and rape.

Again, not everything was bad. The engineers did provide one important element: community organization. In order to build all the necessary

shelters and camp systems, refugee manpower had to be mobilized. The engineers set up schemes for mass-producing shelters, digging ditches, sandbagging low-lying areas, and for hundreds of other routine tasks. This organization commenced from the minute a person entered the camp. After medical screening, those who were fit were immediately sent to a work gang and given an assignment. Several observers have commented that this immediate involvement helped overcome many of the psychological problems that the people faced; with something productive to do, they had less time to worry about their situation.

Lessons learned:

Physical order along military organizational lines is usually inappropriate for civilian populations. Refugee camps are not bases; they are communities whose residents have special social problems and needs.

Services for refugees must be brought to them. They are not in a state that encourages them to seek the services.

Social organization can play a significant part in helping people cope. (However, efforts to organize the people should not be overbearing or dictatorial.)

Evacuation of Earthquake Victims in Guatemala (1976)

Operational scenario: Deployment after a natural disaster, to complement local military relief efforts

Commitment modalities: Logistics support

Thousands of people in remote rural villages in the rugged Guatemalan highlands were injured in the massive earthquake of 1976. The United States immediately offered to send a detachment of helicopters to aid in bringing the injured to hospitals in the capital. The helicopters, manned for the most part by English-speaking crews, went into operation within days of the first shock. In a short period of time, they airlifted almost 700 people, more than 75% of whom were children, to hospitals located an average of 120 kms from their villages.

The areas where the helicopters operated were heavily populated by descendants of the Mayans. Until the earthquake, rural farmers and villagers in the remote highlands had little contact with the outside world. The vast majority of residents spoke one of the more than 20 Indian languages in one of the scores of dialects within each. A few miles from the capital, few people spoke Spanish, the national language. Thus, for many families, the nightmare of the earthquake was only the beginning of their tragedy. For few people had any idea where the helicopters were taking their children. Even if the crew had known the eventual destination of the patients, there was no way to communicate this to the parents. For their part, many of the parents

assumed, quite naturally, that the helicopters would bring the children back -- this was their first exposure to the machines -- and it was several days before they realized that this would not happen. For months afterward, there were pathetic rituals of bands of people going from hospital to hospital trying to find their lost children. While many were recovered, many others, especially infants, were not. It had never occurred to the military crews that such a thing was happening. They had even taken the precaution of having Guatemalan military medical personnel along on some of the flights, but they too were unprepared for the situation, as the Guatemalan military is drawn largely from the Ladino population rather than the Indian community.

Lessons learned:

Preparations for any humanitarian operation should be just as thorough as for a military operation.

Foreign commanders cannot always rely on local military authorities to know the situation better than expatriates.

There are many other cases that could be used to illustrate situations where the military was inappropriately committed to a civil relief operation. What is important to note is the common thread that runs through each one: the military forces were not properly trained for their roles, the doctrines under which they operated were inappropriate for the mission, and the realities of the emergency environment were not known or understood prior to their commitment. In the cases of outside military involvement, there was a failure on the part of civil relief authorities to alert the military to the operational issues and, in the case of Guatemala, failure of the local counterpart forces to provide the necessary orientation about operational problems.

THE NATURE OF THIRD WORLD DISASTERS

Perhaps at this point it would be appropriate to discuss the nature of disasters in the Third World and why military units, especially those from industrialized countries, often find it difficult to undertake civilian relief roles. Only by understanding the environment in which the military operates can we understand the limitations of the military establishment and the pitfalls that may be encountered.

Until recently, disasters were seen as temporary events that could be resolved with relief aid. But some unsettling facts have emerged. Countries on the road to development, experiencing a disaster, suddenly lost momentum. Resources grew scarce, and development programs had to compete with reconstruction activities for available funds. In the aftermath of wars, the outcome was even worse.

At first the solution was assumed to be more relief aid from the industrialized countries, and annually appropriations grew. Despite the influx of aid, the results were discouraging. Perhaps the answer was to speed the response,

to devote more resources, or to expand the international delivery system. But these measures and others were applied, few with meaningful results. Why?

The concept of a disaster as a separate event requiring a rapid response of medical and material aid was not entirely accurate and led to efforts that were not only very ineffective, but in many cases counterproductive. The basic problem was the conceptual failure by aid organizations to link disasters in the Third World with poverty and underdevelopment. Relief agencies tended to view disasters as discrete emergencies and responded by providing emergency medical assistance, basic goods (especially personal articles such as clothes and blankets) and temporary emergency shelter, usually tents. Emergency aid, collectively called "relief", was distributed free, as a form of charity. Even if this were totally effective in meeting emergency needs and could be provided at an appropriate time, such aid would still not address the roots of the problem: poverty and underdevelopment.

More than any other human event, a war or a natural disaster dramatically brings into focus all the basic problems and inherent weaknesses of a society and often forces a reappraisal of goals. Critical decisions, previously unaddressed, can no longer be ignored, and choices must be made. When it became evident in Guatemala that the earthquake had affected the poorer sectors (especially the Indian communities) to a far greater extent than the middle- and upper-class families, everyone recognized the portent this held for the future of the country. For the first time, people who had been unconcerned about poverty or unaware of the extent of poverty in Guatemala were brought face-to-face with the reality.

Disaster-induced changes occur because disasters create a climate wherein changes in society are more acceptable. While not all people, least of all the governments, experience a desire for change, pressures from victims often evolve into demands for fundamental changes -- demands that may cover not only changes in the society, but also changes in the form of the community, including land and housing.

The changes that may occur are numerous and varied. Changes in building styles, methods and materials can often be traced to a disaster. Migrations or relocations of people from one area to another can alter urbanization or rural living trends. Land invasions following earthquakes have affected the makeup of peripheral settlements around large cities and, in many cases, have affected the pattern of land ownership and tenure, not only in the immediate area of the invasion but also in surrounding communities. In wars or droughts, when large numbers of people are forced to migrate, the place where they stop in order to receive relief supplies often becomes a new settlement.

The loss of economic opportunity or need to find alternate sources of income has often caused large-scale migrations. Migrations compound the problems for relief agencies since they have to provide relief instead

of development assistance, significantly increasing overall post-disaster assistance costs. Unfortunately, many of the principal relief strategies used today encourage, rather than discourage, migrations.

For a society, disasters often bring changes in the structure of community leadership. New organizations may be born out of necessity to deal with the disaster and may remain to continue the work of bringing economic change to the community. New leaders often emerge, sometimes to replace leaders felled by the disaster, but more often to replace those who have proved ineffective or unable to cope in the aftermath of a disaster.

Disasters are one result of the cycle of poverty common to developing countries. The roots of poverty are the increased marginalization of the population caused by high birthrates and the lack of resources (or the failure of governments to allocate resources) to meet the basic human needs of an expanding population. At the center of the resource issue are the parallel problems of land and economic opportunity. As the population increases, land in both rural and urban areas becomes more scarce, and those seeking new land for farming or housing are forced to accept marginal lands offering less productivity and a smaller measure of physical or economic safety. Such trends result both in rapid and unchecked urbanization and in massive deforestation of mountainous and jungle regions that occur as small farmers push into less tenable areas for farming. In addition to the political failure of governments to develop new economic systems and to reallocate resources (especially land) to benefit the nation as a whole, there is an inappropriate attempt to use high technology to instantly “modernize” the society. This has two contradictory results: higher unemployment and rising expectations.

Recognizing poverty as the primary root of vulnerability and disaster in the Third World is the first step towards developing an understanding of the need for change in current disaster response practices. For if the magnitude of disasters is an outgrowth of underdevelopment and poverty, how can we expect to reduce the impact with food, blankets and tents -- the traditional forms of assistance?

The issues are largely the same in the aftermath of both natural disasters and civil war. In many cases the very reason a war was fought was over issues of entitlement, poverty, land, fair housing and food. For military units, especially peacekeeping forces, deployment in this environment requires extreme caution.

DILEMMAS FACING FOREIGN MILITARY UNITS IN HUMANITARIAN OPERATIONS

Conflicting Values in Emergencies

One way to explore the dilemmas facing the military is to examine the conflicting values at play in an emergency. Following a disaster, there are

many conflicting perceptions regarding needs and requirements held by the government, the local military, relief agencies and the population. For example, take the issue of tents. For the government, tents offer a quick solution to what they see as a temporary shelter problem. Furthermore, tents do not imply permanency; if the government decides to change its reconstruction or settlement plans, people in tents can easily be moved.

For the relief agency, tents are a comparatively cheap solution. Often they will be donated by a foreign military establishment and many can be transported by air or lorry to the disaster site.

For the survivors, the tent is of little use. Most people in the Third World build their own houses at very low cost with indigenous or locally-available materials. It is not uncommon for people to build houses for less than US$100. Given the comparative cost of a tent big enough for a family of 5 or more (US$150 - 1,500), most survivors view tents as a waste of money. They would much rather have the cash or its equivalent in building materials.

It is well-documented that most survivors build their own emergency shelters, normally using a portion of the materials salvaged from their old homes. The process of salvaging and building is very important; it reduces costs and permits people to recapture and hold the materials so that they will not be bulldozed during rubble clearance activities. More important (especially to people whose land tenure is not legally recognized) is the fact that construction of the shelter demonstrates a degree of permanence to the authorities -- to them a tent is definitely only for secondary use.

There is one more aspect to consider, that is, the subtle “message” that is conveyed when a tent is given out to disaster victims. The tent implies a temporary solution, an unfinished process. It hints that something else is coming since it is obviously an interim solution. Contrast this to the approach of providing tools and building materials; the message is clearly “get on with it -- don’t wait for anything else”. Of the two approaches to shelter, which promotes self-sufficiency and accelerates reconstruction, and which supports passivity and dependence and creates unreasonable expectations?

This is only one example, built around what is almost an inconsequential relief item. Far more complex issues abound.

Nuances of Involvement

There is one additional caution that must be clearly understood by any military commander contemplating the commitment of his forces to a humanitarian operation in a developing country. In many countries, the military represents the power of a repressive government and local people, far from welcoming the arrival of the military after a disaster, are often fearful of any increased presence of the armed forces, local or foreign. Since the visiting units will almost certainly avail themselves of the facilities of the host military, in the minds of the people, the foreigners will be linked

to the host military in the public mind -- a sort of guilt by association.

An extension of this problem occurs when the visiting military is placed under local civil defense authorities. Civil defense in many developing countries has connotations beyond simply assisting the civilian population. Many civil defense agencies are dominated by military officers and internal security forces whose role is to control, not aid, the civilian population. In some cases, the agencies are a shadow command designed to “take over” in a complete sense in an “emergency”.

The Mantle of Neutrality

One of the most important determinants of the success of a military deployment in a humanitarian operation is whether or not the force is able to assume and maintain a “mantle of neutrality”. The importance of this cannot be overstated. If at any time one or more parties of a conflict perceive that a foreign force has other than humanitarian objectives, either for itself or for the other party, the operation in which it is involved will be regarded as a military intervention and the force will become engaged in the conflict.

Once the mantle of neutrality is lost, it cannot be regained. This is especially a problem for non-UN peacekeeping missions (e.g., the Arab League force in Lebanon, the IPKF in Sri Lanka, the western Multi-Lateral Force in Lebanon).

Humanitarian Assistance vs. Pacification

Perhaps the single most common point where a peacekeeping force loses its public support is when it inadvertently offers humanitarian assistance that is perceived by the insurgents as “pacification”. This is a particularly difficult issue for, as we have seen, relief officials commonly turn to military commanders with requests for use of their assets. How can the commander determine whether the aid he is providing will be perceived as humanitarian or not?

First, he must negotiate the limits of assistance with all parties. It is extremely important that field-level contacts be established and maintained throughout the assistance effort. Activities that both sides permit will change from one locality to another; the only way a commander can proceed is with a broad understanding by both sides of what can be carried out without interruption. On the government side, a general agreement on the range of permissible activities is required. On the insurgents’ side, specific clearances for each locality are needed. For example, a road may be permitted in one area and not another, depending upon whether it goes through a sanctuary or could be used for military purposes. In Sri Lanka, reconstruction of schools is controversial, since they have been used in the past as temporary military encampments or outposts for controlling roads. It is possible to work out informal agreements with both sides. It must be clearly understood that, unless these contacts are made, assistance should not be provided.

Second, it is absolutely vital that assistance actions not be used for political gain by either side of the conflict. As soon as the program is seen to be politically motivated, it will be attacked by the opposite side.

Neutrality can be attained by carefully selecting assistance activities. As a general rule, assistance should focus on repairing or rebuilding critical infrastructure of a non-controversial and non-visible nature (such as water and sanitation facilities). Avoid systems such as telecommunications that only one side is likely to use or control. Wherever possible, the assistance should be provided through or by international organizations (IOs) such as UNICEF, UNHCR or UNDRO, or by non-governmental organizations (NGOs).

Avoiding collaboration with politically-sensitive ministries or agencies of the local government. Groups to avoid include ministries of defense, interior, security, etc. There are line ministries in every government that are generally regarded as non-provocative, such as ministries of health, transportation and others. If the peacekeeping force must collaborate with government ministries to deliver aid, assistance should be channeled through these ministries. Participation by any government ministry, agency or department associated in any way with the government's conduct of the war will result in immediate identification of the effort as pacification.

Avoiding Politically-sensitive Issues

Key issues that must be avoided include:

- providing assistance to people in government-sponsored resettlement or relocation programs or zones;
- providing support to colonisations, "peace villages" or settlements designed to occupy or hold a contested zone;
- supporting forced changes in settlement patterns that are clearly unpopular (e.g., villagization schemes).

In some cases, it will simply not be possible to provide humanitarian assistance to a particular locale. This may be because the area is too politically complex to work in or because pacification or similar programs have been carried out there. For example, commanders should avoid areas where a government is relocating people away from the conflict zone. Even if the humanitarian assistance were targeted for non-relocates, the fact that it was carried out in the relocation zone could give the appearance that it was somehow linked to pacification.

To decide which locales should be given preference during the initial stages, the best suggestion is to analyze where communities are returning to normal without assistance. For example, the return of refugees or displaced persons to their communities can often give a clue regarding which areas the people consider safe, since they usually have much better knowledge about the local situation than governments or relief agencies.

Operational Issues

There are a number of operational problems associated with using military assets. First, military units are not suited to long-term disaster roles. Very few commanders are willing to allow their troops or key personnel to devote extensive time to non-defense-related activities. Thus, organizations dependent upon the military in key sectors must by necessity limit their involvement to the emergency period.

A second problem is that any organization or activity tends to mold its method of operation around the key participants. If the military assumes a major role in disaster response, activities will be molded to military capabilities. A subtle example of this is the emphasis on the use of tents as emergency shelter; because military units already have tents and can erect them quickly, few alternatives are sought.

The third problem is precisely what makes the military so efficient in the first place, that is, its highly-centralized control system. Its hierarchy is designed to facilitate control and centralize authority. But in a disaster, people need to get together and develop collective responses. A military hierarchy of decision-making can discourage and inhibit this process.

CONCLUSIONS

In order to address the problems that will face commanders who are ordered into humanitarian operations, there are several tasks that need to be undertaken.

First, military establishments that are likely to be committed to humanitarian operations need to develop a body of in-house expertise on civilian disaster relief. This should not be too difficult. There are numerous training courses now available, ranging from self-teaching courses offered by the University of Wisconsin Disaster Management Center to intensive university courses (e.g., Cranfield/U.K.) to special training institutes such as the Asian Disaster Preparedness Center in Bangkok. Courses range from general topics (“What is a Disaster?”) to highly-technical or specialized topics such as “Refugee Camp Planning” and “Supplementary Feeding for Refugees and Displaced Persons”.

The need for training extends to non-military authorities involved in peacekeeping or other humanitarian operations where neutral military forces or detachments may be deployed. As mentioned earlier, civilian relief authorities hold misconceptions and unrealistic expectations about military capabilities and tend to ask the military to undertake assignments that cannot be accomplished easily. Training regarding appropriate tasking of military units and assets in humanitarian operations should be provided specifically for emergency operations staff of the Secretary General’s staff, director-level personnel at UNHCR, UNDRO and UNICEF, and resident

representatives of UNDP. Other bodies in the relief system that could benefit from training or orientation are the ICRC, the League of Red Cross & Red Crescent Societies, and major NGOs (especially those that are routinely involved in food logistics). Emphasis should also be placed on effective coordination models in different types of operations.

