NATO EOD CENTRE OF EXCELLENCE
I. OLBRACHTA 5, 911 01 TRENCIN, SLOVAK REPUBLIC
tel.: (0421) 960 333 533; fax: (0421) 960 333 504; e-mail: eodws24@eodcoe.org
www.eodcoe.org

Trencin, 17 December 2024

Ref.No: I-EOD COE – 400 /2024

TO: All participants of the 10th EOD Workshop 2024

SUBJECT: **Report from the 10th Explosive Ordnance Disposal Workshop 2024, Samorin, Slovakia, 05-06 November 2024**

REFERENCES: A. The 10th Explosive Ordnance Disposal Workshop 2024 - Calling Letter, no: I-EOD COE – 20–11/2024 dated on 11 June 2024

B. The 10th Explosive Ordnance Disposal Workshop 2024 – Save the Date Letter, no: I-EOD COE – 342/2023 dated on 11 December 2024

A. General information

Event name:	The 10th Explosive Ordnance Disposal Workshop 2024
Organizer:	NATO Explosive Ordnance Disposal Centre of Excellence (EOD COE)
OPR:	MAJ Adrian PETER
POCs:	Mr Juraj HALAMA Mr Marian LACHYTA
Block leaders:	Block 1: Mr Juraj HALAMA Block 2: COL Zsolt SZYLAGYI Block 3: 1LT David SLATKOVSKY Block 4: Mr Vojtech FUCEK
Participation:	• 111 in-person participants: 25 Speakers, 62 external, 16 EOD COE, 8 admin • 21 nations (BEL, CHE, CZE, DEU, DNK, ESP, FRA, GBR, GRC, HUN, ISR, ITA, LVA, NZL, POL, ROU, SGP, SRB, SVK, UKR, USA)
Date:	05-06 November 2024
Place:	X-Bionic Hotel, Samorin, Slovakia
Classification:	NATO UNCLASSIFIED Releasable to IPC and specific invitees

B. Workshop Topics

Workshop Name: "Consistent EOD Capability Development"

Block Topics:

Block 1: "EOD as a Helper Around the Globe"
Block 2: "EOD Training of Today and for Tomorrow"
Block 3: "Technological Helix and Synergies of Innovations"
Block 4: "AI and EOD"

Block 1: "EOD as a Helper Around the Globe"

Aim & Objectives:

1. The aim of this block is to provide the audience with some observations, lessons, experiences, insights, threats and challenges that were and will have to be addressed within the EOD capability developments in the future.
2. To share lessons and experience from cases/incidents from homeland or international environment (kind of case studies)
3. To share views on upcoming threats and challenges to be considered within the EOD Capability developments (consisting of national approaches in EOD capability building, including training activities, seeing capability development as a multidisciplinary integrated task, …)

Presentations and Speakers

- B 1.1 UXO (Aerial Bomb) Disposal in Urban Terrain, MAJ Sebastian WONG (SGP-A)
- B 1.2 A Revolution in Military Learning – Lessons Learned Processes, Prof. Tom DYSON (GBR) & Dr. John TULL (GBR)
- B 1.3 Humanitarian Demining – Case Study, Vuk Radovic (SRB)
- B 1.4 Humanitarian Demining – New approach to old problems, Mr Krzysztof PLUSA (POL)
- B 1.5 Hamas and Palestinian Weapons, Mr Michael CARDASH (ISR)
- B 1.6 EOD in front of the Court, Mr Massimo PEDEMONTE (ITA)

Observations

- When conducting unexploded explosive ordnance (UXO) aerial bomb disposal in an urban environment, where EOD tasks span multiple phases – from securing the area to on-site construction – effective coordination among the various stakeholders involved is essential.

- A transformative approach to military learning highlighted the importance of a structured yet adaptable Lessons Learned (LL) process, stressing the need for flexibility, conducive learning environments, and clear visibility of LL progress to inspire and engage military personnel at all levels.

