

## **Sector 5: Crisis - Consequence Management**

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## **3. Minimization of the harmful effect from emergency situations with the pollution of chemical and radioactive substances into the atmosphere**

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### **Abstract**

A comprehensive system for minimizing the harmful effect from natural and man-made emergency situations for the atmosphere has been developed. This system is based on the fact that the management decision support subsystem has a complex of mathematical tools for forecasting changes in the state of the pollution zone and implementing the process of influencing it and the decision implementation subsystem has effective methods of precipitation from the atmosphere of dangerous gaseous and dispersed substances by artificial rainscavenging. The pollution zone is monitored with the establishment of its dimensions, geographical coordinates, the height of the lower and upper limits, the chemical composition and the quantitative composition of pollutants, the dispersion of the polluting aerosol and meteorological parameters in the pollution zone. Space satellites, manned and unmanned aerial vehicles, ground mobile and stationary vehicles can be used as means of monitoring. The prepared monitoring results are sent to the management decision-making support system, where, based on the received data, using a developed set of calculation tools, precipitation intensity is predicted, which determines the

rate of pollution removal from the lower atmosphere. The head of the pollution elimination process decides on the methods of impact and delivery of droplet formation activators to the impact zone. There is a possibility of integrating new and promising both chemical and physical methods of artificial influence on atmospheric processes into the developed method of minimizing the harmful effect from an emergency situation for atmospheric air.

**Keywords:** Pollution zone; man-made emergency situations; artificial rainscavenging

### Biography - Maksym Kustov



Col. Dr. Kustov Maksym, Head of Scientific Department on Problem of Civil Protection and Technogenic-Environmental Safety, National University of Civil Protection of Ukraine. In 2006 graduated from the National University of Civil Protection of Ukraine and received a master's degree in fire safety. He worked as a fire brigade commander. In 2010, he received a Ph.D. in fire safety for the development of new fire extinguishing compositions. From 2010 to 2021, he was involved in the organization and training of command personnel for the CBRN teams. In 2019, he received the degree of Doctor of Technical Sciences, specializing in Civil Protection for the development of a system for the deposition of hazardous chemical and radioactive substances from the atmosphere. At the moment, he is the scientific supervisor of several scientific programs and international grants, which are carried out at the university as well as Ph.D. students. The main scientific interests are the liquidation of major CBRN accidents, crisis management, training of rescuers.

## 8. Remote Detection of CBRNE Threats with use of Unmanned Vehicles

**Bartłomiej Jankiewicz**<sup>1\*</sup>, Bartosz Bartosewicz,<sup>1</sup> Bogusław Budner,<sup>1</sup> Miron Kaliszewski,<sup>1</sup> Krzysztof Kopczyński,<sup>1</sup> Malwina Liszewska,<sup>1</sup> Jarosław Młyńczak,<sup>1</sup> Maksymilian Włodarski,<sup>1</sup> Martin Sabo,<sup>2,3</sup> Mateusz Szala<sup>4</sup>

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### Abstract

Military personnel and first responders widely use unmanned Ground and Aerial Vehicles (UGV and UAV) in various missions. The main advantages of using UGV and UAV include reduced risk for personnel, small size, lower cost of acquisition and operation than existing manned platforms, and flexible and reconfigurable payloads, which can be adjusted to specific mission types. The use of UGV and UAV in missions focusing on detecting CBRNE threats is a subject of many activities worldwide, including EU and EDA R&D projects. In this presentation, we report the results of our studies and tests carried out within national and international projects on developing CBE sensors for unmanned platforms. The remote detection and identification of IEDs components during route clearance operations with the use of unmanned vehicles were one of the main goals of the project "CONFIDENT - Confirmation, Identification and Airborne Early Warning of (CBRN) IEDs" carried out in the frame of EDA Programme on IED Detection (IEDDET). The IOE MUT team's focus in the project was the development of chemical and explosives detection systems allowing for the remote detection of explosives used for preparing IEDs and potential chemical payloads. The bioaerosol point detection system for UGV was developed in the project "SFORA - Mobile laboratory for environmental sampling and identification of biological threats" funded by the National R&D Centre. Finally, the potential of CBRNE detection on unmanned platforms is further explored within the project "Strengthening CBRNE safety and security – Coordination and Standardization" implemented under the Norwegian Financial Mechanism.

**Acknowledgements:** The project "Strengthening CBRNE safety and security – Coordination and Standardization" is financed by the Programme "Home Affairs" implemented under the Norwegian Financial Mechanism for 2014-2021.