Second, military establishments should take a lesson from the post- World War II occupation of Europe and develop cadres of officers whose MOS is peacekeeping, humanitarian operations, and civil support operations.

Third, more effective means of coordination with and subordination to international relief authorities should be developed. In every case, it is extremely important to place military forces under civilian control. The resources that are needed in a disaster and that the military can easily provide should be identified, including transport, communication and medical services. Plans should be made to place small units under the temporary authority of civil officials for specific tasks. It will then be easier for non-military authorities to manage these resources, and local leaders will not feel overwhelmed or threatened by the presence of soldiers in their community.

It should become a matter of doctrine that, in a humanitarian operation, no matter how close the linkage with local military authorities prior to the emergency, the foreign forces will strive to attain and maintain the mantle of neutrality.

In civil operations where use of force by the foreign units is not a role, i.e., after civil disasters, it is extremely important to ensure that the military detachments are not threatening to the civil population. An effective and non-threatening way of integrating military and civil functions is to assign officers with a technical background to humanitarian operations and, at the local level, to place command of military units under the authority of junior officers or senior non-commissioned officers.

Finally, under no circumstances should foreign military commanders allow their forces to become identified with one side or the other when they are in a peacekeeping or spot delivery role. As guarantors of equal access, peacekeepers cannot in any way become involved in pacification efforts. To do so will destroy their credibility and draw them into a conflict which they cannot win.

DEVELOPMENT OF DISTRIBUTED ENVIRONMENT IN SUPPORT OF SECURITY CAPABILITIES IN THE BALKANS REGION

Orlin Nikolov

Abstract: *The nature of the conflicts and waging battles is almost changed and is timely evaluated in different types in which is required involvement of more prepared units. Cooperation and interoperability between civilian and military, especially in crisis management, terrorist threats, protection of strategic infrastructure and others is a top priority for EU, NATO and Nations structures.*

Keywords: *CAX, Crisis Management, Disaster relief, Comprehensive Approach, NATO-EU Cooperation, Civil-Military Interoperability, Interagency Cooperation, Defense Support to Civilian Authorities, Multinational Exercise Smart Defense, Pooling and Sharing, SEEETN*

INTRODUCTION

Today we are facing global change in all aspects of life. We encounter globalization, uncontrollable technological advances in almost all fields of life, increased industrial production that brings about environmental degradation and world natural resources depletion.

All Allies face a severe financial crisis. So if we would like to enhance the Alliance's ability to anticipate the emerging security challenges, if we want to adapt its capabilities accordingly, we need to do this by making more effective and efficient use of the resources we currently have. In short, all Unions must be more flexible, efficient service providers for its member nations. One important priority is to reform our own command structure by making it leaner, more effective and less costly.

In all these areas, the biggest reform challenge is to change our mind-set. Twenty years after the end of the Cold War, we still have not fully shifted our focus from planning to action and implementation.

Change in geopolitical environment has brought serious consequences to the military in all domains of its activities. That is why military organizations confront the ongoing challenge of how to improve their effectiveness within the context of highly complex, unpredictable and demanding operating environment. It has become of paramount importance to maximize the use of the organizations' stock of intellectual capital.

Therefore we are prepared to include the fullest extent and at an early stage in multinational initiatives for the joint acquisition, construction and

development of defense capabilities as NATO “Smart Defense” and Pooling and sharing capabilities costs of the EU.

Over the past decade, European defense budgets have been declining steadily. The current financial crisis is exacerbating the situation and resulting in further deep cuts. European armed forces have increased their international cooperation for the development of defense capabilities. However, a number of capability gaps continue to exist, as illustrated by the recent operation in Libya. There is also overcapacity in certain areas at the European level, for which there is scope for rationalization.

One of the key elements of our efforts should be to find new solutions for effective and efficient spending of resources. In conditions of growing interdependence and vulnerability in the context of this financial gap, even the strongest allies in NATO are now no longer able to cope with the full spectrum of challenges Therefore we believe that we can maintain both domestic and collectively, sufficiently reliable defensive potential that must increasingly seek collaborative solutions within our partners. This reflects a new strategic culture, working together with allies and recognizing one another.

The lessons learned from NATO operations, in particular in Afghanistan and the Western Balkans, make it clear that a comprehensive political, civilian and military approach is necessary for effective crisis management. The Alliance will engage actively with other international actors before, during and after crises to encourage collaborative analysis, planning and conduct of activities on the ground, in order to maximize coherence and effectiveness of the overall international effort.

Established cooperation and trust between countries in the region is a good basis on which to build the multinational initiatives “Smart defense” and “Pooling & Sharing”.

JOINT INITIATIVES WITH THE NEIGHBORHOODS.

The process of meetings of defense ministers of South Eastern Europe (SEDM) launched in 1996 in Tirana has proved its importance in achieving better coordination in solving the political-military issues in the region.

Countries participating in the process: Albania, Bosnia and Herzegovina, Bulgaria, Greece, Italy, Macedonia, Romania, USA, Slovenia, Turkey, Croatia, Ukraine, Serbia and Montenegro. With observer statuses are: Moldova and Georgia. As a mechanism intended to play an important role in making the SEE region security, stability and prosperity, SEDM has considerable potential.

The objectives of that initiative are to reform the armed forces of participating countries according to the standards of EU and NATO and maintaining the processes of Euro-Atlantic and European integration as well to develop the

ability to participate in Pease Support operations, military cooperation in areas agreed by the nations and to increase confidence and transparency in cooperation between the nations.

The major regional initiatives within the SEDM:

- Multinational Peace Force South Eastern Europe (MPFSEE)- SEEBRIG.
- Simulation network on countries of South Eastern Europe (SEESIM)
- Network of the military hospital of SEE (IMIHO)
- Defense / military support the fight against terrorism, proliferation of weapons of mass destruction and border control (CBSC)
- Cooperation defense industry, research and technology (SEEDIRET)
- Cooperation in military education in SOUTH EAST EUROPE (SEMEC)
- Female leaders in security and defense

On 10.05.2007 the chief of Defence / General Staffs of South Eastern Europe (Albania, Bosnia and Herzegovina, Bulgaria, Greece, Macedonia, Romania, Serbia, Turkey, and Montenegro) signed a document "The Terms of Reference of the Balkan Countries' CHODs Conference on Military Cooperation".

By this act, the participants commit themselves to cooperate in the development of military relations to improve and promote military cooperation in the region at all levels and contribute to timely and effectively counter potential asymmetric threats in the region.

Current practice shows that the forum is of interest for the European Union and NATO, and guests who participate in it are the Presidents of the EU Military Committee and NATO commander U.S. European Command and Commander of the Joint Command of NATO forces in Naples.

One of the main projects established by the CHOD initiative is titled "South Eastern Europe Education and Training Network". The project goals are to create a network by linking existing simulation centers and simulation training in general federation in South Eastern Europe, allowing the establishment of common capabilities of a wide range of simulations and software for the purpose of preparing the armed forces in the region.

NATO's main task is to continually develop and improve its capabilities in order to be adequate to the strategic environment in which it operates.

NATO has a number of Centers of Excellence and training centers including those under the "Partnership for Peace" initiative. There are currently 11 PfP centers located in Austria, Finland, Greece, Romania, Slovakia, Sweden, Switzerland, Turkey, Ukraine and the United States.

Educational institutions such as the NATO Defense College in Rome or the NATO School in Oberammergau provide ample opportunities for

education and training of representatives of the EU and other international organizations. The exchange of views enhances the relations and the mutual understanding, and builds a strong sense of a shared purpose.

The Alliance expands its exercises with the presence of EU representatives as observers and participants.

The training transformation through building joint capabilities for education and training on a national level is a task, which when solved will significantly improve the joint training by assigning joint tasks in the upcoming exercises and drills of various units of the Armed Forces. They will fill the gaps in their programs creating new expanded joint interoperability exercises that will improve their relationship in a joint training environment. The aim is to establish a joint global network of training capabilities using the full spectrum of live, virtual and constructive simulation.

In the context of financial crisis, this goal has become increasingly important not only for Bulgaria but also for our neighboring countries and allies.

The aim is to increase the capabilities and the interoperability, to preserve resources and to reduce the risk in applicable areas of training, operations, defense planning and capability development through the standardization of tactics, techniques and procedures used by the member states of the Alliance.

In this regard, NATO seeks to develop distributed and network capabilities for training and education to be integrated and to contribute to the growth of the existing national capabilities with which to prepare and train the forces for the Alliance's current and future operations.

The introduction of a number of NATO initiatives in the provision of network services for training - NATO Education and Training Network (NETN), NATO Training Federation (NTF), Distributed training and Education (DTE) and others, interfere with the national forces and assets that are part of NATO's joint forces and carry out joint operations. Elements of the created learning and training capabilities include training in NATO's established centers, joint distributed education, training and exercises (live), training simulations (virtual) and modeling and simulation as part of the computer based training (constructive).

Since this is not a new area for most of NATO member states, a need arises to integrate the network environment in the education and training in the Alliance and the coalition partners. This will generate significant advantages for saving time and resources. Initially this can be achieved using the established capabilities across countries, national modeling and simulation centers, and NATO Centers of Excellence.

These operational requirements depend on the interoperability and integration between NATO and the national headquarters and forces. The increase in capacities such as unmanned aerial vehicles, tracking devices

for their own forces and assets, cyber security, air command and control system and the active anti-ballistic missile defense, is a combination that requires a new method of education and training.

Therefore, the training should be made possible from the highest offices of NATO Command Structures (NCS) to the lowest levels of NATO Force Structures (NFS). For all these reasons, there is a dire need for a joint education and training environment, in which all can routinely exercise “as they fight”, for standards and interoperability unification, while reducing duplication of efforts for the effective use of resources.

The efforts of South Eastern European nations are focused on the same goals. Most of them participate in many activities of NATO Science and Technology and Allied Command of Transformation in the area of Modelling and Simulation. Most countries in the region use similar simulation systems JTLS, JCATS and tools JEMM, JEST, JPECT, etc.

For example, the JCATS simulation system is adopted and is used by the following South Eastern European countries - Croatia, Slovenia, Romania, Bulgaria, Turkey, Ukraine. The system is to be purchased by Albania and Serbia. The JTLS simulation system is available in Slovenia and Turkey. Besides these countries, JCATS is also used in Azerbaijan, Ukraine, United Kingdom, Australia, Estonia, Lithuania, Denmark, Georgia, Uzbekistan, Taiwan, Oman, Saudi Arabia, Jordan, Singapore, Canada, the US and NATO.

Connecting the simulation centers in South Eastern Europe which have the JTLS and JCATS simulation systems will allow the establishment of a federation with a joint constructive simulation environment that can and should be used for education and training in the learning process of the armed forces from operational to strategic level. Adding simulation systems and software for virtual and live simulation will close the circle and will bring the tactical and the strategic levels closer.

NATO Communication and information Agency with its technical and scientific capabilities may play a large part in this process. Using tools developed by the NCIA, such as JEMM, JEST, FLAMES, JPECT, JDARTS, especially CFBLNet, can serve as the basis for establishing an education and training network in South Eastern Europe. (SEE Education and Training Network –SEEETN – Figure 1).

In the last 4 years we have turned the focus on capabilities - training, modernization, participating in missions and operations. We have increased the number of conducted exercises with main battle units. During these exercises we have evaluated and improved the national operational procedures for crisis management with international players and other ministries, GOs and NGOs.

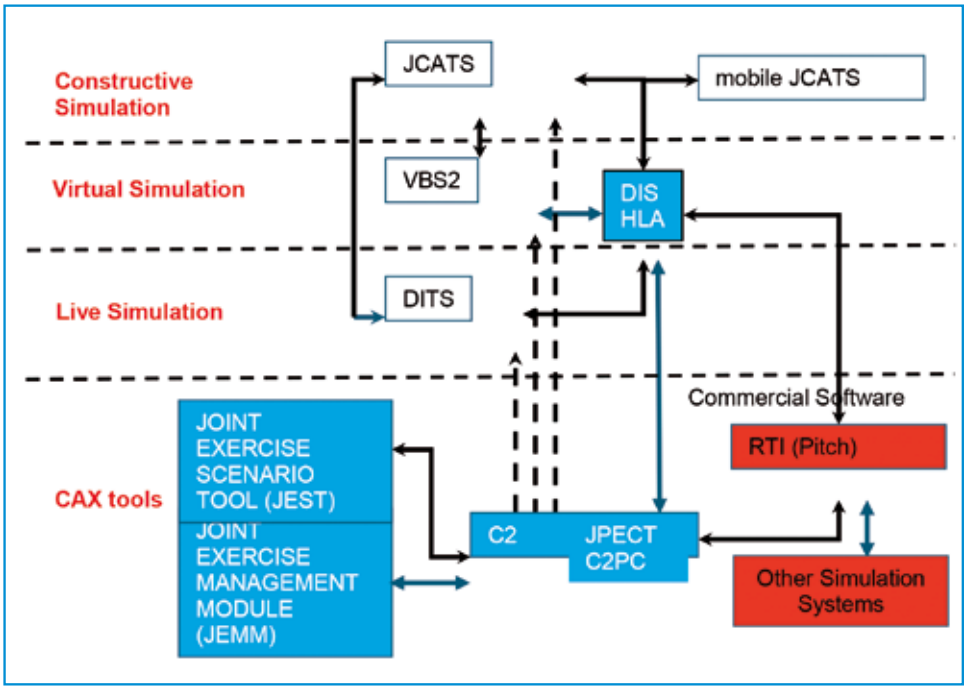

Figure 1. Example of the organization of simulation system and tools from tactical to strategic level

Bulgaria developed a submission for a complementary set of experiments to be conducted in conjunction with Exercises Phoenix 2010, Energy Flame 2011 and SEESIM 12. In the exercises were involved NATO structures (SACT - Supreme Allied Command of Transformation, JWC - Joint Warfare Centre, JFTC - Joint Force training Centre, NCIA - NATO Agency for Communications and Information, STA – Science and Technology Agency in part some group for Modeling and Simulations) to conduct their own experiments and to achieve a WIN-WIN situation.

CONDUCTING OF THE EXPERIMENTS AND EXERCISES

Showed to SACT that Bulgaria has a serious Crisis Management program in place and is working hard to improve its capabilities. Phoenix 2010 provided an opportunity for NATO to observe from first-hand how Nation's ministries (In fact 17 Bulgarian Ministries and Governmental Agencies) would deal with a crisis providing multiple ministry support and creating ad-hoc solutions when current Standard Operating Procedures (SOP) failed to address all of the issues. In the same time ACT used the exercises to test and validate different programs by experimenting with them in an exercise environment:

- CIMIC Crisis Emergency Planning (CEP)
- CIMIC Joint Planning, Execution and Coordination Tools (JPECT)
- Testing CBRN simulation system and instruments
- Civil-Military Fusion Center (CFC/CMO)
- Strategic Communication the result of which we used in the next exercise SEESIM 12 for educational purposes with conducting course for Strategic Communications
- CLOVIS (Civil Military Legal Overview Virtual Information System)
- Joint Exercice Management Module (JEMM)
- Exercice Scenario Resource Portal (ESRP)
- Distributed Training and Exercises and testing NATO Training Federation for future use.

The last experiment is fundamental for our present and future work in the region.

The South Eastern Europe Simulation Network 2012 and 2014 (SEESIM 12, 14) Computer Assisted Exercises (CAX) were the sixth and seventh in a series of exercises within the framework of the South Eastern Europe Defence Ministerial (SEDM) process and one of the most important for turning point to the development of permanent capabilities in the countries in the region.

The purpose of the SEESIM exercise is to promote cooperation, coordination and interoperability of civil-military operations and reinforce real world crisis response within and among the SEDM nations and their various SEDM initiatives through effective use of computer modeling and simulation (M&S). The specific aim is to develop the capabilities and procedures of national and regional coordination, cooperation, and mutual assistance among the SEDM nations in the face of devastating emergencies, such as natural disasters or terrorist attacks.