- Two in-depth case studies highlighted a distinctive set of activities related to underwater demining, introducing an innovative approach to equipping humanitarian demining teams. This approach proposed a comprehensive, self-contained toolkit designed to empower teams to effectively address recurring field challenges without being hindered by technical limitations.

- The shifting dynamics of modern warfare, showcasing the innovative weaponry and engineering tactics employed by Hamas and Palestinians in recent conflicts. They also

highlighted the adaptive strategies developed by both sides through the use of captured technologies during the Ukraine-Russia conflict.

- A forensic case study showcased a real-life IED event investigation presented before the Court of Appeal, providing a comprehensive overview of the evidence-gathering process and subsequent trial proceedings. This case underscored the importance of precision and expertise in EOD work for legal contexts, highlighting that such tasks must be conducted by highly trained EOD professionals with specialized forensic skills at the earliest stage of investigation.

- This segment provided the audience with critical observations, lessons, experiences, procedures, insights, and forward-looking perspectives on future threats and challenges, all vital for advancing within the EOD domain. The integration of emerging technologies and innovative weaponry highlighted the ever-changing nature of modern conflict, underscoring not only the potential opportunities but also the risks associated with technological advancements.

Block 2: "EOD Training of Today and for Tomorrow"

Aim & Objectives:

1. The aim of this block is to share current national approaches to the EOD operator training with identified gaps/ deficiencies and indicated possible/ desired future improvements in national EOD operator training processes.
2. To introduce a particular/ national approach to meet NATO EOD-related E&T standards.

Presentations and Speakers

- B 2.1 EOD COE Education & Training, LTC Alexander HUGYAR (SVK-A)
- B 2.2 New Concept of Education of EOD Specialists, LT Andrej HALAJ (SVK-A)
- B 2.3 Romanian EOD Training Concept, MAJ Ovidiu SAMOILA (ROU-A)
- B 2.4 C-IED Enablers, MSG Judit FAZEKAS (HUN-A)
- B 2.5 EOD Training System in Polish Armed Forces, MAJ Dariusz SYCZ (POL-A)
- B 2.6 Airport Screeners Training Experience – Dealing with Human Factors, LTC Francois VILLARD (CHE-A)
- B 2.7 Pioneering EOD Training with Wearable Tech, Mr Dylan MCKAY (NZL)

Observations

- The EOD COE, working with various nations, is leading a new approach to EOD training. Understanding the need to keep up with changing threats, they provide customized, practical education for EOD operators, officers, and first responders. By combining hands-on exercises, modern learning tools, and realistic training scenarios, this method fills existing gaps and ensures that EOD personnel are well-prepared to handle the challenges of demanding operational situations.

- Nations are adopting innovative EOD training concepts informed by real-world conflict experiences, with some exploring inter-European collaboration to exchange knowledge and enhance techniques.

- In particular, advanced training strategies for airport security operators now include 3D-colored object recognition to enhance inspection precision and overall safety.

- Additionally, wearable capnography technology is being employed to monitor stress levels, optimizing human performance during EOD training activities. The integration of improved and advanced training in conjunction with wearable technology is transforming future EOD operators into highly resilient and adaptive professionals. Realistic, data-driven training and physiological monitoring tools enhance skill optimization, may allow operators to handle complex, high-stress environments with greater control.

- Moreover, C-IED enablers are expanding the scope of practical applications within the EOD community of interest, further strengthening operational capabilities.

- The presentations and discussions highlighted how different countries currently train their EOD operators, pointing out weaknesses and suggesting ways to improve and develop these programs in the future. These efforts show a shared commitment to making EOD specialists better prepared, more adaptable, and highly effective.

- By using realistic scenario-based training, advanced technologies, and wearable equipment, the EOD community is giving its operators the skills, flexibility, and accuracy they need to handle future explosive threats safely and professionally.