**Keywords:** CBRNE Detection; Remote Detection; Unmanned Vehicles

## Biography – Bartłomiej Jankiewicz



Bartłomiej Jankiewicz is a scientist at the Institute of Optoelectronics at the Military University of Technology (MUT) in Warsaw, Poland. He gained his MSc in chemistry, specialty CBRN protection, in 2004 (MUT) and PhD in chemistry in 2008 (Purdue University). His research focuses on fabrication of plasmonic nanostructures for various applications including CBE-sensing by using surface enhanced spectroscopies. He is and was involved in various national and international projects and activities related to DIM of CBE agents. He represented Poland as a CapTech National Coordinator (CNC) and CapTech Governmental Expert in Capability and Technology group of European Defence Agency focusing on CBRNE Protection & Human Factor topics.

## 22. Thermal burden of PPE and Non-invasive monitoring of core body temperature for responders

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### Abstract

Thermal insulation properties of PPEs were evaluated on thermal manikin and microclimate conditions in PPE and physiology status were evaluated by the volunteers with purposely elevated core body temperature (CBT) for +38, 5 °C. Volunteers were monitored with a rectal probe and with a new non-invasive sensor; including skin temperature and heart rate wearing different PPE (air permeable, perspiration, isolation, ventilation) with define work-load and elevated environmental temperature (+5 to +35°C) and humidity.

It was concluded, that for a long-term and repeated use of PPE by the first receivers and responders the improvement of microclimate conditions inside of PPE is essential for sustainable protection of their health. In parallel also monitoring of the health status of end-users wearing PPE (heart rate and CBT) with non-invasive means will be beneficial.

### Biography - Dr. Pavel Castulik



Graduate in chemical technology engineering with specialisation on protection and decontamination against WMD/CBRNE from University of Defence in Czech Republic. He holds PhD in NBC defence & protection with specialization on decontamination. He has over 50 years working in the CBRNE community and has had multiple CBRNE commands and senior R&D positions, including at OPCW and EU CBRN CoE Initiative. He is lecturing at academic institutions, JCBRN CoE, Police School, and NATO School in Oberammergau and for courses abroad. He regularly contributes to national and international conferences. Currently he is R&D Manager of DEKONTA, JSC responsible for R&D projects for physical protection means, decontamination technologies and training of responders. He is co-inventor of the patents on PPEs.

## 30. Impact of Chemical and Biological Agent Decontamination on Traces Recovery

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### Abstract

Ensuring safety and minimizing risks takes precedence in the event of biological or chemical incidents. Decontamination processes are employed to neutralise or remove toxic substances from individuals, objects, and locations. From a forensic standpoint, it is essential to understand the effects of these decontamination procedures on the relevant traces in order to determine the most effective strategies for recovering these traces and securing complete and reliable evidence.

This study explores the impact of 16 different decontaminants targeting biological and chemical agents on fingerprints, DNA, and digital media. In terms of fingerprints, paper and glass substrates were investigated.

Various techniques were employed to develop fingermarks and identify the most compatible combination of decontaminant and revelation technique.

Cyanoacrylate, small particle reagent, ninhydrin, indanedionezinc, and physical developer were among the fingerprint enhancement techniques tested.

In the case of DNA, the quantity and quality of DNA profiles collected from traces of blood and saliva were assessed, and degradation analysed. Additionally, the data integrity of digital media was assessed after exposure to decontaminants, using SHA1 and MD5 hashes.

By examining these aspects, valuable insights can be gained regarding the effects of decontamination on various types of evidence, enabling the formulation of recommendations on compatible decontamination strategies with traces recovery.

**Keywords:** Fingermarks; DNA; Digital Media; Toxic substances; Decontamination

### **Biography – Dr. Isabelle Radgen-Morvant**



Isabelle Radgen-Morvant is a graduate assistant and a PhD student at the school of criminal justice at the University of Lausanne. She holds a BSc degree in forensic science and a MSc degree in forensic science with emphasis on chemical criminalistics both from the University of Lausanne. She concluded her master in August 2018 after an exchange semester at the University of Technology Sydney (UTS). Her current research is in the field of CBRN forensic and focuses on the possibility to handle forensic relevant items and traces contaminated with chemical and biological agents.

## **26. Missing National CBRNe Strategy and National CBRNe Action Plan**

Ivan Mašek, **Prof. Otakar Jiří Mika**, Jozef Sabol

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### **Abstract**

Current CBRNe security threats are also very important in the Czech Republic. It must be emphasized that the Czech Republic adequately deals with these serious security issues, it has prepared not only the necessary documentation, but also the forces and resources to quickly and reliably overcome such adverse events.