The main objectives of SEESIM are to:

- Standardize and improve national, SEEBRIG HQ and regional processes and procedures in emergency response situations; improve interoperability among the SEDM nations and SEEBRIG HQ
- Provide a training environment to promote SEDM and NATO objectives of transparency, confidence-building and good neighborliness
- Serve as a focal point for facilitating the integration of SEDM initiatives
- Encourage development of national simulation capabilities

The collaborative effort to support ACT experimentation serves as an example of SMART Defence for others to emulate. Joint Force Trainer is supported by the Capability Engineering Division of the Capability Development Directorate with representatives from the Joint Warfare

Center, Joint Force Training Center and the NATO Communication and Information Agency (NCIA) actively participating as well. In addition, industry is supporting the U.S. Joint Staff J7, Joint and Coalition Warfighting in the development of key technology that were critical in meeting several ACT experiment objectives (Figure 2).

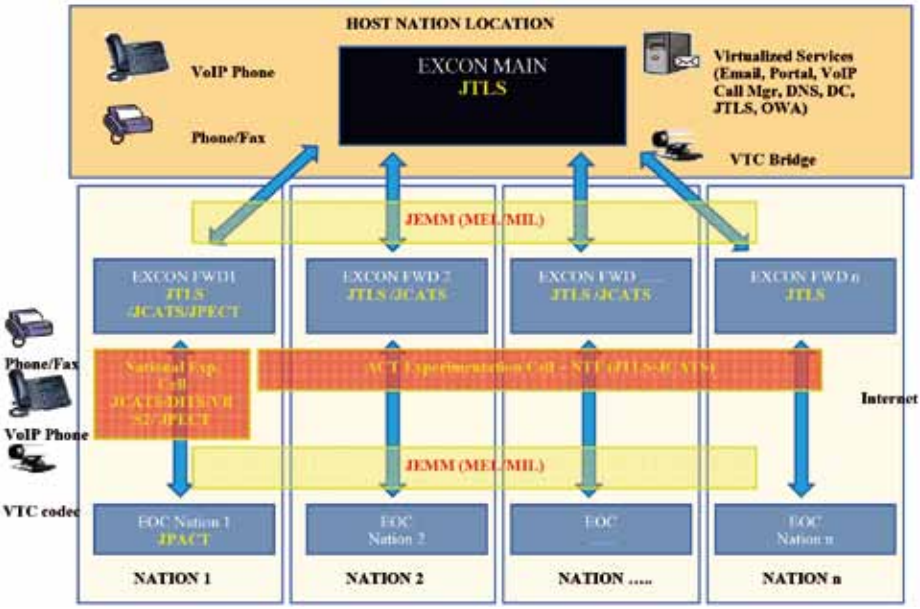

Figure 2. Example of the system organization to SEESIM exercises

The main idea of the conducted experiment through SEESIM 12 was to use, to explore the existing national capabilities, and to create technical platform with common instruments and software. That platform should be used for future permanent environment in order to conduct different type of exercises, trainings, courses, seminars, e-learning and etc.

For first time we create distributed points in Bulgaria, Croatia and Serbia where we have used JCATS (operational level) as a simulation system for role players and connected them through Swedish software PITCH to JTLS (strategic level). For synchronization purpose between the exercise and experiment, we have used Joint Exercise Management Module (JEMM). The Joint Exercise Management Module, a tool sponsored by ACT, developed by NCIA and used by NATO Training Centers was adopted as the exercise management tool for SEESIM12, and its use in a non-NATO led multi-national exercise was assessed as part of the experiment set (Figure 3).

Overall, the experiment seeks to inform the Alliance, and Partner nations, how NATO technology and processes could affect multi-national exercises such as SEESIM. The results may also provide insights on how NATO can bolster

the use of exercises to sustain interoperability. Additionally, experiment results may introduce potentially new roles for the NATO Training Centers in multi-national exercises regarding utilizing NATO tools and procedures.

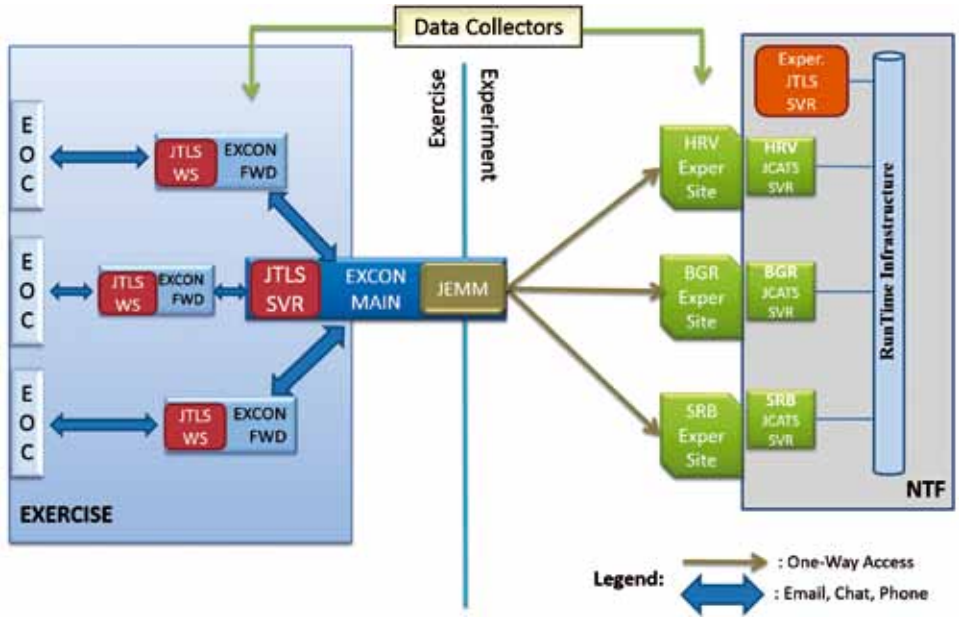

Figure 3. JCATS as a simulation system for role players

The Distributed Training & Exercises (DTE) experiment during SEESIM12 provided insights regarding potential roles of NATO in multi-national, non-NATO led exercises. This report expresses those insights in the form of findings, conclusions, considerations and recommendations across the designated experimental areas. In conducting this experiment, tools and processes were introduced that otherwise would not have existed in the SEESIM12 exercise setting. Similar to the Balkan Chiefs of Defence South Eastern Europe Education and Training Network (SEEETN) initiative, DTE sought to realize parts of a vision "to deliver to NATO and Partners a persistent, distributed combined joint training capability". The experiment sought to assess the viability and utility of selected aspects of this vision. Joint Exercise Management Module (JEMM), SEESIM12 NATO Training Federation (SEESIM12 NTF), Exercise Scenario Resource Portal (ESRP), and Combined Federated Battle Lab Network (CFBLNet) were made available to the participating nations. Each aspect had the potential to introduce new capabilities or processes that affected participating NATO organizations as well as NATO and Partner nations.

For the next SEESIM 14 exercise the Host Nation (Croatia) had to find solutions for:

- Virtual Private Network (VPN)
- Voice over Internet Protocol (VoIP)
- Joint Conflict and Tactical Simulations (JCATS) capability
- Digital geo data for JCATS (Play Boxes)
- Video Teleconference (VTC) capability
- Exchange Server (Email) for integration with JEMM

They succeeded to conduct for the first time in the history of SEESIM exercises a cost effective exercise using national assets and open source solutions. The ideas of the SEESIM 12 experiment have been practically realized through the:

- VPN - Open Source, Linux applications pfSense & OpenVPN
- VoIP - hardware (Linksys SPA941) and software telephones (Open Source applications MicroSIP & Zoiper)
- Simulations capability:
  - JCATS nations run simulations at the EXCON Forward
  - Host Nation provides Non JCATS nations and SEEBRIG with JCATS workstations and model operators at the EXCON Main
- Digital geo data for JCATS - provided by USEUCOM upon approval of all parties
- VTC capability - Adobe Connect software provided by USEUCOM
- Exchange Server (Email) - software provided by USEUCOM

For the last 14 years SEESIM has proved to be a major confidence-building forum in Europe. Its focus on transparency, international cooperation, and professional training and education of military and civilian personnel has contributed to mutual understanding, trust and respect throughout the region, the European community of nations, and NATO and other international organizations. That's why we believe that ideas based in SEESIM Exercises should continue

RESULTS AFFECTED BY CONDUCTING OF THE EXERCISES

Change in geopolitical environment has brought serious consequences to the military in all domains of its activities. That is why military organizations confront the ongoing challenge of how to improve their effectiveness within the context of highly complex, unpredictable and demanding operational environment. It has become of paramount importance to maximize the use of the organizations' stock of intellectual capital.

The distributed exercises are considered a key element supporting the Armed Forces transformation, enabling the participants to establish a multinational federation, using network technologies and sharing a common toolset and approach. At this stage, one of the major tasks of the Bulgarian

Armed Forces is to develop specialized centers with a broad spectrum of capabilities for interaction of the MoD with other ministries, civil agencies and organizations within the framework of the civil-military cooperation.

In that regard, in 2012 the Bulgarian Armed Forces created an Integrated Modeling and Simulation System including four centers for Modeling and Simulation using JCATS for constructive simulation, Distributed Integrated Training System (DITS) for live simulation and VBS2 for virtual simulation (Figure 4). In the set are included different types of software JEMM, JEST, JPECT as well mobile version of JCATS and VBS2.

With the system we try to achieve first of all cost effectiveness. Often HQ's will wish to remain in their home location due to the costs associated with either deploying into the field or travelling en masse to an overseas training facility.

Second to "Train as you fight". In real world operations it is extremely likely that the various Component, Tactical and Strategic level HQ's will be geographically separate during the conduct of operations. Therefore it will be desirable during training to ensure that this separation is maintained in order to properly test communications, distributed working practices and the operational battle rhythm.

In the light of future activities and real-life challenges, the countries within the region recognize the need for development of a distributed and networked Exercise and Training (E&T) Capability, which will integrate and enhance existing national capabilities and will focus on the education and training of forces in order to prepare them to conduct different kinds of missions.

Figure 4. Integrated Modeling and Simulation system within Bulgarian Armed Forces

SEEETN PROJECT

To meet this operational demand, the CHODs Initiative member states outlined the need of providing the Armed Forces of the South Eastern European countries with a persistent, distributed education and training capability that is able to support training, leveraging national expertise and capabilities (Figure 5).

The CHOD initiated the SEEETN project in compliance with this vision.

SEEETN will provide services, such as e-mail, web-access, VoIP, VTC, exercises, shared scenarios, Modeling & Simulation (M&S) toolsets, etc.

All of them should be distributed via Wide Area Network (WAN) or should be designed specially for education and training network.

SEEETN will provide a backbone infrastructure by hosting the core services and functionality for each component. The core capability should be easily extendable and reconfigurable to reach and provide services to National HQs, Centers of Excellence (COE), NATO Schools, governmental and non-governmental agencies and appropriate national centers, ranges, or virtual simulators, depending upon exercise specifications and National needs and desires. SEEETN will institute a common set of standards, protocols, interface middleware and procedures for M&S, exercise and training integration. These will establish the foundation for SEEETN-wide interoperability and reuse in the training and education domain. The Exercise component capitalizes the latest web-enabled technologies for Advanced Distributed Learning (ADL). A scenario management framework will allow rapid scenario generation and sharing in a collaborative environment while enforcing version control, user access rights and retrieval and storage mechanisms.

SEEETN will be designed as a long-lasting phased project.

The timeframe for achieving SEEETN operational capabilities (OC) is subject to consideration. It is also expected that SEEETN will demonstrate OC by supporting CHODs Initiative events; meanwhile its development should continue to support education and training requirements through a dynamic, evolving environment to provide flexibility and promote reusability. The Armed Forces transformation process builds on education and training by developing and inoculating interoperability, especially through linking systems, forces and headquarters at regional and national level, and routinely practicing and refining tactics, techniques, and procedures to meet the evolving operational requirements. SEEETN is a critical element of that solution set and will bring exercise and training to those who need it anywhere at any time and will transform the Armed Forces intellectually, culturally and militarily.

Figure 5. Organization within SEEETN

Phases and Activities

Phase I: Assess the distributed simulation and E&T capabilities in order to develop concept of the project, feasibility study and roadmap. Recommend and demonstrate a way forward for interoperability, technical standards and architectures.

Phase II: To set up the infrastructure of a Virtual Private Network (VPN) using the Internet with statically–assigned public IP addresses at each participant's site;

Phase III: Basic services (e-mail, web-portals, central repository, etc.) to be provided and tested by participants;

Phase IV: Integration of local (national) training and exercise networks in a common network.

In that regard until now were developed feasibility study, concept and road map. This year were conducted first tests of the SEEETN and in November will be conducted experimentation Computer Assisted Exercise BALKAN BRIDGES 15 (BB15).

BALKAN BRIDGES 2015 aims to provide a training platform and environment, which contribute to the improvement of joint war fighting capabilities, as well as to strengthen the linkage between training and future deployment.

The aim of the exercise is to improve and enhance Balkan states' capabilities to respond adequately to any security concerns and risks related to a regional crisis by testing the potential integration of national M&S systems and/or simulators into a regional Information Communication Technology Infrastructure (ICT).

In May 2015 the all nine participating nations together with JFTC conducted experiments and tests to determine the environment required for planning, training, concept development, and experimentation for the purpose of Exercise and Training at regional level using Modelling and Simulation, in order to develop this network.

The tests and the exercise will provide the test bed for NATO (JFTC) to asses and determine the execution of connecting National and NATO training Capabilities under Connected Forces Initiative (CFI).

CFI test I case covered and were achieved the following result:

Test 1 - Common data source for simulation (Simulation Data)

• JOB was used successfully to collect ORBAT data for SEEETN exercise JCATS database.

• Average time to create battalion size ORBAT using JOB is 4.8 man hours.

• Availability of the map type was limited.

Test 2 - Connect the exercise site(s) with JFTC, Test distributed configuration (Network Testing)

• All capitals managed to complete network tests.

• Athens experienced some problems with the previous router. After router was changed, network between Sofia and Athens was stable. Response time of clients for JCATS and IGEOSIT tests were slow. Athens is planning to increase the bandwidth from 6Mbps to 20 Mbps.

• Ankara turned off Checkpoint firewall program and assigned a dedicated real IP to the line.

• Bucharest conducted the test with a software router Pfsense. Actual router configuration can support only one node. In the case that no services will be provided from JFTC during SEEETN exercise, this software will prove to be adequate and can be used for the exercise.

• Sarajevo experienced some problems with the previous router. Additional tests were executed with Sofia on 19 May 2015 after changing the router.

• Bandwidth problems limiting the connection between JFTC and Sofia which have been identified and fixed. What's-up Gold Software was used to check the bandwidth requirements. Installation of this software to the same VLAN in JFTC caused latency problems between Sofia and JFTC.

• Network equipment and security standards need to be followed by all participant capitals. Different kinds of network equipment, lack of real internet IP numbers, firewalls and lack of expertise about router configuration were the cause of late network establishment.

Test 3 - Field test of Mobile CAX capability of JFTC (Simulation System Testing)

• Field test of Mobile CAX Capability was conducted during 11-15 May 2015 to identify and prove Mobile CAX can be deployed and adapted for NATO & National exercises.

• Limited Mobile CAX equipment was installed in Sofia and Athens for supporting other tests. Using the outcome of this test data, JFTC can plan the types and the number of equipment necessary to establish a proper CAX structure at a remote location.

• Mobile CAX usage proved to be useful and efficient.

Test 4 - Field use of NATO simulations (JCATS, VBS) (Simulation System Testing)

• JCATS client bandwidth requirement without repeater is 1 Mbps and with repeater 100 Kbps.

• JCATS client pop up times without repeater is changing from 46 seconds to 17 minutes. Client pop up times with repeater is changing from 20 seconds to 1 minute.

• JCATS clients need to be mounted to repeaters, installed from repeaters and the updated database will be provided to capitals by Sofia.

• Usage of JCATS repeaters enhances performance.

• Sofia will run the JCATS server during the Balkan Bridges 15 exercise.

• There are capitals that do not have JCATS and there are capitals having different versions of JCATS which caused technical issues.

• JCATS 12.2 will be presented as an option to technical syndicate during Balkan Bridges 15 MPC.

Test 5 - Stimulation of NATO FASs from national and NATO simulations (Interoperability)

• IGEOSIT client bandwidth requirement without repeater was 300 Kbps.

• JCATS client pop up times without repeater was changing from 50 seconds to 8 minutes. JCATS client pop up times with repeater is changing from 22 seconds to 40 seconds.

• Sofia does not have a C2 system to support the training audience during BB15 exercise and counts on JFTC's support for iGeoSIT.

•The servers necessary to stimulate iGeoSIT are getting input from JCATS servers. Using of iGeoSIT servers locally enhances performance.

• The servers necessary to stimulate iGeoSIT were getting input from JCATS servers located in Sofia, JFTC and Athens.

The second CFI test will be conduct through the Balkan Bridges Exercise.

The aim of the CFI Test II is to connect national training with the NATO Training Environment, sharing hardware/software and technical SMEs, to establish a Common Operating Picture with NATO FAS Capability using IGeoSit as well to test CFI Implementation possibilities.

The Expected Outcomes from CFI II test are:

• Gain mutual experience in connecting capabilities below the joint Operational Level.

• Create a robust process that will serve to guide future training and exercise events for JFTC.

• Through the shared use of JCATS and IGeoSIT, SEEETN is provided the opportunity to gain experience for possible future NATO/NATO led missions.

For that purpose will be conducted four test cases:

• Test Case 1 – High Level Architecture (HLA):
- Will be tested before BB15 with Sofia.

• Test Case 2 - Use of JCATS:
- Replication Server at JFTC along with multiple clients.

• Test Case 3 - Use of (FAS) IGEOSIT:
- Replication Server at JFTC along with multiple clients.

• Test Case 4 – Mobile CAX:
- Deploy Mobile CAX to Sofia and Athens.

Generally the key findings and proposals we can define as:

• Database :
– Use of JCATs Orbat Builder- STARTEX validation, MEL/MIL synchronization need to be conducted

• Network:
– Sofia need to increase bandwidth, all capitals need to start network tests 1 October prior to exercise and establish tested network 15 days before the exercise.

• JCATS:
– Propose using version 12.1, each capital using a JCATS repeater.

– For non-NATO nations who do not have a JCATS license, Sofia to provide JCATS clients with an operator located in Sofia.

– For Athens JFTC can provide JCATS 12.1 virtual server and necessary number of virtual clients with JCATS SMEs.

– NATO nations who have a JCATS license but who do not have 12.1 version, JFTC can provide JCATS 12.1 virtual server and necessary number of virtual clients.

• IGEOSIT:

– JFTC will provide IGEOSIT support to all participating capitals from SOFIA during BB15 as part of the JFTC CFI Test Case.
To achieve the aims of the SEEETN and test cases, JFTC will share technical expertise through subject matters experts (SMEs), Software (JCATS, ORBAT, iGeoSit, VBS 3), Mobile CAX on the wheels (Hardware), and will make a coordination using WEBEX.

On the BB15 participant nations will experiment SEEETN in order to determine the environment required for planning, training, concept development, and experimentation for the purpose of Exercise and Training at regional level using Modeling and Simulation, in order to develop this network.

We expected to be accomplished following main objectives:

1. To achieve the required functionality operating in network environment in order to conduct common trainings and exercises by means of:

• Modeling of Combat and Non-military Operations/Operations other than war;

• Generation of CAX Scenarios;

• MEL/MIL Management;

• Conducting particular simulations and/or implementing CAX/other training activities-related scenarios by means of:

- Exercising control over the units/forces of the opposing sides involved in relevant CAX;

- Data transmission between remote clients and the server;

- Model's database update;

- Providing access to the data received from relevant workplaces/ workstations within the SEEETN according to the personal user clearance.

• Observation and control over the actions taken by the opposing sides involved in CAXs and relevant training events;

• Analysis and exercise statistical data processing.

2. To achieve required interoperability and compatibility with the national armed forces in the course of the HQs and units' training process;

3. To provide an opportunity to develop SOPs and models for staff officers/HQs and units'.

4. To exploit available technological and technical environment in order to improve the education and training provided by the military schools/ colleges.

5. To provide an opportunity to investigate usability of compatible C2 systems during trainings and exercises.

6. To provide basic services (e-mail, VoIP, VTC, web-portals, central repository, etc.)

The SEEETN implementation will increase the efficiency and effectiveness of the education, reduce the costs and time for HQs & units' training and improve the interface/interaction quality and decision making in a realistic environment.

SEEETN will provide the environment required to conduct exercises for rehearsing humanitarian operations together with Law Enforcement, as well as IOs, GOs, NGOs, based on consensus.

SEEETN setup and implementation will enable us to achieve interoperability with NATO nations and relevant environment to conduct international CAXs within the region, as well as allow the military units of Southeastern European states to participate in multinational exercises.

CONCLUSION

NATO and the European Union (EU) share common values and strategic interests, and are working side by side in crisis-management operations. NATO's Strategic Concept commits the Alliance to prevent crises, manage conflicts and stabilize post-conflict situations, including by working more closely with the European Union and the United Nations. The opportunity for closer cooperation between NATO and the European Union as well as with other actors is an important element for the development of an international comprehensive approach to crisis management and disaster relief.

In financial crisis, creating new capabilities will significantly increase Close cooperation between NATO and the European Union. As nations have only one set of forces, it will be imperative for NATO to work closely with the EU not only to avoid duplication of effort but also to ensure that projects are coordinated and complementary. NATO-EU cooperation will demonstrate Europe's readiness to align its efforts in order that it can shoulder its fair share of the security burden even when budgetary resources remain scarce.

Creating common multinational permanent environment and expertise for preparation of our troops and forces will increase our abilities for training and education.

Furthermore, creating new capabilities will give us new opportunities to participate more strongly in crisis management process that is the future

use of the Armed Forces. In that way will be involved a lot of civilian potential for experimentations of different types of operation in any kind of crises. That will help for equalization of Standard Operational Procedures, doctrines and concepts, and will erase the boundaries and accelerate the transformation and close cooperation of NATO and EU.

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About the author:

Colonel Orlin Nikolov graduated Military School in 1991; Defense Staff College in 2003; Junior Staff Officer Course in Slovakia in 2005; Joint Specialized Operation Course in Joint Specialized Operation University - USA – 2006. From 2005 to 2007 Col. Nikolov was Deputy Chief of National Center for Modeling and Simulations "Charalitza". From 2007 to 2013 he was Assistant in "Doctrines and training programs" branch in Training Directorate in the Genera Staff of the Bulgarian Armed Forces; Chief Assistant in Exercise and Training Branch in Operation and Training Directorate in MoD. Since 2013 col. Nikolov has been appointed as Chief of Capabilities Branch in Crisis Management and Disaster Response Centre of Excellence. He is author of many articles and features on Air Defense and Modeling and Simulations thematic and Member of NATO Modeling and Simulation Group MSG-068/105/134. Col. Nikolov is Project Manager of projects such as Establishment and development of National Centre for Modeling and Simulation "Charalitza"; Integrated System for Modeling and Simulation in MoD; Crisis Management and Disaster Response Centre of Excellence; South Eastern Europe Education and Training Network. E-mail: orlin.nikolov@cmdrcoe.org

ENVIRONMENT FOR CRISES MANAGEMENT AND DISASTER RESPONSE TRAINING

Irena Nikolova, Nikolay Tomov

Abstract: *The paper presents a vision for an Integrated Training Environment for Crises Management and Disaster Response, based on the recent advances in simulation and gaming technologies. It comprises six integrated frameworks managed according to project portfolio management methodology. Idea for an Integrated Training Environment adapted to the NATO Concept Development and Experimentation Policy and Processes is presented. Some insides of the civilian perception for the crises management training are described, a further consideration of which could increase the efficiency of the training and exercises in this domain.*

Keywords*: simulation, training, crises management, virtual reality, project management, interoperability, computer assisted exercises*

"Tell me and I forget. Teach me and I remember. Involve me and I learn."
Confucius

INTRODUCTION

Recent advances in information, communication and computing technologies have opened the gates to new dimensions in the simulations and virtual reality. These new dimensions are the main "drivers" for enhancing the education and training in all mankind activities. The new technologies and tasks necessitate the usage of new terms and approaches in the training domain. Current technologies bridge the training needs and capabilities improvement and provide optimal way for resolving key issues on organizational, national and global level.

The new opportunities for using simulation and gaming for crises management training of decision makers, rescue teams and ordinary people can enhance the capability development in a safe and cost-effective way. Beroggi et al. (1995)[1] describes how the virtual environments could support the decision making by providing a sensation of a real emergency situation, which is difficult to create in traditional simulation and gaming situations.

Having a number of simulation and gaming tools developed for different analytical or training purposes and used independently cannot answer the present needs of the crises managers. This fact has been realized several

[1] Beroggi GEG, Waisel L, Wallace WA (1995) Employing virtual reality to support decision making in emergency management. Saf Sci 20:79–88

years ago by the military during the process of soldiers' preparation for their missions. They started the development of a training environment comprising real facilities, virtual environments and people working as one – an Integrated Training Environment. But such an environment developed for serving the military operations with specific for the army tools and methodologies could not be efficient enough for the purpose of crises management and disaster response (CMDR) training.

The main goal is the Integrated Military Training Environment to be adapted for collective and individual training for non-military organizations, responsible and/or involved in the management of crises.

CMDR TRAINING TROUGH A CIVILIAN PERSPECTIVE

Emergency management consists of five phases: prevention, mitigation, preparedness, response and recovery. The management of each phase requires the involvement of experts with different skills and experience.

Crises are various in kind and usually occur without warning – natural disasters or terrorist attacks. For that reason one of the major tasks in crises management is to have as much as possible well trained military personnel, civilian staff and individuals that could make decisions and respond in the most appropriate way.

In most cases the CMDR virtual trainings and exercises are provided and controlled by the military – a circumstance that leads few disadvantages behind. Based on the authors experience there is a civilian perspective that has to be considered objectively in order any crises management exercise to be more effective, to increase the learning potential and to achieve its goals. Civilians usually have various perceptions for the emergency situations and how to respond during a disaster, often not coinciding with the military perception. It is a challenge task to tailor the existing military training methodologies and tools for the purpose of civilian CMDR training, but there are several "rules" that have to be taken into account when civilians are involved in a training and/or exercise:

- *Willing to educate and train* – in the human nature is "embedded" the willingness to develop itself, the civilians do not differ;
- *Different understanding and terminology* – for the civilians is difficult to understand sometimes the words and phrases used during the training process of the militaries;
- *Motivated by curiosity and personal ambition* – the internal motivation for a personal development and feeding the curiosity could be two of the reasons for participating in trainings and exercises;
- *No commands and orders* – there is no a civilian that is glad to be trained by commands;

- *Noob, not an enemy* – the military have to consider the civilian as an unexperienced supporter, not as an individual who fights against him;
- *Want to have the leading role* – sometimes the civilian believes he knows more about a certain situation and can response in a better way than any other, so the control and the leading role should be his;
- *Exercise is not a Mission, it is a Game* – there are no many civilians that have been participated in military missions. For them the exercise is just a game with some serious elements;
- *Will"survive" without trainings* – a common delusion in most of the civilians.

SIMULATION AND GAMING IN CMDR

Applying the Modeling&Simulation tools and methods in trainings is a new form for education, learning and capabilities development. Simulation scenarios could be executed faster than the real-time scenarios - the so called "time jumps" is an attractive and useful feature. This advantage is used for making an efficient "if-then-else" analysis of different alternatives. Simulation brings the possibility to "pre-live" the Future and to see the effects of your actions.

Walker et al. (2011)[2] identifies five specific purposes for using simulation and gaming as an approach for improving crisis management:

- To assist in pre-crisis resource requirements determination and resource allocation decision making;
- To assist in response planning;
- To assist in training in crisis management for actual crises;
- To manage an ongoing crisis in real time;
- To analyse and re-run a crisis after resolution to learn from experience and modify the Crises Management System for future deployment.

There are many different simulation tools and systems at the market, which could be included in the CMDR training, depending on the specific scenarios played. For example:

- SYNERGY – SYNERGY is a training simulation that enables tactical and strategic high-level decision-makers from public and private organizations to efficiently prepare emergency management scenarios, rehearse procedures and validate emergency plans. The situations simulated in SYNERGY are highly realistic, immersing the crisis-cell members in an extremely diverse range of scenarios.[3]

[2] Walker W., Giddings J., Armstrong S., Training and Learning for crises management using a virtual simulation/gaming environment., Cogn Tech Work (2011) 13: p.163-167
[3] http://masa-group.biz/products/synergy/

- EXONAUT Suite – The EXONAUT software suite offers a range of functions ranging from basic data setup to the tracking of capabilities within an organization. It also facilitates knowledge management and distribution of risk management and training data and enhances capability throughout the training, exercise and planning cycle.[4]
- JTLS – The Joint Theater Level Simulation is used to simulate joint, combined, and coalition civil-military operations at the operational level. Used for civil/military simulations and humanitarian assistance/ disaster relief scenarios, JTLS is an interactive, computer-assisted simulation that models multi-sided air, ground, and naval resources with logistical Special Operation Forces and intelligence support. The primary purpose of JTLS is to create a realistic environment in which agency staff can operate as they would within a real-world or operational situation.[5]
- JCATS - JCATS is a joint multi-sided, real-time, stochastic, high resolution, interactive computer based simulation system that models force interactions from the Joint Task Force level to the individual person. It is a physics and data-based simulation that accurately replicates entity-level combat.[6]
- VBS 2/3 – Virtual Battlespace 3 (VBS3) is a flexible simulation training solution for scenario training, mission rehearsal and more.[7]
- HEAT – Hazard Estimation after TBM Engagement is a software system for the calculation and visualization of the dispersion of chemical warfare agents, which can be released following an engagement of TBM (Tactical Ballistic Missiles) with unconventional warheads. Such functionality is indispensable for assessment of the effectiveness of extended air defense weapons systems, as well as for operational use in planning and early warning in the field of passive defense.[8]
- NEWS - NEWS is a software system that facilitates both the simulation of complex dispersion conditions (e.g. the dispersion of biological warfare agents) as well as the calculation of warning areas and hazard areas in compliance with NATO standard ATP-45.[9]
- PRESAGIS Suite – Presagis M&S Suite offers a unique and flexible M&S development environment to create accurate and immersive simulation applications for training, operations, and analysis.[10]

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[7] https://bisimulations.com/virtual-battlespace-3
[8] https://www.tms-bonn.de/en/products/heat/
[9] https://www.tms-bonn.de/en/products/news/
[10] http://www.presagis.com/products_services/products/modeling-simulation/

- PITCH Suite – PITCH tools provide innovative services and solutions for cost effective development and integration of distributed simulation systems for CMDR, ensuring high level of interoperability.[11]
- OCULUS Rift - The Rift uses state of the art displays and optics designed specifically for virtual reality and gaming. Its high refresh rate and low-persistence display work together to provide incredible visual fidelity and an immersive, wide field of view.[12]

Figure 1. Simulation tools for CMDR training.

Shufelt[13] claims that by 2030, a diversely-equipped army will use a seamless, plug-and-train network of virtual training and battle command systems within an integrated Joint, Live – Virtual – Constructive training environment. This integrated training environment will support requirements to build and sustain unit training, develop flexible, adaptive, and innovative leaders and enable high fidelity mission planning and rehearsals. The objective end state is greater combat readiness and enhanced operational execution. It is expected this integrated environment will support also CMDR training missions.

[11] http://www.pitch.se/
[12] https://www.oculus.com/en-us/rift/
[13] Col. Shufelt, Jr., James, A Vision for Future Virtual Training, (http://ftp.rta.nato.int/public/PubFullText/RTO/MP/RTO-MP-HFM-136/$MP-HFM-136-KN2.pdf)

INTEGRATED (DISTRIBUTED) TRAINING ENVIRONMENT

Currently, the combination of Live, Virtual and Constructive simulation are forming the Integrated Training Environment for the militaries. In the context of an architecture for a CMDR Training Environment we can identify the main "modules" of such an Environment as:

- **Management Framework –** Management Framework includes the Integrated Management Cycle. Considering the training specific features and the best practices, the framework has been developed on the conceptual basis of the project management.
- **Simulation Framework** – application of a federated approach based on High Level Architecture (HLA), but could include also Distributed Interactive Simulation (DIS) and Test and Training Enabling Architecture (TENA);
- **Modelling and Simulation Tools** – tools including modelling and simulation of CBRN, flooding and earthquake effects during crises, crowd movement models and modelling of civil emergency services, etc.;
- **Environment Representation** - including terrain, weather conditions and infrastructure;
- **Training Audience** with their C4I real tools including decision and situational assessment tools, also visualization, simulation control and analysis tools;
- **ICT Infrastructure –** including hardware, basic software and connectivity for supporting the functioning of the Training Environment.

These six main "modules" of the CMDR Training Environment could form a powerful Integrated (Distributed) Training Environment for CMDR. The option "Distributed" means that the training environment resources could be allocated at different physical locations.

Adapted to NATO's Concept Development and Experimentation Policy[14] and processes for capability development the Integrated Environment for CMDR Training could be schematically presented as three main functional labs (see Fig. 2):

- Concept Development Lab – provides a framework for identifying existing ideas and solutions or developing new ones to overcome capability shortfalls and gaps in CMDR;
- Experimentation Lab – its role is to determine, with the means and tools of experimentation, whether a concept under development will achieve its main aim;
- Training Lab – a place for exercising the approved concepts, tested and validated with experiments.

[14] MC 583 – Policy for NATO CD&E, 30 Sept 2009

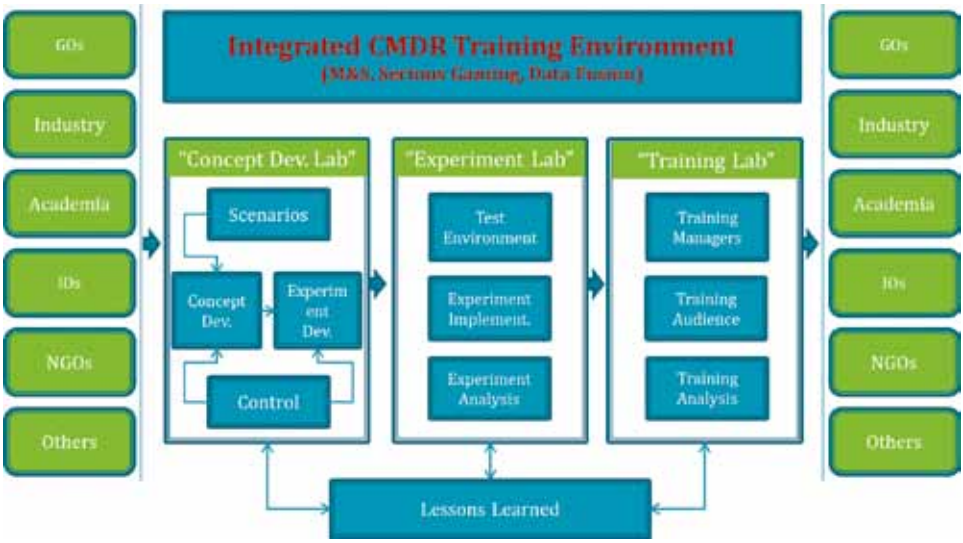

Figure 2. Integrated Environment for CMDR Training

According Walker et al. (2011)[15] there are still several barriers to realizing gaming and simulation environment as:

- Participation – availability of human participation as subject matter experts;
- Data – the quality of input data and transferring it to the correct format;
- Validation – the complex simulation environment brings difficulties in validation and verification of the simulated/gaming results;
- Behavioural representation – the dependency of the simulation performance on the sub-models;
- Computing power – depending on the architecture and organization of the simulation, considerable computing resources could be needed;
- Scepticism – simulation and gaming are still not considered seriously by most of the people;
- Culture representation – the importance to represent realistically the cultural elements of the simulation.

THE SIMULATION INTEROPERABILITY GAP

In order to create a Fully Integrated (Distributed) Training Environment for CMDR one of the main issue is the Simulation Interoperability between all the simulation tools. Achieving a high level of simulation interoperability

[15] Walker W., Giddings J., Armstrong S., Training and Learning for crises management using a virtual simulation/gaming environment., Cogn Tech Work (2011) 13: p.163-167

is the main goal of NATO Modeling and Simulation Group – 086[16], where experts from the industry, academia and government collaborate to fill in the interoperability gap.

As A. Tolk (2006)[17] says the focus of the present standards for networked simulation environments is basically on the technical, syntactic and on the semantic (with some limitations) interoperability level. To increase the quality of interoperability in all levels we need to standardize the interoperability at higher levels, involving pragmatic, dynamic and conceptual levels. The reference standards for this could be Distributed Simulation Engineering and Execution Process (DSEEP, IEEE Std 1730)[18] and Distributed Simulation Engineering and Execution Process Multi-Architecture Overlay (DMAO, IEEE Std 1730.1)[19]

During the crises the support of additional information sources providing situational awareness is very valuable and this "component" should not be rejected in the training. For the purpose of the Integrated Training Environment it requires automated information sharing and strong integration of simulation systems with other systems such as command and control (C2) systems. Currently, Simulation Interoperability Standards Organization (SISO)[20] and other organizations and NATO M&S groups (as NMSG-085)[21] are working towards creating standards for C2-Simulation interoperation.

Currently, the most of simulation tools and software are designed to operate independently. A year ago, a new paradigm for an Integrated Training Environment that combines Constructive, Virtual and Gaming systems was presented by US Army – the so called "Future Holistic Training Environment - Live Synthetic". As outlined in a report by the Army News Service[22], the plan is to create a "live synthetic" system that fuses the main areas of simulation into one whole that will allow the participants to be scattered across various centers, yet still be able to fully participate in training exercises in real time. The good news is that this kind of evolved Integrated Training Environment could support not only military staff exercises but civilians also.

INTEGRATED MANAGEMENT OF CMDR TRAINING ENVIRONMENT

Developing a complex Integrated Environment for CMDR Training is a real challenge – from organizational, technological, cultural and other aspects. Managing the complexity of the tasks for establishing the Environment and

[16] Final report of Task Group MSG-086, (http://ftp.rta.nato.int/public//PubFullText/RTO/TR/STO-TR-MSG-086-Part-I///$$TR-MSG-086-Part-I-ALL.pdf)
[17] A. Tolk et al., "Ontology Driven Interoperability – M&S Applications", Whitepaper for Interservice/Industry Training, Simulation, and Education Conference (I/ITSEC 2006).
[18] http://standards.ieee.org/findstds/standard/1730-2010.html
[19] http://standards.ieee.org/findstds/standard/1730.1-2013.html
[20] https://www.sisostds.org/
[21] https://www.cso.nato.int/ACTIVITY_META.asp?ACT=1957
[22] http://www.army.mil/article/128559/Army_training__technology_evolving/

controlling its integrated operations could be effective if best practices of the project management are applied.

Management is tasked with generating an organizational system and integrating operations for high efficiency. Management can be defined as a way for achieving goals that add the most value (Magretta J., 2003)[23]. It's about being sufficiently organized to identify the right goals and the best means for achieving them.

Integration management is an element of project management that coordinates all aspects of a project. Project integration, when properly performed, ensures that all processes in a project run smoothly (PMBOK, 2013).

Integrated management uses new and existing managerial methodologies, concepts and tools. In contemporary organizations, this approach to management is valued as a strategy to reconciling complex cross-functional challenges. Integrated practices, as opposed to unilateral, specialized practices, are proven to foster open-mindedness and flexibility in individuals and communities. Integrated management promotes a flattening of traditional organizational silos while encouraging a context-sensitive approach to understanding individuals, systems and organizations.

The Integrated Management of CMDR training (IMT) integrates all of training's environment systems and processes into one complete framework, enabling the training environment to work as a single unit with unified objectives.

The Integrated Management of crises management and disaster response training refers on the best practices and scientific arguments from the theory of project and portfolio management (Turner J. R., 1992; Scoot S., 2009; PMBOK, 2013; Turley F. PRINCE2 Kindle Edition)[24, 25, 26, 27].

The application of project management is a base for an unified, systematic, multidisciplinary approach for training management using scientific proven concepts, best practices methodology for effective planning, execution and evaluation and provides tools and methods for training environment design and capabilities development for crises management and disaster response.

Considering the training specific features and the best practices, the integrated management approach has been developed on the conceptual basis for project management. The applied methodology follows the five phases of the project management lifecycle: initiation, planning, execution,

[23] Magretta J., (2003), What management is, London: Profile Books
[24] Turner J. R., (1992) The handbook of project-based management, McGraw-Hill Book Company
[25] Scoot S., (2009) PORTFOLIO MANAGEMENT, MCGRAW-Hill Education-Europe
[26] Project Management Institute, (2013) The Standard for Portfolio Management, Third Edition, Global Standard, by Project Management Institute (Corporate Author) PMI
[27] PRINCE2 Foundation Study Guide Kindle Edition by Frank Turley

control and monitoring and finalization. The selection of adequate tools for operating in the management environment depends on the training scale, specificity and resources.

IMT provides a series of integrated modules that can be tailored and extended to meet specific customer and training needs. IMT combines five components of integration:

Figure 3. Integrated Management of CMDR Training

- People;
- Process;
- Tools;
- Methodologies;
- Results and outcomes.

The IMT is a high-level description of a consistency of activities, control and clear responsibility. The training environment includes not only hardware, software and infrastructure network, but also human participation and involvement of decision makers. IMT tries to see the training as a whole, and systematically challenge the difficulties encountered with new re-thinking processes in order to increase quality of the training management.

In addition, the portfolio project management cycle proposed, allows the creation of an excellent base of information that, with some extension and analysis, could be transformed into knowledge, facilitating the post-mortem analysis of the decisions taken and of the scenarios in a specific period.

This ability can enhance the training learning, gathering valuable lessons in order to avoid the repetition of past errors.

So it is of great importance to apply a flexible and expandable environment for an integrated management of CMDR training, which considers concepts, methods, approaches and tools and combine the different criteria in the most suitable selection of the project portfolio, involving the full participation of the decision makers and providing the users with a quick feedback impact, in certain parameters, with the consequences of the changes produced.

COMPUTER ASSISTED EXERCISE CONCEPT

Development of new training models in alignment with NATO and EC priorities and applying lessons learned from the practice contribute for strengthening the individual and team readiness for crises management.

The Computer Assisted eXercises (CAX) are one of the valuable tools for enhancing the effectiveness of trainings and achieving interoperability at lower prices and decreased risks, in comparison to field exercises (Cayirici E., Marincic D., 2009)[28]. CAX is a validated tool for testing doctrinal documents implementing the gained experience and lessons learned in past military missions. CAX are specifically applicable in situations related to crises management, due to “recreation” of similar situations in real environment is too complex, economically ineffective and sometimes infeasible.

Despite the important role of CAX for enhancing training capabilities in the integrated security sector, unified CAX management environment practically is missing. Such environment needs to form organizational system of concepts, approaches, methodologies, tools and means for effective realization of processes and its improvement.

Design, development and utilization of unified CAX environment is a multidiscipline systematic approach for CAX management and affords opportunity for planning, execution and results assessment of CAX projects in the crises management and disaster response domains. The CAX is one the most effective approach for “utilization” of the Integrated Training Environment for CMDR.

CONCLUSIONS

Although all the benefits provided by simulations and gaming in crises management and disaster response training, the intention is not the live training to be replaced by virtual and constructive ones. This kind of training will supplement the trainees in their live training. Many advantages of virtual and constructive training are currently limited by lack of full interoperability between the other simulation tools. It is

[28] Cayirici E., Marincic D., (2009) Computer Assisted Exercises and training. A Reference Guide, Wiley

expected the evolved Integrated (Distributes) Environment for CMDR Training to increase greatly the features and interoperability of the virtual training environment, which will lead to more accurate replication of the real operational environment.

The Integrated Management of the Training is a framework that helps to achieve training's goals through consistent control and transparency of its operations, process and tools. Applying it in the management of the Environment will integrate the full operations processes, optimize the time for tailoring the environment for a specific CMDR scenario and will allow the monitoring of the quality through the entire training lifecycle. The added value of the Integrated Management of Training finds expression in the benefits of implementation of project and portfolio management practices, as well in benefits from its multidisciplinary nature, to the many challenges it raises, passing through the different techniques, models and tools used to solve the multiple problems known.

Analyzing the trends in the simulation and training, it will not sound improbable to say that the Next Generation Integrated Training Environment will be fully interoperable synthetic immersive environment developed and controlled by matured project management practices.

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About the authors:

Mr. Nikolay Tomov is a Managing Director in Synergy Horizons Ltd. – Bulgarian company, provider of advanced simulation and training tools and services. Since 2010 Nikolay is a Chairman of the Management Committee at the Bulgarian Modeling and Simulation Association – BULSIM. He is also a member of the Management Board at the Cluster "Aerospace Technologies, Research and Applications (CASTRA)". His previous positions include CEO in the Center of Excellence in Operational Analyses at the Bulgarian Academy of Sciences, as well CTO in Joint Training Simulation and Analyses Center for Civil Security – BAS. Nikolay has 10 years of experience in planning and conducting CAXes for crises management and civil security. In the last years Nikolay holds different managing positions in international and local companies. In the period 2005 – 2006 he represents Bulgaria in NATO Modeling&Simulation Group – 049 and is invited participant in NATO Industrial Advisory Group – SG98. Nikolay Tomov is the Project Director of the first ever Bulgarian Computer Assisted Exercise on cyber-security for the government administration "CYBERWINTER 2011". He holds Master Degree in Physics and Astronomy and currently works on his Ph.D. study on CAX architectures and lessons learned methodology.E-mail:ntomov@synergy-horizons.com

Asst. Prof. M.Sc. Nikolova, I. PhD. is a researcher with more than 15 years of experience in the field of defense and security economics, crisis management, project management, economic analysis in the field of computer-assisted exercises, trainings, analysis and assessment of lessons learned. Irena has Ph.D. in Automated systems for information processing and management, specialized in the Project management, marketing, training and customer support. She has participated in several projects applying modelling and simulation in the area of civil protection and defense. She was a senior adviser to the Minister of Defense in the field of the implementation of project management best practices in the Ministry of Defense based on PRINCE II methodology. Irena has a number of publications in the field of financial management of research projects, economic analysis, development of the Balanced Scorecard for assessing performance, optimization, planning and developing systems for crisis management and computer-assisted exercises. Irena is a member of the Bulgarian Modeling and Simulation Association – BULSIM. E-mail: irena.nikolova@mail.space.bas.bg

REDEFINING THE ROLE OF HUMANITARIANORGANIZATIONS IN TAKING CARE OF CIVILIANS DURING EMERGENCIES

Katarina Strbac

Abstract: *Article is dedicated to improvement of work of humanitarian organizations in the emergencies. Even though, humanitarian organizations play significant role in protection of civilians, it is important to emphasize certain points which must be better. In the organization and implementation of civil emergency relief, humanitarian organizations both national and international participate alongside the maximum engagement of governmental services and institutions in every emergency today. The consequences of emergencies include human losses, environmental destruction, and the inability to provide basic human needs (water, food, and shelter), and the destruction of infrastructure, all of which endanger the survival of civilians, and especially that of the most vulnerable: children, women, and the disabled, sick, and elderly. Also based on experience which we all witnessed in previous years and unfortunately today, it is obvious that in area of humanitarian work is much place for improvement of efficiency. The circumstances that can cause emergencies have changed significantly; security challenges still exist, as well as the need for efficient civil emergency planning and relief. Within the framework of the new circumstances, crisis relief in cases of emergency and armed conflict is the most important humanitarian activity carried out by society. Good organization and efficient functioning of humanitarian organizations in an emergency situation and particularly in the case of armed conflict can be of paramount importance for the survival of civilian populations as well as for the management of the consequences of peacetime emergencies.*

Key words: *emergencies, humanitarian organizations, security challenges, emergency preparedness*

EMERGENCIES - HOW TO DEFINE?

In cases of emergency, the state authorities, the respective government institutions and bodies in charge of civil emergency relief, and non-governmental humanitarian organizations are responsible for the protection of endangered populations. They plan, organize, and conduct civil emergency relief operations. Regardless of the altered conditions of the security environment, civil emergency relief efforts are to be divided into two different categories, the consequences of which are still the same, civilian losses and suffering. Those categories are peacetime civil emergency relief and armed conflict civil emergency relief.[1]

[1] Katarina Strbac, Humanitarian organizations in the management of the civilian population in emergency situations, Military Publishing, Belgrade, 2008 year, ISBN 978-86-335-0233-7 (in Serbian)

An emergency situation is - a condition in which the risks and threats or consequences - disasters, extraordinary events and other risks to the population, the environment and property of such scope and intensity of that their occurrence or the consequences cannot be prevented or eliminated by regular operation of the competent bodies and services, which is why the mitigation and removal necessary to use special measures, forces and resources with the enhanced mode.[2]

Disaster is significant disruption of society caused by natural phenomena and / or from human activity and leading to negative consequences for the life or health of the population, property, the economy and the environment, preventing, tackling and overcoming that exceeds the capacity of service system to normal activities to protect the society.[3]

Sudden, unexpected, or impending situation that may cause injury, loss of life, damage to the property, and/or interference with the normal activities of a person or firm and which, therefore, requires immediate attention and remedial action.[4]

Sudden, unexpected risk which undermines existing processes and disrupts life conditions, social sphere and environment, and has an adverse impact on functioning of the society as a whole.

Emergency is a term describing a state. It is a managerial term, demanding decision and follow-up in terms of extra-ordinary measures.[5]

A “state of emergency” demands to “be declared” or imposed by somebody in authority, who, at a certain moment, will also lift it. Thus, it is usually defined in time and space, it requires threshold values to be recognized, and it implies rules of engagement and an exit strategy.

EMERGENCY PREPAREDNESS

In both scenarios peacetime civil emergencies and armed conflict civil emergencies, humanitarian organizations play a critical role in providing urgent civil emergency relief and aiding in the mitigation of consequences following a crisis. If we look at the any civil emergency scenario, there

[2] Law on emergency situations, Republic of Serbia, (Sl. currier RS Vol. 111/09 , 92/11 , 93/12) (in Serbian)

[3] Ad Disaster Protection Act, Republic of Bulgaria, (Updated SG. vol.102 from 19 December 2006, amend. SG. Vol.41 from 22 May 2007, amend. SG. Vol.113 from 28 December 2007, amend. SG. Vol.69 from 5 August 2008, amend. SG. Vol.102 from 28 November 2008, amend. SG. Vol.35 from 12 May 2009, amend. SG. Vol.74 from 15 September 2009, amend. SG. Vol.93 from 24 November 2009, amend. SG. Vol.61 from 6 August 2010, amend. SG. Vol.88 from 9 November 2010, amend. SG. Vol.98 from 14 December 2010, amend. SG. Vol.8 from 25 January 2011, amend. SG. Vol.39 from 20 May 2011, amend. SG. Vol.80 from 14 October 2011, amend. SG. Vol.68 from 2 August 2013, amend. SG. Vol.53 from 27 June 2014, amend. SG. Vol.14 from 20 February 2015. (in Bulgarian)

[4] http://www.businessdictionary.com/

[5] http://www.oxforddictionaries.com/definition/english/pocket

are certain situations that demand a response from humanitarian organizations. Those situations include mass civilian losses in the war zone and its vicinity, or the use of weapons of mass destruction or other forms of attack that cause the loss of lives, destruction of property, and the environment.

In order to adequately respond to such emergencies, it is necessary to conduct certain preparations. In both cases, it is necessary to implement urgent measures in order to alleviate negative consequences. The plans for deployment and rules of engagement of all the available resources must be in place in order to minimize human losses and material damages. It is of the utmost importance for a state to have at its disposal the resources necessary to earn out any type of emergency relief and, if the situation requires, to mobilize additional human and material support. Civil Protection, Civil Defense, or an institution responsible for emergency management should be the organization through which the state assists its population in cases where humanitarian relief is required. The Red Cross and other humanitarian organizations that can be part of emergency relief operations should be involved as well.

If a country is in a state of war or involved in other armed conflict, and there is no emergency management system in place, or the existing system is inadequate, the state then must mobilize all its available national resources and request assistance from the international community. As a rule, humanitarian organizations shall provide assistance to endangered populations regardless of their race, gender, age, religion, political affiliation, or any other differences. Assistance from humanitarian organizations is based on consolidated appeals launched by state institutions or from the endangered territory.

The lessons learned from major refugee crises worldwide show that the usual emergency measures, such the provision of food and water, shelter, and medical assistance are ineffective if rescue plans are not implemented in an organized manner. These situations are followed by states of humanitarian emergency; the most important step in such cases is to properly react to and meet the needs of the affected civilian population. In such extreme situations, cooperation between different humanitarian organizations is too often slow and inadequate (although there are international efforts underway to improve reaction time and cooperation in emergency situations). Consequently, it is no surprise that there is confusion on the part of humanitarian organizations when facing extreme situations.

Emergency preparedness is an action taken in anticipation of an emergency to facilitate rapid, effective and appropriate response to the situation.[6]

[6] Inter-Agency Contingency Planning Guidelines for Humanitarian Assistance, 2001

TYPES OF EMERGENCIES

Sudden-onset disasters – Both "natural" disasters (e.g. earthquakes, hurricanes, floods) and man-made or "complex" disasters (e.g. sudden conflict situations arising from varied political factors), for which there is little or no warning.[7]

Technological – fast developing- Result of industrial accidents with little warning.

Slow onset – Disasters that take a long time to produce emergency conditions, for instance natural disasters such as drought or socio-economic decline, which are normally accompanied by early warning signs.[8]

Complex political emergency – A situation with complex social, political and economic origins which involves the breakdown of state structures, the disputed legitimacy of host authorities, the abuse of human rights and possibly armed conflict, that creates humanitarian needs. The term is generally used to differentiate humanitarian needs arising from conflict and instability from those that arise from natural disaster.[9]

Permanent emergencies – Result of wide spread poverty, can be worsening due to natural disasters.

Mass migrations – Migrations are consequences above mentioned emergencies.

HUMANITARIAN ORGANIZATIONS

One of definition said that humane is a person or organization who seeks to promote human welfare.[10]

Another one said that humane, benevolent, beneficent, kind, good, considerate, compassionate, sympathetic, understanding, merciful, lenient, gentle, generous, magnanimous, public-spirited, unselfish, Philanthropic, altruistic, charitable, welfare, N. Philanthropist, altruist, benefactor, good Samaritan, social reformer are attributes for person or organization which are dealing with humanitarian work.[11]

Although the most important mission for humanitarian organizations is taking care of endangered civilians in peacetime-that is, offering help with humanitarian aid and shelter; supplying adequate amounts of quality food, water, and health care; and especially resolving people's refugee status-humanitarian organizations have to be supported by relevant institutions both within individual states and the international community. Therefore,

[7] Defined by World Food Program
[8] Defined by World Food Program
[9] Defined by ALNAP. ALNAP is a unique system-wide network dedicated to improving humanitarian performance through increased learning and accountability.
[10] http://www.oxforddictionaries.com/definition/english/pocket
[11] https://www.penguin.com.au/products/9780141018485/penguin-thesaurus

the final and overall solution of these problems requires the cooperation and coordinated activities of all participants involved in humanitarian efforts. Humanitarian organizations should play an important principle driven and creative role in these processes.

TYPE OF HUMANITARIAN ORGANIZATIONS

- **National organizations** are organization which operates within one country only, respecting international humanitarian law. Although the area of their operation is limited, it is necessary to harmonize national legislation which relates to their activities with international legislation.
- **International organizations** are permanent forms of institutionalized communication of three or more countries based on multilateral agreements, with special status and permanent bodies responsible for the process of multilateral negotiations and collective decision-making of the Member States in the relevant fields of international cooperation are taking place, as provided in the statutes and other basic documents of the organizations.

Who is founder of humanitarian organizations?

- Governmental humanitarian organizations can be national and supranational, but are obliged in their program commitments and actions to represent human interests of citizens and government by which they were formed. These organizations are generally formed as a direct response to specific cases.
- Unlike governmental humanitarian organizations, non-governmental (private) non-international and international organizations comprise of associations, institutions or individuals from one or more countries, and are established to achieve the common interest not consisting of material gain. The number of such organizations is very large. Affiliation with these organizations is sometimes concealed in order to make the efficiency of performance, and can sometimes be seen from the name of the non-governmental organization.

The most prominent humanitarian organizations

International Red Cross and Red Crescent Movement

The International Red Cross and Red Crescent Movement is the world's largest humanitarian network. The Movement is neutral and impartial, and provides protection and assistance to people affected by disasters and conflicts.

The Movement is made up of nearly 100 million members, volunteers and supporters in 189 National Societies. It has three main components:

- The International Committee of the Red Cross (ICRC)

- The International Federation of Red Cross and Red Crescent Societies (IFRC)
- 189 member Red Cross and Red Crescent Societies

The International Red Cross and Red Crescent Movement is an international humanitarian movement with approximately 97 million volunteers, members and staff worldwide which was founded to protect human life and health, to ensure respect for all human beings, and to prevent and alleviate human suffering.

The movement consists of several distinct organizations that are legally independent from each other, but are united within the movement through common basic principles, objectives, symbols, statutes and governing organizations. The movement's parts are:

The International Committee of the Red Cross (ICRC) is a private humanitarian institution founded in 1863 in Geneva, Switzerland, by Henry Dunant and Gustave Moynier. Its 25-member committee has a unique authority under international humanitarian law to protect the life and dignity of the victims of international and internal armed conflicts.

The International Federation of Red Cross and Red Crescent Societies (IFRC) were founded in 1919 and today it coordinates activities between the 188 National Red Cross and Red Crescent Societies within the Movement. On an international level, the Federation leads and organizes, in close cooperation with the National Societies, relief assistance missions responding to large-scale emergencies.

National Red Cross and Red Crescent Societies exist in nearly every country in the world. Currently 189 National Societies are recognized by the ICRC and admitted as full members of the Federation. Each entity works in its home country according to the principles of international humanitarian law and the statutes of the international Movement. Depending on their specific circumstances and capacities, National Societies can take on additional humanitarian tasks that are not directly defined by international humanitarian law or the mandates of the international Movement. In many countries, they are tightly linked to the respective national health care system by providing emergency medical services.[12]

UN specialized agencies and offices OCHA is the part of the United Nations Secretariat responsible for bringing together humanitarian actors to ensure a coherent response to emergencies. OCHA also ensures there is a framework within which each actor can contribute to the overall response effort. OCHA’s mission is to:

Mobilize and coordinate effective and principled humanitarian action in partnership with national and international actors in order to alleviate human suffering in disasters and emergencies:

[12] https://www.icrc.org/en/who-we-are/movement

- Advocate the rights of people in need.
- Promote preparedness and prevention.
- Facilitate sustainable solutions.

WFP In the first case, food aid is essential for social and humanitarian protection. It will be used in a way that is as developmental as possible, consistent with saving lives. To the extent possible, the provision of relief food aid will be coordinated with the relief assistance provided by other humanitarian organizations. In the second case, food aid is a pre-investment in human resources. In the third, it uses poor people's most abundant resource, their own labour, to create employment and income and to build the infrastructure necessary for sustained development.

WFP is well placed to play a major role in the continuum from emergency relief to development. WFP will give priority to supporting disaster prevention, preparedness and mitigation and post-disaster rehabilitation activities as part of development programmes. Conversely, emergency assistance will be used to the extent possible to serve both relief and development purposes. In both cases the overall aim is to build self-reliance.

UNICEF is the leading humanitarian and development agency working globally for the rights of every child. Child rights begin with safe shelter, nutrition, protection from disaster and conflict and traverse the life cycle: pre-natal care for healthy births, clean water and sanitation, health care and education.

UNICEF has spent over 60 years working to improve the lives of children and their families. Working with and for children through adolescence and into adulthood requires a global presence whose goal is to produce results and monitor their effects. UNICEF also lobbies and partners with leaders, thinkers and policy makers to advance the access of all children to their rights-especially the most disadvantaged.

UNDP works in more than 170 countries and territories, helping to achieve the eradication of poverty, and the reduction of inequalities and exclusion. We help countries to develop policies, leadership skills, partnering abilities, institutional capabilities and build resilience in order to sustain development results. Inclusive growth, better services, environmental sustainability, good governance, and security are fundamental to development progress. UNDP offers expertise in development thinking and practice, and in decades of experience at country level, to support countries to meet their development aspirations and to bring the voices of the world’s peoples into deliberations.

WHO began when Constitution came into force on 7 April 1948 – a date which now celebrate every year as World Health Day. WHO are now more than 7000 people working in 150 country offices, in 6 regional offices and at our headquarters in Geneva. Their primary role is to direct and coordinate

international health within the United Nations' system. These are main areas of work:

1. Health systems;
2. Promoting health through the life-course;
3. Noncommunicable diseases;
4. Communicable diseases;
5. Corporate services;
6. Preparedness, surveillance and response.

UNHCR emerged in the wake of World War II to help Europeans displaced by that conflict. Optimistically, the Office of the United Nations High Commissioner for Refugees was established on December 14, 1950 by the United Nations General Assembly with a three-year mandate to complete its work and then disband. The following year, on July 28, the United Nations Convention relating to the Status of Refugees - the legal foundation of helping refugees and the basic statute guiding UNHCR's work - was adopted. At the same time, UNHCR has been asked to use its expertise to also help many internally displaced by conflict. Less visibly, it has expanded its role in helping stateless people, a largely overlooked group numbering millions of people in danger of being denied basic rights because they do not have any citizenship.[13]

International organization for migrations (IOM) is committed to the principle that humane and orderly migration benefits migrants and society.

As the leading international organization for migration, IOM acts with its partners in the international community to:

1. Assist in meeting the growing operational challenges of migration management.
2. Advance understanding of migration issues.
3. Encourage social and economic development through migration.
4. Uphold the human dignity and well-being of migrants.[14]

International Civil Defence Organization (ICDO), created in 1972 as an intergovernmental Organization, has the mandate to promote and develop Civil defence all over the world:

a) In the management of all emergency measures, priority should be given to dealing with prevention, and preparedness measures which are of primary importance in reducing the impact of disasters and the need for relief assistance.

b) Civil defence responsibility belongs to the States and risks and consequences of disasters are not limited by national borders, and their prevention depends largely on international cooperation.[15]

[13] www.un.int
[14] www.iom.int
[15] www.icdo.org

The European Commission's Humanitarian aid and Civil Protection department (ECHO) aims to save and preserve life, prevent and alleviate human suffering and safeguard the integrity and dignity of populations affected by natural disasters and man-made crises. EU assistance, amounting to one of the world's largest, is enshrined in the Treaty of Lisbon and supported by EU citizens an as expression of European solidarity with any person or people in need.[16]

All humanitarian organizations should operate under international humanitarian law based on common principle of work for all humanitarian organizations which should be: humanity, neutrality, impartiality and independence. Human suffering must be addressed wherever it is found. The purpose of humanitarian action is to protect life and health and ensure respect for human beings. Humanitarian actors must not take sides in hostilities or engage in controversies of a political, racial, religious or ideological nature. Humanitarian action must be carried out on the basis of need alone, giving priority to the most urgent cases of distress and making no distinctions on the basis of nationality, race, gender, religious belief, class or political opinions. Humanitarian action must be autonomous from the political, economic, military or other objectives that any actor may hold with regard to areas where humanitarian action is being implemented. The role of humanitarian and some international organizations and associations is very significant for creation, observance and application of international humanitarian law. The International Red Cross and Red Crescent Movement has taken the initiative in creating the rules of the international humanitarian law, its development and advocated for its implementation since it has been established. In 1964 the international conference for Amelioration of Condition of the Wounded was held at the initiative of the International Committee, which was constantly expanded and supplemented with new humanitarian measures. International Red Cross and Red Crescent Movement have played an important role in development of international humanitarian law in preparation and adoption of the four Geneva Convections in 1949, which provide the protection to all victims of war. Also, participating in the preparations and during the conference, the International Red Cross and Red Crescent Movement has played a significant role in the adoption of two Protocols additional to the four Geneva Conventions in 1977 relating to the Protection of the Victims of the International Armed Conflicts (Protocol I) and Non-International Armed Conflicts (Protocol II). At the First World Red Cross Conference on Peace (Belgrade, 1975), International Red Cross and Red Crescent Movement sought to contribute by its actions to spreading peace and cooperation among countries, and the reduction of the likelihood of the occurrence of war. One of the main tasks of the International Red Cross and Red Crescent Movement is the observance of international humanitarian law, which attempted to ensure that armed

[16] http://ec.europa.eu/echo/

conflicts do not produce unnecessary suffering of people. In particular, the national societies have the opportunity to ensure, in cooperation with the authorities of their countries, observance and implementation of these rights. National Societies can take a number of measures that promote the application of rights, such as: questions regarding accession to treaties of international humanitarian law, the adoption of rules of application of this law, the dissemination of knowledge about international humanitarian law and promotion of policies, providing assistance in education and more. United Nations humanitarian organizations involved in humanitarian work have the significant role in the implementation of international humanitarian law, in tasks regarding systematization of humanitarian regulations, enforcement of direct humanitarian assistance and the like. Although these organizations are managed by the UN member states that are not neutral, these organizations are trying to distance themselves from the political interests of states in peace keeping action and the distribution of humanitarian aid.

IMPROVING STANDARDS FOR THE PROVISION OF AID

Various analyses show that the current level of overall humanitarian activities with respect to solving the problems of refugees and assisting displaced persons is not satisfactory. Even though there are objective problems at the general, social level, which often provide the environmental context for action, humanitarian organizations are unable to fully accomplish their essential role in assisting endangered civilians. The lessons learned from the experience of humanitarian organizations in assisting endangered civilians in civil emergencies have not been comprehensively analyzed and sufficiently taken into consideration in defining either the standards that must be met by any successful civil emergency relief operation or the criteria for evaluation of the defined solution to the civil emergency situation. To conclude, well-organized, well-prepared, and highly mobile admission centers and refugee shelters are the first and most important links in the chain of providing shelter and more generally successfully aiding endangered populations.

One of the most difficult problems in providing for endangered civilians in emergency situations is shelter. Regardless of the causes of the emergency, in the wartime or peacetime circumstances, the first activity in taking care of endangered people is evacuation from the endangered territory and the provision of shelter. Therefore, resolving the problem of shelter - the most critical and important step that is *the* basic condition in taking care of any endangered population - should not be left to chance and resolved in an arbitrary way.

Therefore it is more than necessary to standardize methods of providing shelter for endangered populations and getting housing solutions to a level

of mobile readiness, so that they can be deployed on short notice. On the basis of our research, several things would contribute to greater success on the part of humanitarian organizations in providing shelter:

- Defining the concept, content, and various methods of sheltering endangered civilian populations in emergency situations;
- Precisely defining the types of shelter that might be used (centralized, group, or joint kinds of shelter in refugee camps should be the basic types; all the other, complementary forms would be used depending on individual choice);
- Defining standards for the infrastructure, equipment, autonomy, and general conditions for normal living in refugee camps is of utmost importance.

Humanitarian organizations, as suggested earlier, should have a well-prepared global action plan that would be useful in any civil emergency. The observation that only a very small number of refugees are able to rely completely on refugee camps points to the fact that the camps did not have enough food of good quality, and were not able to prepare it. That pointed to the need to define standards and criteria for the provision of quality nutrition to the endangered civilian population. Taking into account the possible appearance of sudden emergency situations provoked by natural phenomena-or, for example, terrorist actions, which could lead to massive numbers of injuries in a very short time-humanitarian organizations should define the rules of action and operation in such cases. Under emergency circumstances, humanitarian organizations make essential contributions to the reduction and alleviation of threats to endangered populations. These organizations play a critical role in taking care of refugees or internally displaced persons that are suffering as a consequence of warfare or peacetime catastrophes; both people and the reduction of material damage depend on their efficiency. It should be noted that the internal organizational shortcomings of humanitarian organizations cannot be exclusively blamed for their overall performance, which should be viewed within the broader social, economic, political, and even military context. One of the reasons for the inefficiency of these organizations is the lack of strictly defined standards and criteria for needs assessment, provision and distribution of aid, as well as the clear definition of what constitute “minimum living standards” in a given environment.

Another reason for humanitarian organizations’ unsatisfactory performance is the cooperation and coordination of activities-or rather the lack of it-between humanitarian organizations and relevant state institutions, in particular in monitoring the situation. Due to the government’s poor assessment of the situation in the war-affected territories, there was no sustainable action plan for receiving and providing assistance to the refugees and displaced persons. More precisely, in addition to their internal organizational issues,

the unsatisfactory performance of humanitarian organizations was also the consequence of the poor assessment of the course and outcomes of the war by the relevant government institutions.

CONCLUSION

Contemporary emergency situations show a tendency toward increased suffering and victimization on the part of civilians. The accomplishment of the programmatic goals and tasks of humanitarian organizations in emergency situations in which global threats to people, material goods, and the means of survival are increasingly present must be adjusted and matched to the conditions and methods that result from contemporary challenges, risks, and threats. Related to that, from a humanitarian point of view, it is necessary to update standards and legal procedures in order to create legal bases for resolving problems in the areas of providing aid to endangered civilians and achieving greater operational efficiency in emergency situations.

What should be taken into consideration is:

- Establishment of legal and regulatory duties, rights, obligations, and procedures of supervising institutions in the areas of contemporary emergencies;
- Creation of a national security strategy in individual nations, which should define all the relevant issues in connection with humanitarian activities, as well as the position of the state with regard to humanitarian activities;
- Special legal regulations in the area of civil defence clearly laying out civil defense agencies relations and obligations toward humanitarian organizations and missions;
- Creation of laws and regulations defining the modalities of cooperation and coordination between humanitarian and other NGOs and the government in carrying out humanitarian missions;
- Creation of national strategies for the resolution of the status of refugees and displaced persons, with clearly defined responsibilities, roles, and assignments (for example, housing loans and other similar assistance);
- The potential creation of a national fund that would strictly be dedicated to the emergencies;
- To standardize the definition of civil emergency, which would contain a humanitarian component as a common foundation and framework for all sectors in the humanitarian field;
- To create a national database of resources that can be drawn on in cases of natural disaster and other emergencies, and that can help in

efforts to systematize the actions of all participants in the process of resolving civil emergencies;

- To standardize a methodology for collecting data at the national level on the basis of total economic and environmental loss calculations;
- To provide support and cooperation among the authorities that establish the database in order to decrease redundancy, support data exchange, and improve public access to that database.

The aspirations of modern society to maintain the peace and avoid war, as well as to enhance international cooperation and mutual respect and tolerance, are the starting points in improving solidarity and cooperation in humanitarian activities. Therefore, the fact that current research projects focus on the role of humanitarian organizations in protecting endangered civilians in civil emergencies is of great relevance. Presently, that role is arguably more relevant than ever. Due to contemporary challenges, risks, and threats, it is not possible to foresee all potential emergencies, and that greatly complicates the operations of institutions and individuals devoted to protecting and rescuing civilians and material and cultural property.

Despite the development of international institutions and world aspirations that have produced cooperative efforts in the field of security, international relationships still cannot be completely controlled nor considered a guarantee of peace and security. This is particularly true of civil emergencies that cannot be predicted and prevented on the basis of previous experience, and under which civilians suffer. In any case, regardless of whether these civil emergencies are caused by human or natural factors, the consequences are the suffering and agony of innocent people, and significant destruction of property. War has always been and still is the main cause and the worst form of emergency situations, with catastrophic consequences for civilians, mostly because of the advanced weapons systems that are deployed, and the frequently indiscriminate application of extremely dangerous and destructive capabilities. Therefore it is necessary to increase the efficiency of humanitarian activities and to evaluate the capabilities of humanitarian organizations and institutions according to their preparedness to carry out their functions in civil emergencies.

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About the author:

Colonel PhD Katarina Štrbac graduated National Defense Faculty 1986; Master at same faculty 2000; PhD 2006 at Belgrade University and entitled PhD of security, defense and protection. Her PhD thesis is dedicated to protection of civilians in emergencies. She has additional education such as: Leaders for 21 century in Marshal Center 2004; Managing defence in democracies in Cranfield University and Defence Academy 2006; CSDP EU seminar 2012 and certain number of courses, seminars concerning security, SSR, EU, NATO, and emergencies. From 2005 to 2008 Col PhD Štrbac was Head of Section for Strategic documents in the Department for Strategic Planning, MoD Serbia, from 2008 to 2015 was Head of Division for strategic analyses and security integrations, Institute for strategic research, Sector for Defence Policy, MoD Serbia, from 2015 and now she is Director of Directorate for European Integration and Project Management, Sector for Defence policy, MoD Serbia. She is author of three books from area of security and many articles in Serbia and abroad concerning emergencies, integrations and asymmetric threats to security. She was running several projects such as: Security and defence aspects of Serbian accession to EU, Security trends in SEE till 2020. She is member of negotiation team for chapter 31 of Serbian accession to EU. E-mail: katarina.strbac@mod.gov.rs

ANTI-TERRORISTSYSTEM FOR CONTROL, ANNOUNCEMENT AND REACTION (ASCAR)

Nikolai Mladenov, Georgi Petkov, Stiliyan Kalitzin, Nikolay Valev, Nikolay Mihaylov

Abstract: *The presented ASCAR system is based on innovative scientific and management solutions to bring a cost-effective, easily implementable, accurate new-age disaster management and prevention product. Information from the place of a terrorist act is transmitted in real time to all national services with corresponding action protocols, which allows for multi-level/stage management.*

Keywords: *Crisis and Disaster Management, Mathematical Modelling, Model Simulations, Scientific Approach, Innovations, Civil-Military Cooperation, Structures Management, PHTLS/HTLS*

INTRODUCTION

In the human history there is no such century connected with so many tragedies like ours. Together with the two world wars, a number of regional wars and armed conflicts, international terrorism, especially during the recent 30 years contribute immensely to the enrichment of the human history with terror and violence.

It is the international terrorism at present, which is the biggest threat for the peace in the democratic societies. Practically all armed conflicts, which arose in Asia, Africa, the Near and Middle East as well as on the Balkans and on the territories of the former Soviet republics were accompanied by diversion terrorist acts and the main consequences were in the form of civilian casualties.

Social inequality, national controversies, the absence of reliable rule regulation and the presence of religious activity contribute to the establishment of a considerable amount of extremist, nationalist organizations, fanatical religious sects, which all have military units and consider terrorism as the main means of combating their opponents. Terrorism has risen to the level of state policy.

After the events of 11th of September 2001 in the United States of America and the subsequent terrorist attacks in Europe, Russia and other countries, development of anti-terrorist innovations and attempts for anti-terrorist modules in the emergency, civil defence, special services, constructions and others to be introduced have begun. However, a complete system has not yet been implemented anywhere as all the ones developed thus far are

based on very expensive equipment and methodology and would hardly make their way to the open market. The system, proposed in the current paper "Anti-terrorist system for Control, Announcement and Reaction" (ASCAR) is based on qualitatively different scientific approaches that are to a great extent more effective and have a fully acceptable financial coast. Analysis of the actions special services have made during terrorist attacks in the last decade shows that such a system could reduce the number of victims up to 50%, dramatically increase the efficiency of special service reaction and prepare units for the expected conditions at the place of the terrorist incident – something they have been in the blind for until now.

ASCAR OVERVIEW

The product, proposed in the current paper ASCAR contains an architectural model[1] (Sariev & Semerdziev, 2004) of an integrated system that fulfils monitoring, announcement and management of all special and national services in case of a terrorist act in the territory of the relevant country. Through the National coordination Centre information is sent to all national departments for timely response regarding the location and the type of the terrorist act, supposed material and immaterial damages including fatalities and injuries as well as the algorithms for action by the Emergency.

The merit of this development is in the fact that in real time it gives the required data and information from the site of the terrorist act, coordinates and manages at the same time the actions of the Emergency and of all national services and authorities for any contingency.

Through a system of permanently operating cameras and detectors placed on the site, the information acquired is transmitted by a modern and fast-acting interface to the National Coordination Centre (NCC). In less than a minute this information is processed and transmitted to the users at the senior state management, emergency medical services, civil defence and fire department, the Interior Ministry and special services. To different users the received information differs in size and subject-matter in correspondence to the specificity of the user as well as the algorithm action required concerning the incident at hand. In practice the National Coordination Centre coordinates the interaction between the various

[1] Architectural model – morphological description of the морфологично описание на pragmatically distinct structure of knowledge (conceptual arising model), with which are defined: (a) constituents, building blocks of the conceptual model of the change and their interrelationships (topology); (b) functions of the components (rights and obligations) and ongoing processes in the model (data processing) (c) guiding principles and guidelines for building (synthesis, analysis) and development (reengineering) of the model over time. The architecture is presented through many perspectives (or „views"), which are interpreted in various aspects. The architectural interpretation of the social organizations leads to defining of the so called architectural descriptions, which are functional, system and technical.

national emergency services, which leads to a timely, organized and adequate response in the event of a terrorist act in the territory of the relevant country.

ASCAR was developed by leading specialist from the Military Medical Academy in Sofia together with a group of Bulgarian scientists working on a national level and in many EU countries and experts from Trace Group Hold PLC. The idea of the system and its medical part was prepared from N. Mladenov. The mathematics and the realisation of the system were developed from G. Petkov and S. Kalitzin. The management framework was prepared from N. Mihaylov and N. Valev in a close collaboration with the above mentioned authors.

OBJECTIVES AND MOTIVATION

The relevance of ASCAR is determined by the increasing necessity for new knowledge for the PHTLS/HTLS[2] process and more precisely for knowledge for the provision of medical care in trauma, received among the civilians (children and adults) after indoor terrorist explosions.

The main objective of ASCAR is to help units reengineer their reaction in case of terroristic blasts.

The significance of the system is determined by the range of its mission, which is defined as follows: “Establishing a set of necessary and sufficient conditions for further development of anti-terrorist reaction theory and practice.”

INNOVATIONS AND SCIENTIFIC VALUE BEHIND THE SYSTEM

Mathematics of the System

The primary set of scientific problems, which were solved during the development of the system, is:

1. Creation of a mathematical model for simulation of blast wave propagation in time inside closed and open spaces.
2. Synthesis of a mathematical model for simulation of the spectrum of blast injuries among civilians in a particular environment (indoors/outdoors).

Using the created models one may: Optimise the created PHTLS / HTLS medical organization, including the latest developments of the relevant methodology in order to minimize risks of victims; Analyse, evaluate, compare and select the most appropriate algorithms for behaviour in case of mass disasters caused by terrorist blasts; Forecast and recommend the necessary resource for management in such incidents; Form a set of specific algorithms to be used for future reengineering of the process;

[2] PHTLS/HTLS - prehospital trauma life support / hospital trauma life support

In order to employ the created models working in a particular situation we need to know:

- Constructive characteristics of the building;
- People's flow density at the time of the explosion;
- The power of the explosion (as TNT equivalent);
- The location of the explosion;

The following Figure 1 explains the usage of the created models, described above.

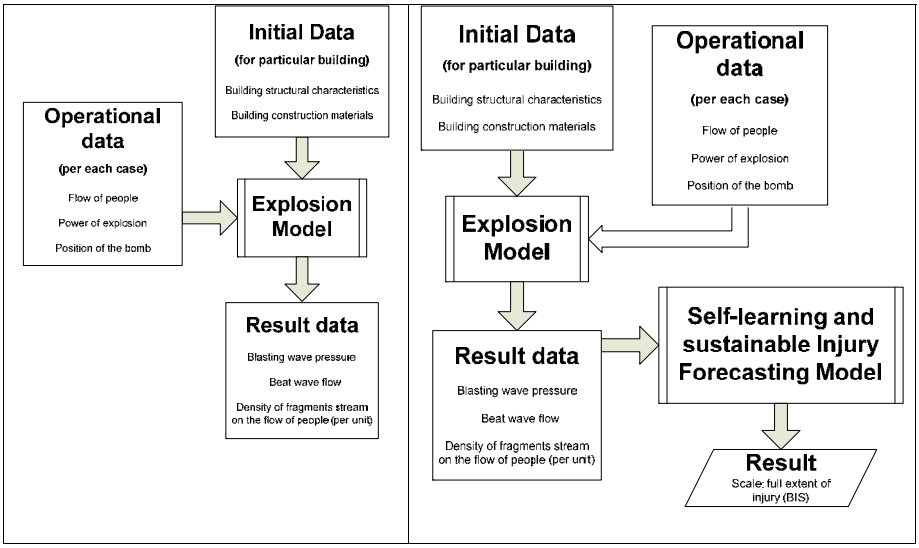

Figure 1. Usage of the solutions. The figure contains two panels. On panel one is presented the usage of the solution of problem 1. On panel two is presented the usage of the solutions of problems 1. & 2. In the schematic reflection of the explosion modelling process we have presented the model as a "black box" with corresponding inputs and outputs

On Figure 1 the model is presented as a 'black box' because:

- Thus we are focusing on the nature of the process - not on theoretical and technical details of the specific development;
- For each specific building it is necessary to develop a specific model constrains.

The secondary set of scientific problems, which were solved follows directly from Figure 1. Somehow the model should know the "Operational Data". The detection of the blast, its position and power as well as the people density problems were solved in real-time with the use of cameras and a special set of algorithms. The whole process is described[3] in (Petkov, Mladenov, &

[3] The article could be downloaded from: http://content.iospress.com/articles/integrated-computer-aided-engineering/ica00425

Kalitzin, 2013). The detection algorithm was clinically tested and validated for seizure detection in epileptic patients (Kalitzin, Petkov, Velis, Vledder, & Lopes da Silva, 2012), (Petkov et al., 2012). The modelling technique and analysis was demonstrated in (Kalitzin, Koppert, Petkov, & da Silva, 2014).

Medical and Organizational Part of the System

All possible cases were examined and medical protocols (algorithms) were prepared. A model for emergency assistance was developed, as well as PHTLS / HTLS activities' and a management model. Of course we basically tried to follow the model employed during the disaster, and we have supplemented and specified it. The following scheme shows a model of emergency assistance in disasters and mass casualty events (Figure 2).

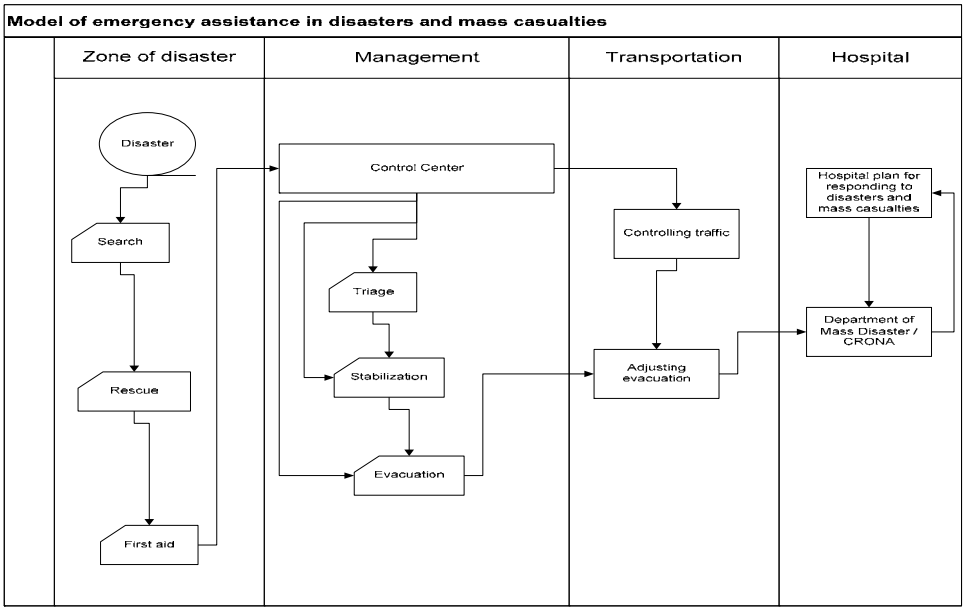

Figure 2. Model of emergency assistance in disasters and mass casualties

Modern medical techniques for injury treatment, used in the chain of PHTLS/ HTLS medical assistance have been studied, in cases of mass disasters caused by terrorist blasts and a classification of these methods was made as a result of comparative analysis of their advantages and disadvantages.

Combining mathematics and medicine we have obtained the following full process scheme:

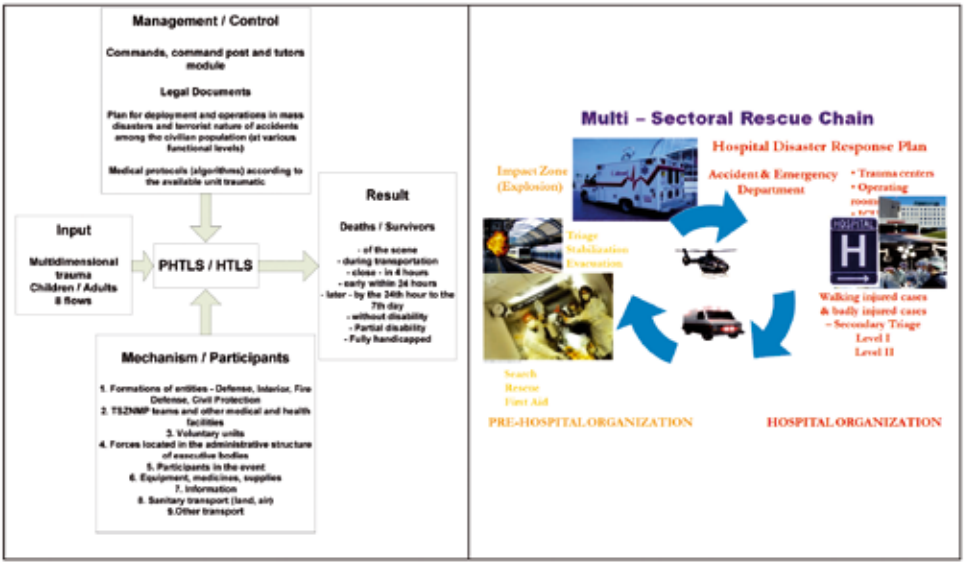

Figure 3. Contextual diagram of the model of phtls/htls activities

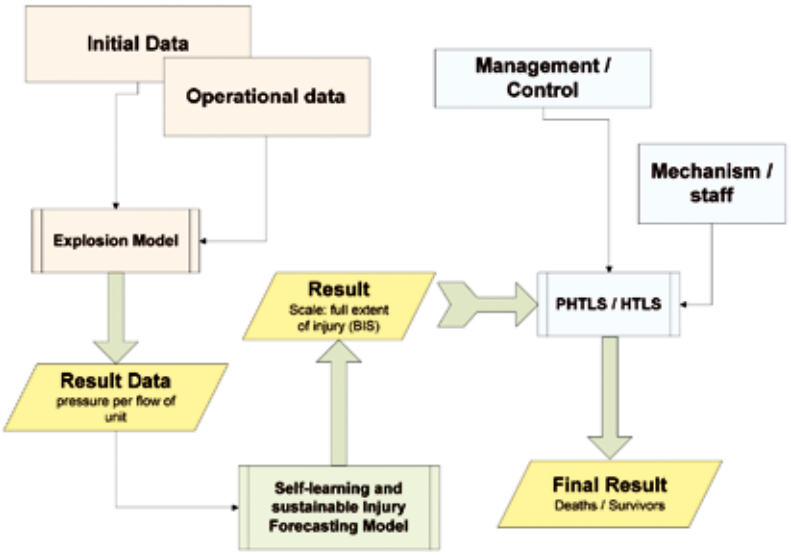

Figure 4. Full process schema

As it was mentioned before, based on the above scientific concepts and solutions more than eight years a vanguard Anti-terrorist system for Control, Announcement and Reaction (ASCAR) was being developed by

leading specialist from the Military Medical Academy in Sofia together with a group of Bulgarian scientists working on a national level and in many EU countries and some experts from Trace Group Hold PLC. The idea of the system and its medical part was developed from N. Mladenov. The mathematics and the system realisation were done from G. Petkov and S. Kalitzin. The management framework was prepared from N. Mihaylov and N. Valev in a close collaboration with the other authors.

Perspectives and Applicability

The product contains an integrated system that fulfils monitoring, announcement and management of all special and national services in case of a terrorist act in the territory of the relevant country.

Figure 5. The National Coordination Centre (NCC)

Through the National Coordination Centre (NCC) the information is sent to all national departments for timely response regarding the location and the type of the terrorist act, supposed material and immaterial damages including victims and injured as well as the algorithms for actions by the Emergency (Figure 5).

Through a system of permanently operating cameras and detectors placed on the site, the information acquired is transmitted by a modern and fast-acting interface to the National Coordination Centre (NCC). In less than a minute this information is processed and transmitted to the users the senior state management, emergency medical services, civil defence and fire department, the Interior Ministry and special services. To different users different in size and subject-matter information follows through regarding the specificity of the user as well as the algorithm of the action. In practice the National Coordination Centre coordinates the interaction between the various national emergency services, which leads to a timely, organized and adequate response in the event of a terrorist act in the territory of the relevant country.

Figure 6. System algorithms

The NCC alerts/ announces the closest hospitals and emergency centres and organizes their reaction. Teams from various hospitals and emergency centres through the respective medical protocols will make a search for, triage, stabilization (first aid) and evacuation of the injured to the hospitals, emergency rooms and trauma centres.

Figure 7. Medical protocols

Those are specific medical protocols that are subject of discussion with medical professionals. Nevertheless, I can give you a simple example on how the lack of coordination between units impeded the response to the terrorist attacks on September 11th. It turns out that the mildly injured who moved to the hospital by themselves fully occupied the nearest emergency rooms and the more severely and critically injured patients had to be transported to more distant hospitals. The lack of coordination has

also resulted in the transporting of patients to hospitals inappropriate for treatment of their types and extents of traumas. Our system allows avoiding all these inconsistent actions and organizing the emergency on site, as well as the most adequate allocation of the patients to appropriate hospitals and medical centres.

In this case the system has determined the injury zones from the centre of the terrorist attack to the periphery. Dedicated mathematical software reports the information for the people in different zones which includes also the number of victims supposed, the number of injured supposed, types and extent of the injuries, and generates action protocols for the medical teams.

The medical action protocols generated in electronic and printed form are provided in real-time (up to 1 minute after the terrorist attack) to the medical teams, which after their arrival at the site begin prioritized rescue procedures (Figure 7). Each action priority protocol respectively has a different associated colour and is put on the hands of the victims and injured. After providing first aid, the injured are evacuated to the medical centres.

In general the target of the national implementation and application of the system is:

- ✓ Coordination and management of Emergency and the actions taken by all the national services in the event of a terrorist act in places in the relevant country, where the system is installed and is being exploited.
- ✓ Preventive anti-blast/anti-terrorist architectural and building decisions when constructing or reconstructing national, municipal, departmental, business, trade, sport, educational, recreational and other facilities of public importance.
- ✓ Preventive determining the critical points most vulnerable to a terrorist attack in selected by the national services places and contribution in allocating safety routes for traffic and stay.

International target application of the system:

- ✓ In the EU – under a common recommended regulation;
- ✓ Other and any countries exhibiting interest in the system;

The system for prevention

The following figures demonstrate the current version of the software and its use for prevention of terrorist acts.

The system can also be used to simulate hypothetical incidents and predict their outcomes (Figure 8). This adds another layer of functionality - the

preventive use. In a place where the system is implemented through the software interface the damages and casualties of a hypothetical bomb of any type at a user-specified place and user-specified magnitude can be calculated.

Figure 8. Simulation of hypothetical incident

This is facilitated by the software's intuitive menu and high number of parameters, which also ensures profound and detailed output information from the hypothetical blast simulation (Figure 9).

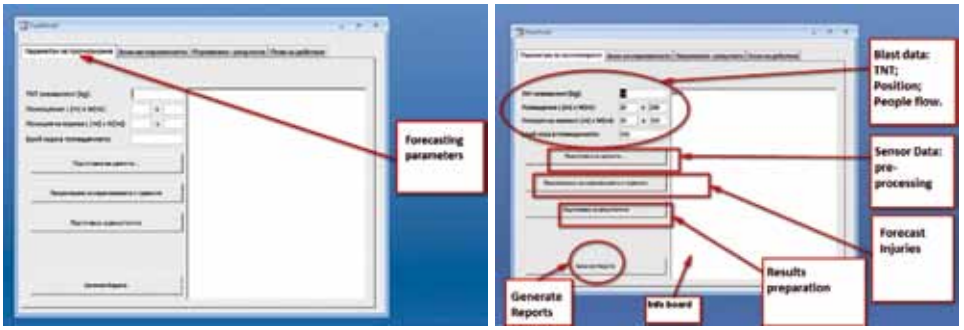

Figure 9. Output information from blast simulation

This information includes the different zones of injury with estimates for the different types of trauma depending on the distance from the blast centre (Figure 10).

That amongst other detailed simulation results will help manage an area's traffic flow – relieve places where potential damages/casualties from a terrorist attack are high, create new building and architecture decisions to make a facility more resilient to acts of terror and minimalize potential damages/casualties.

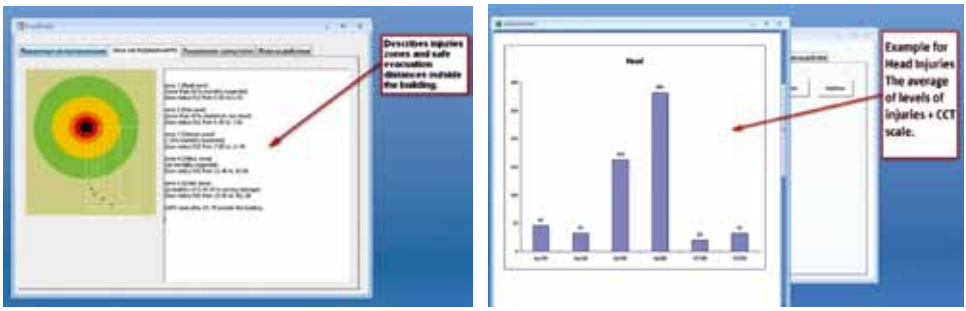

Figure 10. Detailed information for the different type of trauma

CONCLUSIONS

The presented system is a game-changer in today's world so threatened by terror. It has functionality, applicability and accuracy that cannot be rivalled by other contemporary defensive systems. Its biggest advantage is that it can easily be introduced to the open market without it being too costly or too complicated. Its biggest strength is its preventive nature which can help us monitor, manage and build a safer future.

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About the authors:

Colonel Ass. Prof. Nikolai Mladenov, MD, DSc is an associate professor at the Department of Anaesthesiology and Intensive Care at the Military Medical Academy, and National medical consultant intensive care. He has over 80 publications and specializations in Germany, Austria, and Switzerland.

Georgi Petkov, PhD is a mathematician, Research Fellow at College of Engineering, Mathematics & Physical Sciences, University of Exeter, UK, and Researcher at "Wellcome Trust Centre for Biomedical Modelling and Analysis", University of Exeter, UK. Current project: "Dynamic modelling of complex brain networks". - https://www.researchgate.net/profile/George_Petkov

Stiliyan Kalitzin, PhD is a physicist, professor in External Faculty, Image Sciences Institute, University Medical Centre Utrecht and Clinical Physicist and Principal Advisor in Medical Technology at (SEIN) Foundation Epilepsy Institute NL https://www.researchgate.net/profile/Stiliyan_Kalitzin

Dipl. Eng. Nikolay Valev is Vice Chairman of the Board of Directors of "Trace Group Hold" PLC and supervises international activities of the group. He worked more than 10 years in diplomatic missions of Republic of Bulgaria in the Persian Gulf countries among which Kuwait, Kingdom of Bahrain and Qatar.

Prof. Dr Dipl. Eng. Nikolay Mihaylov is Chairman of the Board of Directors of "Trace Group Hold" PLC and Head of Department of Road Construction in the University of Architecture, Civil Engineering and Geodesy (UACEG), Sofia, Bulgaria. He is Chairman of the Bulgarian Forum for Transport Infrastructure and member of great number national and international institutions.

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Crisis Management and Disaster Response Centre of Excellence

Address:
34A Totleben Boulevard, Shipka Hotel, floor 2
1606 Sofia, Bulgaria
Phones: 359 29224700, 359 2 9224705
Fax: 359 2 9224755

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Published in Bulgaria
ISSN 2367-766X