Block 3: "Technological Helix and Synergies of Innovations"

Aim & Objectives:

1. The block presenters will inform the audience about particular efforts/projects related to technological solutions and inventions during training, combat missions and post-conflict activities. The topic is not limited to EOD and other aspects like IEDD, demining, reconnaissance and explosive threat detection.
2. To provide the audience with technological solutions to demining, EOD/IEDD missions and training.

Presentations and Speakers

- B 3.1 The Modern Battlefield is Connected, SG MAJ Frederic BOUDIER (FRA)
- B 3.2 Vulcans Forge, Mr Jeff DAVID (USA)
- B 3.3 Ground Area Reconnaissance and Assurance, MAJ Mark FETTERS (GBR-A)
- B 3.4 Czech Developments in Autonomous Ground Robotic System for EOD, MAJ Dana KRISTALOVA (CZE)
- B 3.5 Remote Detection of IEDs Combining Ground and Arial Robots, Mr Lorenzo PRAT (ESP)
- B 3.6 Wider Global Capacity for EOD, Mr Rick RICKARD (SWE)

Observations

- A key focus was on creating practical, affordable tools to help EOD operators in the field. The U.S. Army's Vulcan's Forge project highlighted tools designed by bomb technicians to make their work easier in tough conditions, focusing on keeping costs low while maintaining effectiveness. Another highlight was NATO's planned JOED NET platform, which aims to be a shared space where nations can exchange these innovations and strengthen their ability to work together effectively.

- Another important topic was the use of robotics and Artificial Intelligence (AI) in EOD, especially for detecting and disarming threats from a safe distance. Examples

included the University of Brno's unmanned ground vehicle (UGV), which uses special sensors to handle EOD tasks, and the DIEDRO Project, which showed drones (UAVs) equipped with AI-powered cameras for real-time planning, monitoring, and identifying threats. These technologies are designed to keep people safer by minimizing their exposure to danger while making missions more accurate and effective.

- Augmented Reality (AR) is becoming an important tool for training EOD operators. It provides lifelike, hands-on simulations that help them learn better and be better prepared for real-life situations. AR is easy to use, affordable, and portable, making it a great option for training EOD teams worldwide, even in remote or unstable areas where traditional training methods might not be possible.

- Looking to the future, there is a great chance to improve data-sharing systems and encourage international teamwork, making it easier for allied forces to quickly adopt new and effective ideas. Keeping up with investments in practical tools, robotics, and flexible training methods will be crucial as EOD teams deal with more complicated threats. These improvements will help build a stronger, more connected, and better-prepared EOD community ready to handle future challenges.

- This session introduced various technological advancements in EOD, showcasing tools and solutions developed for training, field missions, and post-conflict situations. Key themes included cost-effective, operator-friendly equipment, robotics, AI, and advanced training aids. The presentations highlighted a growing focus on using integrated and flexible technologies to improve safety, efficiency, and collaboration across EOD teams, preparing them to handle evolving threats effectively.

Block 4: "AI and EOD"

Aim & Objectives:

1. The block presenters will inform the audience about particular efforts/projects related to AI and its applicability within the EOD area. The selected AI capabilities and challenges will be highlighted and subsequently, the participants will be encouraged to provide their views on the issue via a distributed survey.
2. To provide the audience with some insights on AI and its applicability in the EOD area.
3. To obtain some feedback from the participants on AI applicability within the EOD area.

Presentations and Speakers

- B 4.1 EOD Posture in Large Scale Combat Operations, Mrs Cynthia GARCEAU (USA)
- B 4.2 Role of EODTIC, Mr. Eric MCVEY (GBR)
- B 4.3 Application Possibilities of AI in Technical Support of EOD Tasks, LT Balazs ADAM (HUN-A)
- B 4.4 AI and ML for EOD, Humanitarian Demining and Clearance, Prof. John FRUCCI (USA)

Observations

- AI is increasingly recognized as a transformative asset in EOD tasks, with the potential to enhance decision-making capabilities, from identifying explosive devices

to providing task support for military and police forces.

- The EOD community of interest is encouraged to accelerate the integration of AI and machine learning (ML) into EOD practices, promising improvements in operational efficiency, safety, and precision through real-time threat analysis, predictive insights, and advanced decision support tools.

- Active participation in the development of AI-driven tools is recommended for the EOD COI to facilitate the automation of complex data processing, address emerging explosive threats, and support the use of autonomous systems to minimize human risk in hazardous scenarios.

- AI, combined with advanced sensors, 3D modelling, and augmented reality interfaces, is expected to provide EOD operators with enhanced situational awareness and confidence, establishing a new benchmark for safety and mission success.

- To ensure AI is equipped with relevant and high-quality EOD data, the community of interest is encouraged to strengthen collaborative efforts in information sharing.

- The briefings underscored significant advancements within the EOD community, emphasizing progress in technical information management and the growing influence of AI and ML in EOD missions.

C. Overall summary

During the 10th EOD Workshop 2024, significant advancements and innovations within the EOD field were highlighted, emphasising the integration of new technologies, international collaboration, and enhanced training approaches to address evolving threats. Key topics included:

- Technological Innovations: Robotics, AI, augmented reality, and wearable technologies are transforming EOD operations and training. These tools enhance safety, efficiency, and precision by enabling remote threat detection, real-time mission planning, and immersive training simulations. Projects like Vulcan's Forge, NATO's JOED NET, and the DIEDRO Project showcased practical and cost-effective solutions for improving operational capabilities.
- Advanced Training: Realistic, scenario-based training supported by cutting-edge technologies and data-driven tools is equipping EOD operators with the skills to handle complex threats. Efforts also focus on improving airport security through 3D object recognition and monitoring stress levels using wearable capnography.
- AI and Data Integration: AI and ML are increasingly recognized as transformative for EOD, offering real-time threat analysis, predictive insights, and decision-making support. Combined with 3D modelling and AR interfaces, these technologies improve situational awareness and reduce risks. Collaborative data-sharing systems are essential to fully leverage these capabilities.
- Operational Adaptation: Presentations emphasized the need for structured but adaptable lessons learned processes and effective coordination among stakeholders, especially during multi-phase operations like urban UXO disposal. Forensic case studies demonstrated the importance of precision and expertise in evidence collection and legal contexts.

- Future Outlook: Strengthening international collaboration, improving data-sharing platforms, and investing in flexible tools and training methods are critical to building a resilient, well-prepared EOD community capable of addressing future challenges.

These advancements collectively aim to enhance readiness, efficiency, and safety, ensuring the EOD community remains at the forefront of addressing the complexities of modern warfare and explosive threats.

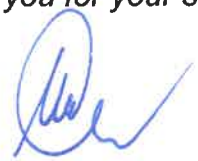
D. EOD COE Director´s Conclusion

The feedback from workshop participants reinforces my confidence that we are on the right path. Over the years, we've not only improved the quality of the events but also introduced innovative solutions to address future challenges. The application of advanced technologies in everyday tasks continues to amaze and inspire.

This workshop highlighted the importance of bringing experts together to share insights, test knowledge, and build on collective experience, strengthening the EOD community's cohesion and capabilities.

I extend my gratitude to all contributors, especially the COE Project Team, for their dedication. This report and workshop aim to be practical resources for your work, helping you address the future challenges effectively.

The workshop's discussions and analyses confirmed that EOD development is a continuous, dynamic process requiring focus and adaptability. By fostering collaboration and knowledge-sharing, we ensure the EOD community remains ready for emerging threats. Thank you for your support, and let's continue to work together toward our shared goals!



Frantisek MIHALOVIC
Colonel, SVK Army
Director

The processor: MAJ Adrian PETER
Approved by: COL Frantisek MIHALOVIC
Number of pages: 8
Value symbol and storing period: S-3
Number of printouts: 1
Printout No. 1: for the Registry