This paper provides expert discussion on the lack of a National Strategy and National Action Plan for protection against chemical, biological, radiological, nuclear and explosive (CBRNe) threats aimed at protecting the population and general preparedness for CBRNe issues. Necessary improvement of the integrated chain of preventive, protective, rescue, mitigation, reaction, and recovery measures under the conditions of the Czech Republic. Academic reflections, professional discussions dealing with the above-mentioned areas in the Czech Republic with a presentation of important technical areas focused on CBRNe terrorism.

Conclusions and recommendations on how to improve the current situation, including proposals for basic methodological procedures of first responders. Basic information about a professional project at the Police Academy of the Czech Republic in Prague, which dealt with issues of CBRN preparedness and protection, with a focus on new progressive modern detection methods. Among other things, the output of the aforementioned security project was two certified methodologies. All three listed authors of this professional contribution worked on this project.

**Keywords:** CBRNe Threats, CBRNe Preparedness, CBRNe Protection, Integrated Rescue System, Typical Activities of Components of the Integrated Rescue System

### **Biography – Prof. Otakar Mika**



Academic and associate professor (lecturer) with 33 years of university experience at several state and private universities in the Czech Republic. From October 1, 2020, he started to work at the Department of Crisis Management, Faculty of Security Management, Police Academy of the Czech Republic in Prague (Associate Professor), full time job. From July 1, 2021, he started to work at the Faculty of Health and Social Sciences, a part of South Bohemia University in České Budějovice (associate professor), part time job. Now, he works at both schools, meaning at the Academy and the University. During the period 2019-2022 he worked as a Project

Manager for the national scientific and research CBRNe grant at the Police Academy of the Czech Republic in Prague.

### **34. COUNTERACT: European agile network for medical countermeasures against CBRN treats**

**Yannick Saintigny**<sup>1\*</sup>, Nathalie Dereuddre-Boquet<sup>1</sup>, Roger Le Grand<sup>1</sup>

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#### **Abstract**

The CEA coordinates the European project COUNTERACT which aims to reinforce the European Union's preparedness for nuclear, radiological, biological and chemical (NRBC) threats.

COUNTERACT is co-funded for 49 million euros by the European Defence Fund and aims to set up pre-clinical and clinical studies on the safety and efficiency of medical countermeasures targeting NRBC-type threats. COUNTERACT is also cofunded by France, Germany and Norway with dedicated funds.

The project will cover a four-year period and started in December 2022. This project brings together key European players: 27 partners from 11 EU Member states (five universities; three technological research bodies, including the CEA; ten public research institutes; nine SME and start-ups).

COUNTERACT will:

Develop and mature four types of medical countermeasures, for which two will aim to achieve the stage of application for authorization to place the products on the market by the European medicines Agency;

Promote EU independence in the development and production of countermeasures against NRBC threats by establishing a European network of sustainable industries, research laboratories, research bodies and clinical centers, aiming to achieve a flexible and efficient umbrella structure for the health sector targeting defense;

Draw up a road map for the development of the future generation of medical countermeasures against current and future threats, simplify the process for obtaining market authorizations, guarantee independent EU supply chains and prepare storage and deployment strategies.

**Keywords:** Medical CounterMeasures, European Defense Fund

Type of contribution: ORAL or POSTER

#### **Biography - Yannick Saintigny**



Dr Yannick Saintigny, PhD is EU Affairs Officer at the François Jacob Institute of Biology of CEA ([www.cea.fr](http://www.cea.fr)). Dr Saintigny is a radiation biologist now specialized on EU funding of CBRN medical countermeasure research and development projects. Dr Saintigny is deputy coordinator of RESILIENCE FPA and COUNTERACT projects (European Defence Fund). Dr Saintigny is member of the Education and Training working group, Multidisciplinary European Low Dose Initiative (MELODI). ORCID: 0000-0002-3839-3562

### **10. Georgia's experience in national coordination and building resilience towards emerging CBRN threats**

**Ms. Mari Lursmanashvili**

*State Security Service of Georgia, Head of CBRN Regional Secretariat for SEEE Region*

#### **Abstract**

This presentation reviews the author's long experience in building national and regional coordination and partnerships across governments and CBRN national teams, and discusses the accomplishments and issues encountered in this process. The presenter will showcase Georgia's experience in developing national CBRN Threat Reduction Strategies and action plans as well as country's effort in building national resilience towards emerging CBRN threats (incl. consequences of Covid-19 and the war in Ukraine).

The author will highlight the work of the Georgian government's Interagency Coordinating Council for Combating CBRN Threats that is regarded as a successful model for interagency coordination in Eastern Europe and beyond.

She will also present examples on what comes next after developing national CBRN security plans and share valuable lessons for other countries on implementation tools.

The presentation will also review the recent work of regional stakeholders in the Balkans and Black Sea region on CBRN Regional Action Plan and common priorities, and how these countries work together through joint projects and initiatives to achieve goals outlined for CBRN safety and security.

The author will also discuss success stories and regional cooperation of Black Sea countries on strengthening capabilities of intelligence officers to counter RN smuggling.

**Keywords:** Georgia, CBRN, National Action Plans

### **Biography - Ms. Mari Lursmanashvili**



Ms. Lursmanashvili has a 25+ year career, most of which she worked in WMD non-proliferation and security-related industries. Currently, she represents the State Security Service of Georgia (SSSG) and is a primary focal point for the government of Georgia's Interagency Coordinating Council for Combating CBRN Threats, leading the interagency coordination of CBRN programs and supporting bi-lateral and multi-lateral cooperations for Georgia. In 2019 Ms. Lursmanashvili was nominated by the government of Georgia as a Head of Regional Secretariat of the South East and Eastern Europe (SEEE) for the

European Union's CBRN Risk Mitigation Centres of Excellence (CoE) initiative. In this capacity, she supports planning and implementation of regional initiatives, projects and exercises among 10 partner countries of the SEEE region and is a well-recognized professional across regional and international CBRN community. She is also a lead on CBRN Initiative under the Substantial NATO-Georgia Package.

Before joining the SSSG, for almost a decade, Ms. Lursmanashvili worked on the US DTRA-funded Cooperative Threat Reduction (CTR) programs in Georgia and other former Soviet Union countries. In 2014 she supported the organization of the CSCM Congress in Tbilisi, Georgia, when the agreement on transition of the Collaborative Biological Engagement Program (CBEP) was signed between Georgia and the US.

## **56. Radiation-Enhanced Nuclear Missiles (Tactical Nuclear Weapons)**

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### **Abstract**

The preferred type of contribution: ORAL Keyword: nuclear missiles, tactical nuclear weapons, enhanced radiation, protection, defense. Recently, we have witnessed significant changes in the geopolitical situation in the world caused by a series of conflicts that are being waged, among other things, on European soil, and the frequent mention of nuclear weapons. This necessarily results in changes in the understanding of war, both in its conduct and in the development of defense in a strategic and tactical sense. With the development of science and technology, the introduction of new types of nuclear weapons that differ in construction, mode of action, power and launch method, the world's nuclear potential is becoming more complex and diverse. In the current development of nuclear weapons, two directions can be distinguished, one of which goes in the direction of producing missiles for operational-strategic purposes and developing and perfecting the means for their transfer and launch, and the other represents the research, development and improvement of tactical nuclear weapons of small and very low power on the fission and fusion principle of energy release. In principle, a tactical nuclear weapon is considered to be a weapon with a power of less than 10 kT, which has a pronounced radiation effect, and the shock and thermal effects are reduced to a minimum, so we also call them weapons with increased radiation (radiation weapons), in which the dominant effect of the destruction of the living force comes from the initial pulse of neutron radiation. All previous agreements (SALT and START) limit the amount of strategic nuclear weapons, but do not limit the research and development of tactical nuclear weapons. It is necessary to monitor the development of these weapons, the development and improvement of ways, methods and principles of protection. The potential application of these weapons can be diverse, which imposes the obligation to establish an anti-neutron defense, covering all structures of society as well as considering the problems of military skill and defense in general.

### **Biography - Dr. sc. Valentina Ključarić**

Valentina Ključarić is an employee of the Center for Defense and Strategic Studies "Janko Bobetko" at the Croatian Defense Academy "Dr. Franjo Tuđman" in Zagreb. She is the Head of the NBK laboratory. She is a

lecturer, supervisor and associate at several courses at Military Studies at CDA. The areas of research work she is focused on include the field of chemistry - organic synthetic chemistry, as well as the development of methods of detection and identification of precursors and toxic industrial substances that are important in the field of CBRN defense. She is the manager of several national projects from the functional field of CBRN and one international project. She is a member of the National Commission for the Implementation of the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction.